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DEPARTMENT OF THE NAVY
FY 1995 BUDGET ESTIMATES

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APR 29 1994
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JUSTIFICATION OF ESTIMATES
FEBRUARY 1994

RESEARCH, DEVELOPMENT, TEST & EVALUATION, NAVY
DESCRIPTIVE SUMMARIES (U)

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NAVY RDT&E
PROGRAM ELEMENT DESCRIPTIVE SUMMARIES

INTRODUCTION AND EXPLANATION OF CONTENTS

1. General. This document has been prepared to provide information on the Department of the Navy Research, Development, Test and Evaluation Program to Congressional committees during the FY 1995 hearings. The Descriptive Summaries provide narrative information on all non-special access Navy RDT&E Program Elements and Projects.

2. Comparison of Fiscal Data. A direct comparison of data in the Program Element Descriptive Summaries dated April 1993 will reveal significant differences. Many of the differences are attributable to the following factors:

a. FY 1994 reductions and increases as a result of Congressional action on the appropriation.

b. FY 1993 funding changes including Navy RDT&E Reprogramming Actions and rescissions approved by Congress.

3. Navy Research and Development Categories. In conjunction with the HASC Report 103-200, the content of all Navy research and development category 6.3 through 6.6 PEs included in this submission has been reviewed and all PEs have been properly categorized.

4. Realignment of RDT&E Appropriation Budget Activities (BA). DoD has realigned the RDT&E budget activity structure to reflect research categories on a one for one basis. This realignment will make the budget structure consistent with this DoD acquisition milestone sequence. The new budget activity structure is as follows:

BUDGET ACTIVITY #	TITLE	RESEARCH CATEGORY
1	Basic Research	6.1
2	Exploratory Development	6.2
3	Advanced Development	6.3
4	Demonstration and Validation (DEM/VAL)	6.4
5	Engineering and Manufacturing Development (EMD)	6.5
6	RDT&E Management Support	6.6
7	Operational Systems Development	6.7

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5. New Starts.

PROGRAM ELEMENT	PROJECT	PROJECT TITLE
0204413N	S2231	MCAC Weapons Development
0601572N		Navy Dual Use Technology Program
0602572N		Navy Dual Use Technology Program
0603382N	K0324	Adv Combat Sys Technology
0603451N	X2055	National Imagery Support
0603512N	W2231	Future CV R&D
0603572N	R2240	Navy Dual Use Technology Program
0603712N	R2206	Environmental Adv Technology
0603795N	S2156	Naval Surface Fire Support
0603800N	D2232	Joint Advanced Strike Technology Program
0604270N	C1961	Mobile Elec Warfare Spt Sys (MEWSS)
0604761N	R0809	E/O Sensor Dev
0605152N	S2233	Naval Surface Warfare Studies

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

7. Table of Contents. The Table of Contents is presented in two different formats - Alphabetically and in R-1 Line Item Order.

8. Highly Classified Programs. The following PEs are funded in FY 1995, however, due to classification are not provided in this document:

PROGRAM ELEMENT	TITLE
0301327N	Tech Reconn & Surv
0304111N	Special Activities
0603525N	PILOT FISH
0603536N	RETRACT JUNIPER
0603576N	CHALK EAGLE
0603734N	CHALK CORAL
0603746N	RETRACT MAPLE
0603748N	LINK PLUMERIA
0603751N	RETRACT ELM
0603755N	Ship Self Defense (project LINK IRON only)
0603787N	Special Processes

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0604261N	ACOUSTIC SEARCH SENSORS	96	1041
0603382N	ADVANCED COMBAT SYSTEM TECHNOLOGY	36	539
0603709N	ADVANCED MARINE BIOLOGICAL SYSTEM	67	811
0603570N	ADVANCED NUCLEAR POWER SYSTEMS	53	683
0603504N	ADVANCED SUBMARINE COMBAT SYSTEMS DEVELOPMENT	39	571
0603561N	ADVANCED SUBMARINE SYSTEM DEVELOPMENT	49	643
0603573N	ADVANCED SURFACE MACHINERY SYSTEMS	54	699
0603792N	ADVANCED TECHNOLOGY TRANSITION	29	905
0603270N	ADVANCED ELECTRONIC WARFARE TECHNOLOGY	19	531
0604307N	AEGIS COMBAT SYSTEM ENGINEERING	101	1095
0604504N	AIR CONTROL	107	1173
0603217N	AIR SYSTEMS AND WEAPONS ADVANCED TECHNOLOGY	17	485
0604373N	AIRBORNE MINE COUNTERMEASURES	105	1135
0602122N	AIRCRAFT TECHNOLOGY	6	355
0604264N	AIRCREW SYSTEMS DEVELOPMENT	98	1061
0604218N	AIR/OCEAN EQUIPMENT ENGINEERING	92	971
0603207N	AIR/OCEAN TACTICAL APPLICATION	31	441
0604603N	AIR-TO-SURFACE MUNITIONS	120	1273
0204413N	AMPHIBIOUS TACTICAL SUPPORT UNITS	170	103
0207163N	AMRAAM	185	289
0604212N	ASW & OTHER HELO DEVELOPMENTS	88	931
0603254N	ANTI-SUBMARINE WARFARE SYSTEMS DEVELOPMENT	34	503
0604214N	AV-8B AIRCRAFT (ENGINEERING)	89	953
0205633N	AVIATION IMPROVEMENTS	175	173
0603216N	AVIATION SURVIVABILITY	33	471

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0605896N	BASE OPERATIONS R&D	158	1551
0604721N	BATTLE GROUP PASSIVE HORIZON EXTENSION SYSTEM	131	1325
0603794N	C3 ADVANCED TECHNOLOGY	30	911
0603512N	CARRIER SYSTEMS DEVELOPMENT	41	587
0605154N	CENTER FOR NAVAL ANALYSIS	142	1445
0604518N	COMBAT INFORMATION CENTER CONVERSION	111	1199
0603582N	COMBAT SYSTEM INTEGRATION	56	707
0603785N	COMBAT SYSTEMS OCEANOGRAPHIC PERFORMANCE ASSESSMENT (CSOPA)	84	895
0602232N	COMMAND, CONTROL & COMMUNICATIONS TECHNOLOGY	8	369
0204571N	CONSOLIDATED TRAINING SYSTEMS DEVELOPMENT	171	113
0603609N	CONVENTIONAL MUNITIONS	59	709
0305160N	DEFENSE METEOROLOGICAL SATELLITE PROGRAM	191	321
0601103N	DEFENSE RESEARCH SCIENCES	2	331
0604784N	DISTRIBUTED SURVEILLANCE SYSTEMS	137	1415
0204152N	E-2 SQUADRONS	166	49
0604270N	ELECTRONIC WARFARE DEVELOPMENT	99	1067
0602270N	ELECTRONIC WARFARE TECHNOLOGY	11	397
0604507N	ENHANCED MODULAR SIGNAL PROCESSOR	108	1183
0603712N	ENVIRONMENTAL QUALITY AND LOGISTICS ADVANCED TECHNOLOGY	26	817
0603721N	ENVIRONMENTAL PROTECTION	70	831
0205667N	F-14 UPGRADE	177	191
0204136N	F/A-18 SQUADRONS	165	33
0603725N	FACILITIES IMPROVEMENT	72	851
0204163N	FLEET COMMUNICATIONS	167	55
0605155N	FLEET TACTICAL DEV & EVAL PROG	143	1451

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0603795N	GUN WEAPONS SYSTEMS TECHNOLOGY	86	919
0303140N	INFORMATION SYSTEMS SECURITY PLAN	187	311
0601152N	IN-HOUSE INDEPENDENT LAB RESEARCH	1	327
0204311N	INTEGRATED SURVEILLANCE SYSTEM	169	89
0604761N	INTELLIGENCE ENGINEERING	134	1389
0603800N	JOINT ADVANCED STRIKE TECHNOLOGY (JAST) PROGRAM	87	927
0604618N	JOINT DIRECT ATTACK MUNITION	123	1293
0603654N	JOINT SERVICE EXPLOSIVE ORDNANCE DISPOSAL DEVELOPMENT	65	775
0604654N	JOINT SERVICE EXPLOSIVE ORDNANCE DISPOSAL DEVELOPMENT	124	1299
0604727N	JOINT STANDOFF WEAPON SYSTEMS	132	1337
0604610N	LIGHTWEIGHT TORPEDO DEVELOPMENT	121	1285
0604759N	MAJOR T&E INVESTMENT	140	1383
0605853N	MANAGEMENT, TECHNICAL & INTERNATIONAL SUPPORT	146	1457
0603707N	MANPOWER, PERSONNEL, & TRAINING ADVANCED TECHNOLOGY DEVELOPMENT	25	793
0604703N	MANPOWER, PERSONNEL, TRAINING, SIMULATION & HUMAN FACTORS	126	1301
0708011N	MANUFACTURING TECHNOLOGY	193	1553
0605871M	MARINE CORP TACTICAL EXPLOITATION OF NATIONAL CAPABILITIES	155	1537
0603640M	MARINE CORPS ADVANCED TECHNOLOGY DEMONSTRATION (ATD)	23	751
0603611M	MARINE CORPS ASSAULT VEHICLES	61	721
0206624M	MARINE CORPS COMBAT SERVICES SUPPORT	181	237
0604719M	MARINE CORPS COMMAND/CONTROL/COMMUNICATIONS SYSTEMS	130	1315
0206626M	MARINE CORPS COMMAND/CONTROL/COMMUNICATIONS SYSTEMS	183	257
0206313M	MARINE CORPS COMMUNICATIONS SYSTEMS (OPERATIONAL SYSTEMS PRODUCT IMPROVE)	179	203
0603635M	MARINE CORPS GROUND COMBAT/SUPPORT SYSTEM	64	737

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0206625M	MARINE CORPS INTELLIGENCE/ELECTRONICS WARFARE SYSTEMS	182	245
0602131M	MARINE COPPS LANDING FORCE TECHNOLOGY	7	363
0603612M	MARINE CORPS MINE COUNTERMEASURES	62	731
0604612M	MARINE CORPS MINE COUNTERMEASURES (ENGINEERING)	122	1289
0605873M	MARINE CORPS PROGRAM WIDE SUPPORT	157	1541
0602234N	MATERIALS, ELECTRONICS & COMPUTER TECHNOLOGY	10	385
0602315N	MINE COUNTERMEASURES MINING & SPECIAL WARFARE TECHNOLOGY	13	417
0603706N	MEDICAL DEVELOPMENT (ADVANCED)	24	781
0604771N	MEDICAL DEVELOPMENTS	135	1391
0604601N	MINE DEVELOPMENT	118	1269
0205632N	MK 48 ADCAP	174	165
0604301N	MK-92 FIRE CONTROL SYSTEM (FCS) UPGRADE	100	1089
0604777N	NAVIGATION/ID SYSTEM	136	1393
0603572N	NAVY DUAL USE TECHNOLOGY PROGRAM	22	695
0601572N	NAVY DUAL USE TECHNOLOGY PROGRAM	3	337
0602572N	NAVY DUAL-USE TECHNOLOGY PROGRAM	16	439
0603724N	NAVY ENERGY PROGRAM	71	845
0604710N	NAVY ENERGY PROGRAM (ENG)	128	1311
0205658N	NAVY SCIENCE ASSISTANCE PROGRAM	176	189
0605866N	NAVY SPACE & ELECTRONIC WARFARE SUPPORT	153	1525
0102427N	NAVY SPACE SURVEILLANCE SYSTEM	163	31
0101402N	NAVY STRATEGIC COMMUNICATIONS	162	23
0604574N	NAVY TACTICAL COMPUTER RESOURCES	117	1259
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0602435N	OCEANOGRAPHIC & ATMOSPHERIC TECHNOLOGY	15	431
0603713N	OCEAN ENGINEERING DEVELOPMENT	69	825
0205675N	OPERATIONAL NUCLEAR POWER SYSTEMS	178	197
0605865N	OPERATIONAL TEST AND EVALUATION CAPABILITY	152	1523
0603238N	PRECISION STRIKE AIR DEFENSE TECHNOLOGY DEMONSTRATION	18	497
0604221N	P-3 MODERNIZATION PROGRAM	93	979
0603542N	RADIOLOGICAL CONTROL	47	625
0605862N	RDT&E,N INSTRUMENTATION MODERNIZATION	149	1491
0605861N	RDT&E,N SCIENCE AND TECHNOLOGY MANAGEMENT	148	1481
0605863N	RDT&E,N SHIP AND AIRCRAFT SUPPORT	150	1501
0602233N	READINESS, TRAINING & ENVIRONMENTAL QUALITY TECH	9	377
0604217N	S-3 WEAPON SYSTEM IMPROVEMENT (WSIP)	91	967
0303109N	SATELLITE COMMUNICATIONS	186	295
0603555N	SEA CONTROL AND LITTORAL WARFARE TECHNOLOGY DEMONSTRATION	21	637
0605867N	SEW SURVEILLANCE SPT	154	1531
0603782N	SHALLOW WATER MCM DEMONSTRATION	28	893
0603514N	SHIP COMBAT SURVIVABILITY	43	609
0603563N	SHIP CONCEPT ADVANCED DESIGN	51	665
0604567N	SHIP CONTRACT DESIGN/LIVE FIRE T&E	116	1239
0603564N	SHIP PRELIMINARY DESIGN & FEASIBILITY STUDIES	52	671
0603508N	SHIP PROPULSION SYSTEM	20	583
0604755N	SHIP SELF DEFENSE	133	1345
0603755N	SHIP SELF DEFENSE	82	750

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0603513N	SHIPBOARD SYSTEMS COMPONENT DEVELOPMENT	42	597
0604707N	SPACE ELECTRONIC WARFARE ARCHITECT/ENGINEERING SUPPORT	127	1303
0101224N	SSBN SECURITY & SURVIVABILITY PROGRAM	160	11
0604561N	SSN-21 DEVELOPMENT	114	1225
0604366N	STANDARD MISSILE IMPROVEMENTS	103	1117
0604215N	STANDARDS DEVELOPMENT	90	959
0101221N	STRATEGIC SUBMARINE & WEAPONS SYSTEM SUPPORT	159	1
0605856N	STRATEGIC TECHNICAL SUPPORT	147	1473
0605152N	STUDIES AND ANALYSIS SUPPORT, NAVY	141	1427
0101226N	SUB ACOUSTIC WARFARE DEVELOPMENT	161	17
0604504N	SUBMARINE COMBAT SYSTEM	112	1205
0604503N	SUBMARINE SYSTEM EQUIPMENT DEVELOPMENT	106	1149
0604562N	SUBMARINE TACTICAL WARFARE SYSTEM	115	1231
0603562N	SUBMARINE TACTICAL WARFARE SYSTEMS	50	657
0602323N	SUBMARINE TECHNOLOGY	14	425
0603502N	SURFACE AND SHALLOW WATER MINE COUNTERMEASURES	38	547
0603553N	SURFACE ANTI-SUBMARINE WARFARE	48	633
0205620N	SURFACE ASW COMBAT SYSTEM INTEGRATION	173	153
0602121N	SURFACE SHIP TECHNOLOGY	5	349
0603506N	SURFACE SHIP TORPEDO DEFENSE	40	575
0602111N	SURFACE/AEROSPACE SURV. & WEAPONS TECHNOLOGY	4	339
0207161N	TACTICAL AIR INTERCEPT	184	285
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0205604N	TACTICAL DATA LINKS	172	131
0603451N	TACTICAL SPACE OPERATIONS	37	541
0604258N	TARGET SYSTEMS DEVELOPMENT	139	1031
0605804N	TECHNICAL INFORMATION SERVICES	145	1455
0605864N	TEST AND EVALUATION SUPPORT	151	1511
0604256N	THREAT SIMULATOR DEVELOPMENT	138	1017
0204229N	TOMAHAWK & THEATER MISSION PLANNING CENTER (TMPC)	168	77
0603208N	TRAINING SYSTEM AIRCRAFT	32	459
0604312N	TRI-SERVICE STANDOFF ATTACK MISSILE	102	1111
0602314N	UNDERSEA SURVEILLANCE & WEAPONS TECHNOLOGY	12	405
0603747N	UNDERSEA WARFARE ADVANCED TECHNOLOGY	27	853
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0602111N	SURFACE/AEROSPACE SURV. & WEAPONS TECHNOLOGY	4	339
0602121N	SURFACE SHIP TECHNOLOGY	5	349
0602122N	AIRCRAFT TECHNOLOGY	6	355
0602131M	MARINE CORPS LANDING FORCE TECHNOLOGY	7	363
0602232N	COMMAND, CONTROL & COMMUNICATIONS TECHNOLOGY	8	369
0602233N	READINESS, TRAINING & ENVIRONMENTAL QUALITY TECH	9	377
0602234N	MATERIALS, ELECTRONICS & COMPUTER TECHNOLOGY	10	385
0602270N	ELECTRONIC WARFARE TECHNOLOGY	11	397
0602314N	UNDERSEA SURVEILLANCE & WEAPONS TECHNOLOGY	12	405
0602315N	MINE COUNTERMEASURES, MINING & SPECIAL WARFARE TECHNOLOGY	13	417
0602323N	SUBMARINE TECHNOLOGY	14	425
0602435N	OCEANOGRAPHIC & ATMOSPHERIC TECHNOLOGY	15	431
0602572N	NAVY DUAL-USE TECHNOLOGY PROGRAM	16	439
0603217N	AIR SYSTEMS AND WEAPONS ADVANCED TECHNOLOGY	17	485
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0603270N	ADVANCED ELECTRONIC WARFARE TECHNOLOGY	19	531
0603508N	SHIP PROPULSION SYSTEM	20	583
0603555N	SEA CONTROL AND LITTORAL WARFARE TECHNOLOGY DEMONSTRATION	21	637
0603572N	NAVY DUAL USE TECHNOLOGY PROGRAM	22	695
0603640M	MARINE CORPS ADVANCED TECHNOLOGY TRANSITION DEMONSTRATION	23	751
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0603712N	GENERIC LOGISTICS ADVANCED TECHNOLOGY DEVELOPMENT	26	817
0603747N	UNDERSEA WARFARE ADVANCED TECHNOLOGY	27	853
0603782N	SHALLOW WATER MCM DEMOS	28	893
0603792N	ADVANCED TECHNOLOGY DEMONSTRATIONS	29	905
0603794N	C3 ADVANCED TECHNOLOGY	30	911
0603207N	AIR/OCEAN TACTICAL APPLICATION	31	441
0603208N	TRAINING SYSTEM AIRCRAFT	32	459
0603216N	AVIATION SURVIVABILITY	33	471
0603254N	ANTI-SUBMARINE WARFARE SYSTEMS DEVELOPMENT	34	503
0603261N	TACTICAL AIRBORNE RECONNAISSANCE	35	519
0603382N	ADVANCED COMBAT SYSTEM TECHNOLOGY	36	539
0603451N	TACTICAL SPACE OPERATIONS	37	541
0603502N	SURFACE AND SHALLOW WATER MINE COUNTERMEASURES	38	547
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0603506N	SURFACE SHIP TORPEDO DEFENSE	40	575
0603512N	CARRIER SYSTEMS DEVELOPMENT	41	587
0603513N	SHIPBOARD SYSTEMS COMPONENT DEVELOPMENT	42	597
0603514N	SHIP COMBAT SURVIVABILITY	43	609
0603528N	NON-ACOUSTIC ANTI-SUBMARINE WARFARE	45	623
0603542N	RADIOLOGICAL CONTROL	47	625
0603553N	SURFACE ANTI-SUBMARINE WARFARE	48	633
0603561N	ADVANCED SUBMARINE SYSTEM DEVELOPMENT	49	643
0603562N	SUBMARINE TACTICAL WARFARE SYSTEMS	50	657
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0603573N	ADVANCED SURFACE MACHINERY SYSTEMS	54	699
0603582N	COMBAT SYSTEM INTEGRATION	56	707
0603609N	CONVENTIONAL MUNITIONS	59	709
0603611M	MARINE CORPS ASSAULT VEHICLES	61	721
0603612M	MARINE CORPS MINE COUNTERMEASURES	62	731
0603635M	MARINE CORPS GROUND COMBAT/SUPPORT SYSTEM	64	737
0603640M	MARINE CORPS ADVANCED TECHNOLOGY DEMONSTRATION (ATD)	23	751
0603654N	JOINT SERVICE EXPLOSIVE ORDNANCE DISPOSAL DEVELOPMENT	65	775
0603706N	MEDICAL DEVELOPMENT (ADVANCED)	24	781
0603707N	MANPOWER, PERSONNEL, & TRAINING ADVANCED TECHNOLOGY DEVELOPMENT	25	793
0603709N	ADVANCED MARINE BIOLOGICAL SYSTEM	67	811
0603711N	FLEET TACTICAL DEVELOPMENT & EVALUATION PROGRAM	68	813
0603712N	ENVIRONMENTAL QUALITY AND LOGISTICS ADVANCED TECHNOLOGY	26	817
0603713N	OCEAN ENGINEERING DEVELOPMENT	69	825
0603721N	ENVIRONMENTAL PROTECTION	70	831
0603724N	NAVY ENERGY PROGRAM	71	845
0603725N	FACILITIES IMPROVEMENT	72	851
0603755N	SHIP SELF DEFENSE	82	750
0603763N	WARFARE SYSTEMS ARCHITECTURE & ENGINEERING	83	891
0603782N	SHALLOW WATER MCM DEMOSTRATION	28	893
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0604301N	MK-92 FIRE CONTROL SYSTEM (FCS) UPGRADE	100	1089
0604307N	AEGIS COMBAT SYSTEM ENGINEERING	101	1095
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0604366N	STANDARD MISSILE IMPROVEMENTS	103	1117
0604372N	NEW THREAT UPGRADE	104	1129
0604373N	AIRBORNE MINE COUNTERMEASURES	105	1135
0604503N	SUBMARINE SYSTEM EQUIPMENT DEVELOPMENT	106	1149
0604504N	AIR CONTROL	107	1173
0604507N	ENHANCED MODULAR SIGNAL PROCESSOR	108	1183
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0604567N	SHIP CONTRACT DESIGN/LIVE FIRE T&E	116	1239
0604574N	NAVY TACTICAL COMPUTER RESOURCES	117	1259
0604601N	MINE DEVELOPMENT	118	1269
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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101221N
PROGRAM ELEMENT TITLE: Strategic Submarine and Weapons System Support
PUDGET ACTIVITY: 7

Date: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
J0951 TRIDENT II	46,533	24,900	45,588	42,209	43,768	46,504	50,480	CONT.	CONT.
S0004 TRIDENT Submarine System	23,471	3,509	6,773	7,887	9,269	12,239	21,346	CONT.	CONT.
J0091 FBM Systems	4,862	2,105	-0-	7,378	6,563	6,679	6,931	CONT.	CONT.
TOTAL	74,866	30,522	52,361	57,464	59,600	64,422	78,757		

B. (U) BRIEF DESCRIPTION OF ELEMENT: The TRIDENT II (D5) Submarine Launched Ballistic Missile (SLBM) provides the U.S. a weapon of greater accuracy and payload capability as compared to the TRIDENT I (C4) system. TRIDENT II enhances U.S. strategic deterrence by providing a survivable sea-based system capable of engaging the full spectrum of potential targets with fewer submarines. This PE supports continued evaluation of the system's long range performance and capabilities and investigations into new technologies to mitigate the program impact due to component obsolescence and a rapidly decreasing manufacturing support base. Efforts also continue to support integration of the NAVSTAR Global Positioning System (GPS) capability into the TRIDENT I (C4) weapon system, support of the Navigation Test Ship and investigation of potential opportunities for technology insertion to solve obsolescence problems in the ship installed TRIDENT I (C4) Fleet Ballistic Missile Weapon System. Additionally, effort continues for investigation, identification and resolution of systems design and material problems associated with the Weapon System interface with the TRIDENT submarine baseline.

(U) The TRIDENT Submarine System program develops and integrates command, control and communication improvements needed to maintain TRIDENT submarine operational capability through the life cycle of this vital strategic asset. The program conducts efforts needed to maintain strategic connectivity, ensure platform invulnerability, and reduce life cycle costs through obsolete equipment replacement and commonality. The program consists of four major components: (1) CNO mandated 688 Class SSN and TRIDENT Class SSBN commonality initiative comprised of CCS MK2 Mod 3 Combat System and AN/BOQ-5E(V)4 Sonar (together termed QE2), (2) External Communication Upgrades, (3) TRIDENT Command and Control System (CCS) Engineering and Integration (E&I), and (4) TRIDENT OCS Improvements.

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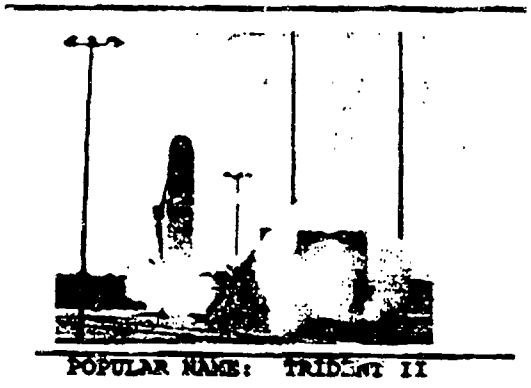
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101221N
PROGRAM ELEMENT TITLE: Strategic Submarine and Weapons System Support

BUDGET ACTIVITY: 7
PROJECT NUMBER: J0951

Date: 7 February 1994

PROJECT TITLE: TRIDENT II



POPULAR NAME: TRIDENT II

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101221N
PROGRAM ELEMENT TITLE: Strategic Submarine and Weapons System Support

BUDGET ACTIVITY: 7
PROJECT NUMBER: J0951

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
MILESTONES								
ENGINEERING MILESTONES								
T&E MILESTONES								
CONTRACT MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL PROGRAM (TO COMPLETE)
MAJOR CONTRACT	33,004	14,543	36,348	33,658	34,905	37,087	40,258	CONT.
SUPPORT CONTRACT	0	0	0	0	0	0	0	N/A
IN-HOUSE SUPPORT	13,529	10,365	9,240	8,551	8,863	9,417	10,222	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	N/A
TOTAL	46,533	24,908	45,588	42,209	43,768	46,504	50,480	CONT.

B. BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The TRIDENT II (D5) Submarine Launched Ballistic Missile (SLBM) provides the U.S. a weapon of greater accuracy and payload capability as compared to the TRIDENT I (C4) system. TRIDENT II enhances U.S. strategic deterrence by providing a survivable sea-based system capable of engaging the full spectrum of potential targets with fewer submarines. This project supports continued evaluation of the system's long range performance and capabilities and investigations into new technologies to mitigate the program impact due to component obsolescence and a rapidly decreasing manufacturing support base.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101221N
PROGRAM ELEMENT TITLE: Strategic Submarine and Weapons System Support

BUDGET ACTIVITY: 7
PROJECT NUMBER: J0951

Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,300) Initiated Fail Safe and Risk Reduction (FARR) initiative. Investigated options to increase control of SLBM system by requiring offboard information prior to launch.
- (U) ($916) Continued to investigate, identify and resolve system design and material problems associated with the weapon interface with the TRIDENT submarine baseline.
- (U) ($200) Completed long term component aging failure analysis impacts.
- (U) ($8,000) Effort continued to support Phase Two development of the SLBM Retargeting System (SRS)
- (U) ($7,800) Commenced full scale engineering development of portable flight test instrumentation vans.
- (U) ($2,800) Effort continued to support development of the GSS program. Prototype software were developed, implemented and tested onboard the Navigation Test Ship.
- (U) ($15,000) The Congressionally mandated propellant characterization study continued. This year's study continued experimental impact testing and analytical modeling and small scale material characterization of propellant properties and sensitivities.
- (U) ($417) Payments from closed accounts.
- (U) ($2,500) TRIDENT Systems investigations into analyzing alternative mechanizations within the weapons system to enhance safety or use control features continued.
- (U) ($5,700) The Integrated Shipboard Subsystems (ISS) effort continued on possible integrated subsystems with alternative architectures.
- (U) ($1,900) Single piece chip carrier effort will investigate utilization of diamond films to improve thermal conductivity in a single piece chip carrier.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101221N
PROGRAM ELEMENT TITLE: Strategic Submarine and Weapons System Support

BUDGET ACTIVITY: 7
PROJECT NUMBER: J0951

Date: 7 February 1994

2. (U) FY 1994 PLAN:

- (U) ($700) Continue FARR initiative
- (U) ($808) Continue to investigate, identify and resolve system design and material problems associated with the weapon system interface with the TRIDENT submarine baseline.
- (U) ($8,400) Effort will complete in support of Phase Two development of the SLBM Retargeting System (SRS)
- (U) ($15,000) The Congressionally mandated propellant characterization study is planned to continue. This year's study will continue experimental impact testing and analytical modeling and small scale material characterization testing of propellant priorities and sensitivities.

3. (U) FY 1995 PLAN:

- (U) ($8,800) Effort will begin in support of Phase Three development of the SLBM Retargeting System (SRS).
- (U) ($5,000) The Congressionally mandated propellant characterization study will complete. This year's effort will complete analytical modeling and support preparation of the final report.
- (U) ($2,100) Propellant Program: This task involves investigations of advanced propellant formulations with the potential to combine high delivered performance with low hazard characteristics while meeting increasingly restrictive environmental requirements for manufacturing, test, and disposal.
- (U) ($4,700) Continue full scale engineering development of portable flight test instrumentation vans.
- (U) ($15,000) Continue Reentry Vehicle Industrial Base Sustainment Program. FY 1995 efforts include:
  - A state-of-the-art technology survey will be conducted to determine what enabling technologies currently under pursuit in the community have application to strategic reentry systems. Technologies will be assessed to determine maturity, risk, cost, and environmental impact.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101221N
PROGRAM ELEMENT TITLE: Strategic Submarine and Weapons System Support

BUDGET ACTIVITY: 7
PROJECT NUMBER: J0951

Date: 7 February 1994

- An assessment of the SLBM reentry system industrial base will be conducted to evaluate near term and far term industrial base capability in the areas of human resources, manufacturing and production plants, laboratory and test facilities, instrumentation and software/design tools unique to the development of strategic reentry systems. Capabilities will be evaluated to determine readiness, redundancy, and plans for improvements or downsizing.

- A technical program plan will be developed to identify what critical industrial base parameters will be sustained and how that will be accomplished. This plan will integrate Air Force and Navy requirements into a singular coordinated technology requirements definition.

- Assessment of SLBM reentry vehicle unique accuracy fidelity drivers including effects of RV service life extension and evaluation of concepts for accuracy maintenance.

- Evaluation of SLBM reentry vehicle range limitations and options for extension.

- Ground test evaluation of materials developed under previous programs and contractor internal research and development activities for application to reentry vehicle designs.

- Concept formulation, trade studies, and requirements definition to evaluate material concepts for reentry vehicle design applications and instrumentation concepts for on-board flight measurements in support of known industrial base deficiencies.

- (U) ($6,038) TRIDENT Cost of Ownership Reduction Initiative: This task is required to identify and assess concepts and technologies which will significantly reduce life cycle costs. The current focus is development of a virtual prototyping design capability. Virtual prototyping and simulation, or elements thereof, has been referred to as Integrated Product Development (IDP), concurrent engineering, or paperless design. Boeing has pioneered application of virtual prototyping in their 777 aircraft design. This design approach could permit a significant cost reduction for the design and development of replacement system elements caused by the continued erosion of the industrial base for the TRIDENT Weapon System.

- (U) ($950) Complete efforts to investigate, identify and resolve system design and material problems associated with the weapon system interface with the TRIDENT submarine baseline.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101221N
PROGRAM ELEMENT TITLE: Strategic Submarine and Weapons System Support

BUDGET ACTIVITY: 7
PROJECT NUMBER: J0951

Date: 7 February 1994

- (U) ($3,000) Continue FARR initiative.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: Strategic Systems Programs, Washington, D C. CONTRACTORS: General Electric Company, Ordnance Systems, Pittsfield, MA; UNISYS Systems Corp., Great Neck, NY; Charles Stark Draper Laboratory, Cambridge, MA; Lockheed Missiles and Space Company, Sunnyvale, CA; General Dynamics, Electric Boat Division, and others.

E. (U) COMPARISON WITH AMENDED FY 1994 PRESIDENT'S BUDGET:

1. (U) TECHNOLOGY CHANGES: Implementation of a joint Air Force/Navy Reentry Vehicle Industrial Base Sustainment Program

2. (U) SCHEDULE CHANGES: Not applicable for this submission

3. (U) COST CHANGES: Not applicable for this submission

F. (U) PROGRAM DOCUMENTATION: DCP-2/87; TEMP-8/89; OR # 196-02-88 (SRS)-1/88

G. (U) RELATED ACTIVITIES: Program Element 0101221N, Fleet Ballistic Missile System, Project J0091. Provides for developments related to deployed TRIDENT I (C4) Strategic Weapons Systems.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	To COMPLETE	TOTAL PROGRAM
• (U) PROCUREMENT WPN LI 2&3	980,325	1,098,576	696,019	467,562	414,667	383,019	414,776	12,500	15,592,000

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable for this submission

J. (U) TEST AND EVALUATION: Not applicable for this submission.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101221N
PROGRAM ELEMENT TITLE: Strategic Submarine & Weapons System Support
PROJECT NUMBER: S0004
BUDGET ACTIVITY: 7
Date: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: S0004, TRIDENT Submarine System Improvement. The TRIDENT Submarine System Improvement Program develops and integrates command, control and communication improvements needed to maintain TRIDENT submarine operational capability through the life cycle of this vital strategic asset. The program conducts efforts needed to maintain strategic connectivity, ensure platform invulnerability, and reduce life cycle costs through obsolete equipment replacement and commonality.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($4,818) Continued development of Extremely High Frequency Satellite Communications (EHF SATCOM).
- (U) ($14,593) Completed development of QE2 (MK2 Mod 3 Combat System and AN/BQQ-5E Sonar System).
- (U) ($3,010) Continued Engineering and Technical Support for revision test and integration.
- (U) ($1,050) Continued various TRIDENT Command and Control System (CCS) Improvements under $500,000.00.

(U) FY 1994 PLAN:

- (U) ($3,240) Continue development of EHF SATCOM.
- (U) ($269) Continue various TRIDENT CCS Improvements.

(U) FY 1995 PLAN:

- (U) ($1,126) Initiate development of Consolidated Tactical Systems (CTS).
- (U) ($1,662) Initiate development of Miniaturized Demand Assigned Multiple Access AN/USC(V)1.
- (U) ($3,300) Continue development of EHF SATCOM.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101221N
PROGRAM ELEMENT TITLE: Strategic Submarine & Weapons System Support
PROJECT NUMBER: S0004
BUDGET ACTIVITY: 7
Date: 7 February 1994

- (U) ($685) Continue various TRIDENT CCS Improvements.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCENDIV, Newport, RI; COMSPAWARSYSCOM, Washington, DC. CONTRACTORS: IBM, Manassas, VA; Raytheon, Portsmouth, RI; General Electric, Camden, NJ; Electric Boat Division of General Dynamics Corp., Groton, CT.

(U) RELATED ACTIVITIES: These PEs develop submarine software and hardware that are directly related to efforts conducted by the program element.

- (U) PE 0101224N (SSBN Security & Survivability Program)
- (U) PE 0101402N (Navy Strategic Communications)
- (U) PE 0604562N (Submarine Tactical Warfare System)
- (U) PE 0604503N (Submarine System Equipment Development)

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

FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line #87 (BA2)								
127,396	44,375	33,380	47,285	51,685	48,546	80,282	CONT.	CONT.
• (U) OPN Line #178 (BA4)								
14,389	6,372	4,716	6,936	5,106	8,335	8,328	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101224N
PROGRAM ELEMENT TITLE: SSBN Security & Survivability Program
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0092 SSBN Security Technology	60.198	28,068	20,777	21,211	23,102	22,622	23,899	CONT.	CONT.
V1871 SSBN Survivability	16,351	7,820	8,538	8,577	8,801	8,981	9,215	CONT.	CONT.
TOTAL	76,549	35,888	29,315	29,788	31,903	31,603	33,114	CONT.	CONT.

*NOTE: V1871 funded under PE 0603588N in FY 1993.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The purpose of the SSBN Security & Survivability Program is to ensure the current covert mobility and pre-launch survivability of the Fleet Ballistic Missile Submarine Force with respect to emerging applications of advanced technology in the ocean environment. This program identifies requirements for maintaining or enhancing the current tactical superiority and stealth characteristics of the Fleet Ballistic Missile Submarine Force. The SSBN Survivability Program bridges the gap between the SSBN Security Program and full scale development by validating countermeasures and enhancing submarine survivability.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101224N
PROGRAM ELEMENT TITLE: SSBN Security & Survivability Program
PROJECT NUMBER: R0092
BUDGET ACTIVITY: 7
DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0092 SSBN Security Technology	60,199	28,068	20,777	21,211	23,102	22,622	23,899	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The purpose of the SSBN Security Technology Program is to ensure the current covert mobility and pre-launch survivability of the Fleet Ballistic Missile Submarine Force with respect to emerging applications of advanced technology in the ocean environment. This program identifies requirements for maintaining or enhancing the current tactical superiority and stealth characteristics of the Fleet Ballistic Missile Submarine Force.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:
   - (U) ($5,424) Continued tactics development and operations assessments.
   - (U) ($7,909) Conducted sea tests to evaluate shallow water concepts for
   - (U) ($ 310) Continued investigations to understand signature generation mechanisms.
   - (U) ($1,749) Completed analysis of experimental data to assess performance of high-gain, arrays.
   - (U) ($3,293) Planned an at-sea test of a
   - (U) ($4,707) Completed analysis of experimental data from Critical Sea Test 7 and participated in an experiment.
   - (U) ($1,142) Continued signature measurements using bottom-mounted sensors.
   - (U) ($6,884) Conducted a experiment and data analysis.
   - (U) ($1,001) Continued development of clutter reduction algorithms for

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101224N | PROJECT NUMBER: R0092 | DATE: 7 February 1994
PROGRAM ELEMENT TITLE: SSBN Security & Survivability Program | BUDGET ACTIVITY: 7

- (u) ($5,690) Conducted a final detectability at-sea experiment.
- (u) ($ 110) Conducted studies to address large scan angle effects on
- (u) ($ 260) Prepared Preliminary Detectability Assessments (PDAs) fo

- (u) ($1,030) Conducted an airborne noise measurement and continued investigation or noise reduction techniques.
- (U) ($ 415) Convened a Technical Working Group to develop a long-term hydrodynamic measurement model validation plan and plan an at-sea test.
- (u) ($ 898) Continued submarine model development.
- (u) ($ 310) Continued maintenance and development of environmental data bases.
- (u) ($3,325) Analyzed FY-92 at-sea test measurements to determine signatures and background noise levels for development of advanced sensor.
- (u) ($2,655) Continued submarine analysis.
- (u) ($2,190) Conducted final data analysis, and began updating the PDA.
- (u) ($1,281) Planned an experiment to investigate submarine detection concepts.
- (u) ($ 310) Conducted airborne signature/noise measurement assessment and studies.
- (u) ($8,355) Conducted the Science and Technology Assessment Project to

- (u) ($ 950) Completed analysis of sea tests to evaluate shallow water active and passive acoustic, and passive EM sensors for

2. (U) FY 1994 PLAN:
- (U) ($3,153) Continue tactics development and operations assessments.
- (u) ($6,065) Conduct a experiment in a convergence zone propagation environment.
- (u) ($4,951) Conduct an at-sea test of a towed array.
- (u) ($ 273) Continue maintenance and development of environmental data bases.
- (u) ($4,626) Conduct assessment of
- (u) ($9,000) Continue the Science and Technology Assessment Project to

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101224N
PROGRAM ELEMENT TITLE: SSBN Security & Survivability Program
PROJECT NUMBER: R0092
BUDGET ACTIVITY: 7
DATE: 7 February 1994

3. (U) FY 1995 PLAN:
- (U) ($3,080) Continue tactics development and operations assessments.
- (U) ($2,300) Continue analysis of data in convergence zone environment.
- (U) ($1,150) Complete analysis of performance of towed array performance.
- (U) ($ 297) Continue maintenance and development of environmental data bases.
- (U) ($5,900) Continue assessment of
- (U) ($4,370) Prepare for test of concept.
- (U) ($3,680) Prepare for test of Concept.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NCCOSC RDTE DIV, San Diego, CA; NRL SSC, Stennis Space Center, MS; NAVUNSEAWARCEN DET, New London, CT; NRL, Washington, DC; NCEL, Port Hueneme, CA; NAVUNSEAWARCENDIV, Keyport, WA; NAVAIRWARCENACDIV, Warminster, PA. CONTRACTORS: Johns Hopkins University/Applied Physics Laboratory, Laurel, MD; Arete Associates, Sherman Oaks, CA; University of Washington/Applied Physics Laboratory, Seattle, WA; Dynamics Technology Inc., Torrance, CA; American Telephone and Telegraph, Alexandria, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:
1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: NAPDD #011-02 6/91

G. (U) RELATED ACTIVITIES:
- (U) PE 0602314N (Undersea Surveillance and Weapons Technology)

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

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

J. (U) MILESTONE SCHEDULE: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101224N
PROGRAM ELEMENT TITLE: SSBN Security & Survivability Program
PROJECT NUMBER: V1871
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: V1871, SSBN Survivability. The following projects are being developed under the SSBN Survivability Program: Low, Medium Frequency Active Support (LMFAS) and Low Frequency Active Acoustics (LFAA) to acoustic transmissions; the Self Monitor (TSM) to detect own ship the Buoy Extended Frequency System (BEFS) to detect radars while Project Jade (JADE) to warn of detection systems in use; the Tactical Decision Aids for Submarine Security (TDASS/Stealth) to provide guidance for detection system avoidance; Standard Rampart (RAMPART) to detect own ship Standard Crimson (CRIMSON) to minimize Automated Threat Overflight Monitoring System (ATOMS) to detect aircraft using the Lighthouse (LIGHTHOUSE) to reduce submarine detectability by detection systems. Out-year countermeasure development programs will include but are not limited to: Electromagnetics, Magnetics, and

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($14,761) Thirteen projects continued with sea/lake tests for JADE, ATOMS, CRIMSON, LMFAS, TDASS and TSM.
- (U) ($ 1,210) Concluded Standard Oboe with the development of a Draft Utilization Plan, and concluded project participation in INVERSE.
- (U) ($ 380) Transitioned Buoyant Cable Antenna Extended Frequency System technology to the OE-315 and the BEFS project.

(U) FY 1994 PLAN:
- (U) ($ 4,900) Eleven projects continue with sea/lake tests for LMFAS/Low Frequency Active (LFA), TDASS/Stealth, LIGHTHOUSE, JADE and CRIMSON.
- (U) ($ 525) Conclude CRIMSON with quarter scale lake tests.
- (U) ($ 2,045) Complete TSM-2 sea test analysis and initiate development of an integrated hull and machinery system.
- (U) ($ 350) Design and initiate development of BEFS.

(U) FY 1995 PLAN:
- (U) ($ 3,163) Nine projects continue with lake/sea tests for LMFAS/LFA, JADE, and TDASS/Stealth.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101224N
PROGRAM ELEMENT TITLE: SSBN Security & Survivability Program
PROJECT NUMBER: V1871
BUDGET ACTIVITY: 7
DATE: 7 February 1994

- (U) ($ 838) Transition the JADE and RAMPART sensors to TDASS/Stealth (Tactical Oceanographic Monitoring System), and ATOMS into the AN/BOR-23.
- (U) ($ 3,577) Complete Processor Advanced Development Model (ADM), BEFS ADM, and TSM III integrated system development.
- (U) ($ 400) Complete LIGHTHOUSE concept assessment.
- (U) ($ 560) Initiate transition of Array from the SSBN Security program and conduct initial design definition.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCEN DET, New London, CT; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NAVSURFWARCEN DET, Annapolis, MD; NRL, Washington, DC. CONTRACTORS: Johns Hopkins University/Applied Physics Laboratory, Laurel, MD; Georgia Tech University, Atlanta, GA; Scientific Atlanta, San Diego, CA; Northwest Research Associates, Belleview, WA; Applied Mathematics Incorporated (AMI), New London, CT.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

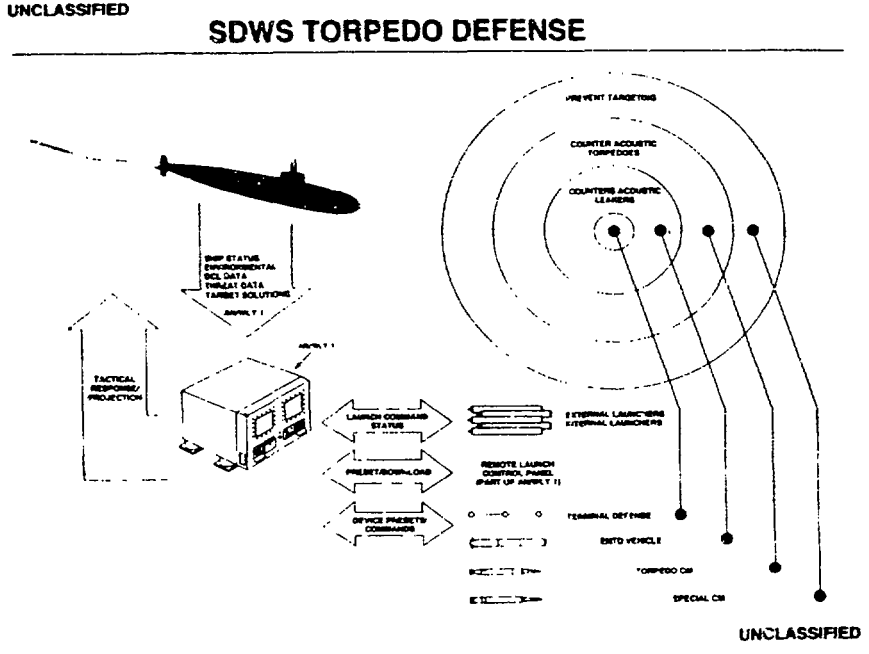
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101226N
PROGRAM ELEMENT TITLE: Sub Acoustic Warfare Development

PROJECT NUMBER: V1265
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: Submarine Defensive Warfare System



POPULAR NAME: SDWS

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101226N
PROGRAM ELEMENT TITLE: Sub Acoustic Warfare Development
PROJECT NUMBER: V1265
BUDGET ACTIVITY: 7
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		ADC MK4 MS III 3/94		AN/WLY-1 MS II 3/96	ADC EX-11 MS II 7/97	SMTD MS II 8/98		ADC EX-11 MS III 12/01 AN/WLY-1 MS III 8/00
ENGINEERING MILESTONES	AN/WLY-1 CDR-1 1/93				AN/WLY-1 CDR-2 8/97	ADC EX-11 PDR 12/97 ADC EX-11 CDR-1 1/98	SMTD PDR 6/99	SMTD CDR-1 01/00
T&E MILESTONES	ADC EX-11 DT I 1/93 ADC MK4 DT IIB 7/93	ADC MK4 OTII 11/93 AN/WLY-1 DT-1 7/94				SMTD DT-1 6/98 AN/WLY-1 DT-IIA 6/99	AN/WLY-1 DT-IIA 6/99 AN/WLY-1 DT-IIB 9/99 ADC EX-11 DT-IIA 3/99	ADC-EX-11 OTII 10/01 ADC-EX-11 DTIIB 7/00 AN/WLY-1 OTII 12/00 SMTD DTIIA 12/01 12/01
CONTRACT MILESTONES		ADC MK4 Production 3/94			AN/WLY-1 EMD 9/97	ADC EX-11 EMD 1/98	SMTD EMD 12/99	SMTD LRIP 10/02

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	16,350	7,082	0	1,350	7,870	20,956	26,450	CONT.
SUPPORT CONTRACT	692	700	0	548	743	1,381	1,255	CONT.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101226N PROJECT NUMBER: V1265 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Sub Acoustic Warfare Development BUDGET ACTIVITY: 7

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
IN-HOUSE SUPPORT	21,786	8,747	537	1,414	3,971	7,000	8,900	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	CONT.
TOTAL	38,828	16,529	537	3,312	12,584	29,337	36,605	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project develops a Submarine Defensive Warfare System (SDWS) to improve the effectiveness and survivability of all classes of US submarines. Project efforts consist of countermeasures devices, launchers, threat detection, and Command and Control systems. Specific devices in development are: Acoustic Device, Countermeasure (ADC) MK 4, an advanced sonar countermeasure device; a Mobile Multi-Function countermeasure device (ADC EX-11); and an advanced Submarine Torpedo Defense (SMTD) device capable of interception and neutralization of future torpedo threat capabilities. Launcher development efforts are directed to external countermeasure launchers specifically configured to each submarine class for ready stowage and rapid launching of devices, including launcher quieting techniques to meet advanced submarine noise requirements. Threat detection and command and control efforts consist of development of a new sonar intercept system designated AN/WLY-1, which will have torpedo recognition capability for early threat acquisition, classification, tracking and a consolidated command and control subsystem for countermeasure inventory, status, tactical solutions, and launch management of all on board countermeasure devices and launcher systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,895) Completed DTIIB for the ADC MK 4 device.
- (U) ($25,283) Continued Prototype system fabrication and factory acceptance testing as well as commenced submarine installation of the prototype system for the AN/WLY-1 system.
- (U) ($2,096) Completed prototype integrated vehicle range and Torpedo DTI testing for the ADC EX-11 device.
- (U) ($7,790) Continued Prototype fabrication and conducted integrated vehicle acoustic, propulsion and guidance DTI testing on the SMTD device.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101226N
PROGRAM ELEMENT TITLE: Sub Acoustic Warfare Development
PROJECT NUMBER: V1265
BUDGET ACTIVITY: 7
Date: 7 February 1994

- (U) ($483) Continued quieting design studies.
- (U) ($281) Completed EMD design, DTI testing and documentation for the NLQ-1 device.

2. (U) FY 1994 PLAN:

- (U) ($1,970) Conduct prototype fabrication and testing for the ADC EX-11.
- (U) ($12,944) Continue submarine installation of prototype system and conduct submarine installed at-sea DTI testing for the AN/WLY-1 system.
- (U) ($850) Obtain Milestone III approval and complete OTII (Operational Evaluation Testing) for the ADC MK4. Award production contract.
- (U) ($415) Complete quieting design studies.
- (U) ($350) Complete Prototype fabrication and conduct integrated vehicle acoustic, propulsion and guidance DTI testing for the SMTD device.

3. (U) FY 1995 PLAN:

- (U) ($437) Continue prototype testing and analysis for the AN/WLY-1 system.
- (U) ($100) ADC EX-11 and SMTD programs delayed, provide Technology updates.

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

D. (U) WORK PERFORMED BY: In House: NAVSURFWARCENCOASTSYSTA, Panama City, FL; NAVUNSEAWARCEN DET, New London, CT. Contractors: Norden Systems, Melville, NY; Bendix, Inc., Sylmar, CA; Hazeltine Corp., Braintree, MA; EML Research, Hudson, MA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101226N
PROGRAM ELEMENT TITLE: Sub Acoustic Warfare Development
PROJECT NUMBER: V1265
BUDGET ACTIVITY: 7

Date: 7 February 1994

2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

SYSTEM	TOR	DOP	OR	TEMP	COEA	ORD	ASR
ADC MK 4	N/A	N/A	12/76	#1171 (03/88)	07/93	09/93 (343-87-93)	07/93
AN/WLY-1	09/85	06/86	09/90	#1351 IN PROCESS			
NLQ-1	03/86	11/87	07/88	#1338 IN PROCESS			
ADC EX-11	03/86	11/87	07/88	#1339 IN PROCESS			
SMTD	02/88	05/92	06/92	TBD			
LAUNCHER QUIETING	N/A	N/A	12/76	#581 REV 1 (08/90)			

G. (U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) OPN Line 57	12,903	16,148	8,151	9,339	14,074	4,195	5,487	CONT.	CONT.

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

J. (U) TEST AND EVALUATION:

	SYSTEM	DT I	DT IIA	DT IIB (TECHEVAL)	OT II (OPEVAL)
• (U)	ADC MK 4	09/91	08/92	07/93	11/93
• (U)	ADC EX-11	01/93	03/99	4Q/00	1Q/01
• (U)	AN/WLY-1	07/94	06/99	09/99	1Q/00
• (U)	SMTD	06/98	1Q/01	3Q/02	4Q/02
• (U)	NLQ-1	06/93	N/A	N/A	N/A
• (U)	LAUNCHER QUIETING	08/92	N/A	N/A	N/A

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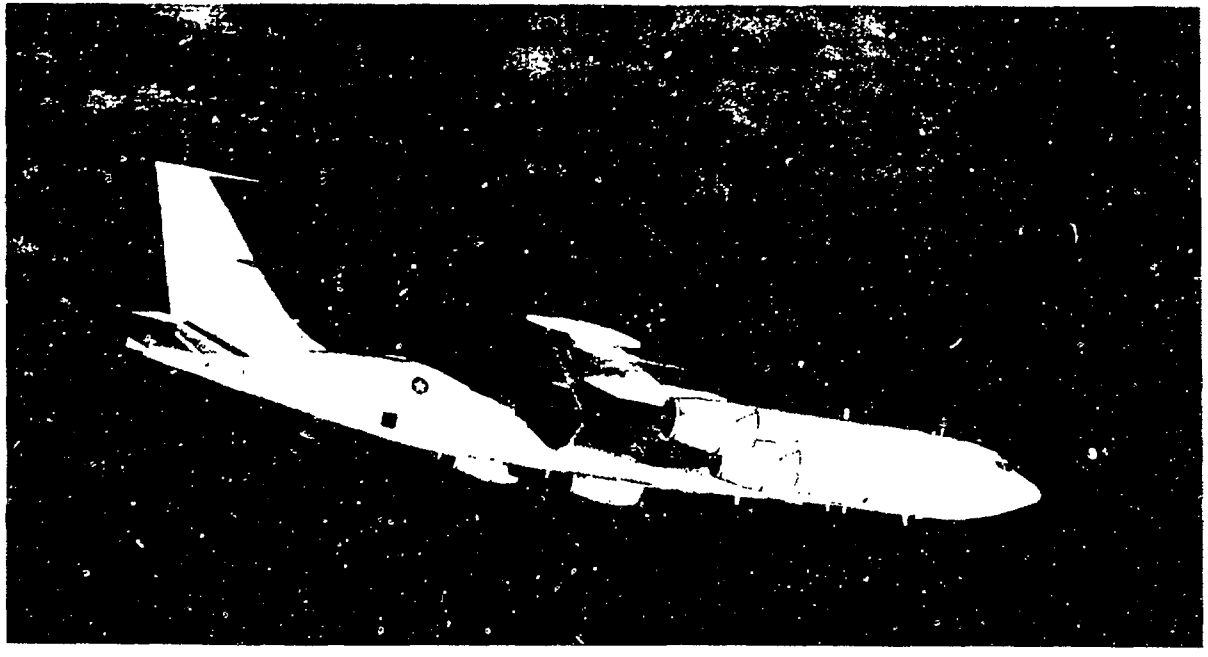
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101402N
PROGRAM ELEMENT TITLE: Navy Strategic Communications
PROJECT NUMBER: H0793
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: TACAMO



POPULAR NAME: TACAMO

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101402N
PROGRAM ELEMENT TITLE: Navy Strategic Communications
PROJECT NUMBER: H0793
BUDGET ACTIVITY: 7
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
HPTS 4/93 MSII(LRIP)			5/95 MSIII					
BLOCK			5/95 MSIII					
OI		1/94 MSII	6/95 MSIII					
ABNCP		6/94 MSIII						
ENGINEERING MILESTONES								
BLOCK	3/93 PDR 6/93 CDR							
OI		6/94 PDR 9/94 CDR						
T&E MILESTONES								
HPTS	10/92 OTIIB	7/94 DTIIC	11/94 OTIIC					
BLOCK		7/94 DTIIA	11/94 OTIIA					
OI			4/95 DTIIA					
ABNCP				8/97 FOT&E(DTIIIA/OTIIIA)				
CONTRACT MILESTONES								
HPTS	INCREMENT							
BLOCK	10/92 AWARD							
OI		1/94 AWARD						
ABNCP			11/94 AWARD					

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101402N
PROGRAM ELEMENT TITLE: Navy Strategic Communications
PROJECT NUMBER: H0793
BUDGET ACTIVITY: 7
Date: 7 February 1994

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	40,611	14,977	24,387	56,487	18,500	0	0	0	154,962
SUPPORT CONTRACT	3,152	226	76	90	0	0	0	0	3,544
IN-HOUSE SUPPORT	43,083	4,271	4,205	11,473	2,238	0	0	0	65,270
GFE/ OTHER	5,221	79	1,700	7,942	0	0	0	0	14,942
TOTAL	92,067	19,553	30,368	75,992	20,738	0	0	0	238,718

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

(U) HIGH POWER TRANSMITTER SYSTEM: The Very Low Frequency/Low Frequency (VLF/LF) High Power Transmitter System (HPTS) and Dual Trailing Wire Antenna (DTWA) Systems for the E-6A TACAMO and the Air Force National Emergency Airborne command post (E-4B) are required to communicate with the strategic bomber, missile and submarine forces. The transmitter equipment (200KW) provides the E-6A TACAMO aircraft with a state-of-the-art system replacing tube-type equipment that is logistically insupportable. The replacement DTWA will provide increased reliability and a third Utility Wire Antenna (UTWA) for redundant short or long wire capability.

(U) BLOCK UPGRADE: An additional upgrade of the E-6A TACAMO systems is required to ensure communications compatibility within the Strategic Connectivity System (SCS), the system that links TACAMO with other strategic communications platforms and systems. Extremely High Frequency Military Strategic Tactical and Relay (EHF MILSTAR), Message Processor, Time/Frequency Standard Distribution System (T/FSDS), and Global Positioning System (GPS) upgrades will be installed aboard the E-6A TACAMO as a Block II Upgrade Program. In addition to providing the required E-6A/SCS compatibility, the installation of these systems will provide a significant increase in reliability and maintainability, enhance system communications capability, and provide increased supportability. Production of both HPTS and Block II are scheduled for concurrent installation as the E-6A Avionics Block Upgrade.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101402N
PROGRAM ELEMENT TITLE: Navy Strategic Communications
PROJECT NUMBER: H0793
BUDGET ACTIVITY: 7
Date: 7 February 1994

(U) ORBIT IMPROVEMENT: Provides the orbit control necessary to prevent Long Trailing Wire Antenna (LTWA) contact with the horizonal stabilizer during orbit maneuvers where bank angles greater than 40° are required. The Orbit Improvement program consists of the installation and integration of commercial/FAA certified auto throttles and modifications to the Flight Management Computer System software to precisely control the aircraft's air speed and bank angle, thereby, stabilizing the aircraft during orbit and dampening LTWA oscillations and preventing LTWA contact with the tail. This modification corrects major E-6A OT-III deficiencies.

(U) AIRBORNE COMMAND POST (ABNCP): The E-6A ABNCP modification is an extension of application program that moves already proven equipment from the EC-135 aircraft to the E-6A aircraft. It also replaces the existing message processing computer with a commercial-off-the-shelf processor along with commercial message handling software. This program allows the consolidation of JCS strategic command and control mission. It utilizes already developed equipments to achieve significant operations and maintenance savings while effectively executing existing missions. The installation of ABNCP equipments into the E-6A enables CINCSTRAT to execute direct command and control of the strategic forces through the use of one vice two airborne platforms. This program incorporates the Intercommunication System (ICS) modifications reported separately in previous RDDS. The ABNCP modifications correct the E-6A OT-III ICS critical-to-mission operational deficiencies.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:
   - (U) ($218) Completed Development and Operational Test and Evaluation (DT/OT-IIB) on E-6A HPTS in support of Low Rate Initial Production (LRIP) milestone IIA.
   - (U) ($13,232) E-6A Avionics Block Upgrade contract awarded for E&MD in October 1992.
   - (U) ($2,433) Conducted Preliminary Design Review (PDR) for Block Upgrade.
   - (U) ($3,670) Conducted Critical Design Review (CDR) for Block Upgrade.

2. (U) FY 1994 PLAN:
   - (U) ($11,549) Continue installation and integration of Avionics Block Upgrade and Contractor Testing for Avionics Block Upgrade.
   - (U) ($1,700) Complete E-6A Avionics Block Upgrade and HPTS TECHEVAL Testing in support of production milestone (MS-III).
   - (U) ($16,087) Obtain the Orbit Improvement Milestone II decision for E&MD and award Orbit Improvement E&MD contract.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101402N
PROGRAM ELEMENT TITLE: Navy Strategic Communications
PROJECT NUMBER: H0793
BUDGET ACTIVITY: 7
Date: 7 February 1994

- (U) ($1,032) Conduct Preliminary and Critical Design review for Orbit Improvement.
- (U) Obtain a Milestone III decision to initiate the Airborne Command Post modification.

3. (U) FY 1995 PLAN:
   - (U) ($6,300) Complete E-6A Avionics Block Upgrade installation and integration.
   - (U) ($3,921) Complete E-6A Avionics Block Upgrade and HPTS OPEVAL Testing (OT-II) to support a Production Milestone III.
   - (U) ($7,187) Complete Orbit Improvement modification.
   - (U) ($4,021) Complete Developmental Testing (DT-II) on E-6A Orbit Improvement modification in support of Production Milestone III.
   - (U) ($54,563) Award and monitor the Airborne Command Post nonrecurring engineering, engineering change proposal definition, and installation contract.

4. (U) PROGRAM TO COMPLETION:
   - (U) Complete Airborne Command Post modification installation and contractor testing in the fourth quarter FY 1997.
   - (U) Complete Airborne Command Post Follow-On Test and Evaluation in the third quarter FY 1998.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA; NAVAIRWARCENACDIV, Patuxent River, MD; NAVAIRWARCENACDIV, Indianapolis, IN; NCCOSC RDTE DIV, San Diego, CA. CONTRACTORS: Rockwell, Dallas, TX; Chrysler Technologies Airborne Systems, Waco, TX; Boeing Defense & Space Group, Seattle, WA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101402N
PROGRAM ELEMENT TITLE: Navy Strategic Communications
PROJECT NUMBER: H0793
BUDGET ACTIVITY: 7
Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:

1. (U) HPTS

a. (U) TEMP	5/92
b. (U) Acquisition Plan (AP)	1/92
c. (U) Operation Requirements (OR) Documentation	8/86
d. (U) Integrated Program Summary (IPS)	8/92

2. (U) E-6A AVIONICS BLOCK UPGRADE

a. (U) TEMP	9/92
b. (U) AP (Revision 1)	5/92
c. (U) OR	8/92
d. (U) IPS	9/92

3. (U) OI

a. (U) TEMP	1/94
b. (U) AP (Revision 3)	9/93
c. (U) OR	8/91
d. (U) IPS	1/94

4. (U) ABNCP

a. (U) TEMP	6/94
b. (U) AP	2/94
c. (U) OR	3/94
d. (U) IPS	6/94

G. (U) RELATED ACTIVITIES:

- (U) PE 0303131F, (Air Force) Minimum Essential Emergency Communications Network. The VLF/LF HPTS and DTWA Systems for the E-6A TACAMO and the Air Force E-4B are required to communicate with the strategic bomber, missile,and submarine forces.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0101402N
PROGRAM ELEMENT TITLE: Navy Strategic Communications
PROJECT NUMBER: H0793
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) APN5	32,588	57,845	90,482	134,603	106,628	82,726	42,266	17,405	531,955

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

J. (U) TEST AND EVALUATION:

HPTS	10/92 OTIIB, 7/94 DTIIC, 11/94 OTIIC
BLOCK	7/94 DTIIA, 11/94 OTIIA
OI	4/95 DTIIA
ABNCP	08/97 FOT&E (DTIIIA/OTIIIA)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0102427N
PROGRAM ELEMENT TITLE: Navy Space Surveillance System
PROJECT NUMBER: X0125
BUDGET ACTIVITY: 7
DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0125 Naval Space Surveillance	863	699	858	837	823	842	866	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND PROJECT: The Navy Space Surveillance (NAVSPASUR) System is an integral component of the U.S. Space Command Detection and Tracking System. This system provides continuous surveillance and unalerted detection of space objects crossing the continental U.S. NAVSPASUR is also the only space surveillance system which provides satellite vulnerability data to the Fleet units. It is a multistatic continuous-wave radar fence consisting of three transmitter sites, six receiver sites, and a computation center. The transmitter and receiver sites are located on a great circle across the southern CONUS, and the computation center is located at NAVSPASUR Headquarters in Dahlgren, VA.

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($458) Initiated research into processing alternatives and improve system performance.
- (U) ($255) Continued digital filter development.
- (U) ($150) Completed development of Digital Signal Processing Receiver (DSPR) for high altitude stations.

(U) FY 1994 PLAN:

- (U) ($239) Continue research into processing alternatives and improve system performance.
- (U) ($400) Begin development of a digital replacement for the analog portion of the receivers.
- (U) ($60) Complete digital filter replacement development.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0102427N
PROGRAM ELEMENT TITLE: Navy Space Surveillance
PROJECT NUMBER: X0125
BUDGET ACTIVITY: 7
DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($415) Continue development of a digital replacement for the analog portion of the NAVSPASUR receiver.
- (U) ($443) Improvement studies: e.g. communications transmission improvement to make use of additional target data available at field sites; replacement design for transmitter cards, algorithm improvements (e.g., moon pass notching), the possibility of remote monitoring to reduce operations costs.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NESEC, Charleston.

(U) RELATED ACTIVITIES: Not applicable.

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

- (U) OPN Line - 33290100

FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
95	2,458	0	0	0	0	0	0	2,551

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204136N
PROGRAM ELEMENT TITLE: F/A-18 SQUADRONS
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
E1662 F/A-18 Improvements	14,315	11,323	22,776	24,901	18,564	17,991	18,318	CONT.	CONT.
E2065 F/A-18 RADAR Upgrade	38,042	46,023	40,617	26,453	10,319	2,731	0	0	299,713
E2130 F/A-18 Follow-On Variant	843,084	1,396,741	1,348,482	617,733	302,921	159,169	125,163	735,196	5,886,367
TOTAL	895,441	1,454,087	1,411,875	669,087	331,904	179,891	143,481	CONT.	CONT.

B. (U) DESCRIPTION: The F/A-18 is capable of using selected external equipment to perform either fighter or attack missions. The capabilities of the F/A-18 weapon system can be upgraded to accommodate and incorporate new or enhanced weapons as well as advances in technology to respond effectively to emerging future threats. Continued development capability is required to successfully optimize new F/A-18 weapon system capabilities in the Fleet. Additionally, continued improvements in reliability and maintainability are necessary to ensure maximum benefit is achieved through reduced cost of ownership and to provide enhanced availability. The F/A-18 Naval Strike Fighter program transitioned from full-scale engineering development to operational systems development during FY 1983. As F/A-18 squadrons report discrepancies and new requirements, a continuing capability is needed to perform technical evaluations, investigative flight testing, software support, and incorporate pre-planned product improvements (P3I) (i.e., capability enhancements). The F/A-18 radar (APG-65) has been upgraded to the APG-73 to operate in the projected electronic warfare environment of the 1990's. The follow-on F/A-18 (E/F version) is an airframe upgrade incorporating increased capabilities, performance, and survivability necessary to satisfy the continuing requirement to implement new and more effective capability to counter emerging threats. The E/F will have a 53 percent increase in range over the C/D in a high-low-low-high attack/interdiction mission carrying three tanks, four 1000 pound bombs, and two AIM-9 air-to-air missiles. The E/F version will have increased internal fuel capacity, increased weapon carriage capability, increased carrier recovery payload, enhanced survivability/vulnerability, increased growth capacity, and increased engine thrust. It will retain all of the P3I enhancements developed for the earlier night attack C/D version of the aircraft.

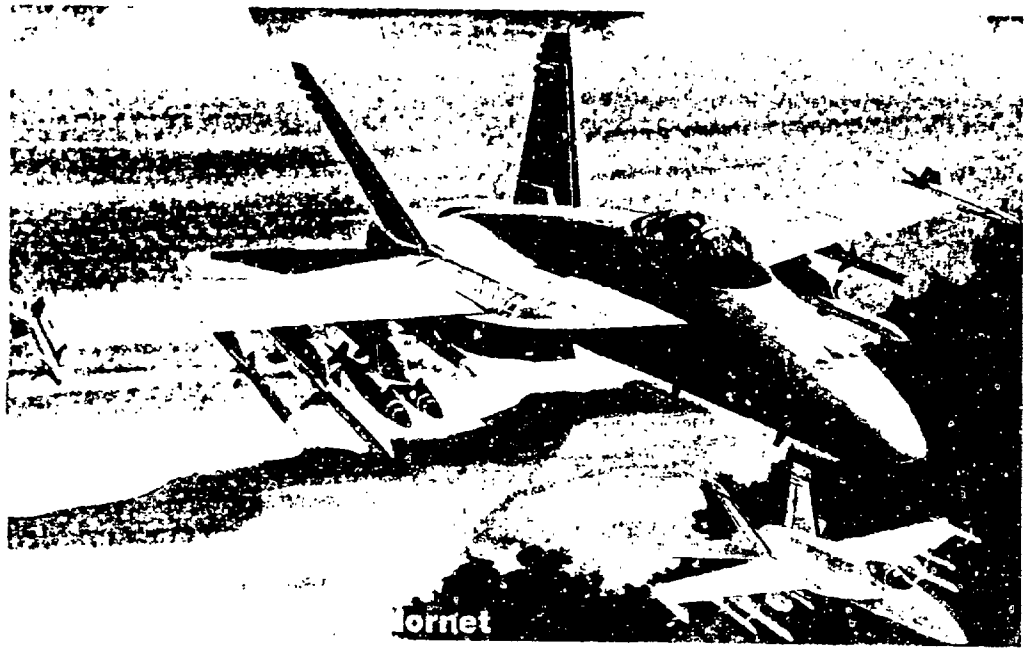
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204136N
PROGRAM ELEMENT TITLE: F/A-18 SQUADRONS

PROJECT NUMBER: E1662
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: F/A-18 IMPROVEMENTS



POPULAR NAME: HORNET

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204136N
PROGRAM ELEMENT TITLE: F/A-18 SQUADRONS
PROJECT NUMBER: E1662
BUDGET ACTIVITY: 7
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
ENGINEERING MILESTONES								
T&E MILESTONES								
CONTRACT MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET TO COMPLETE)
MAJOR CONTRACT	1,620	4,875	17,393	20,284	10,717	9,504	9,323	CONT.
SUPPORT CONTRACT	0	0	0	0	0	0	0	CONT.
IN-HOUSE SUPPORT	6,556	3,137	2,992	1,522	3,704	2,224	2,241	CONT.
GFE/ OTHER	6,139	3,311	2,391	3,095	4,243	6,263	6,754	CONT.
TOTAL	14,315	11,323	22,776	24,901	18,664	17,991	18,318	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The F/A-18 is a multi-mission strike fighter aircraft that is used in fighter and attack roles through selected use of external equipment (such as external fuel tanks, targeting and navigation Forward Looking Infrared (FLIR) pods). The capabilities of the F/A-18 weapon system are being upgraded to accommodate and incorporate new or enhanced weapons including the AMRAAM, I2R Maverick, Harpoon, and SLAM as well as other advances in technology such as night attack, reconnaissance, enhanced performance engine and radar upgrade to respond

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204136N
PROGRAM ELEMENT TITLE: F/A-18 SQUADRONS
PROJECT NUMBER: E1662
BUDGET ACTIVITY: 7
Date: 7 February 1994

effectively to emerging future threats. Continued development capability in terms of software and hardware improvements is required to successfully optimize new F/A-18 weapon system capabilities in the fleet. Continued improvements in reliability and maintainability for the airframe, avionics, and engines are necessary to ensure maximum benefit is achieved through reduced cost of ownership and enhanced availability. As F/A-18 squadrons report system problems and requirements, a continuing capability is needed to perform technical evaluation, investigative flight testing, software support, and incorporate capability enhancements.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,620) Developed and integrated enhancements to the effectiveness, operability, and safety of the F/A-18 Weapon System (airframe, avionics, weapons, and subsystems). Conducted engineering analysis and testing to verify these modifications. Investigated deficiencies and developed corrective actions. Continued ALR-67(V)3, Navy Aircrew Common Ejection Seat (NACES) P3I, instrumentation, and fatigue testing. Completed ALE-47 (Counter Measure Dispenser System) Integration.
- (U) ($6,556) Conducted engineering analyses and developed/assessed improvements to existing systems and sub-systems for deficiencies identified during the deployment of the aircraft. Provided technical support for the integration of new weapons and systems. Commenced: variable flight control computer effort, improved windscreen, Ground Proximity Warning System (GPWS) integration, Data Storage Unit Receptacle (DSUR), Joint Direct Attack Munitions (JDAM), and HARM Command Launch Computer Program (CLCP). Continued data link pod, Multi-Sensor Integration (MSI), Joint Stand-Off Weapons (TSOW), ALE-47, ALR-67(V)3, Global Positioning System (GPS) integration and Reconnaissance/Advanced Tactical Airborne Reconnaissance (RECCE/ATARS). Continued light weight gun evaluation.
- (U) ($6,139) Conducted flight testing to assess improvements in design/configuration of the F/A-18 Weapon System. Evaluated the capabilities of new weapons/new systems and any other modifications that may potentially impact the overall performance, operability, and effectiveness of the F/A-18 Weapon System. Continued flight testing and evaluation of the above in-house efforts.

2. (U) FY 1994 PLAN:

- (U) ($4,875) Develop and integrate enhancements to the effectiveness, operability, and safety of the F/A-18 Weapon System (airframe, avionics, weapons, and subsystems). Conduct engineering analysis and testing to verify these modifications. Investigate deficiencies and develop corrective actions. Continue NACES P3I, structural, ALR-67(V)3, instrumentation.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204136N | PROJECT NUMBER: E1662 | Date: 7 February 1994
PROGRAM ELEMENT TITLE: F/A-18 SQUADRONS | BUDGET ACTIVITY: 7

- (U) ($3,137) Conduct engineering analyses and develop/assess improvements to existing systems and sub-systems for deficiencies identified during the deployment of the aircraft. Provide technical support for the integration of new weapons and systems. Continue RECCE data link pod, variable flight control computer, GPS integration, MSI, GPWS, JSOW, JDAM, ALR-67(V)3 improved wind screen, and RECCE/ATARS. Complete Light Weight Gun Evaluation.
- (U) ($3,311) Conduct flight testing to assess improvements in design/configuration of the F/A-18 Weapon System. Evaluate the capabilities of new weapons/new systems and any other modifications that may potentially impact the overall performance, operability, and effectiveness of the F/A-18 Weapon System. Continue flight testing and evaluation of the above in-house efforts.

3. (U) FY 1995 PLAN:

- (U) ($1,393) Develop and integrate enhancements to the effectiveness, operability, and safety of the F/A-18 Weapon System (airframe, avionics, weapons, and subsystems). Conduct engineering analysis and testing to verify these modifications. Investigate deficiencies and develop corrective actions Continue structural assessments, instrumentation, and ALR-67(V)3; Continue NACES P3I.
- (U) ($2,992) Conduct engineering analyses and develop/assess improvements to existing systems and sub-systems for deficiencies identified during the deployment of the aircraft. Provide technical support for the integration of new weapons and systems. Continue variable flight control computer, GPWS integration, MSI, JSOW, JDAM, ALR-67(V)3, and RECCE/ATARS. Complete improved wind screen, RECCE data link pod, and GBU-24.
- (U) ($2,391) Conduct flight testing to assess improvements in design/configuration of the F/A-18 Weapon System. Evaluate the capabilities of new weapons/new systems and any other modifications that may potentially impact the overall performance, operability, and effectiveness of the F/A-18 Weapon System. Continue flight testing and evaluation of the above in-house efforts.
- (U) ($16,000) Commence development of Positive Identification System (PIDS), for combat identification.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA; NAVAIRWARCENACDIV, Lakehurst, NJ; NAVAIRWARCENACDIV, Trenton, NJ; NAVSURFWARCENDIV, Indian Head, MD; NAVAIRWARCENWPNDIV, China Lake, CA; NAVWPNENGSUPACT, Washington, D.C.; NAVAIRWARCENWPNDIV, Point Mugu, CA; NAVAIRWARCENACDIV, Patuxent River, MD; NRL, Washington, D.C.; OPTEVFOR, Norfolk, VA. CONTRACTORS: McDonnell Aircraft Company, St. Louis, MO (Airframe and Weapon System integration); General Electric Company, Lynn, MA (F-404 Engine); Hughes Aircraft Company, Culver City, CA (Radar subcontractor to McDonnell); Northrop Aircraft Division, Hawthorne, CA (center/aft fuselage subcontractor to McDonnell); Control Data Corporation, Minneapolis, MN (ATARS).

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204136N
PROGRAM ELEMENT TITLE: F/A-18 SQUADRONS

PROJECT NUMBER: E1662
BUDGET ACTIVITY: 7

Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) F/A-18 DCP 9/86
- (U) F/A-18 C/D TFMP 9/87

G. (U) RELATED ACTIVITIES:

- (U) RELATED ACTIVITIES:
  - PE 0207163N, AMRAAM;
  - PE 0604727N, JSOW
  - PE 0604270N, EW Development
  - PE 0604777N, Navigation ID System, project X0921, NAVSTAR GPS equipment
  - PE 0305141D, BQH Communications

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204136N
PROGRAM ELEMENT TITLE: F/A-18 SQUADRONS

PROJECT NUMBER: E1662
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
PROCUREMENT: (F/A-18C/D, FY95 PRES BUDGET, Lines 5, 6, 25, and 48)									
• (U) QTY	36	36	24	24	24	0	0	0	144
• (U) APN-1	1,244,258	1,648,039	1,117,160	1,183,328	1,307,711	48,507	0	0	6,549,003
• (U) APN-5	70,292	48,833	86,088	68,550	53,666	303,015	315,774	CONT.	CONT.
• (U) APN-6	89,826	88,148	50,205	43,055	40,160	0	0	0	311,394

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

J. (U) TEST AND EVALUATION: A DT/OT will be of the FOT&E (OT-III) variety.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204136N
PROGRAM ELEMENT TITLE: F/A-18 SQUADRONS

PROJECT NUMBER: E2065
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: F/A-18 RADAR Upgrade

PICTURE NOT AVAILABLE

POPULAR NAME: RUG

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204136N
PROGRAM ELEMENT TITLE: F/A-18 SQUADRONS
PROJECT NUMBER: E2065
BUDGET ACTIVITY: 7
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	LRIP-2 8/93	PDR PHII 4/94	III 8/95	IOC 10/95				
ENGINEERING MILESTONES		LRIP-3 6/94						
T&E MILESTONES	DT-IIB/OT-IIA 12/92	DT-IIC 12/93 OT-IIB 12/93	OT-IIC 1/95 DT-III 2/95	OT-III 11/95	FOT&E 10/97			
CONTRACT MILESTONES	LRIP-2 8/93	PHII/LRIP-3 4/94 6/94	FRP 8/95					

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	129,647	29,000	34,694	28,331	24,843	7,124	419	0	254,058
SUPPORT CONTRACT	0	0	0	0	0	0	0	0	0
IN-HOUSE SUPPORT	0	176	89	68	68	109	31	0	541
GFE/ OTHER	5,881	8,866	11,240	12,218	1,542	3,086	2,281	0	45,114
TOTAL	135,528	38,042	46,023	40,617	26,453	10,319	2,731	0	299,713

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The F/A-18 radar (AN/APG-65), requires an upgrade to improve electronic counter-countermeasure (ECCM) performance against improved threat electronic countermeasures (ECM). This threat ECM improvement has partially resulted from compromises in the F/A-18 radar performance against various threat electronic warfare systems. The AN/APG-73 radar follows and capitalizes on AN/APG-70 and AN/APG-71 developmental and value engineering programs to maximize shop replaceable assembly (SRA) commonality. A Pre-planned Product Improvement (P3I) Phase II program will develop improved hardware and software for an all-weather Reconnaissance (RECCE) strip map mode.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204136N
PROGRAM ELEMENT TITLE: F/A-18 SQUADRONS

PROJECT NUMBER: E2065
BUDGET ACTIVITY: 7

Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($29,000) Product Development: Completed contractor flight testing of hardware and software designs.
- (U) ($176) Provided completed In-house engineering support.
- (U) ($8,866) Test and Evaluation: Conducted DT/OT Readiness Review prior to conclusion of the APG-73 Phase I contract. Completed operational testing OT-IIA phase.

2. (U) FY 1994 PLAN:

- (U) ($11,210) Product Development: Complete Phase I hardware and software development. Complete physical configuration audit for Phase I.
- (U) ($22,384) Product Development: Initiate Phase II hardware and software development program which is required to integrate an all weather reconnaissance capability into the AN/APG-73 RADAR (in lieu of a side looking radar pod).
- (U) ($89) Continue in-house engineering support PH I.
- (U) ($1,100) Commence in-house engineering support PH I.
- (U) ($11,240) Test and Evaluation for Phase I: Commence and complete TECHEVAL (DT-IIC). Complete OT-IIB (Joint Canadian/Navy Operational Assessment). Complete Verification and Validation (V&V).

3. (U) FY 1995 PLAN:

- (U) ($28,331) Product Development: Continue Phase II development efforts.
- (U) ($68) Continue in-house engineering support.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204136N
PROGRAM ELEMENT TITLE: F/A-18 SQUADRONS
PROJECT NUMBER: E2065
BUDGET ACTIVITY: 7
Date: 7 February 1994

- (U) ($10,000) Test and Evaluation: Commence and complete OT-IIC (Navy only OPEVAL).
- (U) ($2,218) Test and Evaluation for Phase II: Complete DT-III (Insurv). Complete Production Readiness Review.

4. (U) PROGRAM TO COMPLETION:
   - (U) Complete Phase I, IOC in FY96. Continue DT and OT of Phase II (RECCE Strip Map Mode); complete FOT&E; and develop hardware and software through FRP approval.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA; NAVAIRWARCENACDIV, Lakehurst, NJ; NAVAIRWARCENWPNDIV, China Lake, CA; NAVWPNENGSUPACT, Washington, D.C.; NAVAIRWARCENACDIV, Point Mugu, CA; NAVAIRWARCENACDIV, Patuxent River, MD; NRL, Washington, DC. CONTRACTORS: McDonnell Douglas Aircraft Company, St. Louis, MO (Airframe and Weapon System Integration); Hughes Aircraft Company, Culver City, CA (Radar subcontractor to McDonnell).

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Radar software development was delayed 5 months resulting in OT-IIB (Joint Canadian/US OPEVAL) being delayed from October 93 to December 93. Milestone III (Full Rate Production) was adjusted from March 95 to August 95 to allow for completion of OT-IIC (Navy-only OPEVAL) which is scheduled for commencement in January 95.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: OR #022-05-83, promulgated 25 Jun 84 and OR #199-05-88, promulgated 27 Jan 88.

G. (U) RELATED ACTIVITIES:
- PE 0205667N, F-14D Radar Upgrade is directly related to the AN/APG-65 upgrade due to hardware (SRA) commonality.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)
- (U) This information is included in project E1662.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable (The Canadian MOU completes in FY94).

J. (U) TEST AND EVALUATION: A TEMP revision to accommodate a combined DT-IIB/OT-IIC and Phase II is currently in draft.

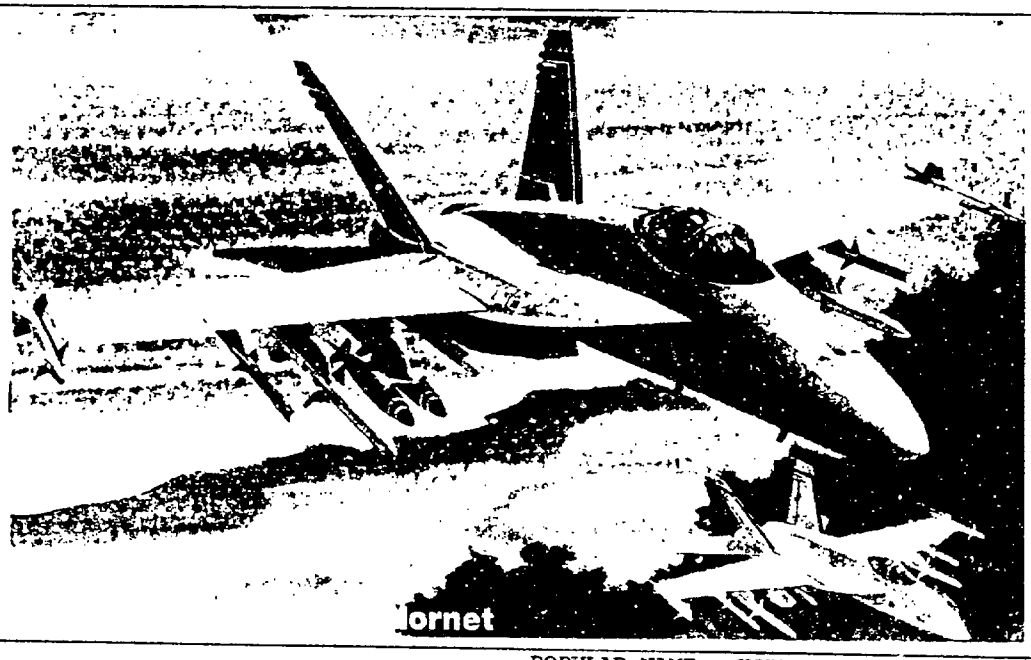
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204136N
PROGRAM ELEMENT TITLE: F/A-18 SQUADRONS

PROJECT NUMBER: E2130
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: F/A-18 FOLLOW-ON VARIANT



POPULAR NAME: HORNET

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204136N
PROGRAM ELEMENT TITLE: F/A-18 SQUADRONS

PROJECT NUMBER: E2130
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES				NPR 2Q96	MS IIIA 2Q97	NPR 2Q98	NPR 2Q99	MS III 2Q00
ENGINEERING MILESTONES	PDR 6/93	CDR-ENG 3/94 CDR 6/94	PFQ 3/95 PRR 9/95	OP Assess 2Q96				
T&E MILESTONES	1ST Engine Test 5/93			1ST FLT 1Q96	OT-IIA 2Q97	OT-IIB 2Q98	OT-IIC 3Q99	
CONTRACT MILESTONES				Long Lead 2Q96	LRIP-1 2Q97	LRIP-2 2Q98	LRIP-3 2Q99	FRP 3Q00

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	332,171	762,640	1,324,091	1,280,947	526,599	229,428	138,270	100,951	5,365,200 (670,103)
SUPPORT CONTRACT	1,320	2,255	3,634	3,519	2,484	2,254	1,435	213	19,557 (2,443)
IN-HOUSE SUPPORT	15,494	20,388	30,343	43,923	53,986	26,114	6,528	4,956	230,524 (28,792)
GFE/ OTHER	8,893	57,801	38,673	20,093	34,664	45,125	12,936	19,043	271,086 (33,858)
TOTAL	357,878	843,084	1,396,741	1,348,482	617,733	302,921	159,169	125,163	5,886,367 (735,196)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
The F/A-18 is a twin-engine, mid-wing, multi-mission, tactical aircraft employed in Navy and Marine Corps strike fighter squadrons. The F/A-18, through selected use of external equipment is designed for flexibility in fighter, attack, fleet air defense, and close air support roles. The F/A-18 E/F variant is an upgrade to the night attack "C" and "D" models. The F/A-18 E/F will be the second major upgrade since the program's inception. The F/A-18 E/F incorporates modification to the air vehicle to increase mission radius, payload flexibility, improve survivability, increase carrier recovery payload and growth potential. This will allow the F/A-18 to continue to adapt its strike fighter role to evolving threats into the next century.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204136N
PROGRAM ELEMENT TITLE: F/A-18 SQUADRONS

PROJECT NUMBER: E2130
BUDGET ACTIVITY: 7

Date: 7 February 1994

The F/A-18 E/F E&MD program is under a Congressional mandated cost cap of $4.883B FY90 dollars. Pre-development effort of $44.1M in FY90 base year dollars, previously funded under the F/A-18 C/D program, is reflected in the RDT&E total, but is not included in the approved $4.883B development cap.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($764,895) Continued all engineering and manufacturing design activity leading to the development of the airframe and engine. Conducted Preliminary Design Review. Conducted flight simulation.
- (U) ($20,388) Definitized E&MD contracts. Conducted systems engineering development, materials engineering, ILS support, design engineering, and simulation.
- (U) ($57,801) Conducted various test efforts including: first engine testing/engine development tests, preproduction component tests, wind tunnel test, flight test support, and operations test. Procured GFE items required for development effort.

2. (U) FY 1994 PLAN:

- (U) ($1,327,725) Continue engineering and manufacturing design activity leading to the development of the airframe and engine. Complete Critical Design Review (airframe and engine). Complete structural Assembly Layouts. Start major assembly aircraft #1. Release 90% structural design - aircraft #1.
- (U) ($30,343) Continue to conduct systems engineering development, materials engineering, ILS support, design engineering, and simulation.
- (U) ($38,673) Continue to conduct various test efforts including: first engine testing/engine development tests, preproduction component tests, wind tunnel test, flight test support, and operations test. Continue to procure GFE items required for development effort.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204136N
PROGRAM ELEMENT TITLE: F/A-18 SQUADRONS
PROJECT NUMBER: E2130
BUDGET ACTIVITY: 7
Date: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) ($1,284,466) Continue engineering and manufacturing design activity leading to the development of the airframe and engine. Start final assembly aircraft #1. Aircraft #1 engines available for install. Conduct Pre-flight Qualify (PFQ).
- (U) ($43,923) Conduct Program Readiness Review. Begin engineering delivery acceptance.
- (U) ($20,093) Complete flight test readiness review. Complete static test article ground test. Complete symmetrical pullup.

4. (U) PROGRAM TO COMPLETION:

- (U) Continue engineering and manufacturing design activity leading to the development of the airframe and engine. Qualify engines for limited and full rate production. Complete drop, static, and fatigue life testing. Complete contractor flight testing. Complete physical configuration audit. Conduct development flight tests through completion of TECHEVAL.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA; NAVAIRWARCENACDIV, Lakehurst, NJ; NAVAIRWARCENACDIV, Trenton, NJ; NAVSURFWARCENDIV, Indian Head, MD; NAVAIRWARCENWPNDIV, China Lake, CA; NAVWPNENGSUPACT, Washington, D.C.; NAVAIRWARCENWPNDIV, Point Mugu, CA; NAVAIRWARCENACDIV, Patuxent River, MD; NRL, Washington, D.C.; OPTEVFOR, Norfolk, VA; NAVAIRWARCENDIV, Indianapolis, IN; NATSF, Philadelphia, PA; PSD, North Island, CA. CONTRACTORS: McDonnell Douglas Aircraft Company, St. Louis, MO (Airframe and Weapon System integration); General Electric Company, Lynn, MA (F-414 Engine); Hughes Aircraft Company, Culver City, CA (Radar subcontractor to McDonnell); Northrop Aircraft Division, Hawthorne, CA (center/aft fuselage subcontractor to McDonnell).

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not available for comparison.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204136N
PROGRAM ELEMENT TITLE: F/A-18 SQUADRONS

PROJECT NUMBER: E2130
BUDGET ACTIVITY: 7

Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION: ORD (19 December 1991) Temp (5 May 92); IPS (26 Feb 92); and APB (11 Jun 92).

G. (U) RELATED ACTIVITIES:
- (U) PE 0207163N AMRAAM
- (U) PE 0604727N Joint Standoff Weapons Systems
- (U) PE 0604270N EW Development
- (U) PE 0604777N Navigation/ID System
- (U) PE 0305141D Joint UAV
- (U) PE 0603261N Tactical Airborne Reconnaissance
- (U) PE 0204163N Fleet Communications

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(J) PROCUREMENT: (F/A-18E/F, FY95 PRES BUDGET, Lines 6 and 48.)									
• (U) A/C QTY	0	12	24	36				928	1,000
• (U) APN-1	353,167	2,138,617	3,078,071	3,654,531				67,380,440	76,604,826
• (U) APN-6	0	77,525	51,137	112,637				6,395,386	6,636,685

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

J. (U) TEST AND EVALUATION: In FY 1996, complete first flight.

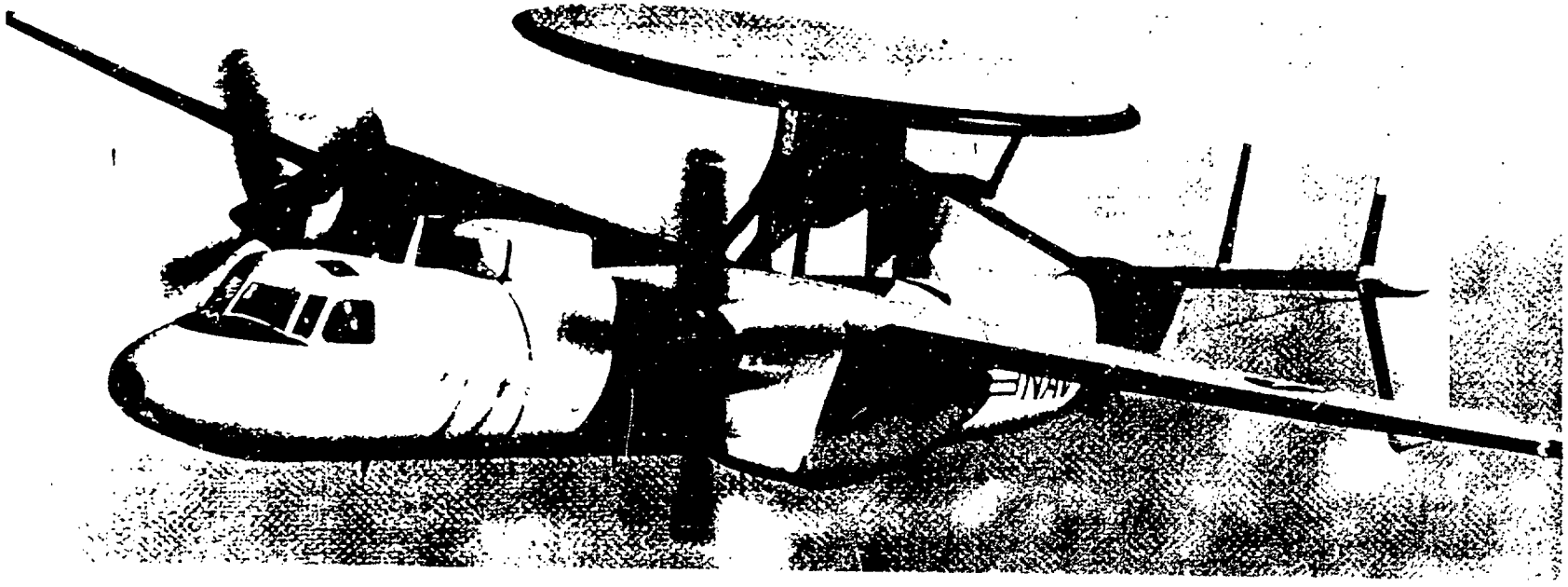
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204152N
PROGRAM ELEMENT TITLE: E-2 SQUADRONS

PROJECT NUMBER: E0463
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: E-2C IMPROVEMENTS



POPULAR NAME: E-2C HAWKEYE

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204152N
PROGRAM ELEMENT TITLE: E-2 SQUADRONS

PROJECT NUMBER: E0463
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		UDP GPII MS III 4/94 MCU MS IV/II 4/94						MCU MS III 1/00
ENGINEERING MILESTONES	MCU SSS 7/93	MCU SDR 7/94 MCU CDR	MCU PDR 6/95 9/95					
T&E MILESTONES	UDP GPII OT-IID 3/93	UDP GPII OT-III 6/94	UDP GPII OT-IV 6/95	MCU DT/OT 6/96	MCU DT/OT 4/97	MCU DT/OT 1/98		
CONTRACT MILESTONES		MCU AWARD 6/94			LRIP 1/97	LRIP 1/98		FRP 4/00

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	254,800	0	12,777	51,107	57,340	44,201	16,734	0	436,959
SUPPORT CONTRACT									
IN-HOUSE SUPPORT	100	100	85	100	100	100	100	0	685
GFE/ OTHER	91,548	6,252	5,219	7,553	9,569	13,902	5,208	0	139,251
TOTAL	346,448	6,352	18,081	58,760	67,009	58,203	22,042	0	576,895

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204152N
PROGRAM ELEMENT TITLE: E-2 SQUADRONS
PROJECT NUMBER: E0463
BUDGET ACTIVITY: 7
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project provides preplanned product improvements for the evolution of E-2C airborne weapon system capabilities in support of naval warfare command and control requirements. It funds development for the modification/replacement of selected weapon replaceable assemblies of current installed subsystems. Additionally, applying ongoing developments and non-developmental items (NDI) where available, it funds integration and testing of new subsystems for meeting naval and national tasking requirements during the remainder of the E-2C service life. Included in this Update Development Program (UDP) are two sub-projects, UDP Groups I and II to be followed by a mission computer upgrade (MCU). Group I improved electronic countermeasures in the radar subsystem and increased target track capacity. Group II extends radar detection range, and improves target identification capability and information processing to assist operator workload. MCU, applying ongoing developments in data processing and target detection, will relieve current bottlenecks in signal and data processing and will permit incorporation of additional functional capabilities to satisfy evolving operational requirements, e.g., Cooperative Engagement and satellite communications.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($3,200) Completed Technical Evaluation (TECHEVAL) for UDP Group II (DT-IID).
- (U) ($1,600) Conducted Operational Evaluation (OPEVAL) for UDP Group II (OT-IID).
- (U) ($1,552) Developed and promulgated System Segment Specification (SSS) for MCU.

2. (U) FY 1994 PLAN:

- (U) ($0) Establish UDP Group II baseline at Milestone III (MSIII).
- (U) ($0) Authorize development Mission Computer Upgrade (MCU) at Milestone IV/II (MS IV/II).
- (U) ($0) Award MCU contract for Engineering and Manufacturing Development (E&MD).
- (U) ($4,520) Initiate hardware design and fabrication for MCU engineering development models (EDM).
- (U) ($9,945) Initiate development of tactical software for MCU EDMs.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204152N
PROGRAM ELEMENT TITLE: E-2 SQUADRONS
PROJECT NUMBER: E0463
BUDGET ACTIVITY: 7
Date: 7 February 1994

- (U) ($2,616) Initiate aircraft integration design for MCU EDMs.
- (U) ($500) Establish Functional Baseline
- (U) ($500) Conduct System Design Review

3. (U) FY 1995 PLAN:

- (U) ($14 [illegible]0) Continue hardware design and fabrication.
- (U) ($6,442) Continue tactical software development.
- (U) ($5,876) Continue aircraft integration design.
- (U) ($10,752) Early operational assessment in laboratory (T&E).
- (U) ($500) Conduct Preliminary Design Review.
- (U) ($500) Conduct Critical Design Review.

4. (U) PROGRAM TO COMPLETION:

- (U) Complete hardware fabrication & integration.
- (U) Complete tactical software development.
- (U) Complete aircraft hardware/software integration.
- (U) Complete Contractor (CT), Development (DT) and Operational (OT) Testing (CT,DT/OT).
- (U) Procure Production Representative MCUs for TECHEVAL/OPEVAL.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204152N
PROGRAM ELEMENT TITLE: E-2 SQUADRONS
PROJECT NUMBER: E0463
BUDGET ACTIVITY: 7
Date: 7 February 1994

- (U) Conduct periodic audits and reviews of development progress.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Patuxent River, MD; NRL, Washington, DC; NCCOSC RDTE DIV, San Diego, CA; NAVAIRWARCENACDIV, Warminster, PA; NAVAIRWARCENACDIV, Lakehurst, NJ. CONTRACTORS: Grumman Aerospace Corporation, Bethpage, NY.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:
OR 31-2012-66
DCP (Rev 1)6/71
DCP W-0463-AA12-90
TEMP 760 (Rev 4)12-90
TEMP 760 (Rev 5)In Process
TEMP 1431 MCU In Process

G. (U) RELATED ACTIVITIES:

- (U) PE 0602232N, Command, Control and Communications Technology, PE 0602111N, Surface/Aerospace Survivability and Weapons Technology.
- (U) PE 0603755N, Ship Self Defense, Cooperative Engagement. This PE will fund the R&D efforts to integrate the CE hardware and software into the E-2C. CE will also fund the procurement of equipment, software, and installation costs.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204152N
PROGRAM ELEMENT TITLE: E-2 SQUADRONS

PROJECT NUMBER: E0463
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) APN Lines 1/6	94,786	37,781	327,428	330,830	342,596	352,170	361,692	0	7,467,600
• (U) APN Line 5	82,396	114,103	187,139	35,890	119,680	208,913	192,496	CONT.	CONT.
• (U) APN Line 6	2,598	0	11,542	15,421	12,849	13,048	6,599	0	436,100

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

• (U) This cooperative project involves the Egyptian Air Force and the US Navy. The MOU was signed 15 May 91. The project includes design, coding, integration and testing of an Egyptian Air Force (EAF) full capability L-304 mission computer program to implement functions which maximize the tactical capabilities of the Enhanced Main Display Unit.

• (U) Project planning efforts have been initiated by the Program Executive Officer, Tactical Aircraft Programs and Naval Command, Control and Ocean Surveillance Center, Research, Development Test and Evaluation Division (NRaD), San Diego, CA. Software engineering changes were approved by the Steering Group in Nov 92. The Design Working Group is taking action on the approved changes. The program has been funded by Nunn Program (PE 0603790D) and Egyptian National funds. At this time there is no U.S. corporate involvement.

J. (U) TEST AND EVALUATION:

- (U) UDP II/OT-IID; March 1993
- (U) UDP II/OT-III; June 1994
- (U) UDP II/OT-IV; June 1995

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N
PROGRAM ELEMENT TITLE: Fleet Communications
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0661 Combination Radio	3,663	435	0	0	0	0	0	0	52,808
X0725 Communication Automation	8,638	4,197	557	959	3,118	3,194	3,271	CONT.	CONT.
X2074 Communication Support System	5,966	8,039	8,404	8,264	3,592	3,568	2,572	CONT.	CONT.
X2083 Shipboard SINCGARS/VHF Relay Pallet	4,372	2,138	2,397	899	0	0	0	0	19,928
X1083 Shore to Ship Communications System	17,343	16,663	23,701	17,342	12,278	15,090	12,906	CONT.	CONT.
X0792 ELF Communications	568	593	1,604	1,269	1,251	1,284	1,316	CONT.	CONT.
X0795 Support of MEECN	1,286	1,227	1,279	1,298	1,312	1,348	1,383	CONT.	CONT.
TOTAL	41,836	33,292	37,942	30,031	21,551	24,484	21,448	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program develops an anti-jam radio system incorporating shipboard interfaces, interference mitigation, radio frequency distribution (including antennas), high speed burst data transmission and relocatable Very High Frequency (VHF) relay. The Communication Support System (CSS) develops the architecture for an integrated Navy Communication system for Ship-to-Shore and Shore-to-Ship communications defined as the Copernicus TADIXS and prototypes Early Operational Capabilities. It provides for integration of Electronic Counter-Counter Measures radios in Navy ships and replaces existing antiquated VHF (Frequency Modulated) radios. Develops communications systems elements which provide positive command and control of deployed ballistic missile submarines (SSBNs). The Extremely Low Frequency (ELF) Communications System provides the Navy with a highly reliable means of transmitting short messages from submarine command authorities in the CONUS to submarines. Minimum Essential Emergency Communications Network (MEECN) is the Tri-Service transmission system which ensures delivery of Emergency Action Messages (EAM) to our strategic platforms.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N
PROGRAM ELEMENT TITLE: Fleet Communications
PROJECT NUMBER: X0725
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X0725, Communication Automation. This project is a continuing program that provides for automating and communications upgrades for Fleet Tactical Communications. Two developments currently in process are:

- (U) Navy Modular Automated Communications System (NAVMACS): Automates the message receiving, distribution and preparation functions aboard ships.

- (U) High Speed Fleet Broadcast (HSFB): Resolves long standing throughput and system flexibility shortcomings by replacing the existing Fleet Broadcast with a more efficient, volume responsive broadcast.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) HSFB: ($6,991) Procured developmental and operational test systems to equip one communications area and two battlegroups to support a formal Development Test/Operational Test(DT/OT).

- (U) NAVMACS: ($1,647) Began rehosting the NAVMACS II software from the DTC-2 computer system to the TAC-3 computer system. Began structuring software to maximize information security properties.

(U) FY 1994 PLAN:

- (U) HSFB: ($1,331) Resolved DT/OT and Milestone III test issues. Revise the procurement specification and awarded the production contract.

- (U) NAVMACS: ($2,866) Continued INFOSEC structure. Begin interfacing work to shipboard backbone LAN architecture including PC's. Begin efforts to evolve NAVMACS II into Communications Support Systems (CSS)/COPERNICUS baseline.

(U) FY 1995 PLAN:

- (U) NAVMACS ($557) Complete initial INFOSEC structure. Complete initial PC LAN interfacing. Continue evolution efforts into COPERNICAN architecture. Begin effort to accommodate emerging shipboard LAN enhancements as well as other communications enhancements.

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

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N PROJECT NUMBER: X0725
PROGRAM ELEMENT TITLE: Fleet Communications BUDGET ACTIVITY: 7

DATE: 7 February 1994

(U) WORK PERFORMED BY: IN-HOUSE: NAVELEXCEN, Portsmouth, VA. CONTRACTORS: RJO Enterprises Inc, Lanham, MD; SEMCOR, Arlington, VA; Validity, Landover, MD.

(U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 3050 Ship Comm Automation (NAVMACS Project Unit)	7,903	18,030	5,763	5,575	5,340	5,050	6,283	CONT.	CONT.
• (U) OPN Line 3050 Ship Comm Automation (HSFB Project Unit)	0	5,640	5,042	5,150	5,588	4,520	6,536	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N
PROGRAM ELEMENT TITLE: Fleet Communications

PROJECT NUMBER: X2074
BUDGET ACTIVITY: 7

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X2074, Communication Support System. This project is an initiative to develop the Copernicus Tactical Data Information Exchange Subsystem (TADIXS) concept, an integrated Navy communication system architecture based on shared use of links and multimedia networks. It will provide increased communication survivability, throughput and security. Communications Support System (CSS) will further integrate the approach to research, development, acquisition and deployment of a total Command, Control and Communications Intelligence (C3I) system supporting Navy missions. The work to be performed is a system engineering effort that generates engineering solutions and guidelines, prototyping and early operational capabilities, and transition plans involving all current and planned Navy communication systems.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,366) Completed CSS Requirements Document, Operational Concept, Architecture, System Specification, and Security Policy.
- (U) ($1,500) Prototyped initial Integrated Network Manager (INM).
- (U) ($1,200) Prototyped CSS functionality, integrated circuit switch Integrated services digital Network (ISDN) technology into Automated Integrated Communication System (AICS) Advanced Technology Demonstrations (ATD) and tested at Wallops Island.
- (U) ($500) Developed a CSS user level encryption specification.
- (U) ($1,400) Completed Early Operational Capability (EOC) II equipment and software prototype.

(U) FY 1994 PLAN:

- (U) ($1,000) Add Light Airborne Multi Purpose system (LAMPS), Joint Tactical Information Distribution system (JTIDS) and Common Data Link (CDL) in CSS architecture.
- (U) ($2,000) Design resource planning, monitoring, and management subsystem to the INM.
- (U) ($1,100) Design multimedia mission area subnet virtual network for Space and Electronic Warfare Commander (SEWC).

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N
PROGRAM ELEMENT TITLE: Fleet Communications
PROJECT NUMBER: X2074
BUDGET ACTIVITY: 7
DATE: 7 February 1994

- (U) ($500) Explore Asynchronism Transfer Mode (ATM) technology for dynamic internetting.
- (U) ($600) Develop profiles for digital, voice, and video users.
- (U) ($?,200) Design and fabricate EOC III prototype.
- (U) ($63?) Install and test EOC II.

(U) FY 1995 PLAN:

- (U) ($1,500) Develop interface with Global Grid.
- (U) ($1,704) Complete planning for Joint Network Manager topology.
- (U) ($1,200) Finalize Multilevel Security Design IAW Joint Architecture.
- (U) ($1,300) Investigate, in lab, advanced commercial communications products.
- (U) ($1,500) Install and test EOC III.
- (U) ($1,200) Design EOC IV.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC.; NCCOSC RDTE DIV, San Diego, CA.; NAVELEXCEN, Portsmouth, VA.; NESEA, St. Inigoes, MD. CONTRACTORS: MITRE Corp., McLean, VA; Harris Corp. Melbourne, FL.

(U) RELATED ACTIVITIES:

- (U) Shared Adaptive Internet Technology (SAINT), Communications Shared Network Interface (CSNI) (NATO)
- (U) PE 0205604N, Tactical Data Links

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N
PROGRAM ELEMENT TITLE: Fleet Communications

PROJECT NUMBER: X2074
BUDGET ACTIVITY: 7

DATE: 7 February 1994

- (U) PE 0303109N, Satellite Communications
- (U) PE 0303140N, Information Systems Security Plan.
- (U) CSS is the systems engineering effort which brings all these implementing programs into a single communications architecture.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

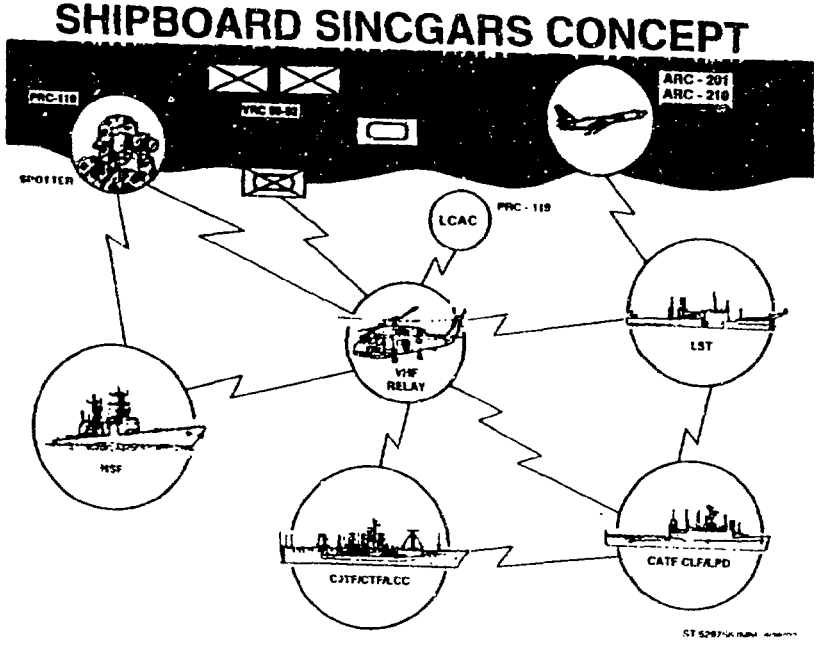
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N
PROGRAM ELEMENT TITLE: Fleet Communications

PROJECT NUMBER: X2083
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: Shipboard SINCGARS/VHF Relay Pallet



POPULAR NAME: Shipboard SINCGARS

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N PROJECT NUMBER: X2083 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Fleet Communications BUDGET ACTIVITY: 7

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES			Relay Seg MSII 11/94		System MS III 12/96	FOC		30/00
ENGINEERING MILESTONES								
T&E MILESTONES		Relay OP Assessment 7/94		Mitigation Equip FAT 11/96				
CONTRACT MILESTONES								

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT SUPPORT CONTRACT	0	344	330	250	100				1,024
IN-HOUSE SUPPORT	10,063	4,025	1,793	2,132	794				18,807
GFE/ OTHER	159	3	15	15	5				197
TOTAL	10,122	4,372	2,138	2,397	899				19,928

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Provide Very High Frequency (Frequency Modulation) (VHF) (FM) jam resistant communications and digital Communications Terminals (DCTs) for Naval Surface Fire Support and Amphibious Ships, and a VHF airborne relay capability for beyond line-of-sight communications. This development will provide communications between Naval amphibious and gun fire support ships supporting Marine Corps and Army ground forces. Shipboard SINCGARS is based on the SINCGARS radios developed by the Army and the required interface and interference mitigation equipment to allow this equipment to operate in a multi-channel shipboard and airborne relay environment is being developed.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N
PROGRAM ELEMENT TITLE: Fleet Communications
PROJECT NUMBER: X2083
BUDGET ACTIVITY: 7
Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,182) Tested and certified single channel shipboard SINCGARS with Shipboard Interface Unit.
- (U) ($2,870) Continued fabrication of 3 airborne relay engineering development models (EDM).
- (U) ($320) Began development of co-site Interference Mitigation Unit.

2. (U) FY 1994 PLAN:

- (U) ($1,731) Complete Fabrication of Airborne Relay EDMs and begin Development Tests/Operational Tests (DT/OT).
- (U) ($407) Continue development of co-site interference mitigation equipment and other shipboard issues. Issue request for proposals (RFP) for first article models.

3. (U) FY 1995 PLAN:

- (U) ($1,200) Correct any DT/OT deficiencies and complete Milestone II for the Relay unit.
- (U) ($1,197) Resolve remaining shipboard co-site interference issues.

4. (U) PROGRAM TO COMPLETION: ($899) Correct overall system deficiencies.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCEN, Indianapolis, IN; NAVAIRWARCEN, Warminster, PA; NAVELEXCEN, Portsmouth, VA; NESEA, St Inigoes, MD; NRL, Washington, DC. CONTRACTORS: VITRO, Silver Spring, MD; MITRE Corp, Reston, VA; Vredenburg, Reston, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N
PROGRAM ELEMENT TITLE: Fleet Communications

PROJECT NUMBER: X2083
BUDGET ACTIVITY: 7

Date: 7 February 1994

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- TOR 135-094-85 12/86
- TEMP 706-1

G. (U) RELATED ACTIVITIES: PE 0604805A, SINCGARS-Army is the lead service for tri-service efforts to insure SINCGARS interoperability among services and platforms. The receiver-transmitter units to be integrated into the Shipboard System will be acquired from the Army production contract.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) OPN Line-Ship Items Under 2M	997	0	0	0	0	0	0	0	997
(U) OPN Line-SINCGARS	7,274	13,749	13,171	15,153	15,936	14,445	CONT.	CONT.	

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

J. (U) TEST AND EVALUATION:

- (U) Approved Test and Evaluation Master Plan (TEMP) 11/93
- (U) Ship Test and Certification 10/93
- (U) Relay Segment DT/OT 07/94
- (U) Interference Mitigation Unit DT/OT 11/96

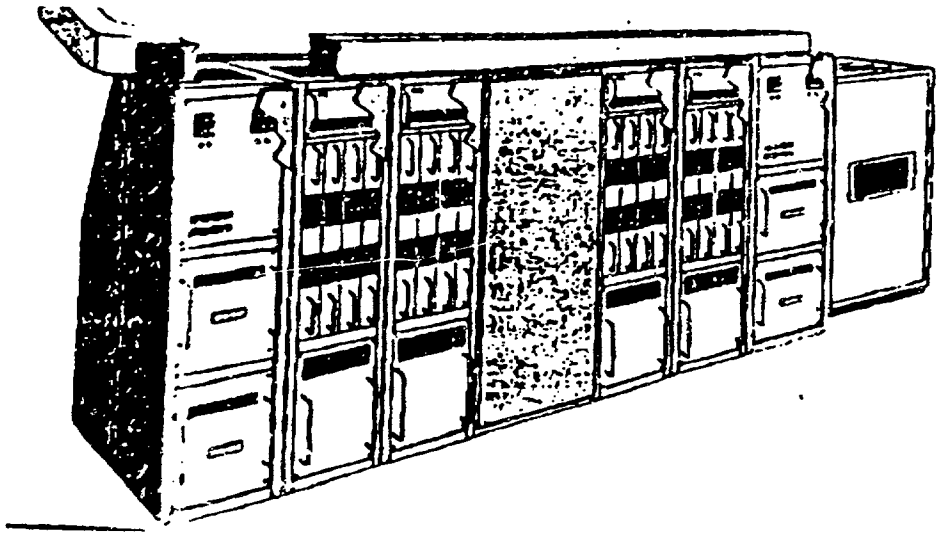
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N
PROGRAM ELEMENT TITLE: Fleet Communications

PROJECT NUMBER: X1083
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: Shore to Ship Communications System



POPULAR NAME: SLVR VME, SCAP, VERDIN, & SSPAR

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N
PROGRAM ELEMENT TITLE: Fleet Communications

PROJECT NUMBER: X1083
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES					SLVR MSIII 10/97			
ENGINEERING MILESTONES	SLVR SRR 7/93 SSPAR SRR 10/93	SLVR SDR 2/94 SLVR PDR 9/94	SLVR CDR 7/95 SSPAR CDR 12/95 SSPAR CDR 12/95					
T&E MILESTONES		SLVR TECHEVAL 7/96		SLVR OPEVAL 10/96-2/97				
CONTRACT MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	9,170	7,522	7,936	4,976	1,331	1,351	1,355	CONT.
SUPPORT CONTRACT	250	200	207	215	222	230	240	CONT.
IN-HOUSE SUPPORT	7,923	8,941	15,558	12,151	10,725	13,509	11,811	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	CONT.
TOTAL	17,343	16,663	23,701	17,342	12,278	15,090	12,906	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project develops communications systems elements which provide positive command and control of deployed ballistic missile submarines (SSBNs). This program provides enhancements to the shore-to-ship transmitting systems, shipboard receiver systems, and development of the Submarine Low Frequency (LF)/Very Low Frequency (VLF) Versa Module Eurocard (VME) Receiver (SLVR) System (formerly the Advanced VLF/LF VME (AVR/VME) receiver system). Continuing evaluation of this communications system is provided via the Strategic Communications Assessment Program (SCAP). Fixed VLF/LF develops an energy efficient, solid state, power amplifier for the VLF shore based transmitters of the submarine broadcast system, investigates improvement of the radio frequency high voltage insulators used

in these stations through the High Voltage Insulator Program (HVIP), and measures and analyzes atmospheric noise and signal propagation through the Coverage Prediction Improvement Program (CPIP).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,318) Continued SCAP, HVIP, and CPIP atmospheric studies.
- (U) ($1,060) Validated 3-D electric field prediction program and continued non-ceramic HVI tests and insulator studies.
- (U) ($1,077) Continued VLF test bed analysis.
- (U) ($6,799) Completed SLVR System Requirements Review (SRR).
- (U) ($6,089) Began the Solid State Power Amplifier Replacement (SSPAR) Program development effort.
- (U) ($1,000) Began SLVR development effort.

2. (U) FY 1994 PLAN:

- (U) ($1,646) Continued SCAP, HVIP, and CPIP atmospheric studies.
- (U) ($894) Continued validation of 3-D electric field prediction program and HVIP tests and new high voltage Radio Frequency (RF) insulator materials investigation.
- (U) ($600) Converted and approved CVLF program documentation for SLVLR including the Operational Requirements Document (ORD) and Acquisition Strategy Report (ASR).
- (U) ($7,600) Completed Preliminary Design Review (PDR) of SLVR E&MDM.
- (U) ($816) Continued VLF Test Bed Analysis.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N
PROGRAM ELEMENT TITLE: Fleet Communications
PROJECT NUMBER: X1083
BUDGET ACTIVITY: 7
Date: 7 February 1994

- (U) ($4,907) Began SSPAR SRR.
- (U) ($200) Conduct Cutler Bandwidth Enhancement reactor driver testing.

3. (U) FY 1995 PLAN:

- (U) ($1,500) Complete PDR of SSPAR E&MDM.
- (U) ($1,500) Conduct Contract Design Review (CDR) for SSPAR.
- (U) ($4,632) Continue development of software documentation and coding for SLVR.
- (U) ($5,100) Continue development of custom hardware for SLVR.
- (U) ($2,800) Continue development of SLVR crypto interface capability.
- (U) ($1,801) Conduct Critical Design Review (CDR) for SLVR.
- (U) ($905) Continue SCAP efforts.
- (U) ($1,155) Continue VLF Test Bed Analysis.
- (U) ($400) Continue CPIP atmospheric studies.
- (U) ($487) HVIP insulator/bushing development and test.
- (U) ($3,421) SSPAR E&MD design and development continuing with CDR and start fabrication.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDTE DIV, San Diego, CA; NRL, Washington, DC; NISE WEST, Vallejo, CA; NAVSURFWARCENDIV, Crane, IN; NAVCIVENGLAB, Port Hueneme, CA. CONTRACTORS: MITRE Corp., McLean, VA; Johns Hopkins University Applied Physics Laboratory, Laurel, MD; C-Cubed Corp., Arlington, VA; Technology Services Corp., Silver Spring, MD.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N
PROGRAM ELEMENT TITLE: Fleet Communications

PROJECT NUMBER: X1083
BUDGET ACTIVITY: 7

Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

• SLVR Acquisition Plan AP	9/95
• SLVR ORD/ASR	11/93
• SSPAR AP	9/91
• SSPAR OR	10/91
• SSPAR Temp	9/93

G. (U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 3107 Shore LF	3,799	3,641	3,851	12,665	12,208	12,455	12,394	CONT.	CONT.
• (U) OPN Line 3147 Advanced VLF Receiver	0	0	0	0	0	53,361	47,620	CONT.	CONT.
• (U) O&M,N	4,357	4,627	5,038	5,121	5,031	5,378	5,609	CONT.	CONT.

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

J. (U) TEST AND EVALUATION: SSPAR and SLVR T&E of E&MD in FY 96/97.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

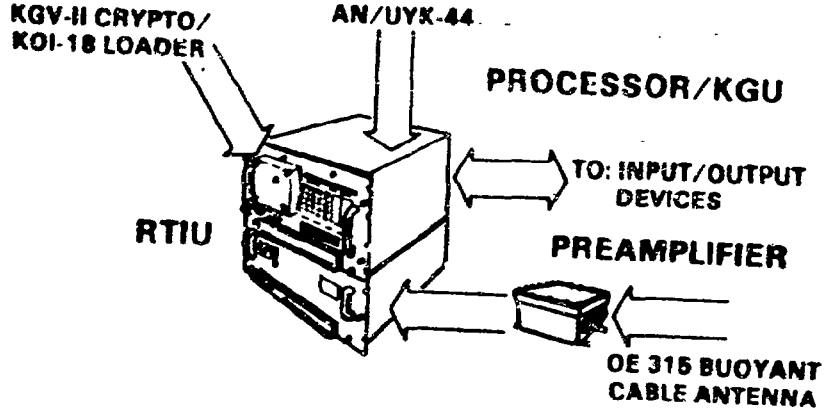
PROGRAM ELEMENT: 0204163N
PROGRAM ELEMENT TITLE: Fleet Communications

PROJECT NUMBER: X0792
BUDGET ACTIVITY: 7

DATE: 7 February 1994

PROJECT TITLE: ELF Communications

ELF RECEIVER TERMINAL GROUP OR-279/BRR



POPULAR NAME: ELF Communications

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N
PROGRAM ELEMENT TITLE: Fleet Communications
PROJECT NUMBER: X0792
BUDGET ACTIVITY: 7
Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($162) Completed Receiver Software Baselining.
- (U) ($200) Completed Software Recompilation.
- (U) ($206) Developed Operational Concept for EDR.

2. (U) FY 1994 PLAN:

- (U) ($393) Complete Advanced Demonstration of EDR.
- (U) ($200) Complete Preliminary Design Review for EDR.

3. (U) FY 1995 PLAN:

- (U) ($1,200) Conduct Critical Design Review of EDR.
- (U) ($404) Start Validation and Certification Testing of EDR.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCENDET, New London, CT.; NAVELEXCEN, Charleston, SC. CONTRACTORS: Not applicable.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:
1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not available for comparison.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N
PROGRAM ELEMENT TITLE: Fleet Communications
PROJECT NUMBER: X0792
BUDGET ACTIVITY: 7
Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:

• Navy Decision Coordination Paper (NDCP) MSII	10/84
• NDCP (MSIII)	6/87
• Navy Program Decision Memorandum (NPDM)	6/87
• Integrated Logistic Support Plan (ILSP)	6/87
• TEMP (Rev 3)	6/91

G. (U) RELATED ACTIVITIES: Not applicable

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

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

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N
PROGRAM ELEMENT TITLE: Fleet Communications

PROJECT NUMBER: X0795
BUDGET ACTIVITY: 7

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X0795, Support of MEECN. MEECN is the Tri-Service transmission system which ensures delivery of Emergency Action Messages (EAM) to our strategic platforms. Because of substantial downsizing in the number of MEECN assets such as the CINC Airborne Command Post (ABNCP) fleet, it is necessary to improve the range, timeliness and reliability of MEECN communications to maintain connectivity to the platforms. This project identifies, researches, and develops improvements to the MEECN primarily in the Very Low Frequency and Low Frequency (VLF/LF) ranges of MEECN. The MEECN Message Processing Mode (MMPM), which reduces transmission time while improving message delivery reliability at greater ranges, was developed under this project and is being implemented in the MEECN VLF/LF Systems. A new High Data Rate (HIDAR) mode which greatly reduces message transmission time, while providing the performance of low data rate modes, is being implemented. Potential improvements in mode design and signal processing are continually being investigated for MEECN application. Independent assessment, T&E support, and MEECN oversight are provided to other MEECN-related developments and efforts such as the Navy's Non-Linear Adaptive Processor (NONAP) development.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($460) Issued HIDAR Mode Standard.
- (U) ($182) Supported HIDAR Implementation in Enhanced Verdin System.
- (U) ($108) Reported on HIDAR/Block II Conflicts.
- (U) ($114) Initiated NONAP/Signal Separator Integration Study.
- (U) ($130) Collected buoy depth/signal phase data.
- (U) ($225) Investigated error correction for Fixed VLF (FVLF).
- (U) ($67) Investigated Frequency Scanning improvement techniques.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N
PROGRAM ELEMENT TITLE: Fleet Communications

PROJECT NUMBER: X0795
BUDGET ACTIVITY: 7

DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($232) Certify Enhanced Verdin System (EVS) HIDAR Implementation.
- (U) ($168) Support HIDAR Implementation in Advanced VLF Receiver.
- (U) ($102) Determine whether conflicts truly exist between HIDAR & Block II.
- (U) ($80) Assess correlation between buoy depth and signal phase.
- (U) ($211) Identify optimum error correction for FVLF.
- (U) ($266) Continue NONAP/Signal Separator Study.
- (U) ($129) Determine optimum Frequency Scanning approach.
- (U) ($39) Begin HIDAR Signal Design Report.

(U) FY 1995 PLAN:

- (U) ($173) Support HIDAR implementation in Submarine LF/VLF VME Receiver (SLVR).
- (U) ($270) Identify the optimum NONAP/Signal Separator integration for AVR & SLVR.
- (U) ($231) Complete HIDAR Signal Design Report.
- (U) ($237) Support 3-Mode Automatic Mode Recognition (AMR) implementation in EVS.
- (U) ($128) Assist FVLF Range Extension development.
- (U) ($171) Design signal phase tracking using buoy depth information.
- (U) ($69) Support transmit crypto development.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204163N
PROGRAM ELEMENT TITLE: Fleet Communications
PROJECT NUMBER: X0795
BUDGET ACTIVITY: 7
DATE: 7 February 1994

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

(U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDTE DIV., San Diego, CA. CONTRACTORS: GTE, Government Systems Corporation, Needham Heights, MA; Technology Services Corporation, Santa Monica, CA; Johns Hopkins University/Applied Physics Laboratory, Laurel, MD.

(U) RELATED ACTIVITIES: Project X1083 contains VLF/LF systems into which improvements, developed under the MEECN project, will be incorporated.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204229N
PROGRAM ELEMENT TITLE: Tomahawk and Theater Mission Planning Center (TMPC)
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1992 AND PRIOR	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
A0545 TOMAHAWK	1,651,225	27,048	40,993	81,854	138,455	163,957	115,193	63,011	161,582	2,443,318
A1784 Theater Mission Planning Center	61,442	3,556	5,770	3,919	3,115	0	0	0	0	77,802
TOTAL	1,712,667	30,604	46,763	85,773	141,570	163,957	115,193	63,011	161,582	2,521,120

B. (U) BRIEF DESCRIPTION OF ELEMENT:

(U) The TOMAHAWK Weapons System (TWS) provides the Tomahawk cruise missile attack capability against targets at sea (Tomahawk Anti-Ship Missile) and on land (Tomahawk Land Attack Missile (TLAM)). The TLAM can be fitted with either Conventional unitary warhead, a Nuclear warhead, or a submunition Dispenser. This program ensures that the TWS exploits state-of-the-art technology to preserve the efficacy of this proven weapon system.

(U) The Tomahawk project includes all missile development; planning system development, submarine and surface ship weapons control development, as well as launcher system development.

(U) The Tomahawk TLAM Block VII system upgrade, recently completed, incorporates the Global Positioning System capability; provides a smaller, lighter warhead, extended range, Time of Arrival; and improves accuracy for low contrast matching (Digital Scene Matching Area Correlator). The Advanced Tomahawk Weapons Control System and Tomahawk Baseline Improvement Program (TBIP) will provide a quick reaction response capability, improved strike planning and mission tasking, real time target and aimpoint selection, autonomous terminal prosecution of the target, improved lethality, and a multi-role mission.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 02.4[illegible]9N
PROGRAM ELEMENT TITLE: Tomahawk and Theater Mission Planning Center (TMPC)
BUDGET ACTIVITY: 7

DATE: 7 February 1994

(U) The Theater Mission Planning project provides for the Tomahawk Theater Mission Planning Center Upgrade (TMPCU) and the Afloat Planning System (APS). TMPCU and APS provide mission planning and command and control for the nuclear and conventional TLAM. The TMPCU is software developed to decrease mission planning time and increase the quality and accuracy of each mission. APS rapidly plans and/or modifies conventional TLAM missions at sea. The Tomahawk Strike Coordination Module of the APS optimizes strike assets by integrating Tomahawk, tactical air, and weapon planning at sea.

(U) These efforts provide battle-group tactical flexibility and responsiveness while maximizing TWS wartime capability.

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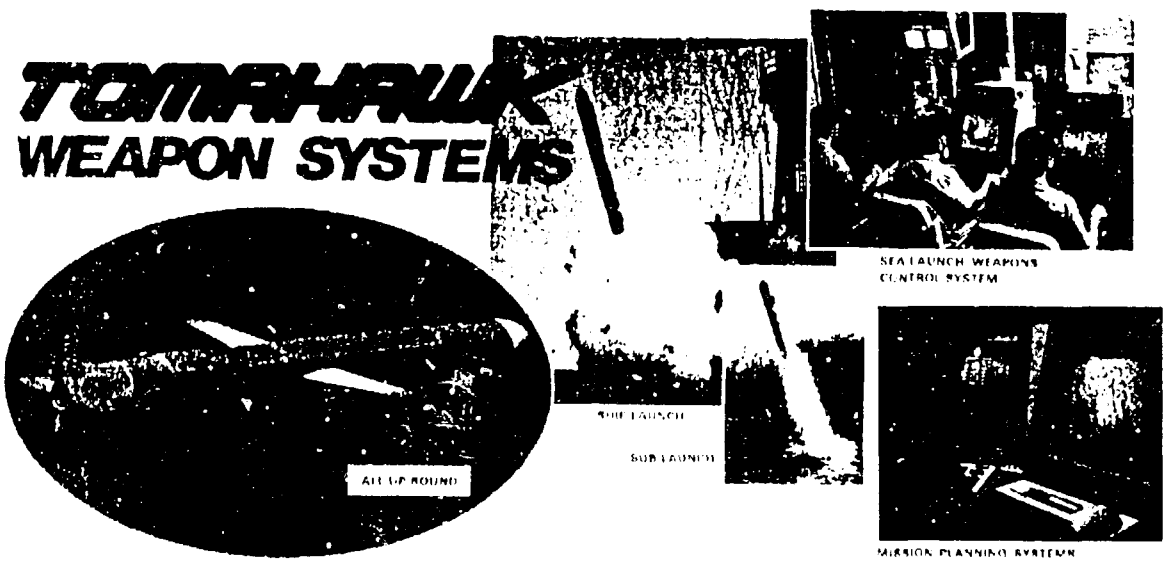
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204229N
PROGRAM ELEMENT TITLE: Tomahawk and Theater Mission Planning Center (TMPC)

PROJECT NUMBER: A0545
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: Tomahawk



POPULAR NAME: Tomahawk

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204229N
PROGRAM ELEMENT TITLE: Tomahawk and Theater Mission Planning Center (TMPC)
PROJECT NUMBER: A0545
BUDGET ACTIVITY: 7
Date: 7 February 1994

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

SCHEDULE	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		IOC BLKIII SHIP 5/93	IOC BLKIII SUB 2/94 ATWCS LRIP 6/94 MSIV/II TBIP 4/93		FOC BLKIII SUB 8/96 MSIII ATWCS 1/96				IOC TBIP 1QTR/01
ENGINEERING MILESTONES		DES REV ATWCS		SYS DES REV TBIP		DES REV TBIP			
T&E MILESTONES		DT ATWCS	DT/OT ATWCS	TECH/OPEVAL ATWCS		DT TBIP	OT TBIP		
CONTRACT MILESTONES		BLK III VLS TWS ISNSA	TBIP BLK III ATWCS VLS INT ISNSA	TBIP ATWCS BLK III ISNSA VLS INT	TBIP	TBIP	TBIP	TBIP	TBIP

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	1,145,307	18,098	30,868	69,158	122,111	140,475	87,173	43,181	1,780,428 (124,057)
SUPPORT CONTRACT	0	0	0	0	0	0	0	0	0 (0)
IN-HOUSE SUPPORT	495,368	8,950	9,525	11,596	15,034	15,682	15,020	8,930	604,342 (24,237)
GFE/ OTHER	10,550	0	600	1,100	1,310	7,800	13,000	10,900	58,548 (13,288)
TOTAL	1,651,225	27,048	40,993	81,854	138,455	163,957	115,193	63,011	2,443,318 (161,582)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204229N
PROGRAM ELEMENT TITLE: Tomahawk and Theater Mission Planning Center (TMPC)
PROJECT NUMBER: A0545
BUDGET ACTIVITY: 7
Date: 7 February 1994

2. (U) FY 1994 PLAN:

- (U) ($30,900) Seek approval for EMD; and commence EMD of the TBIP to provide guidance, navigation and control systems including associated command and control systems upgrades for a near-real time single land/sea attack missile capability and hardened target capability.
- (U) ($6,410) Continue ATWCS EMD, VLS integration and advanced system engineering, and conclude ATWCS operational assessment. Achieve ATWCS Limited Rate of Initial Production (LRIP).
- (U) ($3,683) Achieve BLK III Submarine CCS MK I Initial Operational Capability (IOC). Conduct CCS MK II and AN/BSY-1 DT/OT of Tomahawk Block III.

3. (U) FY 1995 PLAN:

- (U) ($81,854) Commence ATWCS Technical/Operational Evaluation (TECHEVAL/OPEVAL) and continue the EMD of the ADV TWS-TBIP.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, Pt Mugu, CA; and China Lake, CA; NAVUNSEAWARCENDIV, Newport, RI; NAVAIRWARCENACDIV, Indianapolis, IN; and Warminister, PA; NAVSURFWARCENDIV, Port Hueneme, CA; and Dahlgren, VA. CONTRACTORS: McDonnell Douglas Aerospace, St. Louis, MO; General Dynamics Electronics, San Diego, CA; Hughes Missile Systems, Tucson, AZ; JHU/APL, Laurel, MD; Logicon. San Pedro, CA, Lockheed Missiles & Space Company, Austin, TX, Science Application Inc, Arlington, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: MS IV/II changed from 4Q/93 to April 1994. This delay has resulted from further review of required mission capabilities funding levels reflect this change.

3. (U) Cost Changes: Data in previous budget not available for comparison.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204229N
PROGRAM ELEMENT TITLE: Tomahawk and Theater Mission Planning Center (TMPC)
PROJECT NUMBER: A0545
BUDGET ACTIVITY: 7
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The TOMAHAWK Cruise Missile provides an attack capability against targets at sea (TOMAHAWK Anti-Ship Missile (TASM)) and on land (TOMAHAWK Land-Attack Missile (TLAM)). The TLAM can be fitted with either Conventional unitary warhead (TLAM/C), Nuclear warhead (TLAM/N) or submunition Dispenser (TLAM/D).

(U) The Tomahawk Development encompasses TLAM C/D Block III (BLK III) upgrade and Advanced Tomahawk Weapons Systems (ADV TWS). The BLK III effort incorporates the Global Positioning System capability; provides a smaller, lighter warhead, extended range, Time of Arrival; and upgrades the Digital Scene Matching Area Correlators accuracy for low contrast matching. The Advanced Tomahawk Weapons Control System (ATWCS) development provides automated engagement planning, and Over-the-Horizon Tomahawk capability, automated Tomahawk Command Information, integrated strike planning/coordination, and improved organic training. The Tomahawk Baseline Improvement Program (TBIP) development provides a comprehensive baseline upgrade to the Tomahawk Weapon System to improve system flexibility and responsiveness. Essential elements of the TBIP include upgrades to the guidance, navigation and control systems along with the associated command and control systems to provide a single variant missile, the Tomahawk Multi-Mission Missile that is capable of attacking sea- and land-based targets in near real time. TBIP will also enhance its hard target penetrating capability beyond current weapons systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($17,448) Completed development of TLAM BLK III for ships. Continued engineering development of BLK III for submarines including CCS MKI DT, Independent Software Nuclear Safety Analysis (ISNSA), Vertical Launch System (VLS) integration and Advanced Systems Engineering.
- (U) ($5,900) Continued ATWCS Engineering and Manufacturing Development (EMD).
- (U) ($3,700) Continued TBIP risk reduction and evaluation of potential engineering and propulsion upgrades that enable TOMAHAWK to selectively attack certain hardened targets.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204229N
PROGRAM ELEMENT TITLE: Tomahawk and Theater Mission Planning Center (TMPC)
PROJECT NUMBER: A0545
BUDGET ACTIVITY: 7
Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:

	TOR	DOP	OR	NDCP	TEMP
TOMAHAWK Missile (All-up Round)	N/A	N/A	N/A	12/90	7/93
TOMAHAWK Launch platforms	N/A	N/A	N/A	12/90	7/93
TOMAHAWK Missile Block III			11/87	12/90	7/93

G. (U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) WPN Line 5	411,850	257,517	301,993	258,026	267,760	383,819	138,707	CONT.	CONT.
• (U) OPN Line 171	52,490	51,704	63,970	60,618	70,622	42,680	49,198	CONT.	CONT.
• (U) OPN Line 172	3,548	6,140	4,879	5,667	5,482	5,600	5,967	CONT.	CONT.

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

J. (U) TEST AND EVALUATION:

- (U) TOMAHAWK ATWCS DT/OT 3-4/94
- (U) TMIP DT/OT 8/97-1/00

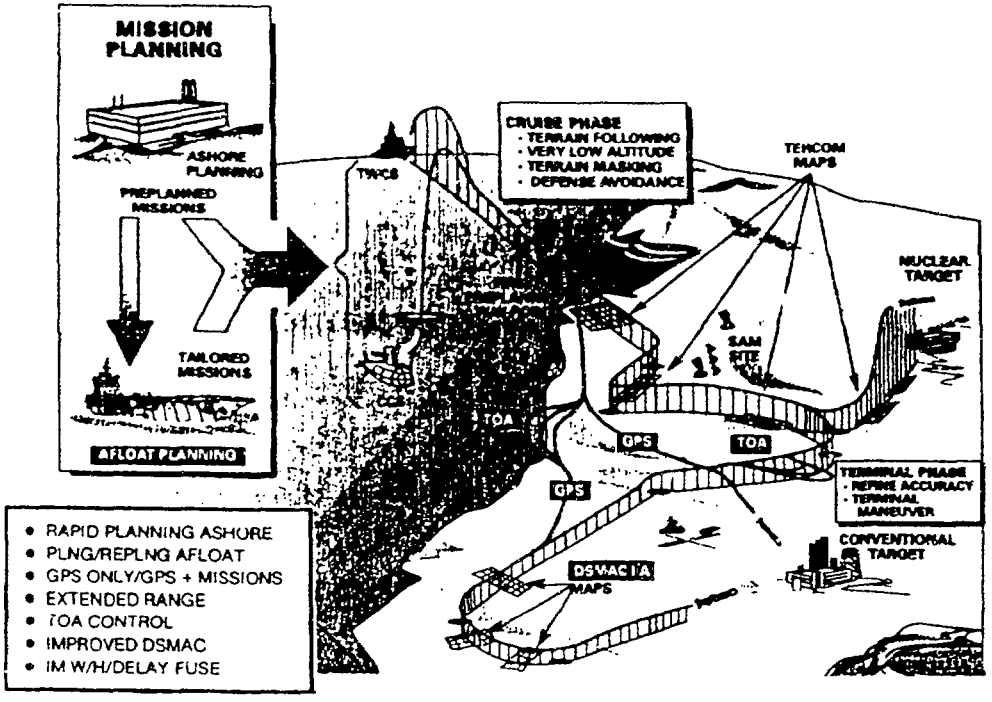
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204229N
PROGRAM ELEMENT TITLE: Tomahawk and Theater Mission Planning Center (TMPC)

PROJECT NUMBER: A1784
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: THEATER MISSION PLANNING CENTER



POPULAR NAME: TMPC

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204229N
PROGRAM ELEMENT TITLE: Tomahawk and Theater Mission Planning Center (TMPC)

PROJECT NUMBER: A1784
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

SCHEDULE	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		IOC/TMPCU 4/93 MS IIA IOC APS 9/93	MSIII APS 7/94 FOC TMPCU 7/94		FOC APS 9/96				
ENGINEERING MILESTONES									
T&E MILESTONES		TECHEVAL TMPCU DT/OTIIB APS DT IIIA TMPCU	DT/OTIIIB APS OTIIIA TMPCU		FOT&E APS				
CONTRACT MILESTONES		APS TMPCU	APS TMPCU	APS	APS				

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	52,517	2,014	3,519	3,666	2,779	0	0	0	64,495 (0)
SUPPORT CONTRACT	0	0	0	0	0	0	0	0	0 (0)
IN-HOUSE SUPPORT	8,925	1,542	2,251	253	336	0	0	0	13,387 (0)
GFE/ OTHER	0	0	0	0	0	0	0	0	0 (0)
TOTAL	61,442	3,556	5,770	3,919	3,115	0	0	0	77,802 (0)

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204229N
PROGRAM ELEMENT TITLE: Tomahawk and Theater Mission Planning Center (TMPC)
PROJECT NUMBER: A1784
BUDGET ACTIVITY: 7
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Tomahawk Theater Mission Planning Center Upgrade (TMPCU) ashore and Afloat Planning System (APS) provide data base generation and processing, flight mission data, command and control information preparation, and distribution for nuclear and conventional Tomahawk Land Attack Missiles. The TMPCU project designs and develops software to decrease mission planning time in response to contingency requirements, improves the production of mission data for distribution and provides automated command and control information for employment and strike planning. APS utilizes the TMPCU's software on down-sized and ruggedized computer hardware for use in support of Afloat Strike Warfare Commanders. This improves battle-group tactical flexibility and responsiveness while maximizing Tomahawk Weapon Systems (TWS) wartime capability. APS includes the Tomahawk Strike Coordination Module which is a software program that facilitates coordinated planning of Cruise Missile. These systems will be compatible with the Navy Command and Control Systems, TMPC/TMPCU ashore and the TWS.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,356) Achieved TMPCU Initial Operability Capability (IOC).
- (U) ($2,200) Performed APS Developmental/Operational Testing (DT/OT) IIB testing leading to approval for limited production and IOC.

2. (U) FY 1994 PLAN:

- (U) ($1,470) Perform TMPCU OT of full capability, imagery integration and continue software architectural enhancements.
- (U) ($4,300) APS installation of production representative unit aboard ship, commence afloat testing, operational coordination/employment enhancement, and Operational Evaluation (OPEVAL).

3. (U) FY 1995 PLAN:

- (U) ($347) Continue TMPCU national imagery integration and architectural software enhancement.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204229N
PROGRAM ELEMENT TITLE: Tomahawk and Theater Mission Planning Center (TMPC)
PROJECT NUMBER: A1784
BUDGET ACTIVITY: 7
Date: 7 February 1994

- (U) ($3,572) Correct APS OPEVAL deficiencies; continue testing of Special Compartmental Information (SCI) Isolation Segment (SIS) and operational employment/coordination functionality.

4. (U) PROGRAM TO COMPLETION:

- (U) ($3,115) Complete APS, SIS testing and transition to production in FY 1996.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Dahlgren, VA; NRL, Washington, DC; NRAD, Philadelphia, PA; USCINCPAC, Camp Smith, HI; USCINCLANT, Norfolk, VA. CONTRACTORS: McDonnell Douglas Aerospace, St. Louis, MO; Tiburon System, San Jose, CA; Science Application Inc., Arlington, VA; GDE Systems, San Diego, CA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

	TOR	DOP	OR	NDCP	TEMP
TMPC Upgrade	N/A	N/A	N/A	8/88	6/92
APS	6/86	9/87	N/A	8/88	6/92

G. (U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
WPN LINES 5, 18	(Procurement justification material does not contain this level of detail.)								
OPN LINES 175, 176									

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204229N
PROGRAM ELEMENT TITLE: Tomahawk and Theater Mission Planning Center (TMPC)
PROJECT NUMBER: A1784
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

J. (U) TEST AND EVALUATION:

TMPCU:

DT-IIIA	AUG 93
OT-IIIA	APR 94

APS:

DT-IIIB	NOV/DEC 93
OT-IIIB	JAN/FEB 94
FOT&E APS	SEPT 96

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204311N
PROGRAM ELEMENT TITLE: Integrated Surveillance System
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0758 SURTASS	22,146	13,761	6,157	4,373	5,340	5,132	8,054	CONT.	CONT.
X0766 IUSS Detect/Classif Systems	67,369	59,492	22,648	14,579	22,366	20,196	18,387	CONT.	CONT.
TOTAL	89,515	73,253	28,805	18,952	27,706	25,328	26,441	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Integrated Undersea Surveillance Systems (IUSS) provides the Navy with its primary means of detection of submarines, both nuclear and diesel. With the end of the Cold War, the program is undergoing a major transition from emphasis on maintaining a large dispersed surveillance force, with many Sound Surveillance System (SOSUS) sites and Surveillance Towed Array Sensor System (SURTASS) ships keyed to detection and tracking of Soviet submarines, to a smaller, mobile undersea surveillance capability that is equally effective against modern diesel submarines.

(U) The IUSS Research and Development project consists of SOSUS, Surveillance Direction System (SDS), and developments. SOSUS will retain the most critical part of its deep water coverage and eliminate coverage in areas which are no longer of interest. Processing sites will be reduced and display equipment will be modernized to significantly lower life cycle costs and enable consolidation of the system. To greatly reduce manpower requirements CNO has directed that the SOSUS system be placed in a stand-by status beginning in FY95. The underwater system and shore processing equipment will be maintained, but no manpower will be allocated to monitor SOSUS data. The SDS Command, Control and Communications system provides the means for FDS, SOSUS and SURTASS to manage and report contacts with minimum time-late. The SDS equipment and software replaces several obsolescent components of IUSS which are increasingly expensive to support. will provide an active adjunct capability for IUSS passive and tactical sensors, to counter the quieter diesel and nuclear threats of the 1990s and beyond.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204311N
PROGRAM ELEMENT TITLE: Integrated Surveillance System
BUDGET ACTIVITY: 7

DATE: 7 February 1994

(U) The SURTASS project comprises the mobile, tactical arm of the Integrated Undersea Surveillance System, providing long range detection and cuing for tactical weapons platforms against both diesel and nuclear submarines. SURTASS has experienced recent successes against diesel submarines operating in shallow water. In response to today's fiscal environment, SURTASS is greatly reducing fleet ships, consolidating logistics support, using Non-Developmental items and commercial hardware, increasing operator efficiency, and incorporating sonar capability to detect third world diesel submarines. SURTASS development efforts include: improved detection and classification to counter quieter threats; additional signal processing and capability; integrated operations; improved Battle Group support; improved information processing; and improved operator training.

*Previously funded under 0204313N

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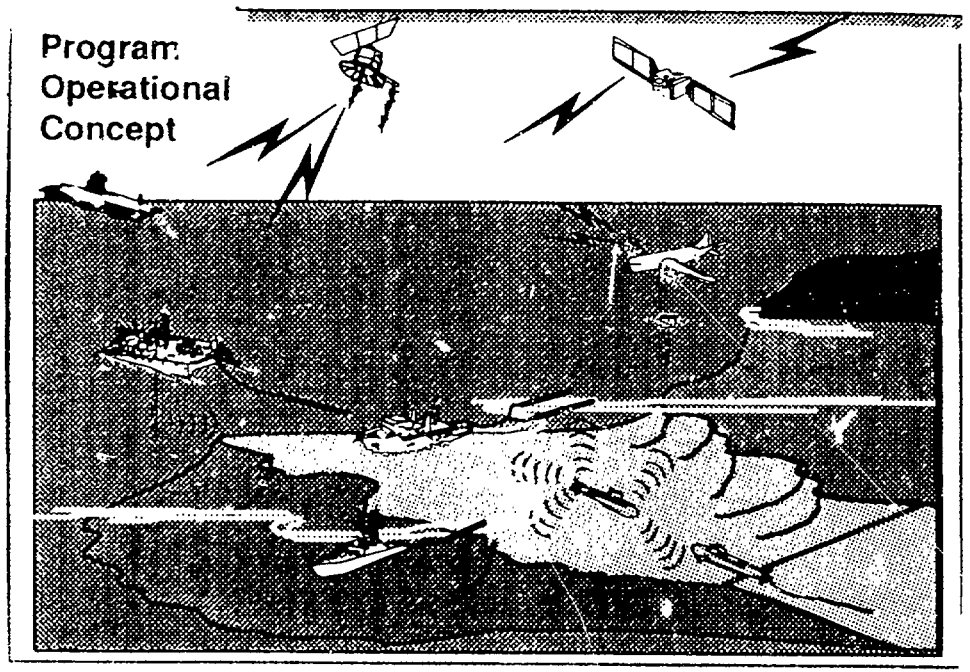
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204311N
PROGRAM ELEMENT TITLE: Intergrated Surveillance System

PROJECT NUMBER: X0758
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: SJRTASS



POPULAR NAME: SURTASS

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204311N
PROGRAM ELEMENT TITLE: Intergrated Surveillance System
PROJECT NUMBER: X0758
BUDGET ACTIVITY: 7
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
ENGINEERING MILESTONES	Concept Def. Info Proc Upgrade 7/93		SSR Info. Proc	PDR Info. Proc.	CDR Info. Proc.			CONT.
T&E MILESTONE		DT-II DT II/OT II 3/94	FOT&E B/L —	—		DT/OT Info. Proc.		CONT.
CONTRACT MILESTONES								CONT.

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	19,733	11,987	5,075	3,473	4,340	4,182	7,004	CONT.
SUPPORT CONTRACT	1,816	909	657	600	550	550	550	CONT.
IN-HOUSE SUPPORT	597	865	425	300	450	400	500	CONT.
GFE/ OTHER								
TOTAL	22,146	13,761	6,157	4,373	5,340	5,132	8,054	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Surveillance Towed Array Sensor System (SURTASS) is the mobile, tactical arm of the Navy's undersea surveillance capability that provides long range detection and cuing for tactical weapons platforms against both diesel and nuclear submarines. In response to today's fiscal environment and the change in the world threat, the SURTASS program is moving towards a reduced T-AGOS fleet; consolidation of logistics support; use of Non-Developmental Items (NDI) and commercial hardware for data processing; and focused development efforts to use new technology to increase operator efficiency and incorporate sonar capability for detection of Third World diesel submarines. The SURTASS programs provide improved detection and classification capability to counter quieter threats, including diesel submarines, projected in the future.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204311N
PROGRAM ELEMENT TITLE: Intergrated Surveillance System
PROJECT NUMBER: X0758
BUDGET ACTIVITY: 7
Date: 7 February 1994

provides for the quieting conversion of a commercial ship to upgrade an It also and for fleet evaluation and tactics development. Additional upgrades will provide for a capability to multiply effectiveness of the T-AGOS 19 (SWATH-P) class; integrated SURTASS operations; improved shipboard detection, classification and tracking capability to support Battle Group operations; improved information processing systems to search for quieter targets without increasing manpower or communications bandwidth; realistic training and testing for operators to ensure proficiency; the integration of SURTASS with Integrated Undersea Surveillance System (IUSS) sensors; and the required conversion from Enhanced Modular Signal Processor (EMSP) SEM B to SEM E.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:
   - (U) ($6,157) Continued development of Capability, Operational Readiness Inspection (ORI) Capability, FSP Capability.
   - (U) ($4,247) Continued Block Upgrade Development.
   - (U) ($7,430) Continued integration of Block Upgrade into
   - (U) ($3,248) Continued conversion SEM B to SEM E.
   - (U) ($1,064) Developed concept definition of computer aides For detection and classification.

2. (U) FY 1994 PLAN:
   - (U) ($1,504)
   - (U) ($1,446) Complete integration.
   - (U) ($7,453)
   - (U) ($1,018) Continue concept definition for computer aides for detection and classification.
   - (U) ($2,340) Continue conversion to EMSP SEM E signal processor.

3. (U) FY 1995 PLAN:
   - (U) ($3,260) Complete software upgrades ORI, Processing.
   - (U) ($1,614) Complete SEM B to SEM E.
   - (U) ($1,283) Complete concept definition of computer aides for detection and classification.

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

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204311N
PROGRAM ELEMENT TITLE: Integrated Surveillance System
PROJECT NUMBER: X0758
BUDGET ACTIVITY: 7
Date: 7 February 1994

D. (U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDT&E DIV, San Diego, CA; MSC, Washington, DC. CONTRACTORS: Hughes Aircraft Company, Fullerton, CA; AT&T Federal Systems & Advanced Technology, Greensboro, NC.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

DCP 137	2/90
TEMP 164-1 (REV 1)	4/92
TEMP 1214 (REV 1)	9/92
AP 91-06 (SURTASS)	8/91

G. (U) RELATED ACTIVITIES:

- (U) PE 0204311N, X0766, Integrated Undersea Surveillance Detection/Classification System provided the in FY 90 and 91, and Surveillance Direction System (SDS) development.
- (U) PE 0603785N, Combat Systems Oceanographic Performance Assessment - provides acoustic data and modeling support and testing of modified arrays.
- (U) PE 0604507N, Enhanced Modular Signal Processor (EMSP) - develops signal processor for Block Upgrade.
- (U) PE 0603747N, X1959 Critical Sea Test provides ship support for EDM and scientific oceanographic and acoustic data for performance models.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204311N
PROGRAM ELEMENT TITLE: Integrated Surveillance System

PROJECT NUMBER: X0758
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PROCUREMENT									
SCN #20	0	0	0	0	0	0	0	CONT.	CONT.
OPN #65	28,388	9,576	8,781	25,816	20,943	5,969	12,121	CONT.	CONT.
MILCON #P422	0	16,780	0	0	0	0	0	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

J. (U) TEST AND EVALUATION:

- (U FY 1993:
- (U) FY 1994:
- (U) FY 1995: TOT&E for

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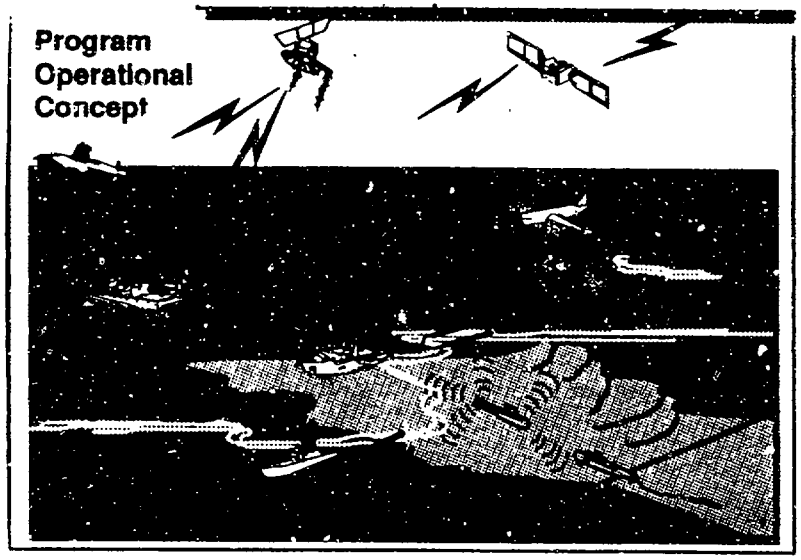
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204311N
PROGRAM ELEMENT TITLE: Integrated Surveillance System

PROJECT NUMBER: X0766
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: IUSS Detect/Clssif Systems



POPULAR NAME: IUSS

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204311N
PROGRAM ELEMENT TITLE: Integrated Surveillance System

PROJECT NUMBER: X0766
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES				SDS MS II/III 4Q/96				
			MS III 4Q/96					
ENGINEERING	SDR SDS 10/92 PDR SDS 8/93 FSP DEMO 8/93 PDR/CDR ARS 9/93	Auto Detect SDS CDR 1Q/94 DEMO 6/94 Deliv 9/94	PDR Littoral Improv 6/96 SDS FQT 2Q/95			CDR Littoral Improv 3/98	CONT.	
T&E MILESTONES	Sea Test 10 6/93 Sea Test 11 8/93	Sea Test 12 8/94 Sea	SDS TECHEVAL 2Q/96 DT-II/OT-IIT 11/95 2/96 SDS OPEVAL 3Q/96		Sea Tests	Sea Test/ FOT&E	DT/OT Littoral Improv.	
		Test 13 2/95						
CONTRACT MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	58,152	46,580	19,137	12,063	18,764	16,404	15,282	CONT.
SUPPORT CONTRACT	2,171	5,233	1,550	404	648	648	727	CONT.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204311N
PROGRAM ELEMENT TITLE: Integrated Surveillance System

PROJECT NUMBER: X0766
BUDGET ACTIVITY: 7

Date: 7 February 1994

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
IN-HOUSE SUPPORT	6,606	7,679	1,961	2,112	2,954	3,144	2,378	CONT.
GFE/ OTHER	440							
TOTAL	67,369	59,492	22,648	14,579	22,366	20,196	18,387	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: IUSS provides the Navy with its primary means of detection of submarines, both nuclear and diesel. With the end of the Cold War, the program is undergoing a major transition from emphasis on maintaining a large dispersed surveillance force, with many Sound Surveillance System (SOSUS) sites and Surveillance Towed Array Sensor System (SURTASS) ships keyed to detection and tracking of Soviet submarines, to a smaller, mobile undersea surveillance capability that is equally effective against modern diesel submarines. CNO has directed that the SOSUS system be placed in a stand-by status beginning in FY95. The underwater system and shore processing equipment will be maintained, but no manpower will be allocated to monitor SOSUS data. This program provides for a smaller, consolidated SOSUS system: the Surveillance Direction System (SDS) Command, Control and Communication systems; and the development and deployment of a

(U) Primary Mission: To provide undersea global maritime surveillance in areas of interest to national security.

(U) SURTASS and will provide mobile coverage in deep and shallow water. The SURTASS program will provide an active adjunct capability for IUSS passive and tactical sensors, to counter the quieter diesel and nuclear threats of the 1990s and beyond. The program is developing for the SURTASS T-AGOS (Small Waterplane Area Twin Hulled - Active (SWATH-A)) platforms, and will also provide for of other IUSS and tactical platform (s) sensors. SURTASS program components are: (1) T-AGOS 23 class SWATH platforms; (2) (3) receive processing subsystem to perform detection, classification and reporting aboard the SWATH ship; (4) SURTASS receive array; and (5) shore display of contact reports.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204311N
PROGRAM ELEMENT TITLE: Integrated Surveillance System

PROJECT NUMBER: X0766
BUDGET ACTIVITY: 4

Date: 7 February 1994

(U) The Surveillance Direction System (SDS) will provide the Command, Control, Communications (C3) and functions to combine the capabilities of the Fixed Distributed System (FDS), SURTASS, and SOSUS, sensor systems in a manner SDS will provide a reliable and mobile tactical communications system significantly reducing reporting times. SDS will be fully integrated into the Navy's Space and Electronic Warfare Architecture and the C4I for the Warrior concept. In addition, SDS is a specified requirement for FDS and ADS sensor fusion and communications developments. The following capabilities will be incorporated: targets; promulgating threat tracks to tactical users including the CINC Command Center (CCC), TADIXS, Tactical Command Center (TCC) Ocean Surveillance Information System (OSIS), ASW Operations Center (ASWOC), Shore Targeting Terminal (STT), and Tactical Flag Command Center (TFCC); sustained wartime operations: secure, robust communications to handle voice, record, and through rates consistent with a concept of environment. SDS will be fully integrated with the Navy's Space Electronics Warfare Architecture.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($6,251) Continued development of software models to integrate SOSUS workstations (SWS) with the IUSS C3I network.
- (U) ($14,719)

- (U) ($11,810) Continued SDS design; conducted System Design Review (SDR) first quarter; conducted Preliminary Design Review (PDR) fourth quarter; continued Tactical Communications (TACCOM) systems test and integration; continued Advanced Sensors Acoustic Prediction System (ASAPS) development.
- (U) ($5,671) conducted littoral water test
- (U) ($6,285) Completed development.
- (U) ($17,083) Continued software development.
- (U) ($4,750) Data analysis of FY 92 and FY 93 performed.
- (U) ($800) Shut down NAVFAC Adak sending array data to Hawaii by satellite for analysis.

2. (U) FY 1994 PLAN:

- (U) ($1,009)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204311N
PROGRAM ELEMENT TITLE: Integrated Surveillance System
PROJECT NUMBER: X0766
BUDGET ACTIVITY: 7
Date: 7 February 1994

- (U) ($9,116)

- (U) ($26,073) Conduct Critical Design Review (CDR) for SDS; begin coding and testing for SDS; ASAPS will transfer functionality to SDS.
- (U) ($5,034)
- (U) ($11,609) Continue, development.
- (U) ($2,191) Complete source testing.
- (U) ($4,460) Perform data analysis on FY 93 and first FY 94 test.

3. (U) FY 1995 PLAN:

- (U) ($11,044) Continue coding and testing of SDS; begin delivery of Advanced Development Models (ADM's) for SDS; TACCOM will be integrated and tested with SDS hardware; Complete ASAPS development.
- (U) ($9,626) Continue development.
- (U) ($1,978) Perform data analysis on FY 94 and one FY 95 test.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDT&E DIV, San Diego, CA; NCEL, Port Hueneme, CA; NRL, Washington, DC; NESEA, St. Inigoes, MD. CONTRACTORS: Hughes Aircraft Co., Fullerton, CA; APL/JHU, Laurel, MD; AT&T Technologies Inc., Greensboro, NC; ARL Univ of Texas, Austin, Texas; Lockheed Sanders Inc., Manchester, NH; IBM, Manassas, VA; AT&T Bell Laboratories, Whippany, NJ; TRW, Mclean, VA; E-Systems, Dallas, TX.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not available for comparison.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204311N
PROGRAM ELEMENT TITLE: Integrated Surveillance System
PROJECT NUMBER: X0766
BUDGET ACTIVITY: 4
Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:

NDCP #78 (SOSUS)	1/80
AP 93-02 (SOSUS)	8/93
OR 246-02-89 (SDS)	6/89
AP 89-1 (SDS)	5/90
AP Update 89-1 (SDS)	12/91
APB (SDS)	9/93
OR 038-95-88	7/85
TEMP 1214 REV 1	12/92
DCP T-AGOS-23 SWATH A	8/89
DCP 137 Rev 1-SURTASS Improvements	2/90
AP 91-06 (SURTASS	8/91

G. (U) RELATED ACTIVITIES: PE 0604784N, Distributed Surveillance Systems; PE 0204311N/X0758, SURTASS; PE 0603747N, Advanced ASW Technology; PE 0604507N, Enhanced Modular Signal Processor (EMSP); PE 0602937N Exploratory Development.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PROCUREMENT									
SCN #20									
	0	0	0					CONT.	CONT.
OPN # 62									
	84,623	41,898	21,007	20,604	24,342	14,176	5,798	CONT.	CONT.
OPN #65									
	28,920	9,576	8,761	46,816	20,943	5,969	12,121	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: SDS required for FDS-1 in accordance with international agreements. These agreements are classified higher than this document.

J. (U) TEST AND EVALUATION: In FY 1992 the ADM system was replaced with a significantly more capable EDM system on the R/V Cory Chouest. DT/OT IIA was conducted in FY 1992 to demonstrate the operational effectiveness of this new capability. In FY 1993 two tests were conducted with tactical platforms in shallow and basin areas. These tests also tested tactics and C3. In FY 1994 two tests in shallow and marginal deep ocean areas will be performed. These tests will be similar in scope to the FY 1993 tests and will test robustness of system performance in different areas.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204413N
PROGRAM ELEMENT TITLE: Amphibious Tactical Support Units
BUDGET ACTIVITY: 7

7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1980	Amphib OTH C2								
	3,707	2,729	944	0	0	0	0	0	14,802
S2231	MCAC Weapons Development								
	0	0	3,630	3,845	2,031	0	0	0	9,506
TOTAL	3,707	2,729	4,574	3,845	2 031	0	0	0	24,308

B. (U) BRIEF DESCRIPTION OF ELEMENT: Both projects support Landing Craft Air Cushion (LCAC) during amphibious operations. Project S1980, AN/KSQ-1 Amphibious Assault Direction System integrates existing developments into a system which will support the command and control of surface amphibious assaults launched from extended over-the-horizon off shore ranges. The AN/KSQ-1 adapts the USMC's Position Location Reporting System for naval operations and integrates it with shipboard navigation and communications systems. The AN/KSQ-1 is required to identify, track, communicate with, and control landing craft from launch through transit, offload and return. MCAC is a new start program. Project S2231, LCAC Control Enhancements initiative provides a remote control capability for LCAC to allow minesweeping and explosive lane breaching with an unmanned LCAC in support of amphibious operations.

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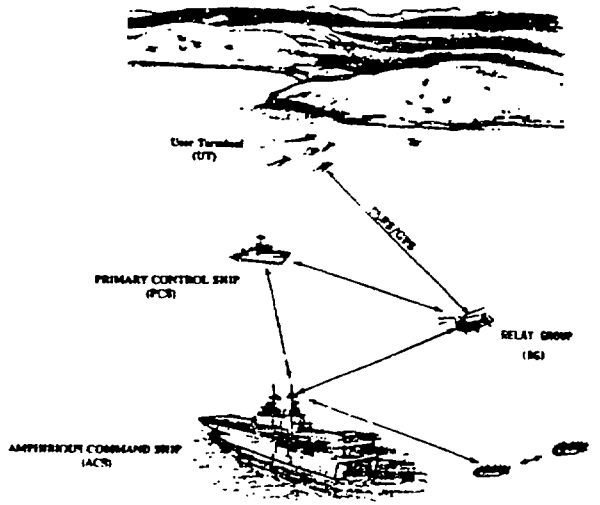
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204413N
PROGRAM ELEMENT TITLE: Amphibious Tactical Support Units
PROJECT NUMBER: S1980
BUDGET ACTIVITY: 7
DATE: 7 February 1994

PROJECT TITLE: Amphib Other C2

AN/KSQ-1 PROGRAM



Popular Name: AN/KSQ-1

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204413N PROJECT NUMBER: S1980 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: Amphibious Tactical Support Units BUDGET ACTIVITY: 7

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES			III 3/95					
ENGINEERING MILESTONES	CDR 12/92							
T&E MILESTONES		DTIIA 10/93 DTIIB 3/94 DTIIC 12/94	OTII					
CONTRACT MILESTONES	9/94							

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	0	0	0	0	0	0	0	0	0
SUPPORT CONTRACT	616	365	365	240	0	0	0	0	1,586
IN-HOUSE SUPPORT	6,80[illegible]	3,342	2,364	704	0	0	0	0	13,216
GFE/ OTHER	0	0	0	0	0	0	0	0	0
TOTAL	7,42[illegible]	3,707	2,729	944	0	0	0	0	14,802

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204413N
PROGRAM ELEMENT TITLE: Amphibious Tactical Support Units
PROJECT NUMBER: S1980
BUDGET ACTIVITY: 7
DATE: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION RE REMENT AND SYSTEM CAPABILITIES: The AN/KSQ-1 Amphibious Assault Direction System integrates existing developments into a system which will support the command and control of surface amphibious assaults launched from extended over-the-horizon off shore ranges. The AN/KSQ-1 adapts the USMC's Position Location Reporting System for naval applications and integrates it with shipboard navigation and communications systems. The AN/KSQ-1 is required to identify, track, communicate with, and control landing craft from launch through transit, offload, and return.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($618) Conducted Critical Design Review.
- (U) ($726) Performed Hardware Integration and Testing.
- (U) ($684) Performed System Integration and Testing.
- (U) ($552) Developed Software Increment I.
- (U) ($1,127) Installed System for Development Testing.

2. (U) FY 1994 PLAN:

- (U) ($478) Conduct DT-IIA Basic System Testing.
- (U) ($497) Install Software Increment II.
- (U) ($210) Conduct DT-IIB Simulation Test.
- (U) ($417) Install Software Increment III.
- (U) ($1,127) Conduct DT-IIC TECHEVAL.

3. (U) FY 1995 PLAN:

- (U) ($535) Conduct Operational Testing.
- (U) ($409) Meet Initial Operational Capability.
- (U) Projected Program Completion is March 1995.

4. (U) PROGRAM TO COMPLETION: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204413N PROJECT NUMBER: S1980 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: Amphibious Tactical Support Units BUDGET ACTIVITY: 7

D. (U) WORK PERFORMED BY: IN-HOUSE: NWAC, Warminster, PA; NAVSURFWARCENCOASTSYSTA Panama City, FL; MCTSSA Camp Pendleton, CA; NAVAIRWARCENACDIV Indianapolis, IN; NCCOSC-ISE Vallejo, CA.
CONTRACTORS: None.

E. (U) COMPARISON WITH AMENDED FY 1994 PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:
TOR Not applicable.
TEMP Signed 2 August 1993.

G. (U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN LI0670	0	0	11,748	6,112	6,848	0	21,065	0	45,773
• (U) O&MN	0	0	347	318	462	382	227	CONT.	CONT.

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

J. (U) TEST AND EVALUATION:

- (U) DT-IIA 10/93
- (U) DT-IIB 03/94
- (U) DTIIC 09/94
- (U) OTII 12/94

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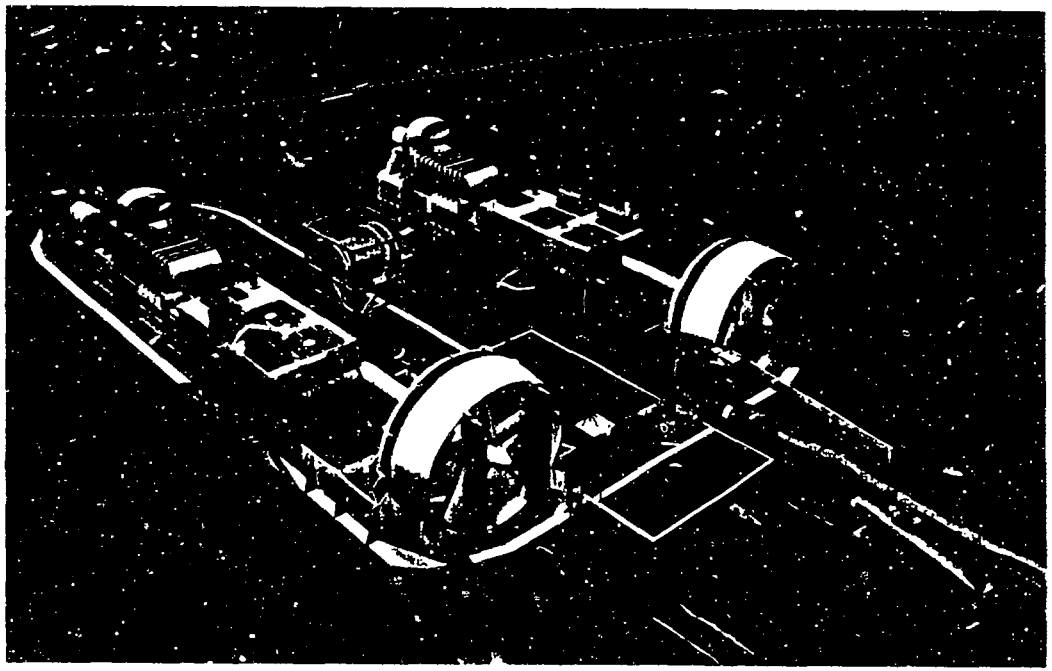
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204413N
PROGRAM ELEMENT TITLE: Amphibious Tactical Support Units
PROJECT NUMBER: S2231 DATE: 7 February 1994
BUDGET ACTIVITY: 7

PROJECT TITLE: MCAC Weapons Development



Popular Name: LCAC Control Enhancements

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204413N
PROGRAM ELEMENT TITLE: Amphibious Tactical Support Units
PROJECT NUMBER: S2231 DATE: 7 February 1994
BUDGET ACTIVITY: 7

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
ENGINEERING MILESTONES			CDR 9/95					
T&E MILESTONES				DT 9/96	FOT&E 06/97			
CONTRACT MILESTONES			EDM 3/95					

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	TOTAL BUDGET FY 1999	(TO COMPLETE)
MAJOR CONTRACT	0	0	0	2,700	1,752	816	0	0	5,268
SUPPORT CONTRACT	0	0	0	100	100	100	0	0	300
IN-HOUSE SUPPORT	0	0	0	530	463	295	0	0	1,288
GFE/ OTHER	0	0	0	300	1,530	820	0	0	2,650
TOTAL	0	0	0	3,630	3,845	2,031	0	0	9,506

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The LCAC Control Enhancements initiative provides a remote control capability for Landing Craft, Air Cushion (LCAC) to allow minesweeping and explosive lane breaching with an unmanned LCAC in support of amphibious operations.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: Not applicable.

2. (U) FY 1994 PLAN: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204413N
PROGRAM ELEMENT TITLE: Amphibious Tactical Support Units
PROJECT NUMBER: S2231
BUDGET ACTIVITY: 7
DATE: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) Program is a new start.
  - (U) ($2,700) Award Contract for System Design and Prototype Production.
  - (U) ($330) Conduct Critical Design Review.
  - (U) ($600) Initiate Logistics Support.

4. (U) PROGRAM TO COMPLETION:

- (U) Conduct Developmental Test (DT).
- (U) Conduct Follow-On Test and Evaluation (FOT&E).
- (U) Production contract to award in FY 1997.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENCOASTSYSTA Panama City, FL; CONTRACTORS: TBD.

E. (U) COMPARISON WITH AMENDED FY 1994 PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

TOR Not applicable.
TEMP LCAC TEMP No. 594 being revised to include LCAC Control Enhancements.

G. (U) RELATED ACTIVITIES: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204413N
PROGRAM ELEMENT TITLE: Amphibious Tactical Support Units
PROJECT NUMBER: S2231
BUDGET ACTIVITY: 7
DATE: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN LI 098000	0	0	0	0	3,500	3,400	10,800	0	17,700

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

J. (U) TEST AND EVALUATION:

- (U) DT 09/96
- (U) FOT&E 06/97

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 02U4571N
PROGRAM ELEMENT TITLE: Consolidated Training Systems Development
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1992 AND PRIOR	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
U1427 Surface Tactical Team Trainer (STTT)	2,951	8,201	6,581	2,353	1,691	429	427	CONT.	CONT.	
W0431 Tactical Aircrew Combat Training System (TACTS)	8,468	5,550	6,178	6,127	6,161	6,334	6,482	CONT.	CONT.	
W0604 Training Range and Instrumentation Development (TRID)	8,504	6,485	7,230	7,096	7,368	7,601	7,715	CONT.	CONT.	
W1998 Tactical Combat Training System (TCTS)	9,310	12,763	23,401	16,553	7,413	7,635	7,780	CONT.	CONT.	
W2124 Air Warfare Training Development (AWTD)	817	2,012	2,427	967	0	0	0	0	0	6,223
X1823 Training and Training Devices Systems (TTDS)	2,059	2,688	2,422	2,112	2,384	2,375	2,364	CONT.	CONT.	
TOTAL	33,304	38,114	46,779	34,241	25,017	24,374	24,768			

B. (U) DESCRIPTION: The STTT will develop the Battle Force Tactical Trainer/Cryptologic Systems Embedded Team Trainer systems to provide realistic joint warfare training including a means to link these ships together for coordinated in-port training. This system is the planned shipboard weapons system interface of the TCTS program. TACTS provides real-time monitoring and post-exercise debrief of aircrews flying on instrumented training ranges. This system is the primary training tool used by the Navy's advanced tactical training schools ("Top Gun," STRIKE U, and MAWTS). TRID program provides development of many range systems including range electronic warfare simulator, advanced weapons training systems, laser training systems, fleet telemetry stations, and shallow water range technology. TCTS will develop fleet deployable instrumentation for at sea surface, subsurface, and air training and tactics development. TCTS will incorporate the Defense Modeling and Simulation Office sponsored Distributed Interactive Simulation Protocol Data Unit for interoperability with Navy and other service live, virtual (simulators), and constructive (war games) simulations. AWTD will provide current data simulation to a wide range of aircrew simulators in three services, using a common threat real time simulation and standard threat database. TTDS provides a geographically distributed war gaming system for littoral operations training which supports objectives of Fleet Commanders, Naval War College, Joint Warfare Center, and Tactical Training Groups in wargaming, tactical decision making training, and tactics development and evaluation.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204571N
PROGRAM ELEMENT TITLE: Consolidated Training Systems Development

PROJECT NUMBER: U1427
BUDGET ACTIVITY: 7

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: U1427, Surface Tactical Team Trainer (STTT). Battle Force Tactical Training (BFTT) will provide realistic joint warfare training across the spectrum of armed conflict; realistic unit level team training in all warfare areas; a means to link ships together which are in different homeports for coordinated training; external stimulation of shipboard training systems; and simulation of non-shipboard forces. BFTT uses a distributed architecture and will be compatible with Distributed Interactive Simulation (DIS) protocols. BFTT provides ships' Commanding Officers and Battle Group/Battle Force Commanders with the ability to conduct coordinated, realistic, high stress, combat system team training in support of the Afloat Training Organization. The Cryptologic Systems Embedded Trainer (CSET) will provide realistic training to shipboard cryptologic system operators and teams on their own tactical equipment and will be integrated with BFTT. The Amphibious Warfare Tactical Trainer (AWTT), when integrated with the Enhanced Naval Warfare Gaming System and the Marine Tactical Wargaming System, will provide joint interoperability for training, wargaming exercises, and tactics development for multi-service littoral operations. Upgrade of the Standard Ocean Acoustics Model (SOAM) will provide a realistic, reusable software ocean model for use in Naval training systems. The Mine Warfare Model (MW MODEL) will provide a data base and analysis of known and projected mine warfare threats, tactics, and strategies.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,500) Developed the Advanced Development Model hardware, software, and integration/interfaces necessary to demonstrate the Proof of Concept of the interconnectivity of the BFTT System.
- (U) ($876) Developed and integrated the government owned computer programs in a Navy Standard TAC-3 for the shipboard scenario generation and control portion of the BFTT program.
- (U) ($575) Provided engineering support for development of the Engineering Development Model (EDM) for CG 47 Class AEGIS ships and FFG 7 Class ships.

(U) FY 1994 PLAN:

- (U) ($2,654) BFTT - Complete development and demonstrate during DT-IIA the CG 47 class, FFG 7 (MOD 6) class, and LSD 41 class to include integration of the following systems; ACTS, LINK 11, AWS LSD, CG 47 Class PM, WSP, FAST, AN/SLQ-32A EW OBT, AN/SQQ-89(V)T OBT, FFG 7 Class PM, AN/SPA-25G.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204571N
PROGRAM ELEMENT TITLE: Consolidated Training Systems Development
PROJECT NUMBER: U1427
BUDGET ACTIVITY: 7
DATE: 7 February 1994

- (U) ($963) BFTT - Provide engineering support for development of the EDM for DD 963 Class ships.
- (U) ($4,584) CSET - Accomplish Phase III of the development for CSET for OUTBOARD II.

(U) FY 1995 PLAN:

- (U) ($4,400) BFTT - Develop and demonstrate during DT-IIB the DD 963 class and CV/CVN class to include integration of the following systems; LINK 4, AN/SSN-6 NAVSSI, HARPOON, TOMAHAWK, JMCIS, DD 963 Class PM, CV/CVN Class PM.
- (U) ($1,381) CSET - Provide three additional Service Test Models.
- (U) ($200) AWTT - Develop interface/commonality requirements to automate integration of Navy and Marine wargaming systems.
- (U) ($100) SOAM - Develop an update to the SOAM for use in all surface trainer programs.
- (U) ($500) MW Model - Develop a Foreign Mine Data base and evaluate U.S. minefield planning models.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Port Hueneme, CA and Dahlgren, VA; NAVTRASYSCEN, Orlando, FL; NAVUNSEAWARCEN DET, New London, CT; NAVSURFWARCENCOASTSYSCEN, Panama City, FL. CONTRACTORS: PARAMAX, Dam Neck, VA and Great Neck, NY; PRC, San Diego, CA; Litton Data Systems, Pascagoula, MS; Martin Marietta, Moorestown, NJ; Comptek, Arlington, VA.

(U) RELATED ACTIVITIES: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204571N
PROGRAM ELEMENT TITLE: Consolidated Training Systems Development

PROJECT NUMBER: U1427
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line	3,757	10,530	12,167	13,136	14,355	15,081	7,554	CONT.	CONT.
• (U) O&MN Line	800	850	3,400	3,350	3,250	2,250	700	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204571N
PROGRAM ELEMENT TITLE: Consolidated Training Systems Development

PROJECT NUMBER: W0431
BUDGET ACTIVITY: 7

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W0431, Tactical Aircrew Combat Training System (TACTS). This project develops new TACTS capabilities primarily through the integration of additional types of aircraft and weapons. This requires development of new aircraft interfaces, weapons and countermeasures simulations, and modifications to displays. Software is also developed to produce computer generated Electronic Warfare (EW) threats to enhance the system's ability to provide training in a realistic EW environment. Various other system performance improvements are also developed to make the system more effective and reliable.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($850) Aircraft Integration - Completed development of software to enable AV-8B (night attack) and F-14D training on TACTS and continued efforts to integrate other aircraft capabilities.
- (U) ($1,897) Weapons Integration - Completed development of several bomb and mine simulations and continued development of several missile simulations as well as integration of airborne countermeasures.
- (U) ($1,159) Threat Integration - Continued initial integration of the Fallon Orange Command, Control, and Communications (OCCC) system and uplink of Computer Generated Threat Simulations (CGTS) and development of additional threat simulations (e.g., barrage Anti-Aircraft Artillery (AAA), 2S6 AAA, and SA-11 Surface-to-Air Missile (SAM)).
- (U) ($2,743) System Upgrades - Completed development of TACTS block 4.0 and A07 software and continued development of the front end processor, pod encryption, and other system improvements.
- (U) ($1,819) Studies/Analysis/T&E - Conducted testing of block 4.0/A07 software and the Fallon OCCC system. Conducted systems engineering analysis for F-14A/B "No Drop" Weapons Scoring (NDWS), Advanced Medium Range Air to Air Missile (AMRAAM), and other system requirements.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204571N
PROGRAM ELEMENT TITLE: Consolidated Training Systems Development

PROJECT NUMBER: W0431
BUDGET ACTIVITY: 7

DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($834) Aircraft Integration - Complete the development of a NDWS capability for the AV-8B (day attack) and F-14A/B as well as software modifications to accommodate the F-14D tape D02 release. Develop countermeasures and CGTS training capabilities for the AV-8B.

- (U) ($1,650) Weapons Integration - Complete the development of training capabilities for Phoenix, AMRAAM (Phase I), and countermeasures (for F-14 and F/A-18). Continue development of simulation capabilities for the High Speed Anti-Radiation Missile (HARM), Sparrow (AIM-7M H-build) and additional adversary missiles (Super 530 and MICA).

- (U) ($361) Threat Integration - Complete simulations for barrage AAA, 2S6 AAA, and SA-11 SAM.

- (U) ($1,438) System Upgrades - Complete development of TACTS block 5.0 and A08/A04 software and integration of the front end processor. Continue development of pod encryption and other system improvements.

- (U) ($1,267) Studies/Analysis/T&E - Conduct testing of block 5.0/A08/A04 software Fallon OCCC, and the front end processor. Conduct systems engineering analysis for F-14A/B upgrade, and F/A-18E/F, Joint Stand-Off Weapon (JSOW) and other system requirements.

(U) FY 1995 PLAN:

- (U) ($770) Aircraft Integration - Complete the development of a countermeasures and CGTS capability for AV-8B. Develop training capabilities to accommodate the F-14A/B upgrade and F/A-18F.

- (U) ($1,951) Weapons Integration - Complete the development of training capabilities for the AIM-7M H-build as well as simulations for the Super 530 and MICA adversary weapons. Continue development of simulation capabilities for HARM, AMRAAM (Phase II), Joint Direct Attack Munitions, and JSOW.

- (U) ($2,057) System Upgrades - Complete development of TACTS block 6.0 and A09/A05 software. Continue development of pod encryption (including the development of the Advanced Message Oriented Data Security Module) and other system improvements.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204571N
PROGRAM ELEMENT TITLE: Consolidated Training Systems Development

PROJECT NUMBER: W0431
BUDGET ACTIVITY: 7

DATE: 7 February 1994

- (U) ($1,400) Studies/Analysis/T&E - Conduct testing of block 6.0/A09/A05 software. Conduct systems engineering analysis for V-22, AH-1, UH-1, the tactical air launch decoy, and other system requirements.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, China Lake, CA; NAVAIRWARCENACDIV, Patuxent River, MD and Warminster, PA; NWAD, Corona, CA. CONTRACTORS: Cubic Defense Systems, San Diego, CA; Loral, Sunnyvale, CA; FAAC, Ann Arbor, MI; CTA, Ridgecrest, CA.

(U) RELATED ACTIVITIES:

- (U) PE 0604735F (Range Improvement) - Includes funding for joint efforts with USAF.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN/P-1 #150	5,975	12,241	4,410	17,800	0	0	4,745	CONT.	CONT.
• (U) APN/P-1 #61	10,514	14,007	13,973	13,959	14,108	4,953	4,206	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204571N
PROGRAM ELEMENT TITLE: Consolidated Training Systems Development

PROJECT NUMBER: W0604
BUDGET ACTIVITY: 7

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W0604, Training Range and Instrumentation Development (TRID). This project develops specialized instrumentation systems for fleet readiness training while minimizing life cycle costs. Tasks include the following systems: Range Electronic Warfare Simulators (REWS) and associated subsystems, Target Control System, Large Area Tracking Range (LATR), Imaging Weapons Training Systems (IWTS), Weapons Impact Scoring Set (WISS), Underwater Training System-Mobile (UTS-(M)), Shallow Water Undersea Warfare Training Range (SWUWTR) technology and range requirements.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,500) Continued development of Electronic Warfare Range Operation Center (EWROC) for Southern California Offshore Range (SCORE). Fielded Engineering Development Model (EDM) unit at SCORE and conducted Developmental Testing (DT)-IIB.
- (U) ($1,558) Achieved Milestone (MS)-II and awarded development contract for Electronic Warfare Response Monitor (EWRM). Began development of SCORE hardware.
- (U) ($700) Continued initial development of Computerized Threat Simulator (CTS). Demonstrated relay, repeater, responder data link capability for CTS. Incorporated requirements for Threat Radar Simulator multibeam into CTS requirements.
- (U) ($231) Developed LATR specifications.
- (U) ($300) Prepared for MS-III approval for Telemetry.
- (U) ($99) Developed of systems specifications and procurement package for Integrated Target Control System (ITCS) "Keep Alive" project.
- (U) ($932) Continued development of WISS (V4) and IWTS.
- (U) ($2,266) Conducted several underwater acoustic telemetry link field tests in support of both the UTS(M) and SWUWTR projects for the Undersea Range Technology Development Program.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204571N
PROGRAM ELEMENT TITLE: Consolidated Training Systems Development
PROJECT NUMBER: W0604
BUDGET ACTIVITY: 7
DATE: 7 February 1994

- (U) ($918) Continued systems definitions, development of specifications, analysis of concepts, and systems engineering.

(U) FY 1994 PLAN:

- (U) ($903) Complete development and testing of WISS (V4) and prepare for MS-III in 4Q, FY94. Continue development and testing of IWTS.
- (U) ($500) Complete EWROC. Resolve issues identified in DT-IIB. Prepare for MSIII 2Q, FY94.
- (U) ($1,732) Continue development of SCORE EWRM. Conduct DT-IIB and resolve development issues. Prepare for EWRM MS-III in 2Q, FY95.
- (U) ($585) Continue development of CTS. Prepare for MS-II in 2Q, FY95.
- (U) ($110) Award contract in 3Q, FY94 for ITCS "Keep Alive" project.
- (U) ($1,962) Prepare for Undersea Range Technology Development MS-I and begin advanced development model development for the UTS-M and shallow water range.
- (U) ($693) Continue systems definitions, development of specifications, analysis of concepts, and systems engineering. Initiate systems engineering efforts for range integration.

(U) FY 1995 PLAN:

- (U) ($2,415) Continue preparation for MS-II in 2Q, FY95 and initiate development of EDM CTS. Coordinate development with LATR to provide littoral electronic warfare capability.
- (U) ($1,149) Complete development and testing of IWTS to satisfy MS-II/III exit criteria.
- (U) ($800) Complete development of SCORE EWRM. Resolve DT-IIB issues and prepare for MS III in 2Q, FY95.
- (U) ($125) Continue development and testing of ITCS "Keep Alive" system.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204571N
PROGRAM ELEMENT TITLE: Consolidated Training Systems Development
PROJECT NUMBER: W0504
BUDGET ACTIVITY: 7
DATE: 7 February 1994

- (U) ($1,800) Achieve MS I in 1Q, FY95 for shallow water range and UTS(M) and prepare for a MS-II decision for UTS-(M).

- (U) ($941) Continue systems definitions, development of specifications, analysis of concepts, and systems engineering. Continue systems engineering efforts for range integration.

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

(U) WORKED PERFORMED BY: IN-HOUSE: NCCOSC WC ISE DIV, San Diego, CA; NAVAIRWARCENWPNDIV, Point Mugu, CA; and China Lake, CA; NAVAIRWARCENACDIV, Patuxent River, MD; and Warminster, PA; NWAD, Corona, CA; NAVSURFWARCENDIV, Dahlgren, VA; NAVUNSEAWARCENDIV, Newport, RI. CONTRACTORS: SRI International, Menlo Park, CA; LORAL, Sunnyvale, CA; SAIC/MARIPRO, Goleta, CA; EMA, Inc, Lexington Park, MD; CTA, Ridgecrest, CA.

(U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN/P-1 #145	21,305	8,084	7,265	0	0	0	0	0	36,654
• (U) APN/P-1 #61	7,351	6,798	7,036	13,955	14,108	2,124	1,802	11,778	64,952

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204571N
PROGRAM ELEMENT TITLE: Consolidated Training Systems Development
PROJECT NUMBER: W1998
BUDGET ACTIVITY: 7
Date: 7 February 1994

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W1998 Tactical Combat Training System (TCTS)	9,310	12,763	23,401	16,553	7,413	7,635	7,760	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Tactical Combat Training System (TCTS) will develop and procure deployable instrumentation designed to provide and evaluate Naval Combat Training at-sea for single platform, multi-platform (surface ship, submarine, aircraft) and Naval Expeditionary Force multi-warfare training. To accomplish this, TCTS instrumentation will be designed to develop and transmit exercise scenarios; simulate/stimulate all exercise participant sensors/weapons with the exercise scenario; track all exercise participants and events, e.g., weapons engagements, and, provide accurate, realistic, and timely exercise feedback. TCTS will build on technology developed for existing tactical training range systems including Tactical Aircrew Combat Training System and Mobile Sea Range (MSR) and the capabilities developed for the in-port Battle Force Tactical Trainer program. TCTS will incorporate the Defense Modeling and Simulation Office sponsored Distributed Interactive Simulation Protocol Data Unit for interoperability with Navy and other service live, virtual (simulators) and constructive (war games) simulations.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($3,900) Awarded three design contracts.
- (U) ($2,400) Monitored contractor progress, evaluated technical concepts.
- (U) ($100) Achieved MS-I.
- (U) ($1,200) Initiated preparation for MS-II decision.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204571N
PROGRAM ELEMENT TITLE: Consolidated Training Systems Development
PROJECT NUMBER: W1998
BUDGET ACTIVITY: 7
Date: 7 February 1994

- (U) ($1,400) Completed the MSR developments for Engineering Change Proposals (ECP) I and II. ECP I developed Global Positioning System based ship instrumentation. ECP II developed secure data Standard Airborne Instrumentation Packages and weapons simulations for weapons engagements.
- (U) ($310) Initiated proposal evaluation.

2. (U) FY 1994 PLAN:

- (U) ($357) Achieve MS-II.
- (U) ($600) Continue to evaluate proposals and select one contractor.
- (U) ($9,341) Award Engineering and Manufacturing Development (E&MD) contract for Engineering Development Model (EDM).
- (U) ($2,465) Monitor contractor progress and evaluate engineering approaches.

3. (U) FY 1995 PLAN:

- (U) ($21,444) Continue E&MD contract for EDM development.
- (U) ($1,857) Monitor contractor progress, coordinate subsystem engineering development/integration.
- (U) ($100) Conduct preliminary design review.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, Pt. Mugu, CA and China Lake, CA; NAVAIRWARCENTRASYSDIV, Orlando, FL; NAVUNSEAWARCENDIV, Newport, RI; NCCOSC WC ISE DIV, San Diego, CA; NAVAIRWARCENACDIV, Patuxent River, MD and Warminster, PA; NWAD, Corona, CA; and NAVSURFWARCENDIV, Port Hueneme, CA. CONTRACTORS: SRI, Menlo Park, CA; Frontier Engineering, Inc., Stillwater, OK; for the FY93 Design Phase, prime contractors are Loral Space and Range Systems, Sunnyvale, CA; TRW Federal Systems, Fairfax, VA; and Raytheon Submarine Signal Division, Portsmouth, RI.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204571N
PROGRAM ELEMENT TITLE: Consolidated Training Systems Development

PROJECT NUMBER: W1998
BUDGET ACTIVITY: 7

Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

TOR	6/84
DOP	12/84
OR	1/86
AP	8/91
ORD	9/92
TEMP	9/92

G. (U) RELATED ACTIVITIES: Not applicable

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN/P-1 #150	2,700	1,200	0	0	0	23,977	22,527	41,480	87,984
• (U) APN/P-1 #61	0	0	0	0	0	27,500	25,808	61,544	114,852

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204571N
PROGRAM ELEMENT TITLE: Consolidated Training Systems Development

PROJECT NUMBER: W1998
BUDGET ACTIVITY: 7

Date: 7 February 1994

J. (U) MILESTONE SCHEDULE:

MS I	Oct 92
Design Contract Award	Oct 92
MS II	Feb 94
E&MD Contract Award	Mar 94
PDR	Feb 95
CDR	Mar 96
TECHEVAL	Jan 97
OPEVAL	May 97
MS III	Oct 97
Production Contract Award	Nov 97
IOC	Jan 00

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204571N
PROGRAM ELEMENT TITLE: Consolidated Training Systems Development

PROJECT NUMBER: W2124
BUDGET ACTIVITY: 7

Date: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W2124, Air Warfare Training Development (AWTD). This program develops Universal Threat System for Simulators (UTSS) which is designed to provide current and validated threat data to a wide range of aircrew simulators in three services, using a common threat module and standard threat database. Historically, each different simulator has required development and maintenance of a separate threat generation system. Development of the standardized UTSS will provide current threat representation and will eliminate redundant efforts and expense. UTSS will be incorporated on existing and future aviation Flight Trainers, Tactics Trainers and Weapons System Trainers. UTSS is a Navy-led, joint service program through the Joint Technical Coordination Group - Training Systems Development.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($50) Developed joint service charter and agreements for total participation in development and support of UTSS prototype and transition.
- (U) ($762) Defined user needs and functional requirements for UTSS
- (U) ($600) Developed operation of concept and technology assessment.
- (U) ($600) Defined and developed integration plan for UTSS modules and database with data driven models and model library for selected threat systems.

(U) FY 1994 PLAN:

- (U) ($903) Develop specification and contract package for development of UTSS.
- (U) ($893) Develop single value threat database.
- (U) ($300) Define/determine database parameters along with threat model characteristics to populate UTSS.
- (U) ($56) Investigate DOD standards for development of real time simulation software baseline
- (U) ($275) Determine validation process for threat data and modules.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204571N
PROGRAM ELEMENT TITLE: Consolidated Training Systems Development
PROJECT NUMBER: W2124
BUDGET ACTIVITY: 7
DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($600) Develop UTSS hardware system/populate system
- (U) ($367) Test UTSS system.

(U) PROGRAM TO COMPLETION: Not applicable.

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA; Air Force Electronic Warfare Center, San Antonio, TX; Army Simulation and Training Instrumentation Evaluation Command, Orlando, FL; Air Force Aeronautical Systems Division, Dayton, OH; Defense Intelligence Agency/MSIC, Huntsville, AL; NAVUNSEAWARCEN, Keyport, WA, Newport, RI, and New London, CT; NAVAIRWARCEN, Indianapolis, IN. CONTRACTORS: GPS Technologies, Arlington, VA; JWK Inc., Dayton, OH; Analysis and Technology, Arlington, VA; SPARTA, Inc., Huntsville, AL; OCI Inc., Keyport, WA

(U) RELATED ACTIVITIES:

- (U) UTSS is a joint service program with the Army, Air Force, Marines and Defense Intelligence Agency participation under the Navy lead. There is a joint charter and signed Memorandum of Agreement between all services.

(U) OTHER APPROPRIATION FUNDS: Not applicable

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204571N
PROGRAM ELEMENT TITLE: Consolidated Training Systems Development

PROJECT NUMBER: X1823
BUDGET ACTIVITY: 7

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X1823, Training and Training Devices Systems (TDDS). The employment of naval forces in a multi-dimensional warfare environment is a complex operational problem. To counter the threat expected in hostile environments, naval officer training must be provided for all mission areas on a real-time basis at the Battle Force/Group level. This training must focus on tactical decision-making, tactics development/evaluation, and operational planning/execution. Shore-based classroom training and at-sea exercises have historically satisfied the Battle Group tactical training requirement. However, the effectiveness of this approach to training was reduced by the lack of a real-time decision-making environment during shore-based training and the reduction in number and scope of at-sea exercises. Enhanced Naval Warfare Gaming System (ENWGS) provides the decision-making environment and is a critical portion of the training that Battle Group Commanders and their supporting Warfare Commanders receive prior to deployment. ENWGS provides development of an enhanced wargaming/simulation capability to provide train to Battle Group Commanders and associated Warfare Commanders. ENWGS is a geographically distributed war gaming system that supports the needs and objectives of the Fleet Commanders. Through computer simulation, ENWGS assists tactical commanders in planning, executing, and evaluating Fleet operations and exercises. ENWGS also provides the ability to test the Battle Groups' Operation Orders, providing the essential supplement to at-sea operations, prior to deployment. During FYs 94-97, ENWGS will complete its conversion to an open systems architecture to provide software portability (Release 5.0) and lead to the development of a shipboard scenario generator (Release 6.0).

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,059) Continued development of Release 4.0.

(U) FY 1994 PLAN:

- (U) ($2,338) Complete and test Release 4.0.
- (U) ($350) Perform Final Qualification Testing of Release 4.0.

(U) FY 1995 PLAN:

- (U) ($2,422) Commence development of Release 5.0 and conduct Preliminary, Critical and Systems Design Reviews of Release 5.0.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0204571N
PROGRAM ELEMENT TITLE: Consolidated Training Systems Development

PROJECT NUMBER: X1823
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

(U) WORK PERFORMED BY: IN-HOUSE: Not applicable. CONTRACTORS: Computer Sciences Corporation, Moorestown, NJ.

(U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN LI#8210	0	2,958	2,407	2,263	1,163	1,299	1,470	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
P1743 C^2 Processor Program	5,370	2,733	1,813	1,322	108	0	0		91,167
P1753 Link Eleven Improvements	928	1,851	1,914	2,367	2,393	1,442	1,477	CONT.	CONT.
P1977 Navy JTIDS	40,787	11,457	5,083	7,473	8,794	11,189	10,989	CONT.	CONT.
P2126 Multifunctional Information Distribution System	12,422	22,954	23,689	39,540	33,345	27,449	27,933	CONT.	CONT.
TOTAL	59,507	38,995	32,499	50,702	44,640	40,080	40,399	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element (PE) develops and improves the Navy's tactical data link system. It includes the Joint Tactical Information Distribution System (JTIDS), the Multifunctional Information Distribution System (MIDS), the Command and Control Processor (C^2P), and the Link 11 Improvement Program (LEIP).

(U) JTIDS will provide selected U.S. Navy tactical aircraft, U.S. Navy ships, and U.S. Marine Corps ground units with crypto-secure, jam resistant, low-probability-of-exploitation communication of tactical data and voice at a high data rate. It will have additional capabilities of common grid navigation and automatic relay inherent in the equipment that will enable long range communication and provide jam resistance. The system will be interoperable among all Services and NATO/Allied users equipped with JTIDS or the NATO MIDS.

(U) The MIDS program is a multinational cooperative development program that will provide space constrained tactical fighter aircraft with Link-16 capability through the development of a terminal (MIDS-Low Volume Terminal (LVT)) that is functionally identical to the JTIDS Class 2 terminal, but through the use of VHSIC and MMIC technology is one-half the weight and one-third the size of the JTIDS terminal. This project funds the costs to integrate and test MIDS in the F/A-18. Terminal development costs are funded in PE 0604771D.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links
BUDGET ACTIVITY: 7

DATE: 7 February 1994

(U) The Command and Control Processor (C^2P) program is a software development effort that will provide an interface between the Tactical Digital Information Links (TADILs) (Link 4A, 11 and 16) and major surface ship Command and Control systems (ACDS and AEGIS C&D). The C^2P will provide translation between TADILs and isolate all tactical data link equipment, message standards and protocols from tactical information processors. This will provide a flexible capability for rapidly exchanging tactical information using a single data base for translating various link formats while remaining completely independent of communications equipment and tactical data computing systems.

(U) The Link 11 Improvement Plan (LEIP) is made up of several efforts to improve existing computer-to-computer digital radio communications in the HF and UHF radio frequency bands among Combat Direction System (CDS) equipped ships, submarines, aircraft and shore sites. Data link improvements will allow more effective employment of fleet units by increasing the timeliness, accuracy, and content of tactical data transfer. In order to ensure interoperability, the U.S. is the Lead Technical Nation to the NATO Improved Link Eleven (NILE) Office.

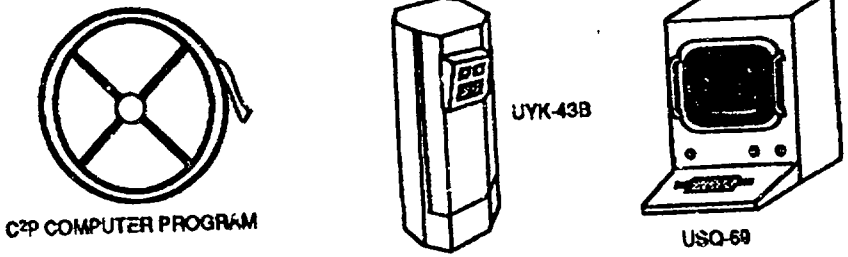
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links

PROJECT NUMBER: P1743
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: C^2 Processor Program



POPULAR NAME: Command and Control Processor (C^2P)

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links

PROJECT NUMBER: P1743
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		RTF (VO) 2/94	AFP NPDM 1/95			RTF (V1) 7/97		
ENGINEERING MILESTONES								
T&E MILESTONES	VCD 6/93 OT-IID 11/93 TECHEVAL(VO) 4/94 OPEVAL (VO) 7/94		ACDS BLK 1 TECHEVAL 5/96					
CONTRACT MILESTONES								

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	59,138	2,321	1,077	620	0	0	0	0	63,156
SUPPORT CONTRACT	1,865	392	230	0	0	0	0	0	2,487
IN-HOUSE SUPPORT	9,350	1,787	1,137	939	972	0	0	0	14,185
GFE/ OTHER	9,468	870	289	254	350	108	0	0	11,339
TOTAL	79,821	5,370	2,733	1,813	1,322	108	0	0	91,167

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Command and Control Processor (C2P) will remove link translation and processing duties from the tactical data processor, thereby increasing track capacity and target insertion rates for the combat direction system. The C2P will be a newly developed computer program hosted on Navy standard computers (AN/UYK-43) that will serve as the interface between tactical digital communication systems and selected shipboard processors, providing a rapid and flexible capability for exchanging tactical information. Where installed, the C2P will isolate all tactical data link equipment, message standards and protocols from tactical information processors. The C2P provides the interface between Links 4A, 11, Improved Link 11, 16, the Advanced Combat Direction System (ACDS), and AEGIS Command and Decision (C&D). The C2P will extract information from Tactical Digital Information Links (TADILs), translate between TADILs, forward data between specific TADILs and provide the information derived from those links to on-board

processors. Information received from shipboard processors will be formatted and provided to the appropriate link equipment for transmission. The C2P program is being developed in two versions. Version 0 (V0) will support ACDS Block 0 and AEGIS Model 4 C&D ships. Version 1 (V1) will support ACDS Block 1 and AEGIS Model 5 C&D ships.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($5,370) Continued C2P development by: correcting C2P V0 deficiencies/Trouble Reports (TRs) identified during testing; conducting Verification of Correction of Deficiencies; and continuing C2P V1 development.

2. (U) FY 1994 PLAN:

- (U) ($1,100) Conduct C2P testing and corrections for OT-IID and OPEVAL/TECHVAL.
- (U) ($1,633) Continue C2P V1 development and start integration testing ACDS Block 1.
- (U) (N/A) Achieve C2P IOC.

3. (U) FY 1995 PLANS:

- (U) ($1,813) Verify fixes to C2P V0 identified in TECHEVAL/OPEVAL and conduct testing with ACDS BLK1.

4. (U) PROGRAM TO COMPLETION:

- (U) Complete testing to verify fixes to C2P V0 identified in TECHEVAL/OPEVAL.
- (U) Complete C2P V1/ACDS Block 1 Development/Operational Testing.
- (U) Correct C2P deficiencies/TRs identified during testing.

D. (U) WORK PERFORMED BY: IN-HOUSE: FCDSSA, San Diego, CA; NCCOSC RDTE DIV, San Diego, CA; FLTCOMBATDIRSSACT, Dam Neck, VA. CONTRACTORS: Hughes Aircraft Company, Fullerton, CA.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links

PROJECT NUMBER: P1743
BUDGET ACTIVITY: 7

Date: 7 February 1994

E. (U) COMPARISON WITH AMENDED FY 1994 PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:
- (U) OR 12/85
- (U) NDCP 2/88 (Revised 11/89)
- (U) TEMP 357-02 2/92

G. (U) RELATED ACTIVITIES:

- (U) PE 0205604N, Tactical Information Systems: LINK 16 is one of the tactical data links currently under development that interfaces with C2P.

- (U) PE 0604518N, CIC Conversion: ACDS is a shipboard processor currently under development that interfaces with C2P.

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OPN Line #2614	12,607	5,591	13,851	9,444	8,817	11,648	8,727	CONT.	CONT.
SCN Line #	4,848	3,594	2,755	3,830	3,830	2,941	4,008	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links

PROJECT NUMBER: P1743
BUDGET ACTIVITY: 7

Date: 7 February 1994

J. (U) TEST AND EVALUATION:

- (U) Conducted Verification of Correction of Deficiencies, 6/93.
- (U) Conducted OT-IID, 11/93.
- (U) Conduct C2P V0 TECHEVAL, 4/94.
- (U) Conduct C2P V0 OPEVAL, 7/94.
- (U) Conduct C2P V1/ACDS Block 1 Integration Testing, 7/94.
- (U) Continue C2P V1/ACDS Block 1 Integration Testing.
- (U) Conduct OT-IIIA to verify fixes to C2P V0 deficiencies identified in TECHVEAL/OPEVAL.
- (U) Complete C2P V1/ACDS Block 1 DT/OT.

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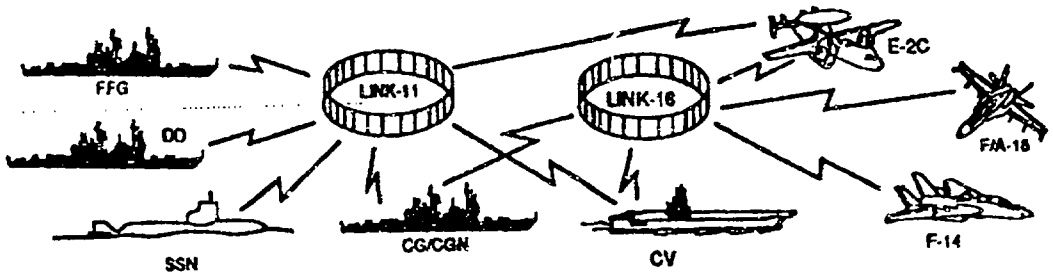
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links

PROJECT NUMBER: P1753
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: Link Eleven Improvements



POPULAR NAME: Link Eleven Improvement Program (LEIP)

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links

PROJECT NUMBER: P1753
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES				NILE MSII 4QTR/96				
ENGINEERING MILESTONES								
T&E MILESTONES								
CONTRACT MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	0	0	0	0	0	0	0	CONT.
SUPPORT CONTRACT	51	210	200	100	100	110	160	CONT.
IN-HOUSE SUPPORT	877	1,641	1,714	2,267	2,293	1,332	1,317	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	CONT.
TOTAL	928	1,851	1,914	2,367	2,393	1,442	1,477	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: LEIP improves existing computer-to-computer digital radio communications in the High Frequency and Ultra-High Frequency radio frequency bands among Combat Direction System (CDS) equipped ships, submarines, aircraft and shore sites. In prior years the Link-11 Improvement Program (LEIP) was made up of several efforts. These included near term improvements to existing Link-11, technical support of the NATO efforts to develop an improved Link 11 system, development of a data link for use with non-Link-11 equipped foreign navies, development of a Mobile Universal Link Translator System (MULTS), and a Critical System Demonstration (CSD) of technologies to improve the performance of current Link-11. These data link improvements allow more effective employment of fleet units by increasing the timeliness, accuracy, and content of tactical data transfer. In order to ensure interoperability, the U.S. is the lead technical nation to the NATO Improved Link Eleven (NILE) office. Of these efforts only the NILE effort continues in RDT&E beyond FY 1993. The NILE development will occur in two design and development

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N | PROJECT NUMBER: P1753 | Date: 7 February 1994
PROGRAM ELEMENT TITLE: Tactical Data Links | BUDGET ACTIVITY: 7

subphases. Subphase I will validate specification using simulation, emulation and modeling and a test bed developed during this subphase. Subphase II involves the acquisition, integration and testing of the NILE Reference System.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) (N/A) Completed fielding LEDS upgrades.
- (U) ($328) Completed preparation of NILE simulation plan and installed NILE simulation equipment and integration of software.
- (U) ($200) Continued development and validation of NILE system specifications using simulation, emulation and modeling.
- (U) ($300) Continued early operational capability efforts as first portion of U.S. Companion Program to NILE.
- (U) ($100) Completed CSD of TDMA Network Protocols, Mission Area Subnet and Multi-Media Protocols.

2. (U) FY 1994 PROGRAM:

- (U) ($500) Complete development and validation of NILE system specifications using simulation, emulation and modeling.
- (U) (N/A) Complete development of NILE test bed.
- (U) (N/A) Conduct NILE system testing using test bed, aircraft and ship services.
- (U) ($1,351) Perform at sea operation of early operational capability and message standard in preparation for NILE Reference System.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links

PROJECT NUMBER: P1753
BUDGET ACTIVITY: 7

Date: 7 February 1994

3. (U) FY 1995 PLANS:

- (U) ($1,214) Complete NILF interoperability testing and analysis.
- (U) (N/A) Prepare and deliver test bed report.
- (U) ($700) Continue preparations for NILE Reference System.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVELEXCEN, Portsmouth, VA; NCCOSC RDTE DIV, San Diego, CA; NRL, Washington, D.C.; NCTSI, San Diego, CA; NAVELEXACT, St. Inigoes, MD; FLTCOMBATDIRSSACT, Dam Neck, VA. CONTRACTORS: SAIC, San Diego, CA; Rockwell International, Dallas, TX.

E. (U) COMPARISON WITH AMENDED FY 1994 PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) OR X1327 (LEIP) 2/82
- (U) DCP High Frequency Anti-Jam (HFAJ/LEIP)1/87
- (U) TEMP (HFAJ/LEIP)1/86

G. (U) RELATED ACTIVITIES: Not applicable.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links

PROJECT NUMBER: P1753
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line #2660	1,934	0	0	0	0	0	0	0	7,737

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: The NATO Improved Link Eleven (NILE) program is in design and development Subphase I under the Memorandum of Understanding effective July 1992. Participating nations are: Canada, France, Italy, Germany, Netherlands, the United Kingdom and the United States.

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

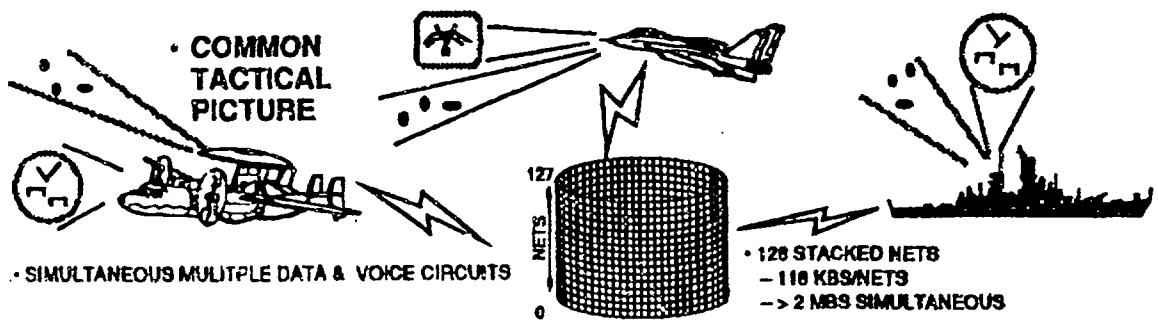
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links

PROJECT NUMBER: P1977
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: Navy JTIDS



POPULAR NAME: Joint Tactical Information Distribution System (JTIDS)

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links

PROJECT NUMBER: P1977
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		IOC 2/94	NPDM 1/95 DAB IIIB FRP 2/95					
ENGINEERING MILESTONES	Deliver Operational Fixes 3/93							
T&E MILESTONES	DT-IIF 1,2 VCD 6/93 (OT-IIC-1)	DT-IIG 10/93 OT-IID 11/93 TECHEVAL 4/94 OPEVAL 7/94	JTC 3A 11/94-6/95	DT-IIIA 10/95 OT-IIIA 3/96 DT-IIIB 5/96 DT-IIIC 8/96	OT-IIIB 1/97 OT-IIIC 6/97			
CONTRACT MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	16,794	4,691	2,367	3,358	3,810	4,659	4,560	CONT.
SUPPORT CONTRACT	1,246	480	202	298	348	440	431	CONT.
IN-HOUSE SUPPORT	11,043	3,679	1,551	1,783	2,166	2,874	2,802	CONT.
GFE/ OTHER	11,704	2,607	963	2,034	2,470	3,216	3,196	CONT.
TOTAL	40,787	11,457	5,083	7,473	8,794	11,189	10,989	CONT.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links
PROJECT NUMBER: P1977
BUDGET ACTIVITY: 7
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Combat experience gained during the Southeast Asia conflict, Middle East incidents, Grenada, and Desert Storm exposed several deficiencies in U.S. tactical communication, navigation, and identification systems. Extensive analyses of these combat situations indicate that a joint service, high capacity, secure and jam resistant communication and data link would increase force effectiveness and substantially reduce losses due to hostile action and friend-on-friend engagements. These capabilities are critical in the high speed, long range, and electronically hostile environment envisioned in any substantial modern-day conflict. This includes any engagement with minor or third world powers due to the proliferation of high-technology weaponry.

(U) Link 16 is an integration of the Time Division Multiple Access (TDMA) family of Joint Tactical Information Distribution System (JTIDS) terminals and the Tactical Digital Information Link J (TADIL J) Message Standard. It will provide selected U.S. Navy tactical air, U.S. Navy ships and U.S. Marine Corps ground units crypto-secure, jam resistant, low-probability-of-exploitation communication of tactical data and voice at a high data rate. It will have the additional capabilities of common-grid navigation and the use of automatic relay inherent in the equipment that will enable long-range communication and provide jam resistance. The system will be interoperable among all Services and NATO/Allied users equipped with JTIDS or the European version, NATO MIDS (Germany, Italy, France, and Spain). This project will fund the costs to integrate and test JTIDS in the E-2C, F-14D, CV, CG, DDG, the required development to accommodate expanded LINK 16 operational capabilities for additional warfare areas, and development of automated network management aids.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($12,657) Continued air and ship integration efforts.
- (U) ($7,630) Continued multi-platform and joint service testing.
- (U) ($6,400) Continued JTIDS systems engineering including the development of joint service Automatic Network Management Aid and the delivery of Navy unique and joint service operational networks.
- (U) ($4,100) Conducted DT testing (DT IIF/1,2) and Verification of Correction of Deficiences (VCD) (OT-IIC-I) in preparation for DT-IIG and OT-IID.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links

PROJECT NUMBER: P1977
BUDGET ACTIVITY: 7

Date: 7 February 1994

- (U)($10,000) Continued JTIDS hardware software engineering efforts and integrated logistics support efforts including pre-operational support and test program set modification development.

2. (U) FY 1994 PLAN:

- (U) ($5,857) Conduct JTIDS testing including (DT/OT DT-1IG/OT-IID), technical evaluation (TECHEVAL), operational evaluation OPEVAL and correction of deficiences.
- (U) ($2,800) Complete joint service Automatic Network Management Aid development.
- (U) Achieve Initial Operational Capability (IOC).
- (U) ($2,800) Support continued development of the Advanced Combat Direction System (ACDS) Block 1 and AEGIS Baseline 5.

3. (U) 1995 PLANS:

- (U) ($2,200) Continue developing fixes to deficiencies identified during TECHEVAL/OPEVAL.
- (U) ($355) Participate in joint service developmental TADIL J message certification testing.
- (U) ($2,528) Contine effort on ACDS Block I program and developing Aegis Baseline 5.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDTE DIV, San Diego, CA; NAVAIRWARCENACDIV, Patuxent River, MD; NAVSURFWARCEN FLTCOMBATDIRSSACT, Dam Neck, VA; NCCOSC RDTE DIV DET, Warminster, PA; CONTRACTORS: GEC-Marconi Electronics System Co., Wayne, NJ; Collins Avionics and Communications Division of Rockwell International, Cedar Rapids, IA; Grumman Aerospace Corp., Bethpage, Long Island, NY; The Boeing Corporation, Seattle, WA.

E. (U) COMPARISON WITH AMENDED FY 1994 PRESIDENT'S BUDGET:

1. (U) Technology Changes: Data in previous budget not available for comparison.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links
PROJECT NUMBER: P1977
BUDGET ACTIVITY: 7
Date: 7 February 1994

2. (U) Schedule Changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) MJCS 194-89 (MROC for JTIDS) 11/89
- (U) Joint JTIDS Navy TEMP Annex 5/89
- (U) ADM (JTIDS Milestone IIIA) 10/89
- (U) SDP LRIP Decision 4/91
- (U) SDP ADM LRIP Decision 9/92

G. (U) RELATED ACTIVITIES:

- (U) PE 0205667N, F-14 Upgrade. Aircraft upgrades include integration with JTIDS.
- (U) PE 0204152N, E-2C Improvements. Aircraft upgrades include integration with JTIDS.
- (U) PE 0604771D, Common JTIDS. Funding develops and procures the Navy's Engineering and Manufacturing Development terminals through the Joint Program Office.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
APN Line #55, 140	4,005	15,648	31,332	16,135	8,438	5,946	9,711	CONT.	CONT.
APN Line #167	2,648	5,194	2,673	5,497	2,825	0	0	CONT	CONT.
OPN Line #2614	27,635	18,430	28,600	22,287	22,308	22,409	15,532	CONT.	CONT.
SCN Line #	15,144	15,970	10,268	8,222	8,338	6,396	8,709	CONT.	CONT.

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links

PROJECT NUMBER: P1977
BUDGET ACTIVITY: 7

Date: 7 February 1994

J. (U) TEST AND EVALUATION DATA:

- (U) FY 1993: DT-IIF-1,2/VCD (OT-IIC-1) testing is required to verify correction of deficiencies to support FY 1993 continued low rate initial production.
- (U) FY 1994: DT-IIG/OT-IID testing is required to verify correction of deficiencies prior to OPEVAL (7/94). TECHEVAL/OPEVAL are test phases required to support the Full Rate Production DAB (2/95).
- (U) FY 1995: T&E Milestone JTC3ADCT is a test phase required for joint certification (11/94 - 6/95), and to verify integration of ACDS Block 1 respectively (8/95 - 12/95).
- (U) FY 1996-FY 1997: DT-IIIA and OT-IIIA testing is required to verify correction of deficiencies from OPEVAL and fielded requirements per CNO letter of 28 April 1993. DT-IIIB and OT-IIIB is required in conjunction with ACDS Block 1 TADIL J database introduction. DT-IIIC and OT-IIIC is required in conjunction with AEGIS Baseline 5 TADIL J database introduction.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

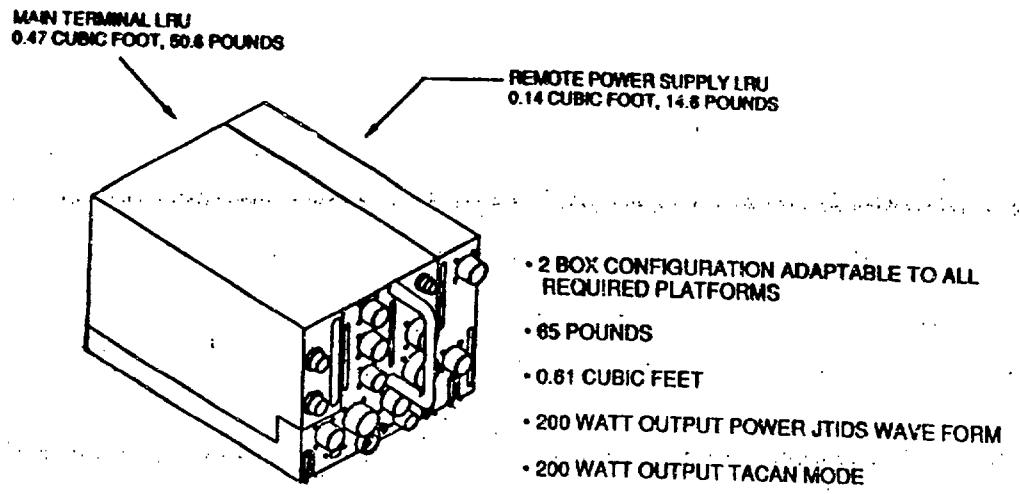
PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links

PROJECT NUMBER: P2126
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: Multifunctional Information Distribution System

MIDS LOW VOLUME TERMINAL CONFIGURATION



POPULAR NAME: Link 16 Multifunctional Information Distribution System (MIDS)

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links
PROJECT NUMBER: P2126
BUDGET ACTIVITY: 7
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		DAB II 12/93						DAB III 3 QTR/01
ENGINEERING MILESTONES				OFP 11C 3/96 PDR 5/96	CDR 3/97	OFP 13C 3/98		OFP 15C 2 QTR/00 OFP TOD 2 QTR/02
T&E MILESTONES			DT-IIB-1 4/95	DT-IIB-2 1/96	DT-IIA-2 7/97 DT-IIB-3 7/97	DT-IIB-4 2/98 OT-IIA 9/98 DT-IIC 9/98	DT-IID 9/99	OPEVAL 1 QTR/01 TECHEVAL 3 QTR/00
CONTRACT MILESTONES		F/A-18 Integ. Contract Award 7/94						

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	6,970	18,420	17,539	30,465	13,890	9,486	9,505	CONT.
SUPPORT CONTRACT	1,301	1,066	1,238	1,340	1,366	1,392	1,327	CONT.
IN-HOUSE SUPPORT	2,150	2,713	3,819	3,680	3,515	1,104	1,108	CONT.
GFE/ OTHER	2,001	755	1,093	4,055	14,574	15,467	15,993	CONT.
TOTAL	12,422	22,954	23,689	39,540	33,345	27,449	27,933	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Multifunctional Information Distribution System (MIDS) is a multinational (U.S., France, Germany, Italy, and Spain) cooperative development program established to design, develop, and deliver low-volume (LV), lightweight tactical information system terminals for U.S. fighter aircraft as well as foreign fighter aircraft, helicopters, ships and ground sites. The terminals will be designed as a Pre-Planned Product Improvement (P3I) of the Joint Tactical Information Distribution System (JTIDS) Time Division Multiple Access (TDMA) Class 2 terminals. The goal of the MIDS program is to produce a terminal that is smaller, lighter, fully compatible with, and as capable as the JTIDS TDMA Class 2 terminals but suitable for use on platforms that cannot accommodate the bulkier, heavier JTIDS TDMA Class 2 terminals. The first U.S. Navy planned application of a MIDS terminal is on the F/A-18. This PE will fund the costs to integrate and test MIDS on the F/A-18. Terminal development costs are funded in PE 0604771D.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links

PROJECT NUMBER: P2126
BUDGET ACTIVITY: 7

Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($12,422) Conducted MIDS system engineering integration activities on the F/A-18 and HARM Downsizing.

2. (U) FY 1994 PROGRAM:

- (U) ($600) Complete downsizing of HARM CLC.
- (U) (N/A) Complete MIDS F/A-18 integration design study.
- (U) (N/A) Award contract for MIDS F/A-18 integration.
- (U) ($22,354) Start development of initial MIDS software build and F/A-18 modifications for incorporation into Operational Flight Program (OFP) 11C.

3. (U) FY 1995 PLANS: ($23,689) Continue development of initial MIDS software build and F/A-18 modifications for incorporation into Operational Flight Program (OFP) 11C.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDTE DIV DET, Warminster, PA; NAVAIRWARCENWPNDIV, China Lake, CA. CONTRACTORS: McDonnell Douglas, St. Louis, MO; Texas Instruments, Dallas, TX; GEC-Marconi Electronics System Co., Wayne, NJ.

E. (U) COMPARISON WITH AMENDED FY 1994 PRESIDENT'S BUDGET:

1. (U) Technical Changes: Data in previous budget not available for comparison.

2. (U) Schedule Changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205604N
PROGRAM ELEMENT TITLE: Tactical Data Links

PROJECT NUMBER: P2126
BUDGET ACTIVITY: 7

Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:

NATO:	Military Operational Requirement (MOR) MC 306	3/87
US:	JTIDS-Multiple Required Operational Capability (MROC) MJCS-194-89	8/89
	MIDS-Mission Needs Statement (MNS) for MIDS F/A-18	4/90

G. (U) RELATED ACTIVITIES:

- (U) PE 0205604N, JTIDS: Funds Integration and test costs for JTIDS on the following Navy platforms: E-2C, F-14D, CV, CG/CGN, and DDG.
- (U) PE 0604771D, Common JTIDS: Funding develops and procures the Navy's JTIDS and MIDS Full-scale development terminals.
- (U) PE 0604771D, OSD MIDS - Terminal development.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

1. (U) Terminal Project Definition Memorandum of Understanding (MOU) with NATO Nations, 14 Nov 86.
2. (U) Terminal Program MOU and Pre-EMD Phase Supplement, 4 Oct 91.

J. (U) TEST AND EVALUATION DATA:

(U) DT-IIB-1	4/95
(U) DT-IIB-2	1/96
(U) DT-IIA-2	7/97
(U) DT-IIB-3	7/97
(U) DT-IIB-4	2/98
(U) DT-IIC	9/98
(U) DT-IIA	9/98
(U) DT-IID	9/99

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205620N
PROGRAM ELEMENT TITLE: Surface ASW Combat System Integration
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
V0896	ASW Combat System Integration								
	16,914	6,603	3,683	0	0	0	0	0	218,486
V1916	Surface ASW System Improvements								
	0	16,269	12,966	5,485	5,200	5,121	5,179	CONT.	CONT.
TOTAL	16,914	22,872	16,649	5,485	5,200	5,121	5,179	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The objective of this program element is to complete the transformation of three independently developed AN/SQQ-89 ASW sensors (AN-SQR-19, AN/SQS-53, AN/SQQ-28) and the MK 116 Mod 7 ASW Control System to achieve a fully integrated AN/SQQ-89 ASW Combat System which will provide optimum system effectiveness. It seeks to continue the minimum development necessary to keep the AN/SQQ-89 abreast of other combat system developments, such as the evolution of Aegis variants and the deployment of the MK-50 torpedo. This program element also funds efforts to develop open system architecture elements for the AN/SQQ-89 which will enable moderate and affordable capability growth, especially in the area of shallow water ASW.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

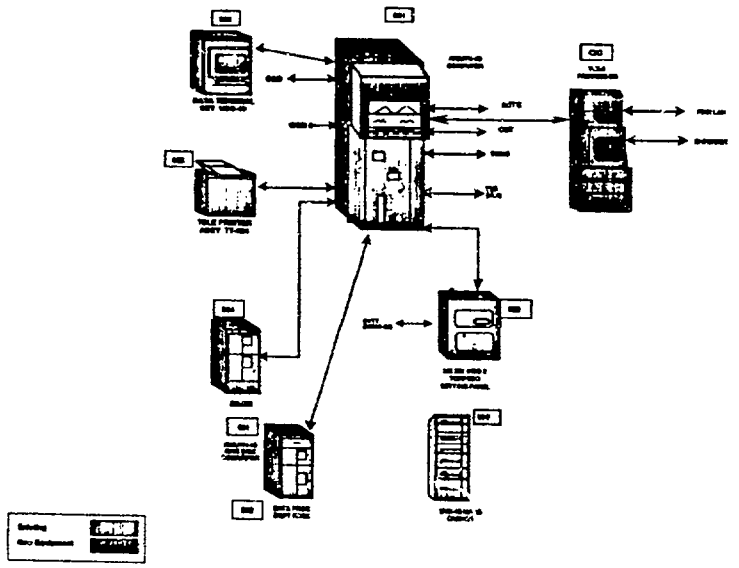
PROGRAM ELEMENT: 0205620N
PROGRAM ELEMENT TITLE: Surface ASW Combat System Integration

PROJECT NUMBER: V0896
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: ASW Combat System Integration

MK 116 MOD 7 ASW CONTROL SYSTEM



POPULAR NAME: ASWCSI

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205620N
PROGRAM ELEMENT TITLE: Surface ASW Combat System Integration

PROJECT NUMBER: V0896
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
ENGINEERING MILESTONES	MK50 PDR 3/93 MK50 CDR 6/93	TDSS/ ASWCS 5/94 TDSS/ ASWCS CDR 7/94	TDSS EDM 9/95					
T&E MILESTONES	MOD 7/SIMAS TEST 3/93	MK50 INTEG TEST 4/95						
CONTRACT MILESTONES								

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	100,115	1,635	2,872	1,723					106,345 (0)
SUPPORT CONTRACT	8,180	1,013	400	200					9,793 (0)
IN-HOUSE SUPPORT	77,773	14,067	3,131	1,560					96,531 (0)
GFE/ OTHER	5,218	199	200	200					5,817 (0)
TOTAL	191,286	16,914	6,603	3,683					218,486 (0)

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205620N
PROGRAM ELEMENT TITLE: Surface ASW Combat System Integration
PROJECT NUMBER: V0896
BUDGET ACTIVITY: 7
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This research and development project will provide a fully integrated AN/SQQ-89 ASW Combat System which will achieve maximum operational effectiveness by completing the transformation of three independently developed AN/SQQ-89 ASW sensors and the MK 116 Mod 7 ASW Control System. These efforts will also correct OPTEVFOR identified deficiencies, meet the contact management functions addressed in the original Aegis Weapon System specification, complete the development of a MK 50 torpedo employment capability and complete AN/SQQ-89 system integration through development of a generic non-developmental item/commercial off-the-shelf (NDI/COTS) derived interface processor which will allow unlimited access to all sensor data, allow for enhanced data sharing with combat direction and C4I systems, and provide for insertion of modern 6.2/6.3 technology into shipboard AN/SQQ-89 systems. Contact management system efforts have been renamed the Tactical Decision Support Subsystem (TDSS).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($9,022) Evaluated results of at-sea test of stand alone prototype CMS and developed functional allocation of requirement between CMS & ASWCS MK 116 MOD 7. Provided test and evaluation, reliability, maintainability, and availability (RM&A), and systems engineering support for CMS development. Evaluated proposed design architecture for CMS. Initiated bi-directional interface between CMS and MK 116.

- (U) ($60) Completed MOD 7/Sonar In-SITU Mode Assessment System (SIMAS) (Desktop) interface development and conducted integration tests.

- (U) ($2,045) Continued fleet requested MOD 7 corrections and changes required for MK 50 Torpedo introduction. Provided technical support for MK 50 integration including systems engineering, RM&A, and technical documentation. Conducted MK 50 Preliminary and Critical Design Review.

- (U) ($3,536) Provided software engineering support, documentation, and independent testing of ASWCS MK 116 release group C.

- (U) ($2,251) Continued coordination of ASWCS development with all AN/SQQ-89 elements.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205620N
PROGRAM ELEMENT TITLE: Surface ASW Combat System Integration
PROJECT NUMBER: V0896
BUDGET ACTIVITY: 7
Date: 7 February 1994

2. (U) FY 1994 PLAN:

- (U) ($2,864) Continue contact management development efforts by using a COTS based computer workstation and display to improve ASW watch team performance (TDSS). Continue development of bi-directional interface with CMS and ASWCS MK 116.
- (U) ($1,395) Continue MOD 7 changes required for MK 50 Torpedo introduction.
- (U) ($809) Conduct Preliminary Design Review.
- (U) ($1,535) Continue coordination of ASWCS development with all AN/SQQ-89 elements.

3. (U) FY 1995 PLAN:

- (U) ($1,000) Complete development of MK 116 bi-directional interface and conduct testing.
- (U) ($426) Complete MOD 7 changes required for MK 50 torpedo introduction. Conduct integration test of MK 50 torpedo capability in ASWCS.
- (U) ($1,525) Complete development of the Tactical Decision Support Subsystem. Conduct Critical Design Review and integrate TDSS.
- (U) ($732) Continue coordination of ASWCS development with all AN/SQQ-89 elements.

4. (U) PROGRAM TO COMPLETION: FY-95 plans consist of completion of the MOD 7 changes for MK 50 torpedo introduction, completing development and integration of the TDSS and ASWCS MK 116 bi-directional interfaces, and coordinating ASWCS development with all AN/SQQ-89 elements. Efforts in this project will continue under PE 0205620N, project V1916, Surface ASW Systems Improvements, after FY 1995.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCEN DET, New London, CT; NAVSURFWARCEN WHITE OAK DET, Silver Spring, MD; NRL SSC, Stennis Space Ctr., MS. CONTRACTORS: Matrix, Inc., Arlington, VA.; Westinghouse, Sykesville, MD.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205620N
PROGRAM ELEMENT TITLE: Surface ASW Combat System Integration

PROJECT NUMBER: V0896
BUDGET ACTIVITY: 7

Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) NDCP V0896-AS 5/81
- (U) OPTEVFOR Reports 802-2-OT-III C, D, and E

G. (U) RELATED ACTIVITIES:

- (U) PE 0604212N, Project H1707, (LAMPS III IMP).

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 51	129,291	85,817	88,445	41,514	36,004	16,142	19,563	CONT.	CONT.

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

J. (U) TEST AND EVALUATION: Test and Evaluation consists of production acceptance test and AN/SQQ-89 integration test of Set IV, V and VII software baselines.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

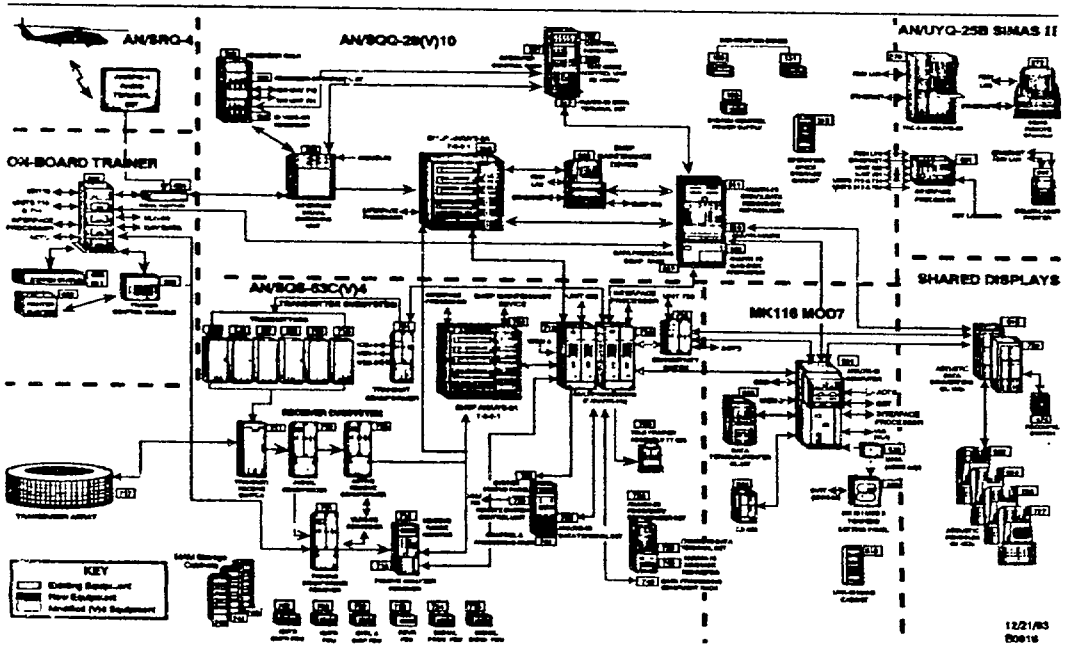
PROGRAM ELEMENT: 0205620N
PROGRAM ELEMENT TITLE: Surface ASW Combat System Integration

PROJECT NUMBER: V1916
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: Surface ASW System Improvements

AN/SQQ-89(V)10 SURFACE ASW COMBAT SYSTEM FOR DDG-51 FLIGHT-IIA



POPULAR NAME: AN/SQQ-89 Modernization

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205620N
PROGRAM ELEMENT TITLE: Surface ASW Combat System Integration

PROJECT NUMBER: V1916
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
ENGINEERING MILESTONES	EMSP SSR 6/93 AIDS SSR 3/93 AIDS SDR 7/93	EMSP PDR 10/93 AIDS PDR 12/93 AIDS CDR 2/94 AIDS/EDM 6/94 EMSP CDR 6/94	AIDS/EMSP SYS INTEG TESTING					
T&E MILESTONES								
CONTRACT MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	0	8,364	4,809	2,254	2,013	1,955	1,783	CONT.
SUPPORT CONTRACT	0	1,054	1,000	467	365	360	356	CONT.
IN-HOUSE SUPPORT	0	6,851	7,157	2,764	2,822	2,806	3,040	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	CONT.
TOTAL	0	16,269	12,966	5,485	5,200	5,121	5,179	CONT.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205620N
PROGRAM ELEMENT TITLE: Surface ASW Combat System Integration

PROJECT NUMBER: V1916
BUDGET ACTIVITY: 7

Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Incrementally modernize the existing AN/SQQ-89 system by incorporating the UYS-2 Enhanced Modular Signal Processor (EMSP), the Advanced Integrated Display Station (AIDS), operability enhancements, and a number of modest performance enhancements recommended by the Fleet CINCs. This modernization will fully support the DDG-51 Flight IIA and follow-on requirements. Develop open system architecture elements for AN/SQQ-89 to pave the way for moderate and affordable growth, particularly in the area of shallow water ASW. This modernization effort will be accomplished by: 1) completing the redesign of the AN/SQQ-89(V)6 into the AN/SQQ-89(V)10 variant which incorporates the UYS-2 (EMSP), the UYQ-65 (AIDS), and deletes the AN/SQR-190; 2) developing a coherent open system architecture to enable further affordable performance growth. This includes developing a set of AN/SQQ-89 interface standards and protocols to build an open system architecture test bed in which this technology will be integrated with the AN/SQQ-89 system operability including operator-machine interfaces, using modern commercially derived technology; and 3) developing the following enhanced AN/SQQ-89 capabilities: Interoperability with low frequency active (LFA), interoperability with LAMPS MK III Blk II, Acoustic Intercept capability, torpedo alertment and countermeasure capability.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) (FY 1992 Funds) Continued EMSP recoding/design efforts; conducted EMSP System Software Review (SSR).
- (U) (FY 1992 Funds) Continued AIDS design/development; conducted AIDS System Software Review/System Design Reviews (SSR/SDR), CI Mode Testing.
- (U) (FY 1992 Funds) Continued AIDS/EMSP Integration efforts for DDG-51 Flight IIA.
- (U) (FY 1992 Funds) Performed operability analysis and begain development of fleet requested operability improvements.
- (U) (FY 1992 Funds) Began development efforts to provide the AN/SQQ-89(V) open system architecture elements.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205620N
PROGRAM ELEMENT TITLE: Surface ASW Combat System Integration

PROJECT NUMBER: V1916
BUDGET ACTIVITY: 7

Date: 7 February 1994

2. (U) FY 1994 PLAN:

- (U) ($3,548) Continue EMSP recoding efforts for the AN/SQS-53C and AN/SQQ-28. Conduct EMSP Preliminary Design Review (PDR). Continue development of the UYS-2 enclosure and interface designs to e[illegible]e AN/SQQ-89(V)10 compatibility. Conduct EMSP Critical Design Review (CDR).

- (U) ($2,298) Conduct AIDS Preliminary Design Review/Critical Design Review (CDR/PDR). Complete AIDS Engineering Development Model (EDM). Begin system tests. Continue AN/UVQ-65 (AIDS) hardware and software development efforts for Flight IIA integration efforts.

- (U) ($10,423) Continue fleet requested operability improvements development. Conduct system analysis and system trade studies on required enhancements. Continue open system architecture development efforts in the area of shallow water and conduct LFA, LAMPS MK III Block II, torpedo alertment and acoustic intercept operability evaluations.

3. (U) FY 1995 PLAN:

- (U) ($3,347) Complete EMSP recoding efforts, interface designs, and system integration tests.

- (U) ($1,727) Conduct AIDS system tests. Complete system integration tests.

- (U) ($7,892) Continue development, analysis and studies of fleet requested operability improvements to include LFA and LAMPS MK III Block II interoperability, torpedo alertment and acoustic intercept system evaluations. Continue efforts to provide the AN/SQQ-89(V) open system architecture elements for moderate and affordable growth particularly in the area of shallow water ASW.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN WHITE OAK, Silver Spring, MD; NAVSURFWARCEN, Crane, IN; NAVUNSEAWARCEN DET New London, CT; NAVUNSEAWARCEN DET, Norfolk, VA; NAVUNSEAWARCENDIV, Keyport, WA; NAVUNSEAWARCENDIV, Newport, RI; COMSURFWARDEVGRU, Norfolk, VA. CONTRACTORS: TRACOR, Arlington, VA; AT&T, Greensboro, NC; Diagnostic Retrieval System (DRS), Oakland, NJ; Westinghouse Corp, Sykesville, MD

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205620N
PROGRAM ELEMENT TITLE: Surface ASW Combat System Integration
PROJECT NUMBER: V1916
BUDGET ACTIVITY: 7
Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- Acquisition Program Baseline (Pending approval)
- Test and Evaluation Master Plan (TEMP S02-2)

G. (U) RELATED ACTIVITIES:

- (U) PE 0603553N (Surface Anti-Submarine Warfare) - Advanced ASW Development.
- (U) PE 0604212N (Anti-Submarine Warfare & Other Helicopter Developments)
- (U) PE 0604507N (Enhanced Modular Signal Processor) - Development of Navy Standard Processing.
- (U) PE 0604574N (Navy Tactical Computer Resources) - Development of Navy Standard Displays.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 51	129,291	85,817	88,445	41,514	36,004	16,142	19,563	CONT.	CONT.

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

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

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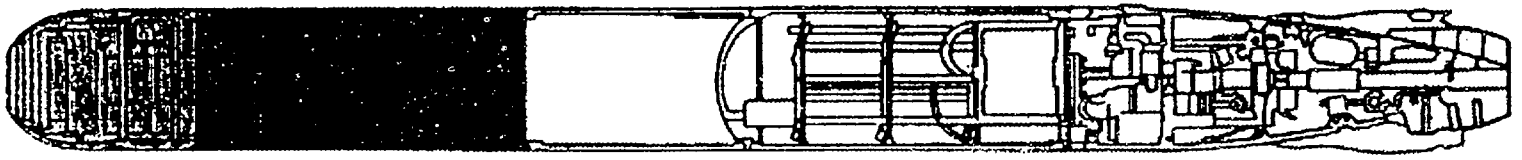
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205632N
PROGRAM ELEMENT TITLE: MK 48 ADCAP

PROJECT NUMBER: V0366
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: MK 48 ADCAP



NEW GUIDANCE AND CONTROL

NEW WARHEAD ADD-ON SENSOR MODIFIED EAW, & EXPLODER

NEW ENLARGED FUEL TANK (APS PROGRAM)

NEW FUEL PUMP, ELECTRICAL POWER SOURCE AND FINS (APS PROGRAM)

POPULAR NAME: MK 48 ADCAP

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205632N
PROGRAM ELEMENT TITLE: MK 48 ADCAP

PROJECT NUMBER: V0366
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	MS IV 01/93			MS III 2Q/96				
ENGINEERING MILESTONES		TPU PDR 1/94 TPU CDR 7/94						
T&E MILESTONES		G&C OT-IIIB 3/94	G&C/TPU DT-III 10/94 TPU/G&C OT-III 5/95	3Q/96 G&C BLOCK III OT	2Q/97 G&C BLOCK IV OT			
CONTRACT MILESTONES	TPU PROTOTYPE CONTRACT AWARD 9/93		LRIP 2Q/95					

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	7,177	7,529	5,058	4,019	1,193	571	838	CONT.
SUPPORT CONTRACT	139	203	130	135	139	143	148	CONT.
IN-HOUSE SUPPORT	9,772	10,030	9.997	8,184	4,004	2,782	2,871	CONT.
GFE/ OTHER	10,954	8,907	12,093	6,286	5,205	3,840	3,759	CONT.
TOTAL	28,042	26,669	27,278	18,624	10,541	7,336	7,616	CONT.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205632N
PROGRAM ELEMENT TITLE: MK 48 ADCAP
PROJECT NUMBER: V0366
BUDGET ACTIVITY: 7
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The MK 48 ADCAP torpedo R&D program focuses on two specific areas: the Guidance and Control (G&C) software block upgrades and the Torpedo Propulsion Upgrade (TPU). These efforts have been significantly restructured in the past year to reflect the changes to the threat. ADCAP was initially developed to counter high speed deep diving Soviet submarines. Chief of Naval Operations (CNO) has identified shallow water (less than 600 feet) as a critical operating area to counter third world diesel electric submarines. Severe water temperature gradients, reflection of acoustic energy from the ocean surface and bottom, and non-combatant ship traffic are but a few of the factors which make shallow water a difficult operating environment for acoustically guided weapons. Torpedo testing in shallow water has demonstrated that in-service ADCAP has less than full capability in this difficult environment. However, this testing, in conjunction with laboratory simulation efforts, has shown that significant performance improvements can be made by implementing changes to weapon tactics and software algorithms. Development, implementation and testing of these changes will be accomplished under the ADCAP G&C software block upgrade program. As part of this effort, several dedicated shallow water test exercises will be conducted to fully characterize the environment and assess weapon performance. ADCAP software is being converted from the CMS-2 programming language to ADA (Navy standard) in a phased approach. Software Block Upgrade II, written in CMS-2, will be the first upgrade to enhance shallow water capability. Advanced sonar waveforms and computer processing techniques, currently in 6.2 funded development, will be used to further improve shallow water performance.

(U) The TPU, which is a propulsion quieting program, is required to decrease torpedo radiated noise and reduce the time available for the target to take evasive action and counter fire against the U.S. submarine. TPU will significantly reduce the probability of U.S. submarine loss during a regional conflict. TPU will also improve shallow water performance by reducing the amount of radiated noise which is reflected off the ocean surface and bottom, thereby making target acquisition less difficult. The TPU program has been combined programmatically with a WPN funded ordnance alteration of the ADCAP G&C to constitute the ADCAP MODS program. Major design reviews, testing, and, in the FY 1995 and later time frame, hardware procurement will be performed concurrently when possible to minimize cost. The MODS program successfully completed a MS IV review in Jan 93. This has resulted in several changes to the TPU schedule relative to the previous submission.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205632N
PROGRAM ELEMENT TITLE: MK 48 ADCAP

PROJECT NUMBER: V0366
BUDGET ACTIVITY: 7

Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($4,452) Awarded contract for TPU Prototype Design/Fabrication.
- (U) ($3,855) Conducted TPU detailed design.
- (U) ($3,438) Initiated fabrication and testing of TPU components.
- (U) ($1,300) Completed Near-Term Lethality Prototype Development Program.
- (U) ($2,820) Commenced upgrade of weapon simulators to emulate shallow water environments.
- (U) ($600) Conducted Command, Operation, Test, and Evaluation Forces (COMOPTEVFOR) validation of weapon simulator.
- (U) ($11,375) Conducted G&C Software Block Upgrade engineering and testing.
- (U) ($202) Conducted program management and travel to support above activities.

2. (U) FY 1994 PLAN:

- (U) ($1,429) Continue TPU component testing.
- (U) ($2,240) Continue TPU detailed design.
- (U) ($5,977) Fabricate TPU Proof of Manufacture (POM) units.
- (U) ($1,413) Initiate TPU Development Testing (DT-III).

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205632N
PROGRAM ELEMENT TITLE: MK 48 ADCAP
PROJECT NUMBER: V0366
BUDGET ACTIVITY: 7
Date: 7 February 1994

- (U) ($1,604) Complete G&C Software Block Upgrade II Improvement and Program, including Operational Testing (OT-IIIB).
- (U) ($7,819) Begin G&C Software Block Upgrade III/IV Improvement Program. Block III/IV addresses the software interfaces with the TPU Program.
- (U) ($156) Upgrade Weapon Analysis Facility (WAF) simulator to reflect latest G&C hardware configuration.
- (U) ($1,947) Conduct special shallow water test exercises.
- (U) ($2,974) Continue shallow water upgrade of WAF simulators.
- (U) ($518) Commence evaluation of improved shallow water tactics and algorithms.
- (U) ($324) Conduct Command, Operation, Test, and Evaluation Forces (COMOPTEVFOR) validation of weapon simulator.
- (U) ($268) Continue program management and travel to support above activities.

3. (U) FY 1995 PLAN:

- (U) ($3,142) Continue contract for TPU Prototype Design/Fabrication.
- (U) ($6,805) Complete development testing (DTIII) and operational testing (OT) of the TPU.
- (U) ($2,519) Continue TPU detailed design.
- (U) ($12,848) Continue Block Upgrade III/IV Improvement program.
- (U) ($1,243) Continue evaluation of improved shallow water tactics and algorithms.
- (U) ($524) Conduct Command, Operation, Test, and Evaluation Forces (COMOPTEVFOR) validation of weapon simulator.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205632N
PROGRAM ELEMENT TITLE: MK 48 ADCAP

PROJECT NUMBER: V0366
BUDGET ACTIVITY: 7

Date: 7 February 1994

- (U) ($197) Continue program management and travel to support above activities.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCENDIV, Newport, RI; NAVUNSEAWARCENDIV, Keyport, WA. CONTRACTORS: ARL/Penn State University, State College, PA; APL/University of Washington, Seattle, WA; Hughes Aircraft Company, Middletown, RI; and Westinghouse Company, Cleveland, OH.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

1. (U) NDCP Rev. 2, 9/88

2. (U) TEMP 371 Rev. 3, 3/90 (Rev. 4 update in approval cycle, exp. 3/94)

3. (U) TPU Operational Requirement Document (ORD) #310-87-93, 11/93

4. (U) Operational Requirement 070-02-86, 1/86

5. (U) Acquisition Decision Memorandum (ADM) for MS IV approved 1/93

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205632N
PROGRAM ELEMENT TITLE: MK 48 ADCAP

PROJECT NUMBER: V0366
BUDGET ACTIVITY: 7

Date: 7 February 1994

G. (U) RELATED ACTIVITIES:

- (U) PE 0603562N (Submarine Tactical Warfare Systems)
- (U) PE 0604562N (Submarine Tactical Warfare System)

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

WPN

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
TPU Kits	0	0	2,220	5,100	9,210	11,256	17,019	CONT.	CONT.
Quantities	0	0	37	85	177	230	289	CONT.	CONT.

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

J. (U) TEST AND EVALUATION: Software Block Upgrade II: (DT III B) Final Development Testing of Block Upgrade II was completed in October 1993 in the Gulf of Mexico. Twenty-one in-water runs were conducted. This makes a total of 90 in-water DT runs conducted for Block Upgrade II development. Operational Testing (OT III B) of Software Block Upgrade II will occur in March 1994. G&C: (DT III C) DT of the modified G&C will occur from 10/93 to 11/94 and consist of 99 in-water firings of torpedoes using the modified G&C hardware executing ADA-based software Block IIA. Fire Control Systems integration testing of the mod G&C will occur from 1/95 to 3/95 and will consist of 40 test firings. OT (OT III C) of mod G&C will occur from 5/95 to 10/95 and will consist of 30 in-water test runs. TPU: DT (DT III D) of the quieted torpedo will occur from 10/93 to 11/94 and will consist of 28 in-water test runs. Fire Control Systems integration testing of the quieted torpedo will occur from 1/95 to 3/95 and will consist of 40 test firings. OT (OT III D) of the TPU will occur from 5/95 to 10/95 and will consist of 50 test firings. Software Block Upgrade III: DT (DT III E) will be conducted from 1/96 to 7/96. OT (OTIII E) will be conducted from 8/96 to 2/97. Software Block Upgrade IV: DT (DT III F) will be conducted from 11/97 to 4/98. OT (OT III F) will be conducted in 1998.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205633N
PROGRAM ELEMENT TITLE: Aviation Improvements
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
1/ W0601 Common Ground Equipment	5,151	2,878	3,118	3,083	3,398	3,476	3,544	CONT.	CONT.
1/ W0852 Consolidated Automated Support System (CASS)	8,335	5,542	3,454	13,806	8,960	9,172	9,350	CONT.	CONT.
W1041 Aircraft Equipment Reliability & Maintainability Improvement Program (AERMIP)	1,840	1,942	1,951	1,968	1,894	1,943	2,020	CONT.	CONT.
2/ W1355 Aircraft Engine Component Improvement Program (CIP)	63,322	62,840	55,997	58,308	62,055	65,696	69,491	CONT.	CONT.
TOTAL	78,648	73,202	64,520	77,165	76,307	80,287	84,405	CONT.	CONT.

1/ Previously funded under PE 0604215N
2/ Previously funded under PE 0604268N

B. (U) BRIEF DESCRIPTION OF ELEMENT: Common Ground Equipment is a Naval Aviation project to apply new technology to common support equipment necessary to support all aircraft. Consolidated Automated Support System (CASS) develops standardized Automated Test Equipment (ATE) with computer assisted, multi-function capabilities to support the maintenance of aircraft subsystems and missiles. AERMIP is the only Navy program that provides engineering support for in-service out-of-production aircraft equipment and provides increased readiness at reduced operational and support cost. Aircraft Engine CIP develops reliability and maintainability (RM) and safety enhancements for in-service Navy aircraft engines, transmissions, propellers, starters, auxiliary power units, electrical generating systems, fuel systems, and fuels and lubricants.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205633N
PROGRAM ELEMENT TITLE: Aviation Improvements
PROJECT NUMBER: W0601
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W0601, Common Ground Equipment. This project improves support equipment systems enhancing Fleet supportability through the application of new technology to improve aircraft readiness via effective, efficient, and cost saving fleet support equipment introductions.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,900) Contracted for second Standard Engine Test Systems (SETS) prototype.
- (U) ($2,081) Tested and evaluated SETS, Generator Test Stand, and Carbon Dioxide Blasting Unit.
- (U) ($170) Evaluated fiber optics test equipment for new aircraft applications.

(U) FY 1994 PLAN:

- (U) ($65) Initiate engine oil by-pass filter evaluation.
- (U) ($180) Construct prototype Test Program Set (TPS) software and Systems Engineering Environment for Test (SEET) for ATE interface.
- (U) ($1,604) Continue SETS test and evaluation, completion of second prototype delayed until FY-95.
- (U) ($489) Finalize dynamic line drop compensator development and SD-2 shift linkage. Complete prototype of Aircraft Generator Test Set.
- (U) ($300) Develop shipboard Electronic Warfare (EW) signal simulator using non-destructive inspection equipment.
- (U) ($240) Continue United States Navy (USN) involvement with advanced boresight equipment.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205633N
PROGRAM ELEMENT TITLE: Aviation Improvements

PROJECT NUMBER: W0601
BUDGET ACTIVITY: 7

DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($203) Commence development of acoustic harmonic non-destructive inspection units (composite corrosion/anomaly detection), Augmented Fluorescent Penetration Failure Detection Units (air-craft structure flaw detection), Engine Oil Recycling Units, Next-Generation Air Conditioners (eliminating R-22), and Microwave non-destructive inspection Units (graphite/epoxy composite inspection using microwaves), and Video temperature monitoring system for Engine Test System.
- (U) ($110) Construct engineering design models of the Electronic Shaft Alignment System and Gear Box Diagnostic System.
- (U) ($300) Conduct test and evaluation of Aircraft Generator Test Set prototype.
- (U) ($1,400) Continue USN involvement with US Army Advance Boresight Equipment development program.
- (U) ($255) Prototype hardware using non-destructive inspection equipment for a shipboard EW signal simulator, design and prototype Advanced Firing Circuit and Electric fuzing tester.
- (U) ($850) Complete second prototype and finish SETS test and evaluation.

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

(U) WORK PERFORMED BY: IN HOUSE: NAVAIRWARCENACDIV Lakehurst, NJ and Patuxent River, MD; NADEPs Cherry Point, NC and Jacksonville, FL. CONTRACTORS: Hilton Systems Inc., Jackson, MS (SETS); ARL, Inc., Arlington, VA (GTS); SAIC, Teaneck, NJ (ATE).

(U) RELATED ACTIVITIES: PE 0603801A (Advanced Maintenance Concepts): The Advanced Boresighting program is a part of coordinated Tri-Service effort supported, and directed by the Joint Logistics Commanders (JLC).

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

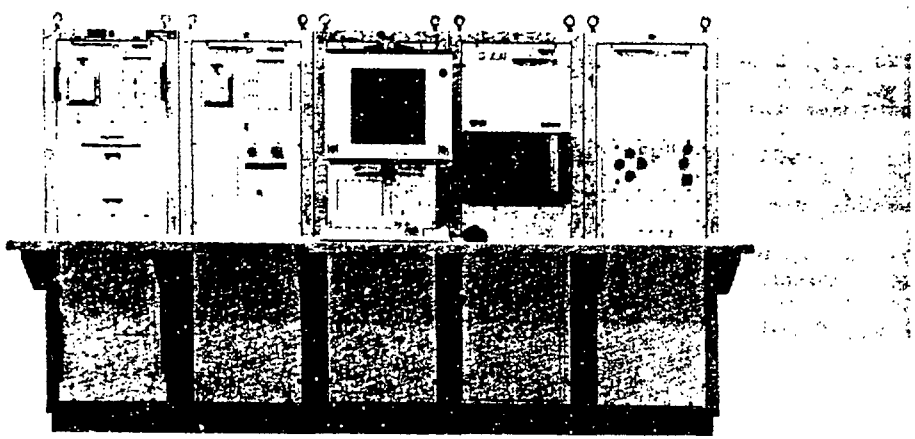
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205633N
PROGRAM ELEMENT TITLE: Aviation Improvements

PROJECT NUMBER: W0852
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: Consolidated Automated Support System



The Basic Test System

POPULAR NAME: CASS

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205633N
PROGRAM ELEMENT TITLE: Aviation Improvements

PROJECT NUMBER: W0852
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	IIA3 6/93	III 3/94						
ENGINEERING MILESTONES	AUR	PCA 12/93 AUR	AUR					
T&E MILESTONES	DTIIC) OTIIC 5/93							
CONTRACT MILESTONES	AUR CONTRACT AWARD LRP 6/93	FRP 3/94						

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	3,370	2,930	2,200	12,382	7,443	7,485	7,820	CONT.
SUPPORT CONTRACT	125	382	0	135	200	400	200	CONT.
IN-HOUSE SUPPORT	911	1,730	1,254	1,289	1,317	1,287	1,330	CONT.
GFE/ OTHER	3,929	500						CONT.
TOTAL	8,335	5,542	3,454	13,806	8,960	9,172	9,350	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The CASS project will design and develop modularly constructed automated test equipment with computer-assisted, multi-functional capability based standardized hardware and software elements. CASS responds to Fleet Commanders' expressed requirements to correct serious deficiencies in existing automatic test equipment. Program objectives are: (1) increase material readiness; (2) reduce life cycle costs through standardization; (3) improve tester sustainability at depot and intermediate maintenance levels; (4) reduce proliferation of unique test equipment; and (5) provide test capability for existing and future avionics/electronics systems. Current effort addresses the joint development of a CASS All-Up-Round (AUR)/guidance section missile test capability.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205633N
PROGRAM ELEMENT TITLE: Aviation Improvements

PROJECT NUMBER: W0852
BUDGET ACTIVITY: 7

Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($874) Obtained approval (Milestone (MS) IIA-3) for and continued Limited Rate Production, (LRP).
- (U) ($1,322) Completed Technical Evaluation/Operational Evaluation testing (Developmental Testing (DT)-IIC3)/(Operational Testing (OT)-IIC).
- (U) ($3,370) Initiated the Phase II development effort for a missile test capability and awarded and funded first increment of Common Test Station contract.
- (U) ($2,769) Identified funds for reprogramming.

2. (U) FY 1994 PLAN:

- (U) ($3,900) Continue the Phase II development effort for a missile test capability.
- (U) ($619) Obtain (MS III) approval for CASS commencing Full Rate Production (FRP).
- (U) ($1,023) Complete Physical Configuration Audit (PCA) and establish product baseline.

3. (U) FY 1995 PLAN:

- (U) ($1,748) Continue Phase II development effort for a missile test capability.
- (U) ($1,706) Initiate CASS pre-planned product improvement program by commencing work on High Speed Data Busses software evaluation and DOD Automated Test System standard interfaces.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Lakehurst, NJ and Patuxent River, MD; NAVAIRWARCENWPNDIV, Pt. Mugu, CA. CONTRACTORS: Martin-Marietta Technical Services Inc., Americus, GA.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205633N
PROGRAM ELEMENT TITLE: Aviation Improvements

PROJECT NUMBER: W0852
BUDGET ACTIVITY: 7

Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) ORD 1/93
- (U) IPS 5/93
- (U) TEMP 5/93

G. (U) RELATED ACTIVITIES:

- (U) A Memorandum of Agreement was executed between Naval Air Systems Command (NAVAIR) and the Air Force Systems Command (October 1988) in which the Navy will provide complete depot level repair for AMRAAM on CASS. A Memorandum of Understanding has also been executed between the U.S. Army and NAVAIR (March 1991) for technical support and procurement of the CAAS Electro-optical subsystem for integration with the Army's Integrated Family of Test Equipment (IFTE) program.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) APN-7 (47C2)	166,233	124,975	152,705	155,185	141,512	144,351	168,437	369,302	1,728,800
• (U) O&MN	600	900	2,400	2,300	1,100	900	300	0	9,900
• (U) MILCON P-451	1,600	0	0	0	0	0	0	0	1,600
• (U) MILCON P-649	0	0	0	4,100	0	0	0	0	8,300

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205633N
PROGRAM ELEMENT TITLE: Aviation Improvements

PROJECT NUMBER: W0852
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

J. (U) TEST AND EVALUATION: Operaticnal evaluation (OT-IIC) was completed in May 1993

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205633N
PROGRAM ELEMENT TITLE: Aviation Improvements

PROJECT NUMBER: W1041
BUDGET ACTIVITY: 7

Date: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W1041, Aircraft Equipment Reliability & Maintainability Improvement Program (AERMIP). AERMIP is the only Navy program which provides Research, Development, Test & Evaluation (RDT&E) engineering support specifically for in-service, out-of-production aircraft equipment. AERMIP increases readiness through R&M and safety improvements to existing systems and equipments installed in Naval aircraft. It provides a cost effective solution to obsolescence problems encountered when service lives are extended, and promotes commonality and standardization across aircraft platform lines and among the services through both extension of application and use of non-developmental items. AERMIP also decreases life cycle costs through reduced operation and support costs. AERMIP facilitates the Operational, Safety, and Improvement Program (OSIP) by applying proven, low-risk solutions to current fleet problems. AERMIP also funds high priority flight testing which is not associated with any acquisition or development program under the Flight Test General (FTG) task.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($400) Continued common Solid State Barometric Altimeter (SSBA) and Cost Benefit Analysis Model.
- (U) ($196) Performed airwake data analysis under FTG project, S-3 bomb bay wiring harness and anti-collision lights R&M improvement tasks.
- (U) ($575) Continued S-3 brake R&M improvement, and helicopter/ship dynamic interface simulation improvement.
- (U) ($297) Initiated KC-130 main landing brake, Common Air Data Device, S-3 Bleed Air Selector Valve, and Standard Parachute R&M improvement tasks.
- (U) ($322) Continued engineering support in identification, analysis, and evaluation of AERMIP candidates.
- (U) ($50) Completed S-3 flight control bearing R&M improvement tasks.

(U) FY 1994 PLAN:

- (U) ($753) Conclude SSBA, all previously initiated S-3 related R&M improvement tasks, Cost Benefit Analysis Model, and KC-130 brake testing under FTG project.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205633N
PROGRAM ELEMENT TITLE: Aviation Improvements

PROJECT NUMBER: W1041
BUDGET ACTIVITY: 7

Date: 7 February 1994

- (U) ($550) Continue helicopter/ship dynamic interface simulation improvements, Common Air Data Devise, and standard parachute R&M improvement tasks.
- (U) ($310) Continue engineering support in identification, analysis and evaluation of AERMIP candidates.
- (U) ($329) Initiate high potential R&M improvement tasks.

(U) FY 1995 PLAN:

- (U) ($700) Continue prior year R&M improvement tasks.
- (U) ($265) Initiate high potential R&M improvement tasks as directed.
- (U) ($675) Continue helicopter/ship dynamic interface simulation improvement, and standard parachute R&M improvement tasks.
- (U) ($311) Continue engineering services in identification, analysis and evaluation of AERMIP candidates.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Patuxent River, MD, Lakehurst, NJ and Indianapolis, IN. NAVAIRWARCENWPNDIV, China Lake, CA. CONTRACTORS: Lockheed, Burbank, CA; ISSS, Malvern, PA.

(U) RELATED ACTIVITIES:

- (U) PE 0708026F, Producibility, Reliability, Availability & Maintainability (PRAM) PRAM is a similar USAF program sharing development cost on the common altimeter improvement task. A MOU will facilitate future joint efforts with the PRAM program.

(U) OTHER APPROPRIATION FUNDS: Not applicable

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205633N
PROGRAM ELEMENT TITLE: Aviation Improvements
PROJECT NUMBER: W1355
BUDGET ACTIVITY: 7
DATE: 7 February 1994

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W1355 Aircraft Engine Component Improvement Program (CIP)	63,322	62,840	55,997	58,308	62,055	65,696	69,491	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: CIP provides the only source of critical engineering support for in-service Navy aircraft engines, transmissions, propellers, starters, auxiliary power units, electrical generating systems, fuel systems, and fuels and lubricants. CIP addresses all safety-of-flight issues (highest priority), corrects service-revealed deficiencies, improves Operational Readiness (OR) and Reliability and Maintainability (R&M), reduces engine Life Cycle Cost (LCC), maintains specification performance, and conducts testing to qualify engineering changes and verify life limits. Historically, the missions, tactics, and environmental exposure of military aircraft systems keep changing to meet new threats or operational demands, and often result in unforeseen problems, which if not corrected, can cause critical safety/readiness degradation, such as that experienced during DESERT SHIELD/DESERT STORM operations due to sand erosion. In addition, numerous new problems arise through actual use during deployment, production and service. Development programs, while geared to resolve as many problems as possible before deployment, cannot duplicate actual operations or account for the vast array of environmental and usage variables. Therefore, it is essential to maintain a CIP that can provide an immediate engineering response to these flight-critical problems. CIP tasks reduce in-flight aborts, safety incidents, not-mission-capable rates, scheduled and unscheduled engine removals, maintenance work hours, and overall cost of ownership. Programs identify hardware, maintenance and procedural safety and R&M problems and develop corrective engineering proposals. CIP starts after engine development and Navy acceptance of the first production engine. CIP continues over the engine's life, gradually decreasing to a minimum level sufficient to keep older inventory operational. CIP addresses usage and life problems not covered by engine warranties. CIP is a highly leveraged tri-service program with Foreign Military Sales participation.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) (45,135) Ensured Fleet Safety by conducting over 208 redesign/analysis safety tasks including approximately 6500 engine ground test hours and 140 altitude test hours. Tasks included management of 13 engine contracts with prime contractors and numerous work assignments with various Navy support activities. Specific major accomplishments include:

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205633N
PROGRAM ELEMENT TITLE: Aviation Improvements

PROJECT NUMBER: W1355
BUDGET ACTIVITY: 7

DATE: 7 February 1994

- (U) Continued comprehensive life management analysis, hardware support, immediate response capability to service revealed deficiencies for the F-14, F/A-18, AV-8, EA-6, H-60, H-53, H-46, H-3, and S-3 engine programs.
- (U) Completed comprehensive review of F-14B/D missions required to update parts reliability and ensure safe life limits are not overflown. Accumulated about 50% more test time than the highest time fleet engine providing for aggressive problem solution prior to fleet occurrence.
- (U) Completed redesign and qualification of the F/A-18 engine fan and turbine cooling plate life limiting parts to preclude further premature failures in the fleet. Updated F/A-18 engine life limits from the fan through the turbine. Started to refine field inspection techniques to verify predicted lives prior to fleet failures.
- (U) Identified cause of S-3 engine inflight cockpit fumes and incorporated corrective action.
- (U) Redesigned an AV-8 engine inlet guide vane controller, a primary engine safety concern due to mishaps caused.
- Continued redesign of H-3/H-46 engine fuel manifolds to prevent cracking and torching which caused five mishaps.
- Completed H-53 engine fuel and oil line firesleeve design to provide fire retardant capability and eliminate a primary engine safety problem.
- Initiated F-14 and completed EA-6B/A-6E starter endurance and containment tests.
- Corrected UH-1N and H-60 tail drive shaft deficiencies.
- Identified safe rechargeable lithium battery chemistries and initiated steps to eliminate cadmium-placed connectors.
- Developed test methods to establish the effects of carbon fiber contamination of aircraft fuel.
- Tested fleet hardware for sensitivity to low lubricity fuels.
- Developed industry standards for refueling equipment.
- Resolved over 40 fleet fuel and oil service related problems.

- (U) (18,187) Improved system R&M by completing approximately 159 redesign and analysis tasks realizing an estimated $30M annual cost savings to the government. Specific major reliability related accomplishments include:
- (U) Redesigned the F-14 B/D air/oil cooler and ejector valve to provide significant reliability improvements for the fleet's top maintenance drivers. Also corrected fatigue and engine monitoring system software problems. This correction prevents numerous and costly false faults maintenance actions.
- (U) Initiated refinement of F/A-18 engine flight line troubleshooting procedures to significantly improve flight-line repair and shop repair rate.
- (U) Initiated S-3 engine arrestment/overtemp solution and improved T-5 amplifier reliability, a top readiness driver.
- (U) Increased S-3 fan blade life extension and identified oil system design deficiencies which is expected to reduce engine removals by 25% annually.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205633N
PROGRAM ELEMENT TITLE: Aviation Improvements
PROJECT NUMBER: W1355
BUDGET ACTIVITY: 7
DATE: 7 February 1994

- (U) Redesigned AV-8 engine low pressure compressor spacer to eliminate cracking and premature engine removal and replacement.
- (U) Initiated H-3/H-46 engine main fuel control instability solution to correct the engine's top maintenance degrader.
- (U) Completed S-53 engine design modification to reduce sensitivity to sand erosion and improve engine performance in desert operations and compressor blade life. This was a major Desert Storm service revealed deficiency.
- (U) Improved H-60 engine bearing reliability by 100%.
- (U) Developed T-56 engine main fuel control simulator reducing the cost of evaluating fuel control modifications.
- (U) Instituted a variety of life and reliability improvement programs to include H-53 main gear box reliability verification and VH-3D drive system certification due to gross weight increase.

2. (U) FY 1994 PLAN:

- (U) (52,615) To ensure Fleet Safety, conduct 178 redesign and engineering tasks and complete up to 10,000 engine and component test hours including 300 engine flight test hours and 500 engine service evaluation hours. Some of the major safety programs include:
- (U) Comprehensive life analyses on the F-14, F/A-18, AV-8, EA-6B, H-60, H-46, H-3, H-53, and S-3 engine systems.
- (U) Eliminate turbine fires from oil leaks in the F-14A engines. Provide an afterburner analytical model to understand cause of afterburner related mishaps on the F-14B/D aircraft.
- (U) Complete redesign of AV-8 engine low pressure compressor vane to improve wear.
- (U) Complete F/A-18 engine compressor redesign to eliminate titanium compressor fires. Also, complete two safety center required tasks to eliminate bay fire ignition and design retention system for F/A-18 turbine borescope plug.
- (U) Initiate A-6/EA-6B engine diffuser case redesign to resolve engine bay fire problem.
- (U) Complete analysis and initiate redesign effort on E-2C, C-130, C-2, and P-3 engine turbine spacer failures and turbine wheel fretting.
- (U) Complete H-46 and H-3 engine fuel manifold improvement to prevent inflight fuel leakage.
- (U) Continue with F-14A starter endurance containment tests.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205633N
PROGRAM ELEMENT TITLE: Aviation Improvements
PROJECT NUMBER: W1355
BUDGET ACTIVITY: 7
DATE: 7 February 1994

- (U) (10,225) To improve System Reliability, complete approximately 77 redesign and analysis tasks with a potential to realize an estimated $495M of savings/cost avoidance in LCC. Some of the major reliability improvement programs include:
- (U) F-14 engine afterburner components redesigns and repairs yielding LCC savings/cost avoidance estimated at $15M.
- (U) F/A-18 engine variable exhaust nozzle and afterburner mixer improvements yielding over $50M LCC savings/cost avoidance. Engine exhaust frame repair procedures will be qualified to improve this primary engine readiness degrader. A bearing redesign will allow engine hot section inspection interval to double.
- (U) Increase A-6/EA-6B engine first stage turbine vane durability for a potential $31M savings/cost avoidance.
- (U) Develop H-53 engine compressor coatings for an estimated LCC savings/cost avoidance of $58M.
- (U) Conduct F/A-18, S-3 and H-53 starter control and hydraulic starter verification tests.
- (U) Continue a variety of life and reliability improvement programs to include H-53 main gear box reliability verification and VH-3D drive system certification due to gross weight increase.

3. (U) FY 1995 PLAN:

- (U) (52,022) To ensure fleet safety, execute 134 redesign and analysis tasks and continue unfinished 1994 programs. Conduct 6500 engine test hours. Major safety programs identify hardware, maintenance and procedural safety problems and develop corrective engineering proposals. These efforts reduce safety incidents and in-flight aborts. Some of the major safety programs include the following:
- (U) Continue redesign of AV-8 engine controller which has caused mishaps and is a top safety concern.
- (U) Conduct H-53 and H-60 power unit endurance and containment tests.
- (U) Evaluate surface plating and corrosion of aircraft battery components.
- (U) Continue comprehensive life analyses on the F-14, F/A-18, AV-8, EA-6B, H-60, H-46, H-3, H-53, and S-3 engine systems.
- Continue efforts to eliminate turbine fires from oil leaks in the F-14A engines. Provide an afterburner analytical model to understand cause of afterburner related mishaps on the F-14B/D aircraft.
- Conduct hardware tests using carbon fiber contaminated fuel.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205633N
PROGRAM ELEMENT TITLE: Aviation Improvements

PROJECT NUMBER: W1355
BUDGET ACTIVITY: 7

DATE: 7 February 1994

- (U) (3,975) To improve systems R&M, execute 22 redesign and analysis tasks and achieve a 20 year LCC savings/cost avoidance of over $180M. Operating at a much reduced level as a result of the Base Realignment and Closure impacts and budget constraints, some of the major R&M programs include the following:
- (U) Continue F-14 engine afterburner components redesigns and repairs.
- (U) Continue efforts to improve F/A-18 engine variable exhaust nozzle and afterburner mixer. Qualify engine exhaust frame repair procedures to improve this primary engine readiness degrader. Redesign a bearing to allow engine hot section inspection interval to double.
- (U) Continue efforts to increase EA-6B engine first stage turbine vane durability.
- (U) Continue development of H-53 engine compressor coatings.
- (U) Insert near-term technology to meet increasing electrical power demands of aircraft modification programs.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Patuxent River, MD, Warminster, PA, and Trenton, NJ; and NAVSURFWARCENDIV, Crane, IN. CONTRACTORS: Allison Gas Turbine Division, Indianapolis, IN; General Electric Company, Lynn, MA and Evendale, OH; Pratt and Whitney Aircraft Group, West Palm Beach, FL; and Rolls-Royce, Bristol, England.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: Acquisition Plan No. AIR-91-06 approved 21 March 1991.

G. (U) RELATED ACTIVITIES: PE 0604268F and 0203752A (Air Force and Army CIP): CIP is a tri-service program which includes cost sharing with commercial and foreign users, where applicable. Each service administers the engine contract for engines they developed with the other service as members, therefore, eliminating unnecessary duplication of effort.

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205633N
PROGRAM ELEMENT TITLE: Aviation Improvements

PROJECT NUMBER: W1355
BUDGET ACTIVITY: 7

DATE: 7 February 1994

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:
- (U) Description: CIP for F402 Engines.
- (U) Participants: United Kingdom (UK) Ministry of Defence and the USN
- (U) Financial Commitments: USN and the UK each pays 50% on common engine work and 100% for unique work.
- (U) Effective date: 22 October 1969.
- (U) DOD funding: Estimated USN F402 CIP funding for FY 94 is $ 8.4M.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205658N
PROGRAM ELEMENT TITLE: Navy Science Assistance Program
PROJECT NUMBER: S0834
BUDGET ACTIVITY: 7
Date: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0834 Navy Science Assistance Program (NSAP)	*7,464	6,593	7,097	7,380	7,358	7,539	7,727	CONT.	CONT.

* COMSPAWARSYSCOM Project X0834 in FY-93.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND PROJECT: Provides assistance to the Fleet by on-site support of scientists and engineers from the Navy RDT&E Centers and labs. Program ensures communications between technology producer (Navy RDT&E community) and technology customer (Navy/Marine Corps operating forces). Provide technological support initiatives evolved from user needs and requirements.

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($5,117) Fielded 28 advisors in support of 20 operational commands.
- (U) ($275) Demonstrated Neural Network for prediction of failure modes for shipboard fire pumps - COMNAVAIRPAC.
- (U) ($312) Demonstrated the use of AI System in conjunction with Mast Mounted Sight for auto alert/detect on targets of interest - COMNAVSURFLANT.
- (U) ($303) Evaluated Blue-on-Blue/Blue-on-White identification system for COMSECONDFLT.
- (U) ($300) Demonstrated very low-cost, rapid and robust solution to Mine Detection and Avoidance problem for pre-BSY-1 subs - COMSUBPAC.
- (U) ($298) Provided ability to tag/track merchant ships - COMUSNAVCENT.
- (U) ($268) Demonstrated technology required for improvement of Shipboard Intercommunications onboard amphibious ships - COMNAVSURFPAC.
- (U) ($316) Evaluated effectiveness of AN/ARS-6 locating unit on SH-60 Helo - COMNAVSPECWARCOM.
- (U) ($75) Assessed effectiveness of NSAP technical products in filling fleet requirements.
- (U) ($200) Communications and information transfer network.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205658N PROJECT NUMBER: S0834 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Navy Science Assistance Program BUDGET ACTIVITY: 7

(U) FY 1994 PLAN:

- (U) ($5,124) Field 28 advisors in support of 20 operational commands.
- (U) ($215) Demonstrate HF Rake Spread Spectrum communication in support of Marine Corps Amphibious Operations - COMMARFORLANT.
- (U) ($253) Evaluate new pulse radar technology for detecting buried mines - COMMARFORPAC.
- (U) ($248) Demonstrate Enhanced Volume Reverberation Measurement Systems - COMSUBPAC.
- (U) ($233) Develop low-cost organic method of delivering psychological material - COMUSNAVCENT.
- (U) ($245) Evaluate surveillance systems' ability to detect Low Profile Drug Trafficking Vessels -COMJOINTASKFOR 4.
- (U) ($65) Assess effectiveness of NSAP technical products in filling fleet requirements.
- (U) ($210) Communications and information transfer network.

(U) FY 1995 PLAN:

- (U) ($5,277) Serve as primary science and technology advisors to the 20 operational Navy and Marine Corps commands. Liaison with RDT&E and acquisition communities to better inform these communities of readiness shortfalls.
- (U) ($1,520) Identify and resolve science and technology issues based on priority operational readiness deficiencies.
- (U) ($75) Assess effectiveness of NSAP technical products in filling fleet requirements.
- (U) ($225) Communications and information transfer network.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Dahlgren, VA; NAVAIRWARCENWPNDIV, China Lake, CA; NCCOSC RDT&E DIV, San Diego, CA; NAVHLTHRESCEN, San Diego, CA; NAVUNSEAWARCENDIV, Newport, RI; Contractor: ARL-UT, Austin, TX.; NAVUNSEAWARCEN DET, New London, RI; Naval Research Lab, Washington, DC.

E. (U) RELATED ACTIVITIES: PE 0602233N Mission Support Technology.

F. (U) OTHER APPROPRIATION FUNDS: This is a non acquisition program although major acquisition programs are impacted as fleet customer identifies needs.

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

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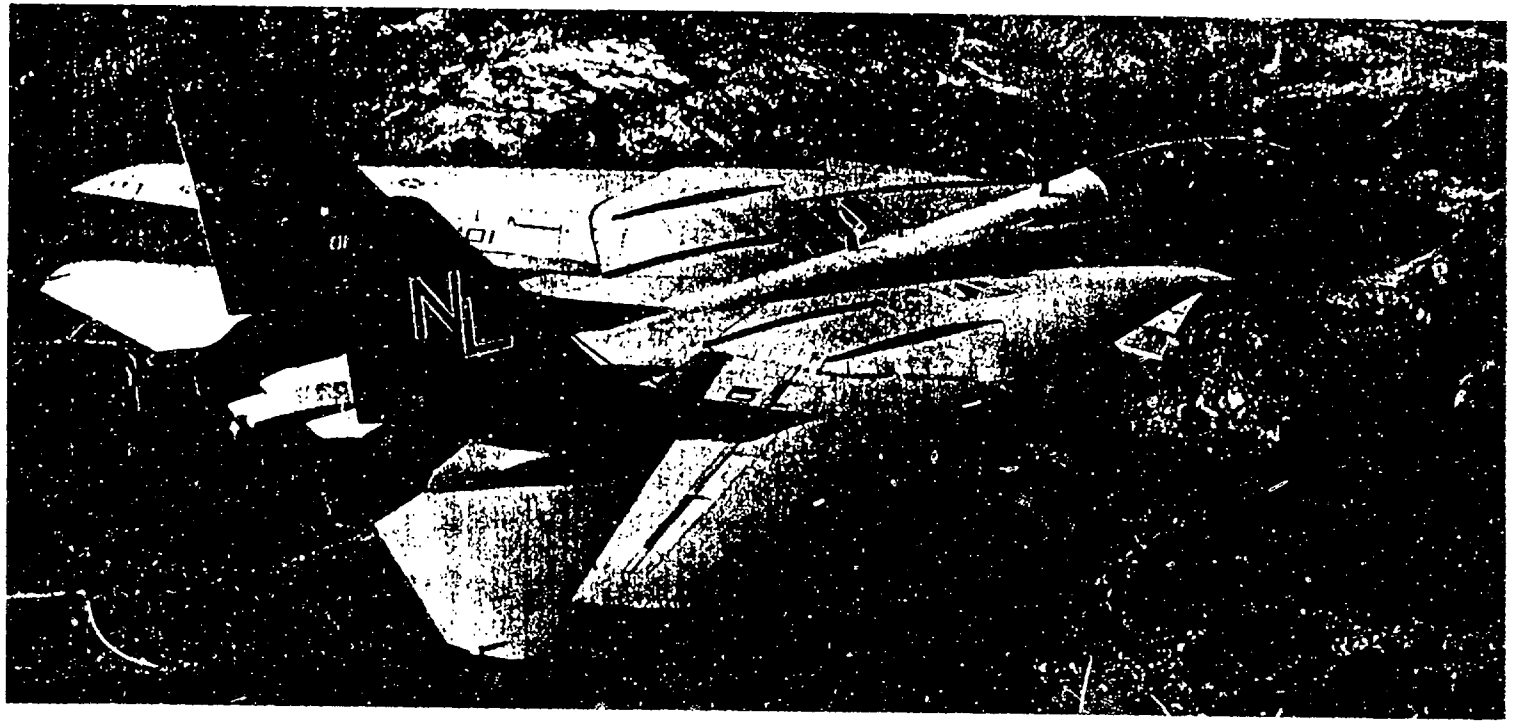
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205667N
PROGRAM ELEMENT TITLE: F-14 UPGRADE

PROJECT NUMBER: E1408
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: F-14 UPGRADE



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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205667N
PROGRAM ELEMENT TITLE: F-14 UPGRADE

PROJECT NUMBER: E1408
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

SCHEDULE	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES			NPDM MS IV/II 8/94			LRIP BLOCK I 12/96		MS III BLOCK I 3/99	CONT.
ENGINEERING MILESTONES									CONT.
T&E MILESTONES			OTIID 6/94		OP ASSESS BLOCK I 6/96	OP ASSESS BLOCK I 6/97	OP EVAL BLOCK I 7/98		CONT.
CONTRACT MILESTONES			BLOCK I STRIKE 8/94						CONT.

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	1,171,569	39,324	45,000	100,028	98,279	5,700	4,200	900	1,466,500 (1,500)
SUPPORT CONTRACT									
IN-HOUSE SUPPORT	324,053	65,263	19,904	61,361	67,077	28,041	30,343	28,558	644,800 (20,200)
GFE/ OTHER	110,987	15,473	6,000	10,300	3,950	3,890	3,000	1,500	158,400 (3,300)
TOTAL	1,606,609	120,060	70,904	171,689	169,306	37,631	37,543	30,958	2,269,700 (25,000)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205667N
PROGRAM ELEMENT TITLE: F-14 UPGRADE
PROJECT NUMBER: E1408
BUDGET ACTIVITY: 7
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program element provides for the development of improvements to the Navy F-14 squadrons in order to counter the projected threat through the year 2000 and beyond and to enable the F-14 to perform some of the missions currently performed by the A-6E, which is being retired early. The F-14D has increased capability in three major areas: new engine, new digital avionics, and upgraded radar. These changes yield significant improvements in capability and performance, as well as reliability and maintainability, and will facilitate the total integration and exploitation of related programs i.e., Joint Tactical Information Distribution System (JTIDS), Airborne Self-Protection Jammer (ASPJ) and Infrared Search and Track System (IRST). A Pre-deployment Update (PDU) program (primarily software) includes Advanced Medium Range Air-to-Air Missile (AMRAAM), Global Positioning System (GPS), fighter-to-fighter data link, and radar/Electronic Counter-Countermeasures (ECCM) improvements for the F-14D. The PDU program was created because of concurrent development of the F-14D and the above listed common avionics and weapons. It implements the capabilities inherent in systems incorporated during the full scale development (FSD) program and is a planned integral part of the evolution of the F-14D aircraft. F-14D weapons integration supports integration of electronic warfare improvements, common mission recorder, correction of OPEVAL deficiencies, incorporation of digital flight controls, and various software upgrades. Beginning in FY 1994, the Block I Strike program will include the development and integration of weapons and systems to add a limited air-to-ground capability to the F-14A/B/D. The F-14 Block I Strike program, as currently proposed, includes a Forward Looking InfraRed/Laser Designator (FLIR/LD), night vision compatible cockpit lighting, improved Defensive Electronic Countermeasures (DECM), an improved Heads Up Display (HUD) (F-14A/B), improved air-to-ground radar modes in the F-14D (software only), and integration of selected precision air-to-ground weapons (laser guided bombs).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($82,682) Continued PDU hardware/software integration and testing; continued PDU flight test; continued development and test of second PDU tape; and released first PDU tape.
- (U) ($485) Completed DT IIC (TECHEVAL) on Longwave IRST systems.
- (U) ($7,056) Continued testing and integration of the Digital Flight Control System. Foreign Comparative Testing funding provided by OSD in FY 1992, FY 1993 and FY 1994 for this effort.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205367N
PROGRAM ELEMENT TITLE: F-14 UPGRADE
PROJECT NUMBER: E1408
BUDGET ACTIVITY: 7
Date: 7 February 1994

2. (U) FY 1994 PLAN: FY 1993 funding is being utilized for FY 1994 PDU efforts.

- (U) ($25,000 FY 93 Funds) Continue PDU hardware/software integration and testing, commence DT/OT on second PDU tape, and continue development and test of third PDU tape.
- (U) ($4,837 FY 93 Funds) Conduct OT IID (OPEVAL Phase II) on F-14D concurrent with OT-IIC (OPEVAL) on Longwave IRST systems.
- (U) ($14,500) Conduct analysis and prepare documentation for Block I milestone decision.
- (U) ($56,404) Block I EMD.

3. (U) FY 1995 PLAN:

- (U) ($29,427) Complete DT/OT on second PDU tape and continue development and test of third PDU tape. Additionally, plan to release second PDU tape.
- (U) ($142,262) Continue Engineering and Manufacturing Development Phase of Block I Program including development of test equipment and other pre-production costs.

4. (U) PROGRAM TO COMPLETION: The F-14 Block I Program will continue the Engineering and Manufacturing Development (E&MD) Phase in FY 1996 through 1999. This phase consists of continuing hardware and software integration. The E&MD Phase will culminate in a FY 1999 Operational Evaluation of the F-14 Block I Program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Trenton, NJ; NAVAIRWARCENACDIV, Patuxent River, MD; NAVAIRWARCENWPNDIV, Pt. Mugu, CA; NAVAIRWARCENWPNDIV, China Lake, CA; NAVAIRWARCENACDIV, Warminster, PA; NAVAIRWARCENACDIV, Indianapolis, IN; NAVAIRWARCENACDIV, Lakehurst, NJ; NADOC, Patuxent River, MD; NADS Norfolk, VA; NADS North Island, CA; and NTSC Orlando, FL. CONTRACTORS: Grumman Aerospace Corporation, Long Island, NY; General Electric, Evandale, OH; General Electric, Utica NY; and Hughes Aircraft Company, El Sugundo, CA.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205667N
PROGRAM ELEMENT TITLE: F-14 UPGRADE

PROJECT NUMBER: E1408
BUDGET ACTIVITY: 7

Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: OR 05/84; NDCP Updated 12/89; TEMP Updated 06/90.

G. (U) RELATED ACTIVITIES:

- (U) 0205604N, Tactical Data Links
- (U) 0604771D, Joint Tactical Information Distribution System (JTIDS)
- (U) 0604270N, EW Development
- (U) 0604314N, Air-to-Air Missiles

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) APN-1	135,199	0	0	0	0	0	0	0	4,619,704
• (U) APN-5	195,467	115,498	158,326	202,067	328,271	349,563	416,064	774,641	2,539,897
• (U) APN-6	0	11,168	10,094	5,843	27,549	34,310	16,897	1,246	107,107

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

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205667N
PROGRAM ELEMENT TITLE: F-14 UPGRADE

PROJECT NUMBER: E1408
BUDGET ACTIVITY: 7

Date: 7 February 1994

J. (U) TEST AND EVALUATION: OT-IID (OPEVAL Phase II) in June 1994. F-14D Block I OPEVAL in July 1998 which includes FLIR/LD, night vision compatible cockpit lighting, improved DECM, improved air-to-ground radar modes and selected precision air-to-ground weapons. Digital Flight Control System DT&E in November 1994 and OPEVAL is anticipated the second quarter of FY 1996.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205675N
PROGRAM ELEMENT TITLE: Operational Nuclear Power Systems

PROJECT NUMBER: S1303
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1303 Operational Reactor Development	59,274	57,736	58,851	60,564	62,587	64,241	65,883	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The objective is to ensure continued safe nuclear propulsion plant operation and improve the operability of plants. This program designs, develops, and tests improvements to systems and evaluates means to increase component reliability; conducts testing of existing structural materials to resolve emergent defects; develops equipment and methods needed for servicing, inspections and evaluations; and develops methods to reduce component and servicing inspections. This work directly influences safe reactor plant operation, and reflects the constant need to reevaluate operating plants in light of new standards, knowledge and technology.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($16,623) Tested for expanded fleet use as a Began feasibility study to develop sludge removal technology. Developed improved inspection methods for use in NIMITZ Class, Los Angeles Class, and Ohio Class steam generators. Performed over tests for application in USS ENTERPRISE. Conducted of long-term inspection and analysis of inside steam generators of USS LOS ANGELES Class submarines. Compiled a computer database of data for use in developing computer models to better predict the extent and causes of steam generator corrosion.

- (U) ($7,000) Developed computer models to predict growth and tested to mitigate in pressurizing system components. Fabricated prototypic test specimens of

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205675N
PROGRAM ELEMENT TITLE: Operational Nuclear Power Systems

PROJECT NUMBER: S1303
BUDGET ACTIVITY: 7

Date: 7 February 1994

pressurizing system components and initiated long-term mechanical and chemical testing. Performed in-service nondestructive inspections and post-service destructive evaluations of pressurizing system components.

- (U) ($11,000) Evaluated vendor conceptual design reports for replacement equipment. Initiated testing of sensors which are more accurate and require less maintenance than sensors. Continued development of portable reactor protection system time response test instruments.

- (U) ($4,000) Initiated testing of for quieter, longer-life pump bearings. Developed finite element computer model to predict electromagnetic forces in electrical motors. Continued developing new electronic equipment for fleet applications to replace .

- (U) ($16,000) Performed structural analysis of redesigned for NIMITZ Class carriers. Tested and materials to reduce in operating plants. Collected in-service reliability data on installed components. Conducted on-site test programs after delivery of new interactive display equipment used to model plant transients and test new design modifications.

- (U) ($1,000) Performed mechanical analysis to resolve problems identified during the USS ENTERPRISE refueling. Performed material tests to support the design of a new shipping container for irradiated fuel.

- (U) ($3,651) This accounts for effort funded in FY 1993 by PE 0602324N Nuclear Propulsion Technology, which will be consolidated with PE 0603570N Nuclear Technology Development and PE 0205675N Operational Reactor Development beginning in FY 1994.

2. (U) FY 1994 PLAN:

- (U) ($17,769) Testing different combinations of such as a to reduce used in steam generators. Conduct tests to determine causes of in steam generators. Design improvements for inspection and steam generator

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cleaning equipment. Develop non-destructive examination techniques, less dependent on the operator, to increase inspection efficiency and reduce radiation exposure to workers.

- (U) ($6,994) Conduct tests and develop methods to confirm plant operating limits and resolve concerns about the performance of components. Develop pressurizing components with reduced susceptibility to Test existing structural materials to resolve emergent defects, increase reliability, and ensure continued plant safety.

- (U) ($10,990) Design, develop, and test instrumentation and control equipment using the latest technology to increase reliability and performance of operational plants. Developing and testing to replace circuit breakers.

- (U) ($4,996) Pursue low maintenance designs and improved methods to limit component and system Developing improved equipment for integration into existing propulsion plants to improve operating efficiency, reliability, and maintainability. Design and develop for operating plants.

- (U) ($15,987) Develop, prototypically test, and thermal-hydraulically analyze improved component designs, such as Develop improved processes for testing and analyzing performance data and predicting component failures. Developing systems and computer codes modeling evolutions and continuous operations over life to better understand plant behavior.

- (U) ($1,000) Develop and evaluate reactor servicing and refueling methods and equipment for the first-of-a-kind servicing of NIMITZ Class carriers; test and certify containers for shipping irradiated fuel and radioactive components.

3. (U) FY 1995 PLAN:

- (U) ($18,524) Develop analytical models of and analyze inspection data from operating plants to assess model predictions of to optimize steam generator inspections. Develop and improve inspection and cleaning techniques to enhance fleet steam generator reliability while reducing costs, hazardous waste, and radiation exposure to personnel. Incorporate in the inspection and cleaning process. Develop automated data analysis techniques to better characterize and enable the repair of Develop and qualify improved steam generator such as

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205675N
PROGRAM ELEMENT TITLE: Operational Nuclear Power Systems

PROJECT NUMBER: SJ303
BUDGET ACTIVITY: 7

Date: 7 February 1994

to inhibit corrosion, reduce inspections and repairs, and enhance plant reliability.

- (U) ($7,057) Develop pressurizing system components with reduced susceptibility to Improve existing pressurizers, inspecting and testing pressurizing system components and welds to determine structural integrity, and design improved pressurizing system components for backfit in operating plants. Test structural materials currently in use to resolve emergent defects, increase reliability, and ensure continued plant safety.

- (U) ($11,090) Adapt developments in instrumentation and control, and electronic technology for backfit into existing plants to resolve problems, enhance reliability and safety, and extend service life. Planned adaptions include new design equipment with advanced techniques to simplify operating requirements and increase system performance, and alternate design steam generator detectors which provide a third reference to act as a mediator when two detector readings conflict. Developing to replace circuit breakers.

- (U) ($5,041) Design, analyze and test means to reduce or eliminate generated by equipment in operating propulsion plants. Develop and test alternate to reduce and to increase component reliability. Develop and test quieter to reduce generated in components such as Adapt equipment which reduces structure-borne noise by producing a Adapt which allow to operate at to provide the best possible acoustic performance.

- (U) ($16,131) Test and assess reactor plant components under prototypic conditions to evaluate performance, validate design parameters, and predict component failures. Perform thermal, hydraulic and mechanical analyses, and destructive and non-destructive examinations to confirm operability through design lifetime and determine ability to extend lifetime beyond original design basis.

- (U) ($1,008) Identify and implement improvements in reactor servicing equipment and techniques. Develop and test improvements in welding and machining techniques to take advantage of technological improvements which may lower refueling costs and minimize personnel radiation exposure

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

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0205675N
PROGRAM ELEMENT TITLE: Operational Nuclear Power Systems

PROJECT NUMBER: S1303
BUDGET ACTIVITY: 7

Date: 7 February 1994

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD. CONTRACTORS: Westinghouse Electric Corporation, Bettis Atomic Power Laboratory and Plant Apparatus Division, Pittsburgh, PA, and Machinery Apparatus Operation, Schenectady, NY; Martin Marietta Company, Knolls Atomic Power Laboratory, Schenectady, NY.

E. (U) COMPARISON WITH AMENDED FY 1994 PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: PE 0603570N, Advanced Nuclear Power Systems. There is no duplication of effort.

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

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

J. (U) MILESTONE SCHEDULE: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206313M
PROGRAM ELEMENT TITLE: Marine Corps Communications Systems (Operational Systems Product Improvement)
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0048 Communications Terminal Improvement	281	706	358	327	235	198	136	CONT.	CONT.
C0049 Unit Level Switches (ULS)[1]	661	3,047	2,368	1,004	490	337	346	CONT.	CONT.
C0065 Communications Control[1]	479	505	594	1,254	2,104	507	470	CONT.	CONT.
C1931 Communications Ancillary Equipment	2,067	4,234	4,002	332	48	48	48	CONT.	CONT.
C1975 [1] Tactical Communications Center	142	48	86	42	43	43	43	CONT.	CONT.
TOTAL	3,630	8,540	7,408	2,959	2,920	1,133	1,043	CONT.	CONT.

1 FY 1993 funding was moved from Program Element (PE) 0208C10M due to the Congressional Program Element Restructure.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This PE provides for development of the Joint Unit Level Switches (ULS) and supporting equipment, as well as Marine Corps ground telecommunications items which are not being developed within the chartered responsibilities of the Joint Tactical Communications Agency. Equipment developed within this PE supports the mission area of command and control and switching requirements of the various sub-systems within the Marine Corps Tactical Communications Architecture. The Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (ASD C3I) has designated the Marine Corps as the developing service for the ULS; the ASD provides oversight for the Marine Corps' testing of Joint Tactical C3 program equipment. The ULS project consists of product improvements to the Unit Level Circuit Switch, Unit Level Tactical Data Switch, and peripheral equipment. The Communications Control (COMM CON) project involves development in the areas of systems planning and engineering, operational systems control, and technical control required to deploy, operate, refurbish and retrofit the Marine Corps tactical communications systems. The program also includes support for Marine Joint Tactical Communications Program Testing.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206313M
PROGRAM ELEMENT TITLE: Marine Corps Communications Systems (Operational Systems Product Improvement)
PROJECT NUMBER: C0048
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C0048 Communications Terminal Improvement. This project develops enhanced technical software and hardware interoperability for High Frequency (HF), Very High Frequency and Ultra High Frequency radios.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($99) Conducted research on cosite problems associated with the Single Channel Ground-Air Radio System (SINCGARS) radio on Marine Corps Platforms. Researched potential solutions to cosite problems, including solutions used by other services. Provided analysis and recommended direction for following year testing.
- (U) ($147) Procured hardware and services to upgrade four prototype AN/TSC-120 HF radios to production configuration. Completed certification and approval of AN/TSC-120 RS-2100 Satellite Communication Units. Completed conversion of one AN/TSC-120 to a classroom trainer.
- (U) ($35) Conducted Follow-on Operational Test and Evaluation of the AN/GRC-171B(V)4 to satisfactorily test Tactical Digital Information Link "C" and collect sufficient operating data for system reliability.

(U) FY 1994 PLAN:

- (U) ($180) Write test plans and test procedures for testing of SINCGARS cosite issues in the Command, Control and Communications Vehicle, Armored Amphibious Vehicle C7 (AAVC7) platforms. Conduct antenna coupling tests on AAV platforms.
- (U) ($256) Model cosite improved SINCGARS radio. Conduct cosite tests with SINCGARS radio on AAVC7 platforms. Test Frequency Hopping Multi-Plexer on AAVC7 platform.
- (U) ($270) Develop database for obtaining total Acquisition Objective for the General Purpose Radio Remote. Prepare market analysis for General Purpose Radio.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206313M
PROGRAM ELEMENT TITLE: Marine Corps Communications Systems (Operational Systems Product Improvement)
PROJECT NUMBER: C0048
BUDGET ACTIVITY: 7
DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($141) Test hardware solutions to SINCGARS cosite problems. Conduct initial tests on Non-developmental item antenna replacement for OE-254 antenna.
- (U) ($120) Test and develop replacement software for Consolidated SINCGARS Electronic Countermeasures Package (Army software) in the Data Transfer Device.
- (U) ($97) Test Army's Revised Battlefield Electronic Communications, Electronic Operating Systems Distribution Software transition software for compatibility with Marine Corps radios (ARC-210/Have Quick).

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

(U) WORK PERFORMED BY: IN-HOUSE: NESEA, St. Inigoes, MD; MCCDC, Quantico, VA; MCLB, Barstow, CA; CECOM, Ft. Monmouth, NJ; MCOTEA, Ft. Huachuca, AZ. CONTRACTORS: ITT, Chicago, IL; XETRON, Cincinnati, OH; IITRI, Annapolis, MD; Rockwell, El Paso, TX.

(U) RELATED ACTIVITIES:

- (U) PE 0303140N (Information Systems Security Plan) Project X0734, Communications Security Research and Development
- (U) PE 0604805A (Command Control & Communication Systems Eng. Development), SINCGARS (V)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206313M
PROGRAM ELEMENT TITLE: Marine Corps Communications Systems (Operational Systems Product Improvement)
PROJECT NUMBER: C0048
BUDGET ACTIVITY: 7
DATE: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 42 (BLI# 413800) Vehicle Mounted Radios and Equipment	6,430	97	0	0	0	0	0	0	37,006
• (U) PMC Line 43 (BLI# 414000) AN/GRC-171B(V)4	19,090	0	0	0	0	0	0	0	19,090
• (U) PMC Line 52 (BLI# 451000) SINCGARS Radio System	58,367	45,920	47,865	47,293	39,523	27,787	31,960	CONT.	CONT.
• (U) PMC Line 54 (BLI# 456700) Items less than 2 million (NVIS only)	1,600	500	0	0	0	0	0	0	3,100

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206313M
PROGRAM ELEMENT TITLE: Marine Corps Communications Systems (Operational Systems Product Improvement)
PROJECT NUMBER: C0049
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C0049 Unit Level Switches. The Unit Level Circuit Switch (ULCS) and the Unit Level Tactical Data Switch (ULTDS) (hereafter known as the ULCS Data Module) provide the backbone of the digital communications architecture within the Marine Corps. This program provides software improvements to support incorporation of the ULTDS into the ULCS; the addition of Integrated Tactical Strategic Data Network (ITSDN) compatible protocols to the ULCS operating software; the development of an enhanced switching function as a software upgrade to the MSC-63A Tactical Communications Center; and the development of a system prototype of the Tactical Data Network (TDN).

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($214) Continued software improvements to integrate Packet Switch and Circuit Switch software into a single package for each of the ULCS platforms.
- (U) ($248) Identified and defined an ITSDN compatible protocol suite for the ULCS data switching network as required by the Defense Intelligence Systems Agency.
- (U) ($199) Supported Marine Tactical Command and Control System development with maintenance of AN/GYC-7 packet switch engineering design models.

(U) FY 1994 PLAN:

- (U) ($1,533) Develop software improvements to make the ULCS Data Module compatible with the Government Open Systems Interconnection Profile (GOSIP) and other software changes necessary to interoperate with ITSDN.
- (U) ($914) Perform concept demonstration and prototyping of the TDN.
- (U) ($600) Develop software upgrade to the AN/MSC-63A Tactical Communications Center.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206313M
PROGRAM ELEMENT TITLE: Marine Corps Communications Systems (Operational Systems Product Improvement)
PROJECT NUMBER: C0049
BUDGET ACTIVITY: 7
DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($1,070) Continue concept demonstration and prototyping of the TDN.
- (U) ($1,298) Continue Unit Level Switch software transition to ITSDN and GOSIP protocols and support other anticipated Department of Defense directed interoperability requirements.

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

(U) WORK PERFORMED BY: IN-HOUSE: MARCORSYSCOM, Quantico, VA; MCTSSA Camp Pendleton, CA; Marine Corps Logistics Base, Barstow, CA. CONTRACTORS: ITT Aerospace Communications Division, Clifton, NJ; Lockheed Missile and Space Company, Austin Division, Austin, TX; ETA Corporation, Garrisonville, VA.

(U) RELATED ACTIVITIES:

- (U) PE 0208010A (Tri-Service Joint Tactical Communications Program)
- (U) PE 0208010F (Tri-Service Joint Tactical Communications Program)

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 45 (BLI# 417700) ULCS - Marine Corps (FY 1997 through FY 1999 Fiber Optics Multi-plexor (FOM) funding omitted. FOM PMC funding is listed under Project C1931, Communications Ancillary Equipment in this program element.)	7,494	11,956	0	18,880	0	0	0	CONT.	CONT.
• (U) PMC Line 46 (BLI# 418900) Tactical Communication Center Equipment	0	2,914	0	0	0	0	0	0	2,914

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206313M
PROGRAM ELEMENT TITLE: Marine Corps Communications Systems (Operational Systems Product Improvement)
PROJECT NUMBER: C0065
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C0065 Communications Control. The Systems Planning Engineering and Evaluation Device (SPEED) is a combination of hardware and software that together supports the Marine Corps' tactical communications systems by providing the communicator with a means to evaluate system performance prior to installation. The Digital Tech Control (DTC) is a High Mobility Multi Purpose Wheeled Vehicle (HMMWV) transportable shelter designed to provide technical control functions during tactical operations. The DTC provides an integrated shelter from which to patch, test, monitor, troubleshoot and restore digital circuits. The DTC contains: an electronic matrix to patch either single channel or multiplexed circuits together, a variety of multiplex equipment used to extract and insert single channel circuits into multiplexed bit streams and a source of highly accurate timing (atomic clock). The DTC replaces the TSQ-84.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($147) Developed a Satellite Planning module and incorporated into software release.
- (U) ($232) Developed a Position Location Reporting System manager module integrated into the SPEED software suite.
- (U) ($100) Enhanced multi-channel radio frequency planning and profiling. The software suite is migrating into the Windows environment and graphical user interface to ease operation of the system by providing the same "look and feel" for all the applications.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206313M
PROGRAM ELEMENT TITLE: Marine Corps Communications Systems (Operational Systems Product Improvement)
PROJECT NUMBER: C0065
BUDGET ACTIVITY: 7
DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($123) Continue the Pre-Planned Product Improvement program in accordance with the Project Plan and Required Operational Capabilities. Develop a frequency deconfliction (co-site analysis) module to predict potential interference between/among transmitters located within close proximity.
- (U) ($151) Develop an enhanced High Frequency Communications Planner to better aid the communicator in planning and profiling High Frequency communications.
- (U) ($156) Develop a radar coverage software module to aid the air defense community in placing radars to achieve maximum effectiveness and efficiency. Evolve SPEED into the functional areas of systems control and network management.
- (U) ($75) Preparation of MS 0/I/II documentation. Provide support for Joint Interoperability Certification/Operational testing at the JITC, Ft Huachuca.

(U) FY 1995 PLAN:

- (U) ($250) Provide enhanced SPEED software support to enable the current "stand alone" disk operating system applications to fully function within the Windows operating environment.
- (U) ($144) Test, evaluate, select, and integrate the most useful Defense Mapping Agency mapping environment into the SPEED software suite for use in overlaying transmission system profiles.
- (U) ($150) Rewrite the Tactical Network Analysis and Planning System into Windows for full integration into SPEED.
- (U) ($50) Continued support for Joint Interoperability Certification/Operational testing. Provide for additional testing for Marine Corps unique requirements.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206313M
PROGRAM ELEMENT TITLE: Marine Corps Communications Systems (Operational Systems Product Improvement)
PROJECT NUMBER: C0065
BUDGET ACTIVITY: 7
DATE: 7 February 1994

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

(U) WORK PERFORMED BY: IN-HOUSE: ECAC, Annapolis, MD; Tobyhanna Army Depot, Tobyhanna, PA. CONTRACTORS: Atlantic Research Corporation, Rockville, MD; Eagle Technology, Orlando, FL; ITAC, Reston, VA.

(U) RELATED ACTIVITIES:

- (U) PE 0208010A (Tri-Service Joint Tactical Communications Program)
- (U) PE 0208010F (Tri-Service Joint Tactical Communications Program)

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 68 (BLI# 417700) (Digital Tech Control)	0	0	0	0	0	3,397	8,959	0	CONT.

- (U) PMC Line is DTC.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206313M
PROGRAM ELEMENT TITLE: Marine Corps Communications Systems (Operational Systems Product Improvement)
PROJECT NUMBER: C1931
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C1931 Communications Ancillary Equipment. The Communications Ancillary Equipment project monitors development of tactical Ultra High Frequency (UHF), Super High Frequency and Extremely High Frequency Satellite Communication (SATCOM) terminals. The project also develops modifications to the AN/TSC-96 UHF SATCOM System to maintain interoperability with Navy SATCOM network and improves multi-channel radio systems. Marine Corps Fiber Optic Multi-Plexer System (MCFOMS) is a signal Multiplexer system to allow the connection of subscriber communications equipment to related shelter equipment (communications switch or radios) through high speed links. MCFOMS will have the capacity to accommodate up to 16 channels and multiplex them into one signal channel for transmission via the fiber optic cable link. MCFOMS will interface to subscriber equipment (analog and digital phones) or terminating equipment (switches or radios) depending on the deployment scenario. MCFOMS will enhance the basic capabilities provided by the fiber optic cable system (FOCS) by adding on off-the-shelf multiplexer to the suite of existing FOCS components.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($759) Developed a single van AN/TSC-96A modification.
- (U) ($600) Designed Uninterruptible Power Supply and developed prototype AN/MRC-142 for shipboard operation.
- (U) ($708) Developed programmatic documentation for Milestone review and participated in Source Selection Evaluation Board.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206313M
PROGRAM ELEMENT TITLE: Marine Corps Communications Systems (Operational Systems Product Improvement)
PROJECT NUMBER: C1931
BUDGET ACTIVITY: 7
DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($440) Conduct development of Application Program Sets.
- (U) ($356) Conduct development of engineering and integration of High Speed Fleet Broadcast modification for the AN/TSC-96A, UHF radio.
- (U) ($3,381) Preparation of MS 0/I/II documentation. Provide support for DT II/OT II Testing and Joint Interoperability Certification/Operational Testing.
- (U) ($57) Monitor the Army development of Military Strategic and Tactical Relay Satellite System (MILSTAR) terminals. Modify existing antenna towers for Marine Corps application.

(U) FY 1995 PLAN:

- (U) ($113) Conduct AN/PSC-5, UHF radio, development of the Fielding Plan Operational Test in preparation of Milestone III.
- (U) ($38) Conduct development of the Material Fielding Plan in preparation for out-year fielding of the Single Channel Terminal (MILSTAR) to the Fleet Marine Force.
- (U) ($3,851) Preparation of MS III documentation. Continued support for Joint Interoperability Certification/Operational Testing. Perform studies for integration with numerous fielded systems. Provide for MCFOMS additional testing for Marine Corps unique requirements.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206313M
PROGRAM ELEMENT TITLE: Marine Corps Communications Systems (Operational Systems Product Improvement)
PROJECT NUMBER: C1931
BUDGET ACTIVITY: 7
DATE: 7 February 1994

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

(U) WORK PERFORMED BY: IN-HOUSE: MARCORSYSCOM, Quantico, VA; NESEA, St. Inigoes, MD, MCTSSA, Camp Pendleton, CA. CONTRACTORS: ETA, Garrisonville, VA. Others to be determined.

(U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 40 (BLI# 402700) Manpack Radios and Equipment (AN/PSC-5 portion only)	3,000	0	1,747	10,955	7,502	5,853	632	CONT.	CONT.
• (U) PMC Line 44 (BLI# 414500) AN/TSC-96A Fleet Satellite Communication Terminal	1,957	1,722	526	0	0	12,471	14,631	0	31,307
• (U) PMC Line 45 (BLI# 417700) (Marine Corps FOM portion only)	0	0	0	0	8,172	13,400	16,000	CONT.	CONT.
• (U) PMC Line 66 (BLI# 455500) Modification Kics (Tel)	380	660	0	0	0	0	0	0	2,659

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206313M
PROGRAM ELEMENT TITLE: Marine Corps Communications Systems (Operational Systems Product Improvement)
PROJECT NUMBER: C1975
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C1975 Tactical Communications Center. The Expanded Memory Digital Communications Terminal (EMDCT) is a lightweight, handheld, programmable message processor providing the user with a capability of burst transmitting, and receiving formatted and free text messages. This project will develop application programs to meet operational requirements.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($142) Developed, coded, tested and fielded the Marine Tactical System (MTS) version 5.0 (MADRE) application software in support of the EMDCT.

(U) FY 1994 PLAN:

- (U) ($24) Continue to develop software application programs to support operational requirements of Marine Corps commands for MTS Version 5.1.
- (U) ($24) Review, test and develop plans for the implementation of Variable Message Format (VMF) protocol and messages to meet Office of the Secretary of Defense (OSD) FY 1995 Interoperability deadline.

(U) FY 1995 PLAN:

- (U) ($24) Continue to develop software application programs to support operational requirements of Marine Corps commands.
- (U) ($24) Continue to test and develop plan for implementation of VMF Protocol and messages to meet OSD FY 1995 interoperability deadline.
- (U) ($38) Continue to review and monitor industry advancements in RAM micro-circuits and screen displays to incorporate into current telecommunications capabilities.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206313M
PROGRAM ELEMENT TITLE: Marine Corps Communications Systems (Operational Systems Product Improvement)
PROJECT NUMBER: C1975
BUDGET ACTIVITY: 7
DATE: 7 February 1994

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

(U) WORK PERFORMED BY: IN-HOUSE: MCISSA, Camp Pendleton, CA; NAVAIRWARCENACDIV, Indianapolis, IN. CONTRACTORS: To be determined.

(U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 50 (BLI# 455500) Modification Kits (Tel)	3,430	3,599	1,088	610	628	648	627	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/Supporting Arms Systems
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0010 Shoulder Launch Multi-purpose Assault Weapon (SMAW)	511	0	0	0	0	0	0	0	31,662
C0021 Assault Amphibious Vehicle 7A1 (AAV7A1)[1]	4,986	0	5,297	3,401	4,477	2,431	759	CONT.	CONT.
C1120 Air Defense Missile System	3,653	1,973	859	845	474	470	470	CONT.	CONT.
C1555 Light Armored Vehicle Program	1,521	1,435	966	961	2,296	2,252	1,177	CONT.	CONT.
C1763 Amphibious Armor System (AAS)[2]	416	0	0	0	0	0	0	0	7,877
C1901 Ground Weaponry Product Improvement	2,733	6,049	2,461	1,038	1,768	1,411	1,408	CONT.	CONT.
C1960 Light Armored Vehicle - Air Defense (LAV-AD)	12,729	3,235	0	0	0	0	0	0	99,791
C2086 Soldier/Marine Enhancement	5,729	5,606	3,468	3,024	3,548	3,524	1,996	CONT.	CONT.
TOTAL	32,278	18,298	13,051	9,269	12,563	10,088	5,810	CONT.	CONT.

1 FY 1994 funding ($2,324) is contained in Program Element (PE) 0603611M, Marine Corps Assault Vehicles, Project B0020, Advanced Amphibious Assault Vehicle.
2 FY 1994 and beyond funding transfers to Project C1901, under this PE.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This PE provides modification to Marine Corps Expeditionary Ground Force Weapons Systems to increase lethality, range, survivability, and operational effectiveness. It also provides for the development of block upgrades of the AAV7A1, improvements in command and control in the Air Defense Missile System, product improvements to the family of the Light Armored Vehicles (LAV), and the development effort for the LAV-Air Defense variant.

UNCLASSIFIED

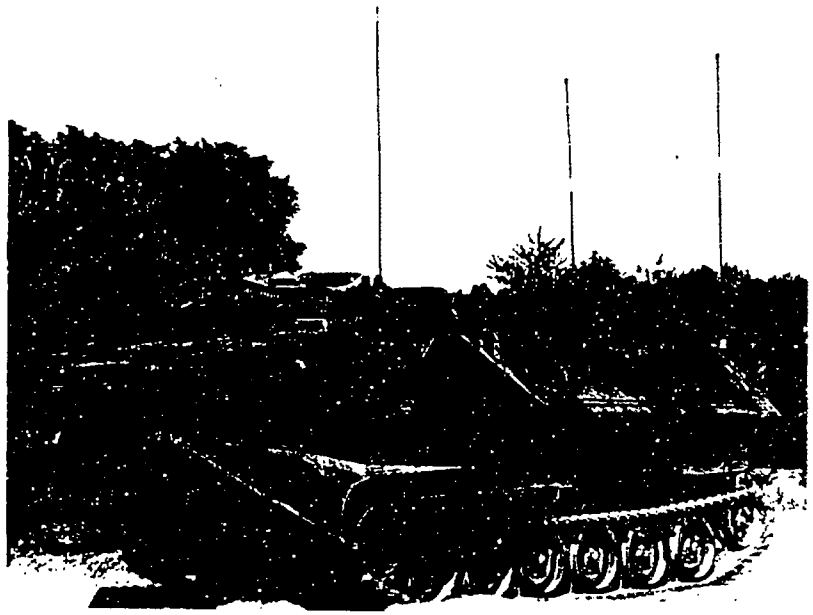
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Supporting Arms Systems

PROJECT NUMBER: C0021
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: Assault Amphibious Vehicle 7A1 Program



POPULAR NAME: AAV7A1

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Supporting Arms Systems
PROJECT NUMBER: C0021
BUDGET ACTIVITY: 7
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		MS II SEPT 94				MS III JAN 98		
ENGINEERING MILESTONES	DEMOS	RELIABILITY TESTS						
T&E MILESTONES		DT-I SEP 94		DT-II JUL-DEC 96	OT-II APR-SEP 97			
CONTRACT MILESTONES		TEST ARTICLES JAN 94			LRIP JAN 97	FRP MAR 98		

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	165	0	3,890	1,292	1,536	1,044	659	CONT.
SUPPORT CONTRACT	3,523	0	400	0	0	0	0	CONT.
IN-HOUSE SUPPORT	1,298	0	1007	2,109	2,941	1,387	100	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	CONT.
TOTAL	4,986	0	5,297	3,401	4,477	2,431	759	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Assault Amphibious Vehicle 7A1 (AAV7A1) Product Improvement Program and Modification Kits Program sustains the capability to conduct surface-borne amphibious assaults by improving the present amphibious vehicle in accordance with the approved Required Operational Capabilities (ROC) document. This extends its effectiveness until a successor vehicle is fielded in FY 2010.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Supporting Arms Systems
PROJECT NUMBER: C0021
BUDGET ACTIVITY: 7
Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:
   - (U) ($0) Obtained production approval for reliability and maintainability improvements for the current existing transmission.
   - (U) ($1,108) Integrated and tested the improved reliability and maintainability AAV7A1 suspension system using the Bradley Fighting Vehicle (BFV) suspension.
   - (U) ($1,700) Modified current AAV7A1 engine and conducted reliability and maintainability engineering tests on the current engine upgraded from 400 to 500 horsepower (Hp).
   - (U) ($200) Upgrade AAV7A1 Technical Data Package (TDP).
   - (U) ($753) Initiated BFV 600 Hp engine integration into AAV7A1 hull.
   - (U) ($605) Provided engineering support for improvements and modifications.
   - (U) ($605) Provided re-certification of transmission molds and re-validation of TDPs.
2. (U) FY 1994 PLAN:
   - (U) The following efforts ($2,324) are funded in FY 1994 only in B0020, Advanced Amphibious Assault Vehicle, Program Element 0603611M.
   - (U) ($570) Integrate BFV 600 Hp de-tuned to 500 Hp into the AAV7A1.
   - (U) ($150) Plan and conduct formal Developmental Test (DT) I testing of an AAV7A1 configured vehicle to include BFV engine and suspension and other available modifications in support of ROC.
   - (U) ($50) Prepare Cost and Operational Effectiveness Analysis.
   - (U) ($0) Conduct Milestone II review of AAV7A1 reliability, availability, and maintainability (RAM) product improvements.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Supporting Arms Systems
PROJECT NUMBER: C0021
BUDGET ACTIVITY: 7
Date: 7 February 1994

- (U) ($1,087) Provide engineering support for improvements and modifications.
- (U) ($467) Complete validation of suspension TDP.

3. (U) FY 1995 PLAN:

- (U) ($273) Refurbish DT I hulls, engines and transmissions test articles.
- (U) ($3,102) Machine hulls and procure engines and suspension parts for vehicle to support formal DT II/Operational Testing II (OT II) testing for the integrated system.
- (U) ($750) Provide engineering support for test planning, data gathering and report writing.
- (U) ($1,172) Provide engineering support for improvements and modifications.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CRANEDIV, Louisville, KY; Amphibious Test Vehicle Branch, Camp Pendleton, CA; TECOM, Aberdeen Proving Grounds, MD; TACOM, Warren, MI. CONTRACTORS: VSE, Alexandria, VA. All others to be determined.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Through coordination with Marine Corps Operational Test and Evaluation Activity and Marine Corps Combat Development Command (both in Quantico, Virginia), the scope of the AAV7A1 DT I testing has been reduced and delayed six months, from March 1994 to September 1994. Although testing was originally scheduled for three months, budget constraints permit only four vehicles be tested vice six. The reduction of the number of vehicles tested will not significantly impact the test results; however, the time span will permit only reliability, availability and maintainability (RAM) determinations rather than both RAM and performance tests. Performance will be tested during DT II / OT II using approximately 12 vehicles.

3. (U) Cost Changes: Data in previous budget not available for comparison.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Supporting Arms Systems
PROJECT NUMBER: C0021
BUDGET ACTIVITY: 7
Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:

- (U) Required Operational Capabilities (No MOB 1.13B) — May 1990
- (U) Test and Evaluation Master Plan — FY 1994
- (U) Milestone II — September 1994

G. (U) RELATED ACTIVITIES:

- (U) PE 0603611M (Marine Corps Assault Vehicles)

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 25 (BLI# 202100) AAV7A1 Product Improvement Program	6,710	2,393	3,022	7,116	6,120	34,702	42,104	CONT.	CONT.
• (U) PMC Line 28 (BLI# 206300) Modification Kits (Tracked Vehicles)	16,413	963	3,508	974	972	8,297	969	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

- (U) 1. The government of Brazil signed two Letters of Acceptance, one on 22 October 1991 for twelve (12) AAV7A1s, the second on 10 June 1992 for two (2) additional AAV7A1s. The estimated total cost is $38 million. This procurement of fourteen (14) AAV7A1s will result in the start up of a production line in FY 1994.
- (U) 2. On 14 February 1992, FMC signed a Memorandum of Understanding with the Republic of Korea for the capture/implementation of two (2) programs:
  - (U) a. New production of eighty-three (83) AAV7A1 vehicles
  - (U) b. Upgrade/conversion of one hundred and three (103) AAV7A1 vehicles
- (U) Korea is looking for a co-production venture to achieve program goals. The United States Government must approve data transfer to Korea and third party agreements prior to co-production.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Supporting Arms Systems
PROJECT NUMBER: C0021
BUDGET ACTIVITY: 7
Date: 7 February 1994

J. (U) TEST AND EVALUATION:

• (U) DT-I	September 1994
• (U) DT-II	July - December 1996
• (U) OT-II	April - September 1997

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Supporting Arms Systems

PROJECT NUMBER: C1120
BUDGET ACTIVITY: 7

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C1120 Air Defense Missile System (ADMS). The Air Defense Missile System (ADMS) encompasses three sub-element programs which are part of the Integrated Air Defense System for the Marine Corps. (1) The HAWK system is the Marine Corps' Low-to-Medium altitude ground based air defense system. Upgrades include mobility enhancements, expeditionary air defense improvements, and Tactical Ballistic Missile (TBM) defense modifications which are in keeping with the Marine Corps' plan to keep HAWK viable until the year 2010. (2) The Air Defense Communications Platform (ADCP) provides a single-configuration shelter which will be capable of receiving/ transmitting data link information to and from various platforms. The ADCP will also serve as an adjunct to the HAWK Battery Command Post (BCP) to provide a TBM defense interface as well as providing cuing information to Air Defense units. (3) The Avenger provides low altitude air defense, day-night, adverse weather, shoot-on-the-move capability with gun/missile mix. Its eight ready-to-fire Stinger missiles and .50 caliber machine gun provide the Marine Air-Ground Task Force with an enhanced air defense capability beyond the year 2005.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,022) Defined TBM defense capability software, interfaces, air picture generation, and correlation for ADCP.
- (U) ($2,060) Continued HAWK exploration of Identification Friend or Foe (IFF) replacement.
- (U) ($571) Completed Avenger laser certification. Completed mount/software redesign for the .50 caliber machine gun.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Supporting Arms Systems

PROJECT NUMBER: C1120
BUDGET ACTIVITY: 7

DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($636) Finish ADCP TBM software development, finish hardware design/fabrication.
- (U) ($462) Continue exploration of IFF replacement for HAWK/Short Range Air Defense (SHORAD) and 3-dimensional sensor for HAWK/SHORAD. Receive Engineering Change Proposal approval of software upgrades in BCP for TBM/SHORAD Command and Control (C2) defense effort. Upgrade Day/Night capability for Tracking Adjunct System camera on High Power Illuminator Radar.
- (U) ($875) Perform formal testing of Command, Control, and Communications data link and Passive Sensor Correlation Integration and Fusion.

(U) FY 1995 PLAN:

- (U) ($233) Explore hardware/software enhancements to the HAWK system.
- (U) ($393) Complete Engineering Change Proposals for passive sensor as well as phase II of the Advanced Fusion Development and cuing.
- (U) ($175) ADCP will complete software testing and software/hardware integration.
- (U) ($58) Software development started for fulfilling Product Improvement Program requirements for mission planning and fire control.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN, Crane, IN; NAVSURFWARCEN, Dahlgren, VA; MCTSSA, Camp Pendleton, CA; MICOM, Huntsville, AL; CECOM, Ft. Monmouth, NJ. CONTRACTORS: Raytheon, Bedford, MA; Northrop, Hawthorne, CA; Boeing, Huntsville, AL; Lockheed/Sanders, Nashua, NH; Magnavox, Ft Wayne, IN; General Electric, Burlington, VT; Paravant, Melbourne, FL; Advanced Programming Concepts, Austin, TX.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Supporting Arms Systems

PROJECT NUMBER: C1120
BUDGET ACTIVITY: 7

DATE: 7 February 1994

(U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 35 (BLI# 300600) HAWK Mod	29,034	2,100	0	0	0	8,502	1,200	0	54,745
• (U) PMC Line 36 (BLI# 301300) Pedestal Mounted Stinger (less Advance Procurement)	24,189	19,201	44,069	51,078	49,520	6,035	100	CONT.	194,192
• (U) PMC Line 37 (BLI# 301303) Pedestal Mounted Stinger (Advance procurement)	4,300	0	0	0	0	0	0	0	12,300

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Supporting Arms Systems

PROJECT NUMBER: C1555
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: Light Armored Vehicle Program

POPULAR NAME: LAV

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Supporting Arms Systems

PROJECT NUMBER: C1555
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES			MS III 3rd QTR					CONT.
ENGINEERING MILESTONES								CONT.
T&E MILESTONES		DT OT II 1st QTR						CONT.
CONTRACT MILESTONES								CONT.

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	0	0	0	0	0	0	0	CONT.
SUPPORT CONTRACT	211	310	50	0	0	0	0	CONT.
IN-HOUSE SUPPORT	1,310	1,125	916	961	2,296	2,252	1,177	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	0
TOTAL	1,521	1,435	966	961	2,296	2,252	1,177	CONT.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Supporting Arms Systems
PROJECT NUMBER: C1555
BUDGET ACTIVITY: 7
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The family of Light Armored Vehicles (LAVs) consists of six fielded configurations with operational capabilities providing significant enhancement to the mobility and firepower of the Marine Air/Ground Task Force. Since the original urgency of need dictated the fielding of essentially off-the-shelf vehicles, this project provides the resources to evaluate, develop, and test designated preplanned product improvements. The program has the single goal of ensuring the maximum reliability/capability for the fielded family of LAVs.

C. (U) PROGRAM ACCCMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,300) Conducted basic engineering support/planning for LAV family of vehicles (FOV).
- (U) ($221) Improved LAV turret stabilization.

2. (U) FY 1994 PLAN:

- (U) ($920) Provide basic engineering support for LAV-FOV.
- (U) ($515) Perform LAV command and control enhancement effort.

3. (U) FY 1995 PLAN:

- (U) ($863) Conduct mobility block testing for LAV-FOV.
- (U) ($103) Perform vision block filter testing.

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

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Supporting Arms Systems
PROJECT NUMBER: C1555
BUDGET ACTIVITY: 7
Date: 7 February 1994

D. (U) WORK PERFORMED BY: IN-HOUSE: Program Manager, LAV, Tank and Automotive Command, Warren, MI; NAVSURFWARCEN, Dahlgren, VA; NAVSURFWARCEN, Bethesda, MD; Marine Corps Logistics Base, Albany, GA; MARCORSYSCOM, Quantico, VA; LAV Test Directorate, Yuma Proving Ground, Yuma, AZ. CONTRACTORS: Diesel Division of General Motors, London, Ontario, Canada.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- MILESTONE III April - June 1995

G. (U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 26 (BLI# 203800) LAV PIP	C 6,646	14,608	8,068	681	0	65,057	CONT.	CONT.	
• (U) PMC Line 27 (BLI# 203900) LAV	10,000	65,350	0	0	0	90,983	257,633	CONT.	CONT.

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

J. (U) TEST AND EVALUATION:
- DT OT II October - December 1993

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Supporting Arms Systems
PROJECT NUMBER: C1901
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT: This project develops joint and Marine Corps unique improvements to infantry weapons/artillery technology, and monitors national/international weapons developments. Beginning in FY 1994, funding for Marine Corps unique amphibious armor improvements for the M1A1 Main Battle Tank and support systems is incorporated in this project from the Amphibious Armor Systems (AAS) Program, Project C1763 under this program element.

(U) PROJECT NUMBER AND TITLE: C1901 Ground Weaponry Product Improvement

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,000) Continued modification kits for Infantry Weapons, 7.62 millimeter (mm) Designated Marksman Rifle (DMR) program, formerly, Sniper Team Support Weapon, thermal sight program, and concept evaluation of Frangible Ammunition and Lightweight Marine Laser Designator Rangefinder (LMLDR).
- (U) ($684) Evaluated artillery technology including software requirements for Back Up Computer System (BUCS) and users trial for Gun Laying and Positioning System (GLPS).
- (U) ($61) Conducted technical risk assessment of the Meteorological Measuring Set.
- (U) ($988) Developed and tested joint 25mm multi-purpose ammunition. Completed M1A1 Forward Observer/Forward Air Controller integration.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Supporting Arms Systems

PROJECT NUMBER: C1901
BUDGET ACTIVITY: 7

DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($534) Continue 5.56mm/9mm Frangible Ammunition program.
- (U) ($3,462) Conduct LMLDR industry study, GLPS market investigation, and validation testing for BUCS and continue artillery technology evaluation.
- (U) ($53) Joint participation with Army for Weapons Safety Certification/Shipboard modification for Multiple Launch Rocket System M77 ammunition.
- (U) ($1,289) Terminate joint 25mm multi-purpose ammunition program. Continue Amphibious Armor System (AAS): upgrade Tank Retriever with upgrade to M88A1, now M88A2.
- (U) ($267) Joint participation with Army on development of an Armored Vehicle Driver's Thermal Viewer.
- (U) ($16) Conduct Validation/Verification of forward Observers Communications Technical Instruction.
- (U) ($428) Continue Joint Thermal Sight Program and Night Vision Equipment Program. Initiate Directed Energy Program.

(U) FY 1995 PLAN:

- (U) ($1,609) Continue LMLDR, GLPS, BUCS, artillery technology evaluation.
- (U) ($852) Continue AAS modifications.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Crane, IN; NAVSURFWARCENDIV, Dahlgren, VA; ARDEC, Dover, NJ; NVEOL, Ft. Belvoir, VA; NAVAIRWARCENWPNDIV, China Lake, CA; MARCORSYSCOM and MCCDC, Quantico, VA; Army Missile Command, Redstone, AL; TECOM, Aberdeen Proving Grounds Aberdeen, MD. CONTRACTORS: Los Alamos National Laboratories, Los Alamos, NM; General Dynamic Land Systems, Warren, MI; Radian, Dumfries, VA; Olin Ordnance, Marion, IL; Strategic Financial Planning Systems, Reston, VA. Other contractors to be determined.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Supporting Arms Systems

PROJECT NUMBER: C1901
BUDGET ACTIVITY: 7

DATE: 7 February 1994

(U) RELATED ACTIVITIES:

- (U) All ground weapons and ground ammunition systems: Army, Navy, Air Force, Coast Guard, and Commander in Chief, Special Operations Command.
- (U) PE 0203735A, Project Number D330.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 28 (BLI# 206300) Modification Kits (Tracked Vehicles)	16,413	963	3,508	974	972	8,297	969	CONT.	CONT.
• (U) PMC Line 31 (BLI# 220900) Modification Kits (Artillery and Other)	12,861	3,903	510	487	486	485	484	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Supporting Arms Systems
PROJECT NUMBER: C2086
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C2086 Soldier/Marine Enhancement. The Marine Enhancement Program (MEP) is a Congressionally initiated program started in FY 1990 which provides Research, Development, Test and Evaluation funding for low visibility, low cost items. It focuses on items of equipment which will benefit the individual Marine by reducing the load, increasing survivability, enhancing safety and improving combat effectiveness. The emphasis of the program is on non-developmental/commercially available items which can be quickly evaluated and fielded. This program is coordinated with the Army's Soldier Enhancement Program and the Special Operations Command.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,866) Investigated equipment items, to include combat service support, clothing, and individual equipment.
- (U) ($1,852) Investigated equipment items, to include ground weapons reconnaissance, amphibious raid, and 81 millimeter infrared mortar.
- (U) ($2,011) Investigated communications, navigation and intelligence items.

(U) FY 1994 PLAN:

- (U) Continue to examine future non-developmental item technologies that show promise for rapid fielding in the areas of:
- (U) ($1,162) combat service support, clothing, and individual equipment;
- (U) ($2,604) ground weapons, amphibious raid, and ground reconnaissance;
- (U) ($1,840) intelligence/communications and command and control equipment.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206623M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Supporting Arms Systems7

PROJECT NUMBER: C2086
BUDGET ACTIVITY: 7

DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($3,468) Continue to examine non-developmental item technology that shows promise for rapid acquisition and fielding to individual Marines. Emphasis will be placed on equipment areas having a direct and immediate impact on improving the individual Marine's combat survivability and effectiveness.

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

(U) WORK PERFORMED BY: IN-HOUSE: MARCORSYSCOM, Quantico, VA; Naval Facilities Engineering Service Center, Port Hueneme, CA; MCB CAMPEN, Camp Pendleton, CA; MCCDC, Quantico, VA; MCRD, San Diego, CA; Army Natick Laboratories, Natick, MA; NAVAIRWARCENACDIV, Warminster, PA; NESEC, San Diego, CA; APG, Aberdeen, MD. CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES:

- (U) PE 0604713A (Army, Soldier Enhancement Program)

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 83 (BLI 643400) Amphibious Raid Equipment	5,726	0	0	0	0	0	0	0	5,726
• (U) O&M,MC Line Initial Issue	11,000	11,000	11,000	11,000	11,000	11,000	11,000	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206624M
PROGRAM ELEMENT TITLE: Marine Corps Combat Services Support
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0076 Combat Service Support (CSS) Product Improvement Program	715	162	4,734	3,379	913	829	186	CONT.	CONT.
C0079 Combat Clothing and Equipment[1]	179	86	77	94	94	93	93	CONT.	CONT.
C0085 Amphibious Reconnaissance Equipment	118	0	1,362	629	648	650	599	CONT.	CONT.
TOTAL	1,012	248	6,173	4,102	1,655	1,572	878	CONT.	CONT.

1 FY 1993 funding was moved from Program Element (PE) 0604717M due to the Congressional PE Restructure.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This PE provides funding for Marine Air-Ground Task Force requirements for combat service support equipment improvements, completes the developmental portion of field feeding systems, and completes research and development efforts for fielding medical equipment. It also provides for evaluation of non-developmental items to support Marine Corps amphibious raid reconnaissance and special operations in low intensity conflicts in all climatic environments, as well as improvements in Tactical Fuel Systems equipment, utilities systems items, and bridging.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206624M
PROGRAM ELEMENT TITLE: Marine Corps Combat Services Support
PROJECT NUMBER: C0076
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C0076, Combat Service Support Product Improvement Program. This project includes improvements in all areas of Combat Service Support Equipment. The Medium Tactical Vehicle Replacement (MTVR) Program and Vehicle Fleet Improvements determine the replacement vehicle for the Medium 5-ton fleet of 8,600 vehicles and provide improvements to the rest of the fleet. This project also includes improvements in all areas of motor transportation which will increase mobility, maintainability and reliability.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($307) Continued MTVR Advanced Technology Demonstrator I (ATD) development/testing (Phase 0).
- (U) ($200) Initiated testing of Marine Corps ATD II for the MTVR.
- (U) ($208) Initiated testing of Logistics Vehicle System cooling system improvements.

(U) FY 1994 PLAN:

- (U) ($64) Initiate Combat Breaching Vehicle (CBV) program with the Army. This program was formerly known as the Combat Mobility Vehicle.
- (U) ($25) Terminate the Marine Corps unilateral Enhanced Reverse Osmosis Water Purification Unit (EROWPU) effort.
- (U) ($20) Begin an effort for the hose reel sub-assembly.
- (U) ($53) Begin an effort for the tactical bulk fuel delivery system.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206624M
PROGRAM ELEMENT TITLE: Marine Corps Combat Services Support
PROJECT NUMBER: C0076
BUDGET ACTIVITY: 7
DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($1,545) Award Phase I Demonstration/Validation contracts for vehicle prototype fabrication and testing.
- (U) ($3,189) Continue the CBV program with the Army, working towards a Joint program.

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

(U) WORK PERFORMED BY: IN-HOUSE: Work performed by various government laboratories to include: Aberdeen Proving Grounds, Aberdeen, MD; Waterways Experimental Station (WES), Vicksburg, MS; NAVWPNSTA, Seal Beach, CA. MARCORSYSCOM, Quantico, VA; US Army Tank and Automotive Command, Warren MI; CONTRACTORS: Nevada Automotive Test Center, Carson City, NV; Cummins Corporation, Columbus, IN; Oshkosh Corporation; etc.

(U) RELATED ACTIVITIES: Family of Medium Tactical Vehicles (Army), PE 0604604A.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206624M
PROGRAM ELEMENT TITLE: Marine Corps Combat Services Support
PROJECT NUMBER: C0079
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C0079, Combat Clothing and Equipment. This program completes the developmental portion of field feeding systems, the Tactical Soft Shelter (TSS) program, and the Research and Development (R&D) efforts for field medical equipment. Authorized Medical/Dental Allowances Lists (AMAL) reviews are conducted on a six year cycle to review all 25 AMALs. This program keeps pace with the rapid changes in medical technology as it applies to the combat field environment.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($10) Performed Non-Developmental Item (NDI) field evaluation on x-ray machines, pulse oximeters, and laboratory equipment. Served as technical sponsor for AMAL reviews involving the functional areas of pharmacy, x-ray, and dental.
- (U) ($30) Conducted R&D efforts required for developmental test fielding of the Tray Ration Heating System (TRHS).
- (U) ($20) Purchased ancillary equipment for TRHS.
- (U) ($40) Finalized technical documentation for TRHS.
- (U) ($79) Continued test and evaluation of NDI TSS.

(U) FY 1994 PLAN:

- (U) ($10) Perform AMAL reviews on laboratory and blood bank.
- (U) ($15) Continue field user evaluation of TRHS.
- (U) ($61) Continue test and evaluation of NDI TSS.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206624M
PROGRAM ELEMENT TITLE: Marine Corps Combat Services Support

PROJECT NUMBER: C0079
BUDGET ACTIVITY: 7

DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($10) Perform AMAL reviews on operating room and battalion aid station.
- (U) ($10) Continue test and evaluation of NDI TSS.
- (U) ($57) Purchase ancillary equipment for TSS.

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

(U) WORK PERFORMED BY: IN-HOUSE: MARCORSYSCOM, Quantico, VA; TECOM, Aberdeen, MD; MCOTEA, Quantico, VA; Army Troop Command Natick Research, Development and Evaluation Center, Natick, MA; NSMRL, Groton, CT; and the Medical Battalions and Medical Logistic Companies of the First, Second, Third, and Fourth Force Service Support Group in Camp Pendleton, CA; Camp LeJeune, NC; Okinawa, Japan; and New Orleans, LA, respectively. CONTRACTORS: To be determined.

(U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 98 (BLI# 636700) TRHS	0	0	2,524	3,304	0	0	0	0	5,828
• (U) PMC Line 92 (BLI# 652200) Field Medical Equipment	3,454	3,494	4,092	0	0	0	0	0	11,040
• (U) PMC Line 112 (BLI# 654000) SHELTER Family	1	0	0	0	0	0	0	0	7,993

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206624M
PROGRAM ELEMENT TITLE: Marine Corps Combat Services Support
PROJECT NUMBER: C0085
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C0085, Amphibious Reconnaissance Equipment. This project provides the evaluation of Non-Developmental Items (NDI) to support Marine Corps unique amphibious raid, advanced amphibious force reconnaissance, special operations and counter-narcotic/counter drug efforts during low and mid intensity conflicts and operations other than war in all environments. Principal requirements are for Reconnaissance Patrolling Insertion and Extraction (R-PIE) Equipment, enhanced parachuting and diving equipment, Direct Action/Close Quarters Battle/Dynamic Assault items and the Light Strike Vehicle (LSV). Additionally, small combatant craft programs are pursued to improve and standardize the Marine Corps capability to conduct over-the-horizon raids, amphibious reconnaissance and riverine warfare. These efforts include the Riverine Assault Craft (RAC), Combat Rubber Reconnaissance Craft with pump jet, 70 horsepower (Hp) pump jet for use with the fielded Rigid Raid Craft and the Improved Rigid Raid Craft (IRRC). Mission capability will be enhanced by reducing weight, improving safety, eliminating redundancy, ensuring compatibility of individual equipment items and increasing the utility and interoperability of amphibious raid, reconnaissance and riverine equipment.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($29) Evaluated numerous NDI items to satisfy remaining Diving Equipment Enhancement Program, parachuting, R-PIE, Airborne Combat Enhancement, advanced amphibious force reconnaissance, LSV, close quarters battle and raid capability, Dynamic Assault Enhancement Equipment requirements.
- (U) ($57) Conducted early operational assessment of LSV candidates.
- (U) ($27) Naval Sea Systems Command adopted Engineering Change Proposal for 35 Hp pump jet. Conducted a Critical Design Review of 70 Hp pump jet.
- (U) ($5) Continued coordination with the Army for adoption of the MC-5 parachute for Department of Defense use.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206624M
PROGRAM ELEMENT TITLE: Marine Corps Combat Services Support
PROJECT NUMBER: C0085
BUDGET ACTIVITY: 7
DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) Congress decreased all FY 1994 funding ($2,458) for source selection evaluation and testing of the LSV. All FY 1994 efforts listed here are unrelated to LSV and are funded via reprogrammings ($283) from PE 0206626M, C2122.
- (U) Achieve Milestone (MS) I/II for the IRRC. Conduct Developmental Test/Operational Test of IRRC (($214) reprogrammings from PE 0206626M, C2122).
- (U) Continue evaluation of NDI candidates for diving, parachuting, ground reconnaissance and close quarters battle capability improvements (($69) reprogrammings from PE 0206626M, C2122).

(U) FY 1995 PLAN:

- (U) ($847) Continue product improvements and upgrades to over-the-horizon raid and reconnaissance craft and individual equipment items by continuing examination of NDI technology.
- (U) ($245) Evaluate product improvements for the RAC.
- (U) ($270) Achieve MS III for IRRC.

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

(U) WORK PERFORMED BY: IN-HOUSE: MARCORSYSCOM, Quantico, VA; NESEA, St. Inigoes, MD; Lexington Blue-Grass Army Depot, Lexington, KY; NAVSURFWARCENCOASTSYSTA, Panama City, FL; Naval Facilities Engineering Service Center, Port Hueneme, CA. CONTRACTORS: Swiftships, Incorporated, Morgan City, LA; Willard Marine Incorporated, Anaheim, CA.

(U) RELATED ACTIVITIES: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206624M
PROGRAM ELEMENT TITLE: Marine Corps Combat Services Support

PROJECT NUMBER: C0085
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 83 (BLI# 653400) Amphibious Raid Equipment	5,726	1,803	255	242	435	458	371	CONT.	CONT.
• (U) PMC Line 99 (BLI# 669200) Drug Interdiction	5,000	0	0	0	0	0	0	CONT.	CONT.
• (U) O&M,MC Counter Narcotic	3,200	850	828	0	0	0	0	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206625M
PROGRAM ELEMENT TITLE: Marine Corps Intelligence/Electronics Warfare Systems
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1992 AND PRIOR	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0062 Intelligence Analysis System (IAS)	4,617	5,652	3,118	2,880	1,314	1,557	702	CONT.	CONT.	
C1296 Joint Service Imagery Processing System (JSIPS)	46,334	9,087	7,530	0	0	0	0	0	0	62,951
C1297 Tactical Remote Sensor System (TRSS)	2,994	1,889	382	193	193	96	48	CONT.	CONT.	
C1463 Counterintelligence and Security Equipment[1]	548	243	107	110	113	116	120	CONT.	CONT.	
C1928 Tactical Electronic Reconnaissance Processing and Evaluation System (TERPES)	7,220	5,865	4,881	3,200	3,179	3,162	2,947	CONT.	CONT.	
TOTAL	24,466	21,179	8,488	6,383	4,799	4,931	3,817	CONT.	CONT.	

1 FY 1993 funding was moved from Program Element (PE) 0604718M due to the Congressional PE Restructure.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This PE funds the operational systems development of Marine Corps intelligence equipment that will complement current and future sensors and will provide systems for data evaluations required to support the operating forces into the next century. The Counterintelligence and Security Equipment program funds purchasing and user evaluation of non-developmental item counterintelligence equipment and product improvement of the Counterintelligence Communication System. The Tactical Electronic Reconnaissance Processing and Evaluation System provides an Electronic Intelligence fusion capability for the Marine Air Ground Intelligence System.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206625M
PROGRAM ELEMENT TITLE: Marine Corps Intelligence/ Electronics Warfare Systems
PROJECT NUMBER: C0062
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C0062 Intelligence Analysis System. The Intelligence Analysis System (IAS) program uses an evolutionary acquisition strategy and non-development hardware and software to product improve the AN/TYQ-19 Intelligence Analysis Center (IAC), a formerly fielded Marine Expeditionary Force (MEF) asset. The program will fulfill the Fleet Marine Force requirement to provide automated intelligence capabilities to all echelons within the Marine Air-Ground Task Force (MAGTF). It will also provide for an end-of-service-life replacement for the IAC. The program consists of overlapping sequential block upgrades. Once fielded, the IAS will enable intelligence analysts to rapidly process and disseminate battlefield intelligence to the MAGTF commander and his subordinate commanders.

(U) The TROJAN Special Purpose Integrated Remote Intelligence Terminal (SPIRIT) II system is designed to provide the deployed MAGTF commander with a dedicated intelligence transceiver and dissemination capability via the use of commercial and military satellite networks which can access national and tactical intelligence databases.

(U) The Marine Corps currently has no dedicated capability at any MAGTF level to access national and tactical intelligence information sources. Non-dedicated communication networks become overwhelmed with the volume and bandwidth requirements imposed by information exchanges between intelligence agencies and Marine units.

(U) The Joint Surveillance target Acquisition Radar System (Joint STARS) is an airborne radar system for detection of moving targets.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($489) Incorporated Integrated Interoperability Data Base.
- (U) ($440) Initialized interoperability with Naval Tactical Command System-Afloat and the Joint Deployable Intelligence Support System (JDISS).
- (U) ($105) Began transition to the Navy/Marine Corps standard mapping tool kit.
- (U) ($45) Conducted Environmental Testing on IAS hardware.
- (U) ($55) Investigated engineering change proposals for the IAS Suite.
- (U) ($45) Developed adjustable plotter case.
- (U) ($125) Developed Integrated Data Base Transaction Formulation (TF) translator.
- (U) ($265) Tested and documented IAS version 2.0 software.
- (U) ($175) Developed IAS training package and self-paced training guide.
- (U) ($95) Developed and drafted communications employment guide.
- (U) ($2,501) Milestone 0 Acquisition Decision Memorandum moved program into Phase 0. Two TROJAN SPIRIT II systems were purchased for the Marine Corps.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206625M
PROGRAM ELEMENT TITLE: Marine Corps Intelligence/ Electronics Warfare Systems
PROJECT NUMBER: C0062
BUDGET ACTIVITY: 7
DATE: 7 February 1994

- (U) ($197) Reviewed/interpreted/analyzed/revised TROJAN SPIRIT II spare packages, Training Program and training documentation, technical manuals and technical drawing package.
- (U) ($80) Performed required modifications to the Army's TROJAN Switching Center.

(U) FY 1994 PLAN:
- (U) ($400) Develop and test IAS version 2.1 and version 2.2 software for the rugged IAS Suites and MEF IAS, respectively.
- (U) ($826) Complete MEF IAS design and Conduct Developmental/Operational Testing.
- (U) ($227) Test and finalize Communications employment guide.
- (U) ($110) Incorporate Message Processor and Tactical Communications Interface Module drivers to upgrade communications interface capability.
- (U) ($109) Integrate IAS Workstation hardware and software.
- (U) ($1,600) Upgrade the two TROJAN SPIRIT II systems bought in FY 1993 from version 2.0 to version 2.2 adding X-band capability.
- (U) ($325) Lease commercial satellite time to support operational testing.
- (U) ($1,075) Develop programmatic and logistics documentation, technical and operator manuals, test plan and Test and Evaluation Master Plan. Perform data collection during testing. Provide test support.
- (U) ($250) Investigate engineering change proposals for IAS Suites.
- (U) ($120) Identify and validate requirements for version 3.0 software.
- (U) ($110) Continue interoperability efforts with NTCS-A and Joint Maritime Commanders Information System (JMCIS); begin transition of IAS.
- (U) ($300) Develop JSTARS programmatic and logistics documentation support.
- (U) ($200) Conduct Cost and Operational Effectiveness Analysis for JSTARS.

(U) FY 1995 PLAN:
- (U) ($160) Conduct MEF IAS Operational Test and Evaluation (OT&E).
- (U) ($65) Conduct IAS Workstation OT&E.
- (U) ($275) Continue testing with other systems of the Marine Tactical Command and Control System, the Marine Air Ground Intelligence System and digital communications.
- (U) ($355) Complete Transition of IAS into JMCIS.
- (U) ($195) Conduct necessary Fiscal Year Interoperability Assurance Plan testing with the MEF IAS.
- (U) ($2,068) Migrate IAS to DOD/DOD IIs interoperability standards.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206625M
PROGRAM ELEMENT TITLE: Marine Corps Intelligence/ Electronics Warfare Systems

PROJECT NUMBER: C0062
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

(U) WORK PERFORMED BY: IN-HOUSE: BRDEC, Ft. Belvoir, VA; NESEA, St. Inigoes, MD; MCTSSA, Camp Pendleton, CA. NAVSURFWARCEN, Crane, IN. CONTRACTORS: Columbia Research Corporation, Dumfries, VA; TRW, Fairfax, VA; ETA, Garrisonville, VA.

(U) RELATED ACTIVITIES: DIA PE: 0301301L (Department of Defense Intelligence System/Military Intelligence Integrated Data System/Integrated Data Base I and II). Navy Tactical Flag Communication and Control System. Marine Corps PEs: 0206626M (Marine Common Operation Software System, Marine Corps Common Hardware System, and MTACCS); 0206625M (TERPES and Topographical Survey Equipment); and 0206313M (TRC-170 and Unit Level Switches).

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 62 (BLI# 474700) Intelligence Support Equipment (IAS portion only)	41,570	16,853	41,977	39,570	9,676	1,250	773	0	164,888

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206625M
PROGRAM ELEMENT TITLE: Marine Corps Intelligence/ Electronics Warfare Systems

PROJECT NUMBER: C1297
BUDGET ACTIVITY: 7

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C1297 Tactical Remote Sensor System. Tactical Remote Sensor System (TRSS) is a suite of unattended ground sensor equipment that provides Marine Air-Ground Task Force commanders with an electronic system capable of continuous all-weather detection, location determination, and monitoring of activity in the area of operations. TRSS is comprised of hand and air emplaced sensors, transmitters, relays, data storage devices, and read-out equipment. Remote sensors detect activity using seismic, magnetic, infra red, and imaging technologies. Activations are transmitted directly, or via relays, to monitoring equipment. TRSS upgrades the existing sensor system (SEAOPS Phase III) with equipment that is lighter and smaller, and is more maintainable and supportable.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($0) Received TRSS Basic System Milestone III decision in the second quarter of FY 1993.
- (U) ($1,134) Continued development of Day-Night Thermal Imager.
- (U) ($610) Performed developmental upgrades to identified deficiencies in software.
- (U) ($210) Performed developmental upgrades to identified deficiencies in monitoring equipment.
- (U) ($110) Continued fixed-wing air certification of Air Delivered Seismic Intrusion Detector (ADSID) on AV-8B aircraft.
- (U) ($315) Continued development of Airborne Relay.
- (U) ($615) Began developmental upgrade of Encoder-Transmitter Unit (ETU).

(U) FY 1994 PLAN:

- (U) ($145) Complete development of ETU upgrade.
- (U) ($100) Complete air certification of ADSID on AV-8B aircraft in the second quarter of FY 1994.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206625M
PROGRAM ELEMENT TITLE: Marine Corps Intelligence/ Electronics Warfare Systems

PROJECT NUMBER: C1297
BUDGET ACTIVITY: 7

DATE: 7 February 1994

- (U) ($70) Complete Day-Night Thermal Imager developmental test/operational test. Complete development of Day-Night Thermal Imager.
- (U) ($1,204) Continue development of Airborne Relay.
- (U) ($195) Complete developmental upgrades in monitoring equipment.
- (U) ($175) Continue developmental upgrades in software.

(U) FY 1995 PLAN:

- (U) ($0) Receive Day-Night Thermal Imager Milestone III decision in the third quarter of 1995.
- (U) ($212) Complete Airborne Relay developmental test/operational test. Complete development of Airborne Relay.
- (U) ($0) Receive Airborne Relay Milestone III decision in third quarter of FY 1995.
- (U) ($170) Continue developmental upgrades to identified deficiencies in software.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Indianapolis,IN; MCTSSA, Camp Pendleton, CA. CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206625M
PROGRAM ELEMENT TITLE: Marine Corps Intelligence/ Electronics Warfare Systems

PROJECT NUMBER: C1297
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 59 (BLI# 474700) Intelligence Support Equipment (TRSS portion only)	27,037	0	8,509	6,960	0	0	0	0	59,400
• (U) O&M,MC	642	268	268	268	268	268	268	2,144	4,394

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206625M
PROGRAM ELEMENT TITLE: Marine Corps Intelligence/ Electronics Warfare Systems

PROJECT NUMBER: C1463
BUDGET ACTIVITY: 7

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C1463 Counterintelligence and Security Equipment. This project funds user evaluation of non-developmental item (NDI) counterintelligence equipment and product improvement of the Counterintelligence Communication System (CCS). A continuing requirement exists to improve Marine Corps equipment which supports tactical counterintelligence special operations, human intelligence collection activities, and Technical Surveillance Countermeasures (TSCM).

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($30) Conducted test and evaluation of two way communication.
- (U) ($80) Reprogrammed hardware-firmware for two-way communication in the CCS sets as required.
- (U) ($74) Fabricated Message Retrieval Unit (MRU) "toss up" antennas.
- (U) ($136) Purchased/tested LIMN02 "30 day" battery packs.
- (U) ($26) Purchased/tested BA 5590 batteries with MRU.
- (U) ($16) Tested CCS Very High Frequency/Ultra High Frequency directional antennas for "helo" antennas.
- (U) ($10) Obtained latest schedule for replacing UH-1N/CH-46E ARC-182 radio/AS-3191 antenna system.
- (U) ($40) Provided program depot support.
- (U) ($40) Updated operator's manuals.
- (U) ($14) Received report on testing of pre-planned product improvement developments.
- (U) ($24) Purchased/fabricated MRU sample lower housing for applicable batteries.
- (U) ($58) Purchased additional TSCM equipment.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206625M
PROGRAM ELEMENT TITLE: Marine Corps Intelligence/ Electronics Warfare Systems

PROJECT NUMBER: C1463
BUDGET ACTIVITY: 7

DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($98) Continue Developmental Test/Operational Test and Evaluation (DT/OT&E) of NDI hardware for TSCM equipment suite improvement.
- (U) ($145) Continue research and development (R&D) efforts with National TSCM community to identify state-of-the-art additions to the TSCM suite.

(U) FY 1995 PLAN:

- (U) ($60) Continue DT/OT&E of NDI hardware for TSCM equipment suite improvement.
- (U) ($47) Continue R&D efforts with National TSCM community to identify state-of-the-art additions to the TSCM suite.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA. CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES: Not applicable.

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

FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 59 (BLI# 474700) Intelligence Support Equipment (Counterintelligence and Security Equipment portion only)								
0	534	0	0	0	562	0	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206625M
PROGRAM ELEMENT TITLE: Marine Corps Intelligence/ Electronics Warfare Systems
PROJECT NUMBER: C1928
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C1928 Tactical Electronic Reconnaissance Processing and Evaluation System. Tactical Electronic Reconnaissance Processing and Evaluation System (TERPES) is designed to process, sort, analyze, display, and correlate digital Electronic Support and Electronic Attack (EA) data collected by the Marine Corps EA-6B aircraft. A tactical air intelligence database is maintained and Electronic Intelligence analysis support is provided to the Aviation Combat Element and the Command Element of a Marine Air-Ground Task Force.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,125) Began integration with the Tactical Information Broadcast Service.
- (U) ($1,580) Began testing and integration with the Tactical Air Command Central (TACC) datalink system.
- (U) ($2,465) Began testing and integration of a TERPES shipboard kit that allows interoperability with the Navy Tactical Command System-Afloat.
- (U) ($2,050) Began development of a TERPES/Tactical Aircraft Mission Planning System (TAMPS)/Tactical EA-6B Mission Support (TEAMS) automated interface.

(U) FY 1994 PLAN:

- (U) ($1,581) Continue development of full Department of Defense Intelligence Information System compatibility, to include Joint Deployable Intelligence Support System.
- (U) ($1,575) Continue integration and testing with the TACC datalink system.
- (U) ($1,427) Continue development of the TERPES/TAMPS/TEAMS automated interface.
- (U) ($1,282) Begin integration with Secondary Imagery Processing National Imagery Transmission Format (NITF) products.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206625M
PROGRAM ELEMENT TITLE: Marine Corps Intelligence/ Electronics Warfare Systems

PROJECT NUMBER: C1928
BUDGET ACTIVITY: 7

DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($2,840) Continue upgrades to TERPES mission processing software to maintain compatibility with upgrades to EA-6B aircraft software changes.
- (U) ($901) Continue integration with Secondary Imagery Processing NITF products.
- (U) ($1,140) Begin integration testing of TERPES/TAMPS/TEAMS automated interface.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, Point Mugu, CA. CONTRACTORS: Lockheed, Austin, TX; TRW Fairfax, VA; CMI Woodland Hills, CA; RECOM Technologies, Oxnard, CA.

(U) RELATED ACTIVITIES:

- (U) Project C0062, Intelligence Analysis System and Project C1297 Tactical Remote Sensor System under this PE.

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

- (U) PMC Line 59 (BLI# 474700) Intelligence Support Equipment (TERPES portion only)

FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
241	4,569	0	743	2,437	630	644	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/Communications Systems
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1992 AND PRIOR	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0045 Tactical Systems Inter/Intraoperability Program		2,874	3,026	3,330	3,055	3,037	3,024	3,006	CONT.	CONT.
C0103 Tactical Air Operations (Operational Systems Product Improvement)		1	4,605	1,417	1,467	1,805	2,171	1,634	CONT.	CONT.
C1067 Aviation Radar Product Improvement Program		0	6,017	60	47	48	48	47	CONT.	CONT.
C1079 Joint Interoperability of Tactical Command and Control Systems		1,361	1,198	1,448	958	953	950	944	CONT.	CONT.
C1443 Training Devices/Simulators (Engineering) Program		2,741	2,128	2,145	831	774	743	15	CONT.	CONT.
C2035 Position Location Reporting System/NAVSTAR/Global Positioning System	1,420	4,065	3,306	524	107	103	957	0	0	11,019
C2102 Improved Direct Air Support Center		922	1,294	1,087	1,150	1,266	1,711	452	CONT.	CONT.
C2122 Tactical Combat Operations		2,592	6,576	2,734	1,916	3,142	3,321	3,768	CONT.	CONT.
C2150 Marine Tactical Auto C2 System		0	7,415	6,696	2,107	2,858	2,845	2,829	CONT.	CONT.
TOTAL		14,556	35,565	19,441	11,638	13,986	15,770	12,695	CONT.	CONT.

1 FY 1993 funding was moved from Program Element (PE) 0604780M due to the Congressional PE Restructure.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element provides funding to ensure the inter/ intraoperability of tactical Command, Control, Communications, Computers, and Intelligence systems required by the Marine Corps and the Department of Defense.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PPOGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems

PROJECT NUMBER: C0045
BUDGET ACTIVITY: 7

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C0045 Tactical Systems Inter/Intraoperability Program. This program ensures the inter/intraoperability of tactical Command, Control, Communications, Computer, and Intelligence (C4I) systems to the extent required by the Marine Corps and the Department of Defense (DoD).

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($500) Maintained Interoperability Database System (IDBS). Began transition to new hardware/ software suite.
- (U) ($400) Revised Marine Air-Ground Task Force Interoperability Requirements Concepts (MIRC), Marine Tactical Systems (MTS) Technical Interface Design Plan (TIDP), and Marine Corps Tactical Communications Architecture (MCTCA).
- (U) ($1,394) Continued systems engineering services support, development of military telecommunications standards, North Atlantic Treaty Organization (NATO)/DoD working/steering groups and Marine Corps telecommunications modelling.
- (U) ($510) Developed MTS Interoperability Test System (MITS).
- (U) ($70) Began interoperability testing/certification of C4I systems for MTS TIDP compliance.

(U) FY 1994 PLAN:

- (U) ($550) Maintain/update IDBS. Complete transition to new hardware/software platform.
- (U) ($617) Continue systems engineering support/configuration management for maintenance/update of the MIRC, MTS TIDP, MCTCA and military telecommunications standards.
- (U) ($1,269) Continue systems engineering services support, development of military telecommunications standards, NATO/DoD working/steering groups, and Marine Corps telecommunications modelling.
- (U) ($590) Continue interoperability testing/certification. Maintain/update MITS.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems

PROJECT NUMBER: C0045
BUDGET ACTIVITY: 7

DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($346) Maintain/update IDBS.
- (U) ($519) Continue systems engineering support/configuration management for maintenance/update of MTS TIDP, MCTCA, MIRC, and military communications standards.
- (U) ($1,773) Continue systems engineering services to support development of military telecommunications standards, NATO working group, DoD working/steering groups, and Marine Corps telecommunications modelling.
- (U) ($692) Maintain/update MITS. Continue interoperability testing/certification of C4I systems.

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

(U) WORK PERFORMED BY: IN-HOUSE: MARCORSYSCOM, Quantico, VA; MCTSSA, Camp Pendleton, CA. CONTRACTORS: LOGICON-Eagle Technology Incorporated, Dumfries, VA; NSR Corporation, Colorado Springs, CO.

(U) RELATED ACTIVITIES:

- (U) PE 0206313M (Marine Corps Communications Systems)
- (U) PE 0206625M (Marine Corps Intelligence/Electronic Warfare Systems)
- (U) PE 0604719M (Marine Corps Command/Control/Communications Systems)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEM: T: 0206626M
PROGRAM ELE: T TITLE: Marine Corps Command/Control/ Communications System
PROJECT NUMBER: C0103
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C0103 Marine Corps Command/Control/Communications System. This project supports improvement of operational Air Command and Control Systems for the Marine Corps and provides for Joint/Allied interoperability and compatibility.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1) Continued to correct interoperability changes in fielded systems which arose from Joint Tactical Air Operations testing, Interoperability specification changes, system growth to accommodate new/changed weapons systems, and performance envelope deficiencies identified when the TAOM underwent joint testing. FY 1993 Accomplishments funded in PE 0605873M, Project C0030.

(U) FY 1994 PLAN:

- (U) ($1,425) Begin upgrade of TAOM to a Joint Tactical Information Distribution System (JTIDS).
- (U) ($800) Begin Receive and Transmit Platform JTIDS to support Theater Missile Defense System effort.
- (U) (2,380) Develop and begin Block Upgrade to basic system. This consists of operational needs identified by the Marine Corps Combat Development Command, Quantico, Virginia.

(U) FY 1995 PLAN:

- (U) ($417) Complete Block Upgrade to include upgrade of system to a JTIDS Receive and Transmit Platform.
- (U) ($800) Complete Surface Anti-Air Weapons Center program to pre-production.
- (U) ($200) Provide Air Tasking Order system to TAOM.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications System
PROJECT NUMBER: C0103
BUDGET ACTIVITY: 7
DATE: 7 February 1994

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

(U) WORK PERFORMED BY: IN-HOUSE: MARCORSYSCOM, Quantico, VA; MCTSSA, Camp Pendleton, CA; NESEC, Vallejo, CA. CONTRACTORS: Litton, Van Nuys, CA. ARC, Dumfries, VA.

(U) RELATED ACTIVITIES:

- (U) PE 0207412F (Air Force Modular Control Equipment and New Mobile Radar Approach Control)

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 56 (BLI# 459400) TAOM	0	2,454	3,584	4,768	8,801	8,687	8,043	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C1067
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMEER AND TITLE: C1067 Aviation Radar Product Improvement Program. This project funds modifications in response to field identified discrepancies for existing radars. The modifications include electronic counter-countermeasures, reliability improvements, and new threat enhancements including a Tactical Ballistic Missile Upgrade sponsored and jointly funded by the Ballistic Missile Defense Organization.

(U) FY 1993 ACCOMPLISHMENTS: There was no RDT&E,N Marine Corps funding in FY 1993. Funding was contained in Ballistic Missile Defense Organization, Program Element 0603216C.

(U) FY 1994 PLAN:

- (U) ($6,015) Monitor, test, and evaluate AN/TPS-59 radar Tactical Ballistic Missile upgrade contract.
- (U) ($1) Continue reliability and improvement study and analysis of Aviation Radars.
- (U) ($1) Analyze field identified deficiencies to Aviation Radars.

(U) FY 1995 PLAN:

- (U) ($50) Continue to monitor, test, and evaluate AN/TPS-59 radar Tactical Ballistic Missile upgrade contract.
- (U) ($5) Continue reliability and improvement study and analysis of Aviation Radars.
- (U) ($5) Analyze field identified deficiencies to Aviation Radars.

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

(U) WORK PERFORMED BY: IN-HOUSE: MARCORSYSCOM, Quantico, VA; NRL, Washington, DC. CONTRACTORS: Sensis Corporation, Syracuse, NY; Martin Marietta Corporation, Syracuse, NY.

(U) RELATED ACTIVITIES:
- (U) PE 0603216C (Ballistic Missile Defense Organization, Theater Missile Defense)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems

PROJECT NUMBER: C1067
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 70 (BLI# 496900) Modification Kits (NonTel)	2,181	424	1,066	0	11,981	15,736	0	0	34,178

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C1079
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C1079 Joint Interoperability of Tactical Command and Control Systems. This program supports Marine Corps participation in Joint Chiefs of Staff-sponsored Joint Interoperability of Tactical Command and Control Systems (JINTACCS) program which provides for the development of joint character and bit-oriented message standards and procedures.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($352) Continued system engineering effort in development of change proposals to Variable Message Format (VMF), Tactical Air Data Information Link-Joint (TADIL-J), and United States Message Text Format (USMTF) as evolving joint standards and updates to existing data lines.
- (U) ($585) Continued joint testing/certification of Joint Tactical Air Operations (JTAO) Systems.
- (U) ($7) Participated in systems engineering effort to provide integrated Tactical Ballistic Missile Defense (TBMD).
- (U) ($417) Continued development of MAGTF C4I Communications/information architecture for Marine Tactical Command and Control Systems.

(U) FY 1994 PLAN:

- (U) ($490) Continue system engineering effort in development of change proposals to VMF, TADIL-J, and USMTF as evolving joint standards.
- (U) ($700) Continue joint testing/certification of Command/Control/Communications (C3) Systems through the JTAO program and Five Year Interoperability Assurance Plan.
- (U) ($8) Participate in system engineering effort to provide integrated TBMD.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems

PROJECT NUMBER: C1079
BUDGET ACTIVITY: 7

DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($576) Continue system engineering effort in development of change proposals to VMF, TADIL-J, and USMTF as evolving joint standards.
- (U) ($864) Continue joint testing/certification of C3 systems through the JTAO program.
- (U) ($8) Participate in system engineering effort to provide integrated TBMD.

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

(U) WORK PERFORMED BY: IN-HOUSE: Joint Interoperability Engineering Organization, Reston, VA; MARCORSYSCOM, Quantico, VA; MCTSSA, Camp Pendleton, CA. CONTRACTORS: LOGICON/Eagle Technology, Incorporated, Dumfries, VA; NSR Corporation, Colorado Springs, CO.

(U) RELATED ACTIVITIES:

- (U) PE 0604719M (Marine Corps Command/Control/Communications Systems)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C1443
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C1443 / Training Devices/Simulators (Engineering) Program. Marine Air-Ground Task Force (MAGTF) Tactical Warfare Simulation (MTWS) is a product improvement of the Tactical Warfare Simulation, Evaluation and Analysis System. MTWS will provide automated exercise control services, Command and Control training, wargaming, and field maneuver control capability to MAGTFs in both joint and intraservice conflict simulation where none currently exists. Additionally, it will provide MAGTFs with a capability to effectively record and prosecute training/testing without reliance on live-fire exercises. Finally, it will provide MAGTFs with the capability to test and assess operations/contingency plans throughout the staff planning process.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($730) Completed Code and Test Phase of software development.
- (U) ($870) Completed Computer Software Component Integration and Test.
- (U) ($501) Completed Computer Software Configuration Item Test development.
- (U) ($500) Completed in-plant test of software.
- (U) ($140) Conducted Post Development Software support and Independent Verification and Validation of Version 1.0 software.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems

PROJECT NUMBER: C1443
BUDGET ACTIVITY: 7

DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($600) Complete System Integration and Test development.
- (U) ($100) Complete Milestone III (Approval for Service Use).
- (U) ($100) Achieve Initial Operational Capability at conclusion of field testing. Field first operational site.
- (U) ($400) Complete fielding of system via installation and testing at each site. Reach Full Operational Capability.
- (U) ($788) Transition software to Software Support Activity and initiate pre-planned product improvements for the man-machine interface.
- (U) ($140) Conduct Post Development Software support and Independent Verification and Validation of Version 1.0 software. Complete acquisition of equipment suites for the Camp LeJeune, North Carolina and Okinawa, Japan test sites.

(U) FY 1995 PLAN:

- (U) ($400) Complete development, integration, and test of pre-planned product improvements for map display and after-action reporting.
- (U) ($606) Conduct research and development of improvements to combat models.
- (U) ($1,000) Develop enhancements to Aggregate Level Simulation Protocol interoperability with joint service wargames, support confederation testing, and conduct joint exercise.
- (U) ($139) Conduct Post Development Software support and Independent Verification and Validation of Version 1.0 software.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C1443
BUDGET ACTIVITY: 7
DATE: 7 February 1994

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

(U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDTE DIV, San Diego, CA. CONTRACTORS: VisiCom Laboratories, Incorporated, San Diego, CA.

(U) RELATED ACTIVITIES:

- (U) PE 0603832D, Joint Simulation Management.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 93 (BLI# 653200 Training Devices)	2,105	792	0	0	0	0	0	0	2,897
• (U) DMSO Line, (RDT&E,D)*	0	875	0	0	0	0	0	0	875

* This is the Marine Corps portion.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

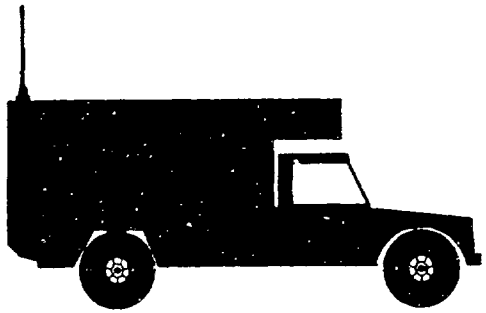
PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems

PROJECT NUMBER: C2035
BUDGET ACTIVITY: 7

Date: 7 February 1994

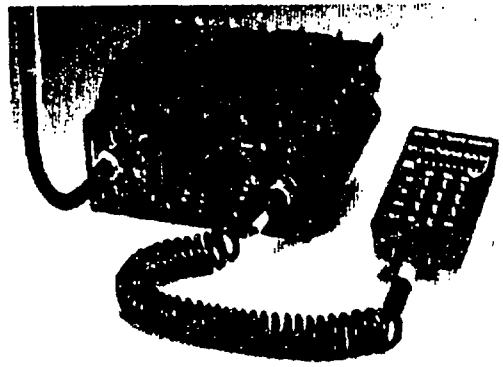
PROJECT TITLE: Position Location Reporting System/NAVSTAR/Global Positioning System

Down-sized Master Station



Intelligence & Communications Systems

PLRS Communication Enhancement (PCE)



Intelligence & Communications Systems

POPULAR NAME: PLRS/NAVSTAR/GPS

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C2035
BUDGET ACTIVITY: 7
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999 TO COMPLETE
Program MILESTONES	PCE: DSMS: GPS: OT	MS III	MS III IOC/FOC	OT	MS III	IOC	FOC
ENGINEERING MILESTONES	PCE: DEM/VAL DSMS:	EDM PHASE I/II SOFTWARE				PRODUCTION	
T&E MILESTONES	PCE: DSMS:	DT I	DT II/OT	OT			
CONTRACT MILESTONES	PCE: PHASE I DSMS:	PHASE II	PRODUCTION			PRODUCTION	

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	671	2,791	2,478	0	0	0	912	0	6,852
SUPPORT CONTRACT	200	881	658	173	0	0	0	0	1,912
IN-HOUSE SUPPORT	1,086	393	170	351	107	103	45	0	2,255
GFE/ OTHER	0	0	0	0	0	0	0	0	0
TOTAL	1,957	4,065	3,306	524	107	103	957	0	11,019

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C2035
BUDGET ACTIVITY: 7
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Position Location Reporting System (PLRS) Product Improvement Program consists of a Master Station Computer Replacement. The PLRS Master Station Software is being rehosted from the current two AN/UYK-7 computer configuration to a single desktop Tactical (TAC-n) Computer. This ensures compatibility with shipboard configuration. Global Positioning System (GPS) Interface Unit (GPSIU), a satellite based navigation system, provides Position Location Information data worldwide, 24 hours a day and is a two year test and development effort with procurement in FY 1995. PLRS Communication Enhancement (PCE) is a development effort with production in FY 1998 and will provide a digital data communication capability of up to 1280 bits per second, independent of the PLRS Master Station. GPS is a two year test with non-developmental item procurement in FY 1994.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($789) Continued Master Station software rehost effort.
- (U) ($348) Began Operational Test of GPS Receivers.
- (U) ($2,928) Continued development of PCE and tested four proof-of-design models. Hughes Aircraft Corporation conducted successful laboratory and field demonstrations of the PCE at Marine Corps Tactical Systems Support Activity (MCTSSA) System Integration Environment. Completed PLRS Interface Controller software. Eldyne Incorporated, in support of MCTSSA, completed development of the Digital Communications Terminal to User-Read-Out port interface. Took delivery of 19 GPSIU prototypes.

2. (U) FY 1994 PLAN:

- (U) ($1,346) Complete PRLS Communication Control Software package and documentation. Retrofit/upgrade Marine Corps basic user units to communicate at 320 bps through the user readout port.
- (U) ($50) Complete Milestone III on GPS.
- (U) ($1,910) Complete Master Station software for Tac-n computer in CMS-2 language. Continue ADA language conversion. Develop Installation Kits for vehicular applications for the Position Lightweight Ground Receiver (PLGR). Complete Down Size Master Station (DSMS) Developmental Test I.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C2035
BUDGET ACTIVITY: 7
Date: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) ($261) Complete Developmental Test II/Operational Test of DSMS software and provide documentation/software baseline for production of DSMS.
- (U) ($263) Provide Logistic support in preparation for fielding the 300 lops PCE.

4. (U) PROGRAM TO COMPLETION:

- (U) ($107) FY 1996: Continue software implementation to maintain PLRS component capability with other fielded command and control systems. Award DSMS production contract.
- (U) ($103) FY 1997: Continue software implementation to maintain PLRS component capability with other fielded command and control systems. Prepare PCE Marine Corps Program Decision Memorandum III documentation. Prepare PCE Production Phase documentation.
- (U) ($957) FY 1998: Complete software implementation to maintain PLRS component capability with other fielded command and control systems. Obtain PCE Initial Operational Capability and Full Operational Capability. Award PCE production contract.
- (U) This program completes at the end of FY 1998.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENCADIV, Warminster, PA; MCTSSA, Camp Pendleton, CA; Joint Program Office, Los Angeles, CA; Army Communications and Electronics Command, Ft. Monmouth, NJ; MCCDC, Quantico, VA. CONTRACTORS: Sierra Cybernetics, Brea, CA; Hughes Aircraft Company, Fullerton, CA; Eldyne Incorporated, San Diego, CA.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C2035
BUDGET ACTIVITY: 7
Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: When budgeting for the PCE program OT, funding was allocated to fabricate a communication enhancement with a speed of only 320 BPS (approximately $1.47 million). However, a communication enhancement speed of 1200 was desired/needed costing approximately $3.1 million. When this error was realized, the development schedule for PCE had to be adjusted to accomodate the faster speed of 1200 BPS. Since additional funding was then needed for PCE, the program was restructured and the OT was moved from FY 1994 to FY 1996. FY 1994 funds are now being used to complete 320 BPS PCE documentation as well as retrofitting and upgrading Marine Corps BUUS with the 320 capability.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

• (U) Required Operational Capabilities	January 1991 (GPSIU, PCE, DSMS)
• (U) Integrated Logistics Support Plan	1992 (GPSIU, PCE, DSMS)
• (U) Letter of Adoption and Procurement	1992 (GPSIU)/1993 (GPSIU, PCE, DSMS)/FY 1993 (PGLR)
• (U) Operational Requirements Document	FY 1992 (PLGR)
• (U) Material Fielding Plan	1993 (GPSIU)
• (U) Test and Evaluation Master Plan	FY 1992 (PLGR)/1993 (GPSIU, PCE, DSMS)

G. (U) RELATED ACTIVITIES: PE: 0603713A Army Data Distribution System (Net Control Station Down Size)

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C2035
BUDGET ACTIVITY: 7
Date: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 41 (BLI# 414200) GPS	7,100	0	0	0	0	0	0	0	7,100
• (U) PMC Line 55 (BLI# 458800) PLRS	0	3,268	3,010	3,740	637	0	0	0	21,573

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: PLRS has cooperative agreements; however, the Army, as the lead service, maintains agreement documentation. GPS has cooperative agreements; however, the Air Force, as the lead service, maintains agreement documentation.

J. (U) TEST AND EVALUATION:

- (U) DSMS: During FY 1993 rehosted software was available for testing. This testing will complete in FY 1995 and a production contract award is anticipated for FY 1996.
- (U) PCE: During FY 1993 a total of four modifications were tested and as a result of this test, 35 Engineering Development Models (EDMs) will be produced and subsequently operationally tested to pursue a production decision.
- (U) GPS: During FY 1993 a total of 19 EDMs were produced to conduct Operational Testing to pursue a production decision.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C2102
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C2102 Improved Direct Air Support Center. The current Improved Direct Air Support Center (IDASC) will be upgraded to include physical/functional enhancements and a digital data interface to associated command and control (C2) systems. Improvements include digital mapping display and information overlay, communications processing, and data base manipulation. Preliminary designs for physical and functional enhancements were approved and prototype hardware developed. Work will continue on review and modification of off-the-shelf software and selection of prototype hardware, as well as determining software baselines and prioritizing system upgrades.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($193) Upgraded current systems software for limited improvement to compatibility with all appropriate external command and control agencies.
- (U) ($469) Downsized IDASC and OE-334 (Communications Shelter) baseline incorporating previous hardware in Low-Rate Initial Production. Initiated Developmental Test on these lightweight multi-purpose Shelters (LMS) (Type-1 Shelters) mounted on High Mobility Multi-purpose Wheeled Vehicles.
- (U) ($260) Studied automation software alternatives (concept exploration), emphasizing non-developmental items, in preparation for an automation Milestone I decision.

(U) FY 1994 PLAN:

- (U) ($451) Initiate selective automation development.
- (U) ($200) Incorporate new message standards to improve interoperability with Tactical Air Command Center and external C2 agencies.
- (U) ($543) Initiate tailoring of IDASC unique software application development towards Navy Tactical Air Command System (Afloat) (NTCS (A)) core capabilities and interfaces.
- (U) ($100) Initiate upgrade for digital voice and data Communications Capability.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C2102
BUDGET ACTIVITY: 7
DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($533) Develop and incorporate new message standards to improve interoperability with Tactical Air Command Center and Advanced Tactical Air Command Central software, Fire Support Coordination Center, Advanced Field Artillery Tactical Data System software, ground combat element Tactical Combat Operations software, Intelligence Analysis System software, and external C2 Agencies for joint interoperability (i.e., Navy via NTCS (A) software and Air Force via Contingency Tactical Air Command System Automated Planning System software).
- (U) ($169) Incorporate IDASC application into NTCS (A) unified build for operational testing.
- (U) ($385) Initiate follow-on automation developmental effort taking advantage of recently introduced technology (i.e., large screen display and protocol conversion using one common hardware suite).

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

(U) WORK PERFORMED BY: IN-HOUSE: NISE WEST, Vallejo, CA; MCTSSA, Camp Pendleton, CA; NAVSURFWARCENDIV, Crane, IN. CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 55 (BLI# 461000) Marine Tactical Command and Control System (IDASC portion only)	2,800	2,767	2,743	3,000	2,425	0	0	0	16,999

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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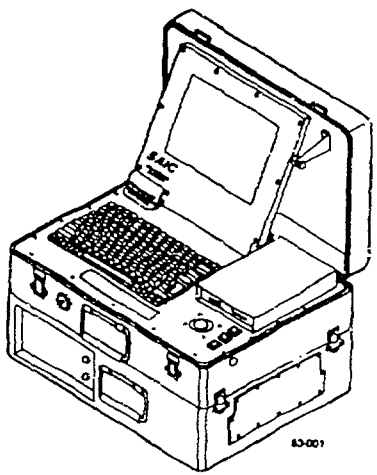
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C2122
BUDGET ACTIVITY: 7
Date: 7 February 1994

PROJECT TITLE: Tactical Combat Operations

Tactical Combat Operations (TCO)



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POPULAR NAME: TCO

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C2122
BUDGET ACTIVITY: 7
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	MS I/II	MS III		MS IIIB				CONT.
ENGINEERING MILESTONES								CONT.
T&E MILESTONES		DT/OT		OT&E				CONT.
CONTRACT MILESTONES								CONT.

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	1,505	4,797	2,047	1,268	2,372	2,477	2,850	CONT.
SUPPORT CONTRACT	335	219	225	224	248	273	298	CONT.
IN-HOUSE SUPPORT	752	1,560	462	424	522	571	620	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	CONT.
TOTAL	2,592	6,576	2,734	1,916	3,142	3,321	3,768	CONT.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C2122
BUDGET ACTIVITY: 7
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Tactical Combat Operations (TCO) system will serve as the operations component to the Marine Tactical Command and Control System. TCO will use microcomputers to provide commanders the automation to receive, fuse, select, and display information from many sources. It will also disseminate selected information throughout the battlefield. Additional TCO attributes include: automated message processing, mission planning, development and dissemination of operations orders and overlays, display of tactical control measures, and interfaces with local and wide area networks.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,150) Modified and adopted Navy Unified Build Operations Software.
- (U) ($250) Completed technical reviews, logistic reviews, and Milestone I/II review during the fourth quarter of FY 1993.
- (U) ($192) Combined concept demonstration with full-scale software development.

2. (U) FY 1994 PLAN:

- (U) ($4,564) Conduct final Developmental Test/Initial Operational Test at the beginning of the fiscal year.
- (U) ($954) Conduct TCO Operational Test and Evaluation.
- (U) ($445) Achieve TCO Milestone III fielding decision.
- (U) ($193) Implement TCO training plan.
- (U) ($115) Initiate fielding of TCO.
- (U) ($22) Revalidate TCO hardware requirements.
- (U) ($283) Reprogram to PE 0206524M, Project C0085.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C2122
BUDGET ACTIVITY: 7
Date: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) ($132) Develop Optional Application Tape for unit readiness, planning, and coordination systems-Marine Corps Fire Support System/Advanced Field Artillery Tactical Data Systems (MCFSS/AFATDS).
- (U) ($675) Develop interface between TCO and fire support planning and coordination systems (MCFSS/AFATDS).
- (U) ($1,927) Continue Developmental Testing of large screen displays, vector-smart mapping, active-matrix, and conversion from RSC-IX to TAC IV platforms.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: MARCORSYSCOM, Quantico, VA; MCTSSA, Camp Pendleton, CA; NESEA, St. Inigoes, MD; SPAWARSYSCOM, Washington, DC. CONTRACTORS: Science Applications International Corporation, Sacramento Valley, CA; TRW, Los Angeles, CA; Columbia Research Corporation, Dumfries, VA; INRI Corporation, Reston, VA; Sun Corporation, Mountain View, CA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) Mission Needs Statement — June 1992
- (U) Operational Requirements Document — August 1993

G. (U) RELATED ACTIVITIES: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems

PROJECT NUMBER: C2122
BUDGET ACTIVITY: 7

Date: 7 February 1994

H. (U) OTHER APPROPRIATION FUNDS:

	FY1993 ACTUAL	FY1994 ESTIMATE	FY1995 ESTIMATE	FY1996 ESTIMATE	FY1997 ESTIMATE	FY1998 ESTIMATE	FY1999 ESTIMATE	TOTAL PROGRAM
• (U) PMC Line #71 (BC# 459700)	0	0	5,652	4,229	2,227	0	0	12,108

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

J. (U) TEST AND EVALUATION:

- (U) Developmental Testing — FY 1992 - FY 1994
- (U) Operational Testing — FY 1992 - FY 1994
- (U) Operational Testing and Evaluation — FY 1996

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C2150
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C2150 Marine Tactical Auto C2 System. The Marine Tactical Command and Control System (MTACCS) System Engineering and Integration (SE&I) Program provides systems engineering/testing services required to ensure implementation of operationally suitable, cost effective and integrated tactical Command, Control, Communications, Computers, and Intelligence (C4I) systems required by Marine Corps units operating ashore and afloat in a Joint environment. It implements the Marine Air-Ground Task Force (MAGTF) C4I System integrated architecture by developing required common software capabilities and hardware specifications. It also provides system development direction and engineering services to MAGTF component C4I system programs.

(U) FY 1993 ACCOMPLISHMENTS: FY 1993 funding is contained in Project C2122, Tactical Combat Operations, and Project C1079, Joint Interoperability of Tactical Command and Control Systems, under this Program Element (PE). Additional FY 1993 funding is contained in Project C1928, Tactical Electronic Reconnaissance Processing and Evaluation System, under PE 0206625M, as well as, Project C1931, Communications Ancillary Equipment, under PE 0206313M.

(U) FY 1994 PLAN:

- (U) ($500) Conduct system-level SE&I planning.
- (U) ($1,430) Conduct MTACCS communications/information exchange engineering.
- (U) ($2,154) Install/operate Systems Integration Environment at Marine Corps Tactical Support Systems Activity (MCTSSA). Conduct conformance and interoperability testing.
- (U) ($3,331) Field Marine Common Applications Support Software Version 1. Field and support common hardware.

(U) FY 1995 PLAN:

- (U) ($2,000) Complete SE&I efforts to define and implement MAGTF C4I System architecture within Joint Maritime Commanders Information System Unified Build.
- (U) ($1,000) Continue participation in Tactical Advanced Computer Program.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0206626M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems

PROJECT NUMBER: C2150
BUDGET ACTIVITY: 7

DATE: 7 February 1994

- (U) ($2,196) Participate in development of common Joint protocols, Joint data elements, and a seamless/unified communications architecture.

- (U) ($1,500) Operate and maintain the Systems Integration Environment.

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

(U) WORK PERFORMED BY: IN-HOUSE: MARCORSYSCOM, Quantico, VA; MCTSSA, Camp Pendleton, CA; SPAWARSYSCOM, Crystal City, VA. CONTRACTORS: Columbia Research Corporation, Dumfries, VA; Fuentez Systems Concepts, Incorporated, Fairfax, VA.

(U) RELATED ACTIVITIES:

- (U) PE 0206313M (Marine Corps Communications)
- (U) PE 0206625M (Marine Corps Intelligence/Electronic Warfare Systems)
- (U) PE 0604719M (Marine Corps Command/Control/Communications Systems)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0207161N
PROGRAM ELEMENT TITLE: Tactical Air Intercept

PROJECT NUMBER: E0457
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: AIM-9X

(U) AIM-9X ACQUISITION STRATEGY (TECHNICAL RISK ASSESSMENT)

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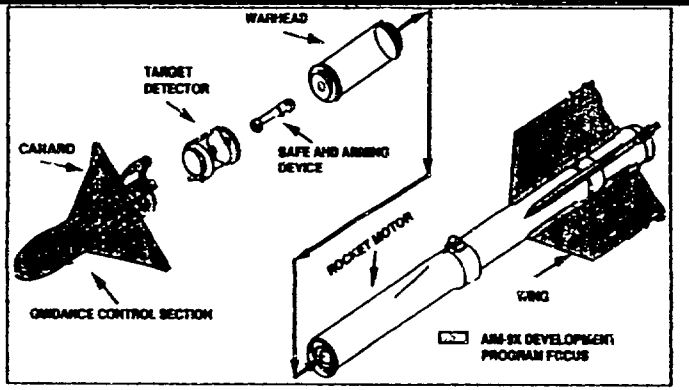

MAJOR MISSILE COMPONENTS	AIM-9M	AIM-9X	
		TECHNICAL APPROACH	RISK ASSESS.
SEEKER	SINGLE DETECTOR (InSb)	IR MIDWAVE IMAGER(FPA)	LOW-MOD
AIRFRAME	CANARD GAS SERVO DRIVEN	BOA OR BOXOFFICE	LOW-MOD
FUZE (AOTD)	DSU-15A/B	DSU-15A/B(REPACKAGE?)	LOW
WARHEAD	WDU-17B	WDU-17B	LOW
ROCKET MOTOR	MK-36 MOD II	MK-36 MOD II	LOW
SAFE & ARM	MK-13 MOD II	MK-13 MOD II OR NEW?	LOW

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POPULAR NAME: AIM-9X

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0207161N* PROJECT NUMBER: E0457 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Tactical Air Intercept BUDGET ACTIVITY: 7

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		MS IV/I		MS-II 1/96				
ENGINEERING MILESTONES				SDR 11/95	CDR 5/97 PDR 10/96		TRR for TECHEVAL 4/99	
T&E MILESTONES			Begin to Fly Brassboards 6/95	DT-IIA 4/96		DT-IIB 10/97 DT-IIC 7/98 OT-IIA 9/98	TECHEVAL 5/99	CONT.
CONTRACT			Release E&MD RFP 7/95	Award E&MD 3/96				CONT.

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT				15,300	29,404	56,837	36,230	25,606	244,577 (81,200)
SUPPORT CONTRACT				0	0	0	0	0	0 (0)
IN-HOUSE SUPPORT				6,076	11,321	20,180	15,982	14,389	82,948 (15,000)
GFE/ OTHER				1,000	0	0	0	0	1,000 (0)
TOTAL	0	0	0	22,376	40,725	77,017	52,212	39,995	328,525 (96,200)

* This program formerly funded under PE 0604354N.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0207161N
PROGRAM ELEMENT TITLE: Tactical Air Intercept
PROJECT NUMBER: E0457
BUDGET ACTIVITY: 7
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The AIM-9 Sidewinder program is a joint USAF/USN effort to continue the evolutionary development of the AIM-9 missile. The AIM-9X ia a long term evolution of the AIM-9 that will provide a series of modifications to the AIM-9 including seeker/guidance and kinematics that will be fielded in post- 2000 timeframe. Funding for AIM-9X activities beyond FY 1993 will be provided equally in the aggregate by the USAF and USN.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: Not applicable.

2. (U) FY 1994 PLAN: (Funded under PE 0603715D)

- (U) Release DEM/VAL RFP.
- (U) Conduct Source Selection.
- (U) Conduct MS IV/I.

3. (U) FY 1995 PLAN:

- (U) ($15,300) Continue Demonstration and Validation (DEMVAL) for Missile Seeker prototype for Engineering and Manufacturing Development (EMD).
- (U) (7,076) Engineering support from NAWC China Lake and other agencies for DT&E/OT&E program to include test range costs and instrumentation.
- (U) (NSP) Begin preparation and analysis for MS-II decision to enter phase II EMD and prepare request for proposal for EMD.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, China Lake, CA. CONTRACTORS: TBD

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0207161N PROJECT NUMBER: E0457 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Tactical Air Intercept BUDGET ACTIVITY: 7

E. (U) COMAPRISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) Systems Threat Analysis Report (STAR) 8/93.
- (U) Operational Requirement Document (ORD) 9/93.
- (U) Cost and Operational Effectiveness Analysis (COEA) 9/93.
- (U) Test and Evaluation Master Plan (TEMP) in coordination 2/94.

G. (U) RELATED ACTIVITIES: This joint program is equally funded by the USAF and USN throughout the life of the program although it may not be equally funded in each year.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIAMTE	FY 1996 ESTIAMTE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) RDT&E, DA 0603715D	10,800	19.800	0	0	0	0	0	0	30,600
• (U) RDT&E, AF 0227161F	0	0	26,949	21,997	31,465	32,635	33,957	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Will be exploring opportunities for international cooperation during the DEM/VAL phase.

J. (U) TEST AND EVALUATION: A TEMP will be written during FY 1994 to support developmental tests (DT-I) that are planned to start in FY 1995. In FY 1995, the AIM-9X test and evaluation activities will be conducting DT-I.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0207163N
PROGRAM ELEMENT TITLE: AMRAAM

PROJECT NUMBER: E0981
BUDGET ACTIVITY: 7

Date: 7 February 1994

PROJECT TITLE: AMRAAM

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POPULAR NAME: AMRAAM

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0207163N
PROGRAM ELEMENT TITLE: AMRAAM

PROJECT NUMBER: E0981
BUDGET ACTIVITY: 7

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES					MS IV 12/96			
ENGINEERING MILESTONES	P3I-1 CDR 1/93		P3I-1/2 PCA/PDR 9/95	P3I-2 CDR 2/96		P3I-2 FCA/PRR 12/97		
T&E MILESTONES				P3I-2 FLT TEST	P3I-2 FLT TEST	P3I-2 FLT TEST		
CONTRACT MILESTONES			P3J-2 DEMO AWARD 12/94			P3I-3 AWARD 2/98		

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	500	0	19,747	36,286	43,872	41,141	47,613	CONT.
SUPPORT CONTRACT								
IN-HOUSE SUPPORT	2,149	0	7,316	7,543	7,496	7,528	7,489	CONT.
GFE/ OTHER		0	850	1,000	1,000	1,000	1,335	CONT.
TOTAL	2,649	0	27,913	44,829	52,368	49,669	56,437	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This joint Navy/Air Force program is structured in response to the Joint Service Operational Requirement and Mission Element Need Statement to develop an air superiority air-to-air missile with significant improvements in operational utility and combat effectiveness. This program supports the integration of the AMRAAM into Navy aircraft with analysis of Navy unique applications, simulation capability development, aircraft missile integration tasks, pre-planned product improvement (P3I) efforts, and procurement of hardware to support Navy test and evaluation tasks.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0207163N
PROGRAM ELEMENT TITLE: AMRAAM

PROJECT NUMBER: E0961
BUDGET ACTIVITY: 7

Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,649) Continued participation in AMRAAM P3I Phase I (P3I-1) program including Critical Design Review (CDR) with emphasis on Navy unique requirements and aircraft integration compatibility and in P3I Phase 2/3 program planning and implementation.

2. (U) FY 1994 PLAN: Not applicable.

3. (U) FY 1995 PLAN:

- (U) ($8,166) Continue Navy technical participation in AMRAAM P3I Phase 1 and Phase 2 program including Physical Configuration Audit (PCA) and Preliminary Design Review (PDR) with emphasis on Navy unique design and test requirements and aircraft integration compatibility.

- (U) ($19,747) Initiate propulsion system demonstrations in support of Phase 3.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV CHINA LAKE CA, NAVAIRWARCENWPNDIV PT MUGU CA. CONTRACTORS: Hughes Aircraft Company, Canoga Park, CA, Raytheon Company, Bedford, MA. OTHERS: Air Force Aeronautical Systems Division, Advanced Medium Range AMRAAM Joint System Program Office, Eglin Air Force Base, FL.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: As a result of Congress deleting Navy FY-94 RDT&E funding the following shows the revised program:
   - (U) The start of Bank-To-Turn, Airbreather, and Advanced Solid Rocket efforts are delayed about 5 months, from late May 1994 (FY-94) to early Nov 1994 (FY-95).

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0207163N
PROGRAM ELEMENT TITLE: AMRAAM

PROJECT NUMBER: E0981
BUDGET ACTIVITY: 7

Date: 7 February 1994

- (U) The start of the seeker/motor integration effort is delayed about 3 months, from mid Jan 1996 to mid April 1996. The completion of this effort is delayed about 1 month. This schedule compression is accomplished by reducing schedule slack (which adds some risk) and increasing the effort in FY-97 and the funding.

- (U) Milestone VI review for the Phase 3 Engineering Manufacturing Development (EMD) effort is delayed about 3 months, from Dec 1996 to early Apr 1997 (EMD contract award-4th quarter FY-97).

3. (U) Cost Changes: Data in previous budget not availeble for comparison.

F. (U) PROGRAM DOCUMENTATION:

JSOR	5/91	SOC	7/86	TEMP	4/92
MENS	11/78	ILSP	2/91	STAR	4/92
SORD	1/90	DCP	3/91		

G. (U) RELATED ACTIVITIES:

- (U) AMRAAM integration with the following programs:
  PE 0207130F, F-15
  PE 0205667N, F-14 Upgrade
  PE 0207163F, AMRAAM P3I
  PE 0207133F, F-16
  PE 0604239F, F-22
  PE 0204136N, F/A-18 Squadrons
  PE 0207134F, F-15E

(U) There is no unnecessary duplication of effort within Navy, Air Force, or Department of Defense.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) WPN LINE 6									
	165	75	86	158	277	269	263	1,551	3,415
	101,613	57,647	84,287	125,523	198,322	197,619	194,356	1,216,031	2,721,327

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

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0207163N
PROGRAM ELEMENT TITLE: AMRAAM

PROJECT NUMBER: E0981
BUDGET ACTIVITY: 7

Date: 7 February 1994

J. (U) TEST AND EVALUATION: Captive and live fire flight testing of the P3I configuration missile on the F/A-18 and F-14 aircraft commencing in FY 1994 and continuing through FY 1998.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303109N
PROGRAM ELEMENT TITLE: Satellite Communications
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X2044 Interoperability of Satellite Intelligence Systems	0	4,803	0	0	0	0	0	0	4,803
X1880 Joint Terminal Project Office	2,236	2,073	3,776	3,036	3,188	3,319	3,402	CONT.	CONT.
X0728 EHF SATCOM Terminals	25,893	14,544	21,357	14,466	18,045	25,564	34,562	CONT.	CONT.
X0731 Fleet Satellite Communications	26 214	32,494	21,982	21,171	19,355	14,928	3,709	CONT.	CONT.
X1660 Navy Fleet SATCOM EHF Package	0	0	0	0	96	190	282	CONT.	CONT.
Total	54,343	53,914	47,115	38,673	40,684	44,001	41,955	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program supports development of shipboard and shore based equipment operating through six communication satellite systems: Fleet Satellite (FLTSAT) Communications, Leased Satellite (LEASAT) Communications, Defense Satellite Communications System (DSCS), Ultra High Frequency Follow-On Program (UFO), NATO Allied, and Air Force Satellite Communications (AFSATCOM). The Navy Extremely High Frequency (EHF) Satellite Communications (SATCOM) Program (NESP) provides for the development and production of terminals to provide anti-jam, low probability of intercept communications capability for Command and Control of the fleet. NESP is the Navy's portion of Milstar. The Milstar program is comprised of satellites, control stations, and air, ship and ground terminals to provide worldwide, secure, anti-jam, survivable communications for the National Command Authority, Specified/Unified CINCs, and operational commanders. The Milstar Joint Terminal Project Office (JTPO) chartered by tri-service Memorandum of Understanding (MOU) coordinates and directs the development of user terminals to achieve interoperability, logistics, and infrastructure support; provides support to CINCS, the Joint Chiefs and Service Staffs; and facilitates EHF technology transfer for the Services.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303109N
PROGRAM ELEMENT TITLE: Satellite Communications
PROJECT NUMBER: X1880
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) X1880 Joint Terminal Project Office: The Milstar program is comprised of satellites, control stations, and air, ship and ground terminals to provide worldwide, secure, anti-jam, survivable communications for the National Command Authority, Specified/Unified CINCs, and operational commanders. The Milstar Joint Terminal Project Office (JTPO) chartered by tri-service Memorandum of Understanding (MOU) coordinates and directs the development of user terminals in four joint tasking areas: (1) ensure terminal interoperability, (2) joint integrated logistics and C3 infrastructure support planning, (3) provide technical support to Office of the Secretary of Defense (OSD), Office of Joint Chiefs of Staff (OJCS), Commander in Chiefs (CINCs) and users, and (4) manage efficient application and transfer of advanced technology into Extremely High Frequency (EHF) terminals.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,400) Worked numerous interoperability issues, developed interoperable protocols and planned and accomplished interoperability testing.
- (U) ($250) Finalized cross-service installation actions and agreements.
- (U) ($500) Provided CINCs and JCS guidance and support.
- (U) ($86) Hosted technology transfer seminar.

(U) FY 1994 PLAN: The JTPO will continue to coordinate and direct the development of EHF terminals in the four tasking areas:

- (U) ($1,246) Resolve interoperability issues, identify and test new baseband devices to ensure interoperability, conduct joint testing with first on-orbit satellite, and baseline new LDR and MDR specifications.
- (U) ($215) Oversee the cross-service training Milstar terminal operators and maintainers.
- (U) ($516) Provide support to AFSPACECOM to manage satellite assets and terminal data flow and support the CINCs, users and JCS in early network planning and operation, data base construction and implementation.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303109N
PROGRAM ELEMENT TITLE: Satellite Communications
PROJECT NUMBER: X1880
BUDGET ACTIVITY: 7
DATE: 7 February 1994

- (U) ($96) Hold additional technology transfer seminars and implement formal structure and process for technology transfer.

(U) FY 1995 PLAN: The JTPO will coordinate and direct the development of user terminals in the four tasking areas:

- (U) ($2,266) Plan for and conduct joint interoperability testing with two cross-link satellites on-orbit, determine certification of Milstar terminals for interoperability prior to production decisions.
- (U) ($416) Oversee the cross-service training of Milstar terminal operators and identify opportunities for logistics and infrastructure cost savings.
- (U) ($930) Support AFSPACECOM, the CINCs, users and JCS in early network planning and operation and help resolve system technical problems and issues.
- (U) ($164) Continue to facilitate and exploit opportunities for technology transfer.

(U) PROGRAM TO COMPLETION: The JTPO will continue to support the four areas defined in the MOU. At Full Operational Capability (FOC), past 2000, the JTPO will turn over its responsibilities to the USAF Space Command, the designated Milstar System Operational Manager.

(U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDT&E Div, San Diego, CA; NAVAIRWARCENNACDIV, Warminster, PA; MIT, Lincoln Laboratory, Lexington, MA. CONTRACTORS: Booz, Allen & Hamilton, Bethesda, MD; Galaxy Scientific Corporation, Alexandria, VA.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

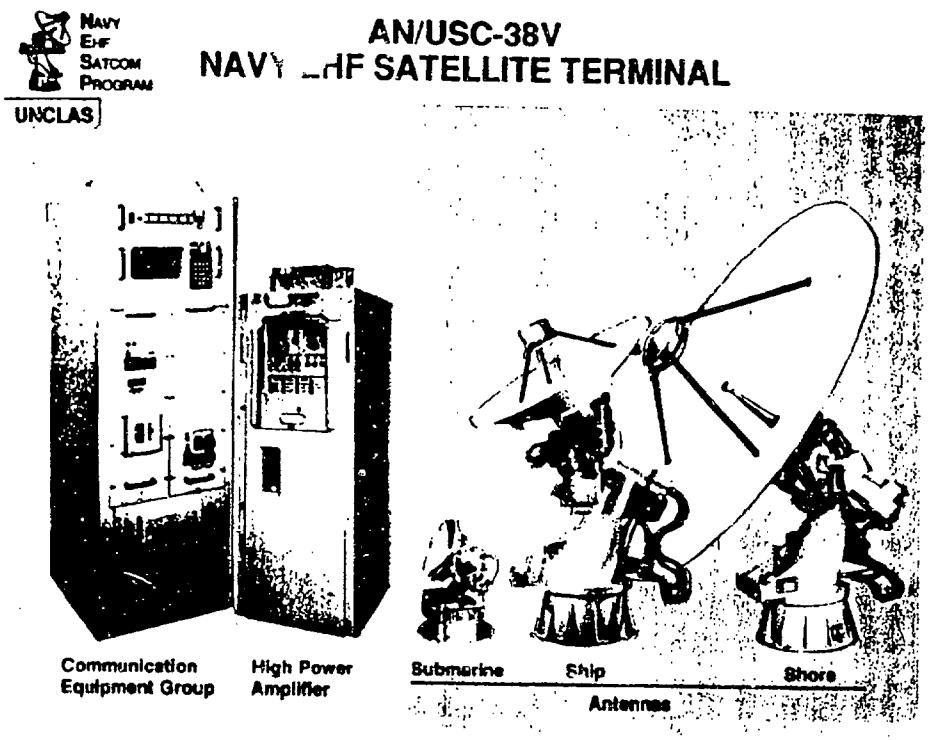
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303109N
PROGRAM ELEMENT TITLE: Satellite Communications

PROJECT NUMBER: X0728
BUDGET ACTIVITY: 7

DATE: 7 February 1994

PROJECT TITLE: EHF SATCOM Terminals



POPULAR NAME: NESP

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303109N
PROGRAM ELEMENT TITLE: Satellite Communications
PROJECT NUMBER: X0728
BUDGET ACTIVITY: 7
DATE: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	MS III 4/93 1st Install 1/93 Organic Sup 2/94 Depot Sup 2/94 Commence Protocols 7/93	IOC 4/94					MS IV 2/99	CONT.
ENGINEERING MILESTONES		NECC EDM 1/94 Commence MDR DVLP 10/94						CONT.
T&E MILESTONES		Terminal FOT&E 8/94 DT-IIIA 3/94	P3I DT&E 10/94 NECC OT 5/95			MDR Opr Test 10/98		CONT.
CONTRACT MILESTONES		Studies/Upgr Awd 1/94		F-O PROC RFP 1/97	MDR Appliq. Awd 10/97			CONT.

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	8,598	1,450	12,514	7,419	10,609	17,829	26,196	CONT.
SUPPORT CONTRACT	1,061	1,018	688	398	334	384	334	CONT.
IN-HOUSE SUPPORT	13,974	10,533	7,289	6,054	6,742	6,990	7,634	CONT.
GFE/ OTHER	2,263	1,543	866	595	360	361	398	CONT.
TOTAL	25,896	14,544	21,357	14,466	18,045	25,564	34,562	CONT.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303109N
PROGRAM ELEMENT TITLE: Satellite Communications
PROJECT NUMBER: X0728
BUDGET ACTIVITY: 7
DATE: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Navy Extremely High Frequency (EHF) Satellite Communications (SATCOM) Program provides for the development and production of terminals to provide anti-jam, low probability of intercept communications capability for Command and Control of the fleet. The terminals will provide physical and electromagnetically survivable, worldwide communications in the current and projected electromagnetic and nuclear threat. Navy EHF terminals are interoperable with Army and Air-Force terminals and will operate with Milstar as well as EHF packages on-board Ultra High Frequency (UHF) Follow-On (UFO) Satellites four through nine. Navy terminals operated during Desert Storm with EHF packages on-board Fleet Satellite 8. The increased capability provided by EHF terminals is accomplished by use of the wider bandwidths available at extremely high frequencies, narrow antenna beamwidths, spread spectrum techniques, on-board satellite processing and advanced signal processing technology.

(U) The Navy EHF Communications Controller (NECC) provides automated, netted tactical data exchange (IXS) over jam resistant EHF satellite links. The NECC will establish EHF networks, control data transfer over the networks and act as a gateway between networks.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($8,239) Continued P3I Developments.
- (U) ($6,970) Continued NECC Development.
- (U) ($8,421) Performed Development Engineering Analysis and Management, including: - Achieved Milestone III - Full Rate Production approval of AN/USC-38(V) Terminals.
- (U) ($2,263) Conducted and Supported Terminal Testing.

2. (U) FY 1994 PLAN:

- (U) ($1,450) Continue P3I Developments, including:
  - (U) Complete initial Milstar Protocols and terminal processor upgrades.
- (U) ($5,880) Continue NECC Development.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303109N
PROGRAM ELEMENT TITLE: Satellite Communications
PROJECT NUMBER: X0728
BUDGET ACTIVITY: 7
DATE: 7 February 1994

- (U) ($5,671) Perform MILSTAR development engineering analysis and P³I engineering management.
- (U) ($1,543) Conduct and support terminal testing, including:
  - (U) Follow-on Developmental Testing (DT-III) with Milstar.
  - (U) Signal susceptibility and vulnerability assessment development.
  - (U) Beginning NECC DT.

3. (U) FY 1995 PLAN:

- (U) ($12,607) Continue P3I Developments, including commencing development of a Medium Data Rate (MDR) upgrade to NESP terminals to allow operations with Milstar satellites three and beyond as well as Army and Air Force MDR terminals
- (U) ($3,584) Continue NECC Development.
- (U) ($4,300) Continue MILSTAR development engineering analysis, P³I and MDR engineering, and management.
- (U) ($866) Conduct and Support Terminal Testing, including:
  - (U) Completing DT and Operational Testing (OT) for NECC Build 1.
  - (U) Completing DT/OT for initial terminal P3I upgrades.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDTE DIV, San Diego, CA; NAVELEXCEN, Vallejo, CA; NAVELEXCEN, Charleston, SC; NAVELEXCEN, Portsmouth, VA; NWAC, Corona, CA; NRL, Washington, DC; NAVSURFWARCEN White Oak DET, Silver Spring, MD; NAVUNSEAWARCEN DET, New London, CT; NAVFAC CHESAPEAKE DIV, Washington, DC. CONTRACTORS: Booz, Allen & Hamilton, Inc., Bethesda, MD; Raytheon, Sudbury, MA; Integrated Systems Control Inc., Arlington, VA; Tele-Consultants, Inc., Manassas, VA.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303109N
PROGRAM ELEMENT TITLE: Satellite Communications

PROJECT NUMBER: X0728
BUDGET ACTIVITY: 7

DATE: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

DCP X0728	04/89
Temp Number 784 (Rev 3)	07/92
Milstar ORD	05/92
Milstar Multi-service TEMP	09/92
Integrated Program Summary	04/93
Full Production Approval (AN/USC-38(V)	04/93
Manpower Estimate Report	08/93
Program Life Cycle Cost Estimate	02/93

G. (U) RELATED ACTIVITIES: The Navy EHF SATCOM Program is part of the Tri-Service Milstar program. The Milstar satellite is being developed by the Air Force. Terminals are being developed by the Air Force, Army and Navy. Terminal requirements are coordinated by the Joint Terminal Program Office. Related PEs are: PE 0303603F, Milstar; PE 0303601F, Air Force Satellite Communications; PE 0303142A, Army Extremely High Frequency Communications Terminal; and UFO PE 0303109.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Ship* (3210)	92,823	68,694	59,674	28,647	28,995	13,644	11,443	CONT.	CONT.
• (U) OPN Shore* (3220)	2,579	19,276	6,177	7,455	4,886	934	9,294	CONT.	CONT.
• (U) O&M,N	5,867	5,328	5,183	6,480	10,019	10.768	11,514	CONT.	CONT.

* Include EHF terminal installation costs.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303109N
PROGRAM ELEMENT TITLE: Satellite Communications
PROJECT NUMBER: X0728
BUDGET ACTIVITY: 7
DATE: 7 February 1994

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

J. (U) TEST AND EVALUATION:

- (U) FY 1994 PLAN:
  - (U) Conduct Initial Follow-On DTIIIA.
  - (U) Perform Terminal Follow-on Operational Test and Evaluation (FOT&E)
- (U) FY 1995 PLAN:
  - (U) Perform UFO On-orbit testing
  - (U) Perform tri-service interoperability testing
  - (U) Conduct NECC Operational Testing
- (U) FY 1996 PLAN:
  - (U) Begin Prototype Testing of MDR Units
- (U) FY 1997 PLAN:
  - (U) Conduct formal DT/OT of MDR Units
- (U) FY 1998 PLAN:
  - (U) Continue Interoperability Testing with Milstar II and MDR Terminals
- (U) FY 1999 PLAN:
  - (U) Perform DT/OT of NECC Submarine Application
  - (U) Conduct FOT&E of MDR with Milstar II

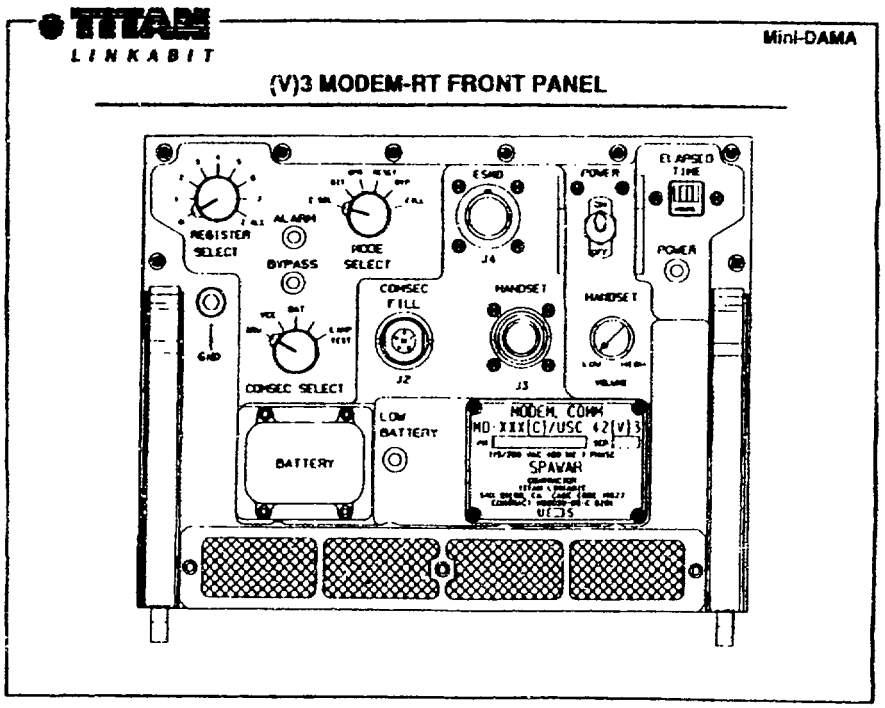
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303109N
PROGRAM ELEMENT TITLE: Satellite Communications

PROJECT NUMBER: X0731
BUDGET ACTIVITY: 7

DATE: 7 February 1994

PROJECT TITLE: Fleet Satellite Communications



POPULAR NAME: SATCOM

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303109N
PROGRAM ELEMENT TITLE: Satellite Communications
PROJECT NUMBER: X0731
BUDGET ACTIVITY: 7
DATE: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	M-D (V)3 MSIIIA 5/94 M-D MSIIIB 9/94 TAC II SSR/SDR 4/93 M-D OT-IIA 12/93 M-D FCA 4/94 M-D FCA 7/94 TAC II PDR 9/94		M-D MS III for (V)3 9/95 Emb. SECVOX PDR/CDR 1Q/95 TAC II CDR 1/95 TAC II FCA 8/95	TAC II Blds 2-4 1/97 TAC II Bld 1 MS IV 12/96	(V)1 IOC 3/97 TAC II Blds 2&3 MS IV 7/97	(V)3 IOC 1Q/98 TAC II Build 4 MS IV 7/98		CONT.
ENGINEERING MILESTONES				TAC II PCA 10/95				CONT.
T&E MILESTONES	DTIID(V)3(TA) M-D 11/93 M-D DTIIB(V)1 4/94 M-D DTIIB(V)1 6/94		DTIIE(V)3 12/94 M-D IIC(V)3 6/95					CONT.
CONTRACT MILESTONES	Embedded SECVOX P3I Dev Opt 7/94			SATSIM 10/95				CONT.

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	14,310	14,888	7,334	8,806	10,180	11,964	2,167	CONT.
SUPPORT CONTRACT	2,368	2,246	1,651	1,865	3,006	1,400	800	CONT.
IN-HOUSE SUPPORT	7,329	11,693	9,299	3,142	3,744	1,364	678	CONT.
GFE/ OTHER	2,207	3,667	3,698	7,358	2,425	200	64	CONT.
TOTAL	26,214	32,494	21,982	21,171	19,355	14,928	3,709	CONT.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303109N
PROGRAM ELEMENT TITLE: Satellite Communications

PROJECT NUMBER: X0731
BUDGET ACTIVITY: 7

DATE: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Fleet Satellite Communications is the principal carrier of Naval communications worldwide for fleet operations. The project supports development of shipboard and shore based equipment operating through six communication satellite systems: Fleet Satellite (FLTSAT) Communications, Leased Satellite (LEASAT) Communication, Defense Satellite Communication System (DSCS), Ultra High Frequency Follow-On Program (UFO), NATO Allied, and Air Force Satellite Communications (AFSATCOM). The principal mission is to provide global, continuous, secure communications among U.S. and Allied Forces via Ultra High Frequency (UHF) satellites and to provide secure and anti-jam communications between joint command centers and fleet commanders using DSCS satellites, and Extremely High Frequency (EHF) capable satellites. A secondary mission is to provide rapid transfer of administrative and logistics messages over commercial and military satellites.

(U) Specifically the efforts of this program develop UHF and Super High Frequency (SHF) communications systems, network controllers, time division multiplexers, and develop tactical applications. The FLTSAT Communication System provides fleet broad service to all Navy ships, Over-the-Horizon Targeting data for TOMAHAWK and Flag configured ships, submarine communications intelligence data and various other battle group and joint task force communications services.

(U) Tactical Data Information Exchange Subsystem (TADIXS) serves as the primary shore-to-ship communication link for providing over-the-horizon targeting data to TOMAHAWK missile equipped ships and Ocean Surveillance Products. TADIXS Phase IV provides world-wide connectivity and interoperability through gateways at major Naval communications Stations.

(U) The Miniature Demand Assigned Multiple Access (Mini-DAMA (M-D) AN/USC-42 (V)) system will provide a similar satellite channel utilization efficiency for aircraft and submarines that are now enjoyed by surfaces ships and shore station equipped with the larger TD-1271 DAMA Multiplexer. M-D, however, provides greater capacity (8 half duplex networks) vice four provided by TD-1271s. M-D will also embed many encryption and data transfer functions which currently require separate equipment. M-D is being developed in two variants; the (V)1 is the submarine ship/shore application, and the (V)3 is the airborne version.

(U) Closely aligned with the fielding of M-D is the conversion of DAMA operations from the Distributed Control (DC) mode to the Automatic (AUTO-DAMA) mode. AUTO-DAMA will provide for dynamic assignment of DAMA slots and will result in a fourfold increase in satellite channel utilization efficiency. Semi-Automatic (SAC) mode is a stepping stone in this process and will provide a two-fold increase; controllers for SAC will be in place FY 93/94. Development and testing of SAC/Auto-DAMA controllers will continue over the FYDP.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303109N
PROGRAM ELEMENT TITLE: Satellite Communications
PROJECT NUMBER: X0731
BUDGET ACTIVITY: 7
DATE: 7 February 1994

(U) Officer in Tactical Command Information Exchange Subsystem (OTCIXS) Phase II software will be developed to provided OTCIXS Battle Group command and control data on a DAMA channel on the satellite. Sending OTCIXS data on DAMA frees valuable satellite channels for other fleet operational use.

(U) The Tactical Intelligence Information Exchange Subsystem Phase II (TACINTEL II) implements the Integrated Special Intelligence Communications (INSICOM) portion of the Copernicus architecture to provide services for transfer of Special Intelligence (SI) information between ships, aircraft, and shore activities in support of joint and combined operations. TACINTEL II will enable real time indications and warning support to joint and component commanders through reliable high speed transfer of sensor data and intelligence information. Enhanced interoperability with other services, agencies, and allies will permit a level of integration of SI operations not achievable with current systems.

(U) The SHF terminals operate within the DSCS. SHF provides high capacity Anti-Jam/Low Probability of Intercept (AJ/LPI) communications for principle Navy ship types and provides Navy connectivity to Allied and Joint Force Command Networks via the DSCS. The Universal Modem is a joint U.S./U.K. development to provide U.S. force and Allied interoperability for command and control networks.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,531) Commenced Development Testing (DT-II) for M-D AN/USC-42(V)1 and DT-III(V)3.
- (U) ($8,514) Commenced delivery of M-D AN/USC-42 (V)1 and (V)3 Pre-production Units and Engineering Development Models.
- (U) ($5,949) Commenced M-D V(3) integration on the P-3 ASUW, and E-2C and EP-3E aircraft.
- (U) ($4,421) Performed Development Engineering Analysis and Management for M-D.
- (U) ($2,197) Completed TACINTEL II Software Requirements Review.
- (U) ($1,821) Completed TACINTEL II Software Design Review.
- (U) ($750) Conducted TACINTEL II operational demonstration of interim capabilities.
- (U) ($281) Procured and installed Engineering Development Models (EDM) for TACINTEL Link Control Facilities.
- (U) ($750) Continued SHF demonstration.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303109N
PROGRAM ELEMENT TITLE: Satellite Communications
PROJECT NUMBER: X0731
BUDGET ACTIVITY: 7
DATE: 7 February 1994

2. (U) FY 1994 PLAN:

- (U) ($300) Conduct Technical Assessment (DT IID) of M-D (V)3.
- (U) ($705) Conduct Operational Assessment (OTIIA) of M-D (V)3.
- (U) ($385) Obtain MS IIIA decision approval for M-D (V)3.
- (U) ($650) Conduct M-D DT IIB Techeval for M-D (V)3.
- (U) ($1,404) Conduct M-D Operational Testing (OT) IIB for M-D (V)1.
- (U) ($791) Obtain Milestone IIID AFD decision approval for M-D (V)1.
- (U) ($2,694) Complete M-D (V)3 integration on the P-3 ASUW and E-2C aircraft.
- (U) ($5,373) Commence development of the M-D SECVOX/KG84.
- (U) ($5,710) Complete M-D AN/USC-42(V)1 and 3 EDM deliveries.
- (U) ($3,060) Perform Development Engineering Analysis and Management for M-D, e.g., TRR, FCA, and PCA.
- (U) ($5,137) Conduct TACINTEL II Preliminary Design Review.
- (U) ($4,175) Conduct TACINTEL II Critical Design Review.
- (U) ($1,191) Purchase six TACINTEL II Build 1 Suites to support OPEVAL in 1995.
- (U) ($629) Provide Engineering & Tech Support Services for TACINTEL II.
- (U) ($290) Continue EHF demonstration.

3. (U) FY 1995 PLAN:

- (U) ($5,584) Continue development of M-D SECVOX/KG84.
- (U) ($902) Conduct M-D DTIIE (TECHEVAL).
- (U) ($736) Conduct M-D (V)3 OPEVAL.
- (U) ($684) Obtain M-D (V)3 MS III AFP production decision approval.
- (U) ($3,157) Perform Development Engineering Analysis and Management for M-D.
- (U) ($3,705) Conduct Functional Configuration Audit (FCA) for TACINTEL II Software Build.
- (U) ($3,106) Conduct Physical Configuration Audit (PCA) for TACINTEL II Software Build.
- (U) ($695) Commence TECHEVAL of TACINTEL II.
- (U) ($450) Commence OPEVAL of TACINTEL II.
- (U) ($1,605) Begin development of INTELNET, Multiple User Special Intelligence Common (MUSIC) II and INTELDATA.
- (U) ($450) Provide Engineering and Tech Support Services for TACINTEL II.
- (U) ($908) Continue SHF demonstration.

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

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303109N
PROGRAM ELEMENT TITLE: Satellite Communications
PROJECT NUMBER: X0731
BUDGET ACTIVITY: 7
DATE: 7 February 1994

D. (U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDT&E DIVISION, San Diego, CA; NAVELEXGACT, St. Indigoes, MD; NAVELEXCEN, Vallejo, CA; NAVELEXCEN, Charleston, SC; NAVUNSEAWARCEN DET, New London, CT. CONTRACTORS: Booz, Allen & Hamilton, Inc., Bethesda, MD; Advanced Corporation, Falls Church, VA; Advanced Communications Systems, Inc., Arlington, VA; Scientific Research Corp., Atlanta, GA; Klein & Stump, Inc., Arlington, VA; Advanced Digital Systems, Inc., San Diego, CA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

OR H-C123-75 (DAMA)	1/75
OR 184-094-89 (TACINTEL II)	8/87
TEMP 252-8 (OTCIXS)	
OR 174-094-87 (M-D)	8/87
TEMP 252-10 (M-D)	12/88
TEMP 252-10 Rev 1 (M-D)	12/93

G. (U) RELATED ACTIVITIES:

- (U) M-D, the Navy DAMA Program; EMUT (PE# 0303142A, Title: Satellite Communications Ground Environment), the Army Program also building interoperable DAMA terminals.

- (U) Operational Intelligence Processor (OPINTEL) upgrade (NSA) (PE# NSA 0301055, Title: Project Embroidery), High Speed Fleet Broadcast (Navy) (PE# 0204163N, Title: Communications Automation), and Navy EHF Satellite Program (Navy) are providing building blocks that complete the INSICOM architecture when combined with TACINTEL II developments.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303109N
PROGRAM ELEMENT TITLE: Satellite Communications

PROJECT NUMBER: X0731
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN SHIP* 3210	50,058	18,779	71,689	48,836	48,145	55,718	61,097	CONT.	CONT.
• (U) OPN SHORE* 3220	18.755	6,405	2,886	4,035	3,953	5,413	3,396	CONT.	CONT.

* Includes installation costs.

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

J. (U) TEST AND EVALUATION: Initiated development testing FY 1993 for M-D.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303140N
PROGRAM ELEMENT TITLE: Information Systems Security Plan
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0734 Communications Security R&D*	11,742	16,356	16,495	17,193	16,463	16,270	16,063	CONT.	CONT.
X0911 Computer Security**	2,929	4,780	4,215	7,111	7,278	8,097	8,040	CONT.	CONT.
TOTAL	14,671	21,136	20,710	24,304	23,741	24,367	24,103	CONT.	CONT.

* FY92.93 previously funded under PE 0303401N
**FY92/93 previously funded under PE 0604574N

B. (U) BRIEF DESCRIPTION OF ELEMENT:

(U) The goal of the Navy Information Systems Security INFOSEC) Program is to ensure the continued protection of Navy and Joint communications and computing systems from hostile exploitation. With the advent of the information age, the network environment and the proliferation of distributed systems, the Navy is making profound changes in the way it has traditionally approached communications and computer security. The development of complex systems, the networking of systems and rapid technological advances, which have virtually eliminated the traditional distinctions between telecommunications and information systems have mandated a system-oriented approach to security. The RDT&E program accomplishes this by: developing a technical strategy and framework to guide and integrate Navy efforts with DOD and NSA efforts; evaluating and tailoring standards, processes and tools for Navy application, assessing available technology and products, developing missing technology and integrating both into prototype products and systems; providing Information Security (INFOSEC) expertise and engineering/certification support to Department of the Navy (DON) development programs; developing standard INFOSEC products and systems to meet DON and, by agreement, Joint requirements. Because INFOSEC is a cradle-to-grave discipline, this program develops the technology and methodology to protect the confidentiality, integrity and availability of systems in development, production and operation. It also develops the infrastructure needed to support and evaluate the security of deployed systems. These same objectives are pursued in both the Communications Security (COMSEC) and Computer Security (COMPUSEC)

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303140N
PROGRAM ELEMENT TITLE: Information Systems Security Plan
BUDGET ACTIVITY: 7

DATE: 7 February 1994

projects, but the focus is different. The COMSEC project focuses on cryptographic technology and its use and impact on secure systems. The COMPUSEC project focuses on the use and impact of trusted computer technology on secure systems. The COMSEC and COMPUSEC projects are becoming more and more integrated and intertwined with the increasing emphasis on software solutions for traditionally COMSEC problems. Thus, the two projects, COMSEC and COMPUSEC are merging into the new unified INFOSEC discipline.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303140N
PROGRAM ELEMENT TITLE: Information Systems Security Plan
PROJECT NUMBER: X0734
BUDGET ACTIVITY: 7
Date: 7 February 1994

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0734 Communications Security R&D*	11,742	16,356	16,495	17,193	16,463	16,270	16,063	CONT.	CONT.

* FY92/93 previously funded under PE 0303401N

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Communications Security (COMSEC) project analyzes existing COMSEC equipments and develops improved, interoperable communications security equipment and methods to protect classified communications from exploitation. The project is a continuing effort to modernize obsolete cryptographic equipment and ancillaries with state-of-the-art replacements in order to meet the evolving threat. Replacement COMSEC, in most cases, will be implemented using embedded modules (using National Security Agency (NSA) approved crypto engines). The technical strategy and framework efforts are focused on the use of COMSEC technology to counter a wide variety of Information Security (INFOSEC) threats in a Navy environment. Processes and tools are being developed and tested to design and evaluate the security of systems that integrate COMSEC products. Technology base efforts are developing new secure voice prototypes, developing technology for a new family of programmable COMSEC modules (Programmable Embeddable INFOSEC Product (PEIP)) and assessing a variety of potentially high pay-off NSA and industry projects. The resulting expertise is applied to a wide variety of Navy development programs that must integrate COMSEC technology. The expertise is also applied to the development of Navy INFOSEC products and systems. Under the Navy Key Distribution System (NKDS) program, the Navy COMSEC program will revolutionize the Navy's COMSEC Material Control System. The overall objectives of NKDS are to: (1) increase security for all on-line and off-line crypto systems and (2) eliminate most of the manual custodian workload. The NKDS program provides for the electronic distribution of cryptographic keying material and includes the development of the NKDS and supporting efforts for benign key fill with the eventual goal of end-to-end encrypted key to eliminate the Walker-Whitworth type insider threat. The NKDS Program will satisfy the Joint Key Management System (JKMS) Requirements. Another specific product under development is the Embeddable INFOSEC Product (EIP), designed to meet the COMSEC requirements for several Navy programs implementing the Copernicus architecture.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: (Funded under PE 0303401N)

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303140N PROJECT NUMBER: X0734 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Information Systems Security Plan BUDGET ACTIVITY: 7

- (U) ($110) Developed draft INFOSEC Universe Description Report (IUDR) and INFOSEC Master Plan (IMP).
- (U) ($102) Developed templates for Security Concept of Operations (CONOPS) and Security Policy.
- (U) ($658) Investigated available tools for application to design and certification of DON systems.
- (U) ($1,150) Secure Voice (SV) consortium: developed new test approaches and prototype of new narrowband multimedia terminal. Initiated benign keying research for PEIP and continued TEMPEST analysis/research and development of TEMPEST receiver.
- (U) ($200) Conducted development and system test of External COMSEC Adapter (ECA) for the Copernicus Tactical Data Information Transfer System (TADIXS) test bed.
- (U) ($1,029) Provided systems security engineering, certification and accreditation support to Navy information system programs including: Multifunctional Information Distribution System (MIDS), Miniature Demand Assigned Multiple Access (Mini-DAMA), Cooperative Engagement Capability (CEC), Tactical Intelligence Network (TACINTEL) II+, and Navy EHF Communications Controller (NECC).
- (U) ($7,354) Continued development and test of Navy implementation of joint Key Management System (KMS) including Preliminary Design Review (PDR) and Critical Design Review for NKDS Phase I.
- (U) ($1,139) Began Engineering and Manufacturing Development (E&MD) for EIP using the COMSEC/Transmission Security (TRANSEC) Integrated Circuit (CTIC) DS-101 Hybrid (CDH) chip.

2. (U) FY 1994 PLAN:

- (U) ($1,005) Complete IUDR and INFOSEC Master Plan. Develop DON INFOSEC framework to include DOD guidance. Develop shipboard secure voice architecture plan for Secure Voice Telephone (STU) III replacement. Tailor INFOSEC threat information relevant to Navy systems.
- (U) ($306) Define near-term (secure voice and data) INFOSEC products and required ancillaries.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303140N
PROGRAM ELEMENT TITLE: Information Systems Security Plan
PROJECT NUMBER: X0734
BUDGET ACTIVITY: 7
Date: 7 February 1994

- (U) ($1,150) Continue to develop INFOSEC engineering templates. Apply chosen certification and accreditation (C&A) tool to shipboard Local Area Network (LAN) problems. Develop/choose risk assessment tools. Tailor penetration tool to support Navy evaluations. Apply RDD-100 tool to PEIP requirements analysis.

- (U) ($1,577) Secure Voice consortium support: Evaluate secure voice for use as biometric access technique. Evaluate technology (NSA and industry) for application to PEIP. Demonstrate prototype voice terminals in Fleet environment. Continue TEMPEST analysis/research.

- (U) ($1,804) Provide systems security engineering, certification, and accreditation support to Navy information system programs including: MIDS, Mini-DAMA, CEC, TACINTEL II+, NECC, Submarine Low Frequency (LF)/Very Low Frequency (VLF) Versa Module Eurocard (VME) Receiver (SLVR), Next Generation Satellite Terminal (NGST), and SSQ-33 program.

- (U) ($8,039) Continue development and test of Navy implementation of joint KMS, including fielding of NKDS Phase I and award of NKDS Phase II contract.

- (U) ($2,475) Continue development of Embeddable INFOSEC Product (EIP).

3. (U) FY 1995 PLAN:

- (U) ($692) Refine IUDR and INFOSEC Master Plans to reflect latest operational requirements, new technology and threat information. Evaluate overall DON INFOSEC risks against programs. Refine technical strategy.

- (U) ($474) Investigate DOD and industry sources for new (secure voice and data) INFOSEC products. Develop procurement information to support acquisition.

- (U) ($737) Refine INFOSEC engineering templates using lessons learned from their application. Evaluate success of certification and risk assessment tools. Publish lessons learned and guides.

- (U) ($2,102) Continue to support secure voice and biometric access consortiums. Evaluate latest NSA and industry COMSEC technology for application to DON systems. Develop and demonstrate prototype INFOSEC products in both laboratory and operational environments. Analyze optical technology in TEMPEST role.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303140N
PROGRAM ELEMENT TITLE: Information Systems Security Plan
PROJECT NUMBER: X0734
BUDGET ACTIVITY: 7
Date: 7 February 1994

- (U) ($4,031) Provide systems security engineering, certification and accreditation support to Navy information system programs including: MIDS, Mini-DAMA, CEC, NECC, SLVR, NGST, and SSQ-33 program.
- (U) ($5,659) Continue development and test of Navy implementation of joint KMS, including joint Common Tier I and NKDS Phase II.
- (U) ($2,124) Continue EIP development effort.
- (U) ($676) Develop PEIP acquisition package. Investigate joint applications.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NAVELEXSECCEN, Washington, DC; NCCOSC RDT&E Div, San Diego, CA; and NAVELEXCEN, Portsmouth, VA. CONTRACTORS: Science Applications International Corporation (SAIC), San Diego, CA; ViaSat, Carlsbad, CA; Booz Allen & Hamilton, McLean, VA

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

(U) OR #14409486 Operational Requirement for NKDS 3/87
(U) Program Change Approval Document PCAD) for the NKDS 7/89
(U) TEMP #0511-01 for NKDS 2/90
(U) PCAD for the NKDS (Change 2) 8/91
(U) Information Security Resources Plan 4/90

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303140N
PROGRAM ELEMENT TITLE: Information Systems Security Plan
PROJECT NUMBER: X0734
BUDGET ACTIVITY: 7
Date: 7 February 1994

G. (U) RELATED ACTIVITIES:

- (U) PE 0303140G, Cryptographic Equipments. NSA TEMPEST Program equipment and techniques used in the Navy's COMSEC Program.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN 3410	69,305	29,866	12,917	16,306	20,015	20,805	21,345	CONT.	CONT.
• (U) OPN 3412	30,402	5,569	13,213	17,182	16,344	16,512	20,433	CONT.	CONT.
• (U) OPN 3486	9,354	13,092	15,292	16,513	18,529	17,574	31,199	CONT.	CONT.
• (U) OPN 3492	422	162	3	0	0	0	0	0	4,706
• (U) OPN 3493	2,369	2,500	2,850	2,594	2,692	2,743	3,152	CONT.	CONT.
• (U) O&MN 4A6M	27,757	19,006	17,320	16,847	20,146	18,670	17,484	CONT.	CONT.

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

J. (U) MILESTONE SCHEDULE:

	DT	OT	M/S III
NKDS	2Q/94	3Q/94	3Q/94 (LRIP)
EIP	2Q/95	*	4Q/95 (LRIP)

*As part of the host systems

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303140N
PROGRAM ELEMENT TITLE: Information Systems Security Plan
PROJECT NUMBER: X0911
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X0911 Computer Security - The Computer Security (COMPUSEC) project is driven by the dependence of Department of the Navy (DON) systems on computer technology and the dependence of their security on the assurance that the computer technology is protected from malicious threats. Accordingly, the project is focused on the integration of computer processes into DON systems and their impact on systems security. The objectives are to: develop technical strategies and a framework to counter threats and reduce risk; introduce standards, processes and tools to leverage available technology; evaluate other source technology, develop missing technology (e.g., Multi-level Security (MLS) and certification methods) and prototype systems that integrate these technologies; use the resulting expertise to support the design and certification of DON systems using COMPUSEC technology; and develop reusable COMPUSEC products for DOD and joint application.

(U) FY 1993 ACCOMPLISHMENTS: (Funded under PE 0604574N)

- (U) ($700) Performed laboratory assessment and demonstration of various trusted products and investigation of trusted system composability issues.
- (U) ($1,282) Performed laboratory investigation of Information Security (INFOSEC) technology applications to Navy information systems.
- (U) ($580) Continued development and partial fielding of an MLS Early Operational Capability (EOC) at the CINPACFLT Command and Control Center.
- (U) ($160) Performed network security engineering and technical analysis.
- (U) ($207) Continued development of a DON INFOSEC architecture.

(U) FY 1994 PLAN:

- (U) ($675) Resolve DON COMPUSEC architecture issues within the Defense Information Infrastructure (DII) MLS framework. Analyze approaches to evaluate DON INFOSEC during exercise and wargame scenarios. Analyze approaches for maintaining assurance of evolving software products. Develop INFOSEC requirements analysis software.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303140N | PROJECT NUMBER: X0911 | DATE: 7 February 1994
PROGRAM ELEMENT TITLE: Information Systems Security Plan | BUDGET ACTIVITY: 7

- (U) ($260) Develop and demonstrate the application of an INFOSEC certification methodology and associated tools. Compile applicable INFOSEC standards, tailored for DON.
- (U) ($988) Investigate and develop methods for secure processing of electronic mail and message traffic. Resolve composability issues.
- (U) ($1,907) Perform laboratory assessments of trusted products and prototype systems. Begin development of a Navy trusted software support capability to support existing and future INFOSEC programs/applications.
- (U) ($950) Perform INFOSEC systems engineering and technical support for Navy information systems and networks under development.

(U) FY 1995 PLAN:

- (U) ($475) Continue to refine and compile DON INFOSEC architecture(s) within the DII MLS framework.
- (U) ($300) Refine and demonstrate the application of an INFOSEC certification methodology/tools to an expanding range of DON systems. Continue to compile INFOSEC standards and processes into easily used guides.
- (U) ($750) Continue development and begin demonstrations of methods for secure processing of electronic mail and message traffic.
- (U) ($950) Perform laboratory assessments and demonstrations of trusted products and prototype systems. Continue development of a Navy trusted software support capability.
- (U) ($1,740) Perform INFOSEC systems engineering and technical support for Navy information systems and networks under development.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NCCOSC RDT&E Div, San Diego, CA. CONTRACTORS: MITRE Corp., Bedford, MA/McLean, VA; Booz Allen & Hamilton, McLean, VA.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0303 40N
PROGRAM ELEMENT TITLE: Information Systems Security Plan

PROJECT NUMBER: X0911
BUDGET ACTIVITY: 7

DATE: 7 February 1994

(U) RELATED ACTIVITIES:

- (U) PE 0301567G - Consolidated Computer Security Program
- (U) PE 0602301E - Strategic Technology
- (U) PE 0603794N - C3 Advanced Technology

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0305160N
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite Program
BUDGET ACTIVITY: 7

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0524 DMSP - Navy Support	840	633	834	902	958	16,137	22,463	CONT.	CONT.
X1452 GEOSAT	15,507	10,738	13,805	9,692	9,758	11,541	20,127	150,000	252,385
TOTAL	16,347	11,371	14,639	10,594	10,716	27,678	42,590	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Program Element (PE) includes two projects - the DMSP Navy Support project and the Geodetic/Geophysical Satellite (GEOSAT) project. The Defense Meteorological Satellite Program (DMSP) is a Joint Service use program which supports sensor and satellite engineering and technology. The DMSP Navy Support project provides for Navy participation in current DMSP and future environmental satellite programs. The GEOSAT satellite provided ocean topography information from 1985 until it failed in January 1990. In FY 1991, the Navy began the development of a follow-on capability to continue providing this required ocean topography information via the GEOSAT follow-on (GFO) project.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0305160N
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite Program
PROJECT NUMBER: X0524
BUDGET ACTIVITY: 7
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X0524 DMSP - Navy Support. This project provides Navy participation in the current DMSP and future environmental satellite programs. The project also acquires the information necessary to keep Navy ground receiving equipment compatible with future satellite data formats and data transfer rates. The project also provides for Navy participation as a voting member of the DMSP Configuration Control Board (CCB).

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($150) Continued to assess Navy DMSP 5D-3/future environmental satellite Command, Control and Communications (C3) impacts.
- (U) ($195) Monitored sensor development efforts.
- (U) ($145) Continued participation on the DMSP CCB.
- (U) ($350) Continued to assess solutions to Navy-unique sensor requirements to arrive at the most effective solution.

(U) FY 1994 PLAN:

- (U) ($78) Continue to assess Navy DMSP 5D-3/future environmental satellite C3 impacts.
- (U) ($195) Continue to monitor sensor development efforts.
- (U) ($110) Continue participation on the DMSP CCB and monitor proposed technical changes and assess impacts.
- (U) ($250) Continue to assess recommended solutions to Navy-unique sensor requirements.

(U) FY 1995 PLAN:

- (U) ($100) Continue to assess Navy DMSP 5D-3/future environmental satellite C3 impacts.
- (U) ($128) Begin to develop Navy DMSP C3 architecture.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0305160N
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite Program
PROJECT NUMBER: X0524
BUDGET ACTIVITY: 7
DATE: 7 February 1994

- (U) ($195) Continue to monitor sensor development efforts.
- (U) ($256) Continue to assess recommended solutions to Navy-unique sensor requirements.
- (U) ($155) Continue participation on the DMSP CCB and monitor proposed technical changes and assess impacts.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NRAD, Los Angeles, CA. CONTRACTORS: Hughes, Los Angeles, CA; Harris, Melbourne, FL; Aerojet, Azusa, CA; Lockheed, Sunnyvale, CA; Martin Marietta, Princeton, NJ; Westinghouse, Baltimore, MD; Aerospace Corp, Los Angeles, CA.

(U) RELATED ACTIVITIES:

- (U) PE 0305160F, Air Force DMSP - provides AF program management for DMSP; PE 0604218N, Air/Ocean Equipment Engineering - AN/SMQ-11 satellite receiver/recorder system engineering to receive data from DMSP onboard selected ships and shore sites.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0305160N PROJECT NUMBER: X1452 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite Program BUDGET ACTIVITY: 7

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X1452 GEOSAT. This project provides a satellite-borne radar altimeter sensor to obtain ocean topography measurements from which tactically significant features such as ocean fronts, eddies, and sea-ice edges are derived. Topography provides a unique and important data source in support of a number of Naval warfare areas such as anti-submarine and undersea warfare, as well as providing other agencies such as NOAA and NASA with valuable inputs to studies involving global warming and climate change. The data was previously provided by GEOSAT from 1985 until that satellite failed in January 1990. The GEOSAT Follow-On (GFO) satellite is intended to provide interim altimetry data until altimetry data becomes available on a future environmental satellite.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($462) Completed Preliminary Design Review of GFO.
- (U) ($14,265) Continued GFO satellite development.
- (U) ($780) Began radar altimeter sensor development.

(U) FY 1994 PLAN:

- (U) ($724) Complete Critical Design Review of GFO.
- (U) ($8,464) Continue GFO satellite development.
- (U) ($1,400) Continue radar altimeter sensor development.
- (U) ($150) Initiate the development of launch vehicle interfaces.

(U) FY 1995 PLAN:

- (U) ($9,613) Continue GFO satellite development.
- (U) ($4,042) Continue radar altimeter sensor development.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0305160N
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite Program
PROJECT NUMBER: X1452
BUDGET ACTIVITY: 7
DATE: 7 February 1994

- (U) ($150) Continue development of launch vehicle interfaces.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC. CONTRACTORS: APL/JHU, Laurel, MD.; Ball Space Systems, Boulder, CO.; E-Systems, St. Petersburg, FL.; AIL, Deer Park, NY.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) Non-Acquisition Program Definition Document #217-094 dated 5 JUN 90.
- (U) Operational Requirement #217-094-92 dated 18 OCT 90.

G (U) RELATED ACTIVITIES:

- (U) PE 0604218N, Air/Ocean Equipment Engineering -AN/SMQ-11 satellite receiver/recorder system engineering to receive altimetry from GFO.

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

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

J. (U) MILESTONE SCHEDULE:

Begin GFO satellite development	08/92
Complete Preliminary Design Review	07/93
Complete Critical Design Review	05/94

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0601152N
PROGRAM ELEMENT TITLE: In-house Laboratory Independent Research

DATE: 7 February 1994
BUDGET ACTIVITY: 1

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
ONR THRUSTS:									
OCEAN SCI.	1,014	1,029	588	571	587	602	620	CONT.	CONT.
ADV. MATLS.	1,791	1,816	1,906	1,850	1,900	1,952	2,010	CONT.	CONT.
INFO. SCI.	1,088	1,104	1,178	1,143	1,174	1,206	1,242	CONT.	CONT.
SUST. PROG.	12,853	13,022	13,440	13,047	13,399	13,760	14,172	CONT.	CONT.
TOTAL	16,746	16,971	17,112	16,611	17,060	17,520	18,044	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program supports the missions of the Naval Warfare Centers with high-risk/high-payoff research, responding as shown below to the Department of the Navy (DON) Joint Mission Areas/Support Areas (JMA/SA) and enabling the technologies that could significantly improve Joint Chiefs of Staff's Future Joint Warfighting Capabilities. The research addresses fundamental questions regarding existing and anticipated naval systems, and is supported within the Office of Naval Research (ONR) thrusts in Ocean Sciences, Advanced Materials, Information Sciences, and its Sustaining Program. This program reflects the integration of efforts both within Warfare Centers and among other research performers. Research efforts are proposed by the Warfare Centers, approved by ONR, and reviewed for the quality of science produced and for relevance to the naval mission.

C. (U) JUSTIFICATION FOR PROJECTS: Justification is described in terms of fundamental research that responds to the JMA requirements, followed by current accomplishments and plans.

(U) This program responds to the Joint Littoral JMA through ocean sciences research into the variability of the marine environment, such as acoustic shallow water models that incorporate wave-breaking sources, allowing superior signal processing in shallow water environments. Research advancing fundamental understanding of DON-essential materials and processes responds to operational capability requirements in the Strategic Sealift JMA, such as the recent development of an aluminum based metal matrix high temperature superconducting material that can be extruded into wires for

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0601152N
PROGRAM ELEMENT TITLE: In-house Laboratory Independent Research

DATE: 7 February 1994
BUDGET ACTIVITY: 1

significantly improved naval electrical power systems. The program responds to the Joint Surveillance JMA through thrusts in information sciences that address naval relevant computing applications including software engineering, high performance computing, artificial intelligence, and the use of computers in manufacturing. For example, the development of an advanced signal processing technique for the analysis of real Anti-Submarine Warfare (ASW) broadband acoustic data provides detection performance which exceeds the conventional energy detector in high noise ASW applications. Research in other areas supports requirements of the Readiness JMA, such as discovering redox chemicals for use in "smart" coatings which alter color when degraded and serve as early warning systems for corrosion of naval systems.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) (1,014) Ocean Sciences responded to the Joint Littoral JMA through quantifying, in a physical acoustic theory and model, the role of near-surface microbubble layers, plumes, and clouds in both the scattering and production of sound. The results will improve ability of the Fleet to handle acoustic signal processing as affected by ocean surface events.

- (U) (1,791) Advanced Materials responded to the Strategic Sealift JMA with a substantial improvement in the oxidation resistance of diamond samples coated with silicon nitride, aluminum oxide or boron nitride. Oxidation resistant coatings on diamond windows can extend flight capabilities of high-speed missiles.

- (U) (1,088) Information Sciences responded to the Joint Surveillance JMA with a demonstration of the spontaneous formation of an oriented film of high-polarization ferroelectric liquid crystal molecules on graphite. This technology is necessary for the development of molecular electronic devices that may achieve greater computational power with substantial savings in power consumption over present silicon-based devices.

- (U) (12,853) Sustaining Programs responded to the Joint Surveillance JMA by developing nonlinear optical polymers with the highest thermal stability yet reported. The results form a major step in the development of high-speed optical switches and modulators to be used in future commercial and Navy communications and avionics signal-processing devices.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0601152N
PROGRAM ELEMENT TITLE: In-house Laboratory Independent Research

DATE: 7 February 1994
BUDGET ACTIVITY: 1

(U) FY 1994 PLAN:

- (U) (1,029) Ocean Sciences respond to the Joint Surveillance JMA by investigating three-dimensional sound propagation models to calculate how the incident sound field radiating from a target is modified by nearby bottom bathymetry in shallow water regions.

- (U) (1,816) Advanced Materials respond to the Strategic Sealift/Protection JMA by determining acoustic properties of polymers for stealth applications, and researching electro-magnetic properties of materials to reduce ship signatures.

- (U) (1,104) Information Sciences respond to the Joint Strike JMA through developing spatio-temporal image processing algorithms to track airborne targets in real time, and performing studies of neural and algorithmic networks.

- (U) (13,022) Sustaining Programs respond to the Joint Surveillance JMA by analyzing nonlinear dynamics and fractals with a view toward control of nonlinear systems, and by studying parameters of ship signatures for reduced signature design.

(U) FY 1995 PLAN:

- (U) (588) Ocean Sciences will respond to the Joint Littoral JMA by examining shallow water effects on high frequency sonar systems.

- (U) (1,906) Advanced Materials will respond to the Strategic Sealift/Protection JMA by investigating grain size and particle concentration in metals to gain understanding of the microstructural influences on flow and fracture, leading to improved models for predicting material response to impact and explosive attack; and by continuing work in property enhancement for advanced structural composites to improve damage tolerance.

- (U) (1,178) Information Sciences will respond to the Joint Surveillance JMA by investigating neural network wavelet processing for ASW, and developing nanotechnology for molecular computing resulting in electronic devices with greater computational power.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0601152N
PROGRAM ELEMENT TITLE: In-house Laboratory Independent Research

DATE: 7 February 1994
BUDGET ACTIVITY: 1

- (U) (13,440) Sustaining Programs will respond to the Joint Surveillance JMA through work to create thermally stable, active optical wave-guiding materials, such as nonlinear optical polymers for use in the development of high-speed optical switches and modulators to be used in future communications and avionics signal processing devices; and through the development of scattering theory for detection and classification of submerged objects such as mines.

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

(U) WORK PERFORMED BY: IN-HOUSE: NCCOSC, San Diego, CA; NAVUNSEAWARCENDIV, Newport, RI; NAVSURFWARCENDIV, Dahlgren, VA; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NAVAIRWARCENACDIV, Patuxent River, MD; NAVAIRWARCENWPNDIV, China Lake, CA; NAVTRASYSCEN, Orlando, FL; NAVPERSRANDCEN, San Diego, CA; and NAVCIVENGRLAB, Port Hueneme, CA. CONTRACTORS: None.

(U) RELATED ACTIVITIES:

- PE 0601153N (Defense Research Sciences)
- PE 0602111N (Surface/Aerospace Surveillance & Weapons Technology)
- PE 0602234N (Materials, Electronics & Computer Technology)
- PE 0602314N (Undersea Surveillance & Weapons Technology)

This program adheres to Tri-Service Reliance Agreements on Basic Research, and oversight is provided by 6.1 cooperation among ONR, Air Force Office of Scientific Research, and Army Research Office. Work in this PE is related to and fully coordinated with efforts in PE's 0601101A and 0601101F, In-house Laboratory Independent Research, in accordance with the ongoing Reliance joint planning process and contains no unwarranted duplication among the Military Departments.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0601153N
PROGRAM ELEMENT TITLE: Defense Research Sciences

DATE: 7 February 1994
BUDGET ACTIVITY: 1

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
ONR THRUSTS:									
OCEAN SCI.	129,082	127,632	135,700	138,414	141,182	144,006	146,886	CONT.	CONT.
ADV. MATLS.	42,322	48,158	54,084	56,247	58,497	60,837	63,270	CONT.	CONT.
INFO. SCI.	34,478	35,160	38,266	39,797	41,389	43,045	44,767	CONT.	CONT.
SUSTAIN PGM.	202,953	184,799	179,921	174,573	179,624	184,328	189,32[illegible]	CONT.	CONT.
TOTAL	408,835	395,749	407,971	409,031	420,692	432,216	444,252	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program sustains U.S. naval scientific and technological superiority, provides new concepts and technological options for the maintenance of naval power and national security, and provides the means to avoid scientific surprise, while exploiting scientific breakthroughs. The program responds as noted below to the science and technology (S&T) requirements from the Department of the Navy (DON) Joint Mission Areas/Support Areas (JMA/SA) and enables the technologies that could significantly improve Joint Chiefs of Staff's Future Joint Warfighting Capabilities. It also seeks to exploit new science opportunities relevant to long term naval requirements. The Office of Naval Research (ONR) responds to requirements through major research thrusts in Ocean Sciences, Advanced Materials, Information Sciences, and the Sustaining Program. These efforts are part of an integrated DON S&T process, initiated by ONR in 1993.

C. (U) JUSTIFICATION FOR PROJECTS: Program justification is described in terms of fundamental research related to the JMA requirements, followed by current accomplishments and plans.

(U) This program responds to the Joint Strike JMA through research leading to better structural materials to increase platform survivability; automated target recognition algorithms to improve identification of friend or foe, and to help improve real-time targeting under camouflage conditions; and physics and chemistry foundations for improved multispectral, all-weather sensors and electronics. Responses to the Joint Littoral JMA, which covers forward

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0601153N
PROGRAM ELEMENT TITLE: Defense Research Sciences

DATE: 7 February 1994
BUDGET ACTIVITY: 1

operations in high-threat coastal regions, involve knowledge of near-shore ocean and atmospheric circulation and optical transmission to improve mine detection and removal, special operations capabilities and submarine detection; novel structural materials for better ship damage tolerance; data fusion research to integrate environmental prediction products into Command, Control, Communications, Computers and Intelligence (C4I) systems; and new concepts in batteries and propellants for improved torpedo performance. The program responds to requirements in the Joint Surveillance JMA with research into advanced materials for improved sensors and electronics; and better signal processing for automated target recognition allowing rapid ship self-defense, and identifying relocatable targets. Requirements of the Joint Space Electronic Warfare (SEW)/Intelligence JMA are matched by research to extend our knowledge of ocean and atmospheric properties, allowing sensors to operate more effectively under varied weather conditions; and by network and data studies to address real-time, all-weather surveillance and targeting, with short revisit times using multiple high capacity data links. Research into improved aerodynamic shapes for high endurance surveillance responds directly to a requirement of the Strategic Deterrence JMA. Research in response to the Readiness and Support JMA includes developing knowledge of acoustic/boundary interactions for improved navigation capabilities in poorly charted areas; exploring longer service life materials for reduced logistics; and investigating chemical and biological processes for clean handling of shipboard waste. Finally, cognitive research leading to more efficient and cost-effective training techniques responds to the Manpower, Personnel and Shore Training SA.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) (129,082) Ocean Sciences responded to the Joint Littoral JMA requirements as follows: transitioned acoustic doppler velocity technology originating in several Small Business Innovation Research programs to a mine countermeasures development program supporting diver activities and tethered vehicle mine neutralization operations; developed coastal ocean models through leveraging international collaboration with New Zealand, Denmark, the European Space Agency, the National Oceanic & Atmospheric Administration and the National Aeronautics and Space Administration; developed aerosol models for radar and infrared propagation predictions through understanding of air-sea energy exchange; and developed real-time modeling of ocean optical propagation for mine counter-measures sensors and satellite submarine communication systems through establishing the relationship between unicellular life-form chlorophyll production and ocean optical properties.

- (U) (42,322) Advanced Materials responded to the Joint Strike JMA requirements as follows: developed precursor techniques for the deposition of solid lubrication films on steels for extended-life bearings for ships and land combat vehicles; transitioned a method for

centrifugally casting metal matrix composites to industry (Wisconsin Centrifugal) with initial product orders for the Lockheed Missile and Space unmanned submersible program; developed high resolution 3-D imaging techniques for finding internal cracks in ship, aircraft and land vehicle metal structures; developed new generation ferroelectric liquid crystals for next generation high speed, high density computer displays; transitioned techniques to refurbish turbine blades for engine life extension to Naval Air Rework Facilities.

- (U) (34,478) Information Sciences responded to the Joint Surveillance JMA as follows: transitioned neural network simulation environment capable of modeling neural maps to AT&T Bell Labs and the British Defense Research Agency--as part of an automatic target recognition development effort; developed algorithms for modeling underwater explosions on submersibles and transitioned to Pratt & Whitney Aircraft for modeling turbine blade impact due to bird ingestion, and to Ford and GM for automobile crash simulation and safety system design; transitioned a technique for simulation of explosively generated underwater bubbles to a development program using near surface generated bubble plumes for ship self-defense against sea skimming missiles.

- (U) (202,953) Sustaining Programs supported the Infrastructure JMA by transitioning the use of Dehydroepiandrosterone (DHEA) for improved human recovery from burns, infections, and surgical trauma to an advanced development program for combat casualty treatment as well as to the National Institute on Aging for development of treatment to reduce the deterioration of the immune system of the aged.

(U) FY 1994 PLAN:

- (U) (127,632) Ocean Sciences respond to Joint Littoral JMA requirements by studying atmospheric mesoscale dynamics in coastal regions to improve coastal surveillance; physical properties of coastal & shallow waters to enhance mine detectability; and forced upper ocean dynamics for extended undersea surveillance.

- (U) (48,158) Advanced Materials respond to the Joint Surveillance JMA by investigating magnetism in small structures for hybrid memory and sensor devices; and to the Strategic Sealift JMA by exploring mechanisms and prevention of biocorrosion to reduce ship maintenance, and spin-polarized heterostructures/charge carrier systems to enable development of smaller,

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0601153N
PROGRAM ELEMENT TITLE: Defense Research Sciences

DATE: 7 February 1994
BUDGET ACTIVITY: 1

faster electronic devices.

- (U) (35,160) Information Sciences respond to the Joint Strike JMA by studying optimization & computational logic for improved logistics analysis and command and control, stochastic analysis of nonlinear ocean structures to improve seakeeping, and life cycle implications of computer science software; it will respond to the Joint Surveillance JMA with research on ultra wideband electromagnetics and signals for enhanced remote sensing; and to the Manpower, Personnel, Shore Training SA with experiments in virtual environment for training, targeting & teleoperation.

- (U) (184,799) Sustaining Programs respond to the Joint Strike JMA by investigating locally connected neuromorphic systems for enhanced signal processing; non-equilibrium turbulence for design of naval vessels and weapons; and atomic control of structure for development of the next generation of optical and electronic semiconductor devices.

(U) FY 1995 PLAN:

- (U) (135,700) Ocean Sciences will respond to Joint Littoral JMA requirements by investigating coastal environment mixing & optics related to mine detection; convective overturning processes and layer stratification for improved undersea surveillance; and underwater detonics of metallized explosive compositions to optimize underwater target destruction.

- (U) (54,084) Advanced Materials will respond to the Joint SEW/Intelligence JMA by exploring epitaxial growth optimization in crystals and synthesized materials to improve radiation resistance of electronic materials; advanced biological self-assembling materials for use in electro-optic systems; nanostructure array fabrication for electronics and opto-electronics; and science and modeling of etching processes in plasma reactors; it will support Joint Surveillance requirements through exploring interfaces of high temperature superconductors with metals, insulators and superconductors for improved detection and propulsion systems; processing science and routes to affordable manufacturing of layered materials; and materials and mechanisms of superconductivity for improved radio frequency and computer systems.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0601153N
PROGRAM ELEMENT TITLE: Defense Research Sciences

DATE: 7 February 1994
BUDGET ACTIVITY: 1

- (U) (38,266) Information Sciences will respond to the Readiness JMA through developing hybrid learning techniques for humans and artificial systems, and virtual environment displays for spatial disorientation training; and to the Precision Strike JMA by exploring the nonlinear dynamics of noisy, complex neural systems to uncover principles leading to novel sensors, controls, and robotics.

- (U) (179,921) Sustaining Programs will respond to the Readiness JMA by investigating multi-domain simulation of ocean structures to predict nonlinear behavior affecting their stability and integrity.

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

(U) WORK PERFORMED BY: IN-HOUSE: Navy Laboratories (30%) CONTRACTORS: Universities (about 59% of funding), industry, not-for-profit and other institutions (11%).

(U) RELATED ACTIVITIES:
- PE 0602111N (Surface/Aerospace Surveillance & Weapons Technology)
- PE 0602121N (Surface Ship Technology)
- PE 0602122N (Aircraft Technology)
- PE 0602234N (Materials, Electronics & Computer Technology)
- PE 0602314N (Undersea Surveillance & Weapons Technology)
- PE 0603207N (Air/Ocean Tactical Application)
- PE 0603785N (Combat Systems Oceanographic Performance Assessment)
- PE 0601152N (In-House Laboratory Independent Research)
- PE 0601102A (Army Defense Research Sciences)
- PE 0601102F (Air Force Defense Research Sciences)

Activities are coordinated through Tri-Service 6.1 Reliance Scientific Planning Groups.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0601572N
PROGRAM ELEMENT TITLE: Navy Dual Use Technology Program

PROJECT NUMBER: N/A
BUDGET ACTIVITY: 1

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Navy DTP	0	0	10,000	0	0	0	0	0	10,000

B. (U) BRIEF DESCRIPTION OF ELEMENT: The purpose of this new start program is to develop dual use technologies which will enhance the economic viability and competitiveness of U.S. industry in technological areas of particular relevance to the Navy. The program places a high emphasis on technology creation and fostering the translation of new technology into practical economic use. The Navy Dual Use Technology Program (DTP) has the additional benefit of encouraging the services to increase the use of lower cost commercial technology in military applications. The Navy DTP is modeled on the Department of Defense Technology Reinvestment Program. The program is guided by the Department of Navy (DON) Science and Technology Investment Strategy. This program element supports the Joint Mission Areas/Support Areas. The primary areas of research will support technical development in Ocean Sciences, Advanced Materials, Information Sciences and Sustaining Programs with particular relevance to Navy needs in medical, personnel, logistics, and Naval platforms. Efforts will concentrate on technology creation through basic research. The sustaining portion of the Office of Naval Research investment is directed toward the development and maintenance of scientific superiority and the provision of scientific options which create and exploit scientific and technological surprise. These accomplishments will bridge critical gaps in current key Navy programs for the U.S. industrial base and joint academic/industrial activities. The results of the basic research undertaken within this program element will support the Joint Warfare Operational Capabilities by allowing the employment of a larger range of military capabilities facilitating the achievement of U.S. defense and commercial objectives.

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS: Not applicable.

(U) FY 1994 PLAN: Not applicable.

(U) FY 1995 PLAN:

- (U) Ocean Sciences: Initiate complete basic systems understandings of the complex interactions between

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0601572N
PROGRAM ELEMENT TITLE: Navy Dual Use Technology Program

PROJECT NUMBER: N/A
BUDGET ACTIVITY: 1

DATE: 7 February 1994

the multiple elements of the ocean environment, including the acoustic, chemical, biological, atmospheric and human systems interactions. Expand fundamental theoretical understandings of the basic sciences into advanced developmental activities which will provide new and improved Navy systems. Involve all areas of scientific performance in the development of joint technical programs involving creation and development of economically viable advanced systems.

- (U) Advanced Materials: Create new materials and material processes for Navy and Industry applications in critical Navy systems. Initiate new theoretical models of complex materials interaction, joining, degradation, corrosion and environmental impact.

- (U) Information Sciences: Investigate new information systems concepts to provide dramatically improved reception, analysis, network dissemination and storage capabilities for Navy and industrial applications. Develop new paradigms for all command, control, communications, and intelligence applications founded upon basic research developments and theoretical understandings.

- (U) Sustaining Programs: Develop new theoretical understandings and practical implementations in relevant Navy technologies such as combat casualty care, human capability enhancement systems, advanced education and training concepts, enhanced performance logistics systems and high performance vehicles including hydrodynamic and aerodynamic performance.

(U) PROGRAM TO COMPLETION: Not applicable.

(U) WORK PERFORMED BY: IN HOUSE: To be determined. CONTRACTORS: To be determined.

(U) RELATED ACTIVITIES:

- (U) PE 0602572N (Navy Dual-Use Technology Program)
- (U) PE 0603572N (Navy Dual-Use Technology Program)

Activities are coordinated through the Navy Dual-Use Technology Program Management Team.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602111N
PROGRAM ELEMENT TITLE: SURFACE/AEROSPACE SURVEILLANCE & WEAPONS TECHNOLOGY
BUDGET ACTIVITY: 2

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1988 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Surface/Aerospace Surveillance and Weapons Technology	68,367	67,822	75,088	80,130	84,990	87,177	89,620	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element (PE) supports future surveillance and weapons systems for surface, air, and space platforms for Naval Warfare relating to the Joint Mission Areas of: Joint Strike Warfare, Littoral Warfare, and Joint Surveillance. Specifically:

(U) Joint Strike addresses technology issues in real-time targeting, surgical lethality, platform survivability, and Battle Damage Assessment. Programs include mission planning, missile and propulsion technology, advanced warheads, and precision targeting.

(U) Littoral Warfare addresses issues in air and surface battlespace and develops technology for ship self-defense, air combat, and survivability. Programs include ship based sensors and innovative weapons concepts, missile signature management and low cost guidance and control (G & C).

(U) Joint Surveillance addresses issues of real-time targeting, connectivity, and counter-jamming and deception. Programs include multi-platform radar and infrared sensors for detection, identification, tracking, and damage assessment.

(U) These efforts support the Joint Warfare Strategy "From the Sea". Programs in this PE are jointly planned in the Reliance process with the Air Force and Army through panels of the Joint Directors of Laboratories (JDL).

C. (U) JUSTIFICATION FOR PROJECTS:

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602111N
PROGRAM ELEMENT TITLE: SURFACE/AEROSPACE SURVEILLANCE & WEAPONS TECHNOLOGY
BUDGET ACTIVITY: 3

DATE: 7 February 1994

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($24,365) SHIP SELF DEFFNSE IN SUPPORT OF SURFACE BATTLESPACE:
  - (U) Evaluated use of composites in launch tube and changer for high pressure projectile, missile, and decoy launchers and developed off-axis recoil solution for lighter weight, cheaper and more reliable ship defense systems.
  - (U) Conducted hydro-code and small scale test lethality evaluation studies of explosively generated water columns for ship terminal defense. Determined that a relatively small charge of a new water activated munition can produce a water column of sufficient duration to warrant further study as an obstacle to incoming missiles.
  - (U) Initiated focal plane array (FPA) uniformity compensation effort to address the feasibility of using a new optical dithering/signal processing technique that will lead to lower cost, lighter weight infrared (IR) trackers for ship self defense weapons.
  - (U) Completed:
    - -- (U) multi-sensor/target tracking investigation in support of the integration of search and track sensors against low flying anti-ship cruise missiles. Produced algorithms to be incorporated into ship self defense system.
    - -- (U) 3-D IR target algorithms for identifying IR tracks in clutter.
    - -- (U) IR search and track exploratory development in support of a two-color advanced IR sensor advanced technology demonstration for low flying targets with small IR contrast to be applied to shipboard Infrared Sensor Technology (IRST) system.
    - -- (U) development of a high power laser source for IR countermeasures against terminal seekers in anti-ship missiles for incorporation in IR countermeasures Advanced Technology Demonstration.
    - -- (U) improvements in switching technology relevant to high power, frequency agile broadband radio frequency (RF) sources for anti-sensor microwave weapons demonstrating sub-microsecond high power on/off switching.

- (U) ($10,518) AIR SUPERIORITY:
  - (U) Conducted hardware-in-the-loop (HWIL) simulations of lock-on-after-launch (LOAL) G&C components to improve air-to-air combat survivability and developed criteria for component requirements.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602111N
PROGRAM ELEMENT TITLE: SURFACE/AEROSPACE SURVEILLANCE & WEAPONS TECHNOLOGY
BUDGET ACTIVITY: 2

DATE: 7 February 1994

- (U) Fabricated and tested 1 mm thick diamond IR dome samples and characterized their structural, thermal and optical properties. Strength measurements of chemical vapor deposition (CVD) diamond gave values in the range of one-tenth to one-fourth of natural diamond. These levels offer no improvement over currently available dome materials. Follow-on work in 1994 will investigate means to increase strength to natural levels.
- (U) Initiated scale tests of selected close encounter warheads to make them smaller, lighter, and cheaper.
- (U) Initiated situational awareness/fire control investigations for future air superiority aircraft.
- (U) Initiated program for high angle of attack predictive codes and innovative control strategies for more highly agile air defense missiles.

• (U) ($11,785) STRIKE AND ANTI-SURFACE WARFARE (ASUW) WEAPONRY:
- (U) Initiated:
  -- (U) investigation of parallel distributed processing techniques for timely route and mission planning and adaptive mission control functions in support of improvements to the Tomahawk missile.
  -- (U) development of automatic methods for real-time confirmation of relocatable targets in Synthetic Aperture Radar (SAR) imagery for littoral application.

- (U) Conducted:
  -- (U) successful airborne tests of real-time multi-sensor correlation algorithms for land attack targeting in support of follow-on development of multi-sensor precision targeting technology demonstration.
- (U) Developed an adaptive mission control concept simulation for strike planning.

• (U) ($21,699) SURVEILLANCE:
- (U) Fabricated:
  -- (U) a test bed Airborne Early Warning (AEW) radar to support development of a wide-band airborne surveillance and target identification radar.
  -- (U) a shared aperture electro-optic/infrared (EO/IR) sensor for detection of targets in poor radar performance domain.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602111N
PROGRAM ELEMENT TITLE: SURFACE/AEROSPACE SURVEILLANCE & WEAPONS TECHNOLOGY
BUDGET ACTIVITY: 2

DATE: 7 February 1994

- (U) Completed:
  - -- (U) integration of volume surveillance radar with point defense sensors as alternative for a multi-function surveillance system for non-Aegis ships.
  - -- (U) field test of 2-D air target identification processor for future application to F-14D AN/APG-71 radar system and demonstrated the technology to form classifiable images of non-maneuvering air targets using Inverse Synthetic Aperture Radar (ISAR) data.
- (U) Demonstrated automatic ship classifier in the laboratory for eventual use in automatic classification of ships at sea using fleet AN/APS-137 ISAR.

(U) FY 1994 PLAN:

- (U) ($24,171) SHIP SELF DEFENSE IN SUPPORT OF SURFACE BATTLESPACE
  - (U) Initiate:
    - -- (U) low cost IR tracker incorporating innovative optical dither scan/signal processing technique to improve target detection in clutter.
    - -- (U) low probability of intercept radar development for improved survivability of airborne surveillance platforms.
    - -- (U) design and fabrication of multi-purpose composite launcher tube and package in box configuration for cheaper and more reliable ship defense systems.
    - -- (U) investigation of beam steering, multipath, and glint problems associated with miniature RF seekers for medium caliber gun launched projectiles in support of more lethal point defense systems.
    - -- (U) high energy laser head-on missile defense test at White Sands for determination of viability of laser anti-ship missile defense systems.
  - (U) Continue:
    - -- (U) hydro-code and small scale test lethality evaluation of explosively generated water columns for ship terminal defense with full scale multi-charge tests for generating water barrier to validate FY 1993 hydro-code analysis, and conduct barrier effectiveness test against fragments and missiles.
    - -- (U) multi-function radar development for lower cost radar systems.
    - -- (U) lab test of survivable radar waveforms for tri-Service development of radar immune to Anti-Radiation Missile (ARM) weapons.

-- (U) advanced multi-spectral IR processor development for implementing 2 color (with sub-bands) IRST for ship self defense.

- (U) ($10,434) AIR SUPERIORITY:
  - (U) Initiate reactive fragment warhead investigation for more lethal warheads,
  - (U) Continue:
    - -- (U) HWIL simulations of LOAL G&C components to improve air-to-air combat survivability.
    - -- (U) diamond dome development by investigating means to increase strength of CVD diamond and develop low cost polishing technique.
    - -- (U) guidance-integrated fuze (GIF) efforts jointly with Army and Air Force for improved air-to-air missile lethality.
    - -- (U) scale tests of selected close encounter warheads to make them smaller, lighter, and cheaper.
    - -- (U) situational awareness/fire control investigations for future air superiority aircraft.
    - -- (U) program for high angle of attack aerodynamic predictive codes and innovative control strategies for more highly agile air defense missiles.

- (U) ($11,691) STRIKE AND ASUW WEAPONRY:
  - (U) Initiate:
    - -- (U) simulations within Advanced Research Projects Agency (ARPA) WARBREAKER environment of parallel distributed processing techniques for route and mission planning and adaptive mission control technologies.
    - -- (U) solid fuel air explosive (SFAE) warhead feasibility investigations for increased strike warhead lethality.
  - (U) Continue:
    - -- (U) airborne testing of real-time multi-sensor correlation algorithms for land attack targeting in support of follow-on development of multi-sensor precision targeting technology demonstration.
    - -- (U) application investigation of parallel distributed processing techniques for timely route and mission planning and adaptive mission control functions in support of improvements to the Tomahawk missile.
    - -- (U) development of automatic methods for real-time confirmation of relocatable targets in

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602111N
PROGRAM ELEMENT TITLE: SURFACE/AEROSPACE SURVEILLANCE & WEAPONS TECHNOLOGY
BUDGET ACTIVITY: 2

DATE: 7 February 1994

Synthetic Aperture Radar (SAR) imagery for littoral application.
- (U) Complete classified development for ships in berth and transition technology to the Joint Surveillance Target Attack Radar System (JSTARS).

• (U) ($21,526) SURVEILLANCE:
- (U) Initiate:
-- (U) field demonstration of shared aperture EO/IR sensor for detection of targets in poor radar performance domain.
-- (U) development of IR novel discriminants processing techniques to exploit polarization content of man-made objects against largely unpolarized backgrounds and to investigate utility of closely spaced sub-bands in the mid and long wave IR spectral region to maximize target return relative to background clutter.
-- (U) demonstration of IR clutter rejection algorithms using frame to frame temporal signal integration and video moving target indicator techniques.
-- (U) test of IR power spectral density model of cloud clutter with turbulence model(s) to provide an analytical model to relate IR radiance to temperature and water content turbulence.
- (U) Complete:
-- (U) transition of advanced AEW radar technology to Naval Air Systems Command.

(U) FY 1995 PLAN:

• (U) ($27,090) SHIP SELF DEFENSE IN SUPPORT OF SURFACE BATTLESPACE:
- (U) Initiate:
-- (U) ultra wideband radar phased array design for rapid response ship self defense applications.
-- (U) field test of low probability of intercept radar for surface search systems.
-- (U) fabrication of breadboard low cost, light weight, IRFPA test-bed tracker for self-defense weapon fire control investigations.
-- (U) fabrication and test of barrel and chamber sealing mechanism for multi-purpose composite launcher.

-- (U) Tri-Service testing of radar survivability waveforms in test bed radar.
-- (U) over-water test of high power microwaves against representative target seekers.
-- (U) demonstration of miniature RF seeker guidance accuracy in multi-path/clutter via HWIL simulation.
-- (U) broad agency announcement for advanced multi-spectral IR processing technology in support of ship self defense 2 color/sub-banded IRST sensor.

- (U) Continue hydro-code and small scale test lethality evaluation of explosively generated water columns for ship terminal defense with a determination of optimal water barrier timing and spacing requirements.
- (U) Complete design and concept development for multi-function radar in support of ship surveillance and self defense needs.

• (U) ($7,989) AIR SUPERIORITY:
- (U) Initiate:
-- (U) HWIL demonstration of LOAL guidance components for improvement of air-to-air combat survivability.
-- (U) HWIL simulations of GIF breadboard hardware for improved air-to-air missile lethality.
-- (U) investigation of coherent fiber bundle scene transformation technique for IR scene generation.
- (U) Complete diamond IR dome effort with fabrication, polishing and testing of a 2.5 inch diameter, 1mm thick dome with high optical, thermal and strength properties suitable for high speed missile operation.

• (U) ($18,342) STRIKE AND ASUW WEAPONRY:
- (U) Initiate feasibility investigations for long range gun launched rocket assisted guided projectile.
- (U) Continue:
-- (U) ARPA WARBREAKER ENVIRONMENT simulations of parallel processing algorithms for near real-time mission planning and adaptive in-flight mission replanning capabilities for future Navy smart weapons.
-- (U) application investigation of parallel distributed processing techniques for timely route and mission planning and adaptive mission control functions in support of

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improvements to the Tomahawk missile.
-- (U) SFAE warhead development.

- (U) ($21,667) SURVEILLANCE:
  - (U) Initiate:
    -- (U) Multi-Sensor Surveillance and Targeting Technology Sensor concept development for unmanned aerial vehicles (coordinated with Joint Program Office).
    -- (U) advanced staring multi-hyper spectral IR sensor development to improve target detection capability in sea and land clutter for multi-mission aircraft.
    -- (U) development of SAR/ISAR technology for Ocean and Land Surveillance using APS-137 radar testbed in support of improved sea/land target surveillance and classification.
    -- (U) land test of space based synthetic aperture interferometer for imaging of objects in space.
    -- (U) EO/IR land surveillance systems concept definition in support of tri-service precision strike needs.
    -- (U) joint experiments with ARPA of space time adaptive processing for AEW radar applications to E-2C improvements.
    -- (U) evaluation of IR sensor performance prediction models for application to Fleet decision aids and mission planning needs.
  - (U) Continue ship area surveillance radar electronic counter-countermeasures and target identification developments to provide long range all aspect air target identification capability.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA; NCCOSC RDTE DIV, San Diego, CA; NRL, Washington, DC; and NAVSURFWARCENDIV, Dahlgren, VA. CONTRACTORS: APL/JHU, Baltimore, MD; MIT/LL, Lexington, MA; QuesTech Inc., Falls Church, VA; Hughes Aircraft Company, Fullerton, CA; TRW, Redondo Beach, CA; Ferranti, Manchester, UK; Westinghouse, Baltimore, MD; Grumman, Bethpage, NY; Texas Instruments, Dallas, TX; LORAL, Lexington, MA; Michigan State University, Lansing, MI.

(U) RELATED ACTIVITIES: This PE adheres to Tri-Service Reliance agreements with oversight provided by

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PROGRAM ELEMENT: 0602111N
PROGRAM ELEMENT TITLE: SURFACE/AEROSPACE SURVEILLANCE & WEAPONS TECHNOLOGY
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DATE: 7 February 1994

the JDL. This PE is related to and fully coordinated with efforts in the following:

- (U) Wide Area Surveillance Radar:
  - (U) PE 0601102F (Defense Research Sciences)
  - (U) PE 0602101F (Geophysics)
  - (U) PE 0602102F (Materials)
  - (U) PE 0602203F (Aerospace Propulsion)
  - (U) PE 0602302F (Rocket Propulsion and Astronautics Technology)
  - (U) PE 0602702F (Command, Control and Communications)
  - (U) PE 0603428F (Space Subsystems Technology)
  - (U) PE 0603741D (Air Defense Initiative)
  - (U) PE 0603789F (C3I Technology Development)
- (U) Air Intercept and Strike Radar:
  - (U) PE 0601101F (In-House Laboratory Independent Research)
  - (U) PE 0602204F (Aerospace Avionics)
  - (U) PE 0602712E (Materials and Electronics Technology)
  - (U) PE 0602782A (Command, Control and Communications (C3) Technology)
  - (U) PE 0603109N (Integrated Aircraft Avionics)
  - (U) PE 0603203F (Advanced Avionics for Aerospace Vehicles)
  - (U) PE 0603217N (Air Systems and Weapons Advanced Technology)
  - (U) PE 0603227E (Strategic Relocatable Targets)
  - (U) PE 0603253F (Advanced Avionics Integration)
  - (U) PE 0605502F (Small Business Innovation Research)
- (U) Air-Air and Anti-Surface EO:
  - (U) PE 0602204F (Aerospace Avionics)
  - (U) PE 0602709A (Night Vision Technology)
  - (U) PE 0603203F (Advanced Avionics for Aerospace Vehicles)
  - (U) PE 0603253F (Advanced Avionics Integration)
  - (U) PE 0603270F (Electronic Combat Technology)
  - (U) PE 0603710A (Night Vision Advanced Technology)
  - (U) PE 0603792N (Advanced Technology Demonstrations)

- (U) Conventional Air/Surface Weaponry:

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- (U) PE 0602203F (Aerospace Propulsion)
- (U) PE 0602302F (Rocket Propulsion and Astronautics Technology)
- (U) PE 0602303A (Missile Technology)
- (U) PE 0602601F (Advanced Weapons)
- (U) PE 0602602F (Conventional Munitions)
- (U) PE 0602618A (Ballistics Technology)
- (U) PE 0602624A (Weapons and Munitions Technology)
- (U) PE 0603004A (Weapons and Munitions Advanced Technology)
- (U) PE 0603216F (Aerospace Propulsion and Power Technology)
- (U) PE 0603609N (Conventional Munitions)
- (U) PE 0603640M (Marine Corps Advanced Technology Demonstration)
- (U) PE 0603790D (NATO Research and Development)
- (U) PE 0602234N (Materials, Electronics and Computer Technology)

(U) This is in accordance with the ongoing Reliance joint planning processes.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602121N
PROGRAM ELEMENT TITLE: SURFACE SHIP TECHNOLOGY
BUDGET ACTIVITY: 2

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Surface Ship Technology	45,805	19,103	19,884	22,297	23,456	24,032	24,690	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element (PE) provides for ship propulsion system technology developments that contribute to meeting top joint warfare capabilities established by the Joint Chiefs of Staff; namely to promptly engage regional forces in decisive combat on a global level, to employ a range of capabilities more suitable to actions at the lower end of the full range of military operations which allow achievement of military objectives with minimum casualties and collateral damage, and to counter the threat of weapons of mass destruction and future ballistic and cruise missiles to the conus and deployed forces.

(U) This PE develops hull, mechanical, and electrical (HM&E) technology in support of present and future surface ship platform assets for Naval Warfare relating to all the Joint Mission Areas. Specifically:

(U) Joint Strike addresses technology requirements and needs in the areas of signature reduction and control, communications, and platform survivability. Joint Littoral Warfare addresses technology requirements and needs in the areas of Improved platform self-defense, reduced own ship signatures, and damage tolerance. Strategic Deterrence addresses primary task areas in Amphibious Warfare, SEW, Mobility and Special Operation Forces (SOF). Strategic Sealift/Protection addresses technology requirements and needs in the areas of damage tolerant ships, stealthier sealift ships, and ship design and construction infrastructure to meet Department of Defense (DOD) needs. Readiness and Support addresses technology requirements and needs in the areas of improved methods of avoiding repair, and more efficient fuels or alternative fuels. Programs include under water signature reduction, electromagnetic compatibility, quieting of machinery systems, topside signature reduction, advanced electrical systems, reduced signature mechanical power and auxiliary systems, damage control, advanced hull and weapons effects.

(U) Joint Surveillance addresses primary task areas in Mobility and Space and Electronics Warfare (SEW) (Communications) and covert surveillance. Programs include under water signature reduction, electromagnetic compatibility, quieting of advanced propulsors, topside signature reduction, systems, reduced signature mechanical power

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PROGRAM ELEMENT: 0602121N
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and auxiliary systems, superconductive propulsion, and advanced hull.

(U) SEW/Intelligence addresses primary task areas in joint command and control. Programs include eiectromagnetic compatibility, topside signature reduction, and advanced hull.

(U) Manpower, Personnel,and Shore Training addresses technology requirements and needs in the area of training. Programs include advanced electrical systems and damage control each having embedded training capability.

(U) Infrastructure addresses technology requirements and needs in the areas of improved, safer fuels and integration of foreign weapons systems into Department of Navy (DON) capability. Programs include, mechanical power and auxiliary systems, and enabling technology.

(U) These efforts support the Joint Warfare Strategy "From the Sea".

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($7,559) PRECISION STRIKE:
  - (U) Completed radio frequency (RF) prediction algorithm and physical scale modeling to predict levels of signature reduction.
  - (U) Completed ship impact assessment of a composite diesel engine to reduce noise signature.
  - (U) Validated National Institute for Science and Technology's (NIST's) Consolidated Fire and Smoke transport model for predicting shipboard smoke spread analysis for damage control.
  - (U) Initiated competitive conceptual designs of power circuit breakers for advanced electrical systems.
  - (U) Initiated construction of contra-rotating homopolor motor for advanced propulsion (electric drive) demonstration.
  - (U) Initiated transition of electrical power distribution system, monitoring and control system, and component level requirements to the Advanced Surface Machinery Program.

- (U) ($6,621) AIR DEFENSE:
  - (U) Completed development of computational algorithm for radar-to-satellite communications

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PROGRAM ELEMENT: 0602121N
PROGRAM ELEMENT TITLE: SURFACE SHIP TECHNOLOGY
BUDGET ACTIVITY: 2

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interference interactions to minimize exterior electromagnetic interference.
- (U) Completed above water explosion damage prediction methodology.
- (U) Documented design and analysis procedures in MIL STD's "Structural Design for Blast Damaged Hull Girders" and "Structural Design for Blast Hardened Bulkheads".
- (U) Demonstrated fiber optic temperature, smoke, and flooding sensors in a simulated shipboard environment for damage control.

• (U) ($3,522) SEA CONTROL and UNDERSEA SUPERIORITY:
- (U) Completed development of design guidelines for asymmetric propulsor ducts for underwater acoustic quieting.

• (U) ($28,103) TECHNOLOGY for AFFORDABILITY:
- (U) Completed a cost benefit analysis of a composite diesel engine to determine the engine issues driving affordability.
- (U) Initiated an advanced concept electrical distribution system architecture having a lower acquisition cost and comparable performance.
- (U) Initiated affordable composite hull development options.
- (U) Validated affordability of automated fabrication and outfitting methods for unidirectional double hull ships.

(U) FY 1994 PLAN:

• (U) ($5,338) PRECISION STRIKE:
- (U) Initiate validation analytical model for combining anti-radiation coatings and hull transmission path blockers to reduce ship radiated noise signatures.
- (U) Initiate development of quiet rudder concepts.
- (U) Initiate development of design guidelines for vertical axis propulsor for noise signature reduction.
- (U) Initiate flooding sensors integration with predictive algorithms for damage control.
- (U) Complete development of two alternate alloy candidates for wire and magnetic components of a low temperature superconducting electric drive system.

• (U) ($4,498) AIR DEFENSE:

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PROGRAM ELEMENT TITLE: SURFACE SHIP TECHNOLOGY
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- (U) Initiate low signature concepts for topside shipboard applications.
- (U) Demonstrate feasibility of electro-optic electromagnetic environment monitoring concept to remotely monitor shipboard RF emission over the entire RF spectrum.
- (U) Demonstrate capability of surface acoustic wave sensor array to detect fire type in a shipboard environment for damage control.
- (U) Demonstrate maneuvering contact tracking algorithms for self-defense against high speed weapons.
- (U) Complete the development of limited duty cycle generator and construct resonant transformer model for feasibility demonstration of pulse power networks for potential shipboard application.

• (U) ($3,565) SEA CONTROL and UNDERSEA SUPERIORITY:
- (U) Complete active noise control system demonstration aboard a large scale ship model.
- (U) Transition closed loop degaussing magnetic signature modification system for steel hull ships to PE 0603555N Advanced Degaussing Technology Demonstration.

• (U) ($5,702) TECHNOLOGY for AFFORDABILITY:
- (U) Complete manufacturer and acceptance tests and trials of sub-scale permanent magnet electric drive system for patrol boat demonstration of quiet operations.
- (U) Complete development and demonstration of solid-state power converter for zonal electrical power distribution system.
- (U) Complete transition design guidelines for a new family of shock-hardened power circuit breakers to advanced development for advanced electrical system applications.
- (U) Complete assessment of artificial intelligence/neural network technology for intelligent machinery control.
- (U) Conduct at sea trials of a low cost, high speed, high payload, Advanced Material Transport (ATM) model.

(U) FY 1995 PLAN:

• (U) ($7,557) PRECISION STRIKE:
- (U) Initiate performance testing of vertical axis propulsor.
- (U) Initiate scale model demonstration of advanced concept electrical power distribution system.

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PROGRAM ELEMENT: 0602121N
PROGRAM ELEMENT TITLE: SURFACE SHIP TECHNOLOGY
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- (U) Initiate exploration of shipboard magazine protection and damage containment.
- (U) Complete hardware validation of resonant transformer for pulse power networks.
- (U) Complete performance testing of cryogenic turbo expander for low temperature superconducting systems.
- (U) Complete performance testing of low temperature superconducting wire alloys.
- (U) Demonstrate low weight, low signature diesel components.
- (U) Demonstrate diesel fed high power density fuel cell power plant.
- (U) Transition light weight, low observable, electromagnetically compatible glass reinforced plastic mast concept to advanced development for full scale demonstration. (Transitioned to PE 0603238N)

• (U) ($7,062) AIR DEFENSE:
- (U) Initiate expert systems decision aids development to assess structural integrity of ships at sea for damage control.
- (U) Initiate expert systems development for damage control decision management.
- (U) Develop electromagnetic capability analysis models and interface reduction techniques for ultra wide band radio frequency systems.
- (U) Develop cost effective radar absorbing structure (RAS), low observable ship and RAS compatible infrared (IR) signature control concepts.
- (U) Demonstrate hatch/door closure damage control sensors.
- (U) Demonstrate a scale model multi-function ceramic armor system.
- (U) Complete investigation of improved slamming load prediction methodology
- (U) Transition probabilistic structural analysis guidelines to advanced development. (Transitioned to PE 0603563N)

• (U) ($5,265) SEA CONTROL and UNDERSEA SUPERIORITY:
- (U) Initiate conceptual development of automatic control of external electric fields of steel hulled ships for signature reduction.
- (U) Demonstrate active noise control techniques for shipboard fluid systems for acoustic quieting.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NAVSURFWARCENCOASTSYSTA, Panama

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PROGRAM ELEMENT: 0602121N
PROGRAM ELEMENT TITLE: SURFACE SHIP TECHNOLOGY
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City, FL; NAVSURFWARCENDIV, Dahlgren, VA; NRL, Washington, D.C.; NCCOSC, San Diego, CA. CONTRACTORS: Analytic Power Corporation, Boston, MA; Ball Aerospace Corporation, Boulder, CO; Baron Associates, Stanardsville, VA; Bath Iron Works, Bath, ME; Creare Incorporated, Hanover, NH; EML Research Inc., Hudson, MA; General Electric Company, Schenectady, NY; Ingalls Shipbuilding, Pascagoula, MS; Klein Systems Corporation, Salem, NH; Lehigh University, Bethlehem, PA; Lockheed Space & Missile Corporation, Sunnyvale, CA; Massachusetts Institute of Technology, Cambridge, MA; Metro Machine, Norfolk, VA; Newport News Shipbuilding, Newport News, VA; Purdue University, West Lafayette, IN; The ReJen Company, Bishop, CA; Roush Industries Inc., Detroit, MI; SatCom Technology Corporation, Cambridge, MA; Seemann Composite Systems, Inc., Gulfport, MS; University of Massachusetts Lowell Research Foundation, Lowell, MA; University of Houston, Houston, TX; University of Michigan, Ann Arbor, MI; Virginia Polytechnical Institute, Blacksburg, VA; Westinghouse Corporation, Pittsburgh, PA.

(U) RELATED ACTIVITIES:

- (U) PE 0602131M (Marine Corps Landing Force Technology)
- (U) PE 0602233N (Readiness, Training and Environmental Quality Technology)
- (U) PE 0602234N (Materials, Electronics & Computer Technology)
- (U) PE 0602315N (Mine Countermeasures, Mining and Special Warfare Technology)
- (U) PE 0602323N (Submarine Technology)
- (U) PE 0603238N (Precision Strike and Air Defense Technology Demonstration)
- (U) PE 0603502N (Surface and Shallow Water MCM Vehicle)
- (U) PE 0603508N (Ship Propulsion System)
- (U) PE 0603513N (Shipboard System Component Development)
- (U) PE 0603514N (Ship Combat Survivability)
- (U) PE 0603553N (Surface Anti-Submarine Warfare)
- (U) PE 0603563N (Ship Concept Advanced Design)
- (U) PE 0603564N (Ship Preliminary Design and Feasibility Studies)
- (U) PE 0603573N (Advanced Surface Machinery Systems)
- Under the Tri-Service Reliance Agreement, the Navy has the lead for this Navy-unique program.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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PROGRAM ELEMENT: 0602122N
PROGRAM ELEMENT TITLE: AIRCRAFT TECHNOLOGY
BUDGET ACTIVITY: 2

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Aircraft Technology	26,648	21,014	24,691	26,837	28,463	30,134	31,865	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program develops technology for naval aviation, with emphasis on the demands imposed by aircraft carrier flight operations and Marine Corps amphibious and field operations relating to the Joint Mission Areas of Joint Strike Warfare and Littoral Warfare. This program exploits the emerging technologies of (a) composite and matrix materials for structures to reduce airframe and propulsion plant weight and the effects of saltwater corrosion; (b) reduced observable aerodynamic designs of Navy-unique aircraft components; (c) advanced gas turbine engine component designs for extended range/endurance; and (d) longer service life to bring about reduced at-sea replacements and spare inventory. Technologies are developed for needed upgrades to shipboard and arresting-gear systems, visual landing aids for safer flight operations and aircraft maintenance test equipment for increased weapon system availability. The program provides mission area analysis and concept definition required for the Exploratory Development phase of air vehicle and weapon system programs.

(U) Aircraft Technology develops the manned airborne platform future joint warfighting capabilities to promptly engage regional forces in decisive combat on a global basis and to employ a range of capabilities more suitable to actions at the lower end of the full range of military operations, which allow achievement of military objectives with minimum casualties and collateral damage. This element adheres to Tri-Service Reliance Agreements and supports the Department of Defense Science and Technology Strategy, which coordinates and minimizes duplication of aircraft technology efforts. The individual Navy aircraft technology exploratory efforts are selected to fill technology gaps that are in the United States Air Force (USAF), Army, National Aeronautics and Space Administration (NASA), Advanced Research Projects Agency (ARPA) and industry programs, which if successfully demonstrated, would meet Navy aviation needs.

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C. (U) JUSTIFICATION FOR PROJECTS:

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($ 6,958) PROPULSION:
  - (U) Completed Advanced Subsonic Turbine Engine Technology turbine design for Integrated High Performance Turbine Engine Technology (IHPTET) program. Research is focused on increased temperature capability, advanced cooling schemes, and the incorporation of next generation engine materials and thermal barrier coatings. The turbine contributes to the IHPTET initiative, which has as its goal the doubling of propulsion performance capability by the year 2003.
  - (U) Pratt & Whitney designed, fabricated and successfully operated a radial magnetic bearing in an IHPTET 6.3A demonstrator engine. This demonstration represents the first time that an aircraft gas turnine engine rotor system has been electromagnetically suspended in a 'flexible" platform. The ability to operate and control the rotor system in a non-stationary structure of this type represents a key technological milestone towards achieving the all electric engine, control, and bearings which represents a 15-20% weight savings over current engines.

- (U) ($ 7,522) AIR VEHICLE:
  - (U) Conducted a systems evaluation of the Advanced Technology Cockpit. Incorporation of an articulating seat for improved G protection, integration of movable flat panel displays, laser sequencing for aircrew escape systems, improved high speed escape and anti-exposure through use of a crew module, and improved severance of composite materials during initial ejection are being evaluated.
  - (U) The development of a next generation magnetic head tracker for a helmet mounted display progressed through initial prototype fabrication. Significant reductions were achieved and demonstrated in head supported weight, improved pointing accuracy and increased field of coverage. Improved lethality of aircraft weapons and reduced aircraft attrition will result.
  - (U) Developed and demonstrated an initial prototype 3D volumetric display system. This technology improves cockpit display, air traffic control, medical diagnostic and commercial television technology.
  - (U) A Smart Structure concept was demonstrated on aircraft structural panels as a first step in the development of localized sensor systems with the ability to process their own data without

burdening the central computer. The ability to detect and locate damage in real time was demonstrated.

- (U) ($ 8,396) DYNAMICS OF FLIGHT:
  - (U) Tested the capabilities of flight controls against high-power microwaves. This demonstrated the capability to operate without degradation at extremely high ambient electromagnetic flux levels (i.e., counter radio-frequency weapons).
  - (U) Completed Flight Control Smart Actuator development with the successful fabrication, high power microwave assessment and flight test on a NASA F-18. All program objectives were met. Large reductions in wire bundles and weight, as well as integral built-in-test and redundancy management, resulted from this technology.
  - (U) Demonstrated increased lift and performance by oscillating aircraft control surfaces for improved carrier landing operations and safety.
  - (U) Continued X-31A aircraft agility development for Navy applications.

- (U) ($ 3,393) SEABASED AIRCRAFT SUPPORT:
  - (U) Developed and transitioned an improved composite wing skin repair method to depots at Jacksonville and Cherry Point This method reduces complexity, cost and time of repairs.
  - (U) Developed automated rapid aircraft-turn-around capability for carriers and air-capable ships. Directly following aircraft recovery, rapid turnaround performs a quick assessment of aircraft status to determine optimal servicing and maintenance.

(U) FY 1994 PLAN:

- (U) ($ 7,658) PROPULSION:
  - (U) Continue to:
    - -- (U) Develop, test, and evaluate remote sensing concepts to assess the performance of aircraft engines. Individual remote sensing concepts being developed to acquire and analyze engine test parameters (i.e. acoustics, electrostatics, and thermal) and to assess, detect, predict and identify engine failures.
    - -- (U) Develop combustion, mechanical, and control and integration of propulsion components for IHPTET.

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PROGRAM ELEMENT TITLE: AIRCRAFT TECHNOLOGY
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- (U) Complete:
  - -- (U) The design and fabrication of the General Electric five stage high pressure compressor focused towards IHPTET Phase II goal of increasing engine thrust-to-weight ratio 60%. Aerodynamic advancements include increased efficiency by 4% and a 25% improvement in stage loading. The compressor will incorporate a titanium metal matrix composite bladed ring in stage 2 which will provide a 21% weight savings over current designs. In addition, a high temperature metallic titanium rear stage will provide a 35% weight savings per stage over current nickel alloy compressors.

• (U) ($ 6,804) AIR VEHICLE:
- (U) Continue to:
  - -- (U) Develop and demonstrate laser sequencing of explosives for aircrew escape systems.
  - -- (U) Flight demonstrate Navy magnetic head tracker for a helmet mounted display, together with Air force 3D biaural sound system in the TAV-8B for increased air-to-air combat effectiveness.
  - -- (U) Develop and evaluate analysis methods for composite fuselage design concepts, including woven preforms and transversely reinforced structures.

- (U) Complete:
  - -- (U) A computer model for next generation Navy aircrew station/interface function specification. The model would be used by industry to design future cockpits, backseat crewstations, and ejection capsules.
  - -- (U) Development of lightweight metal matrix material landing and arresting gear components capable of withstanding the stress of carrier landings.
  - -- (U) Testing and evaluation of a damped composite aircraft centerbody structure to demonstrate vibration and dynamic effects alleviation. The lifetime and safety margin of this structure would be increased. The combined weight and volume of the active control and redesigned structure could potentially be reduced.

• (U) ($ 4,767) DYNAMICS OF FLIGHT:
- (U) Continue to:
  - -- (U) Finalize the development of aircraft agility criteria for future advanced fighter designs based on the X-31A close-in combat capabilities for increased maneuverability.

This will result in higher combat exchange rates and greater combat effectiveness.

-- (U) Develop design requirements for future aircraft applications by augmenting the data collected through X-31A flight testing. Demonstrate the integration of helmet mounted display and 3D audio technologies into the X-31.

- (U) Complete:
  - -- (U) New design/analysis methodologies in aerodynamics for better performance through vortex flow control and airfoil/wing optimization.
  - -- (U) Flight simulations and development of design guidelines for improving helicopter operations at sea with degraded visual conditions.

• (U) ($ 1,785) SEABASED AIRCRAFT SUPPORT:
- (U) Continue to:
  - -- (U) Evaluate an autonomous vehicle for the carrier deck. Technologies being developed by Naval Research Laboratory, Department of Energy, and ARPA will be used in attachable modules to clean up chemical, biological, and radioactive material contamination, to fight fires, and to load and handle weapons.
  - -- (U) Develop an advanced method of tracking the fatigue life of Navy helicopter dynamic components to reduce maintenance and spare parts costs.
  - -- (U) Develop computer-aided interactive simulation deck-spotting board to provide seabased aircraft servicing and maintenance personnel aircraft status data in near real-time. Improvements in the deck-spotting decision aid will increase sortie rates, improve warfighting capability, and enhance mission flexibility.

(U) FY 1995 PLAN:

• (U) ($ 10,261) PROPULSION:
- (U) Continue to:
  - -- (U) Test the innovative turbine internal mechanical damping aerothermal design started in FY 94.
  - -- (U) Test the Advanced Turbine Engine Gas Generator Phase II combustor started in FY 92.

- (U) Complete:

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PROGRAM ELEMENT: 0602122N
PROGRAM ELEMENT TITLE: AIRCRAFT TECHNOLOGY
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-- (U) The development and transition of advanced technology low spool components for fighter/attack aircraft technology demonstrator engines that meet the IHPTET goals and highlight increased performance, life, reliability and maintainability goals with respect to improving the capabilities of advanced Navy carrier based aircraft.
-- (U) Testing of an innovative vaneless stage and one half counter-rotating low pressure turbine in an IHPTET 6.3A demonstrator engine. The advanced aerodynamics and structural technologies will increase temperature capability by 600 deg F, improve engine specific consumption by 0.5% and reduce engine weight by approximately 100 lbs relative to a conventionally vaned two stage design.

• (U) ($ 9,433) AIR VEHICLE:
- (U) Continue to:
-- (U) Develop advanced cockpit concepts, including the Cyborg Eye and Window-to-the-World Graphics, which would provide information to the pilot during enemy laser attack, and 3D Volumetric Display.
-- (U) Test and evaluate metal matrix composite arresting gear, capable of working with today's fleet of aircraft and those under development.
-- (U) Develop aircraft components and performance criteria for reduced cost, weight and maintenance and increased performance, service life and mission effectiveness.
-- (U) Demonstrate ability of smart metallic structures to perform real-time assessments and monitoring of damage and fatigue life.
-- (U) Develop and demonstrate new design concepts and analytical methods for low observable aircraft and aircraft components which were developed under a classified program.

- (U) Complete:
-- (U) Development of advanced crew station concepts and performance evaluation metrics.
-- (U) Development of the Smart Aircraft Vehicle Management System architecture and demonstrate its use with selected smart components.
-- (U) Development and testing of an integral starter/generator and integral power unit for the More Electric Initiative Program.

• (U) ($ 4,997) DYNAMICS OF FLIGHT:
- (U) Continue to:

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PROGRAM ELEMENT: 0602122N
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-- (U) Develop air/ship dynamic interface computer simulation techniques for reduced training costs and safer helicopter operations from ships.

- (U) Complete:
  -- (U) New design/analysis methodologies in aerodynamics for better performance through vortex flow control and increased correlation of wind tunnel models, computational fluid dynamic models, and actual aircraft testing.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA; NAVAIRWARCENACDIV, Trenton, NJ; NAVAIRWARCENACDIV, Lakehurst, NJ; NAVAIRWARCENWPNDIV, China Lake, CA; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NAVSURFWARCENDIV, Indian Head, MD; NRL, Washington, D.C. CONTRACTORS: General Electric, Cincinnati, OH and Lynn, MA; McDonnell-Douglas Corporation, St. Louis, MO; Pratt-Whitney Engines, West Palm Beach, FL; Rockwell International, Columbus, OH; Boeing Aircraft Corporation, Seattle, WA.

(U) RELATED ACTIVITIES: This program adheres to Tri-Service Reliance Agreements on Air Vehicles (Fixed), Air Vehicles (Rotary), Integrated Avionics, and Aeropropulsion with oversight provided by the Joint Directors of Laboratories.

(U) Work in this Program Element (PE) is related to and fully coordinated with efforts in the following PEs:

- (U) 0601101F (Geophysics)
- (U) 0601102F (Materials)
- (U) 0601153N (Defense Research Sciences)
- (U) 0602201F (Aerospace Flight Dynamics)
- (U) 0602202F (Human Systems Technology)
- (U) 0602203F (Aerospace Propulsion)
- (U) 0602204F (Aerospace Avionics)

- (U) 0602233N (Readiness, Training and Environmental Quality Tech)
- (U) 0602234N (Materials, Electronic and Computer Techhnology)
- (U) 0603003A (Rotary Wing Aircraft Technology)

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- (U) 0603106F (Logistics Systems Technology)
- (U) 0603112F (Advanced Materials)
- (U) 0603202F (Aerospace Propulsion Subsystems Integration)
- (U) 0603205F (Flight Vehicle Technology)
- (U) 0603211F (Aerospace Structures)
- (U) 0603216F (Aerospace Propulsion and Power Technology)
- (U) 0603217N (Air Systems Advanced Technology Development)
- (U) 0603231F (Crew Systems and Personnels)
- (U) 0603245F (Advanced Flight Technology Integration)
- (U) 0603706N (Medical Development (Advanced))
- (U) 0603792N (Advanced Technology Demonstrations)

(U) Advanced Technology Transition in accordance with the ongoing Reliance joint planning process and contains no unwarranted duplication of effort among the Military Departments.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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PROGRAM ELEMENT: 0602131M
PROGRAM ELEMENT TITLE: Marine Corps Landing Force Technology
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A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Marine Corps Landing Force Technology	21,567	16,847	17,783	17,740	18,211	23,805	30,797	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program is the only Department of Defense Exploratory Development program that develops the technologies needed to support Marine Corps expeditionary forces warfighting requirements, which are unique for land combat forces due to the amphibious/littoral entry into the battlespace.

(U) By law, the National Security Act of 1947, the Marine Corps is tasked to develop those phases of amphibious operations that pertain to doctrine, tactics, techniques, and equipment used by the landing force, and which are of common interest to the Army. This program element (PE) and its associated Technology Program Plan MQ1A covers eight major technology thrusts that will lead to new or improved capabilities in a variety of functional areas.

(U) The primary focus of this program is Landing Force Technology in direct support of Marine Corps needs as defined in pertinent documents. It also collaterally supports the Joint Chiefs of Staff Joint Warfighting Capability to promptly engage regional forces in decisive combat on a global basis and the Joint Mission Areas: Strike, Littoral Warfare and Surveillance. This is a continuing program based on an annual review of progress, needs, and emerging technology opportunities.

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($3,324) Surface Mobility: Tested scale model of Crypto Pulse Propulsor (CPP) and validated analytical performance models. Completed testing one-half of the set of band tracks to evaluate two elastomers. Began testing of lightweight liquid to air heat exchanger. Installed and tested fluid strut suspension for the Light Armored Vehicle (LAV). Results portend significant weight savings and component life extension in the marine environment.

- (U) ($5,193) Mine Detection: Developed technique for analysis of selected data using image processing algorithm. Initiated the Joint Mine Detection Technology Project. Made significant advances in physics-

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based image processing, image synthesis, and automatic target recognition. Made significant contributions to mine detection capability in support of joint and combined operations in both littoral and land operations across the spectrum of conflict. Transitioned Standoff Mine Detection Ground project to Joint Standoff Mine Detection System, C2079, under PE 0603640M, Marine Corps Advanced Technology Demonstrations.

- (U) ($3,240) Marine Air-Ground Task Force (MAGTF) Command, Control, Communications, Computers, and Intelligence (C4I): This program was formerly titled Battlefield Electronic Support. Awarded Intentional Short Range Communications (ISRC) contracts. Demonstrated Air Officer Support Station concepts within the C4I system at Secure Tactical Data Network. Demonstrated Amphibious Assault Planner. Defined Marine Corps Forces (MARFOR) anchor desk requirements. These efforts serve to ensure that communications will be continuous, seamless, and secure in the transition from littoral to land warfare, and that sustainment links are integrated into the command and control network.

- (U) ($2,487) Survivability: Demonstrated Active Exhaust Cancellation system on the LAV. Demonstrated advances in multi-spectral paints. Conducted full scale demonstrations of hybrid Kevlar/Ballistic nylon. Tested ceramic armors on a variety of backing materials. The focus of these efforts is survivability through low signature and penetration resistance. These properties are more sensitive to vehicles that must swim as well as maneuver on the land than to those that are only land mobile. Signatures are also more difficult to control against the littoral background than against a land background. Advances will have wide spread joint application.

- (U) ($1,870) Advanced Amphibious Logistics: Developed system architecture for Recording and Tracking. Demonstrated Warehousing Tagging. Established Cooperative Research and Development agreements. Evaluated Broad Agency Announcements (BAAs) for industry participation in Advanced Amphibious Logistics Technology. Closely coordinated and integrated with compatible efforts by the Army to address theater level sustainment initiatives. These efforts initiate the execution of a road-mapped approach to provide critical technology in support of Operational Maneuver From the Sea, which will mesh with the Army system once ashore.

- (U) ($2,721) Targeting Sensors: Defined architecture for Intelligent Fire Control (IFC) Support Technology test bed. Awarded High-G acoustic transducer contract. Developed database for obscurants and spectral analysis techniques and results.

- (U) ($1,822) Weaponry: Formulated and evaluated positive energy encapsulant. Completed ballistic

evaluations of chemi-luminescent liquid filled projectiles. Optimized core penetrators for titanium sabot for 20 millimeter - 25 millimeter Multi-purpose Tubular Sabot. Technology is available for transition to Naval Air Systems Command, Crystal City, Virginia and the Joint Service Small Arms Program, Picatinny Arsenal, New Jersey.

- (U) ($360) Chemical/Biological Defense (CBD): Demonstrated rapid detection of Biological Agents using goat and mono-clonal antibodies to ricin and applied for patent. Demonstrated Direct Current auto-nulling bridge extraction of small signal transients from high noise background and applied for patent. These are two of the most significant advances made in detection, and are clearly dual use techniques across a broad spectrum of commercial, agricultural, and treaty compliance scenarios. Terminated all CBD Technology efforts in the third quarter of FY 1993, to include minor allowable efforts under Tri-Service Reliance Agreements.

- (U) ($550) Manpower: Developed and validated a theoretical quality of life model via random sampling of 16,000 Marines worldwide. This project was terminated due to funding reductions. The technology was transferred to the Navy.

(U) FY 1994 PLAN:

- (U) ($2,635) Surface Mobility: Evaluate and develop advanced vehicle concepts. Initiate BAA selections. Begin full scale CPP. Analytically evaluate the water jet de-aeration system. Test full vehicle set of lightweight band track with best elastomer compound. Continue testing cooling systems (air-liquid and liquid-liquid). Transition turbine air inlet development to PE 0603640M, Marine Corps Advanced Technology Demonstrations.

- (U) ($2,242) Mine Detection: Develop tunable multi-spectral camera in ultra-violet, visible, and near infrared (IR) light. This is a parallel effort in conjunction with field-deployable agile tunable laser.

- (U) ($2,920) Mine Countermeasures: Evaluate selected anti-mine munitions for integration into Distributed Explosive Technology tasks. Investigate heavy metal liner concepts (tungsten, tantalum, alloys). Complete exploration of initiation concepts for explosive arrays. Focus on Anti-Helicopter Mines via threat characterization, conceptual counter measures, predictive modeling, and breadboard systems.

- (U) ($2,650) MAGTF C4I: Complete three ISRC Phase II contracts. Develop hardware/software specification

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for switched backbone integration and Navy Ultra High Frequency/Marine Corps Super High Frequency Satellite Communication system integration architecture. Demonstrate Network Management Functionality. Demonstrate automated capability for air support request and landing plan generation.

- (U) ($1,520) Survivability: Complete Phase II multi-spectral camouflage paint. Initiate effort on radar false target generator concepts. Continue joint lightweight armor database work. Evaluate new ceramic armor materials and ceramic-metal (CERMET) composites and techniques for forming and combining.

- (U) ($2,400) Advanced Amphibious Logistics: Demonstrate Radio Frequency Tagging and Tracking in a functionality based scenario. Evaluate User Net (USENET) technology to facilitate cooperative logistics coordination and sharing in a chaotic environment, and for information distribution. Host USENET on emerging Command, Control and Communications systems as a demonstration. Assess and evaluate low earth orbit Very Low Frequency satellites for geographical (geo)-tagging facilitization. Survey, re-apply, and modify existing logistics computer models to construct new models to test advanced internet working and object-based paradigms to determine expected Operational Maneuver From The Sea logistics systems behavior.

- (U) ($1,650) Targeting Sensors: Continue implementation of IFC test bed concepts. Implement processing paradigms in Fourier, wavelet, and harmogram pre-processing techniques. Demonstrate functionality of expendable remote acoustic sensors. Continue investigation of technologies in near IR spectrum and provide system trade-off studies for Generation (Gen) II/III obscurant challenges. Initiate modeling effort to study the entire range-gated imaging scenario. Re-evaluate Combat Identification efforts in light of ongoing joint efforts. Compare detailed radar design concepts to optimal systems engineering designs to permit down-selection from Non-Developmental Items. Transition Riverine Acoustic Sensor Systems effort to Advanced Development.

- (U) ($830) Weaponry: Integrate auto-loading components of mortar system into a full scale mock-up to determine space claims and human engineering factors. Continue BAA evaluation process. Develop and test various particle size and packing configurations with burster to optimize cloud configuration. Determine ignition time requirements and optimize over-pressure. Measure combined performance through field tests. Test and evaluate dissemination techniques, visibility recognition ability, and marker-terrain contrast in point recognition tasks.

(U) FY 1995 PLAN:

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- (U) ($2,832) Surface Mobility: Complete full scale CPP. Continue water jet de-aeration. Continue BAA execution. Continue Hybrid Electric drive for Helicopter Transportable Multi-Mission Platform. Continue corrosion prevention and control.

- (U) ($2,539) Mine Detection: Complete Auto Target Recognition effort. Complete and demonstrate camera/laser integration. Initiate the Advanced Technology program under PE 0603640M, Marine Corps Advanced Technology Demonstrations.

- (U) ($2,890) Mine Countermeasures: Continue execution of selected BAAs. Conduct full scale tests in mechanical mine neutralization. Complete definition of surrogate mine countermeasures systems requirements. Evaluate countermeasures techniques. Complete modeling and simulation and conduct system demonstration.

- (U) ($2,725) MAGTF C4I: Demonstrate Tactical Cellular system. Integrate switch backbone in the Communications Support System. Demonstrate coding and software. Demonstrate MARFOR anchor desk concept.

- (U) ($1,502) Survivability: Complete false target generator. Continue optimization of CERMET technologies.

- (U) ($2,602) Advanced Amphibious Logistics: Continue to execute selected BAAs. Complete system concept for Recording and Tracking. Begin system configuration integration for Recording, Tagging, and Tracking. Develop Amphibious Combat Engineering Technologies concepts. Develop Bulk Liquid system concepts.

- (U) ($1,873) Targeting Sensors: Demonstrate IFC system. Continue execution of selected BAAs. Conduct "all-up" demonstration of Expendable Acoustic Remote Sensor. Prepare to transition gated laser video to Advanced Technology Demonstrations. Complete detailed radar design.

- (U) ($820) Weaponry: Demonstrate auto-loader mortar and transition to Program Manager. Evaluate BAAs. Demonstrate advanced concepts in point recognition projectile.

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

(U) WORK PERFORMED BY: IN-HOUSE: MARCORSYSCOM, Quantico, VA; NOCCSC, San Diego, CA; NAVPERSRANDCEN, San Diego, CA; NAVSURFWARCEN CARDEROCKDIV, Dahlgren, VA; NAVSURFWARCENCOASTSYSTA, Panama City, FL; NAVAIRWRCENWPNDIV, China Lake, CA. CONTRACTORS: DOE, Las Vegas, NV/Los Alamos, NM; LANL, Los Alamos, NM; EOS, San Diego, CA; MITECH,

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Vienna, VA; MIKROS, Princeton, NJ; SPARTA, San Diego, CA; General Dynamics, San Diego, CA; AAI Corporation, Hunt Valley, MD; MTU Corporation, Friedrichshafen, FGR; Tracor Hydronautics, Laurel, MD; APL/University of Washington, Seattle, WA; EG&G, Las Vegas, NV; 3M Corporation, Minneapolis, MN; Battelle, Columbus, OH.

(U) RELATED ACTIVITIES:

- (U) This program adheres to Tri-Service Reliance Agreements in Chemical/Biological Defense, Command, Control and Communications, Conventional Air/Surface Weaponry, Electronic Devices, Ground Vehicles, Ships and Watercraft, Manpower and Personnel, and Training Systems.
  (U) PE 0602232N (Command, Control and Communications Technology)
  (U) PE 0603555N (Sea Control and Littoral Warfare Technology Demonstration)
  (U) PE 0603606A (Improved Dispersed Explosives Technology)
  (U) PE 0603611M (Marine Corps Assault Vehicles)
  (U) PE 0603619A (Improved Dispersed Explosives Technology)
  (U) PE 0603635M (Marine Corps Ground Combat/Support System)
  (U) PE 0603640M (Marine Corps Advanced Technology Demonstrations)
  (U) PE 0603782N (Shallow Water MCM Demonstration)
  (U) The Army, Air Force, and Navy Technology Base Programs are monitored by Marine Corps Project Officers through their counterparts in those organizations to ensure that no unwarranted duplication exists.
- (U) The Marine Corps has no National Laboratories who are also bound by reliance compliance.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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PROGRAM ELEMENT TITLE: Command, Control & Communications Technology
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A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Command, Control & Communications Technology	18,775	17,905	21,099	22,891	24,274	24,915	25,631	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Program Element develops technology necessary for the delivery of critical tactical information to decision makers in a timely manner by developing technology for the transmission, fusion, and management of information between the warrior, the Command center, and National Command Authority in a time sensitive and highly mobile environment. Technology developments include areas of connectivity, networking, distributed computer processing, information management, tactical data quality, decision aids and navigation. The major goal is to provide the Navy with the capacity to interconnect government and commercial telecommunication assets in a worldwide network that would be responsive to regional theater challenges to the National interest. Thus, this Program Elements develops technologies which support the effective utilization of naval forces in the conduct of the Joint Mission Areas as defined by OPNAV (i.e., Joint Strike, Littoral Warfare, Surveillance, SEW/I, Strategic Deterrence, Sealift/Protection, and Readiness/Training), particularly Joint Strike, Littoral Warfare, Surveillance, SEW/I, and Strategic Deterrence. In addition, it is vitally associated with the Joint Warfighting Operational Capability "To maintain near perfect real-time knowledge of the enemy and communicate that to all forces in rear-real-time." The Program Element is planned jointly in accordance with Tri-Service Reliance agreements regarding joint development of C3 technology by the Army, Navy and Air Force, and is subject to review and oversight by the Joint Directors of Laboratories Technology Panel for C3.

(U) In cooperation with Army and Air Force under the JDL Technology Panel for C3, this program supports future joint warfare capabilities in near real-time communications and regional engagements.

(U) Operation Desert Storm emphasized priority needs in greater communications capacity and high volume information management. Efforts are part of an integrated Department of Navy Science and Technology program, recently initiated by the Office of Naval Research.

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C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,500) C3 SYSTEM ARCHITECTURE
  - (U) Completed an evaluation of a Navy developed network access and routing architecture named the minimum coverage approximation/handoff assigned multiple access (MINCAP/HAMA) against standard time division multiple access (TMDA) network protocols. MINCAP/HAMA improves the efficiency and throughput of the network.
  - (U) Built a testbed for the Navy Theatre Extension Network (TENet). The TENet is a high capacity radio communication network. Its purpose is to extend the commercial, terrestrial high-data-rate communication network (information highway) employing ATM (Asynchronous Transport Mode) switches and fiber optic cables to the fleet at-sea.
  - (U) Conducted initial over-the-air demonstration of the advanced submarine communications testbed, showing application of open system architecture principles to the submarine radio room.

- (U) ($7,400) COMMUNICATIONS
  - (U) Completed development of the adaptive locally optimum processing algorithm for the joint-service multiband-multimode radio (SPEAKEASY). The algorithm employs high speed digital signal processing to cancel large interfering signals from the passband of a receiver. The capability is particularly important aboard Navy ships which have high power transmitters in close proximity to sensitive receive systems.
  - (U) Transitioned advanced Low-Probability-of-Intercept (LPI) airborne communication system to 6.3A Advanced Technology Demonstration. This effort would provide up to 10 to 1 communications range advantage over that of an interceptor.
  - (U) Transitioned advanced digital anti-submarine warfare (ASW) receiver to 6.3A Advanced Technology Demonstration. This effort would provide up to 99-channels of reception that is that is not available today.
  - (U) Completed land-based vibration testing of the submarine on-hull extremely-low-frequency (ELF) antenna. This effort would replace the need to deploy a 2000-feet buoyant cable antenna which would improve maneuvability and eliminate course-constraint for ELF reception.

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- (U) ($7,250) COMMAND SUPPORT
  - (U) Transitioned the Cronus distributed computing environment to the 6.3 Operational Support System (OSS). Cronus enables the ability to network a number of dissimilar command and control systems within a command center.
  - (U) Installed the integrated Express Transport Protocol (XTP) with the real-time distributed operating system (RT-Mach) on a real-time testbed.
  - (U) Installed the High Grade Security Experiment (HiGS) testbed.
  - (U) Conducted at-sea demonstration of the prototype ASW data quality monitoring system.
  - (U) Demonstrated and transitioned tactical image viewer with feature and shape extraction algorithms to the OSS project.

- (U) ($1,625) NAVIGATION
  - (U) Tested and evaluated first generation fiber optic gyros for shipboard gyrocompass applications.
  - (U) Completed algorithms for absolute velocity measurement and incorporated into NAVSEA passive navigation instrumentation for testing.
  - (U) Completed design and lab test of the stellar-inertial navigation system for aircraft and missile applications.
  - (U) Completed lab experiments of superconductor rotation for gyro applications.
  - (U) Completed investigation of video bandwidth-compression algorithms in noisy environments.

(U) FY 1994 PLAN:

- (U) ($2,650) C3 SYSTEM ARCHITECTURE
  - (U) The three services have agreed to jointly develop the Theater Extension Network (TENet). To do this, a tri-service testbed is being developed to evaluate standard protocols and demonstrate the capability to interoperate. The TENet testbed will link Rome Laboratories, CECOM and NRaD with comercially based high-data-rate links. The first demonstration will show capability to communicate at 1.544 Mbps (commercial T1 rate).
  - (U) Demonstrate the exchange of digital data, imagery and video between the three services.
  - (U) Communication networks require management in the sense of controlling the network configuration in response to failed links, failed routers and bridges, changes, additions and deletions of addresses, etc. Additionally, information must be derived on network usage. Two quasi-standards are in use,

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simple network management protocol (SNMP) based on internet standards and common management internet protocol (CMIP) developed by the International Standards Organization (ISO). Anticipate completion of the development of a common, open, network management architecture that would be adopted by the three services.
- (U) Conduct simulations of submarine participation in Navy communication networks with distributed control.

- (U) ($6,500) COMMUNICATIONS
  - (U) Prepare plans and hardware for installation of the on-hull ELF antenna onboard a submarine for testing.
  - (U) Investigate candidate super-high-frequency (SHF) antennas for submarine deployment.
  - (U) Perform single-antenna field tests of the ELF corona antenna.
  - (U) Investigate joint-service SPEAKEASY radio for use as a communications relay and as a gateway between two different networks. The SPEAKEASY radio is a radio that can simultaneously support several waveforms in different frequency bands. This capability allows the radio to serve as a gateway between two different radio networks and obviates a requirement for some internet gateways.

- (U) ($7,100) COMMAND SUPPORT
  - (U)Transition XTP to DOD and commercial standards organizations. XTP is an open system communications protocol being considered as a national standard for distributed real-time systems.
  - (U) Investigate key technical issues in integrating XTP with RT-Mach distributed operating system.
  - (U) Initiate joint effort with the Air Force to evaluate the new prototype Trusted HETerogeneous Architecture (THETA) distributed operating system.
  - (U) Transition the High Performance Network Interface Unit to the High Speed Digital Switch (HSDS) and the Navy Tactical Command Systems-Afloat (NTCS-A) programs. The network interface provides a common local-area-network interface to heterogeneous command and control systems.
  - (U) Develop improvements in tactical image exploitation including an object-oriented database for extracting objects from images.

- (U) ($1,655) NAVIGATION
  - (U) Conduct critical design review for the shipboard fiber optic gyro program and perform lab

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evaluations.
- (U) Perform real-time at-sea testing of the absolute velocity measuring concept.
- (U) Conduct flight test of the stellar-inertial navigation system.
- (U) Design and build a superconducting gyro.
- (U) Determine impact of error-correcting coding on video bandwidth-compression algorithms.

(U) FY 1995 PLAN:

• (U) ($3,013) C3 SYSTEM ARCHITECTURE
- (U) Demonstrate capability to communicate at T3 rates (~45Mb/s) over the Tri-Service TENet testbed. Investigate extension of the data rate to OC-3 rates (155 Mb/s).
- (U) Multicast is the transmission of messages from one to many addressees. It is used extensively by the Navy. Present standard protocol suites such as TCP/IP do not support multicast and there is no standard protocol package being developed for commercial application. Development of an enhanced standard multicast protocol for military networks and demonstrate over the Tri-Service TENet is planned.
- (U) Apply the submarine network simulation model to the Communication Support System (CSS) architecture.

• (U) ($8,186) COMMUNICATIONS
- (U) Develop key technologies for embedding SHF antenna arrays in aircraft skin.
- (U) Conduct at-sea measurement and demonstration of the submarine on-hull ELF antenna.
- (U) Conduct dual-antenna field tests of the ELF corona antenna array.
- (U) Conduct field testing of a submarine SHF antenna.
- (U) Initiate phase 2 of the SPEAKEASY radio program with Advanced Research Project Agency (ARPA), National Security Agency (NSA) and other services. The SPEAKEASY program is currently a tri service effort to develop a common radio that will suport multiple waveforms over many frequency bands. Propagation in the military UHF band (225-400 MHz) is fairly well behaved. Additionally, antennas for this band are fairly small and simple. Analysis has shown that the channel can support much higher data rates than currently employed. This is done at the cost of more complicated signal processing performing channel equalization and bandwidth efficient modulation schemes. Anticipate the development of bandwidth efficient modulation and channel equalization algorithms suitable for a dynamic high data rate UHF communications channel.

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- (U) ($8,000) COMMAND SUPPORT
  - (U) Demonstrate XTP integration with the RT-Mach distributed operating systems.
  - (U) Integrate the THETA distributed operating system with the HiGS testbed for test and evaluation.
  - (U) Transition the ASW Data Quality Monitoring System to the NTCS-A and the Joint Operations Tactical System II (JOTS II). The ASW Data Quality Monitoring Systems determine data quality and relevance of tactical messages and track databases to facilitate decision making - a capability not available today.
  - (U) Complete development of the tactical image exploitation system and transition to the OSS and NTCS-A programs.
  - (U) Develop multiple interdependent routing algorithms for strike warfare that incorporates joint strike/weapon capability for mobile targets.

- (U) ($1,900) NAVIGATION:
  - (U) Complete shipboard fiber optic gyro development and transition to NAVSEA 6.3 ship gyrocompass program.
  - (U) Develop design concept for a shipboard infrared stellar-inertial navigation system.
  - (U) Test and evaluate the superconducting gyro design.
  - (U) Conduct simulations for video bandwidth-compression algorithms with encoding for high noise environments.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA; NCCOSC/NRAD, San Diego, CA; NAVUNSEAWARCEN DET, New London, CT; NRL, Washington, D.C. CONTRACTORS: Bolt, Beranek and Newman, Cambridge, MA; Carnegie Mellon University, Pittsburgh, PA; Metron, McLean, VA; University of Virginia, Charlottesville, VA; Physical Science Interests, Manhattan Beach, CA.

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(U) RELATED ACTIVITIES:
- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0602782A (Command, Control and Communications Technology)
- (U) PE 0602702F (Command, Control and Communications)
- (U) PE 0603792N (Advanced Technology Transition)
- (U) PE 0603794N (C^3 Advanced Technology)
- (U) This element adheres to Tri-Service Reliance Agreements. It is coordinated through the Joint Directors of Laboratories (JDL) Joint Service Program Plan for C3, and contains no unwarranted duplication of effort among the Military Services.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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PROGRAM ELEMENT: 0602233N
PROGRAM ELEMENT TITLE: Readiness, Training and Environmental Quality Tech
BUDGET ACTIVITY: 2

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Mission Support Technology	46,551	41,338	42,753	43,492	45,531	46,470	47,471	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element (PE) provides generic enabling technologies in support of all Joint Mission Areas/Joint Support Areas (JMAs/JSAs), in particular the JSAs for Readiness, Support & Infrastructure; Manpower & Personnel; and Shore Training. These three JSAs encompass requirements for manning, operating, and maintaining fleet assets, and for providing the necessary training, facilities, and equipment to maintain operating forces in a high state of readiness. The PE also supports the Joint Warfare Strategy "From the Sea" as well as three of the "Top Five" Future Joint Warfighting Capabilities identified by the Joint Chiefs of Staff--in particular, capabilities related to: (a) conducting limited-objective warfare (e.g., technology for enhancing the performance of special forces personnel, aiding decision makers in highly ambiguous situations, and improving casualty care); (b) promptly engaging regional forces worldwide (e.g., technology for deployable training and mission rehearsal, and for logistics support of amphibious landings); and (c) countering weapons of mass destruction (e.g., technology for responding to chemical and biological threats.) The PE encompasses the following areas:

(U) Personnel, Training, and Human Factors technologies enhance the Navy's ability to select, assign, and manage its people; to train effectively in classroom settings, in simulated environments, and while deployed; and to operate effectively in the complex, high stress, information-rich and ambiguous environments of modern warfare. Technology development in these areas responds to a variety of requirements, including: providing more affordable approaches to training and skill maintenance; managing the force efficiently and maintaining readiness with fewer people and smaller budgets; providing warfighting capabilities optimized for low intensity conflict and littoral warfare; and operating and maintaining increasingly sophisticated weapons systems.

(U) Medical, and Chemical/Biological Defense (CBD) technologies improve safety and enhance personnel performance capabilities under adverse conditions; enhance diagnosis of medical emergencies and treatment of casualties; prevent occupational injury and disease in hazardous environments; and improve the ability of the fleet to respond to existing and future CBD threats. Requirements which support technology development in these areas include: improving

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warfighting capabilities through enhanced supply and long-term storage of prepositioned medical supplies such as blood; providing better stress endurance/control for key personnel; providing enhanced casualty care onboard amphibious casualty receiving ships; and maintaining operational capabilities on ships in a Chemical/Biological (CB) environment and those subject to electromagnetic/laser radiation.

(U) Logistics technologies increase operational readiness through effective management and movement of supplies ashore and at-sea, and advanced techniques for more cost-effective construction and maintenance of shore and off-shore facilities. Technology development in these areas responds to a variety of requirements, including: providing the logistic support needed to support amphibious landing; providing the diagnostic technologies that will enable the implementation of a condition-based vs. time-based maintenance philosophy; and providing a long distance logistics supply chain with short reaction time.

(U) Programs in this PE are jointly planned in the Reliance process with the Air Force and Army, via panels of the Joint Directors of Laboratories (JDL), the Joint Engineers, the Training & Personnel Systems Science & Technology Evaluation and Management Committee (TAPSTEM), and the Armed Services Biomedical Research Evaluation and Management Committee (ASBREM).

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($17,455) PERSONNEL, TRAINING AND HUMAN FACTORS TECHNOLOGY:
  - (U) Initiated development of virtual environment (artificial reality) simulation technology for low cost, deployable, reconfigurable systems to maintain and enhance operator skills.
  - (U) Continued development and evaluation of training strategies to counteract the adverse effects of stress on individual and team tactical decision-making.
  - (U) Completed:
    - (U) development of operator interface design guidelines for display of multiple-source sensor data, to improve aircrew target acquisition performance.
    - (U) development of multi-criteria optimization model for personnel assignment decisions, to reduce costs and increase individual satisfaction while maintaining readiness.
- (U) ($13,822) MEDICAL AND CBD TECHNOLOGY:

- (U) Initiated post-attack shipboard chemical hazard analysis to improve operational capabilities in CBD environment.
- (U) Completed:
  - -- (U) development of the silicon-based sensor electrode for detection of a wide range of toxins, and prototype testing of single molecule chemical, biological detector to enhance future fleet CBD detectors.
  - -- (U) field test of antibody based fiberoptic biological detector for upgrade of fleet CBD detectors and to enable clinical diagnosis.
  - -- (U) measurement of agent destruction by a prototype corona and pulsed power device to be installed in ship CBD collective protection systems.
  - -- (U) initial physiologically-based pharmacokinetics model for occupational chemical hazards.
  - -- (U) determination of physical, sleep, hydration, and nutritional requirements to enhance personnel performance during special warfare missions.
  - -- (U) laser dazzle recovery time work which will improve aircrew protection against lasers.
  - -- (U) work on cytokine inhibition therapy for Adult Respiratory Distress Syndrome to enhance combat casualty care capabilities.
  - -- (U) development of stem cells that respond selectively to interleukin 3 which will improve casualty care.

• (U) ($15,274) LOGISTICS TECHNOLOGY:
- (U) Initiated:
  - -- (U) development of sensors for advanced mechanical diagnostics.
  - -- (U) system for measuring rotor systems loads and fault detection in helicopters.
- (U) Continued method of aircraft engine diagnostics by using exhaust pattern recognition technique.
- (U) Completed:
  - -- (U) method of inspection/evaluation process of engine blade reusability for naval depots.
  - -- (U) methods that allow for effective condition based maintenance of hull, machinery and engineering (HM&E) equipment.

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(U) FY 1994 PLAN:

- (U) ($14,204) PERSONNEL, TRAINING AND HUMAN FACTORS TECHNOLOGY:
  - (U) Initiate:
    - -- (U) evaluation of experimental tools for facilitating collaborative tactical situation assessment by the Space and Electronic Warfare Commander and his team.
    - -- (U) development of improved tactile and force sensors and displays for deployable training devices and for enhanced control of teleoperated systems.
  - (U) Continue:
    - -- (U) development and evaluation of an experimental system designed to enhance human decision making performance under conditions of high stress and ambiguity.
    - -- (U) development and evaluation of active sonar simulation techniques to improve training for shallow water antisubmarine warfare (ASW) and mine detection and recognition.
  - (U) Complete:
    - -- (U) development of personnel strength forecasting techniques to improve manpower planning and policy decisions, thereby improving the Navy's ability to manage force reductions without harming readiness.
    - -- (U) development of high-performance special-purpose simulation co-processor concepts to reduce the costs of high fidelity training devices.
    - -- (U) development of advanced data visualization techniques for rapid review of large volumes of undersea surveillance data, in order to reduce analysis time, facilitate manpower reductions and improve ASW decision support.

- (U) ($15,150) MEDICAL AND CBD TECHNOLOGY:
  - (U) Initiate:
    - -- (U) stimulated agent destruction test by microwave plasma device for ship CBD collective protection systems.
    - -- (U) Naval battle analyses including CB warfare for improved threat analysis capability by including CBD threats.
    - -- (U) in-vivo characterization of the immune system's response to prospective therapeutic reagents for enhanced casualty care.
  - (U) Continue:

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-- (U) post-attack shipboard chemical hazard analysis to improve operational capabilities in CBD environment.
-- (U) hardware development of micromachined chemical, biological sensor for detection of single molecule.

- (U) Complete:
  -- (U) development of corona chemical agent destruction device to be installed in ship CBD collective protection systems.
  -- (U) transition of experimental therapies for Adult Respiratory Distress Syndrome to improve casualty care.
  -- (U) determination of sites of destruction of blood substitutes which will ultimately contribute to improved prepositioned blood supplies.
  -- (U) toxicity trials for immune system oral adjuvant which will ultimately improve disease prevention through enhanced immunization.

• (U) ($11,984) LOGISTICS TECHNOLOGY:

- (U) Initiate:
  -- (U) new capabilities for quickly and accurately predicting the geo-technical characteristics of potential amphibious landing sites.
  -- (U) development of non-destructive test methodologies for piers and associated fendering.
- (U) Continue:
  -- (U) techniques to reduce pile handling time associated with construction of expeditionary pier facilities.
  -- (U) development of new techniques and equipment to pump fuel ashore in support of amphibious landings.
- (U) Complete:
  -- (U) integration of hose, fittings, and other components into a compact, lightweight amphibious refueling system.
  -- (U) development of an analytical model that will predict the useful life and most cost-effective design of synthetic mooring lines.

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PROGRAM ELEMENT TITLE: Readiness, Training and Environmental Quality Tech
BUDGET ACTIVITY: 2

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(U) FY 1995 PLAN:

- (U) ($14,690) PERSONNEL, TRAINING AND HUMAN FACTORS TECHNOLOGY:
  - (U) Initiate:
    - -- (U) development of advanced techniques for personnel classification, based on artificial intelligence technologies, in order to enhance readiness and retention by improving the Navy's ability to match individuals to jobs.
    - -- (U) development of mathematical modeling techniques for training resource allocation, in order to optimize the scheduling and management of finite Navy training assets.
  - (U) Continue:
    - -- (U) evaluation of decision support technology and advanced team training strategies for tactical decision making in ship air defense, limited-objective warfare scenarios.
    - -- (U) development of computer-based dynamic visual-spatial tests that can result in improved job performance, fewer training failures, and less equipment downtime.
    - -- (U) evaluation of 3-dimensional audio and visual displays for improved air combat maneuvering and antisubmarine warfare training.
  - (U) Complete:
    - -- (U) development of algorithms to simulate multi-element/beam sonar processing, for more cost-effective air and surface ASW training systems.
    - -- (U) development of techniques to identify, measure and train aircrew coordination skills in order to enhance mission effectiveness and safety.

- (U) ($15,669) MEDICAL AND CBD TECHNOLOGY:
  - (U) Initiate:
    - -- (U) development of abzyme for removal of Rh(D) antigen from red blood cells along with scale-up and limited clinical testing of enzymatically converted type A red blood cells to ultimately contribute to improved prepositioned blood supplies.
    - -- (U) development of recombinant growth factors and cytokines to enhance recovery of injured blood forming and immune systems to improve casualty care.
    - -- (U) development of data to revise over-conservative standards for safe microwave radiation exposures which would put all weather decks off limits, to improve operational readiness while preventing occupational injury.
  - (U) Continue:

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-- (U) Naval Battle Analyses including CB Warfare and Post-attack Shipboard Chemical Hazard Analysis which will improve operational capabilities in CBD environment.

- (U) Complete:
  - -- (U) hardware development of micromachined chemical, biological sensor for detection of single molecule for improved fleet CBD detectors.
  - -- (U) simulant agent destruction by Microwave Plasma device to be installed in ship CBD collective protection systems.
  - -- (U) documentation, validation, and revision of VSLTRACK 1.5/2.0 which will be installed in joint service CBD hazard prediction models and Navy Mobile Operational Support System (MOSS).
  - -- (U) determination of mechanisms whereby sepsis and/or endotoxemia induces vascular tissue contractile dysfunction for improved casualty care.
  - -- (U) definition of intracellular targets for growth factor modulation in hematopoietic cells for improved casualty care.
  - -- (U) determination of effects of freeze-dried platelet transfusion which will ultimately contribute to improved prepositioned blood supplies.

• (U) ($12,394) LOGISTICS TECHNOLOGY:

- (U) Initiate:
  - -- (U) development of an obstacle clearing vehicle that can more rapidly prepare amphibious landing sites.
- (U) Continue:
  - -- (U) development of capability to examine real-time images of debris in oil lubricating systems and make decisions regarding wear or failure condition of the machinery.
  - -- (U) diagnostic and modeling technology for the prediction of pier structural capacity.
- (U) Complete:
  - -- (U) development of a fire retardant, foam-in-place dispensing system for shipboard use to aid in protecting expensive repair parts.
  - -- (U) equipment design of a faster, more capable underway replenishment system for shipboard use.
  - -- (U) diagnostic technology to assess more accurately the structural safety of Navy heavy lift cranes.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA; NAVAIRWARCENACDIV, Trenton, NJ; NAVAIRWARCENWPNDIV, China Lake, CA; NAVAIRWARCENTRASYSDIV, Orlando, FL; NAVSURFWARCEN, Dahlgren, VA; NAVSURFWARCENCOASTSYSTA, Panama City, FL; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NCCC SC, San Diego, CA; NRL, Washington, D.C.; NAVCIVENGRLAB, Port Hueneme, CA; NAVHLTHRSCHCEN, San Diego CA; NAVMEDRSCHINSTITUTE, Bethesda, MD; NAVPERSRANDCEN, San Diego, CA. CONTRACTORS: Smithsonian Institution, Washington, DC; National Institute of Standards and Technology, Gaithersburg, MD; Carnegie-Mellon U., Pittsburgh, PA.; Scientific Management Associates, Landover, MD; Boston Universtiy, Boston, MA; Scripps Institute of Oceanography, La Jolla, CA.

(U) RELATED ACTIVITIES:

- This PE adheres to Tri-Service Reliance Agreements on Training Systems, Manpower & Personnel, Human Systems Interface, Medical, CBD, Civil Engineering, and Environmental Quality. Oversight is provided by the JDL, TAPSTEM, ASBREM, and Joint Engineers.
- (U) PE 0601152N (In-House Laboratory Independent Research)
- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0602232N (Command, Control, & Communications Technology)
- (U) PE 0603706N (Medical Development (Advanced))
- (U) PE 0603707N (Manpower, Personnel and Training Advanced Technology Development)
- (U) PE 0603712N (Environmental Quality and Logistics Advanced Technology)
- (U) PE 0602202F (Human Systems Technology)
- (U) PE 0602205F (Personnel, Training and Simulation)
- (U) PE 0602716A (Human Factors Engineering Technology)
- (U) PE 0602727A (Non-System Training Device Technology)
- (U) PE 0602785A (Manpower, Personnel and Training Technology)
- (U) PE 0602787A (Medical Technology)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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PROGRAM ELEMENT: 0602234N
PROGRAM ELEMENT TITLE: MATERIALS, ELECTRONICS AND COMPUTER TECHNOLOGY
BUDGET ACTIVITY: 2

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Materials, Electronics and Computer Technology	99,030	72,040	80,867	87,329	93,835	96,297	99,963	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Program Element (PE) provides exploratory development to support all Navy advanced weapon and platform system concepts and needs in the areas of materials, electronics, and computer technology. Developmental tasks address significant improvements in terms of performance, reliability, environmental impact, and cost to effect transition of advanced technology to the Navy fleet. Development efforts are part of an integrated Department of Navy Science and Technology process managed by the Office of Naval Research.

(U) This PE develops enabling technologies that support the following Joint Mission Areas: Strike, Littoral Warfare, Surveillance, Space and Electronics Warfare (SEW)/Intelligence, Strategic Deterrence and Strategic Sealift/Protection. Specifically:

(U) Joint Strike addresses technology issues in real-time targeting, surgical lethality, platform survivability, and battle damage assessment. Programs include advanced thermal management materials for avionics, missile domes and seeker technology, advanced materials for aircraft and missile engines, and hybrid (wavelet, fuzzy logic, and artificial neural networks) signal processing.

(U) Littoral Warfare addresses issues in air, surface, and undersea battlespace and develops technology for ship self-defense, air combat, and survivability. Programs include acoustic signature reducing materials, torpedo warhead materials, fiber optic sensors, vacuum electronics, solid state low noise amplifiers, complex systems engineering, and high performance computing.

(U) Joint Surveillance addresses issues of real-time targeting, connectivity, counter-jamming and deception. Programs include infrared sensors, broadband adaptive transmitter/receiver modules, and control components, fiber optics technology, hybrid signal processing, high performance computing, and artificial intelligence.

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(U) Space and Electronics Warfare/Intelligence(SEW/I) is pervasive across all DoD science and technology thrusts and primarily addresses issues in seven major functional areas to include surveillance, communications, command and control warfare, non-cooperative target recognition, and affordability. Programs include lightweight and radiation-hard satellite materials, radio frequency solid state devices, high performance computing, complex systems reengineering and reuse, software engineering environments, hybrid signal processing, formal systems requirement specifications, human computer interaction, and expert computer systems.

(U) Strategic Deterrence addresses issues of maintaining a responsive readiness to support and conduct strategic nuclear offense, coordinated air strikes and amphibious warfare. Programs include advanced ballistic missile launcher materials and radio frequency solid state devices for secure communications.

(U) Strategic Sealift/Protection addresses issues of supporting DoD strategic mobility and logistics requirements as well as employment of naval forces to control open ocean areas and assure access to littoral regions. Programs include advanced long-life materials for repair of aircraft at sea.

(U) In addition, this PE directly underpins the Readiness and Infrastructure Joint Support Areas especially in the domains of environmental quality and logistics. Programs include environmentally acceptable coatings for both aircraft and ships and the maintenance of the Navy pier and wharf infrastructure for surge capacity.

(U) This PE also supports the Office of the Secretary of Defense Science and Technology Investment Strategy in the following Future Joint Warfighting Capabilities: Real-Time Knowledge of the Enemy, Prompt Engagement of Regional Forces on Global Basis, Lower-End Actions, Space Control, and Countering Threat of Weapons of Mass Destruction. In particular, materials projects support affordable performance increases in radomes, infrared windows, advanced engines, and platform signature reduction that will allow achievement of military objectives with minimum casualties and collateral damage. Materials programs also directly support lightweight, survivable satellite and spacecraft thermal control materials that will positively affect the U.S. ability to control the use of space. The PE is an integral part of the following Department of Defense Key Technology Areas: Materials and Structures, Electronic Devices, and Computers. As a foundational technology area it has impact in most other DoD Key Technology areas as well.

C. (U) JUSTIFICATION FOR PROJECTS:

(U) FY 1993 ACCOMPLISHMENTS:

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PROGRAM ELEMENT TITLE: MATERIALS, ELECTRONICS AND COMPUTER TECHNOLOGY
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- (U) ($34,545) MATERIALS:
  - (U) Demonstrated thin-film diamond coatings on zinc sulfide and zinc selenide sensor windows for tactical missiles through rain erosion testing, and developed first generation anti-reflection coatings for bulk diamond and coated diamond windows. Diamond permits the operation of these zinc ceramics at up to Mach 1 in sand and rain with much less damage than uncoated domes, permitting a wider envelop of safe flight for the missile and operational flexibility.
  - (U) Down-selected intermetallic material compositions for demonstrations of increased thrust-to-weight ratio in next generation integrated high performance turbine engine technology. Intermetallics are half the density of superalloys with higher temperature potential. The orthorhombic titanium-aluminide intermetallics appear to have the potential to replace superalloys in aircraft engine compressors, permitting the lowered weight and higher speed needed for engine thrust and efficiency increases.
  - (U) Completed the development and demonstration of concepts, materials, and procedures for practical field level repair of organic-matrix aircraft composites. Materials include adhesives that may be stored for long periods at ambient temperature and heat blanket curing techniques.
  - (U) Completed Phase 1 of the robust processing of advanced composites initiative, establishing efficient production techniques for high thermal conductivity carbon fibers. These fibers have conductivities of 1000-1100 W/m-K (watts per meter-degree kelvin) and may be incorporated in metal-matrix composites for lightweight thermal radiators for satellites or thermal plane heat sinks for ship and aircraft standard electronic modules.
  - (U) Completed the development of thin-walled, coated carbon-carbon spacecraft truss structure for on-orbit weight reduction. Carbon-carbon is a low-density thermally stable and radiation hard material, but requires coating for low-earth orbit protection against oxidation.
  - (U) Completed the hydrostatic bearing development for eliminating noise in main-shaft submarine bearings. Stick-slip frictional noise is a principal low speed acoustic signature for submarines, which is mitigated by pumping low pressure water between the shaft and bearing staves to maintain a hydrostatic film even at low speed.

- (U) ($45,903) ELECTRONICS:
  - (U) Demonstrated all the components of a 16-bit, 125-Megasample/sec (MS/sec), 20 W Analog/Digital (A/D) converter. High speed, high resolution A/D converters are required to increase the sensitivity of advanced Anti-Submarine Warfare (ASW) receivers, shipborne over-the-horizon high resolution radars, and airborne high-resolution surveillance systems.
  - (U) Continued the Navy-led, Tri-Service initiative on radio frequency vacuum electronics technology for

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development of vacuum electronic components. The program is developing the vacuum technology base to support Army, Navy, and Air Force system applications in the areas of radars, electronic countermeasures, and communications. The program is also addressing issues to rejuvenate the vacuum electronics industry.

- (U) Demonstrated a 1.3W pulsed impact avalanche transit-time device at W band. This device can serve as the basis for a compact transmitter for missile seeker applications requiring high resolution.
- (U) Established Navy-led Tri-Service program in computer-aided microelectronics to promote the rapid insertion of electronic technology into systems. Successful use of high level computer languages such as the Very High Speed Integrated Circuit Hardware Description Language will permit relatively rapid system upgrades and help address the obsolete parts issue. The program is currently addressing the Standard Electronic Module, a board which is used throughout the Services in various systems applications.
- (U) Demonstrated a 6-18 gigahertz, 100 Watt microwave power module (MPM) incorporating a solid-state driver, vacuum electronics power booster, and integrated power supply. This approach integrates the high efficiency of solid state technology with the high power capability of vacuum electronics technology to provide a compact and relatively low cost transmitter for radar and electronic warfare phased-array applications.
- (U) Demonstrated buried conductor technology to interconnect silicon-on-insulator bipolar transistors. The buried conductor is compatible with the high temperatures encountered in device and circuit fabrication and can lead to the implementation of circuits for high temperature operation and three-dimensional (stacked) integrated circuits for applications such as smart focal plane arrays.

• (U) ($18,582) COMPUTERS:

- (U) Demonstrated computer learning with multiple threats via simulation of a multiple plane dogfight. This provided further evidence of the power of genetic algorithms (GA) as a machine learning tool and contributed to the development of GA-based techniques suited to the learning of complex control strategies and to the execution and assessment of tactical doctrine.
- (U) Developed and demonstrated enhanced signal, image and acoustic processing utilizing simulation tools for the design of smart weapon applications to support global surveillance, targeting and affordability.
- (U) Developed baseline automated "computer-intensive" system engineering tools to facilitate the design and optimization of large, complex mission critical systems for parallel/distributed hardware and software architectures. The tools are used in forward system composition methodology to support design, prototyping, and assessment of large-scale computer-based systems (e.g. AEGIS, Advanced Combat Direction System, Tomahawk, E-2C, New Attack Submarine, and 2003 (next generation ship system).
- (U) Demonstrated a 100X100 neural network self-learning array, capitalizing on efforts in PE 0601153N,

(Defense Research Sciences), for airborne target detection in clutter. In contrast to previous work in analog neural networks, this digital neural network is more flexible and can handle a number of traditional neural network signal and imaging processing algorithms as well as wavelet and fuzzy logic algorithms.

- (U) Completed the development of strategies for discourse modeling as the basis for the design of software supporting multi-modal interfaces to advanced decision aids, such as simulation-based planning tools and expert systems. This provided an approach for smoothly integrating natural language processing, and advanced graphics to enhance Command and Control information management systems.
- (U) Completed the preliminary design for an intelligent tutoring system utilizing artificial intelligence-based technology as a substitute for the human instructor in aircrew coordination training (ACT). A module was built incorporating rule-based reasoning about ACT scenarios which, when integrated within a tutorial system, yields a significant reduction in the training instructor's workload and improves readiness and training.
- (U) Formed the West Virginia High Technology Consortium Foundation to explore and develop a model virtual corporation for agile manufacturing. Computational and manufacturing assets are integrated with management resources to demonstrate technical and cost benefits.
- (U) Demonstrated technology towards acquiring the paperless ship through electronic access to media. This reduced the ship's loading volume and weight and decreased information access time.

(U) FY 1994 PLAN:

• (U) ($25,618) MATERIALS:
- Continue:
  -- (U) development of environmentally compatible, controlled-release biomolecular antifoulants for reduced fuel consumption, drawing on efforts transitioned from PE 0601153N. Biofouling on ship bottoms causes increased turbulence, which wastes fuel and elevates noise levels, and leads to a severe maintenance burden for removal. Traditional antifouling paints are based on toxic heavy metals that are being prohibited for environmental reasons. Basic research has identified biologically based antifouling chemicals that are specific to fouling organisms and do not poison the environment.
  -- (U) demonstration of improved lethality of torpedo warhead materials against new threat environments. Modern threats demand both material and design improvements to maintain a technological edge in this area.
  -- (U) development of airfield pavement materials for the high temperature jet engine environment to

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eliminate engine damage from pavement fragments. Navy and Marine vertical take-off and landing aircraft (AV-8B and V-22) and the F/A-18 cause high temperature distress of airfield pavements to a greater extent than other service aircraft. This uniquely military problem is being addressed through the development of advanced pavement testing techniques and the formulation of specific concretes for high temperature resistance.

- Complete:
  - -- (U) transition of hollow superplastic formed/diffusion bonded ship propeller development for decreased noise. Hollow propellers can be damped to reduce noise associated with cavitation and frictional stimuli. The application of superplastic forming/diffusion bonding, developed for aircraft and spacecraft, provides a cost effective fabrication method.
  - -- (U) tests of carbon-carbon satellite radiators for lower weight thermal management systems. The incorporation of high thermal conductivity carbon fibers in a carbon matrix will provide a low density thermal radiator option for satellites. Carbon-carbon composites are more resistant to laser and electromagnetic pulse damage than the copper alloys currently used.

• (U) ($33,932) *ELECTRONICS:*

- Continue:
  - -- (U) demonstration of an artificial neural network with 10^4 synapses (interconnects) on a single monolithic chip implemented in thin-film silicon-on-sapphire for low power, high speed applications such as signal classification.
  - -- (U) demonstration of a high efficiency (95-97%) power supply with a power density of $100W/in^3$ to reduce, in some cases, the system volume consumed by the power supply from 80% to 20%, as well as reduce the power supply weight by a factor of 10.
  - -- (U) demonstration of a high duty cycle (4-10%), low-noise crossed-field amplifier (CFA) for the SPY-1 radar. Thermal analysis is an integral part of the design and will make use of computational techniques developed as a part of the Navy-led Tri-Service Vacuum Electronics Initiative. The high duty cycle CFA will be used together with Moving Target Indicator techniques against low radar-cross-section targets in a high clutter environment.
  - -- (U) development of a frequency-tunable antenna element for a superconducting, superdirective antenna array. The Navy requires low-profile antennas on missiles to detect low-observable targets. The low-loss of superconducting interconnects improves the antenna's radiation efficiency while the use of a superdirective antenna array with frequency-tunable elements provides the needed performance for missile applications.

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- Complete:
  -- (U) development of L-band monolithic receiver front-end. Current technology at these frequencies (400-1400 MHz) requires filter components that are relatively large. The use of semiconductors to implement the filters will reduce the size and permit their use in airborne data links.

• (U) ($12,490) COMPUTERS:
- Continue:
  -- (U) development of wavelet-aided tracking algorithms to facilitate the classification of images by multi-resolution processing of air and ground targets in structured clutter and to enhance air superiority and defense as well as precision strike lock-on-after-launch imaging systems in support of global surveillance and targeting.
  -- (U) development of a general purpose intelligent team-learning software system and demonstration of the utility of genetic algorithms for learning to control aircraft in a simulated tactical domain. This effort is essential to enhance the design of intelligent distributed air-combat training systems.
- Complete:
  -- (U) development and demonstration of a first generation prototype of automated specification, design and traceability tools for complex processor-intensive military systems. This will establish key integrated capabilities to support a full forward system composition methodology for design, prototyping, and assessment of large-scale, computer-based systems and enable the production of more reliable, predictable and affordable systems.
  -- (U) reconfiguration of the existing Naval Global Ocean Prediction Systems to run in a massively parallel, distributed memory computer to measure their performance in this new technology and to assess grid granularity needed to measure and predict behavior in littoral areas.
  -- (U) demonstration of high technology to exploit agile manufacturing. This major demonstration will be hosted by the West Virginia High Technology Consortium Foundation.

(U) FY 1995 PLAN:

• (U) ($29,593) MATERIALS:
- Continue:
  -- (U) development of an advanced liner material with enhanced burn-through resistance for the vertical launch system (Standard and Tomahawk missiles). Current polymer liners do not permit

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multiple launches of advanced missiles using higher energy propellants.
-- (U) demonstration of an anti-fouling release system for biomolecularly derived antifoulants or other antifoulant materials. Release capsules based on micro-tubules, which are self-assembling structures resembling miniature soda-straws and are themselves based on biological analogues, appear to provide the necessary release rate and long life.
-- (U) identifying failure mechanisms in materials used for the repair of Navy piers and wharves. The Navy must maintain a large infrastructure for surge shipping capacity. This infrastructure requires better understanding of the failure of current materials.

- Complete:
-- (U) development of environmentally compliant aircraft coating system including a non-chromate (non-toxic) pretreatment process and a low volatile organic (less than 200 gram per liter) water-borne urethane coating. Coatings of this type are needed to meet future environmental restrictions for both air quality and waste disposal.
-- (U) qualification of a flexible graphite/copper thermal strap for use on Navy GEOSAT satellite and its commercial derivative for weight savings and reliability. Thermal straps conduct heat from internal satellite components to exterior heat radiators.
-- (U) demonstration of higher efficiency thermal barrier coatings for turbine engines with 100° C temperature increase and improved resistance to mechanical shedding under load. This temperature increase is equivalent to approximately a 25% increase in thermodynamic efficiency in aircraft engines while still using traditional superalloys for turbine blades.
-- (U) demonstration of a lower cost (versus tantalum) tungsten shaped charge liner material for use against multiple threats without degradation in performance.

• (U) ($39,870) ELECTRONICS
- Continue:
-- (U) demonstration of Silicon Germanium (SiGe) Heterojunction Bipolar transistor with 100 Watt output, and 55% power-added efficiency at S band. Such performance will permit application of the device to the SPY-1 upgrade.
-- (U) integration of the Microwave and Millimeterwave Advanced Computational Environment being developed under the Navy-led Tri-Service Vacuum Electronics Initiative and Monolithic Microwave Integrated Circuit design systems. This will create a design environment for the efficient design of MPMs for Electronic Warfare, radar, and communication applications.

- Complete:

-- (U) development of high resolution (16 bit), low speed (100 Kilosamples/sec), low power (1 mW) A/D converter implemented in thin-film silicon-on-sapphire. The Navy requires A/D converters of this type for low-cost, low power deployable sensor systems and SIGINT applications.
-- (U) development of dual-band (3-5um and 8-12um) monolithic infrared focal plane array (IRFPA). This approach will eliminate the need for a separate array for each wavelength band, which is the current approach. The dual-band capability provides for enhanced target detection in infrared search and track, forward-looking infrared, threat warning, and missile seeker applications.
-- (U) development of 400-1400 MHz adaptive Transmit/Receive module for Airborne Early Warning radar applications. The adaptive capability provides for improved interference rejection and electronic counter-countermeasure capability, and enhances target detection and track, of low observable targets.
-- (U) development of large (1"x 1"), monolithic, 512x512 element HgCdTe mid-wave (3-5um) IRFPA. The hybrid approach currently used suffers from reliability and cost problems. The large monolithic array, where the detector array and readout circuitry are collocated on the same chip, will reduce cost because of the reduced processing cost and higher yield associated with the silicon-based monolithic approach. Reliability will be increased because the monolithic approach eliminates the hybrid bump-bond structure, which is prone to failure during cooling cycles. The chip will provide target detection in high clutter due to increased resolution.
-- (U) development of laser technology with emphasis on non-acoustic anti-submarine warfare/mine detection and infrared countermeasures applications.

• (U) ($11,404) COMPUTERS:
- Initiate:
-- (U) development of algorithms to demonstrate an initial model of processor architecture graphs to which data flow application descriptions can be mapped automatically to yield computer-intensive systems on best-fit hardware for the given application. This effort supports Navy undersea warfare and signal processing programs and will enable the transfer of software from one parallel platform to a dissimilar parallel platform with relative ease.
-- (U) establishment of a tactical missile processing testbed for comparison of alternative single and combined image processing software and electronic device technologies (e.g., neural networks wavelet and fuzzy logic) in a real-time controlled environment utilizing real-world sensors and data. Measurements are critical to determine the technology insertion opportunities for both individual and combined components and to provide validated parameters for use in simulations. First focus is

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towards launch-to-target lock-on capabilities and sensor/weapon retasking in support of precision strike, air superiority and affordability.

- Continue:
  - -- (U) demonstration of hybrid processors (neural net, fuzzy logic, and wavelet combination) for real-time detection /classification of airborne targets in a controlled environment in support of increased standoff range for air superiority and defense as well as command and control warfare awareness.
  - -- (U) demonstration of prototypes that represent the enhanced performance, functionality and affordability of existing complex operational algorithms/ systems which have been redesigned or retargeted for a massively parallel architecture.
  - -- (U) development of prototype software for the recognition of objects and for the control of a mobile robot. This will demonstrate the power of a novel approach (tripod operators) to the use of range image data, and the utility of a reactive technique for sensor-based control. Targeted applications include carrier-deck robotics (fire-damage control,material handling), as well as tasks in manufacturing in support of the surveillance mission area. This effort provides the mapping of algorithms to processors for the testbed identified above.
- Complete:
  - -- (U) development and demonstration of a sub-system of the AEGIS system using forward and reverse system composition methodology and prototype automation aids for specification and analysis of performance of at least three alternative designs. This will provide a fully integrated, automated environment to support affordable and evolutionary system design methodology for large complex computer-based systems.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVFACENGSERCEN, Port Hueneme, CA; NAVAIRWARCENACDIV, Warminster, PA and Trenton, NJ; NAVAIRWARCENWPNDIV, China Lake, CA; NAVSURFWARCENDIV, Dahlgren, VA; NAVSURFWARCEN CARDEROCK DIV, Bethesda, MD; NAVSURFWARCENDIV, Crane, IN; NUWC, New London, RI; NRL, Washington, DC; NCCOSC(NRaD), San Diego, CA. CONTRACTORS: Advanced System Technologies, Englewood, CA; ALCOA, Alcoa Center, PA; Alliant Techsystems, Minneapolis, MN; Amoco Performance Products, Alpharetta, GA; Automated Sciences Group, Silver Spring, MD; BP Chemicals (HITCO), Santa Ana, CA; Battelle Northwest Labs, Richland, WA; Charles Stark Draper Labs, Boston, MA; Colorado School of Mines, Golden, CO; Computer Sciences Corporation, Fairfax, VA; Cornell Univ., Ithaca, NY; Corning, Inc., Corning, NY; Courtaulds Aerospace, Glendale, CA; Computer Command & Control Company, Philadelphia, PA; Critical Software, Los Angeles, CA; Drexel University, Philadelphia, PA; EG&G

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Washington Analytical Services Center, Rockville, MD; Einstein Medical Center, Philadelphia, PA; FMC Naval Systems, Minneapolis, MN; General Electric Aircraft Engines, Evandale, OH; General Research Corp., Santa Barbara, CA; Grumman Aerospace, Bethpage, NY; Harris Government Information Systems Div, Melbourne, FL; Hercules Aerospace Co., Magna, UT; Hughes Aircraft, Carlsbad, CA; Hughes Ground Systems, Menlo Park, CA; Hughes Research Center, Santa Barbara, CA; IBM Watson Research Center, Yorktown Heights, NY; Intermetrics, Cambridge, MA; Johns Hopkins University Applied Physics Lab, Laurel, MD; Loral Infrared Imaging and Systems Division, Lexington, MA; Loral Rome Computers, Los Angeles, CA; Jet Propulsion Laboratory, Pasadena, CA; LaQue Center for Corrosion Technology, Wrightsville Beach, NC: Lockheed Missiles and Space Co., Sunnyvale, CA; Management, Communications, and Control Inc., Arlington, VA; Martin Marietta Labs, Baltimore, MD; Materials Sciences Corp., Fort Washington, PA; McDonnell-Douglas Aircraft, St. Louis, MO; MITRE, McLean, VA; National Institute for Standards and Technology, Boulder, CO and Gaithersburg, MD; Night Vision Lab, Fort Belvoir, VA; Norton Co., Northboro, MA; Northrop, Rolling Meadows, IL; Pratt & Whitney Aircraft, West Palm Beach, FL, and East Hartford, CT; Raytheon Research Division, Lexington, MA; Rockwell Science Center; Thousand Oaks, CA; Rutgers Univ., New Brunswick, NJ; Southern Research Institute, Birmingham, AL; Southwest Research Institute, San Antonio, TX; Texas Instruments, Dallas, TX; TRIDENT Systems, Fairfax, VA; United Technologies Research Center, East Hartford, CT; University of California, Berkeley and Santa Barbara, CA; Varian, Beverley, MA; West Virginia High Technology Consortium Foundation, Fairmont, WV; Westinghouse, Baltimore, MD.

(U) RELATED ACTIVITIES: This PE adheres to Tri-Service Reliance Agreements on Advanced Materials, Electronic Devices and Computer Technology with oversight provided by the Joint Directors of Laboratories and Joint Engineers. This PE is integrated with the Navy's 6.1, 6.2, and 6.3A PE's shown below and is fully coordinated with efforts in the following other-Service PE's:

- (U) PE's 0601102A, 0601102F, 0601153N (Defense Research Sciences)
- (U) PE's 0602105A, 0602102F (Materials Technology)
- (U) PE's 060705A, 060709A, 0602204F, 0602702F (Electronic Devices Technology)
- (U) PE's 0602783A, 0602789A, 0602202F, 0602204F, 0602702F (Computer Technology)
- (U) PE 0602303A (Missile Technology)
- (U) PE 0602601A (Combat Vehicle and Automotive Technology)
- (U) PE's 0602702F, 0602232N (Command, Control and Communications)
- (U) PE 0602786A (Logistics Technology)
- (U) PE 0602111N (Surface/Aerospace Surveillance & Weapons Technology)
- (U) PE 0602121N (Surface Ship Technology)

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- (U) PE 0602122N (Aircraft Technology)
- (U) PE 0602314N (Undersea Surveillance & Weapons Technology)
- (U) PE 0602323N (Submarine Technology)
- (U) PE 0602270N (Electronic Warfare Technology)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: U.S./Japan Cooperative Materials Project for Advanced Steel Systems.

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Electronic Warfare Technology	17,662	14,729	18,095	18,653	20,643	21,179	21,76[illegible]	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Navy Electronic Warfare (EW) Science and Technology (S&T) Program addresses identified technology requirements for EW in cooperation with the other Services, placing special emphasis on Naval EW roles in Command and Control Warfare (C2W). This program develops technologies which support the effective utilization of naval force capabilities in the conduct of the Navy's Joint Mission Areas (JMAs) as defined by OPNAV (i.e., Joint Strike, Littoral Warfare, Surveillance, Space and Electronics Warfare (SEW)/Intelligence, Strategic Deterrence, Sealift/Protection, and Naval Readiness and Training). It is also vitally associated with future joint warfighting capabilities of "maintaining near perfect real-time knowledge of the enemy..." and "to counter the threat of...cruise missiles to the Continental United States (CONUS) and deployed forces". The program is planned jointly in accordance with Tri-Service Reliance agreements which allocate various EW disciplines and their attendant technology development responsibilities between the Army, Air Force and the Navy. As part of the Integrated S&T EW Program, it is subject to the review and execution oversight by the Joint Defense Laboratories (JDL) Technology Panel for Electronic Warfare (TPEW).

(U) The emergence of a polycentric strategic environment, the evolving and diversified nature of the threat, and the proliferation of arms and technology have contributed to shifting the focus of conflict to regional and littoral areas. Concurrently, the global arms industry continues to supply increasingly sophisticated sensors and weapons to the world-wide arms market. The heterogenous combination of military and commercial systems dictates the need to develop more advanced EW technologies which will be able to adequately exploit and counter the use of these new threats.

(U) The structure and balance of this program are responsive to OPNAV guidance and identified System Command warfighting requirements and needs. The program features the integration of 6.1 category programs and the 6.2 exploratory development programs with 6.3A EW core programs and Advanced Technology Demonstrations (ATDs) which can produce prototypes suitable for naval force deployments and demonstrations. Program integration is achieved through the transition and implementation of program products. The program continues to support the Navy's highest priority need,

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Ship Self-Defense (SSD). It develops EW technologies to counter a range of threats (including multi-spectral/multi-modal sensors and seekers) and span the entire electromagnetic spectrum by improving threat detection, identification, and location in the battle space. The program transitions new technologies to Tactical Aircraft (TACAIR), low observable aircraft, surface EW platforms, and Pre-Planned Product Improvement (P3I) programs through developmental upgrades and direct technology insertions.

C. (U) JUSTIFICATION FOR PROJECT:

Unlike the majority of technology programs, the EW S&T program is neither narrow in scope or product, nor is it focused on a single platform or even a specific family of threats. Indeed it supports air (TACAIR/Helos/Transport), surface, subsurface and space based platforms by active and passive employment of the techniques, tactics and systems/subsystems which it develops. The taxonomy of the program is organized into Threat Warning(RF/IR-EO), Self-Protection(RF/IR-EO) and Mission Support areas, which is identical to the organization of the JDL-TPEW. As previously stated, this program's primary focus is on the Navy's number one priority is Ship Self Defense, yet it concurrently supports several high priority S&T requirements as formulated by JMA Panels. Specific JMA requirements principally supported include: (SEW/I)-C2W Target Neutralization, C2W Planning/Execution/ Assessment Tools, and Battle Damage Assessment; (STRIKE)-Survivability, Target and Kill Time-Critical Targets; (LITTORAL)-"Puncture Proof" self-defense, reduction of own ship signatures. To a lesser extent: (SURVEILLANCE)-Relocatable target detection capability; (STRATEGIC DETERRENCE)-Statistical modeling of wargame scenarios, and (TRAINING & READINESS)-Embedded training and performance support. Finally, the program supports the Navy's assigned near term responsibilities within the newly defined, joint service Infrared Countermeasures (IRCM) program.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($6,884) SSD:
  - (U) Demonstrated integrated shipboard EW sensor algorithms in a real world environment incorporated optimized algorithms into SSD Initiative/Quick Reaction Combat Capability (QRCC) program.
  - (U) Developed Small Ship Compatible Decoy and Light Weight MK-36 compatible decoy payload.
  - (U) Explored results of technologies evaluating surface ship decoy work, DDG-51 model development, and evaluated generic countermeasures concepts against anti-shipping missiles.
  - (U) Continued development and evaluation of a shipborne millimeter wave (MMW) receiver/jammer prototype.
  - (U) Interfaced existing small ship jammer hardware with the SLQ-32 system.
  - (U) Evaluated computer simulations of helicopter dynamics, investigated tether dynamics, and adapted

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flight control technology to the tethered decoy problem in support of FY95 ATD proposal EAGER.
- (U) Analyzed, designed, fabricated and tested several full scale Multi-cloud infrared (IR) chaff decoys.

- (U) ($3,682) AIRCRAFT THREAT WARNING AND SELF PROTECTION:
  - (U) Prepared kinematic Advanced Material Decoy technology for tactical and combat support aircraft for transition to 6.3/6.4 product improvement programs following demonstration of full-up rounds.
  - (U) Demonstrated an advanced Specific Emitter Identification (SEI) processor to improve maritime surveillance capabilities of Navy aircraft.
  - (U) Fiber-Optic Laser Warning System completed and tested.
  - (U) Flight test evaluation of Color Balanced Flare composition in MJU-8/B sized hardware.

- (U) ($7,096) SEW/I AND LITTORAL JMA REQUIREMENTS:
  - (U) Results of the Over-the-Horizon Radar/High Frequency (OTHR/HF) Radar experiments were used to design and develop a nearfield noise jammer.
  - (U) Inserted Polarization Vector characterization technology into on-going Radio Frequency (RF) countermeasures ATD efforts at the close of FY93.
  - (U) Demonstrated full-up, object-oriented environment generation of a naval combat environment.
  - (U) Developed automatic recognition processor for ship identification using artificial intelligence/neural nets.
  - (U) Phase II Quadrature channel receiver demonstrated.
  - (U) Demonstrated prototype displays for resource control and usage time-line analysis.
  - (U) Provided hardware evaluation systems in support of fleet requirements for feasibility demonstrations of SEI in actual operational conditions.

(U) FY 1994 PLAN:

- (U) ($9,083) SSD:
  - (U) Demonstrate EW effectiveness monitoring of own ship's EW system during at-sea trials; conduct at-sea test of EW sensor fusion algorithm to demonstrate improved performance and effectiveness.
  - (U) Demonstrate feasibility of portable universal environment simulator during at-sea testing.

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- (U) Demonstrate high altitude/line-of-sight jammer against OTHR/HF radars.
- (U) Demonstrate at-sea the generation of creditable, false radar targets using the Van Atta Array modulation concept on an RF decoy.
- (U) At-sea demonstration of effectiveness of thin ring millimeter wave chaff in full up chaff rounds against simulated missile threats.
- (U) Demonstrate shipborne millimeter wave receiver/jammer techniques in the laboratory using low power components.
- (U) Demonstrate the effectiveness of the shipborne IR Distraction Decoy during at-sea tests.
- (U) Demonstrate Infrared Search and Track (IRST) countermeasures hardware and techniques during flight tests.
- (U) Complete fabrication and perform wind tunnel stability testing of Small Ship Compatible Decoy.
- (U) Demonstrate the Laser Tethered Decoy Vehicle concept by flight testing a feasibility model.
- (U) Perform land-based and at-sea testing of the Small Ship Jammer.
- (U) Conduct at-sea test of EW sensor fusion algorithms to demonstrate improved performance and effectiveness.

• (U) ($1,800) AIRCRAFT THREAT WARNING AND SELF PROTECTION:
- (U) Flight test and demonstrate the effectiveness of the Smart Towed IR Decoy.
- (U) Provide SEI hardware and perform operational testing to demonstrate design maturity and applicability of the technology base work for transition to a 6.3/6.4 program.

• (U) ($3,846) SEW/I AND LITTORAL JMA REQUIREMENTS:
- (U) Demonstrate the final design of a digitally augmented receiver to be used for advanced signal detection.
- (U) Demonstrate the Phase II Microwave/Millimeter Wave Monolithic Integrated Circuit (MIMIC) technology (analog) Electronic Support Measures (ESM) receiver.
- (U) Develop broadband subsystems including antenna arrays, switching networks, and amplifiers for the Advanced Multi-mode Active Electronic Countermeasures (ECM) System.
- (U) Demonstrate Expert System technology as applied to state-of-the-art ESM systems to enhance signal identification, decision making and resource allocation/management tasks.
- (U) Demonstrate Radar Warning/IR Warning Receiver fusion feasibility during land testing.
- (U) At-sea test of EW sensor fusion algorithms to demonstrate improved performance and effectiveness.

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(U) FY 1995 PLAN:

- (U) ($9,850) SHIP SELF DEFENSE:
  - (U) Evaluate Doppler difference hardware from received signals and estimate the seeker pointing angle for a determination of ECM effectiveness in real time.
  - (U) Develop and test real time data interfaces for multiple shipboard EW sensors and design a prototype sensor integration system.
  - (U) Incorporate a multiple tap delay line into the Van Atta Array modulation brassboard providing phase matched pulse stretching of four multiplexed optical signals.
  - (U) Test high powered lasers and conversion systems and develop full scale vehicle requirements of the Laser Tethered Decoy Vehicle concept.
  - (U) Investigate the feasibility of using a low altitude decoy concept against advanced IR seekers.
  - (U) Perform ground test of a MMW jammer using an operational missile system.
  - (U) Optimize the IR Distraction Decoy design and investigate deployment parameters, demonstrate in over-water firings against anti-ship cruise missile simulators.
  - (U) Complete Optical Augmentation (OA) and foreign IRST susceptibility tests.
  - (U) Complete final design of the Rigid Inflatable RF/IR decoy and perform deployment tests using the MK-36 DLS.
  - (U) Develop anti-ship missile real-time effectiveness measures that correlate ESM and integrated acceleration data from Doppler radar tracks.
  - (U) Demonstrate risk reduction of Long Duration Tethered Electronic Decoy.
  - (U) Fabricate and test an optimal demonstration vehicle and an antenna isolation model for determining the vehicle design compatibility.
  - (U) Optimize the IR Distraction Decoy design and investigate deployment parameters. Demonstrate in over water firings against anti-ship cruise missile simulators.
- (U) ($3,768) AIRCRAFT THREAT WARNING AND SELF PROTECTION:
  - (U) Smart Towed IR Decoy will be evaluated for potential use in helicopters.
  - (U) Field test Radar Warning Receiver/IR Warning Receiver (RWR/IRWR) full-up fusion demonstration.
  - (U) Flight test/at-sea test of full-up automatic SEI system.
- (U) ($4,477) SEW/I AND LITTORAL JMA REQUIREMENTS:

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- (U) Fabricate and test a large, planar array for the Advanced Multi-mode Active ECM system.
- (U) Conduct final Tri-service demonstration of a digitally augmented receiver.
- (U) Develop and test technology for an embedded, at-sea team training capability for EW C2 and the Navy Tactical Command System Afloat.
- (U) Demonstrate the integration of SEI techniques, precision ESM and combat system tracks.
- (U) Demonstrate ultra high speed beam-forming, multimode volume-search and directed-look operation employing an Integrated Multimode Antenna phased-array concept.
- (U) Demonstrate a portable universal environment simulator design meeting fleet requirements for underway training and EW equipment checkout.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NAVAIRWARCENACDIV, Warminster, PA; NAVSURFWARCENDIV, Crane, IN. CONTRACTORS: LOCUS, State College, PA; Questech INC., McLean, VA; Johns Hopkins University/Applied Physics Lab, Silver Spring, MD; Westinghouse Corp., Pittsburgh, PA; Tracor, San Ramon, CA; Hughes Aircraft Company, Fullerton, CA.

(U) RELATED ACTIVITIES:
This PE adheres to Tri-Service Reliance Agreements on EW with oversight and coordination provided by the JDL and is associated with efforts that are being pursued under the following Army and Air Force PEs:
- (U) PE 0602204F (Aerospace Avionics)
- (U) PE 0603270F (Electronic Combat Technology)
- (U) PE 0602270A (Electronic Warfare Technology)
- (U) PE 0603270A (Electronic Warfare Technology)
- (U) PE 0605604A (Survivability and Lethality Analysis)

This program is also closely associated with the following Navy PEs:
- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0602315N (Mine Countermeasures, Mining and Special Warfare Technology)
- (U) PE 0602234N (Materials, Electronics and Computer Technology)
- (U) PE 0602232N (Command, Control & Communications Technology)
- (U) PE 0602111N (Surface/Aerospace Surveillance & Weapons Technology)
- (U) PE 0603792N (Advanced Technology Transition)

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- (U) PE 0603270N (Advanced Electronic Warfare Technology)

(U) PROGRAM DOCUMENTATION: Not Applicable.

(U) OTHER APPROPRIATION FUNDS: Not Applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS:
- The Technical Cooperation Program (TTCP) Subgroup Q & Technical Panel W/TP-1
- DEAs: BILATERAL: Canada C-32, N-92-CA-4509; Denmark N-72-D-5003; France N-72-F-5630, N-73-F-5638; Germany N-79-G-4228; Israel N-81-IS-4106; Italy N-65-I-4406; Japan N-72-J-4016; Korea N-82-K-4516; Netherlands N-8C-TN-4819; Norway N-72-N-5203; Spain N-85-SP-4702; Sweden N-72-S-5410; United Kingdom B-82.
  MULTINATIONAL: ABCA-4

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Undersea Surveillance and Weapons Technology	129,664	136,854	92,765	105,239	107,570	112,785	115,427	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: Work under this program element (PE) is focussed on advanced development of Undersea Warfare technologies in support of three of the "Top 5" Future Joint Warfighting Capabilities endorsed by Joint Chief of Staff as they apply to the undersea target namely: (a) Maintaining near perfect real-time surveillance of an enemy's undersea forces and communicating that knowledge to joint forces in near-real-time. (b) Developing a range of tactical Anti-Submarine Warfare (ASW) warfare capabilities that could be employed at the lower end of the full range of military operations with minimum risk of casualties or collateral damage to friendly forces. (c) Developing a robust world-wide capability for detecting, localizing, and neutralizing undersea threats, including diesel electric submarines in littoral waters, in decisive conflict with minimal risk of casualties or collateral damage to friendly forces. Projects support the development of technologies associated with undersea target detection, classification, localization, tracking and neutralization relating to the Joint Mission Areas (JMAs) of: Joint Littoral Warfare, Joint Strike, Strategic Deterrence, Joint Surveillance, and Strategic Sealift/Protection. Specifically:

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(u) Joint Littoral Warfare includes research and technology issues associated with dominating the undersea battlespace to enable timely execution of joint/combined operations and to ensure joint force sustainability. Programs include advanced sensors and arrays for both improved ASW surveillance and enhanced battleforce self defense, ASW data fusion for better tactical control, active sonar and deployable surveillance systems torpedo technology development for improved shallow water (SW) operation, and torpedo countermeasures for surface battleforce and submarine self defense.

(u) Joint Strike includes research and technology issues associated with reliable undersea target detection and tracking to enable the application of precision offensive military force. Programs include sensors and undersea arrays to provide robust SW surveillance and reconnaissance capabilities, development of insensitive munitions for improved ship and aircraft survivability, new explosives for enhanced target damage effectiveness, and sensors and countermeasures to detect and neutralize undersea threats to the surface battleforce.

(U) Strategic Deterrence includes research and technology issues associated with preserving our nuclear deterrent capability and developing an enhanced conventional warfare ballistic missile capability. Programs include efforts within the SSBN Security Program to ensure the continued viability of our SSBN fleet, improved SSBN self defense sensors and weapons and improved undersea sensors and arrays to enable reactive mission planning in response to potential adversary action.

(U) Joint Surveillance includes research and technology issues associated with maintaining a timely tactical picture of the undersea battlespace to enable allied force power projection and sea control. Programs include development of sensors, arrays, sonobuoys and fusion of multi-sensor data into a reliable tactical picture.

(U) Strategic Sealift/Protection includes research and technology issues associated with reliable undersea target detection; tracking and, if necessary, neutralization; to enable joint battleforce sustainability. Programs include the entire spectrum of technology development undertaken in support of other JMA's.

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(U) It should be noted that success in each JMA addressed above requires effective detection, classification, localization and tracking of enemy movements in the undersea battlespace and many require robust defensive and kill systems to protect our forces from harm while denying enemies the ability to utilize the battlespace to their own advantage.

(U) These efforts support the naval portion of the Joint Warfare Strategy as expressed in "From the Sea". While programs in this PE are primarily service (Navy) unique; explosives and warheads programs are jointly planned or monitored with the Army and Air Force under the Reliance process through the Joint Directors of Laboratories Technical Panel on Conventional Air/Surface Weaponry.

C. (u) JUSTIFICATION FOR PROJECT:

(u) FY 1993 ACCOMPLISHMENTS:

(u) ($70,395) UNDERSEA TARGET DETECTION AND LOCALIZATION:

(u) Completed:
-- (u) acoustic, ceramic and mechanical design and development of "A-sized" sonobuoy slotted cylinder transducer (enabling technology for Maritime Patrol Aircraft, wide area, active search capability).
-- (u) field test of an aircraft magnetic/geomagnetic development indicating an ability to increase magnetic anomaly detection ranges by a factor of two.
(u) Demonstrated:
-- (u) towed array (enabling technology for a improvement in towed arrays).
-- (u) innovative technique for beamforming array (enabling technology for a low cost, surveillance system).
-- (u) at-sea operability of detector/classifier providing robust capability against diesel electric submarines while reducing operator loading.

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-- (U) large area silicon avalanche photodiode technology (enabling technology for improvement in photon-to-electron conversion in laser detectors - Selected "Product of the Year" by Photonics Magazine).
-- (U) advanced active acoustic detection algorithms on a massively parallel processor achieving and processing gain with respect to conventional matched filter processing.
-- (U) an integrated high-temperature superconducting acoustic source transducer cooled to 77 K with a miniature cryo-cooler (enabling technology for development of small, light-weight, high power acoustic transducers).

(U) Transitioned:
-- (U) active classification clutter reduction algorithms for active sonar systems to the mid-frequency active classification processor 6.3B program (PE 0603553N).
-- (U) real-time, active-sonar, data-fusion technology enabling emitter tracking in a noisy SW environment.
-- (U) submarine towed array technology to surface ship towed array program.
-- (U) slotted cylinder projector to airborne ASW sensors program (PE 0603254N).
-- (U) Fabricated and tested a high energy density transducer that could lead to a small, light, low frequency active array.

(U) ($59,269) UNDERSEA TARGET NEUTRALIZATION:
-- (U) Developed the correlator concept which uses waveforms and exploits to improve detection of diesel electric submarines in SW. Using data against the USS Dolphin and ex-Blueback, an average improvement of were obtained compared to existing systems.
-- (U) Completed validation of the maneuver matching terminal homing algorithms and digital simulation model and transitioned technologies to the Terminal Placement Advanced Technology Demonstration (ATD) (PE 0603792N) and the MK 48 ADCAP (Advanced Capability) program. The technology utilizes the of images to estimate target dynamics and a

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targets.

-- (U) Demonstrated the Prototype Intelligent Controller concept for torpedo detection and homing which will enable autonomous tactical decision-making using a and a layered architecture controller to autonomously develop response plans in real time, eliminating the dependence on preset tactics.

-- (U) Conducted in-water tests of a Large Diameter Advanced Test Vehicle with:

mounts. Demonstrated very low radiated noise levels across entire spectrum; motor this quieting technology will improve target detection ranges and enable operations in SW for torpedoes and Unmanned Undersea Vehicles (UUVs).

-- (U) Completed pilot-scale energy tests to demonstrate the feasibility of the power plant with a an oxygen generator, a compact hydrogen/oxygen combustor, and a condenser in a closed cycle system which will provide high power and energy density for undersea vehicle propulsion.

-- (U) Demonstrated: of continuous operation of a wick combustor, as a low rate, controllable energy source for long endurance propulsion; results indicate that: endurance levels are achievable in a vehicle for ASW, mine countermeasure (MCM), and special operations.

-- (U) Performed in-water closed loop experiments of an Guidance and Control (G&C) homing system for demonstrated detection ranges and homing accurate to within the and validated feasibility of integrated homing and fuzing functions to achieve significant cost, volume and component reductions.

-- (U) Demonstrated a manuevering contact tracking algorithm to rapidly track threat weapons and to delineate transitions between trajectory phases. This improvement will permit tracking solutions to be generated rapidly, thereby substantially improving submarine survivability.

(U FY 1994 PLAN:

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(U) ($59,134) UNDERSEA TARGET DETECTION AND LOCALIZATION:
(U) Complete:
-- (U) development and testing of a Towed Source utilizing a spectra and epoxy resin composite tow body to reduce weight and a acoustic array to reduce high angle reverberation in preparation for FY95 joint tests with North Atlantic Treaty Organization (NATO) SACLANT Undersea Research Centre.
-- (U) design of a linear, flexible, array incorporating sensors (enabling technology for a wide area search capability rapidly deployable from a surface ship).
-- (U) Conduct joint sea test with Australia to evaluate technology for exploiting environmental measurements to determine tracks from low signal-to-noise ratio acoustic detections.
(U) Demonstrate:
-- (U) a vertical-line deployable array with eight sensor strings (enabling technology for a low cost, surveillance system).
-- (U) a low temperature thin film superconducting gradiometer with sensitivity over current technology.
-- (U) a micro-machined two channel accelerometer (enabling technology leading to development of a wide area, Maritime Patrol Aircraft deployed, passive acoustic array).

(U) ($39,220) UNDERSEA TARGET NEUTRALIZATION:
-- (U) Continue evaluation of the correlator concept for SW detection and initiate evaluation of the SW classifier using data from in SW. Transition results to the SW Torpedo G&C ATD (PE 0603792N).
-- (U) Obtain critical G&C data against a submarine to obtain data to validate digital simulation target models for new SW detection, classification, and terminal homing algorithms.
-- (U) Evaluate the use of waveforms for detection and imaging of

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targets in SW; this combination, [redacted] allows simultaneous location and target imaging with reduced limitations due to ocean boundary scatterings.

-- (U) Complete in-water testing of the [redacted] closed-cycle propulsion system in a [redacted] vehicle to demonstrate feasibility of MK 48 ADCAP speeds and endurance in a [redacted] torpedo.

-- (U) Fabricate lab-scale wick combustor, fuel vessel, oxidant, and control subsystems as a source for a Stirling engine; and operate continuously for [redacted] to demonstrate feasibility of the technology for extended missions.

-- (U) Conduct tow-tank hydrodynamic validation tests of the Tethered Remotely Operated Vehicle (TROV).

-- (U) Demonstrate technologies for a [redacted] weapon for [redacted] These technologies include: high-speed stored chemical energy propulsion, advanced propulsors with control surface designs and [redacted] control augmentation for hydrodynamic stability, and autonomous control from G&C electronics.

-- (U) Demonstrate technologies for detection, classification, and localization (DCL) of torpedo targets such as:

[redacted] torpedo rapid automatic classification system. At-sea tests will be conducted with the

-- (U) Complete development of signal processing techniques using [redacted] for providing real-time extraction of parameters of intercepted threat signals. Complete development of decision logic and smart countermeasure emulator. Complete combination of [redacted] processing with [redacted] to provide an *in situ* capability to classify threat torpedoes.

-- (U) Design and analyze a module for SW tracking anomaly detection and interpretation to resolve ambiguities resulting from the high-clutter, ambiguous path, shallow water acoustic environment.

-- (U) Transition tough, flexible, high shock energy explosive to Explosive Neutralization ATD (PE 0603555N); this explosive system incorporates an energetic binder that augments performance of the high solids-filled composition and is capable of withstanding high shear during rocket launch, as required by the

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ATD to support MCM capabilities in SW.

(U) ($8,500) SSBN SECURITY:
-- (U) Complete the final [ ] Assessment (PDA).
-- (U) Complete the final [ ] PDA.
-- (U) Upgrade the [ ] assessment for radar.
-- (U) [ ]

(U) FY 1995 PLAN:

(U) ($51,746) UNDERSEA TARGET DETECTION AND LOCALIZATION:
(U) Conduct:
-- (U) cooperative [ ] mid-frequency SW active classification sea test with NATO's SACLANT ASW Centre (gathering real world, SW, [ ] and environmental data needed to develop active classification algorithms and benchmark active sonar developments).
-- (U) at-sea test of a high power acoustic transducer using Lead Magnesium Niobate driver and hybrid electromechanical drive electronics to evaluate an ability to double the energy density of current [ ] acoustic sources.
-- (U) evaluation of [ ] active source technologies in narsh, shallow water environments to validate airborne autonomous ASW [ ] performance capabilities.
(U) Demonstrate:
-- (U) a tri-axial micro-machined directional hydrophone (enabling technology leading to development of a wide area, Maritime Patrol Aircraft deployed, passive acoustic array).
-- (U) a [ ] optical filter that will enable operation of [ ] systems [ ] with performance equivalent to [ ] performance of current systems.
-- (U) deployment of a magnetic reference sensor from an aircraft that will effectively eliminate [ ] noise, [ ]

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(U) ($34,319) UNDERSEA TARGET NEUTRALIZATION:

-- (U) Evaluate SW detection and classification algorithms using data obtained against a submarine, develop their real-time implementation, and utilize in a critical detection/classification test.

-- (U) Complete development of SW algorithms to enhance performance

-- (U) Complete development of a array and conduct in-water tests to obtain a database for classification and terminal homing performance evaluation; this array provides a improvement in the receive beam resolution.

-- (U) Evaluate the use of processing and signals to allow enhanced detection and imaging of submarines and false targets in the highly time-varying littoral water environment.

-- (U) Demonstrate the full scale wick combustor energy system including: fuel vessel, oxidant, and control subsystems.

-- (U) Complete scale model and testing of a low-cost for potential application to the MK 50 torpedo.

-- (U) Demonstrate in water the launch and recovery of TROV using a full scale model of the

-- (U) Fabricate and test quiet, lightweight 21-inch thermoplastic honeycomb inner core hull with filament-wound carbon inner and outer skins for UUV applications to provide increased MCM and surveillance payloads and endurance.

-- (U) Conduct in-water testing of for submarine and surface ship self-defense in environments cluttered by other countermeasures. The goal is to generate a timely, sufficiently accurate definition of configurations at ranges adaptations of low data rate communication and high resolution beam-forming technologies will be developed to provide a description and

-- (U) Evaluate and test at sea technologies for effective torpedo defense

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will be developed and integrated with artificially intelligent predictive tracking extensions of multi-mode sensing concepts to provide increased detection range, stable track prediction, and closer target approach.

-- (U) Develop algorithms for torpedo DCL technology using platform spherical/hull array

classifier technology (expert systems) using Joint Surface Ship Torpedo Defense database. Evaluate application of linear

-- (U) Develop and demonstrate methods for integration of knowledge-based techniques which incorporate available *apriori* information to improve threat weapon tracking and enhance submarine survivability in littoral environments.

-- (U) Transition new, pressable explosive formulations to the Insensitive Munitions Advanced Development Program (PE 0603609N); these formulations are based on the new energetic caged nitramine molecule CL-20 and provide significantly enhanced performance of current shaped charge warheads used in JAVELIN, SMAW, and submunitions and provide capability to effectively defeat the target.

(U) ($6,700) SSBN SECURITY:

-- (U) Prepare assessment of detection concept.

-- (U) Continue analysis of issues.

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

(U) WORK PERFORMED BY: IN-HOUSE - NAVSURFWARCEN WHITE OAK DET, White Oak, MD; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NAVSURFWARCENCOASTSYSTA, Panama City, FL; NAVAIRWARCENDIV, Warminster, PA; NCCOSC, San Diego, CA; NAVUNSEAWARCENDIV, Newport, RI and New London, CT; NAVUNSEAWARECENDIV, Keyport, WA; NRL, Washington, DC and Stennis Space Center, MS; NAVCIVENGRLAB, Port Hueneme, CA. CONTRACTORS - ARL/PSU, State College, PA; ARL/UTex, Austin, TX; APL/JHU, Laurel, MD; GE, Syracuse, NY; Raytheon, Newport, RI; AT&T, Whippany, NJ and Alexandria, VA;

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SAIC, McLean, VA; TI, Dallas, TX; EML, Hudson, MA; Dynamics Technology, Los Angeles, CA; Westinghouse, Cleveland, OH; and TRW, Redondo Beach, CA.

(U) RELATED ACTIVITIES:

(U) PE 0101224N (SSBN Security and Survivability Program)
(U) PE 0601153N (Defense Research Sciences)
(U) PE 0602111N (Surface/Aerospace Surveillance & Weapons Technology)
(U) PE 0602121N (Surface Ship Technology)
(U) PE 0602315N (Mine Countermeasures, Mining and Special Warfare Technology)
(U) PE 0602323N (Submarine Technology)
(U) PE 0602435N (Oceanographic and Atmospheric Technology)
(U) PE 0603741D (Air Defense Initiative)
(U) PE 0603747N (Undersea Warfare Advanced Technology)
(U) PE 0603555N (Sea Control and Littoral Warfare Technology Demonstration)
(U) PE 0603792N (Advanced Technology Transition)

This program adheres to Tri-Service Reliance Agreements on Conventional Air/Surface Weaponry--in particular, in the area of explosives--with oversight provided by the Joint Directors of Laboratories. Work is fully coordinated with efforts in accordance with the ongoing Reliance joint planning process with the following PEs:

(U) PE 0602602F (Conventional Munitions)
(U) PE 0603601F (Conventional Weapons Technology)
(U) PE 0602624A (Weapons and Munitions Technology)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Selected ASW Surveillance and Weapons technology issues and investigations supported by this PE are coordinated with collaborative efforts addressed by the ASW sonar and weapons panels of

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The Technical Cooperation Program with Australia, Canada, New Zealand, and the United Kingdom as well as the NATO nations collectively represented by the NATO SACLANT Undersea Research Centre.

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Mine Countermeasures, Mining and Special Warfare Technology	42,047	23,675	34,710	45,441	47,537	48,888	50,398	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element (PE) provides technologies for U.S. naval mines, Mine Countermeasures (MCM), Special Warfare, and Explosive Ordnance Disposal (EOD) equipment. It is strongly aligned with the Joint Chiefs of Staff Joint Warfighting Capabilities by developing technologies to employ a range of capabilities (MCM, EOD, Special Warfare) more suitable to actions at the lower end of the full range of military operations which allow achievement of military objectives (Power Projection from the Sea) with minimal casualties and collateral damage. The particular emphasis of the PE is on addressing the urgent technology needs for Shallow-Water (SW) and Surf-Zone (SZ) MCM. Efforts are part of an integrated Department of Navy Science and Technology (S&T) process, recently initiated by the Office of Naval Research. The PE supports the Joint Littoral Warfare Mission Area by focusing on technologies that will provide the Naval Force with the capability to dominate the battlespace, project power from the sea, and support forces ashore. The MCM and Mining components concentrate on the development of technologies for mine detection, avoidance, neutralization and clearance, and offensive mining. The Special Warfare Technology component concentrates on the development of technologies for tidal/shoreline obstacle clearance, insertion, covert operations and special boat operations.

(U) MCM Technology: Third-world nations have the capability to procure, stockpile and deploy all types of mines in all water depths. "Desert Storm" demonstrated that U.S. Navy needs to counter the projected third world mine threat. Advanced technologies are needed to rapidly detect and neutralize all mine types, especially in the SW and SZ regions. The Department of Defense (DoD) S&T Strategy has identified SZ and SW MCM as major MCM Thrusts. The SZ MCM Thrust will develop and perform critical technology demonstrations of distributed explosives, weapon deployment, and minefield obstacle clearance and breaching technologies. The SW MCM thrust supports sweeping of

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neutralizes mines in SW. Advanced very shallow-water (VSW) acoustic/non-acoustic sensors, miniaturized warhead, real time processing, and remote platform technologies will be developed and integrated. Both thrusts include high search rate sensor technologies integrated with advanced remote platform technologies for conducting rapid mine reconnaissance operations.

(U) Mine Technology: The need for improved mine technologies has diminished which may be encountered in the littoral waters of regional conflicts. Despite the diminished sophisticated threat, it is imperative that the Navy maintains its "critical mass" effort and capabilities in mine sensors, environment, and systems performance analysis technology. Emphasis will be placed on potentially high pay-off advanced target detection sensors and low cost mine system concepts with expanded weapon effectiveness for regional warfare.

(U) Special Warfare Technology: Naval Special Warfare missions primarily support covert naval operations. The goal is to develop technology required to increase the combat range and effectiveness of Special Warfare units. A major current focus is to develop technologies to enhance the Sea-Air-Land (SEAL) mission of pre-invasion clearance of mines and obstacles in the VSW and SZ approaches to the amphibious landing areas. Improvements to mission support equipment are needed to increase the probability of mission success, endurance and SEAL swimmer survivability.

(U) EOD Technology: Technology development for the EOD needs addresses the Navy's Joint Service and interagency responsibilities in EOD, including that required to counter and neutralize The technologies developed are required for locating, rendering safe, and disposal of conventional devices. These operations typically occur These technologies are expected to transition to the Joint Services EOD Program or the DoD Technical Response Group.

C. (U) JUSTIFICATION FOR PROJECTS:

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($7,500) SURF ZONE MCM:

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- (U) Completed the Distributed Explosive Performance analytical model, including sand characterization for the line charge and Distributed Explosive Technology (DET).
- (U) Completed a coarse rocket deployment model for predicting in flight characteristics of DET. The model was validated by a series of rocket motor/net array deployment tests.
- (U) Evaluated alternative concepts for obstacle clearance. Subscale tests above and below the waterline of the Flying Sword concept and feasibility tests for the Continuous Rod Warhead concept were conducted with encouraging results. An analytic model of the Flying Sword concept was developed.

• (U) ($26,170) SW MCM:
- (U) Fabricated a polymer toroidal volume search sonar (TVSS) and a ceramic TVSS. Began final hardware integration for an FY 1994 sea test. The TVSS is effective against volume and close tethered mines and potentially provides four times the current search rate capability.
- (U) Tested a limited capability prototype synthetic aperture sonar (SAS) using multi-aspect imaging in SW. All mines, proud and partially buried, were detected and imaged. Data from this test will be used for continuing the design of SAS hardware and software, motion compensation, and signal processing.
- (U) Tested the Moored Mine Hardkill concept with success. This eliminates the creation of a floating mine during the mechanical sweep operation and provides verification of neutralization.
- (U) Demonstrated a broadband spark gap acoustic generator for acoustic minesweeping. Based on the preliminary test analysis, it appears that the acoustic signal can be sustained and the required output level can be achieved. This will provide a small, lightweight, low power, low drag, acoustic influence sweep capability that is compatible with small sized platforms.
- (U) Completed and validated the Biot-Stoll Acoustic Penetration Model which is the only current model which accurately computes acoustic penetration at subcritical angles, important to buried mine detection. This development when implemented improves capability of existing and future sensor systems.
- (U) Completed initial component evaluation of a high critical temperature super-conducting gradiometer circuits. These circuits will be capable of operating at liquid nitrogen rather than liquid helium temperatures making use of the technology feasible in a remote platform system.

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- (u) ($2,600) MINING:
  - (u) Conducted lab testing and analysis of [redacted].
  - (U) Evaluated and documented work on Neural Network-Based Mine Control Processing Algorithm.

- (u) ($5,777) SPECIAL WARFARE/EOD:
  - (u) Collected water-entry load and acceleration data for [redacted].
  - (U) Developed robotic serpentine manipulator with end effectors for safer EOD examination & identification of explosive devices.
  - (u) Tested/evaluated candidate sensors for [redacted].
  - (U) Developed micro-mechanical hydrophone array for acoustic imaging.
  - (U) Transitioned oxygen sensor technology to product improvement program for MK 16 Underwater Breathing Apparatus.
  - (U) Transitioned diver-held acoustic lens technology to the Program Management Office (PMO)-EOD for use in the development of a new EOD diver hand-held sonar. Acoustic lens technology will provide a high spatial resolution sensor that has all the salient features required by a diver engaged in the neutralization of underwater explosive ordnance in highly turbid waters.

(u) FY 1994 PLAN:

- (U) ($3,000) SURF ZONE MCM:
  - (U) Conduct laboratory testing to determine the dynamic behavior of wet sand as a function of porosity and degree of saturation.
  - (U) Validate/test and transition DET array hydrocode development and explosive formulation to the Sea Control and Littoral Warfare Technology Demonstration, PE 0603555N.
  - (U) Enhance the rocket Deployment Computer Model used to predict rocket deployment of DET. Alternate deployment concepts for DET will be evaluated.
  - (U) Continue design and development of a large scale Flying Sword warhead.

- (U) ($11,975) SW MCM:
  - (U) Complete towed testing of the TVSS from a small surface vessel. Data will be recorded for later off-line processing.
  - (U) Complete development of the experimental side-looking sonar. This will include fabrication

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of the arrays and a fiber glass tow body section to house them, and modifications to the sonar controller hardware and software.
- (U) Demonstrate the feasibility of using a supercavitating projectile as an anti-mine munition for rapid airborne mine clearance. Conduct oblique water entry, explosive detonation and sand penetration tests.

- (U) ($3,100) MINING:
  - (U) Evaluate probability of detection and probability of false alarm for acoustic Identify Friend or Foe for mines.
  - (U) Verify approach for active acoustic mine to counter surface targets in SW by using high frequency sonar to discriminate ships from the water surface.

- (U) ($5,600) SPECIAL WARFARE/EOD:
  - (U) Incorporate real-time correlator with hand-held sonar for improved mine detection in VSW.
  - (U) Demonstrate
  - (U) Demonstrate (for boring through ordnance casings.
  - (U) Test ability of

(U) FY 1995 PLAN:

- (U) ($7,400) SURF ZONE MCM:
  - (U) Develop alternative DET array deployment concepts.
  - (U) Conduct mine vulnerability testing of previously unavailable threat mines to update kill criteria and expand threat mine database.
  - (U) Develop high speed image processing algorithms for airborne minefield reconnaissance.
  - (U) Develop ultra high speed camera for airborne minefield detection.
  - (U) Demonstrate explosive obstacle clearance technology for surf zone environment.
  - (U) Develop alternate deployment concepts for DET arrays.

- (U) ($18,060) SW MCM:
  - (U) Conduct sea test of SW/VSW high-resolution, motion-compensated synthetic aperture side scan sonar for detection/classification/identification of bottom mines in very shallow water.

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- (U) Design/fabricate experimental nitrogen-cooled superconducting gradiometer for detection/classification of buried mines.
- (U) Design/fabricate mechanical mine sweeping components with bottom following capabilities.
- (U) Conduct sea test of long-range side scan sonar for detection of bottom and close tethered mines from Unmanned Undersea Vehicle (UUV).
- (U) Demonstrate optical mine identification sensor in SW environment from UUV.

• (U) ($2,700) MINING:
- (U) Complete at-sea technology demonstration of acoustic and electromagnetic sensors for Littoral Sea Mine application.
- (U) Complete a neural network target classification algorithm for bottom mine target detecting devices.

• (U) ($6,550) SPECIAL WARFARE/EOD:
- (U) Conduct laboratory tests of prototype clandestine underwater electro-optic imaging system for mine identification.
- (U) Develop prototype diver rebreather incorporating carbon-dioxide separator.
- (U) Conduct laboratory tests of shock mitigation technology components for Naval Special Warfare high speed boats.
- (U) Demonstrate significantly increased
- (U) Test and transition autonomous work package for EOD underwater vehicle containing controller, navigation, and "target" classification sections.
- (U) Demonstrate diver handheld imaging sonar capability for VSW operations.

(U) PROGRAM TO COMPLETION:

(U) This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA; NCCOSC RDTE DIV, San Diego, CA; NAVEODTECHCEN, Indian Head, MD; NRL, Washington, DC; NRL, Orlando, FL; NRL SSC, Stennis Space Center, MS; NAVSURFWARCEN WHITE OAK DET, Silver Spring, MD; NAVSURFWARCENCOASTSYSTA, Panama City, FL; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD. CONTRACTORS: Presearch, Panama City, FL; Harbor Branch, Fort Pierce, FL; Tetra,

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602315N
PROGRAM ELEMENT TITLE: Mine Countermeasures, Mining And Special Warfare Technology
BUDGET ACTIVITY: 2

DATE: 7 February 1994

Albuquerque, NM; Westinghouse, Annapolis, MD; Science Applications Inc., San Diego, CA; Applied Remote Technology, San Diego, CA; TEK Microsys Inc, Boston, MA; PMI Industries, Cleveland, OH; General Electric, Schnectady, NY; Martin Marietta, Orlando, FL; Advanced Photonix, San Diego, CA; Sparta, San Diego, CA; Draper Labs, Cambridge, MA; ARL/PSU, State College, PA; Leigh Aerospace, Rancho Santa Fe, CA; Hughes Aerospace, Fullerton, CA; Loral Defense Systems, Akron, OH; Foster-Miller, Waltham, MA.

(U) RELATED ACTIVITIES:

- This program has strong ties to the PE's listed below:

(U) PE 0601153N (Defense Research Sciences)
(U) PE 0602131M (Marine Corps Landing Force Technology)
(U) PE 0602233N (Readiness, Training and Environmental Quality Tech)
(U) PE 0602314N (Undersea Surveillance and Weapons Technology)
(U) PE 0602435N (Oceanographic and Atmospheric Technology)
(U) PE 0603502N (Undersea Warfare and MCM Development)
(U) PE 0603555N (Sea Control and Littoral Warfare Technology Demonstration)
(U) PE 0603654N (Joint Service EOD Development)
(U) PE 0604654N (Joint Service EOD Development)
(U) PE 1160401BB (Special Operation Technology Development)
(U) PE 1160402BB (Special Operation Advanced Technology Development)

- (U) This program adheres to Tri-Service Reliance Agreements on EOD with coordination provided by the Joint Directors of Laboratories.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS:

(U) Selected Mine Warfare (MIW) technology issues are coordinated with efforts addressed by the MIW Panel of The Technical Cooperation Program with Australia, Canada, New Zealand, and the United Kingdom. Coordination is also maintained with data exchange arrangements involving Italy, France, Denmark, Netherlands, Germany, Norway, Spain, Belgium, South Korea, and Japan.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602323N
PROGRAM ELEMENT TITLE: Submarine Technology
BUDGET ACTIVITY: 2

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Submarine Technology	16,544	14,383	19,557	21,761	23,017	23,593	24,161	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Program Element (PE) provides for Submarine Technology development that contribute to meeting top joint warfare capabilities established by the Joint Chiefs of Staff; namely, to promptly engage regional forces in decisive combat on a global basis, to employ a range of capabilities more suitable to actions at the lower end of the full range of military operations which allow achievement of military objectives with minimum casualties and collateral damage, and to counter the threat of weapons of mass destruction and future ballistic and cruise missles to the CONUS and deployed forces.

(U) This program element (PE) develops new technologies for submarine vehicles to maintain or improve stealth, to reduce submarine vulnerability to threat weapons, and to reduce submarine acquisition costs in support of present and future submarine platform assets for Naval Warfare relating to all Joint Mission Areas. Specifically:

(U) Joint Strike addresses technology requirements and needs in the areas of improved signature reduction and control, increased platform survivability, and increased lethality. Programs include acoustic and nonacoustic signature reduction, quieting and maintenance of auxiliary and electrical machinery, quiet launchers, improved submarine maneuvering and control, quieting of advanced propulsors, and improved hull technology to withstand shallow water weapons effect.

(U) Joint Littoral Warfare addresses technology requirements and needs in the areas of covert operations, Naval special warfare/special operations, and improved platform self-defense. Programs include acoustic and nonacoustic signature reduction, quieting and maintenance of auxiliary and electrical machinery, quiet launchers, improved submarine maneuvering and control, quieting of advanced propulsors, and improved hull technology to withstand shallow water weapons effect.

(U) Joint Surveillance addresses primary task areas in mobility and covert surveillance. Programs include acoustic and nonacoustic signature reduction, quieting and maintenance of auxiliary and electrical machinery, quiet launchers, and improved submarine maneuvering and control, and quieting of advanced propulsors.

(U) Joint SEW/Intelligence addresses primary task areas in joint command and control. Programs include acoustic

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602323N
PROGRAM ELEMENT TITLE: Submarine Technology
BUDGET ACTIVITY: 2

DATE: 7 February 1994

and nonacoustic signature reduction, improved submarine maneuvering and control, quieting of advanced propulsors, quieting and maintenance of auxiliary and electrical machinery.

(U) Strategic Deterrence addresses primary task areas in covert operations, strike, mobility, SEW/Intelligence, and Interdiction of Commerce. Programs include acoustic and nonacoustic signature reduction, quieting and maintenance of auxiliary and electrical machinery, quiet launchers, improved submarine maneuvering and control, quieting of advanced propulsors, and improved hull technology to withstand shallow water weapons effect.

(U) Strategic Sealift/Protection addresses technology requirements and needs in control of open ocean areas and ship design and construction infrastructure sufficient to meet DoD needs. Programs include acoustic and nonacoustic signature reduction, quieting and maintenance of auxiliary and electrical machinery, quiet launchers, improved submarine maneuvering and control, quieting of advanced propulsors, and improved hull technology to withstand shallow water weapons effects.

(U) Readiness and Support addresses technology requirements and needs in the areas of greater adaptability to commercial off-the-shelf (COTS) components. Programs include simulation based design tools to enhance advanced submarine arrangement schemes capable of incorporating COTS.

(U) Infrastructure addresses technology requirements and needs in areas of environmental quality considerations and life cycle approaches. Programs include maintenance of auxiliary and electrical machinery.

(U) These efforts support the Joint Warfare Strategy, "From the Sea" and the Department of Defense Science and Technology (S&T) thrust areas of: Sea Control and Undersea Superiority (acoustic quieting and magnetic signature reduction); and Advanced Technology Demonstration (advanced propulsion).

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS:

(U) ($5,360) STEALTH:

- Completed proof-of-concept trial using:
- Completed design, fabrication, and installation of a 1/3rd scale machinery raft for use in the reduction of machinery generated tonal and broadband noise.
- Completed Turbulent Boundary Layer (TBL) forcing function model suitable for numerical computation with finite element models for a hybrid composite bow dome for control of high speed sonar self and radiated noise.
- Completed dynamic testing of 1/4th scale elastomeric launcher system and transitioned technology to the

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602323N
PROGRAM ELEMENT TITLE: Submarine Technology
BUDGET ACTIVITY: 2

DATE: 7 February 1994

Advanced Submarine Systems Development Program.

(U) ($4,216) SURVIVABILITY:
- Developed multi-step numerical procedure for prediction of deep submergence structural response to underwater explosion loading (UNDEX).
- Completed initial simulations of stiffened cylinder UNDEX tests (Parametric Study Models). Numerical procedure provided superior agreement with experimental results than existing damage rules.

(U) ($3,000) HM&E:
- Transitioned electrical distribution modeling technology in support of a dc power system to the New Attack Submarine (NAS) Program.
- Demonstrated Malone Cycle hardware for application to alternative air conditioning cycles which are efficient and environmentally benign.
- Demonstrated 100 horsepower pulse-power homopolar electric motor capability as a quiet, low-cost actuator.
- Determined design features necessary for silencing of a shaftless seawater pump which will have increased reliability and decreased cost and weight.
- Transitioned variable displacement hydraulic pump technology to the NAS Program.

(U) ($3,968) PROPULSION AND HYDRODYNAMICS:
- Completed computational fluid dynamic code enhancement solutions for automated gridding at the Hydrodynamics/Hydroacoustics Technology Center with application to improved submarine maneuvering and control.
- Computationally assessed the hydroacoustic impact of trailing edge designs for lifting surfaces for reduced hydroacoustic radiated noise.
- Used CFD modeling to calculate the flow field about a SSN 688 model in preparation for conducting a quantative comparison of the numerical simulation to a validation measurement.
- Transitioned reduced drag/noise sail technology to the NAS Program.

(u) FY 1994 PLAN:

(u) ($4,493) STEALTH:
- Incorporate
- Perform deperming studies with non-linear ferromagnetic and improved hysteresis algorithms.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602323N
PROGRAM ELEMENT TITLE: Submarine Technology
BUDGET ACTIVITY: 2

DATE: 7 February 1994

- Control of machinery generated tonal and broadband noise through machinery raft absorption and isolation.
- Construct detailed finite element model of integrated sonar dome/sonar boot system including the interior fluid and sonar sphere, using structure/acoustic analogy for the hybrid composite bow dome.
- Perform flow-induced noise tests to develop the technology required to minimize transient flow in launcher systems.

(U) (3,300) SURVIVABILITY:
- Continue integrated experimental/numerical effort to increase knowledge of deep submergence pressure hull UNDEX response and damage evolution.
- Begin investigation of effects of hull component interactions on structural response and failure.
- Enhance numerical methods for improved treatment of bubble-structure interaction effects.
- Rigorously characterize behavior of current acoustic hull coatings subject to combined shock wave, bubble and hydrostatic loading.
- Develop transducer technology to make possible in-situ measurement of coating response to UNDEX loading.
- Initiate investigation of advanced mount/snubber systems to mitigate severe UNDEX environments. Begin development of design criteria for UNDEX resistant machinery cradles.

(U) ($2,150) HM&E:
- Laboratory demonstration of a full scale shaftless seawater pump.
- Complete Malone cycle experiments for alternative air conditioning cycles.
- Transition baseline recommendations for next generation electrical system to NAS Program.
- Complete testing of a 100Hp homopolar motor.
- Identify research requirements in support of an electric drive submarine.

(U) ($4,440) PROPULSION AND HYDRODYNAMICS:
- Develop and validate mathematical modules implementing improved methods needed to efficiently support submarine design efforts in submarine maneuvering and control.
- The trailing edge model will be used to evaluate the hydroacoustic impact of composite concepts in support of advanced propulsor candidates for the NAS.
- Validate analytical modeling of radiation efficiency of complex propulsor structures.
- Code validation experiment to simultaneously measure the inflow distortions into the propulsor and the resulting unsteady forces generated by the propulsor.
- Established computational capability for high speed, highly unsteady flow predictions at the

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602323N
PROGRAM ELEMENT TITLE: Submarine Technology
BUDGET ACTIVITY: 2

DATE: 7 February 1994

Hydrodynamics/Hydroacoustics Technology Center.

(u) FY 1995 PLAN:

(U) ($5,566) STEALTH:
- Demonstrate
-
- Perform design iteration to accomplish cost/performance tradeoffs for the hybrid composite bow dome.
- Quantitative assessment of the noise generation associated with the slot flow geometry required to minimize transient flow in launcher systems.

(U) ($3,933) SURVIVABILITY:
- Implement enhanced deep submergence testing procedures utilizing developmental transducer technologies and advanced numerical methods.
- Transition damage prediction methods for stiffened cylindrical hull sections to the NAS Program and the Hydrodynamics/Hydroacoustics Technology Center.

(U) ($3,158) HM&E:
- Transition shaftless seawater pump technology to the NAS Program.
- Develop computer models of advanced power system components. Conduct assessment of proposed electric system.
- Develop quiet, reliable, compact electro-mechanical and electrohydraulic actuators. These components will enable a distributed system, eliminating central power plants and piping.

(U) ($6,900) PROPULSION AND HYDRODYNAMICS:
- Develop capabilities to allow shallow water effects to be modeled and efficiently support submarine design efforts in maneuvering and control.
- Enhance the trailing edge model to account for the effects inhomogeneous blade structures in the blade response.
- Validate broadband vibration noise design procedures for use in early propulsor design stages and establish the predictive code at the Hydrodynamics/Hydroacoustics Technology Center.

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PROGRAM ELEMENT: 0602323N
PROGRAM ELEMENT TITLE: Submarine Technology
BUDGET ACTIVITY: 2

DATE: 7 February 1994

- Develop and implement techniques for computing flows about the stern for variation in propulsors and stern flows.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD.; NRL, Washington,D.C.; NUWC/NPTDIV, Newport, RI.; United States Naval Academy, Annapolis, MD CONTRACTORS: Applied Research Lab, Pennsylvania State University, State College, PA; University of Washington, Seattle, WA; Catholic University of America, Washington, D.C.; Massachusetts Institute of Technology, Cambridge, MA; Cambridge Acoustical Associates, Cambridge, MA; University of Maryland, College Park, MD; Notre Dame University, South Bend, ID; Tracor Inc., Rockville, MD; U.S. Composites, Albany, NY; Mechanical Technology Inc., Albany, NY; Allied Signal, Tempe, AZ; Purdue University, West Lafayette, ID; SAIC, San Diego, CA; SUNY at Stony Brook, Long Island, NY; VA Tech University, Blacksburg, VA; University of Colorado, Boulder, CO; NKF, Vienna, VA; Unique Software Applications, Monument, CO.

(U) RELATED ACTIVITIES:
- (U) This Navy unique PE contains no unwarranted duplication of effort among Military Departments or Defense Agencies.
- (U) Related Navy PEs are:
  - (U) PE 0601153N (Structural Acoustics, Structural Dynamics, Acoustic Materials, Internal Ship Structures, Active Control, Signal/Image Processing, Adaptive Control, Applied Hydrodynamics, Undersea Maneuverability, Non-Linear Ship Motion, Propulsor Hydrodynamics, Unsteady Flow.)
  - (U) PE 0602121N (Surface Ship Technology)
  - (U) PE 0602234N (Materials, Electronics, and Computer Technology)
  - (U) PE 0602314N (Undersea Surveillance and Weapons Technology)
  - (U) PE 0603561N (Advanced Submarine System Development)
  - (U) PE 0603569E (ARPA S&T Program)
  - (U) PE 0604558N (NAS Program)
  - (U) PE 0604561N (SSN-21 Development Program)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602435N
PROGRAM ELEMENT TITLE: OCEANOGRAPHIC AND ATMOSPHERIC TECHNOLOGY
BUDGET ACTIVITY: 2

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Oceanographic and Atmospheric Technology	45,386	46,978	44,965	49,782	49,857	52,972	55,333	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Program Element (PE) provides the fundamental programmatic instrument by which basic environmental research is transformed into technology developments that provide new or enhanced warfare capabilities. This PE also provides environmental technologies that form the general environmental technical base on which all systems development and advanced technology depend.

(U) This PE provides for ocean and atmospheric technology developments that contribute to meeting top joint warfare capabilities established by the Joint Chiefs of Staff. Major efforts of this PE are devoted to (1) gaining real-time knowledge of the battlefield environment, (2) environmental needs of regional warfare, (3) providing the on-scene commander the capability to exploit the environment to gain tactical advantage, and (4) atmospheric research related to detection of cruise missiles and weapons of mass destruction.

(U) This PE provides environmental support for fleet operations and for current or emerging systems. This program element supports virtually all the Joint Mission Areas/Support Areas with primary emphasis on Joint Littoral Warfare and Joint Strike Warfare. Specifically:

(U) Joint Littoral Warfare addresses issues in undersea, surface, and air battlespace. Programs include ocean and atmospheric prediction for real-time description of the operational environment, shallow water (SW) acoustics and multiple-influence sensors for undersea surveillance and weapon systems, and environmental influences on mine countermeasure systems.

(U) Joint Strike Warfare addresses issues in air battlespace dominance. Programs include environmental influences

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PROGRAM ELEMENT: 0602435N
PROGRAM ELEMENT TITLE: OCEANOGRAPHIC AND ATMOSPHERIC TECHNOLOGY
BUDGET ACTIVITY: 2

DATE: 7 February 1994

on electromagnetic (EM)/electro-optic (EO) systems used in the targeting and detection of missile weapon systems as well as improvements in tactical environmental information management.

(U) These efforts support the Joint Warfare Strategy "From the Sea." This program adheres to Tri-Service Reliance Agreements on Environmental Sciences with oversight provided by the Joint Directors of Laboratories. Work in this PE is related to and fully coordinated with efforts in accordance with the ongoing Reliance joint planning process. There is close coordination with the U.S. Air Force under the Reliance program in the Environmental Sciences categories of Lower Atmospheric Sciences and Ocean Sciences.

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($29,161) ENVIRONMENTAL SUPPORT FOR UNDERSEA SURVEILLANCE AND WEAPONS:
  - (U) Completed initial active sonar model of false-echo statistics from fish which provides information on one source of echo expected to be prevalent in coastal waters.
  - (U) Completed and closed out the deep-water high gain array program with a final report documenting results and lessons learned; a principal finding was that at low/very low frequencies the complex multi-path structure of the ocean does not prohibit long range detection.
  - (U) Demonstrated components of an ocean information network, including sensor deployment mechanisms and data fusion techniques, to enable rapid description of the environment in coastal regions.
  - (U) Validated SW surface reverberation model using SW data that substantially revises the effect of the surface under high winds; the model improves the ability to account for sea-surface effects on torpedo guidance and control (G&C).

- (U) ($5,315) ENVIRONMENTAL SUPPORT FOR MCM SYSTEMS:
  - (U) Initiated environmental development in high frequency acoustics, atmospheric and ocean optics, and active and passive magnetic clutter in support of new Mine Countermeasures (MCM) systems being developed in PE 0602315N, MCM, Mining and Special Warfare Technology.
  - (U) Completed final design of an MCM Tactical Environmental Data System (MTEDS) for rapid

environmental characterization in MCM operations and began tests of system components.

- (U) ($6,310) OCEAN AND ATMOSPHERIC PREDICTION:
  - (U) Demonstrated high resolution of eddies (1/8-degree longitude) in ocean circulation models, thus establishing one step toward the ultimate objective of a global ocean prediction system as called for by the Oceanographer of the Navy. The global model will be one component of a nested system (global/regional/tactical) in which larger scale models provide necessary inputs to more localized models.
  - (U) Initiated development of coupled ocean/atmosphere models for the Mediterranean Sea, Yellow Sea, Sea of Japan, and their associated coastal environments to provide regional prediction systems in areas of naval importance.
  - (U) Included cloud microphysics in the Navy Operational Regional Atmospheric Prediction System, which will be used as the framework for a coastal mesoscale data assimilation system.

- (U) ($4,600) ENVIRONMENTAL INFLUENCES ON EM/EO SYSTEMS:
  - (U) A radio physical optics model was shown to predict propagation loss to earth-orbiting satellite altitudes and this capability may enable inference of atmospheric refractivity profiles from satellite signals; refractivity is needed for all sensor and weapon systems that rely on EM propagation.
  - (U) Completed the Navy Ocean Vertical Aerosol Model to allow incorporation of the effects of non-uniform vertical distributions of aerosol on EO systems, especially those aimed at detection of anti-ship missiles.

(U) FY 1994 PLAN:

- (U) ($21,574) ENVIRONMENTAL SUPPORT FOR UNDERSEA SURVEILLANCE AND WEAPONS:
  - (U) Use experimental data to identify system and environmental factors relevant to the improvement of active acoustic system performance in adverse environments:
    - (U) identify optimum waveforms and active sonar transmission strategies in surface-reverberation-limited scenarios;
    - (U) evaluate discriminants for surface/volume-reverberation-limited areas;

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0602435N
PROGRAM ELEMENT TITLE: OCEANOGRAPHIC AND ATMOSPHERIC TECHNOLOGY
BUDGET ACTIVITY: 2

DATE: 7 February 1994

-- (U) upgrade active acoustics model to provide predictive capability.
- (U) Validate Time-Dependent Parabolic-Equation SW acoustic propagation model up to 400 Hertz, and assess detection improvements by correlation of acoustic/non-acoustic sensors; these efforts will advance the ability to detect quiet submarines in coastal waters.
- (U) Develop physics-based, full spectrum ambient noise source functions that describe dominant environmental noise sources as a first step toward dealing with those aspects of the noise field that make difficult the detection of transient signals emitted by submarines.
- (U) Construct and test an expendable mooring for ocean sensors that will allow determination of the oceanographic environment in coastal regions, primarily for acoustic surveillance.
- (U) For improved torpedo G&C, determine the time/frequency/spatial correlation character of high-frequency SW surface-reverberation to allow incorporation of acoustic energy that has interacted with the boundaries; validate false target and bistatic bottom scattering strength models.

• (U) ($14,539) ENVIRONMENTAL SUPPORT FOR MCM SYSTEMS:
- (U) Conduct field tests to measure optical parameters in coastal regions, and employ Sea-Viewing Wide-Field-of-View Sensor data in coastal areas to support optical methods in MCM; measure high-frequency acoustics in sediments and develop a performance model for buried mine detection.
- (U) In MTEDS, demonstrate sea floor classification system for mine burial prediction, demonstrate airborne electro-magnetic system capability for use in MTEDS, complete integration of environmental sensor hardware/software, and design database architecture; conduct assessment of environmental effects on MCM tactical decision aids.
- (U) Develop sensors and unmanned underwater vehicle technology to enable determination of the fine-scale aspects of the environment critical to MCM.

• (U) ($6,615) OCEAN AND ATMOSPHERIC PREDICTION:
- (U) Perform tests of the global eddy-resolving ocean model to determine the effect of different data assimilation schemes; this effort will lead to the initial development of the global forecast system.
- (U) Develop turbulent mixing and thermodynamic models for inclusion in the Mediterranean Sea layered model; this will provide a higher resolution of near-surface thermal structure.
- (U) Complete preliminary data assimilation techniques for the mesoscale system along with data

quality controls; such techniques will control the influence of observational data used in making atmospheric forecasts.

- (U) ($4,250) ENVIRONMENTAL INFLUENCES ON EM/EO SYSTEMS:
  - (U) Incorporate rough-surface models into EM/EO propagation assessment systems to enable EM/EO models to deal with the complex ocean-land surface transition in coastal regions.
  - (U) Develop and evaluate refractivity sensing and inference techniques, both ground-based and satellite, with emphasis on coastal regions where variable conditions can have a significant influence on EM/EO systems.

(U) FY 1995 PLAN:

- (U) ($25,731) ENVIRONMENTAL SUPPORT FOR UNDERSEA SURVEILLANCE AND WEAPONS:
  - (U) Construct/validate empirical characterizations of bottom/volume and surface scattering to advance capabilities in low-frequency active acoustics; conduct tests of a low-frequency active acoustics model for SW regions to support undersea surveillance system design and performance estimates.
  - (U) Complete development of a time-dependent parabolic equation/gaussian beam algorithm to provide a computationally efficient SW acoustic propagation model over the broad frequency range of 0-1500 hertz; analyze experimental data to quantify predictive capability of transient signal propagation in SW regions.
  - (U) Continue developments to construct a physics-based full spectrum ambient noise predictive capability to permit noise cancellation/noise adaptation techniques in full spectrum processing; apply a first-generation predictive capability to quantify the effects of noise on selected full spectrum processing algorithms in support of detecting the "quiet" sub.
  - (U) Continue development of methods that utilize in-situ ocean sensing along with remote sensing to provide a means for producing real-time descriptions of coastal environments.
  - (U) Focus on bottom aspects of SW scattering in torpedo guidance and control; use new data to increase the robustness of a feature model for classification of false-targets for improved torpedo performance assessment.

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PROGRAM ELEMENT: 0602435N
PROGRAM ELEMENT TITLE: OCEANOGRAPHIC AND ATMOSPHERIC TECHNOLOGY
BUDGET ACTIVITY: 2

DATE: 7 February 1994

- (U) ($7,134) ENVIRONMENTAL SUPPORT FOR MCM SYSTEMS:
  - (U) Continue development of an optical data base using Sea-Viewing Wide-Field-of-View Sensor data in coastal waters to support optical methods in MCM; conduct towed-body measurements to test high-resolution acoustic imaging algorithms for MCM in SW environments.
  - (U) Complete MTEDS prototype tactical decision aid software, system documentation and prototype assembly for at-sea demo in FY 96; complete initial MCM environmental sensitivity analyses for determining tactical improvements attainable from improved environmental descriptions.

- (U) ($7,500) OCEAN AND ATMOSPHERIC PREDICTION:
  - (U) Continue development of methods aimed at a global ocean prediction system, including nested regional and tactical scale components;
    - (U) develop models to take advantage of massively parallel computers,
    - (U) extend the Mediterranean Sea model to include air-sea interaction effects,
    - (U) develop a limited-area coastal modeling testbed to evaluate coastal models, which will be essential for real-time prediction of the operational environment in regional warfare settings.
  - (U) Increase emphasis on atmospheric prediction capability for coastal strike warfare through the incorporation of aerosols and other visibility parameters into the mesoscale system.
  - (U) Pursue development of a Coupled Ocean-Air Mesoscale Prediction System (COAMPS) that will allow sub-kilometer resolution and that will exploit the computer power expected in the mid-1990s; studies using COAMPS will provide better physical parameterizations for Navy Operational Regional Atmospheric Prediction System (NORAPS).

- (U) ($4,600) ENVIRONMENTAL INFLUENCES ON EM/EO SYSTEMS:
  - (U) Complete measurements on the variability of coastal atmospheric refractivity and evaluate its significance for EM systems used to detect sea-skimmers.
  - (U) Initiate electro-optical performance assessment in coastal environments through the measurement of atmospheric properties that influence EO transmission.

(U) PROGRAM TO COMPLETION:

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PROGRAM ELEMENT: 0602435N
PROGRAM ELEMENT TITLE: OCEANOGRAPHIC AND ATMOSPHERIC TECHNOLOGY
BUDGET ACTIVITY: 2

DATE: 7 February 1994

(U) This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, D.C., Monterey, CA, and Stennis Space Center, MS; NCCOSC, San Diego, CA; NAVSURFWARCENCOASTSYSTA, Panama City, FL. CONTRACTORS: Woods Hole Oceanographic Institution, Woods Hole, MA; Applied Physics Laboratory, University of Washington, Seattle, WA; Applied Research Laboratory, University of Texas, Austin, TX; Marine Physical Laboratory, Scripps Institution of Oceanography, La Jolla, CA; Applied Physics Laboratory, Johns Hopkins University, Baltimore, MD.

(U) RELATED ACTIVITIES:

(U) PE 0601153N (Defense Research Sciences)
(U) PE 0602101F (Geophysics)
(U) PE 0602314N (Undersea Surveillance and Weapons Technology)
(U) PE 0602315N (Mine Countermeasures, Mining and Special Warfare Technology)
(U) PE 0602784A (Military Engineering Technology)
(U) PE 0603207N (Air/Ocean Tactical Applications)
(U) PE 0603785N (Combat Systems Oceanographic Performance Assessment)
(U) PE 0604218N (TESS ENG)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS:

(U) This program element supports collaborative efforts within the Undersea Warfare Subgroup of the Technical Cooperation Program with Australia, Canada, New Zealand and the United Kingdom.

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PROGRAM ELEMENT: 0602572N
PROGRAM ELEMENT TITLE: Navy Dual-Use Technology Program
BUDGET ACTIVITY: 2

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
NAVY DUAL-USE Technology Program	0	0	25,000	0	0	0	0	0	25,000

B. (U) BRIEF DESCRIPTION OF ELEMENT: New program start. The Navy Dual-use Technology Program (DTP) is the Navy's program for the development of new technology which has primary Navy relevance and simultaneously ensures the enhancement of the U.S. industrial base in technology areas critical to the defense of the Nation and founded upon the vitality of U.S. Science and Technology (S&T). The program is executed through joint and cooperative partnerships between industry, academia and government S&T facilities. The Navy DTP is modeled on the Department of Defense Technology Reinvestment Program. The program is guided by the Department of Navy S&T Investment Strategy. It supports the Joint Mission Areas/Support Areas. The primary areas of research include Ocean Sciences, Advanced Materials, Information Sciences and Sustaining Programs with particular relevance to Navy needs in medical, personnel, logistics, and Naval platforms. Examples of Navy DTP technical areas will include ship S&T, ocean S&T, manufacturing S&T, aircraft S&T, multi-system S&T, and information management and human factors. These technical areas developed under the Navy DTP span the complete spectrum of dual-use technologies which are of relevance to the Navy and also critical to the revitalization of U.S. industrial capabilities. The results of the work completed in this program element support the Joint Warfare Operational Capabilities by leading to the employment of a larger range of latest generation technical capabilities which will enhance the achievement of defense objectives and economic industrial revitalization.

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS: Not applicable.

(U) FY 1994 PLAN: Not applicable.

(U) FY 1995 PLAN:

- (U) Ship S&T: Investigate and develop new and novel methods of electric powering, electrical distribution, composite structure for ships, zero discharge and environmental compliant ships, hull coatings, and

PROGRAM ELEMENT: 0602572N
PROGRAM ELEMENT TITLE: Navy Dual-Use Technology Program
BUDGET ACTIVITY: 2

DATE: 7 February 1994

hull-mechanical and electrical technologies.

- (U) Ocean S&T: Explore the application of innovative concepts for ocean exploitation and monitoring, weather prediction, and environmental protection.
- (U) Manufacturing S&T: Create new initiatives in manufacturing education by creating a Teaching Factory. Discover new manufacturing processes, and automated production techniques.
- (U) Aircraft S&T: Develop new Vertical/Short Takeoff and Landing configurations and control techniques working for improved aircraft performance.
- (U) Multi-System S&T: Investigate advanced sensors and devices, active control of noise and vibrations, integrated diagnostics and condition-based maintenance for Navy and commercial applications.
- (U) Information Management and Human Factors: Create new techniques for embedded training, simulation, and virtual reality for use in Navy training systems. Investigate fault to tolerant systems and automated recognition systems.

(U) PROGRAM TO COMPLETION: Not applicable.

(U) WORK PERFORMED BY: IN HOUSE: TBD CONTRACTS: TBD

(U) RELATED ACTIVITIES:

- (U) PE 0601572N (Navy Dual-Use Technology Program)
- (U) PE 0603572N (Navy Dual-Use Technology Program)

Activities are coordinated through the Navy Dual-Use Technology Program Management Team.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Application
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0118 Ocean Measurement Sensors	3,267	2,886	2,876	3,144	3,109	2,825	4,046	CONT.	CONT.
X0513 Air/Ocean Prediction	1,486	1,413	1,513	1,537	1,622	1,690	1,729	CONT.	CONT.
X0514 Air/Ocean Shipboard Measurements	2,059	1,843	1,964	2,010	1,944	2,205	2,263	CONT.	CONT.
X0523 Air/Ocean Data Assimilation	743	776	820	834	884	920	941	CONT.	CONT.
X0948 Precise Timing and Astrometry	1,522	1,387	1,441	1,408	1,468	1,515	1,541	CONT.	CONT.
X1596 Satellite Ocean Tactical Application	3,732	3,984	4,325	4,407	4,634	4,819	4,941	CONT.	CONT.
R1987 Mapping, Charting and Geodesy Techniques	1,276	1,566	1,655	2,024	2,134	2,218	2,248	CONT.	CONT.
X2008 Tactical Ocean Data Assimilation and Prediction	2,224	2,188	2,342	2,284	2,332	2,390	2,455	CONT.	CONT.
TOTAL	16,309	16,043	16,936	17,648	18,127	18,582	20,164	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: Provides improvements to a shipboard environmental support capability designed to optimize weapon, sensor and platform performance in changing oceanic and atmospheric conditions. Projects in this program element develop atmospheric and oceanic data assimilation techniques, forecast models, data base management systems and associated software for use in both mainframe and tactical scale computers afloat. Also developed are algorithms to process remotely sensed satellite data for integration into other systems and tactical applications. The projects also provide for advanced development of specialized oceanographic instrumentation and techniques to measure ocean parameters, new sensors, communications, interface and precise time technologies. Mapping, Charting and Geodesy efforts address the bathymetric and gravimetric needs of the Navy.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Application
PROJECT NUMBER: R0118
BUDGET ACTIVITY: 4
Date: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R0118, Ocean Measurement Sensors. The project develops highly specialized ultra-high resolution instrumentation systems and measurement techniques in support of CNO endorsed requirements. The objectives of this project are to develop rapid environmental data collection methods for littoral and hinterland regions to 1) provide an in-situ assessment capability for combatants, 2) to provide the regional commander with continuous environmental data for operational use, 3) develop baseline data for predictive models in areas of potential interest. Climatological forecastings does not work in the littoral. The major challenges include collection and dissemination of data in highly variable meteorological and oceanographic conditions under stressful environmental situations in denied or inaccessible areas over relatively long periods of time.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,500) Completed successful Test and Evaluation (T&E) of Tactical Oceanographic Monitoring System (TOMS) aboard USS TAUTOG (SSN 639) and USS NEVADA (SSBN 733).
- (U) ($100) Completed and documented vorticity sensor. Transitioned to SSBN Security Program.
- (U) ($450) Completed development and evaluations of high-resolution multi-channel coastal optical profiler in preparation for joint Navy/NASA/NOAA exercises.
- (U) ($215) Completed laboratory tests of Liquid Atomic Emission Spectrometry (LAES) for rapid in-situ chemical evaluation.
- (U) ($200) Initiated development of an expendable bioluminescence sensor.
- (U) ($172) Initiated development of wave spectral height and direction measurement sensors to incorporate into air deployable operational drifting buoy.
- (U) ($250) Completed development and evaluation of algorithms to enable calculation of coastal optical properties from the existing Coastal Zone Color Scanner (CZCS) data base.
- (U) ($210) Completed test and evaluation of common air package for all existing Navy certified air-deployed expandable oceanographic sensors. Incorporated newly developed backscatter sensors.
- (U) ($170) Collected, evaluated and cleansed foreign coastal current meter data for Naval Oceanographic Office. Developed methods to collate data bases.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N PROJECT NUMBER: R0118 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Application BUDGET ACTIVITY: 4

(U) FY 1994 PLAN:

- (U) $900) Transfer TOMS capability to roll on roll off system for all 688 class submarines. Use on SUBDEVRON designated boat as test bed. Demonstrate real time data transmission to central site. Perform side by side comparison with operational UK System Sonar 2081.
- (U) ($350) Develop & demonstrate real time data collection capability for grey ships (Aqua Shuttle) for both immediate tactical use and data bases for predictive models.
- (U) ($250) Continue T&E of expendable bioluminescence sensor in support of spec ops and NAASW.
- (U) ($200) Complete T&E wave sensor development for drifting buoys in support of amphib operations.
- (U) ($175) Initiate air/submarine deployable tidal sensor for remote areas for depth bias corrections.
- (U) ($250) Initiate optical chain for drifting buoys to obtain optical water clarity profiles via Satellite communications.
- (U) ($300) Continue in-situ and remote optical sensor developments for both shallow water Navy requirements and joint NASA/NAVY/NOAA SeaWiFS satellite calibration.
- (U) ($200) Continue collection and evaluation of foreign data bases for Naval Oceanographic Master Data Base.
- (U) ($261) Initiate miniature sensor suites to obtain Atmospheric Electro-optical (E-O) propagation profiles.

(U) FY 1995 PLAN:

- (U) ($500) Complete TOMS T&E. Establish classification levels of data bases within the Naval Oceanographic Office. Transition Program to N872.
- (U) ($470) Initiate "Over the Horizon" radar approach to measuring near shore wave and current conditions directly from assault ships.
- (U) ($498) Complete development of realtime data collection capability for grey ships.
- (U) ($250) Complete and demonstrate tidal sensor development.
- (U) ($611) Complete Navy/NOAA/NASA calibration of SeaWiFS satellite system in various oceanic areas of operational significance.
- (U) ($245) Complete and demonstrate expendable bioluminescence sensor.
- (U) ($302) Continue sensor suite for Atmospheric E-O propagation.

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Application
PROJECT NUMBER: R0118
BUDGET ACTIVITY: 4
Date: 7 February 1994

(U) WORK PERFORMED BY: IN-HOUSE: NRL-SSC, Stennis Space Center, MS; NRL, Washington, DC; NCCOSC RDT&E Division, San Diego, CA; NAVUNSEAWARCENDIV, Newport, RI. CONTRACTORS: APL/JHU, Laurel, MD; APL/UW, Seattle, WA; Sippican Corp., Marion, MA; UCSB, Santa Barbara, CA; ARETE Corp., Washington, DC; General Dynamics/EBD, Groton, CT; WHOI, Woods Hole, MA.

(U) RELATED ACTIVITIES: PE 0101224N, SSBN Security and Survivability Program; PE 0604218N, Air/Ocean Equipment Engineering.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Application
PROJECT NUMBER: X0513
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X0513 Air/Ocean Prediction. This project develops numerical oceanographic and atmospheric models for the Navy's Large Scale Computers at the Fleet Numerical Oceanography Center, Monterey, CA and the Naval Oceanographic Office, Stennis Space Center, MS. Other models under development in this project focus on sea ice, ocean thermal structure and ocean circulation prediction. In addition, the project develops expert systems/artificial intelligence applications which utilize the model output data to afford decision makers a better understanding of operational limitations imposed by the environment.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($295) Continued development of a relocatable high resolution atmospheric model.
- (U) ($501) Completed development of and transitioned the Navy Operational Global Atmospheric Prediction System (NOGAPS) for the Large Scale Computer.
- (U) ($570) Completed validation of the Primary Ice Prediction System (PIPS). Transitioned 1/4 degree global ocean circulation model and began development of Northern Hemisphere Pacific ocean circulation model.
- (U) ($120) Began development of tropical cyclone forecasting expert system.

(U) FY 1994 PLAN:

- (U) ($184) Complete development of and transition prototype tropical cyclone forecasting expert system.
- (U) ($283) Complete development and transition relocatable high resolution atmospheric model and begin development of a tactical scale nested atmospheric forecast model.
- (U) ($474) Continue development of a Northern Hemisphere Pacific ocean circulation model.
- (U) ($472) Begin development of next generation NOGAPS with increased resolution and improved physics.

(U) FY 1995 PLAN:

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Application
PROJECT NUMBER: X0513
BUDGET ACTIVITY: 4
DATE: 7 February 1994

- (U) ($243) Complete development and transition of upgraded tropical cyclone forecasting expert system.
- (U) ($402) Continue development of a tactical scale nested atmospheric forecast model.
- (U) ($400) Complete development of Northern Hemisphere Pacific ocean circulation model and begin transition to operational use.
- (U) ($468) Continue development of the next generation NOGAPS. Begin development of global coupled air-ocean-ice model which exploits next generation computer technology.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC. CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Application
PROJECT NUMBER: X0514
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X0514 Air/Ocean Shipboard Measurements. This project provides for the advanced development of sensors, communication interfaces, and processing and display equipment to measure, ingest, store, distribute and display atmospheric and oceanographic parameters. Major emphasis areas include tactical workstations, data compression, connectivity, interface technology and the advanced development of new sensors such as active and passive atmospheric profilers for the Shipboard Meteorological and Oceanographic Observing System (SMOOS).

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,209) Continued advanced development of Light Detection And Ranging (LIDAR) atmospheric profiler; began transition to engineering development.
- (U) ($200) Completed advanced development of the High Resolution Interferometer atmospheric Sounder (HIS).
- (U) ($356) Continued advanced development of data connectivity and interfaces with C2 systems.
- (U) ($294) Continued advanced development of data compression and visualization techniques.

(U) FY 1994 PLAN:

- (U) ($871) Complete advanced development of data connectivity with the Advanced Tomahawk Weapons Control System, continue development of data connectivity and interfaces with other C2 systems.
- (U) ($400) Continue advanced development of data compression and visualization techniques.
- (U) ($572) Complete LIDAR atmospheric profiler advanced development. Begin advanced development of next generation SMOOS sensors.

(U) FY 1995 PLAN:

- (U) ($858) Complete advanced development of data connectivity with the Tomahawk Weapons Control System, continue development of data connectivity and interfaces with other C2 systems.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Application

PROJECT NUMBER: X0514
BUDGET ACTIVITY: 4

DATE: 7 February 1994

- (U) ($300) Continue advanced development of data compression techniques.
- (U) ($250) Deliver data visualization software for transition.
- (U) ($556) Continue advanced development of next generation SMOCS sensors.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRAD, San Diego, CA; NRL, Washington, DC. CONTRACTORS: ARL/PSU, State College, PA.

(U) RELATED ACTIVITIES: PE 0604218N (Air/Ocean Equipment Engineering). Provides for transition to engineering development.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Application
PROJECT NUMBER: X0523
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X0523 Air/Ocean Data Assimilation. This project develops systems and associated software to process and manage remotely-sensed environmental data at Oceanography Centers ashore and on board ships equipped with the AN/SMQ-11 satellite receiver/recorder. The project also supports code conversion, rehosting of software from other sources and modifications to the Tactical Environmental Support System - TESS(3) - Data Base Management System (DBMS).

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($288) Began development of capabilities to ingest data into environmental data base from new satellite sensors such as radar altimeters, Special Microwave Imagers and Synthetic Aperture Radars.
- (U) ($255) Continued code conversion of numerical models from CYBER 205 to CRAY-90 Large Scale Computer.
- (U) ($200) Completed modifications to TESS(3) DBMS. Began development of DBMS for TESS(3) remote workstation.

(U) FY 1994 PLAN:

- (U) ($303) Continue development of capabilities to ingest data into environmental data base from new satellite sensors such as radar altimeters, Special Microwave Imagers and Synthetic Aperture Radars.
- (U) ($123) Complete code conversion of numerical models for CRAY-90.
- (U) ($200) Begin modifications to TESS(3) DBMS to accommodate upgraded hardware and systems software.
- (U) ($150) Complete development of DBMS for TESS(3) remote workstation.

(U) FY 1995 PLAN:

- (U) ($370) Complete development of capability to ingest data into environmental data bases from satellite radar altimeters; continue development of capabilities to ingest data from other new satellite sensors such as Special Microwave Imagers and Synthetic Aperture Radars.
- (U) ($225) Continue modifications to TESS(3) DBMS to accommodate upgraded hardware and systems software.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Application
PROJECT NUMBER: X0523
BUDGET ACTIVITY: 4
DATE: 7 February 1994

- (U) ($225) Begin exploitation of new relational data base management technologies for large scale computers and TESS(3).

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC. CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES: PE 0604218N (Air/Ocean Equipment Engineering). Provides engineering development for AN/SMQ-11, TESS(3) and other related systems.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Application
PROJECT NUMBER: X0948
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X0948 Precise Timing and Astrometry. This project upgrades the accuracy of the U.S. Naval Observatory's Master Clock System (MCS) for DOD surface, subsurface, air and shore communications, navigation and time dissemination systems. It also develops near-real-time Earth orientation predictions through use of satellite or fiber optics transmission of Very Long Baseline Interferometer (VLBI) data for DOD navigation and positioning systems. It also develops advanced electronic light detectors and interferometry in the optical and infrared wavelength regions for very precise determination of positions of both faint and bright star, satellite tracking, and space debris studies.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($100) Completed Master Clock upgrade and evaluated new technology cesium clock performance.
- (U) ($100) Began development of prototype Clock Environment Behavior Models (CEBM).
- (U) ($..72) Installed large wide-field Charge-Coupled-Device (CCD) on transit telescope and installed delay lines and siderostats at interferometer site.
- (U) ($150) Designed VLBI correlator improvements.

(U) FY 1994 PLAN:

- (U) ($182) Develop clock environmental test bed ensemble.
- (U) ($150) Perform VLBI fiber optics tests and VLBI satellite data transfer tests.
- (U) ($500) Design operational CCD telescope and acquire first infrared detectors for transit telescope and interferometer.
- (U) ($535) Conduct first test observations with prototype interferometer and test large wide-field CCD on transit telescope.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N | PROJECT NUMBER: X0948 | DATE: 7 February 1994
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Application | BUDGET ACTIVITY: 4

(U) 1995 PLAN:

- (U) ($150) Evaluate improved stored ion clock physics package.
- (U) ($100) Verify CEBM models and test new CEBM time scale algorithm.
- (U) ($422) Start Infrared development for optical interferometer.
- (U) ($569) Construct large-scale CCD arrays for electronic astrography.
- (U) ($200) Evaluate VLBI fiber optics vs. satellite data transfer and design final VLBI data transfer system.

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

(U) WORK PERFORMED BY: IN-HOUSE: USNO Washington, DC; NRL, Washington, DC. CONTRACTORS: Universities Space Research Association, Columbia, MD; Interferometrics, Inc., Vienna, VA; University of Arizona, Tucson, AZ; California Institute of Technology, Pasadena, CA; National Optical Astronomy Observatories, Tuscon, AZ; University of California at Los Angeles, CA.

(U) RELATED ACTIVITIES: PE 0602435N, Project RM35G83, Astronomy, exploratory development in general areas covered in this summary, many projects transition to PE 0603207N. Initial research in clock steering algorithms, VLBI - related atmospheric studies, and exploratory research into various methods of observing faint stars and developing star catalogs is performed under this related activity.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Application
PROJECT NUMBER: X1596
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X1596 Satellite Ocean Tactical Application. This project develops concepts and software techniques for the integration and tactical application of significant oceanographic and atmospheric data derived from satellite-borne sensors. Included are techniques and algorithms for the processing of sensor measurements, conversion of raw signal data to geophysical information, analysis schemes encompassing Artificial Intelligence and Expert Systems, and other satellite data applications and field validation of end products. The software developed under this project is planned for use in Mainframe computers and in the Tactical Environmental Support System - TESS(3).

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,293) Completed development of expert system for clear air turbulence and began development of additional expert systems such as electromagnetic refractivity and ocean and atmospheric feature analyses.
- (U) ($1,730) Continued development of algorithms for Synthetic Aperture Radars (SAR), Altimeters, Ocean Color sensors and scatterometers.
- (U) ($350) Continued fleet exercise participation.
- (U) ($359) Began developing methods for littoral zone analysis.

(U) FY 1994 PLAN:

- (U) ($1,565) Complete development of expert system for electromagnetic refractivity; continue development of additional expert systems for satellite oceanographic and atmospheric feature analyses.
- (U) ($1,719) Begin transition of ocean color sensor and scatterometer data operational capability; continue development of algorithms for SAR, altimeters, ocean color sensors and scatterometers.
- (U) ($700) Continue fleet exercise participation and the development of methods for littoral zone analysis.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Application

PROJECT NUMBER: X1596
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($1,807) Begin transition of a cloud pattern recognition expert system; continue development of additional expert systems for satellite oceanographic and atmospheric feature analyses.
- (U) ($1,843) Complete transition of SAR operational capability and continue transition of ocean color sensor and scatterometer data operational capability; continue development of new algorithms for SAR, Altimeters, Ocean Color sensors and scatterometers.
- (U) ($375) Complete development of prototype littoral zone analysis software.
- (U) ($300) Continue fleet exercise participation.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC. CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N PROJECT NUMBER: R1987 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Application BUDGET ACTIVITY: 4

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R1987, Mapping, Charting & Geodesy Techniques: This project develops new charting and bathymetric survey techniques necessary to reduce the existing 300 ship year shortfall in coastal hydrographic survey requirements. Presently 70% of the world's coastline is not adequately charted. The requirements are originated by Fleet Commander In Chief's (CINCS) and the Commandant of the Marine Corps, and validated by the Defense Mapping Agency in support of littoral and expeditionary operations.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($401) Continued Digital MC&G analysis and evaluation of weapons system input requirements to ensure availability and compatibility of data and software developments.
- (U) ($275) Completed prototype Airborne Electromagnetic Bathymetric System for helicopter use.
- (U) ($100) Completed joint NASA/NAVY visible passive sensors for satellite calibration (NASA launch delayed).
- (U) ($200) Completed evaluation of Australian Airborne Laser Bathymetry System; US Army system delayed until 1994.
- (U) ($300) Completed redesign of Navy Survey Ship Bathymetry System to incorporate acoustic bottom images and transitioned model to estimate seafloor roughness for choke point acoustic array deployment.

(U) FY 1994 PLAN:

- (U) ($458) Continue Digital MC&G analysis and evaluation of weapons systems input.
- (U) ($700) Initiate high speed high data rate communication link development to transmit real time acoustic bathymetry images from unmanned remotely controlled vehicle. Marry new bathymetry system, ancillary oceanographic and atmospheric sensors to real time display.
- (U) ($350) Initiate Covert Littoral Acoustic Mapper (CLAM) development for special forces underwater navigation and data collection.
- (U) ($58) Complete evaluation of existing airborne laser bathymetric systems (Canadian/Swedish).

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N PROJECT NUMBER: R1987 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Application BUDGET ACTIVITY: 4

(U) FY 1995 PLAN:

- (U) ($500) Continue Digital MC&G evaluation and collection of data for weapons systems input.
- (U) ($530) Continue development of near shore bathymetric data collection via remotely controlled vehicle.
- (U) ($100) Complete and demonstrate CLAM to special forces as requested.
- (U) ($276) Draw up specifications for fixed wing laser bathymetry system for navy purchase prepare sensors and test ranges for evaluation and optimization.
- (U) ($249) Investigate transfer of nearshore data collection technology from overt controlled vehicles to covert autonomous vehicles.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL-SSC, Stennis Space Center, MS; NRL, Washington, DC. CONTRACTORS: Neptune Sciences, Inc., Slidell, LA; RD Instruments, San Diego, CA; Rockwell International, Anaheim, CA; C&C Technologies, Lafayette, LA.

(U) RELATED ACTIVITIES: PE 0601153N, Defense Research Sciences; PE 0305160N, Defense Meteorological Satellite Program; Navy International Program Office for modification of Laser Airborne Depth Sounder (LADS) Transceiver; MC&G Data Collection 0305131.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Application
PROJECT NUMBER: X2008
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X2008 Tactical Ocean Data Assimilation and Prediction. This project develops new techniques for environmental data assimilation, for both conventional and satellite remotely sensed data, and includes the development of tactical models to utilize these data. Artificial Intelligence, Expert and Rule-Based systems are emphasized. The goal is to provide the Navy with a real-time, stand-alone, shipboard tactical scale atmospheric and oceanographic forecasting capability in accordance with the Pre-Planned Product Improvement (P3I) plan for the Tactical Environmental Support System - TESS(3).

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($105) Completed development of and transitioned the three-dimensional (3D) Vapor, Liquid and Solid Tracking (VLSTrack) model for surface effluents.
- (U) ($1,254) Continued development of Mediterranean Sea oceanographic model; began development of coastal and enclosed basin tactical scale oceanographic models for the Sea of Okhotsk, Yellow Sea, and Sea of Japan.
- (U) ($295) Completed development of and transitioned the second generation range dependent electromagnetic (EM) prediction model.
- (U) ($570) Continued development of the electro-optical (EO) environmental model.

(U) FY 1994 PLAN:

- (U) ($830) Complete development of the 3D VLSTrack model for upper air effluents; continue development of EM/EO environmental models.
- (U) ($1,098) Deliver the Mediterranean Sea oceanographic model; continue development of coastal and enclosed basin tactical scale oceanographic models for the Sea of Okhotsk, Yellow Sea, and Sea of Japan.
- (U) ($260) Begin incorporation of expert system/artificial intelligence techniques in the four-dimensional (4D) assimilation of tactical scale data.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Application

PROJECT NUMBER: X2008
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($860) Complete development of next generation range dependent EM/EO and VLSTrack models for TESS(3); begin incorporation of Expert Systems applications in these areas.
- (U) ($1,147) Complete development of Yellow Sea oceanographic model; continue development of coastal and enclosed basin tactical scale oceanographic models for the Sea of Okhotsk, Sea of Japan and other selected geographical locations in response to emergent requirements.
- (U) ($335) Continue incorporation of expert system/artificial intelligence techniques in the 4D assimilation of tactical scale data.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, D.C.; NRAD, San Diego, CA; NSWC, Dahlgren, VA. CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES: PE 0604218N, Air/Ocean Equipment Engineering - TESS(3) will incorporate data assimilation techniques and models.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603208N
PROGRAM ELEMENT TITLE: Training System Aircraft
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
H1142 T-45 Improvements	49,165	28,560	263	2,024	1,018	836	1,028	CONT.	CONT.
H1150 Joint Primary Aircraft Trainer	0	3,585	3,854	3,225	3,542	3,228	140	CONT.	CONT.
TOTAL	49,165	32,145	4,117	5,249	4,560	4,064	1,168	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT:

(U) The T45TS mission is to provide undergraduate jet pilot training for prospective carrier-based Navy and Marine Corps pilots, and selected international students, to meet aircrew requirements in the 1990's and beyond. Projected T-2 and TA-4 aircraft shortages due to attrition and service life expiration, as well as increasing operating and support costs, require development of a cost effective replacement. T45TS is a total training system concept which includes aircraft, simulators, academics and contractor logistics support.

(U) The Joint Primary Aircraft Training System (JPATS) is an ACAT 1D, non-developmental item (NDI), commercial pilot program initiated to provide a high degree of commonality between the flight training program of the United States Navy (USN) and United States Air Force (USAF). The JPATS is to replace the T-34 and T-37 for the USN and USAF, respectively. JPATS shall employ a common primary training aircraft and related aircrew training devices (simulators, computer-aided instruction terminals, etc.) to satisfy both the USAF primary aircraft training system (AFPATS) and the Naval primary aircraft training system (NPATS) requirements. JPATS shall also address the individual service elements of syllabus courseware, data management, and system support. The mission of JPATS will be to train entry-level USN/USAF student pilots in primary flight instruction. The U.S. Air Force is the executive service. This element funds Navy participation in the joint program and Navy unique requirements.

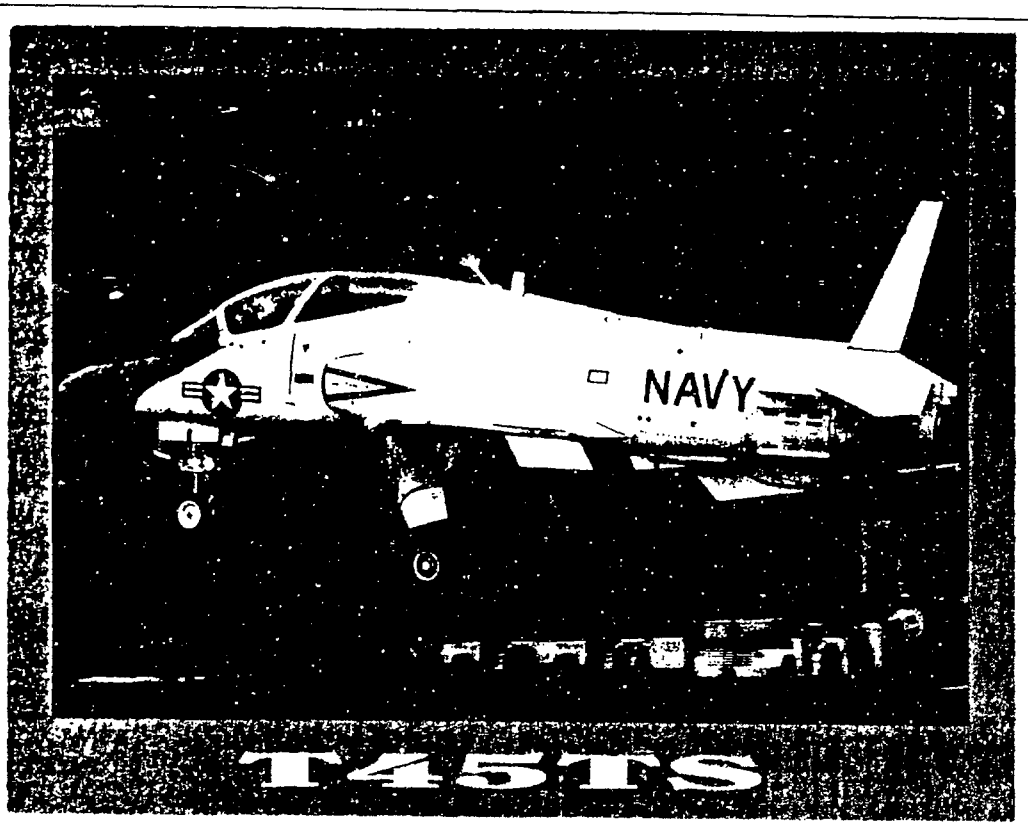
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603208N
PROGRAM ELEMENT TITLE: Training System Aircraft

PROJECT NUMBER: H1142
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: T-45 Improvements



POPULAR NAME: GOSHAWK

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603208N
PROGRAM ELEMENT TITLE: Training System Aircraft

PROJECT NUMBER: H1142
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

SCHEDULE	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		IOC 4/93	MS III 9/94						
ENGINEERING MILESTONES		CP21 PDR 12/92	CP21 DELV 5/94						
T&E MILESTONES			TECHEVAL 11/93 OPEVAL 3/94						
CONTRACT MILESTONES									

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	582,873	40,227	25,325	163	1,493	779	640	766	657,103
SUPPORT CONTRACT									(4,817)
IN-HOUSE SUPPORT	69,833	8,938	3,235	100	531	239	196	242	84,797
GFE/ OTHER									(1,483)
TOTAL	652,706	49,165	28,560	263	2,024	1,018	836	1,028	741,900
									(6,300)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603208N
PROGRAM ELEMENT TITLE: Training System Aircraft
PROJECT NUMBER: H1142
BUDGET ACTIVITY: 4
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The T45TS mission is to provide undergraduate jet pilot training for prospective carrier-based Navy and Marine Corps pilots, and selected international students, to meet aircrew requirements in the 1990's and beyond. T45TS is a total training system concept which includes aircraft, simulators, academics and contractor logistics support. Development of a digital cockpit upgrade (including a 1553 avionics architecture and multi-functional displays) is funded for FY 92 - FY 94 with production and retrofit incorporation into the entire system beginning in FY 95.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($18,600) Continued Engineering, Manufacture and Development of aircraft and ground training system.
- (U) ($1,800) Completed flight test for structural, performance, weapons, brakes, Environmental Control System, Onboard Oxygen Generating System, and avionics demonstrations.
- (U) ($2,000) Continued high angle of attack and carrier suitability flight test demonstrations.
- (U) ($2,100) Conducted Navy flight tests including fleet support, TECHEVAL (DT-IIF) and 2nd Sea Trials.
- (U) ($5,265) Completed preliminary and critical design reviews of digital cockpit. Commenced integration bench tests and fabrication of prototype for aircraft and flight simulator.
- (U) ($19,400) The Navy elected not to proceed with an alternate engine program for the T-45A.

2. (U) FY 1994 PLAN:

- (U) ($0) Complete contractor demonstration and Navy flight test.
- (U) ($224) Complete OPEVAL.
- (U) ($28,336) Complete digital cockpit prototype fabrication. Conduct ground tests, Navy and contractor flight tests and evaluation.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603208N
PROGRAM ELEMENT TITLE: Training System Aircraft
PROJECT NUMBER: H1142
BUDGET ACTIVITY: 4
Date: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) ($263) Support and conduct tests to expand the aircraft operating envelope and continue testing of out-of control flight re ,irements.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV Patuxent River, MD; NAVAIRWARCENACDIV Warminster, PA; NAVAIRWARCENACDIV Lakehurst, PA; NAVAIRWARCENACDIV Indianapolis, IN; NAVAIRWARCENACDIV Trenton, NJ; NTC Orlando, FL CONTRACTORS: McDonnell Douglas Corporation, St. Louis, MO.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

Mission Element Need Statement	6/79
Navy Training Plan	6/93
TEMP	8/93
Acquisition Strategy Report	4/93
Acquisition Program Baseline	4/93

G. (U) RELATED ACTIVITIES:

- (U) PE# 0603216N Aviation Survivability; 0604215N Standards Development; 0604264N Aircrew Systems Development.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603208N
PROGRAM ELEMENT TITLE: Training System Aircraft

PROJECT NUMBER: H1142
BUDGET ACTIVITY: 4

Date: 15 October 1993

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) APN Line 16 & 17	262,640	289,593	245,400	304,854	333,774	260,837	389,536	CONT.	CONT.
• (U) APN-6 (Spares) Line 48	19,979	22,709	21,575	21,586	20,104	20,939	52,153	CONT.	CONT.

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

J. (U) TEST AND EVALUATION:

- (U) TECHEVAL: Complete 11/93
- (U) OPEVAL: */93

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603208N
PROGRAM ELEMENT TITLE: Training System Aircraft

PROJECT NUMBER: H1150
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: Joint Primary Aircraft Trainer

PICTURE NOT AVAILABLE

POPULAR NAME: JPATS

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603208N
PROGRAM ELEMENT TITLE: Training System Aircraft
PROJECT NUMBER: H1150
BUDGET ACTIVITY: 4
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES			MS II 2/95				MS III 6/99	
ENGINEERING MILESTONES				A/C PDR 4/96		A/C CDR 10/97		
T&E MILESTONES						A/C QT&E 9/98	A/C OT&E 9/99	
CONTRACT MILESTONES		A/C RFP 4/94	A/C AWARD 2/95	GBTS AWARD 12/95				

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT									
SUPPORT CONTRACT									
IN-HOUSE SUPPORT	0	0	3,585	3,854	1,871	2,055	1,872	140	13,669 (292)
GFE/ OTHER	0	0	0	0	1,354	1,487	1,356	0	4,197 (0)
TOTAL	0	0	3,585	3,854	3,225	3,542	3,228	140	17,866 (292)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Joint Primary Aircraft Training System (JPATS) is an ACAT ID program initiated to provide a high degree of commonality between the flight training program of the United States Navy (USN) and the United States Air Force (USAF). The JPATS is to replace the T-34 and T-37 for the USN and USAF, respectively. JPATS shall employ a common primary training aircraft and related aircrew training devices (simulators, computer-aided instruction terminals, etc.) to satisfy both the USAF Primary Aircraft Training System (AFPATS) and the Naval Primary Aircraft Training System (NPATS) requirements. JPATS shall also address the individual service elements of syllabus courseware, data management, and system support. The mission of JPATS will be to train entry-level USN/USAF student pilots in primary flight instruction. The U.S. Air Force is the executive service for this joint program. This element funds Navy participation in the program and Navy unique requirements.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603208N
PROGRAM ELEMENT TITLE: Training System Aircraft

PROJECT NUMBER: H1150
BUDGET ACTIVITY: 4

Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: Not applicable.

2. (U) FY 1994 PLAN:

- (U) ($1,464) Conduct technical analysis in support of aircraft source selection.
- (U) ($200) Develop the ground based training system (GBTS) request for proposal.
- (U) ($50) Complete OSD directed streamlining Working Group Review.
- (U) ($271) Conduct field activity tasking and management support.
- (U) ($1,600) Begin Anthropometry Analysis.

3. (U) FY 1995 PLAN:

- (U) ($261) Continue field activity tasking and management support.
- (U) ($208) Begin engineering change proposal (ECP) analysis.
- (U) ($1,704) Provide engineering support of qualification and operational test and evaluation (Q/OT&E) and any USN unique requirements for data or analysis.
- (U) ($306) Complete GBTS source selection.
- (U) ($25) Begin preliminary logistics support analysis.
- (U) ($1,350) Continue anthropometry analysis.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603208N | PROJECT NUMBER: H1150 | Date: 7 February 1994
PROGRAM ELEMENT TITLE: Training System Aircraft | BUDGET ACTIVITY: 4

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Patuxent River, MD; NAVAIRWARCENACDIV, Lakehurst, NJ; NAVAIRWARCENACDIV, Warminster, PA; NTC, Orlando, FL; NAVAIRWARCENACDIV, Trenton, NJ; NAVAIRWARCENACDIV, INDIANAPOLIS, IN; NAMO, Patuxent River, MD. CONTRACTORS: TBD

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

Test & Evaluation Master Plan	2/93
Operational Requirements Document	1/94
Integrated Program Summary	1/93
Acquisition Program Baseline	1/93
Program life Cycle Cost Estimate	3/92
Independent Cost Estimate	3/92
Cost Analysis Requirements Description	3/92
Acquisition Decision Memorandum	7/93

G. (U) RELATED ACTIVITIES:

- (U) JSAF PE 0604233F Specialized Undergraduate Pilot Training. Joint program established per MOA between CNO, USAF Chief of Staff, SAF/AQ and ASN(RDA) dated 11/22/91.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603208N
PROGRAM ELEMENT TITLE: Training System Aircraft

PROJECT NUMBER: H1150
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) APN Line	0	0	0	0	91,609	165,474	171,249	CONT.	CONT.

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

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

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1992 AND PRIOR	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
M0097 Aircrew Impact Injury Prevention	8,098	3,728	1,142	1,487	1,249	1,372	1,497	CONT.	CONT.	
W0584 A/C Protective Clothing and Devices	10,691	11,320	3,475	4,095	3,707	4,117	4,504	CONT.	CONT.	
W0591 A/C Survivability & Vulnerability & Safety	4,358	3,148	2,621	2,730	2,336	2,585	2,841	CONT.	CONT.	
W0592 A/C & Ordnance Safety	3,912	1,665	1,428	1,604	1,481	1,638	1,805	CONT.	CONT.	
W1277 Nuclear Survivable Aircraft (FAANTAEL)	19,635	2,848	0	0	0	0	0	0	0	22,483
W1819 CV A/C Fire Suppression System	2,148	1,168	1,326	1,388	1,393	1,441	1,480	CONT.	CONT.	
TOTAL	32,055	21,029	9,992	11,304	10,166	11,153	12,127	CONT.	CONT.	

B. (U) BRIEF DESCRIPTION OF ELEMENT: Aviation Survivability addresses the issues of both aircrew and platform survivability, enhancing overall chances for protection and enhanced performance. The capabilities addressed under this program element will counter emerging threats of the next generation of operational weapons systems and will enhance combat effectiveness in future operational mission scenarios.

(U) Two of the projects address aircrew requirements. Aircrew Impact Injury Prevention develops human dynamic and injury response models to impact acceleration and determines the correlation of these dynamic responses with the physiological effects and injuries. Aircrew Systems Technology develops, demonstrates and validates technology options that enhance aircrew capability to perform mission and ensure aircrew protection against natural and induced environmental or physiological hazards encountered during routine, combat and emergency flight operations as well as during escape, survival and rescue, following loss of the aircraft.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) The remaining four projects address platform survivability, to address not only the reductions in aircraft susceptibility to enemy and non-combat threats but also aircraft vulnerabilities to conventional, nuclear, chemical, biological, radiological and directed energy. The Aircraft Survivability and Vulnerability and Safety project expands the survivability technology base and develops prototype hardware which is required to improve the survivability of Naval aircraft. Aircraft and Ordnance Safety transitions generic insensitive munitions technology to Navy and Marine Corps air weapons, ensuring that they are insensitive to fast cook-off, slow cook-off, bullet and fragment impact and sympathetic detonation. The Fleet Aircraft Assessment for Navy Testing and Analysis for Electromagnetic pulse Limitation (FAANTAEL) project assessed the vulnerability of tactical aircraft to damage/upset from electromagnetic pulse. The FAANTAEL program is being terminated in FY 1994. Carrier Aircraft Fire Suppression Systems develop improved firefighting systems and fire protective measures for aircraft carriers.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability
PROJECT NUMBER: M0097
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: M0097, Aircrew Impact Injury Prevention. This project develops human dynamics and injury response models of impact acceleration and determines the correlation of these dynamic responses with physiological effects and injuries. These models will be used to evaluate human protective systems designed to prevent impact type injuries. The requirements for this project were initially set forth in NAVAIR letter Ser AIR-531B/206, 22 Aug 1984, followed by Medical Requirement (MR) No. 15a, 28 Jan 1988. These were expanded by recommendations of the Naval Research Advisory Committee, Aviator Physical Stress Panel, June 90, followed by Surgeon General's memo for the ASN (RD&A), Ser 26/OU235316, 18 Jan 1991, and CNO S&T Policy Guidance memo, Ser 911C/1s534990, 23 Aug 1992.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($900) Analyzed human response data for vertical +Gz impact with symmetrical head-mounted devices.
- (U) ($1,498) Collected and analyzed additional male human response data for vertical +Gz impact.
- (U) ($400) Completed development and testing of new state-of-the-art kinematic data acquisition system.
- (U) ($100) Completed kinematic model for multi-axis human and manikin impact response.
- (U) ($165) Started development of standardized volunteer head-neck kinematic database.
- (U) ($35) Continued long-term medical follow-up of human research volunteers.
- (U) ($5,000) For Advanced Marine Technology Center (AMTC). In December 1993 these funds were reprogrammed to PE 0708011N, Manufacturing Technology Development, the AMTC's mission being more appropriately funded as part of this program.

(U) FY 1994 PLAN:

- (U) ($2,000) Collect and analyze female human response data for -Gx impact.
- (U) ($600) Continue development of standardized volunteer head-neck kinematic database.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability
PROJECT NUMBER: M0097
BUDGET ACTIVITY: 4
DATE: 7 February 1994

- (U) ($1,000) Complete phase I of two-dimensional cervical spine injury model; initiate phase II.
- (U) ($90) Initiate physiological stress analysis.
- (U) ($38) Continue long-term medical follow-up of human research volunteers.

(U) FY 1995 PLAN:

- (U) ($1,142) Analyze male/female head-neck response differences.

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

(U) WORK PERFORMED BY: In-House: NAVBIODYNLAB, New Orleans, LA; NAVAIRWARCENACDIV, Warminster, PA. CONTRACTORS: Crescent Ltd., University of New Orleans and Tulane University, New Orleans, LA; GSA Technical Services, Ft. Worth, TX. OTHER: USAF Armstrong Laboratory Det., WPAFB, Dayton, OH; USA Aeromedical Research Laboratory, Ft. Rucker, AL; U.S. Department of Transportation, Washington, DC.

(U) RELATED ACTIVITIES:
- (U) PE 0602201F Aerospace Flight Dynamics
- (U) PE 0604264N Aircrew Systems Development
- (U) PE 0604506F Aircrew Systems Development.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability
PROJECT NUMBER: W0584
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W0584, A/C Protective Clothing and Devices. This project develops, demonstrates, and validates technology options for functionally integrated aircrew and life support systems designed to enhance mission effectiveness, inflight protection and emergency survivability. These developments are in accordance with Operational Requirements Documents, such as OR# 210-05-88 for Chemical/Biological (C/B) Protection, OR# 099-05-087 for Laser Eye Protection; Joint Mission Need Statements for Helmet Mounted Off-bore Sight Cueing/Display, Aircrew Integrated Ensemble (AIE) and advanced anti-G systems; Non-Acquisition Program Development Documents for advanced crew station designs, emergency egress/crash systems and integrated crew protection/performance enhancement systems.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,226) Completed Laser Visor Eye Protection (LVEP) prototype evaluations.
- (U) ($2,250) Completed Advanced Integrated Life Support System (AILSS) preliminary design and initiated lab evaluations.
- (U) ($1,365) Completed Advanced Technology Crew Station (ATCS) functional design mockups.
- (U) ($2,585) Continued development contract for USN/USAF ATCS 4th generation escape system tech.
- (U) ($975) Awarded contract for test hardware for ATCS Advanced Helmet Vision Systems (AHVS).
- (U) ($645) Developed automatic load attenuators for helicopter crashworthiness (CW).
- (U) ($470) Continued design of Biofidelic Manikin (BFM) female prototypes.
- (U) ($470) Completed design guide/physical properties for 21st century head protection.
- (U) ($550) Completed feasibility studies of ceramic technology for Advanced Aircrew Oxygen Delivery System (AAODS).
- (U) ($155) Initiated C/B protection development.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT:0603216N
PROGRAM ELEMENT TITLE:Aviation Survivability

PROJECT NUMBER: W0584
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($450) Complete LVEP laboratory and flight test evaluation.
- (U) ($2,523) Continue ATCS contracted system design efforts.
- (U) ($300) Test CW prototype designs with helicopter CW seats.
- (U) ($1,592) Flight test AILSS prototypes.
- (U) ($3,000) Continue Navy tasks for US Navy/US Air Force (USN/USAF) escape project.
- (U) ($1,755) Continue development of AHVS.
- (U) ($100) Initiate helicopter cockpit safety analysis/design.
- (U) ($250) Provide BFM prototypes for testing under project M0097.
- (U) ($300) Develop AAODS test hardware and continue model development.
- (U) ($120) Complete C/B threat and vulnerability analysis.
- (U) ($930) Initiate joint Navy/Army AIE design.

(U) FY 1995 PLAN

- (U) ($90) AILSS Milestone (MS) II transition.
- (U) ($300) BFM MS II transition.
- (U) ($450) LVEP MS II transition.
- (U) ($280) Continue Navy tasks for joint Navy/Army AIE.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT:0603216N
PROGRAM ELEMENT TITLE:Aviation Survivability

PROJECT NUMBER: W0584
BUDGET ACTIVITY: 4

DATE: 7 February 1994

- (U) ($1,092) Continue Navy tasks for USN/USAF escape project.
- (U) ($200) MS II transition of CW load attenuator hardware.
- (U) ($288) Begin construction of test hardware for helicopter crash safety designs.
- (U) ($100) Continue ATCS as an in-house effort.
- (U) ($425) Flight test AAODS designs. Complete AAODS system design model.
- (U) ($250)Initiate C/B Integrated Protection Design Concepts.

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

(U) WORK PERFORMED BY: IN HOUSE: NAVAIRWARCENACDIV, Warminster, PA, Patuxent River, MD, and Indianapolis, IN; NAVSURFWARCENDIV, Indian Head, MD. CONTRACTORS: MACAIR, St. Louis, MO. & North Beach, CA; BOEING, Seattle, WA; Aerojet, Sacramento, CA; Information Network Systems, Bensalem, PA; University of New Orleans, New Orleans, LA; OTHER: USAF Armstrong Laboratory Det., WPAFB, Dayton, OH.

(U) RELATED ACTIVITIES:

- (U) PE 0602201F Aerospace Flight Dynamics
- (U) PE 0602233N Mission Support Technology
- (U) PE 0604264N Aircrew Systems Development
- (U) PE 0604706F Aircrew Systems Development

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS:

- (U) USA/Canada Master Data Exchange Agreement #MWDDEA-N-92-CA-4504
- (U) Air Standardization Coordinating Committee Working Party 61 U.S. & Commonwealth Nations

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability

PROJECT NUMBER: W0591
BUDGET ACTIVITY: 4

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W0591, A/C Survivability and Vulnerability and Safety. This project develops prototype hardware to improve the survivability of Navy and Marine Corps aircraft. This project addresses the likelihood of an aircraft being hit (susceptibility) and the probability of kill if the aircraft is hit (vulnerability). Types of programs funded under this project include signature reduction efforts, subsystem and component hardening and development of fire and explosion suppression techniques for fuel systems.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,244) Initiated the AH-1W Susceptibility Reduction Program (formerly referred to as LIMIT RAM).
- (U) ($735) Completed and flight tested the A-6E survivability enhancement suite (formerly referred to as LIMIT KNIGHT).
- (U) ($400) Updated vulnerability assessments for the F/A-18, F-14 and A-6.
- (U) ($979) Developed survivability analysis methodology and update aircraft survivability assessments.

(U) FY 1994 PLAN:

- (U) ($800) Develop susceptibility reduction design technology for aircraft and weapon systems.
- (U) ($540) Initiate and complete F-14 Retested Survivability Enhancement Program.
- (U) ($1,808) Develop survivability analysis methodology and update aircraft assessments.

(U) FY 1995 PLAN:

- (U) ($1,525) Complete AH-1W Survivability Enhancement Program.
- (U) ($800) Develop prototype susceptibility reduction design for aircraft and weapon systems.
- (U) ($296) Develop survivability analysis methodology and update aircraft survivability assessments.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability

PROJECT NUMBER: W0591
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, China Lake, CA, and Pt. Mugu, CA; NAVAIRWARCENACDIV, Warminster, PA and Patuxent River, MD; Naval Postgraduate School, Monterey, CA. CONTRACTORS: McDonnell Aircraft, St. Louis, MO, Bell Helicopter, Fort Worth, TX; Grumman Aerospace, Bethpage, NY.

(U) RELATED ACTIVITIES:

- (U) PE 0605132D, Joint Technical Coordinating Group on Aircraft Survivability, supports joint combat survivability development, test and evaluation programs, activities and ensures no duplication of effort between the Services with respect to survivability programs.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability

PROJECT NUMBER: W0592
BUDGET ACTIVITY: 4

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W0592, A/C & Ordnance Safety. This project transitions Insensitive Munitions (IM) technology from IM Advanced Development (Generic Technology) to Air Weapon Systems to comply with Chief of Naval Operations direction that all munitions carried aboard Navy ships be insensitive to Fast Cook-Off (FCO), Slow Cook-Off (SCO), bullet and fragment impact, and Sympathetic Detonation (SD).

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($259) Demonstrated SCO sensor for thermally initiated venting system for advanced medium range air to air missile.
- (U) ($1,026) Initiated rocket motor IM risk reduction study for Advanced Rocket System (ARS)
- (U) ($377) Demonstrated venting system for the FMU-143 fuze for the Navy version of the Air Force BLU-109 warhead for the GBU-24 Penetrator Bomb.
- (U) ($228) Demonstrated container SD shielding design of the BLU-91 GATOR mines.
- (U) ($519) Conducted slapper detonator initiation feasibility studies for the fuze booster of the Joint Direct Attack Munition II (JDAM II) fuze. Characterized several insensitive explosives for JDAM application.
- (U) ($815) Initiated evaluation of IM designs for Joint Standoff Weapon (JSOW).
- (U) ($64) Initiated selection process of IM propellants for Sidewinder rocket motor application.
- (U) ($75) Initiated characterization studies of several IM explosives for weapon warhead analytical models.
- (U) ($321) Demonstrated IM explosive in the HELLFIRE II warhead that pass SD.
- (U) ($123) Demonstrated TOW-2A(AIR) shipping container shield against SD.
- (U) ($105) Assessed IM technologies being conducted in US national labs, other services, and foreign countries.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability

PROJECT NUMBER: W0592
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($462) Complete rocket motor IM risk reduction study for ARS. Evaluate ARS unitary lethal warhead IM technology.
- (U) ($58) Evaluate High-velocity Anti-Radiation Missile SCO performance.
- (U) ($430) Evaluate new fuze booster, new warhead explosive, and outgassing liner technologies for JDAM II IM application.
- (U) ($590) Complete the IM demonstration project for JSOW. Evaluate new fuze booster, new warhead explosive, and outgassing liner technologies for JSOW unitary warhead IM application.
- (U) ($80) Support the IM effort for the development of the Stand-off Land Attack Missile penetrator warhead.
- (U) ($45) Assess weapons systems IM technology transition plans.

(U) FY 1995 PLAN:

- (U) ($527) Support IM technology transition to ARS. Demonstrate ARS unitary lethal warhead IM technology.
- (U) ($480) Demonstrate new fuze booster, new warhead explosive, and outgassing liner technologies for JDAM II IM.
- (U) ($376) Demonstrate new fuze booster, new warhead explosive, and outgassing liner technologies for JSOW unitary warhead IM.
- (U) ($45) Continue assessing weapons systems IM technology transition phase.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, China Lake, CA; CONTRACTORS: D P Associates, Inc, Arlington, VA.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability

PROJECT NUMBER: W0592
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability

PROJECT NUMBER: W1819
BUDGET ACTIVITY: 4

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W1819, CV A/C Fire Suppression Systems. This project develops improved firefighting systems and fire protective measures for aircraft related fires on aircraft carriers including assessment of aircraft fire properties, the development of the P-25 shipboard firefighting vehicle, improvements to firefighting agents and delivery systems and firefighter training improvements.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,500) Awarded contract for design and manufacture of P-25 prototypes.
- (U) ($58) Developed HALON 1211 substitute training agent and fire suppression system.
- (U) ($130) Continued development of flight deck fire imaging system.
- (U) ($100) Continued development of ordnance cooling requirements.
- (U) ($50) Continued development of advanced flight deck fire simulator.
- (U) ($310) Continued development of interactive video firefighter trainer.

(U) FY 1994 PLAN:

- (U) ($1,100) Continue design and manufacture of P-25 prototypes.
- (U) ($10) Complete first prototype of interactive video fighter trainer.
- (U) ($10) Begin development of environmentally safe test and training facilities.
- (U) ($14) Continue development of flight deck fire imaging system.
- (U) ($14) Continue development of ordnance cooling requirements.
- (U) ($10) Continue development of flight deck fire simulator.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability
PROJECT NUMBER: W1819
BUDGET ACTIVITY: 4
DATE: 7 February 1994

- (U) ($10) Initiate new firefighting agent tests.

(U) FY 1995 PLAN:

- (U) ($1,033) Complete design and manufacture of P-25 prototypes.
- (U) ($100) Continue development of environmentally safe fire test and training facilities.
- (U) ($40) Continue development of flight deck fire imaging system.
- (U) ($40) Continue development of ordnance cooling requirements.
- (U) ($50) Continue advanced flight deck fire simulator.
- (U) ($63) Continue new firefighting agents tests.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NAVSURFWARCEN, WHITE OAK DET, Silver Spring, MD; NAVAIRWARCENACDIV, Lakehurst, NJ; NAVAIRWARCENWPNDIV, China Lake, CA; CONTRACTORS: The Enwistle Company, Hudson, MA.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603217N
PROGRAM ELEMENT TITLE: Air Systems and Weapons Advanced Technology
BUDGET ACTIVITY: 3

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0446 Advanced Avionics Subsystems	6,702	0	0	0	0	0	0	0	9,665
R0447 Weapons Advanced Technology	5,467	5,132	13,218	12,604	15,658	17,779	19,191	CONT.	CONT.
W2014 Integrated High Performance Turbine Engine Technology (IHPTET)	6,996	8,117	8,354	8,683	9,851	10,184	11,341	CONT.	CONT.
R2152 Advanced Short Takeoff and Vertical Landing (ASTOVL) Demonstrator	0	10,937	8,721	2,893	0	0	0	0	22,551
W2185 Advanced Anti-Radiation Guided Missile (AARGM)	9,583	12,360	0	0	0	0	0	0	21,943
TOTAL	28,748	36,546	30,293	24,180	25,509	27,963	30,532	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element (PE) demonstrates concepts for future air platforms and surface/air weapons employed in Naval Warfare. The demonstrated concepts support the Joint Warfare Strategy "From the Sea" and relate to the Joint Mission Areas of Joint Strike Warfare, Littoral Warfare, and Joint Surveillance. Projects in this PE are jointly planned in the Reliance process with the Air Force and Army through panels of the Joint Directors of Laboratories.

(U) Joint Strike technology issues relevant to this PE include surgical lethality, platform survivability and affordability and increased Naval gunfire range and accuracy. Littoral Warfare technology issues relevant to this PE include air battlespace dominance, expeditionary forces air support, ship self-defense and increased Naval gunfire range and accuracy. Joint Surveillance technology issues relevant to this PE include sensor/avionics interfaces, platform mission endurance and survivability.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603217N
PROGRAM ELEMENT TITLE: Air Systems and Weapons Advanced Technology
BUDGET ACTIVITY: 3

DATE: 7 February 1994

There were five projects in the PE.

- (U) Advanced Avionics Subsystems: Demonstrated advanced integrated modular avionics concepts for application to Navy aircraft. Work focused on unique Navy concerns, such as demanding physical and intense electromagnetic environments and constrained sea-based support. Funding for this project was terminated by Congress in FY 1994.

- (U) Weapons Advanced Technology: Demonstrates emerging sub-system/component level weapons concepts identified in PE 0602111N which promise affordable and significant performance improvements to both existing and next generation Naval air and surface launched weapons.

- (U) Integrated High Performance Turbine Engine Technology (IHPTET): Provides experimental engine testing to demonstrate readiness for entering engineering development of new gas turbine engine technologies. IHPTET is a tri-service program in which each service contributes established shares of 6.2 and 6.3a funding and laboratory resources to meet specified goals of doubling thrust-to-weight ratio and halving fuel consumption by the year 2003 (relative to a 1987 baseline).

- (U) Advanced Short Takeoff and Vertical Landing (ASTOVL) Demonstrator: A joint Navy/Advanced Research Project Agency (ARPA)/National Aeronautics and Space Administration (NASA) program to demonstrate technologies required to fabricate and fly an ASTOVL demonstrator aircraft by FY99. This continues work initiated by ARPA to investigate the feasibility of designing a single lightweight, affordable aircraft to conduct missions currently performed by the AV-8B, F-16, and F/A-18. The program is in Phase II through FY 96. This phase, jointly conducted by Navy and ARPA, consists of technology validation, producibility analysis, and preliminary design of a demonstrator aircraft. Phase III is planned to start in FY 96.

- (U) Advanced Anti-Radiation Guided Missile: Demonstrated advanced missile/seeker technologies to support a helicopter mounted missile with capabilities comparable to HARM.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603217N
PROGRAM ELEMENT TITLE: Air Systems and Weapons Advanced Technology

PROJECT NUMBER: R0447
BUDGET ACTIVITY: 3

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECTS:

(U) PROJECT NUMBER AND TITLE: R0447, Weapons Advanced Technology: This project has been renamed and expanded. The project was originally named Electromagnetic Radiation Source Elimination (ERASE). This renamed project includes the elements contained in the original ERASE program while providing additional risk reducing demonstrations of emerging weapon guidance & control, ordnance, propulsion and airframe sub-system/component level technologies identified in Exploratory Development which promise affordable performance improvements to existing and next generation Navy air and surface launched weapons. The elements of this project address the Joint Mission Area (JMA) requirements for increased capabilities in the surgical lethality of weaponry (Strike JMA), increased ship self-defense capabilities (Littoral Warfare JMA) and increased accuracy and range for Naval gunfire support (Strike and Littoral JMAs). Included in this project is a focused thrust for both emitter location and defense suppression missile technologies the requirements for which are documented in the Navy's Strike Warfare Master Plan and Conventional Munitions Plan.

(U) FY 1993 ACCOMPLISHMENTS:

- (U)($2,661) Passive Radio Frequency (RF) Targeting:
  - (U) Completed:
    - (U) Fabrication of low frequency targeting system brassboard components and initiated system integration for precision passive targeting capability for existing aircraft.
    - (U) Baseline system targeting flight test. Initial data analysis indicates that a precision radar frequency targeting system is feasible in a Navy F/A-18 pylon.

- (U)($2,806) Advanced ARM Guidance Demonstration (AAGD):
  - (U) Initiated:
    - (U) Anti-Radiation Homing (ARH) receiver design, processor architecture design and development of ARH algorithms for dual mode seeker to address radar shutdown targeting.
    - (U) Terminal sensor study for the active portion of the dual mode configuration.
  - (U) Completed:
    - (U) ARH portion of the dual mode requirements for hardware design.
    - (U) Conformal antenna design study and prepared procurement specification.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603217N
PROGRAM ELEMENT TITLE: Air Systems and Weapons Advanced Technology

PROJECT NUMBER: R0447
BUDGET ACTIVITY: 3

DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U)($1,742) Passive RF targeting:
  - (U) Initiate:
    - (U) Verification tests of passive ranging algorithms.
    - (U) Procurement of low band antennas for hardware integration and test.
    - (U) Investigation of broadband radome for pylon passive RF targeting systems.
  - (U) Continue:
    - (U) Integration of low frequency targeting system for test and evaluation.

- (U)($3,390) AAGD:
  - (U) Initiate:
    - (U) ARH receiver fabrication and testing.
    - (U) Terminal sensor processing software design.
    - (U) ADA test software code generation.
  - (U) Complete:
    - (U) Conformal antenna fabrication.
    - (U) ARH receiver design for hardware fabrication.
    - (U) ARH processor architecture for processor design.

(U) FY 1995 PLAN:

- (U)($2,000) Passive RF targeting:
  - (U) Complete:
    - (U) Low-frequency field flight tests, analyze data and document results.
    - (U) Investigation of broadband radome for pylon passive RF Targeting System.

- (U)($3,527) AAGD:
  - (U) Initiate:
    - (U) Integration of digital signal processor with ARH receiver.
    - (U) Bench and anechoic chamber testing of integrated RF receiver and conformal antenna.
    - (U) ARH receiver fabrication and testing.
    - (U) ARH and active terminal sensor integration design.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603217N
PROGRAM ELEMENT TITLE: Air Systems and Weapons Advanced Technology
PROJECT NUMBER: R0447
BUDGET ACTIVITY: 3
DATE: 7 February 1994

- (U) Procurement and fabrication of ARH processor.
- (U) Terminal sensor processing design.
- (U) ARH processor software code generation.

- (U) Continue:
  - (U) ADA test software development.
  - (U) Software design for terminal sensor processing.
- (U) Complete:
  - (U) Conformal antenna designs and fabrication.
  - (U) ARH receiver design.
  - (U) ARH processor architecture.

- (U)($2,691) Advanced Airframe/Structures:
  - (U) Initiate:
    - (U) Design, fabrication and flight testing of a state-of-the-art lightweight, low cost missile airframe that will demonstrate superior inner boundary performance required for the next generation of short range air-to-air missiles to ensure first shot/kill performance during post-merge dog fight engagements and longer range pre-merge advantage. FY 95 work will establish over-all missile airframe requirements, develop preliminary airframe, propulsion, and flight control subsystem designs.

- (U)($5,000) Strapdown Seeker Technology for Guided Projectiles:
  - (U) Initiate:
    - (U, Feasibility demonstration of an autonomous guidance system for long range gun launched projectiles in support of Naval Surface Fire Support requirements. Key technologies to be demonstrated are strapped-down imaging RF/IR/EO seekers and associated signal processors for generating space stabilized images. FY95 work involves simulation and modelling of representaive gun launched projectile airframes to establish strapdown seeker and signal processing subsystem design requirements and perform preliminary configuration subsystem designs.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWAPCENWPNDIV, China Lake, CA; NSWCDD, Dahlgren, VA; NCCOSC RDT&E DIV, San Diego, CA. CONTRACTORS: LORAL, Newport Beach, CA; Texas Instruments, Colorado Springs, CO; FALON, Inc. & Questech, San Diego, CA.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603217N
PROGRAM ELEMENT TITLE: Air Systems and Weapons Advanced Technology

PROJECT NUMBER: R0447
BUDGET ACTIVITY: 3

DATE: 7 February 1994

(U) RELATED ACTIVITIES:
- (U) PE 0601152N (In House Lab Independent Research)
- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0602111N (Surface/Aerospace Surveillance and Weapons Technology)
- (U) PE 0602234N (Materials, Electronics, and Computer Technology)
- (U) PE 0602602F (Conventional nitions)
- (U) PE 0603238N (Precision Strike and Air Defense Technology Demonstrations)
- (U) PE 0603609N (Conventional Munitions)
- (U) PE 0603601F (Advanced Weapons)
- (U) PE 0602122N (Aircraft Technology)
- (U) PE 0207133F (F-16 Squadrons)
- (U) PE 0203730A (Chaparral Missile)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603217N
PROGRAM ELEMENT TITLE: Air Systems and Weapons Advanced Technology
PROJECT NUMBER: W2014
BUDGET ACTIVITY: 3
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W2014 - Integrated High Performance Turbine Engine Technology (IHPTET) Demonstrator Engines: This project covers the Navy share of the demonstrator engine portion of IHPTET, ensuring that unique Navy design and operational requirements are met. Full scale integrated technology demonstration is essential to transition technologies from exploratory development through advanced development and into system demonstration/validation. Without technology demonstrators, system acquisition cost/schedule risk would have an unacceptably higher level or programs would settle for lessor operational capability. As a result development schedules could increase by as much as four to five years. A strong and viable U.S. propulsion program also provides a dual-use benefit to our country by enhancing our competitiveness in the international commercial engine market. This long term project coordinated through Reliance, will provide for the future needs in air battlespace dominance and expeditionary forces support (Littoral Joint Mission Area (JMA), increased platform mission endurance (Joint Surveillance JMA) and provide technology for increased affordability and platform survivability (Strike JMA). The program funds three demonstrator engine classes. Each engine class has specific performance goals that are divided into three phases with the ultimate goal of doubling propulsion capability by the year 2003. Phase I of the missile/expendable engines class has been completed. This phase was an Air Force funded program identified as the Expendable Turbine Engine Technology (ETEC) program. The phase goals of each engine class are listed as follows and are referenced to a 1987 baseline:

(U) Fighter/attack (Joint Technology Demonstrator Engine [JTDE]): Allison Gas Turbine Division, General Electric Aircraft Engines (GE), Pratt and Whitney (PW).
- (U) Phase I - 1993: +30% thrust/weight (T/W), +100 ^{O}F combustor inlet temperature (CIT), +300 ^{O}F turbine inlet temperature (TIT) with subtasks in: Hollow metal matrix composite (MMC) fan blades, high work turbine, advanced metals, advanced mode controls.
- (U) Phase II - 1997: +60% T/W, +200 ^{O}F CIT, +600 ^{O}F TIT with subtasks in: Advanced aerodynamic fan, vaneless turbine, intermetallics, optic controls and survivability features and hollow MMC fan blades.
- (U) Phase III - 2003: +100% T/W, +400 ^{O}F CIT, +900 ^{O}F TIT with subtasks in: Composite fan, minimum cooling, special attachments, ceramics and magnetic bearings.

(U) Turboprop/shaft (Joint Turbine Advance Gas Generator [JTAGG]): GE and Garrett Engine Division, Lycoming (LYC), Allied Signal Propulsion Division (AE)
- (U) Phase I - 1993: +40% power/weight (P/W), -20% specific fuel consumption (SFC), +300 ^{O}F TIT with subtasks in: High work turbine and advanced titanium.
- (U) Phase II - 1997: +80% P/W, -30% SFC, +600 ^{O}F TIT with subtasks in: High pressure ratio compressor, advanced

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603217N
PROGRAM ELEMENT TITLE: Air Systems and Weapons Advanced Technology
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cooling, electric engine concepts and static ceramic composites.
- (U) Phase III - 2003: +120% P/W, -40% SFC, +1000 ^{O}F TIT with subtasks in: Three dimensional aerodynamic design, rotating ceramics, pulse surge protection.

(U) Missile/expendable engines (Joint Expendable Turbine Engine Concepts [JETEC]): Allison Gas Turbine Division, Garrett Engine Division, Teledyne Ryan Aeronautics (TRA), Williams International (WI).
- (U) Phase I - 1991: +35% thrust/airflow (Fn/Wa), -20% SFC, +1100 ^{O}F CIT, +500 ^{O}F TIT, -30% Cost. Completed by Air Force under ETEC.
- (U) Phase II - 1997: +70% Fn/Wa, -30% SFC, +1200 ^{O}F CIT, +900 ^{O}F TIT, -45% Cost with subtasks in: Ceramic bearings, ceramic composite turbine, carbon-carbon exhaust nozzle, low profile combustor, Low observable (LO) propfan blades.
- (U) Phase III - 2003: +100% Fn/Wa, -40% SFC, +1400 ^{O}F CIT, +1400 ^{O}F TIT, -60% Cost with subtasks in: Ceramic composite compressor, air bearings, carbon-carbon turbine and static structures, Organic Matrix Composite (OMC) fan stages, carbon-carbon vectoring nozzle.

(U) Each engine company utilizes at least two engine builds or demonstrator tests within each Phase to demonstrate the performance goals. The JETEC Phase II goals are divided into demonstrating SFC and Cost for a subsonic demonstrator and Fn/Wa, CIT, TIT and Cost for a supersonic demonstrator.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($6,996) Initiated:
  - (U) Phase I JTAGG: Pre-test review of GE/AE Phase I demonstrator #2 engine test. Identified high pressure turbine blade stress problem in Lycoming (LYC) demonstrator engine. Initiated redesign.
  - (U) Phase II JTDE: Design and fabrication of PW and of GE Phase II demonstrator engines.
  - (U) Phase II JETEC: Design and fabrication of TRA and WI Phase II subsonic demonstrator engines. AE contract terminated due to their corporate decision to cease all unmanned propulsion efforts.

(U) FY 1994 PLAN:
- (U) ($2,221) Initiate:
  - (U) Phase II JTAGG: Review proposals and award contract for subsonic patrol/rotary wing Phase II engine demonstrators. Design of Phase II demonstrator engine with 80% P/W and 30% SFC improvements.
  - (U) Phase II JETEC: Award contract for demonstrating Phase II supersonic goals to replace AE's supersonic demonstrator engine.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603217N
PROGRAM ELEMENT TITLE: Air Systems and Weapons Advanced Technology
PROJECT NUMBER: W2014
BUDGET ACTIVITY: 3
DATE: 7 February 1994

- (U) ($5,396) Continue:
  - (U) Phase II JTDE: Fabrication and assembly of PW and GE Phase II demonstrator engines.
  - (U) Phase II JETEC: Fabrication and assembly of TRA and WI supersonic demonstrator engines.
- (U) ($500) Complete:
  - (U) Phase I JTAGG: GE/AE and LYC Phase I demonstrator 2 tests. Demonstrated 25% fuel burn and 60% power-to-weight improvement over baseline.

(U) FY 1995 PLAN:
- (U) ($683) Initiate:
  - (U) Design and down select for initial supersonic demonstrator engine for specific thrust increase of 75%.
- (U) ($7,293) Continue:
  - (U) Phase II JTDE: Fabrication and assembly of PW and GE demonstrator #1 engine.
  - (U) Phase II JTAGG: Design of Phase II gas generators for subsonic patrol/rotary wing aircraft.
- (U) ($378) Complete:
  - (U) Phase II JETEC: TRA demonstrator #1 engine test. First step towards demonstrating 30% decrease in cost for subsonic expendable applications.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Trenton, NJ (5% of budget). CONTRACTORS: GE, Evendale, OH and Lynn, MA; PW, West Palm Beach, FL; LYC Stratford, CT; AE, Phoenix, AZ; Williams Intl., Walled Lake, MI; TRA, Toledo, OH; Allison Engine Company Indianapolis, IN.

(U) RELATED ACTIVITIES:
- (U) PE 0601102A (Defense Research Sciences)
- (U) PE 0601102F (Defense Research Sciences)
- (U) PE 0601152N (In House Lab Independent Research)
- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0602122N (Aircraft Technology)
- (U) PE 0602211A (Aviation Technology)
- (U) PE 0602203F (Aerospace Propulsion)
- (U) PE 0602234N (Materials, Electronics & Computer Technology)
- (U) PE 0603216F (Advanced Turbine Engine Gas Generator)

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603217N
PROGRAM ELEMENT TITLE: Air Systems and Weapons Advanced Technology

PROJECT NUMBER: W2014
BUDGET ACTIVITY: 3

DATE: 7 February 1994

- (U) PE 0603202F (Aircraft Propulsion Subsystem Integration)
- (U) PE 0603003A (Aviation Advanced Technology)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603217N
PROGRAM ELEMENT TITLE: Air Systems and Weapons Advanced Technology
PROJECT NUMBER: R2152
BUDGET ACTIVITY: 3
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R2152, Advanced Short Takeoff and Vertical Landing Demonstrator (ASTOVL): This is a joint Navy/Advanced Research Project Agency (ARPA)/National Aeronautics and Space Administration project to demonstrate the necessary technologies to fabricate and fly an ASTOVL demonstrator. Phase I, which was initiated by ARPA, investigated propulsive lift concepts and has been completed. Navy funding for Phase II will investigate augmented lift concepts under two contracts. Lockheed will investigate and develop the Shaft Coupled Lift Fan concept, while McDonnell Douglas will investigate and develop the Gas Coupled Lift Fan concept. Each contract will address the system design and operational performance potential of one of these concepts. ASTOVL technology will target the requirement for more capable and affordable expeditionary force air support (Littoral Warfare Joint Management Area).

(U) FY 1993 ACCOMPLISHMENTS:

Not applicable, ATD is a FY94 new start.

(U) FY 1994 PLAN:

- (U) ($10,937) Initiate:
  - (U) Affordability demonstrations, construct large scale wind tunnel models and construct large scale propulsion system components for rig testing for the Shaft Coupled Lift Fan and Gas Coupled Lift Fan Concepts.

(U) FY 1995 PLAN:

- (U) ($8,721) Initiate:
  - (U) Large scale wind tunnel tests and large scale propulsion system tests for the Shaft Coupled Lift Fan and Gas Coupled Lift Fan Concepts.

(U) PROGRAM TO COMPLETION:

- (U) ($2,893) Complete critical technology validation of the Shaft Coupled and Gas Coupled Lift Fan Concepts. Upon successful completion of phase II, continue to Phase III (design and fabrication of a full-scale technology demonstrator aircraft) and Phase IV (flight testing). Completes in FY 96.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603217N
PROGRAM ELEMENT TITLE: Air Systems and Weapons Advanced Technology

PROJECT NUMBER: R2152
BUDGET ACTIVITY: 3

DATE: 7 February 1994

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Patuxent River, MD, Trenton, NJ and Warminster, PA; NAVAIRCEN WPNDIV, China Lake, CA. CONTRACTORS: Lockheed Advanced Development Co., Palmdale, CA; McDonnell Douglas Aerospace, St. Louis, MO.

(U) RELATED ACTIVITIES:
- (U) PE 0601152N (In House Lab Independent Research)
- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0603226E (Experimental Evaluation of Major Innovative Technologies).

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603238N
PROGRAM ELEMENT TITLE: Precision Strike and Air Defense Technology Demonstrations

PROJECT NUMBER: R2145
BUDGET ACTIVITY: 3

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R2145 Precision Strike and Air Defense Tech Demos	9,351	29,607	32,961	30,774	24,220	59,224	62,320	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program focuses science and technology resources in the areas of Precision Strike and Air Superiority/Defense in support of the Joint Chief of Staffs (JCS's) top five Joint Warfighting Capabilities and the following Joint Mission Areas: Joint Strike, Joint Littoral Warfare, Strategic Deterrence and Strategic Sealift/Protection.

(U) The Global Surveillance and Communications area, transferred to Program Element (PE) 0603794N for FY 1995, developed and demonstrated the capability to provide the tactical user with theater of operations, near-real-time precision targeting information, sensor-to-shooter target updating, and Battle Damage Assessment (BDA) generated from multiple existing high-altitude resources.

(U) Precision Strike integrates surveillance and targeting capabilities developed in the Global Surveillance area with high speed processing and precision weapons for rapid response against high-value, short dwell targets over extended ranges. The Navy Tactical Missile System (NATACMS) provides a demonstration launch of a Navy variant of the Army Tactical Missile System (ATACMS) from a ship in support of the Navy's Surface Fire Support (NSFS) mission.

(U) The Air Superiority and Defense area develops and demonstrates all-weather, day/night engagement capabilities against manned aircraft, cruise missiles (including supersonic sea-skimmers), helicopters and tactical ballistic missiles that will be employing stealth and countermeasures. The Cruise Missile Defense, Mountain Top Advanced Technology Demonstration (ATD), continued effort from PE 0603792N, demonstrates that an AEGIS ship using an airborne sensor partner can provide air defense against low altitude cruise missiles over the horizon.

FY 1995 RDT&E, DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603238N
PROGRAM ELEMENT TITLE: Precision Strike and Air Defense Technology Demonstrations
PROJECT NUMBER: R2145
BUDGET ACTIVITY: 3
DATE: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($9,351) STUDIES AND SIMULATIONS:
  - (U) Initiated:
    - (U) zero-based study to define and evaluate future technology options based on joint military needs, affordability, and technology availability which could improve operational capabilities of Navy systems and suggest the most important directions for future development in the Global Surveillance, Precision Strike, and Air Superiority and Defense Areas.
    - (U) NATACMS studies and simulations focusing on Navy unique issue of adapting NATACMS to fire from a ship, using Global Positioning System (GPS) upgrade, in preparation for FY 1994-start ATD.
    - (U) Air Defense Special Access Program studies and simulations. Details available at a higher level of classification.
    - (U) Advanced Strike Planning Tool (ASPT) requirements analysis for automated strike planning for FY 1994-start ATD. (Project canceled by Congress end of FY-93).
    - (U) Apollo airframe configurations, seeker candidate (strap-down configuration), data requirement and trade-off study and analysis for FY 1994-start ATD (Project canceled by Congress end of FY 1993).
  - (U) Completed:
    - (U) Multi-Sensor Precision Targeting (MSPT) requirements (data rates and resolution) definition and technology analysis (sensor candidates) for multi-sensor precision targeting applications for FY 1995-start ATD.
    - (U) Real Time Support studies and simulations to validate the technology and operational concept and user oriented mission requirements analysis for the communication and surveillance aspect of strike mission planning, in-cockpit visualization, and information transfer. Results of the study have been incorporated into the FY 1994 ATD.
    - (U) Initial Precision Spaceborne Targeting System (PSTS) classified studies and simulation. Details available at a higher level of classification.
    - (U) GPS studies to evaluate and minimize the technological and operational risks associated with

FY 1995 RDT&E, DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603238N
PROGRAM ELEMENT TITLE: Precision Strike and Air Defense Technology Demonstrations
PROJECT NUMBER: R2145
BUDGET ACTIVITY: 3
DATE: 7 February 1994

reliance on GPS, including reliability, accuracy, and susceptibility to jamming as applied to global surveillance, air defense and precision strike. Provided results to PSTS, MSPT and NATACMS projects.

2. (U) FY 1994 PLAN:

- (U) ($607) STUDIES AND SIMULATIONS: Continue studies and simulations to define and evaluate future technology options for new ATD starts.
- (U) ($6,000) (U) REAL TIME SUPPORT FOR POWER PROJECTION: Initiate prototype system design. Demonstrate OC-312 155/640 Mega Bits Per Second (MBPS) shipboard local area network for real-time processing of tactical data inputs. Demonstrate real time flow of information to/from aircraft inflight. Complete multifunction mission planning demonstration in laboratory setting. Transfers to PE 0603794N in FY 1995.
- (U) ($5,000) PSTS: Perform initial live fire precision targeting demonstration in conjunction with United States Special Operations Command (USSOCOM) JCS exercise. Develop correlation algorithms, concept of operation, target characterization and classification methodologies. Initiate detailed test concepts of operation for live fire demonstration with NATACMS ATD. Details available at higher classification level. Transfer to PE 0603794N in FY 1995.
- (U) ($18,000) NATACMS: Complete studies and simulations of Navy unique issues of adapting NATACMS to fire from a ship and define requirements for ship systems and missile modifications, award contract for missile buy and initiate ship systems modifications.

3. (U) FY 1995 PLAN:

- (U) ($961) STUDIES AND SIMULATIONS: Continue studies and simulations in support of new ATD starts and evaluate future technology options.
- (U) ($5,000) NATACMS: Complete ship systems modifications, receive missile, complete shipboard system integration, conduct demonstration firing and document results.
- (U) ($27,000) MOUNTAIN TOP ATD (Continued Effort From FY 1994 Funding In PE 0603792N): Install the Cooperative Engagement Concept (CEC) units on the mountain top and in designated AEGIS ship and complete ship's training. Integrate and conduct mountain top test of Advanced Research Projects Agency (ARPA) surveillance radar sensor suite, SPG-51 and CEC against low flyers. Modify SM-2 missiles to be used in test. Complete all planning for live fire demonstration. Initiate design and integration studies for

FY 1995 RDT&E, DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603238N
PROGRAM ELEMENT TITLE: Precision Strike and Air Defense Technology Demonstrations

PROJECT NUMBER: R2145
BUDGET ACTIVITY: 3

DATE: 7 February 1994

airborne platform prototype.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NAVAIRWARCEN, China Lake, CA; NAVSURFWARCEN, Dahlgren, VA and Silver Spring, MD; NAVSURFWARCEN, Bethesda, MD and Annapolis MD; NCCOSC, San Diego, CA. CONTRACTORS: MITRE Corporation, Bedford, MA; APL/JHU, Laurel, MD; CNA, Alexandria, VA; Draper Laboratories, Cambridge, MA; MIT Lincoln Laboratories, Cambridge, MA; ARL/PSU, State College, PA; Jason Associates, San Diego, CA; and others TBD.

E. (U) COMPARISON WITH AMENDED FY 1994 PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: Non-Acquisition Program Definition Documents (NAPDDs) being developed for each task.

G. (U) RELATED ACTIVITIES:
- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0602111N (Surface/Aerospace Surveillance and Weapons Technology)
- (U) PE 0602121N (Surface Ship Technology)
- (U) PE 0602122N (Aircraft Technology)
- (U) PE 0602234N (Materials, Electronics and Computer Technology)
- (U) PE 0603006A (C3 Advanced Technology)
- (U) PE 0603226E (Experimental Evaluation of Innovative Technologies)
- (U) PE 0603238F (Air Defense/Precision Strike Technology Demo)
- (U) PE 0603245F (Advanced Flight Technology Integration)
- (U) PE 0603270N (Advanced Electronic Warfare Technology)
- (U) PE 0603401F (Advanced Spacecraft Technology)
- (U) PE 0603563N (Ship Concept Advanced Design)

FY 1995 RDT&E, DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603238N
PROGRAM ELEMENT TITLE: Precision Strike and Air Defense Technology Demonstrations

PROJECT NUMBER: R2145
BUDGET ACTIVITY: 3

DATE: 7 February 1994

- (U) PE 0603601F (Conventional Weapons Technology)
- (U) PE 0603726F (C3I Subsystem Integration)
- (U) PE 0603772A (Advanced Tactical Computer Science and Sensor Technology)
- (U) PE 0603794N (C3 Advanced Technology)

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

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

J. (U) MILESTONE SCHEDULE: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603254N
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Systems Development
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER& TITLE	FY 1992 AND PRIOR	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
H1292 Advanced ASW Sensors and Processors		10,100	15,562	11,216	12,946	12,024	11,174	11,257	CONT.	CONT.
V0968 Advanced ASW Target	C	13,773	6,825	12,930	15,478	14,041	12,331	16,368	23,369	115,115
W0490 Project BEARTRAP		15,962	11,940	7,367	7,364	12,627	12,911	13,265	CONT.	CONT.
TOTAL:		39,835	34,347	31,513	35,788	38,692	36,416	40,890	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Anti-Submarine Warfare (ASW) System Development program provides for The program is responsive to requirements to improve all ASW systems to counter the existing and projected submarine threats and to develop system performance prediction software for all acoustic and non-acoustic ASW systems.

(U) The Advanced ASW Sensors and Processing project provides improved air ASW warfare platform effectiveness through development of advanced hardware and software associated with airborne acoustic systems. This includes sensors, processing, post-processing, data recording and display capabilities to address regional threat scenarios against conventionally powered submarines represented by the German Type 209, and Soviet developed quiet nuclear submarine, represented by the AKULA.

(U) The Advanced ASW Target project develops the next generation fleet Antisubmarine Warfare (ASW) training target. There are two efforts in this element, the development of the Target MK 30 Mod 2 and the close out of the Fast Deep Target (FDT) Program. The MK 30 Mod 2 replaces the aging MK 30 Mod 1 ASW Target providing increased target reliability and availability to the Fleet and updates the target's electro-acoustic capabilities.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603254N
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Systems Development
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) The BEARTRAP project is a high technology R&D program providing technology and ASW data for _____ for sensor development, weapon design, signal processing programs, modeling and immediate operational fleet use for air, surface, and sub-surface ASW platforms.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603254N
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Systems Development

PROJECT NUMBER: H1292
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: Advanced Anti-Submarine Warfare (ASW) Sensors & Processors (S&P)

PICTURE NOT AVAILABLE

POPULAR NAME: Advanced ASW S&P

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603254N
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Systems Development

PROJECT NUMBER: H1292
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	SWALAS	MS-0 2/94	MS-I 2/95				MS-II 2/99	
ENGINEERING MILESTONES								
T&E MILESTONES			ADLFP DEMO 7/95			SWALAS DT-I 2/98		
CONTRACT MILESTONES		ADLFP 2/94		SWALAS 12/95				

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	794	2,805	3,250	3,600	4,866	2,400	4,450	CONT.
SUPPORT CONTRACT	1,592	1,672	1,971	1,964	1,823	1,694	1,698	CONT.
IN-HOUSE SUPPORT	7,714	11,105	5,995	7.382	5,335	7,080	5,109	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	CONT.
TOTAL	10,100	15,582	11,216	12,946	12,024	11,174	11,257	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program provides improved air Anti-Submarine Warfare (ASW) platform effectiveness through development of advanced hardware and software associated with airborne acoustic systems. This includes sensors, processing, post-processing, data recording and display capabilities to address regional threat scenarios against conventionally powered submarines, represented by the German Type 209, and Soviet developed quiet nuclear submarines, represented by the AKULA. Key objectives are platform accommodations of advanced active and passive sensors, improved detection, classification, localization, tracking, and increased capacity and flexibility to handle multi-sensor data loads.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603254N
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Systems Development

PROJECT NUMBER: H1292
BUDGET ACTIVITY: 4

Date: 7 February 1994

(u) Primary programs being funded during the period identified are the Shallow Water ASW Localization and Attack System (SWALAS) (replaces Advanced Active Sonobuoy), which is a potential replacement for the Directional Command Active Sonobuoy System in harsh water, the Air Deployed Low Frequency Projector (ADLFP) non-acquisition program which will demonstrate low frequency acoustic projector technology, and the development of potential enhancements for Extended Echo Ranging (EER) source technology and software for P-3C platforms.

C. (u) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (u) FY 1993 ACCOMPLISHMENTS:

SWALAS

- (U) ($1,750) Mission Need Statement (MNS) drafted and initiated alternative concept analysis in support of Milestone (MS) I Cost and Operational Effectiveness Analysis (COEA).
- (U) ($973) Continued acoustic alternative component analysis and development.
- (U) ($577) Completed test equipment specification, collected and analyzed shallow water acoustic data.
- (U) ($725) Provided other engineering support and contractor support services.

ADLFP

- (u) ($261
- (U) ($1,700) Procured test support equipment and completed shallow water acoustic data collection.
- (U) ($423) Completed A-size packaging study.
- (U) ($3,691) Provided other engineering support and contractor support services.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603254N
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Systems Development

PROJECT NUMBER: H1292
BUDGET ACTIVITY: 4

Date: 7 February 1994

2. (U) FY 1994 PLAN:

SWALAS

- (U) ($1,000) Complete MS 0, initiate alternatives tradeoffs, and COEA analysis.
- (U) ($228) Provide other engineering support and contractor support services.

ADLFP

- (U) ($2,468) Complete procurement package specifications and award contract.
- (U) ($780) Complete procurement of test support hardware.
- (U) ($1,418) Conduct test data reduction and test support.
- (U) ($1,194) Provide other engineering support and contractor support services.

EER

- (U) ($1,083) Complete software modifications for P-3 acoustic trainer.
- (U) ($800) Complete Operational Evaluation (OPEVAL) flight tests.
- (U) ($1,200) Evaluate improvements to source design.
- (U) ($2,187)
- (U) ($771) Complete modifications to facilitate software support.
- (U) ($1,653) Complete Man-Machine improvements to P-3/EER software.
- (U) ($800) Provide other engineering support and contractor support services.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603254N
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Systems Development
PROJECT NUMBER: H1292
BUDGET ACTIVITY: 4
Date: 7 February 1994

3. (U) FY 1995 PLAN:

SWALAS

- (U) ($200) Complete COEA analysis and MS I.
- (U) ($332) Prepare procurement package and specification.
- (U) ($189) Provide other engineering support and contractor support services.

ADLFP

- (U) ($2,450) Complete integration and test of over-the-side test units.
- (U) ($1,216) Conduct test, evaluation and data reduction.
- (U) ($1,425) Provide other engineering support and contractor support services.

EER

- (U) ($1,300) Complete source hardware redesign alternatives.
- (U) ($2,402) Conduct test, evaluation and data reduction.
- (U) ($1,200) Complete engineering design and specification.
- (U) ($502) Provided other engineering support and contractor support services.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA, Patuxent River, MD, and Indianapolis, IN; NAVSURFWARCENDIV, Crane, IN; WPNSTA, Yorktown, VA; NAVSURFWARCENCOASTSYSTA, Panama City, FL; Stennis Space Center, MS; NCCOSC RDTE DIV, San Diego, CA; ONR, Arlington, VA. CONTRACTORS: Mitre, McLean, VA.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603254N
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Systems Development

PROJECT NUMBER: H1292
BUDGET ACTIVITY: 4

Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

	AAA/ADLFP
MNS	4/92
COEA	12/92
NAPDD	6/93

	SWALAS
MNS	In Process

G. (U) RELATED ACTIVITIES:

- (U) PE 0604261N, Acoustic Search Sensors (Engineering Development).
- (U) PE 0602314N, Undersea Surveillance and Weapons Technology (Technology Demonstration).

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

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

J. (U) TEST AND EVALUATION: SWALAS: DT-I 2/98

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603254N
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Systems Development

PROJECT NUMBER: V0968
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

PROJECT TITLE	FY 1992 AND PRIOR	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
V0968, Advanced Anti-Submarine Warfare (ASW) Target	0	13,773	6,825	12,930	15,478	14,041	12,331	16,368	23,369	115,115

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project develops the next generation fleet Antisubmarine Warfare (ASW) Training target. There are two efforts in this Project, the development of the Target MK-30 Mod 2 and the close out of the Fast Deep Target (FDT) Program. The mission of the MK 30 Mod 2 ASW Training Target System is to provide cost-effective ASW training for Navy platforms (surface ships, submarines, and aircraft) by using a highly reliable and maintainable unmanned undersea vehicle to simulate the dynamics, acoustics, and magnetic signatures of submarines and act as a target for the ASW sensors and torpedoes to detect, classify, track, and pursue in a realistic, operational training environment.

(U) The target will be capable of simulating the Russian and Rest of the World (ROW) submarine threats anticipated in the twenty-first century littoral warfare environment with the degree of simulation fidelity required for effective ASW training, especially the shallow water, slower speed and conventionally powered submarine.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($3,925) Achieved MK-30 Mod 2 Milestone(MS) I, May 1993.
- (U) ($303) Completed closeout of the FDT Program, Sept 1993.
- (U) ($9,545) Initiated MK-30 Mod 2 Demonstration and Validation (D&V) phase contract with Raytheon Company, Sept 1993.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603254N
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Systems Development

PROJECT NUMBER: V0968
BUDGET ACTIVITY: 4

Date: 7 February 1994

2. (U) FY 1994 PLAN:

- (U) ($3,603) Continue D&V phase development contract: Continue designing MK-30 Mod 2 vehicle and support and test equipment, achieve system requirements review Nov 1993, achieve systems design review Mar 1994, and achieve preliminary design review, August 1994.
- (U) ($3,222) Continue program and technical management of the MK-30 Mod 2 development, conduct risk/cost reduction development efforts.

3. (U) FY 1995 PLAN:

- (U) ($6,598) Continue D&V phase development contract. Continue designing MK-30 Mod 2 vehicle and support and test equipment, conduct critical design review February 1995, initiate prototype fabrication, conduct risk/cost reduction development efforts.
- (U) ($3,594) Continue program and technical management of the MK-30 Mod 2 development. Initiate preparation of Milestone (MS) II documentation.
- (U) ($2,738) Test and evaluation support and analysis.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCENDIV Newport RI. CONTRACTORS: Raytheon Company, Portsmouth RI and Applied Remote Technology, San Diego CA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603254N
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Systems Development

PROJECT NUMBER: V0968
BUDGET ACTIVITY: 4

Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:

OR N/A
ORD 05/93
TEMP 05/93
COEA 05/93

G. (U) RELATED ACTIVITIES: Not applicable.

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

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

J. (U) MILESTONE SCHEDULE:

MS I	FY93
MS II	FY96
MS III	FY01

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603254N
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Systems Development

PROJECT NUMBER: W0490
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0490 Project BEARTRAP	15,962	11,940	7,367	7,364	12,627	12,911	13,265	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: BEARTRAP develops new prototype Anti-Submarine Warfare (ASW) tools by incorporating Office of Naval Research developed advanced technology. This permits BEARTRAP aircraft to collect acoustic and non-acoustic data on diesel and quiet nuclear submarines [redacted] BEARTRAP uses developmental and prototype hardware and software installed in specially configured P-3C aircraft to collect [redacted] data and ground facilities to conduct post mission analysis of this information. BEARTRAP utilizes an Assistant Secretary of the Navy directed rapid development capability status for developing new prototype acoustic recorders, full spectrum acoustic and non-acoustic signal processing algorithms, acoustic intercept receivers, advanced data displays, automatic calibration, ASW tactics and advanced sensors. BEARTRAP is a leader in the use of Commercial Off The Shelf (COTS) hardware, installing prototype systems in operational aircraft platforms. BEARTRAP is currently installing the COTS based super processor (APEX) utilizing the new Navy standard Futurebus+ architecture and VME interfaces in P-3C Update III aircraft. APEX permits rapid integration of new "plug-in" sensor technology, signal processing algorithms, and operational evaluation of new detection and surveillance capabilities. Project BEARTRAP has had a major and significant impact upon ASW. This is a result of both the [redacted] and scientific data collection activities, and the initiation of developmental research equipments and concepts later introduced into the ASW community.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,955) Continued installation and initiated upgrades to the APEX systems in Project BEARTRAP aircraft.
- (u) ($1,057) Continued signal processing development efforts to include [redacted]
- (u) ($7,407) Continued acoustic and non-acoustic data collections for [redacted] sensor development and modeling efforts.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603254N
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Systems Development
PROJECT NUMBER: W0490
BUDGET ACTIVITY: 4
Date: 7 February 1994

- (u) ($2,407) Initiated hardware and software development efforts and equipped BEARTRAP aircraft
- (u) ($1,107) Completed delivery and initiated installation of
- (u) ($507) Initiated system performance evaluation of advanced MAD systems and processing algorithms.
- (u) ($522) Continued improvement efforts to the

2. (U) FY 1994 PLAN:

- (U) ($118) Complete installation of MAD systems.
- (U) ($2,075) Continue installation and upgrades to APEX systems in BEARTRAP aircraft.
- (u) ($4,427) Continue acoustic and non-acoustic data collections for sensor development and modeling efforts.
- (u) ($4,782) Continue signal processing development efforts to include active and passive acoustics, non-acoustics, chaos, neural networks, and BEARTRAP mission critical software (Single Acoustics Signal Processor (SASP), CP.2044).
- (U) ($438) Continue evaluation of new processing algorithms for advanced MAD systems.
- (U) ($100) Initiate the integration of advanced classification and image processing into APEX for the Synthetic Aperture Radar/Inverse Synthetic Aperture Radar (SAR/ISAR) systems.

3. (U) FY 1995 PLAN:

- (U) ($1,367) Continue signal processing development efforts to include active and passive acoustics and non-acoustics.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603254N
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Systems Development

PROJECT NUMBER: W0490
BUDGET ACTIVITY: 4

Date: 7 February 1994

- (u) ($750) Continue hardware and software development efforts to equip BEARTRAP aircraft
- (u) ($4,150) Continue acoustic and non-acoustic data collections for _ sensors development and modeling efforts.
- (U) ($402) Continue the requirements of development and integration of advanced classification and image processing into APEX for the SAR/ISAR systems.
- (U) ($698) Continue evaluation of advanced MAD systems and algorithms.

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

D. (U) WORK PERFORMED BY: IN-HOUSE, NRL, WASHINGTON, D.C.; COMPATWINGSPAC, Moffett Field, CA; PATWINGSLANT DET, Jacksonville, FL; NAVAIRWARCENACDIV, Warminster, PA; AAWSO, Patuxent River, MD and Indianapolis, IN; Contractors: Texas Instruments, Inc., Dallas, TX; Sparton Electronics, Jackson, MI; General Scientific Corporation, Arlington, VA; General Physics Corp., Columbia, MD; Johns Hopkins University/Applied Physics Laboratory, Laurel, MD.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) NDCP WO-49-AS 6/20/80
- (U) NAPDD 076-095 4/15/85
- (U) NAPDD 332-880E1 4/27/93

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603254N
PROGRAM ELEMENT TITLE: Anti-Submarine Warfare Systems Development

PROJECT NUMBER: W0490
BUDGET ACTIVITY: 4

Date: 7 February 1994

G. (U) RELATED ACTIVITIES:

- (U) PE 0205620N Surface ASW Combat System Integration.
- (U) PE 0603553N Surface Anti-Submarine Warfare.
- (U) PE 0205632N MK 48 ADCAP.
- (U) PE 0604261N Acoustic Search Sensors.
- (U) PE 0604221N P-3 Modernization Program.
- (U) PE 0604212N ASW and Other Helicopter Developments.
- (U) PE 0603792N Advanced Technology Demonstrations.
- (U) PE 0603747N Advanced Undersea Warfare Technology.

H. (U) OTHER APPROPRIATION FUNDS: Not applicable

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

J. (U) MILESTONE SCHEDULE: Not applicable

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603261N
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
A2174	Joint Service Imagery Processing System, Navy (JSIPS-N)								
	2,274	3,105	*0	0	0	0	0	0	20,417
E0534	Tactical Reconnaissance Systems								
	14,037	29,435	59,372	22,319	16,478	9,936	9,904	CONT.	CONT.
TOTAL	16,311	32,540	59,372	22,319	16,478	9,936	9,904	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Tactical Airborne Reconnaissance Program develops systems to provide timely and accurate imagery intelligence. Present systems provide such imagery from manned platforms using film based sensors, necessitating a return to base for film processing. Manned reconnaissance, with Electro-Optical, Infrared, and Synthetic Aperture Radar (SAR) sensors can provide both broad coverage and high resolution imagery at extended ranges via data link in near real time. The USMC RF-4Bs were phased out in 1990. A Navy Follow-On Tactical Reconnaissance capable aircraft will replace the interim Navy F-14 Tactical Air Reconnaissance Pod System with a suite of sensors that will provide near real time data-linked information; from long range oblique photographic sensors, overflight and short range stand-off sensors, and all weather SAR sensors, both day and night. A Navy shipboard capability, compatible with the JSIPS-N, will be used for imagery processing, analysis, and storage.

*JSIPS transferred to Program Element 0305154D under Defense Airborne Reconnaissance Office (DARO).

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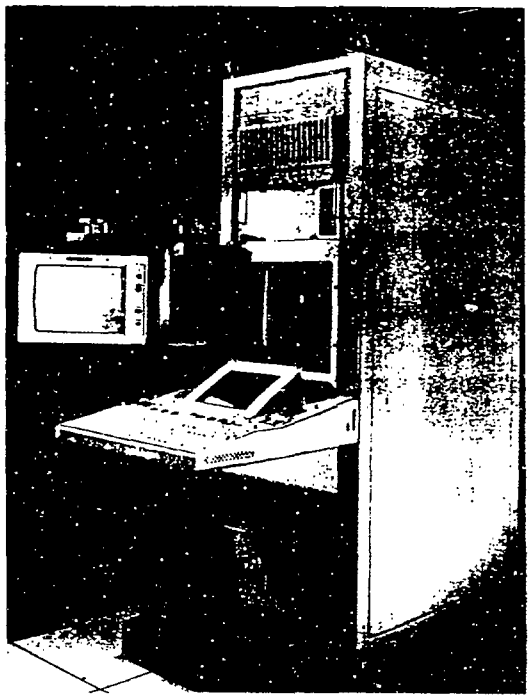
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603261N
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance

PROJECT NUMBER: A2174
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: Joint Service Imagery Processing System, Navy (JSIPS-N)



POPULAR NAME: JSIPS-N

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603261N
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance

PROJECT NUMBER: A2174
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

SCHEDULE	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES			MS IIA DIWSA 5/94						
ENGINEERING MILESTONES									
T&E MILESTONES			DT/OT IIA DIWSA 10/93-2/94 DT/OT IIB DIWSA 7-9/94						
CONTRACT MILESTONES		TIS	TIS						

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	10,153	2,244	3,075	0	0	0	0	0	15,472 (0)
SUPPORT CONTRACT	0	0	0	0	0	0	0	0	0 (0)
IN-HOUSE SUPPORT	4,190	30	30	0	0	0	0	0	4,250 (0)
GFE/ OTHER	685	0	0	0	0	0	0	0	685 (0)
TOTAL	14,948	2,274	3,105	0	0	0	0	0	20,417 (0)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603261N
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance

PROJECT NUMBER: A2174
BUDGET ACTIVITY: 4

Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Joint Service Imagery Processing System (JSIPS) is the joint Department of Defense (DOD) program which receives, processes, exploits, and disseminates time-sensitive imagery from multiple sources, imagery products and imagery-derived intelligence reports. The JSIPS-Navy (JSIPS-N) is the Navy implementation of this architecture using both Navy and joint program hardware/software. Two major hardware components of the JSIPS-N program are the Digital Imagery Workstation Suite Afloat (DIWSA) and the Tactical Input Segment (TIS). The DIWSA serves as the heart of this architecture which receives, processes, exploits and disseminates imagery and reports based on multi-source imagery. The DIWSA receives imagery data on magnetic media, digitized film or electronically. The TIS provides the capability to receive, record and process imagery from multiple sources. The Electro-Optical Long Range Oblique Photography System, Synthetic Aperture Radar (SAR), and Overflight and Short Range Stand-Off (O&SRS-O) suite are sensor suites which will provide imagery to JSIPS-N. JSIPS-N will develop the capability to accept imagery data from these various sources.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

   - (U) ($2,274) Continued JSIPS-N development.

2. (U) FY 1994 PLAN:

   - (U) ($3,105) Continue JSIPS-N development. Perform Development/Operational Testing (DT/OT) of JSIPS-N DIWSA and achieve approval for DIWSA Limited Rate of Initial Production (LRIP) Milestone (MS) IIA.

3. (U) FY 1995 PLAN:

   - (U) ($0) JSIPS funding has transferred to OSD Program Element (PE) 0305154D under the Defense Airborne Reconnaissance Office (DARO).

4. (U) PROGRAM TO COMPLETION:

   - (U) This is a continuing program under OSD PE 0305154D.

PROGRAM ELEMENT: 0603261N
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance

PROJECT NUMBER: A2174
BUDGET ACTIVITY: 4

Date: 7 February 1994

D. (U) WORK PERFORMED BY: IN-HOUSE: OPTEVFOR, Norfolk, VA; NAVSURFWARCENDIV, Dahlgren, VA; NAVAIRWARCENACDIV, Patuxent River, MD; NRAD, Philadelphia, PA. CONTRACTORS: GDE Systems, San Diego, CA; Science Application, Inc, Arlington, VA; E-Systems, Garland, TX.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: JSIPS-N T&E Master Plan: 9/93

G. (U) RELATED ACTIVITIES:

- (U) PE 0204136N, F/A-18 Squadrons (Project E2065 F/A-18 Radar Upgrade Phase II): Future Common Aperture Multi-Spectral Sensor calls for adding all-weather reconnaissance capability to multi-mission aircraft; adds SAR imagery mode provisions to radar upgrade.

- (U) PE 0206625M, Marine Corps Intelligence/Electronic Warfare System: Receives Electro-Optical (EO)/Infrared(IR)/SAR imagery.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 160	0	3,505	4,001	40,839	46,660	51,093	58,756	CONT.	CONT.
• (U) OPN Spares Line 239	0	1,931	1,229	2,257	0	4,761	3,131	CONT.	CONT.

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603261N
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance

PROJECT NUMBER: A2174
BUDGET ACTIVITY: 4

Date: 7 February 1994

J. (U) TEST AND EVALUATION:

	DT	OT
• (U) JSIPS-N DIWSA IIA	10-11/93	1-2/94
• (U) JSIPS-N DIWSA IIB TECHEVAL	7-8/94	9/94

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603261N
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance

PROJECT NUMBER: E0534
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: Tactical Reconnaissance Systems

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POPULAR NAME: Tactical Reconnaissance Systems

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603261N
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance

PROJECT NUMBER: E0534
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

SCHEDULE	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES									
ENGINEERING MILESTONES			EO-LOROPS INTEG CDR 2/94	EO-LOROPS EMD Sensor Delivery 10/94		EO-LOROPS SENSOR/POD INT DEL 1Q/97			
T&E MILESTONES		O&SRS-O DT 2/93			EO-LOROPS CFT 1Q/96	O&SRS-OFMF EVAL 4Q/96			
CONTRACT MILESTONES				O&SRS-O LRIP 5/95			EO-LOROPS EMD CONTRACT 2Q/98		

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	60,431	9,871	20,749	56,944	15,738	10,332	5,228	5,139	184,432 (65,570)
SUPPORT CONTRACT	475	292	284	230	246	248	268	293	2,336 (768)
IN-HOUSE SUPPORT	10,241	3,276	7,119	1,914	5,431	5,059	3,769	3,772	40,581 (14,013)
GFE/ OTHER	1,695	598	1,283	284	904	839	671	700	6,974 (2,395)
TOTAL	72,842	14,037	29,435	59,372	22,319	16,478	9,936	9,904	234,323 (82,746)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603261N
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance

PROJECT NUMBER: E0534
BUDGET ACTIVITY: 4

Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program provides timely and accurate imagery intelligence from the F/A-18D (RC) as a replacement for the Marine Corps RF-4B, which was phased out in 1990. The same capability will be incorporated into a Navy Follow-on Tactical Air Reconnaissance capable aircraft to replace the interim F-14 Tactical Air Reconnaissance Pod System. These systems include Electro-Optical (EO) and Infrared (IR) Sensors that provide day and night broad area coverage and high resolution images at short and extended ranges. Overflight and Short Range Stand-Off (O&SRS-O) coverage will be provided by a system based upon the sensors developed by the Advanced Tactical Air Reconnaissance System (ATARS) program. Long range day and night stand-off imaging is provided by the Electro-Optical Long Range Oblique Photography System (EO-LOROPS).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($14,037) Continued integration and planned testing of EO-LOROPS with the F/A-18. Conducted flight demonstration in F/A-18D of the O&SRS-O sensors developed in the former ATARS program.

2. (U) FY 1994 PLAN:

- (U) ($29,435) Continue integration and plan flight test of EO-LOROPS with the F/A-18. Continue ATARS hardware baseline configuration of the O&SRS-O sensors. Verify F/A-18D (RC) power, cooling, interface modifications for reconnaissance.

3. (U) FY 1995 PLAN:

- (U) ($59,372) Continue integration and start testing of EO-LOROPS with the F/A-18. Develop O&SRS-O Prototype Sensor Suites. Continue Test and Evaluation effort of existing O&SRS-O components.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA and Patuxent River, MD; NAVAIRWARCENWPNDIV, China Lake, CA. CONTRACTORS: Prime for F/A-18D (RC) aircraft and SAR sensor: McDonnell Aircraft Co., St. Louis, MO; Prime for stand-off EO-LOROPS: Loral Fairchild Systems, Syosset, NY; prime for O&SRS-O TBD.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603261N
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance

PROJECT NUMBER: E0534
BUDGET ACTIVITY: 4

Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) DON Reconnaissance Operational Requirement (022-05-83): 06/84; validated by Joint Oversight Requirements Council (JROC) in 10/92; Operational Requirements Document in staffing.
- (U) F/A-18D(RC) Test and Evaluation Master Plan (2[illegible]-1 Annex B Rev 1): 04/90

G. (U) RELATED ACTIVITIES:

- (U) PE 0204136N, F/A-18 Squadrons (Project E2065 F/A-18 Radar Upgrade Phase II): Adds all weather reconnaissance capability to multi-mission aircraft; adds SAR imagery mode provisions to radar upgrade.
- (U) PE 0206625M, Marine Corps Intelligence/Electronic Warfare System: Receives EO/IR/SAR imagery.
- (U) SBIR: Common Aperture Multi-Spectral Sensor and Night IR and Day EO in one sensor.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603261N
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance

PROJECT NUMBER: E0534
BUDGET ACTIVITY: 4

Date: 7 February 1994

J. (U) TEST AND EVALUATION:

	DT	OT	FOT&E
• (U) O&SRS-O	2/93	4Q/96	10/97
• (U) EO-LOROPS	1Q/96 (CFT)	3/97	

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FY 1995 RDT&E DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603270N
PROGRAM ELEMENT TITLE: Advanced Electronic Warfare Technology
BUDGET ACTIVITY: 3

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
E2194 Electronic Warfare Advanced Technology	19,193	6,729	7,856	7,877	9,124	9,376	9,570	CONT.	CONT.
U2090 Functional Recognition/Response	5,649	6,100	6,943	7,007	7,550	7,863	8,072	CONT.	CONT.
TOTAL	24,842	12,829	14,799	14,884	16,674	17,239	17,642	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: Advanced Electronic Warfare Technology (AEWT) is the Navy's continuing, core Advanced Technology Development program for Electronic Warfare (EW) and is oriented to demonstrate and transition EW technology in cooperation with the other Services, placing special empnasis on Naval EW applications of Command and Control Warfare (C2W). This program continues to develop technologies which support the effective employment of naval force capabilities in the conduct of the Navy's Joint Mission Areas as defined by the Chief of Naval Operations (CNO) (i.e. Joint Strike, Littoral Warfare, Surveillance, Surface Electronic Warfare (SEW)/I, Strategic Deterrence, Sealift/Protection and Naval Readiness & Training). P.E. 0603270N is managed at the Office of Naval Research (ONR) by the same office that directs P.E. 0602270N (Navy EW Technology) and provides the vast majority of projects to this program for demonstration and potential transition to full scale development. ONR program manager is also a principal of the Joint Director of Laboratories (JDL) Technology Panel for EW (TPEW) which oversees and coordinates Tri-Service 6.2 & 6.3A EW programs. Consequently, this program is planned jointly in accordance with Tri-Service Reliance agreements which allocate various EW disciplines and their attendant technology development responsibilities between the Army, Air Force and the Navy, and as part of the Integrated Science and Technology (S&T) EW Program, it is subject to the review and execution oversight of the JDL. AEWT is responsive to CNO guidance and the Systems Commands' warfighting requirements and needs, and it is vitally associated with future joint warfighting capabilities of "maintaining near perfect real-time knowledge of the enemy..." and "to counter the threat of...cruise missiles to the Continental United States (CONUS) and deployed forces". It develops EW technologies to counter a broad range of electromagnetic threats.

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FY 1995 RDT&E DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603270N
PROGRAM ELEMENT TITLE: Advanced Electronic Warfare Technology
BUDGET ACTIVITY: 3

DATE: 7 February 1994

The program transitions new technologies to Tactical Air (TACAIR), low observable aircraft, surface EW platforms, and Pre-planned Product Improvement (P3I) programs (including multi-spectral/multi-modal sensors and seekers) by improving threat detection, identification, location and response through developmental upgrades and direct, advanced technology insertions. Currently, AEWT consists of two projects:

(U) E2194-Electronic Warfare Advanced Technology (EWAT)--A continuation of efforts initiated under the Integrated Navy Electronic Warfare System (INEWS) program. Efforts have been streamlined and focused from prior years into a continuing core program aimed at reducing the integration risk of advanced EW systems. Facilitate the transition of high-payoff EW technologies to the Fleet.

(U) U2090-Functional Recognition & Response--Develops algorithms and techniques to recognize emitters by measuring and analyzing their observable, radar function parameters. Uses nondevelopmental item (NDI) or develops hardware (as required) to implement Functional Recognition demonstrations and assess overall operational improvement to extant capabilities.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603270N
PROGRAM ELEMENT TITLE: Advanced Electronic Warfare Technology
PROJECT NUMBER: E2194
BUDGET ACTIVITY: 3
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) E2194 ELECTRONIC WARFARE ADVANCED TECHNOLOGY (EWAT): The EWAT project is responsive to Congressional/OSD direction concerning Integrated Modular Avionics (IMA). It reduces risk in aircraft programs by incorporating modular avionics which greatly reduce the need for avionics development from airframe development programs. EWAT will develop the technology and fabricate a limited number of EW components for Demonstration/Validation (DEM/VAL), integrate these components with other IMA elements, demonstrate the performance and technical maturity, and assist in the programmatic transition to Engineering and Manufacturing Development (EMD). The EW functionalities addressed include Missile Approach Warning and Countermeasure Response which in turn are directly responsive to the following Joint Missile Areas (JMAs):

(U) STRIKE-(Survivability and Flexible Response) enables onboard Electronic Warfare Support Measures/Electronic Countermeasures (ESM/ECM) systems to rapidly adapt to dynamically changing, electromagnetic threat parameters.
(U) SURFACE ELECTRONIC WARFARE (SEW)/I-(C2W Target Neutralization, C2W Planning/Execution/Assessment Tools, and Battle Damage Assessment (BDA))-provides real time specific target identification and selection.
(U) STRIKE-(Target and Kill Time-Critical Targets)-provides real time specific target identification and selection.
(U) LITTORAL WARFARE-("Puncture Proof" self-defense, reduction of own ship signatures)-promotes rapid response capability in threat identification and response selection.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($7838) Developed Prototype Ultra Violet Missile Approach Warning (UV) (MAWS) sensors and record system. Collected missile plume data during multinational missile exploitation effort.
- (U) ($1239) Developed prototype miniature Laser Warning Sensor (LWS), LWS software, controller and record system.
- (U) ($3283) Developed laboratory and flight test assets. Completed MAWS cost-benefit analysis, and F-14 installation study.
- (U) ($1635) Developed and tested two advanced flares in a coordinated effort with the Air Force Advanced Strategic and Tactical Expendables (ASTE) DEM/VAL effort. Developed Navy unique dispensing hardware for ASTE type of expendables. Assisted transition of design into baseline F/A-18 E/F aircraft. Completed demonstration of Low-Flash impulse cartridge.
- (U) ($4288) Completed Advanced Shared Aperture Program and Shared Airborne Antenna System effort.
- (U) ($910) Exploited new generation Infrared (IR) missile seeker in Naval Research Laboratory Infrared

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603270N
PROGRAM ELEMENT TITLE: Advanced Electronic Warfare Technology
PROJECT NUMBER: E2194
BUDGET ACTIVITY: 3
DATE: 7 February 1994

Countermeasure (IRCM) lab. Developed preliminary CM techniques.

(U) FY 1994 PLAN:

- (U) ($3900) Fabricate advanced UV MAWS. Conduct MAWS background/clutter data collection flights.
- (U) ($1660) Design and fabricate miniature laser warning sensors. Begin LWS/UV sensor integration.
- (U) ($769) Integrate MAWS with AN/ALE-47 countermeasures dispenser and CRO software. Commence UV MAWS software integration with SH-60B Advanced AYK-14 (AAYK-14).
- (U) ($400) Complete development of Navy unique dispensing hardware for ASTE expendables.

(U) FY 1995 PLAN:

- (U) ($4122) Complete integrated UV MAWS, LWS and AN/ALE-47 suite performance demonstration with both baseline processor (RAH-66/Comanche data processing module) and SH-60B advanced avionics processor (AAYK-14).
- (U) ($2070) Design, fabricate and test integrated UV/Laser (single aperture) sensor.
- (U) ($1664) Initiate integration of MAWS and Directed IRCM hardware and software.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV China Lake, CA; NAVAIRWPNSTA Pt. Mugu, CA; NAVAIRWARCENACDIV Patuxent River, MD; NAVSURFWARCENDIV Crane, IN; NAVSURFWARCENDIV Indian Head, MD; NAVAVNDEPOT Jacksonville, FL. CONTRACTORS: SoftTech, Inc., Dayton, OH; Westinghouse Electric Corp., Baltimore, MD; Hughes-Santa Barbara Research Corp., Goleta, CA; University of Texas/Applied Research Laboratory, Austin, TX.

(U) RELATED ACTIVITIES:
- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0602270N (Electronic Warfare Technology)
- (U) PE 0603217N (Air Systems and Weapons Advanced Technology)
- (U) PE 0603792N (Advanced Technology Transition)
- (U) PE 0604223A (Comanche)

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603270N
PROGRAM ELEMENT TITLE: Advanced Electronic Warfare Technology

PROJECT NUMBER: E2194
BUDGET ACTIVITY: 3

DATE: 7 February 1994

- (U) PE 0604270N (Electronic Warfare Development)
- (U) PE 0604270F (Electronic Warfare Development)
- (U) PE 0303901N (SIRIUS)

(U) OTHER APPROPRIATION FUNDS: Not Applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603270N
PROGRAM ELEMENT TITLE: Advanced Electronic Warfare Technology
PROJECT NUMBER: U2090
BUDGET ACTIVITY: 3
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) U2090 Functional Recognition & Response:

counter-WARM and Specific Emitter Identification (SEI) technology developed in conjunction with the EW technology base program through field and at-sea fleet demonstrations. Successful transition of this technology to the Fleet will directly address the following JMAs: The approach will demonstrate

(U) SURFACE ELECTRONIC WARFARE (SEW)/I and STRIKE-(Battle Damage Assessment (BDA))

(U) SEW/I-(Global Surveillance and Tracking)
real-time entry and retrieval of those

(U) STRIKE-(Survivability)

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($800)
- (U) ($707) Phase I of
- (U) ($1050) Shipborne/Airborne Functional ID algorithms developed and verified in the laboratory.
- (U) ($892) Completed initial integration of airborne Generic CM techniques with Functional Recognition hardware.
- (U) ($800)
- (U) ($900) Performed at-sea and airborne tests of preliminary Functional ID algorithms and hardware.
- (U) ($500) Demonstrated automatic recognition processor using artificial intelligence for Functional Recognition.

(U) FY 1994 PLAN:

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603270N
PROGRAM ELEMENT TITLE: Advanced Electronic Warfare Technology
PROJECT NUMBER: U2090
BUDGET ACTIVITY: 3
DATE: 7 February 1994

- (U) ($950) Perform at-sea test of Functional ID integrated with Generic CM.
- (U) ($900) Integrate Battlefield Assessment Software Module into Navy Tactical Command System (NTCS) Afloat.
- (U) ($900) Demonstrate at-sea, Functional ID algorithm with improved Decoy Deceptive Electronic Countermeasures integrated with Generic CM for shipborne systems.
- (U) ($800) Demonstrate integration of Airborne Functional ID with Generic CM.
- (u) ($850)
- (U) ($900) Develop tool to model advanced dual mode (Radio Frequency/Anti-Radiation missiles (RF/ARM) and verify performance against known intelligence.
- (u) ($800) Develop advanced flyable hardware for

(U) FY 1995 PLAN:

- (U) ($1023) Demonstrate Artificial Intelligence Product with Generic CM, Functional ID, and UMOP subsystems.
- (U) ($850) Demonstrate at-sea, Generic CM assessment capability for shipborne systems.
- (u) ($950)

- (U) ($1020) Demonstrate fusion of Functional ID, onboard Generic CM and decoys during flight testing.
- (U) ($850) Develop Generic CM against multi-mode seekers and test against Rapier/Flycatcher.
- (U) ($900) Expand digital missile simulation technology to include advanced Western anti-ship missile.
- (u) ($900)
- (u) ($450)

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, D.C.; NAVAIRWPNSTA, Pt. Mugu, CA; NAVSURFWARCENDIV, Dahlgren, VA. CONTRACTORS: Locus, Inc., Alexandria, VA; Questech, Falls Church, VA; selected others.

(U) RELATED ACTIVITIES:
- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0602270N (Electronic Warfare Technology)
- (U) PE 0603217N (Air Systems and Weapons Advanced Technology)
- (U) PE 0603792N (Advanced Technology Transition)

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603270N
PROGRAM ELEMENT TITLE: Advanced Electronic Warfare Technology
PROJECT NUMBER: U2090
BUDGET ACTIVITY: 3
DATE: 7 February 1994

- (U) PE 0604270N (Electronic Warfare Development)
- (U) PE 0604270F (Electronic Warfare Development)

(U) OTHER APPROPRIATION FUNDS: Not Applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603382N
PROGRAM ELEMENT TITLE: Advanced Combat System Technology
PROJECT NUMBER: K0324
BUDGET ACTIVITY: 4
DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
K0324 Advanced Combat System Technology	0	0	3,587	9,852	12,026	14,697	19,402	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND PROJECT: This Program Element is an FY 1995 new start. Developments in radar technology, advanced display systems, multiple sensor coordination and distributed computer architecture have matured to make them candidates for advanced development under AEGIS Program Office management for introduction into the AEGIS Weapon System. This program will take a disciplined systems engineering approach to find how these advances can be integrated into the AEGIS system and subsequent combat systems, and to plan combat system baseline upgrade schedules. Advanced Combat System Technology planning has identified three major efforts, which are interrelated and compatible with planned AEGIS system upgrades. The first is Anti-Air Warfare System Technology, to concentrate on developing multi-function solid state radar systems to include solid state, active array technology, wide band operation, multiple simultaneous array face operations, new wave forms, and advances in signal processing. The second addresses AEGIS Weapon System Improvements, concentrating on commercial display enhancements and upgrades to the Tactical Graphics System to integrate new elements into the Weapon System. AEGIS Fully Distributed Architecture is the third, to implement the results of distributed process computer advances to replace the current AEGIS Combat System architecture with an open, distributed architecture, less dependant on Navy standard computers. These advanced technologies are candidate systems for follow-on combatants which will incorporate advances in computer distributed architecture, new radar wave forms, and signal processing.

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS: Not applicable.

(U) FY 1994 PLAN: Not applicable.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603382N
PROGRAM ELEMENT TITLE: Advanced Combat System Technology
PROJECT NUMBER: K0324
BUDGET ACTIVITY: 4
DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($1,812) Investigate developments in radar technology, advanced display systems, multiple sensor coordination and distributed computer architecture.
- (U) ($900) Perform preliminary system engineering to determine how this new technology can best be integrated into the AEGIS Combat System.
- (U) ($875) Begin preliminary studies of multi-function solid state radars including solid-state active arrays, wide band operation, multiple simultaneous array face operations, new wave forms, and advances in signal processing.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Dahlgren, VA; and ARPA, Arlington, VA. CONTRACTORS: Martin Marietta, Moorestown, NJ; Raytheon Corporation, Wayland, MA; and Johns Hopkins Univ/APL, Laurel, MD.

(U) RELATED ACTIVITIES:

- (U) PE 0604307N (AEGIS Combat System Engineering)

(U) OTHER APPROPRIATION FUNDS: To be determined.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603451N
PROGRAM ELEMENT TITLE: Tactical Space Operations
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X1846 Slow Walker/Joint Tactical Ground System (JTAGS)	0	0	179	0	0	0	0	0	9,802
X2055 National Imagery Support (NIS)	0	0	2,041	1,528	1,528	1,082	1,111	CONT.	CONT.
TOTAL	0	0	2,220	1,528	1,528	1,082	1,111	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program develops the capability to provide deployed forces with timely, day/night warning and surveillance data. In particular, this program supports efforts to provide warning data on tactical ballistic missiles and aircraft, improvement in locating and identifying high interest merchant vessels, and provides a capability to deliver timely, original quality imagery to afloat tactical users. Together, these projects allow the fleet to develop and maintain an essential surveillance capability without the use of fleet-revealing emitters.

(U) The National Imagery Support (NIS) project exploits other service efforts to electronically provide real time/near real time original resolution imagery to Joint Service Imagery Processing System-Navy (JSIPS-N). The JSIPS-N Digital Imagery Workstation Suite Afloat (DIWSA) serves as the national and tactical Imagery processing, analysis, and storage system for afloat TOMAHAWK/TACAIR mission planning, mission rehearsal, and C3I systems.

(U) Slow Walker Joint Tactical Ground Stations (JTGS) is a joint effort with US Army to develop and field transportable ground stations to process space-based early warning data in theater and provide vastly improved warning of theater ballistic missiles attacks.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603451N
PROGRAM ELEMENT TITLE: Tactical Space Operations
PROJECT NUMBER: X1846
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X1846, Slow Walker/Joint Tactical Ground station (JTAGS). The transportable JTAGS, when deployed in theater, will insure timely, reliable delivery of critical I&W data of hostile activity to operational commanders, and other joint users for battleforce management. JTAGS performs real-time tactical stero processing of the infrared data downlink from two Defense Support Program (DSP) satellites to detect, track, and automatically report launch warning, launch point origin, location, speed, and projected impact point for Tactical Ballistic Missiles (TMB), and similar data for Slow Walker aircraft and static events. The JTAGS development, under a MOA between the U.S. Army SSDC and the Navy SPAWARSYSCOM, leverages work previously performed by the Army under the Tactical Survellance Demonstration (TSD). The Navy plans to build two JTAGS.

(U) FY 1995 PLAN:

- (U) ($149) Conduct DT and IOT on EMD JTAGS prototypes.
- (U) ($30) Prepare for MS III decision review.

(U) PROGRAM TO COMPLETION: Not applicable

(U) WORK PERFORMED BY: IN-HOUSE: NAVSPASYSACT, Los Angeles, CA; NAVSURFWARCENDIV, Dshlgren, VA. CONTRACTORS: Aerospace Corp., Los Angeles, CA., Aeroject Corp., Azusa, CA.

(U) RELATED ACTIVITIES:

- (U) Program Element 0102431F Air Force Defense Support Program.
- (U) Program Element 0604766A Army JTAGS.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 2904	0	0	7,969	0	0	0	0		7,969

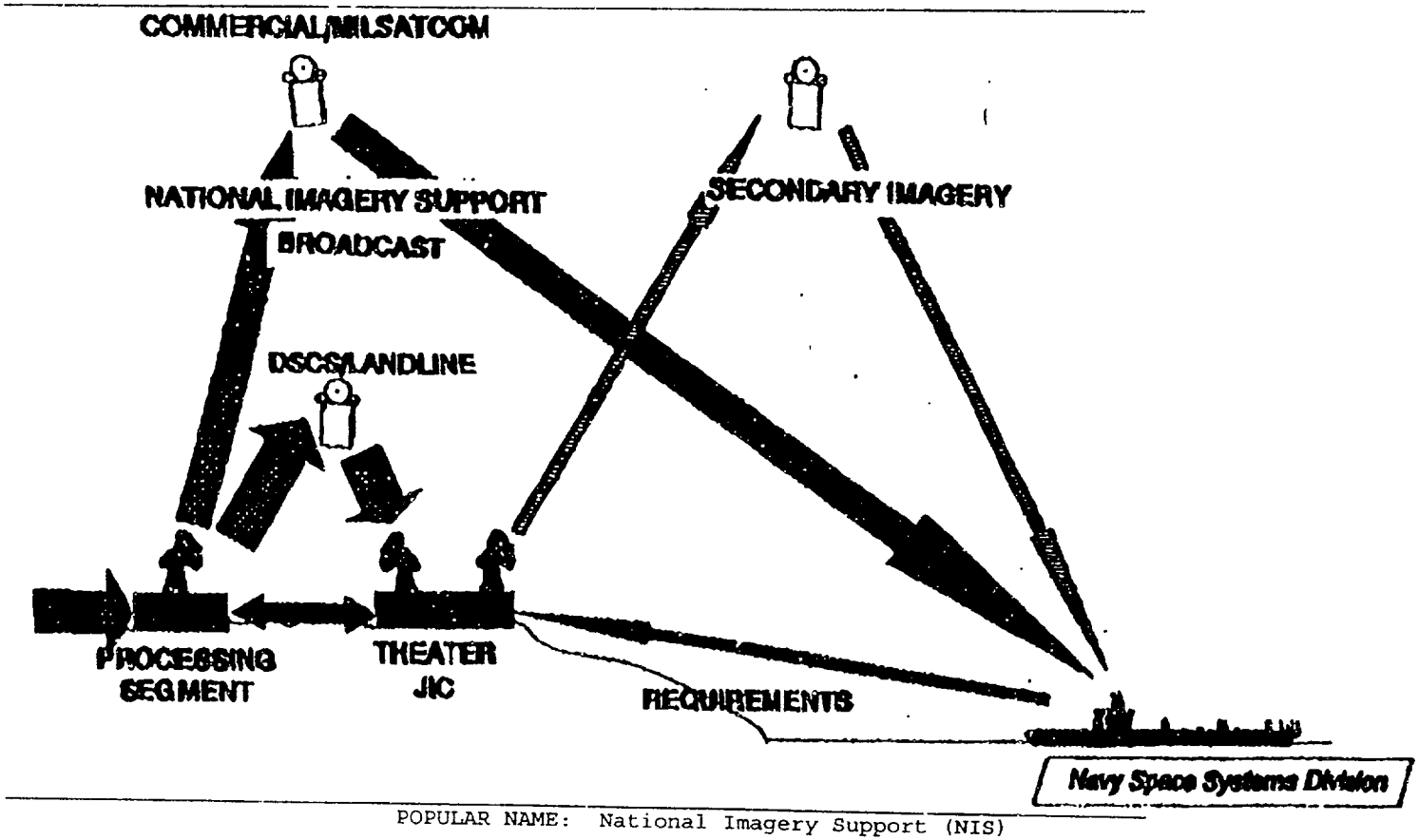
(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603451N
PROGRAM ELEMENT TITLE: Tactical Space Operations
PROJECT NUMBER: X2055
BUDGET ACTIVITY: 4
Date: 7 February 1994

PROJECT TITLE: National Imagery Support (NIS)



POPULAR NAME: National Imagery Support (NIS)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603451N
PROGRAM ELEMENT TITLE: Tactical Space Operations
PROJECT NUMBER: X2055
BUDGET ACTIVITY: 4
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES				LRIP 3/96		JSIPS-N(NIS) MS III 12/97		
ENGINEERING MILESTONES								
T&E MILESTONES				DT/IOT&E 12/95	JSIPS-N (NIS) TECH/OPEVAL 3 & 4 QTR/97			
CONTRACT MILESTONES			NIS/DIWSA					

BUDGET[1]	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT SUPPORT CONTRACT		0	1,741	1,028	778	482	511	CONT.
IN-HOUSE SUPPORT		0	300	500	750	600	600	CONT.
GFE/ OTHER								
TOTAL	0	0	2,041	1,528	1,528	1,082	1,111	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The National Imagery Support (NIS) project is a project to provide real time/near-real time original quality imagery to afloat forces. An outgrowth of CNO project CHALLENGE ATHENA, NIS will provide the interface between national high capacity imagery sources and the Digital Imagery Workstation Suite Afloat (DIWSA)/Joint Service Imagery Processing System - Navy (JSIPS-N). This JSIPS-N DIWSA serves as the National and tactical imagery processing, analysis, and storage system for afloat TOMAHAWK/TACAIR mission planning, mission rehearsal, and C3I systems.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603451N
PROGRAM ELEMENT TITLE: Tactical Space Operations
PROJECT NUMBER: X2055
BUDGET ACTIVITY: 4
Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: Not applicable.

2. (U) FY 1994 PLAN: Not applicable.

3. (U) FY 1995 PLAN:

- (U) ($300) NIS hardware prototype study.
- (U) ($1,741) Commence development of NIS interfaces with DIWS-A and shipboard antenna. Commence modification of NIS for shipboard application.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NCCOSC RDT&E DIV, San Diego, CA; NAVSURFWARCENDIV, Dahlgren, VA. CONTRACTORS: NIS Development/Integration USAF contracts DIWS-A integration, GDE Systems, Inc., Rancho Bernando, CA; Science Application Intl, Corp., Arlington, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Appropriation Committee action deleted the FY-94 funding for the project, necessitating rephasing of the program and delay of Low Rate Initial Production milestone.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) JSIPS-N TEMP 9/93
- (U) JSIPS-N APB 6/92

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603451N
PROGRAM ELEMENT TITLE: Tactical Space Operations
PROJECT NUMBER: X2055
BUDGET ACTIVITY: 4
Date: 7 February 1994

G. (U) RELATED ACTIVITIES:

- (U) PE 0603261N, Tactical Airborne Reconnaissance, project A2174, Joint Service Imagery Processing System - Navy (JSIPS-N).

H. (U) OTHER APPROPRIATION FUNDS:

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE CONT.	TOTAL PROGRAM CONT.
OPN Line 2902	0	0	0	0	4,108	14,220	18,962		

I (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION:

	DT	OT
• (U) DIWSA-NIS	12/95	12/95
• (U) JSIPS-N TECHEVAL	3QTR/97	
• (U) JSIPS-N OPEVAL	4QTR/97	

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
V2094 Unmanned Undersea Vehicle	0	3,604	23,688	25,963	32,977	25,794	26,625	CONT.	CONT.
Q0260 Minehunt	14,810	17,029	229	16,762	18,679	26,182	0	0	226,627
Q1233 MCM Improvements	10,194	10,604	8,970	7,386	1,962	948	0	0	184,661
Q2131 Shallow Water MCM	16,797	13,504	18,992	21,658	31,671	27,084	22,251	CONT.	CONT.
TOTAL	41,801	44,741	51,879	71,769	85,289	80,008	48,876	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The program provides for developments to combat the threat of known and projected foreign mines against U.S. Naval and merchant shipping in harbors, channels, choke points, sea lines of communications, and amphibious and other fleet operating areas. It develops: (1) systems and support for systems which will detect, localize, and counter moored, bottom, close-tethered, and buried mines for use in Mine Countermeasure (MCM) MCM-1 Class, Mine Hunter Coastal (MHC) MHC-51 Class, and other surface ships; (2) systems for detecting, neutralizing and sweeping mines from shallow water, very shallow water, surf zones, and beach landing craft zones in support of amphibious operations.

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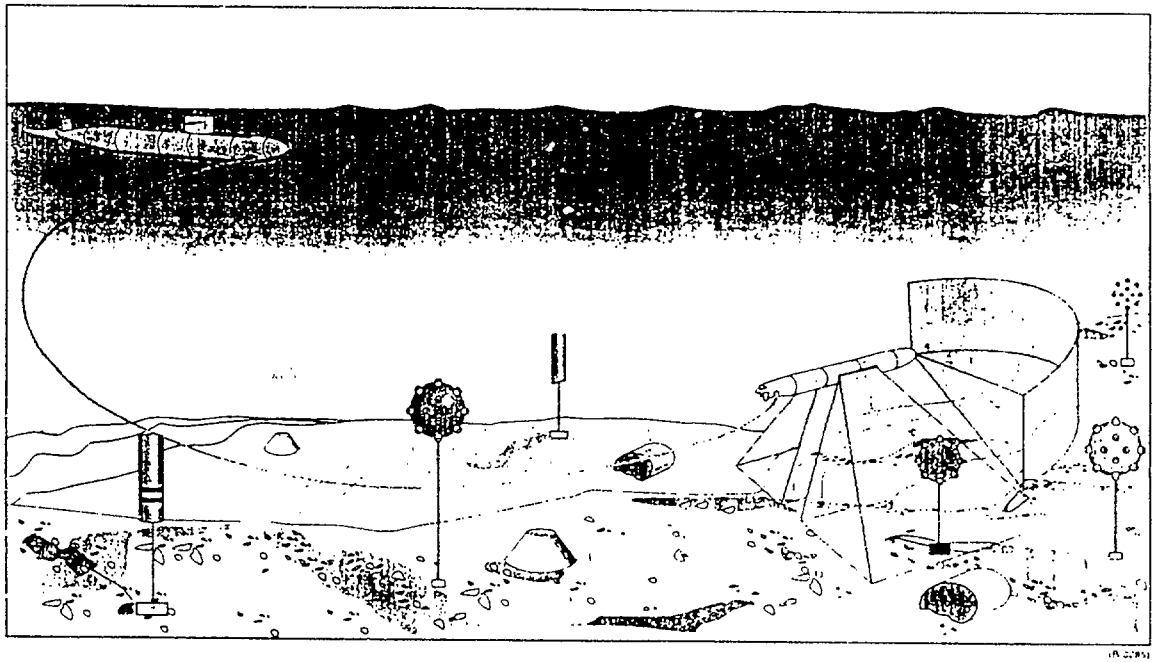
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PRCJECT NUMBER: V2094
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: Unmanned Undersea Vehicle



POPULAR NAME: SUBMARINE OFFBOARD MINE SEARCH SYSTEM (SOMSS)

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PROJECT NUMBER: V2094
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		MSI:6/94						MSII:TBD/00 MSIII:TBD/03 IOC:TBD/04
ENGINEERING MILESTONES				SRR:12/95 PDR:9/96	CDR: 7/97			
T&E MILESTONES					Start DT-I	Continue DT-I	Complete DT-I	IOT&E: TBD/02
CONTRACT MILESTONES			Award D&V:5/95					Award E&MD:11/99

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	0	0	19,995	20,463	27,857	21,974	20,505	CONT.
SUPPORT CONTRACT	0	2,082	1,800	2,500	2,620	1,320	2,620	CONT.
IN-HOUSE SUPPORT	0	1,522	1,893	3,000	2,500	2,500	3,500	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	CONT.
TOTAL	0	3,604	23,688	25,963	32,977	25,794	26,625	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project develops the Submarine Offboard Mine Search System (SOMSS), managed by the Navy's Unmanned Undersea Vehicles (UUV) Program Management Office (PMO403). The objective is to provide SSN-688 class submarines with an organic UUV capability to avoid mines and conduct covert autonomous/semi-autonomous mine field reconnaissance. The SOMSS concept is responsive to the Navy's "From the Sea..." initiative and supports littoral operations by submarines. The SOMSS concept was derived from analysis and tradeoff studies conducted by the Navy in 1991 and 1992, resulting in a program Milestone 0 decision and an Operational Requirements Document (ORD) - draft. The SOMSS concept calls for a submarine operating in potentially mined waters

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures
PROJECT NUMBER: V2094
BUDGET ACTIVITY: 4
Date: 7 February 1994

to deploy a UUV ahead of itself to detect, locate, and avoid close-tethered and bottom mines. Additionally, the submarine can launch the UUV in either a purely autonomous or semi-autonomous mode to conduct minefield reconnaissance in support of Navy Expeditionary Forces. The SOMSS is organized into four major subsystems: the shipboard interface (SOMSS equipment aboard the submarine), the UUV, mine search sensors, and the launch and recovery system. This project also funds the Navy's portion of the Joint ARPA/Navy UUV Program for development of enabling technologies applicable to SOMSS. For Congressional direction the SOMSS program is under review to determine its direction as part of an overall coordination UUV plan.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($000) Navy's FY 1993 request was denied by Congress, which cited the joint Navy and ARPA prototype Mine Search System (MSS) program, and the need to understand and evaluate the lessons learned from MSS before proceeding with SOMSS. The MSS program was subsequently and successfully completed in March 1993.

- (U) ($000) In July 1993, the Congress authorized Navy to restart SOMSS, using available FY 1992 Navy funds, to analyze the results of the MSS tests, to conduct a Cost and Operational Effectiveness Analysis (COEA), and to prepare required Milestone I acquisition documentation. The analysis of the MSS tests was completed and forwarded to the Congress. The COEA and other Milestone I documentation were restarted, to support a FY 1994 Milestone I.

2. (U) FY 1994 PLAN:

- (U) ($3,604) Complete development of SOMSS acquisition documentation, including the COEA, to support a 3rd QTR FY 1994 Milestone I decision. Complete development of Request for Proposals (RFP) for Demonstration and Validation (D&V) phase for formal release to industry in early FY 1995. Conduct risk-mitigating preliminary sonar analyses to support Milestone I decision.

3. (U) FY 1995 PLAN:

- (U) ($23,688) Release RFP, conduct full and open competition, conduct source selection, and award contract. Conduct Systems Requirements Review (SRR).

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures
PROJECT NUMBER: V2094
BUDGET ACTIVITY: 4
Date: 7 February 1994

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEWARCENDIV, Newport, RI; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NAVSURWARCENCOASTSYSTA, Panama City, FL; NAVUNSEAWARCENDIV, Keyport, WA. CONTRACTORS: Applied Physics Laboratory/Johns Hopkins University, Laurel, MD; Applied Research Laboratory/University of Texas, Austin, TX; C.S. Draper Laboratory, Cambridge, MA; various (TBD) competitive contracts.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: One year delay (FY 1994 to FY 1995) in milestones was caused by Congressional direction in the FY 1994 Appropriation bill.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) SOMSS Operational Requirements Document (draft): July 1992.
- (U) ASN (RD&A) approval to proceed to Milestone I, 8 June 1992.
- (U) Memorandum of Agreement, Joint Unmanned Undersea Vehicles Program, signed 29 July 1988 by DARPA and ASN (RE&S) with subsequent update signed 16 March 1992 by DARPA and ASN (RD&A).

G. (U) RELATED ACTIVITIES:

- (U) PE 0603226E, Experimental Evaluation of Major Innovative Technologies: The DARPA portion of the joint UUV program, as described in paragraph B of this RDDS, is funded by Project EE-39 of this PE.

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

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

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures
PROJECT NUMBER: V2094
BUDGET ACTIVITY: 4
Date: 7 February 1994

J. (U) TEST AND EVALUATION:

- (U) ARPA completed testing of the MSS in March 1993. The results were very positive and contributed to demonstrating the viability of the concept of using UUVs to support and conduct mine avoidance and mine survey operations. The results substantiate Navy's the readiness to proceed with the development of the SOMSS program.

- (U) SOMSS Test & Evaluation (T&E) requirements will be documented in the Test and Evaluation Master Plan (TEMP) for Milestone I. D&V subsystem tests will commence in FY 1997; a fully integrated D&V system test will occur in FY 1999. TECHEVAL is projected to begin in FY 2001 and OPEVAL in FY 2002.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PROJECT NUMBER: Q0260
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: Minehunt

PICTURE NOT AVAILABLE

POPULAR NAME: N/A

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PROJECT NUMBER: Q0260
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES AN/SQQ-32		MS III 5/94						
Remote Minehunting		MS I 6/94		MS II 11/95			MS III 11/98	
ENGINEERING MILESTONES AN/SQQ-32 Remote Minehunting					PDR 3/97 CDR 6/97			
T&E MILESTONES AN/SQQ-32		DT-IIG 10/93 OT-IID 12/93			FOT&E 5/97			
Remote Minehunting						DTII 5/98 OTII 8/98		DTIII 2QTR/00 OTIII 3QTR/00
CONTRACT MILESTONES AN/SQQ-32 Remote Minehunting				AWARD EDM CONTRACT 8/96			AWARD FRP CONTRACT 5/99	

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PROJECT NUMBER: Q0260
BUDGET ACTIVITY: 4

Date: 7 February 1994

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	60,805	1,743	4,604	0	11,283	14,979	19,982	0	113,396
SUPPORT CONTRACT	321	357	422	0	345	350	350	0	2,145
IN-HOUSE SUPPORT	65,660	11,256	11,096	229	4,699	3,350	5,850	0	102,140
GFE/ OTHER	6,150	1,454	907	0	435	0	0	0	8,946
TOTAL	132,936	14,810	17,029	229	16,762	18,679	26,182	0	226,627

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: (1) Improvements to AN/SQQ-32 variable depth minehunting sonar for MCM-1 and MHC-51 ships; and (2) Remote Minehunting: Remotely controlled minehunting systems for non-MCM platforms. The Buried Mine program has been terminated in FY 1994 providing funding to finance project Q0260 through FY 1995.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) AN/SQQ-32:
  - (U) ($4,677) Prepared for Technical Evaluation (TECHEVAL) on MCM-1.
  - (U) ($2,836) Developed various P3I.
  - (U) ($2,563) Buried Mine - Performed TDA efforts.
  - (U) ($1,234) RM - Performed TDA efforts.
  - (U) ($3,500) Develop operational prototype.

2. (U) FY 1994 PLAN:

- (U) AN/SQQ-32:
  - (U) ($690) Complete TECHEVAL and Operational Evaluation (OPEVAL) on MCM-1.
  - (U) ($140) Milestone III.
  - (U) ($2,903) Conduct color console engineering testing.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures
PROJECT NUMBER: Q0260
BUDGET ACTIVITY: 4
Date: 7 February 1994

- (U) ($1,221) Complete color console replacement and real-time CAD/LRC processing development.
- (U) ($1,686) Continue AN/UYK-44 Replacement and Man-Machine interface.

- (U) Remote Minehunting:
  - (U) ($1,331) Milestone I.
  - (U) ($1,500) Complete operational prototype.
  - (U) ($7,558) Development of ADM (Advanced Development Model).

3. (U) FY 1995 PLAN:

- (U) FY 1995 efforts are financed using the FY 1994 asset from the terminated Buried Mine subproject.

- (U) Remote Minehunting: Continue development of ADM.

- (U) AN/SQQ-32:
  - (U) ($229) Complete color console replacement and real-time CAD/LRC processing Development.($1,221 is FY94 funds carry-over.)

4. (U) PROGRAM TO COMPLETION: R.M. - Milestone II FY96, Milestone III FY98, DT II FY98, OTII FY98

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENCOASTSYSTA, Panama City, FL; NAVSURFWARCENDIV, Crane, IN; NAVSURWARCENDIV, Indian Head, MD; NCCOSC RDTE DIV, San Diego, CA. CONTRACTORS: Raytheon, Portsmouth, RI; Thomson-Sintra, Brest, France; To be determined.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: The Buried Mine subproject has been terminated. FY 1994 Buried Mine funds will finance FY 1995 requirement.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PROJECTNUMBER: Q0260
BUDGET ACTIVITY: 4

Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:

- (U) AN/SQQ-32: TEMP 005-4 Rev 2 approved 11/93 by Director, Navy Test & Evaluation & Technical Requirements.
- (U) Remote Minehunting: MNS Approved.

G. (U) RELATED ACTIVITIES: PE 0604373N, Airborne Mine Countermeasures.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) MCM (SQQ-32 backfit) OPN Line 81	0	24,200	37,500	13,545	0	0	0	0	87,071
• (U) MCM (SQQ-32 Towed Body) OPN Line 81	9,156	6,837	3,441	0	0	0	0	0	24,088
• (U) (Remote Minehunting) OPN	0	0	0	0	0	0	25,411	CONT.	CONT.
• (U) (SQQ-32 P3I) OPN	0	0	0	0	12,144	13,918	15,800	CONT.	CONT.

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

J. (U) TEST AND EVALUATION:

- (U) AN/SQQ-32: DT-IIG 10/93, OT-IID 12/93, FOT&E 05/97
- (U) Remote Minehunting: DT-II 05/98, OT-II 08/98, DT-III 2QTR/00, OT-III 3QTR/00

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PROJECT NUMBER: Q1233
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: Mine Countermeasures Improvements

PICTURE NOT AVAILABLE

POPULAR NAME: N/A

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PROJECT NUMBER: Q1233
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
AN/SSN-2	MS III 5/95							
AN/SLQ-53				MS III 06/96				
Mission Package 3 (MP3) for AN/SLQ-48		MS III (Partial) 07/94			MS IV 11/96			
AN/SSQ-94				FLEET INTRO 02/96				
Closed Loop Degaussing (CLDG)		MS II 03/94					MS III 11/98	
ENGINEERING MILESTONES								
AN/SLQ-53	CDR 06/93							
MP 3 for AN/SLQ-48		PDR 06/94	CDR 03/95					
AN/SSQ-94	CDR(MNS) 05/93	CDR (SSN-2) 11/93	CDR SQQ-32 02/95					
		CDR (SSN-2) 02/94	PDR(SYQ-13) 11/94					
		PDR (SQQ-32) 08/94	CDR(SYQ-13) 06/95					
Closed Loop Degaussing (CLDG)		PDR 06/94		CDR 12/95				

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures
PROJECT NUMBER: Q1233
BUDGET ACTIVITY: 4
Date: 7 February 1994

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
T&E MILESTONES								
AN/SSN-2	DT-IID 11/92 OT-IIC 11/92			DT-IIB 10/96				
AN/SLQ-53		DT-IIA 7/94		OT-IIB 02/96		FOT&E 1/98		
MP3 FOR AN/SLQ-48				DT-II 5/96				
AN/SSQ-94		MNS MODULE TEST 6/94		OT-II 8/96 MCM SYS TEST 12/95 MHC SYS TEST 6/96				
Closed Loop Degaussing (CLDG)	DTI 8/93	DT-IIA 9/94	DT-IIB 3/95	DT-IIC 9/95	TECHEVAL 9/97	OPEVAL 7/98		
CONTRACT MILESTONES								
AN/SSN-2	PROD. TACT DISPLAY 5/93							
AN/SLQ-53			FINAL PRODUCTION 9/96					
MP3 for AN/SLQ-48						PRODUCTION 12/97		
Closed Loop Degaussing (CLDG)		MOU AMENDMENT			EDM 3/96			PRODUCTION 3QTR/00

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PROJECT NUMBER: Q1233
BUDGET ACTIVITY: 4

Date: 15 October 1993

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	25,360	935	1,520	1,000	1,000	200	100	0	30,115
SUPPORT CONTRACT	3,603	235	237	233	175	0	0	0	4,483
IN-HOUSE SUPPORT	108,263	9,024	8,847	7,737	6,211	1,762	848	0	142,692
GFE/ OTHER	7,371	0	0	0	0	0	0	0	7,371
TOTAL	144,597	10,194	10,604	8,970	7,386	1,962	948	0	184,661

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: (1) AN/SSN-2(V) Precise Integrated Navigation provides precise navigation and tactical displays for the MCM class ships; (2) AN/SLQ-53 Modular mechanical Single Ship Deep Sweep (SSDS) provide mechanical sweep capability for the MHC class ships; (3) AN/SSQ-94 will provide on board Combat System Training for MCM and MHC ships; (4) Closed Loop Degaussing (CLDG) to improve survivability of mine countermeasures ships; (5) Mission Package 3 (MP3) upgrade to the AN/SLQ-48 to provide destruction of moored mines in place.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:
   - (U) AN/SSN-2:
     - (U) ($388) Conducted Phase III TECHEVAL and OPEVAL.
     - (U) ($193) Completed Milestone III.
   - (U) AN/SLQ-53:
     - (U) ($2,379) Continued winch and containers development.
     - (U) ($204) Delivered A/N37U-1.
   - (U) AN/SSQ-94:
     - (U) ($2,714) Conducted Critical Design Reviews for AN/SLQ-48 and Scenario Controller Module.
     - (U) ($832) Continued coding and testing of AN/SLQ-48 and Scenario Controller.
     - (U) ($521) Conducted PDR for AN/SSN-2 module.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures
PROJECT NUMBER: Q1233
BUDGET ACTIVITY: 4
Date: 7 February 1994

- (U) CLDG:
  - (U) ($2,063) Completed multiple item engine room mock-up test.
  - (U) ($100) Completed DT IIA test plan.
- (U) MPB:
  - (U) ($800) MP3 for AN/SLQ-48: Began concept definition.

2. (U) FY 1994 PLAN:
   - (U) AN/SLQ-53:
     - (U) ($1,312) Deliver winch and containers.
     - (U) ($547) Conduct DT-IIA.
   - (U) AN/SSQ-94:
     - (U) ($1,379) Conduct PDRs AN/SQQ-32 and AN/SYQ-13 modules and CDR AN/SSN-2.
     - (U) ($2,325) Install and test AN/SLQ-48, scenario controller, and AN/SSN-2 modules.
   - (U) CLDG:
     - (U) ($800) Milestone II.
     - (U) ($1,012) Conduct DT-IIA SHIPEVAL.
     - (U) ($1,049) Procurement for DT-IIA.
     - (U) ($0) US/FRANCE MOU Amendment approval.
   - (U) MP3 for AN/SLQ-48:
     - (U) ($2,015) Development/Prototype.
     - (U) ($165) PDR.

3. (U) FY 1995 PLANS:
   - (U) ($643) AN/SLQ-53: Conduct DT-IIB.
   - (U) ($2,000) MP-3: CDR 2QTR/95.
   - (U) ($3,464) AN/SSQ-94: SQQ-32/SYQ-13 CDR 2QTR/95. PDR SYQ-13 1 QTR/95. CDR SYQ-13 3 QTR/95.
   - (U) CLDG:
     - (U) ($1,963) Complete DT-IIB and DT-IIC SHIPEVAL.
     - (U) ($500) DT-IIC - Advanced development model.
     - (U) ($400) Select algorithm for development model.

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PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures
PROJECT NUMBER: Q1233
BUDGET ACTIVITY: 4
Date: 7 February 1994

4. (U) PROGRAM TO COMPLETION: AN/SLQ-53 - Milestone III FY96, OPEVAL FY96; MP3 - Milestone III FY97, TECHEVAL FY96; CLDG - Milestone III FY99, DT-IIC FY96, TECHEVAL FY97, OPEVAL FY98.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENCOASTSYSTA, Panama City, FL; NAVSURFWARCENDIV, Crane, IN; NAVSURFWARCEN DET WHITE OAK, Silver Spring, MD; CONTRACTORS: To be determined.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: AN/SLQ-53 - OTIIB 11/95 to 2/96 and DT-IIB 9/95 slipped to 10/96 because of ship availability for testing. CLDG - DTIIA 3/95 to 9/94 moved up laboratory tests using ship data and follow-on tests using magnetic engines; DTIIB initial shipboard tests now scheduled for 3/95 because of ship availability. AN/SSQ-94 - PDR (SYQ-13) accelerated from 2/95 to 11/94 because task evaluated less complicated.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: AN/SSN-2: OR-1026-CC dated 4 NOV 1977; TEMP 005-2 Rev 2 dated 25 APR 1989; AN/SLQ-53: ORD APPROVED 5/92; TEMP #684 APPROVED 6/92; AN/SQQ-94: NAPDD 20 SEP 1990; MP3 Lessons Learned Desert Storm, MNS Documentation NDCP S-260-MW of 17 APR 80, and TEMP 235-1 (REV-2).

G. (U) RELATED ACTIVITIES: PE 0604373N, Airborne Mine Countermeasures is developing the NAVAIR A/N37U-1 controlled depth helicopter sweep which is to be adapted for AN/SLQ-53.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 81	2,760	4,194	965	890	315	340	0		9,464
• (U) OPN Line 24	0	0	12,429	0	0	0	0		12,429
• (U) OPN Line 81	7,366	5,046	0	0	0	0	0		12,412

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PROJECT NUMBER: Q1233
BUDGET ACTIVITY: 4

Date: 7 February 1994

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: MOU amendment for CLDG with FRANCE being negotiated.

J. (U) TEST AND EVALUATION:

- (U) AN/SSN-2: DT-IID 11/92, OT-IIC 11/92
- (U) AN/SLQ-53: DT-IIA 07/94, DT-IIB 10/96, OT-IIB 02/96, FOT&E 01/98
- (U) MP3 for AN/SLQ-48: DT-II 05/96, OT-II 08/96
- (U) AN/SSQ-94: MNS MODULE TEST 06/94, MCM SYS TEST 12/95, MHC SYS TEST 06/96
- (U) CLDG: DT-I 08/93, DT-IIA/IIB 09/94-12/94, DT-IIC 09/95, TECHEVAL 09/97, OPEVAL 07/98

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures

PROJECT NUMBER: Q2131
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: Shallow Water MCM

PICTURE NOT AVAILABLE

POPULAR NAME: Shallow Water MCM

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasured

PROJECT NUMBER: Q2131
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
HSRIS (SAMII)	MSO 3/93	MS I 3/94	MS II 3/95				MS III 8/99	
DET	MSO 3/93	MS I 2/94	MS II 2/95			MS III 6/98		
SABRE	MSO 3/93	MS I 4/94 MS II 7/94		MS III 6/96				
OBS	MSO 3/93		MS I 11/94 MS II 3/95		MS III 9/97			
BLNS	MSO 3/93	MS I/II 6/94	MS III 1/95					
ENGINEERING MILESTONES								
HSRIS (SAMII)				CDR 9/96				
ENGINEERING MILESTONES								
DET				CDR 11/95				
SABRE		CDR 8/94						
OBS				CDR 6/96				
T&E MILESTONES								
HSRIS (SAMII)					DT-II 6/97	OT-II 6/98		
DET			DT-I 11/94		DT-II 10/96		OT-II 11/98	
SABRE		DT I 3/94	DT-II 4/95	OT-II 11/95				
OBS				DT-II 8/96	OT-II 3/97			
CONTRACT MILESTONES								
HSRIS	PDS RFP 7/93		EDM1 RFP 7/95		EDM2 OPTION 12/96			
DET				EDM RFP 11/95				
CONTRACT MILESTONES								

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures
PROJECT NUMBER: Q2131
BUDGET ACTIVITY: 4
Date: 7 February 1994

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	2,716	6,298	10,959	13,211	11,535	10,185	9,368	CONT.
SUPPORT CONTRACT	346	351	520	587	540	530	530	CONT.
IN-HOUSE SUPPORT	11,935	6,315	5,773	5,542	6,982	8,072	9,361	CONT.
GFE/ OTHER	1,800	540	1,740	2,318	12,614	8,297	2,992	CONT.
TOTAL	16,797	13,504	18,992	21,658	31,671	27,084	22,251	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program provides for a combination of joint US Marine Corps and US Navy projects planned to counter the threat to amphibious landing forces from known and projected foreign land and sea mines and obstacles in the shallow water, very shallow water and surf zone approaches to amphibious assault areas. It develops systems for mine sweeping, explosive mine clearance and marking of cleared laned. Included are the High-Speed Remote Influence Sweep (HSRIS), Distributed Explosives Technolcgy (DET), Shallow Water Assault Breach System (SABRE), and Obstacle Breaching System (OBS).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:
   - (U) HSRIS (SAM II):
     - (U) ($450) Milestone 0.
     - (U) ($800) Harmonized operational requirements with Royal Swedish Navy.
     - (U) ($582) Negotiated and signed international agreement with Royal Swedish Navy.
     - (U) ($1,000) Completed joint requirement specification (Type A).

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures
PROJECT NUMBER: Q2131
BUDGET ACTIVITY: 4
Date: 7 February 1994

- (U) DET:
  - (U) ($450) Milestone 0.
  - (U) ($1,000) Determined preliminary load estimates of explosives.
  - (U) ($3,570) Completed explosive feasibility tests to determine panel configuration.
  - (U) ($2,000) Completed DT-0 tests to verify flight dynamics of net array.
- (U) SABRE:
  - (U) ($450) Milestone 0.
  - (U) ($2,000) Completed flight tests of inert partial and full length line charges.
  - (U) ($631) Completed preliminary design of fuze.
  - (U) ($1,000) Conducted explosive characterization and charge effectiveness tests.
- (U) OBS:
  - (U) ($450) Milestone 0.
  - (U) ($200) Defined obstacle target baseline.
  - (U) ($645) Conducted MK83 Bomb effectiveness tests against potential obstacles on land and in water.
  - (U) ($300) Initiated concept exploration of alternatives such as wide area explosive, directed energy, and mechanical systems.
- (U) BLNS:
  - (U) ($450) Milestone 0.
  - (U) ($100) Completed platform survey to determine capabilities and fleet requirements.
  - (U) ($300) Completed market survey on currently available NDI systems (Buoys and Lights).
  - (U) ($419) Demonstrated feasibility of sector lights.

2. (U) FY 1994 PLAN:
- (U) HSRIS (SAM II):
  - (U) ($800) Milestone I.
  - (U) ($900) Contract for project definition study.
  - (U) ($814) Complete system and trade-off analyses.
  - (U) ($300) Draft development specification (Type B).
- (U) DET:
  - (U) ($800) Milestone I.
  - (U) ($3,000) Conduct DT-I explosive test to analyze system against threat mines.
  - (U) ($1,256) Conduct DT-I deployment test to analyze flight dynamics of prototype net array.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasures
PROJECT NUMBER: Q2131
BUDGET ACTIVITY: 4
Date: 7 February 1994

- (U) ($1,000) Conduct demonstration/validation phase.
- (U) SABRE:
  - (U) ($800) Milestone I.
  - (U) ($1,000) Conduct flight & detonation tests of live full length line charges.
  - (U) ($500) Conduct explosive tests of static line charges.
  - (U) ($453) Milestone II.
- (U) OBS:
  - (U) ($133) Complete MK83 Bomb effectiveness tests.
  - (U) ($250) Conduct alternate concepts feasibility studies.
  - (U) ($300) Milestone I.
- (U) BLNS:
  - (U) ($266) Develop NDI sector light product specification.
  - (U) ($700) Conduct functional & reliability tests.
  - (U) ($232) Establish NDI logistic support plans.

3. (U) FY 1995 PLAN:
- (U) HSRIS (SAM II):
  - (U) ($1,045) Milestone II.
  - (U) ($2,841) Award EDM development contract.
- (U) DET:
  - (U) ($893) Milestone II.
  - (U) ($1,713) Conduct detail design.
  - (U) ($6,007) Award contract for test hardware.
- (U) SABRE :
  - (U) ($1,400) Fabricate test hardware.
  - (U) ($2,893) Conduct DT-II tests.
- (U) OBS:
  - (U) ($300) Milestone II.
  - (U) ($1,100) Conduct detail design.
  - (U) ($600) Award contract for test hardware
- (U) BLNS:
  - (U) ($200) Milestone III.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603502N
PROGRAM ELEMENT TITLE: Surface and Shallow Water Mine Countermeasured
PROJECT NUMBER: Q2131
BUDGET ACTIVITY: 4
Date: 7 February 1994

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENCOASTSYSTA, Panama City, FL; NAVSURFWARCEN MINEWARENGACT, Yorktown, VA; NAVSURFWARCEN DET WHITE OAK, Silver Spring, MD; NAVSURFWARCENIHDIV, Indian Head, MD. CONTRACTORS: To be determined.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: FY 95 CDR, DT-I(DET), EDM1 RFP/EDM RFP - changes to FY-96 are attributed to more accurate projection of the program and funding profiles.
3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:
Shallow Water: TOR 3/89
(Overall) DOP 5/91
MNS 3/92
Following ORDs are in Staffing in OPNAV:
ORD SWMCM marking and navigation (BLNS)
ORD SWMCM Mine/Obstacle Clearance (HSRIS, DET, SABRE, & OBS)

G. (U) RELATED ACTIVITIES: PE 0603555N for Explosive Neutralization and Advance Lightweight Influence Sweep Systems Advance Technology Demonstrations; Royal Swedish Navy Self-propelled Acoustic Magnetic Sweep (SAM) program; PEs 0603640M and 0602131M Advanced Countermine System (ACS); USMC M58 line charges.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: HSRIS MOU signed 7 June 93.

J. (U) TEST AND EVALUATION.
- (U) HSRIS: DT-II 06/97, OT-II 06/98
- (U) DET: DT-I 11/94, DT-II 10/96, OT-II 11/98
- (U) SABRE: DT-I 03/94, DT-II 04/95, OT-II 11/95
- (U) OBS: DT-II 08/96, OT-II 03/97

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603504N
PROGRAM ELEMENT TITLE: Advanced Submarine Combat Systems Development

PROJECT NUMBER: V0223
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
V0223 Submarine Combat Systems Improvement (Adv)	32,142	22,608	20,564	22,403	22,181	22,726	26,695	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program supports the advanced development and testing of improvements to present and future sonar and combat control systems. The goal is to address the technology challenges that marginalize tactical control in littoral environments during the performance of a variety of missions including Peacetime Engagement Surveillance, Deterrence, Regional Sea Denial, Precision Strike, Task Group Support, and Ground Warfare Support. Prototype hardware and/or software systems are developed under this program to demonstrate technologically promising systems concepts in an at-sea submarine environment. Technology areas specific to this program include transducers, hull mounted and towed arrays, onboard sonar signal processing, target motion analysis, multiple contact processing, and test and evaluation.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($3,520) Advanced Combat Control. Completed integration of Advanced Data Fusion modified module with Target Motion Analysis Improvements (TMAI) ADM; modified TMA algorithms to account for ray bending; TMAI sea test conducted in Dec 93 (TACDEVEX).

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603504N
PROGRAM ELEMENT TITLE: Advanced Submarine Combat Systems Development

PROJECT NUMBER: V0223
BUDGET ACTIVITY: 4

DATE: 7 February 1994

- (U) ($27,596) Advanced Sonar Systems and Processing. Conducted Advanced Mine Detection System (AMDS) hydrodynamic receive array sea test. Conducted Extended Sensor at-sea testing. Received micromechanical hydrophones and conducted lab evaluation. Completed Lightweight Planar Array (LWPA) fiber optic technology demonstration. Completed Very Low Frequency Sound Source (VLFSS) and transitioned it to TYCOM for sea test. Automatic Detection/Automatic Classification (AD/AC) technologies including Advanced Two Dimensional Auto Detection Algorithm made ready for Dec 93 sea test TACDEVEX. Continued MRADE III development. Continued TAP ADM development; Investigated active sonar improvements. Continued fleet towed array enhancements and submarine Multiline Towed Array (MLTA) development. Finalized towed array handling system specification. Conducted Variable Depth Sonar Towed Array (VDSTA) cable and towed array heading sensors lake tests in preparation for Dec 93 sea test (TACDEVEX).

- (U) ($1,026) Test and Evaluation. Continued system performance and cost analysis in support of both Cost and Evaluation Assessment efforts for advanced submarine sonars. Finalized plans for RANGEX sea test, to be conducted in AUG 94. (see paragraph E-2)

2. (U) FY 1994 PLAN:

- (U) ($2,700) Advanced Combat Control. Initiate and conduct laboratory tests of multisensor single leg TMA algorithm. Investigate multisource Data Fusion (DF) techniques.

- (U) ($18,858) Advanced Sonar Systems and Processing. Complete land-based testing of AMDS inboard electronics systems. Complete transition of Extended Sensor development. Initiate trade-off studies and analyses for hull mounted array development. Continue AD/AC algorithm development. Finalize commence integration of MRADE III ADM. Conduct sea tests of in support of TAP ADM development. Complete MLTA Advanced Technology Demonstration (ATD) joint effort. Conduct sea tests of dry-end processing improvements, including Mid-Frequency Active Improvement (MFAI), provide to 6.4. Complete towed array wet-end improvements including heading and depth sensor development, and reduced flow noise array design. Continue technology efforts in the development of fiber optic acoustic systems.

- (U) ($1,050) Test and Evaluation. Complete post exercise analysis of RANGEX (TACDEVEX). Initiate test planning for RANGEX 1-95.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603504N
PROGRAM ELEMENT TITLE: Advanced Submarine Combat Systems Development
PROJECT NUMBER: V0223
BUDGET ACTIVITY: 4
DATE: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) ($3,000) Advanced Combat Control. Implement automated tactical plots into the TMAI ADM, and sea test. Continue multisource data fusion technique improvements and ADM upgrades.
- (U) ($16,264) Advanced Sonar Systems and Processing. Install and sea test AMDS chin and sail mounted arrays, and inboard electronics. Conduct sea test to evaluate. and conduct sea test. Sea test AD/AC algorithms. Initiate improvements to fleet towed arrays based upon technology transitioned from MLTA ATD. Complete efforts in Variable Depth Sonar Towed Array (VDSTA) cable development and conduct sea test. Conduct sea test of wet and dry end improvements including heading and depth sensors, and adaptive beam forming. Continue fiber optic acoustic systems efforts pending decision of FY94 deferred funding.
- (U) ($1,300) Test and Evaluation. Complete post exercise analysis of RANGEX 1-95. Initiate test planning for RANGEX 1-97.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCENDIV, Newport, RI; NAVUNSEAWARCEN DET, New London, CT; NRL, Washington, DC; NRL USRD, Orlando, FL; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; Naval Postgraduate School, Monterey, CA. CONTRACTORS: Analysis & Technology Inc., North Stonington, CT; Sonalysts Inc., Waterford, CT; ARL/University of Texas, Austin, TX.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: NAPDD #237-02, May 90

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603504N
PROGRAM ELEMENT TITLE: Advanced Submarine Combat Systems Development
PROJECT NUMBER: V0223
BUDGET ACTIVITY: 4
DATE: 7 February 1994

G. (U) RELATED ACTIVITIES:

- (U) PE 0603562N (Submarine Tactical Warfare Sys)
- (U) PE 0604524N (Submarine Combat System)
- (U) PE 0604503N (Submarine System Equipment Development)

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

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

J. (U) MILESTONE SCHEDULE:

• (U) AMDS Receive Array Sea Test	3QFY93
• (U) Extended Sensors Sea Test	3QFY93
• (U) VDSTA Sea Test (TACDEVEX 1-94)	1QFY94
• (U) DUAL Towed Array Processing Sea Test (TACDEVEX)	1QFY94
• (U) AD/AC Sea Test	4QFY94
• (U) RANGEX 1-94	4QFY94
• (U) TAP ADM Sea Test	3QFY94
• (U) Multiline Surface Ship Sea Test	4QFY94
• (U) Transition Dual Tow Processing Algorithms	1QFY95
• (U) Multi-sensor Single-Leg Sea Test	2QFY95
• (U) Automated Multipath Evaluation	2QFY95
• (U) RANGEX 1-95	4QFY95

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603506N
PROGRAM ELEMENT TITLE: Surface Ship Torpedo Defense
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1992 AND PRIOR	FY 1993 ESTIMATE	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 COMPLETE	TO PROGRAM	TOTAL
V0225 Surface Ship Torpedo Defense	189,527	2,954	8,692	0	0	0	0	0	0	201,173
V2045 Joint US/UK SSTD	53,264	24,135	25,218	30,247	30,486	43,543	45,624	46,849	145,823	445,189
TOTAL	242,791	27,089	33,910	30,247	30,486	43,543	45,624	46,849	145,823	646,362

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Surface Ship Torpedo Defense (SSTD) Program is comprised of the US National SSTD Program and the US/UK SSTD Joint Project:

(u) (V0225) DESCRIPTION: The US National SSTD Program will provide torpedo defense for CV/CVN, LHD, and LHA Class ships against the [redacted] Phase I of the National Program is a softkill countermeasure which adds a [redacted] to the existing AN/SLQ-25 (NIXIE) System. Phase I has been expanded to include all NIXIE equipped ships. Phase II of the National Program will provide torpedo detection employing a towed array sensor, and a [redacted]

(u) (V2045) DESCRIPTION: The US/UK SSTD Joint Project is a collaborative program to design, develop and produce a 360° anti-torpedo self-defense capability for US Navy and Royal Navy (RN) combatant, amphibious and auxiliary surface ships. It expands upon the US National SSTD Program in that [redacted] launched from either submarine or surface craft, and will be fitted on a wide range of USN and RN platform types. The US/UK SSTD system will provide advanced detection, classification, localization and countermeasure capabilities. It will be a layered defense system composed of softkill and hardkill countermeasures to provide defense in depth. The US/UK SSTD system will maximize the use of existing ship equipment and be modular to readily fit the US/UK ship market.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603506N
PROGRAM ELEMENT TITLE: Surface Ship Torpedo Defense

PROJECT NUMBER: V2045
BUDGET ACTIVITY: 4

DATE: 7 February 1994

PROJECT TITLE: Joint US/UK SSTD

POPULAR NAME: JT US/UK SSTD

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603506N
PROGRAM ELEMENT TITLE: Surface Ship Torpedo Defense

PROJECT NUMBER: V2045
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM			MS I			MS II		
MILESTONES		03/94			4TH/97			
ENGINEERING MILESTONES						PDR 1ST/98 CDR 2ND/98		
	RM LABS	SRR 1ST/94		SDR 3RD/96				
T&E MILESTONES	RM TESTING COMPLETED	D&V TESTING STARTS	D&V TESTING CONT.	D&V TESTING CONT.	D&V TESTING COMPLETED			TECHEVAL 3RD/01 OPEVAL 4TH/01
CONTRACT MILESTONES	RM AWARD 1/92	D&V AWARD 04/94		EMD RFP 4TH/96	EMD AWARD 4TH/97			

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	8,782	4,182	13,450	13,900	14,169	21,630	28,794	29,313	228,496 (94,276)
SUPPORT CONTRACT	1,804	669	810	942	972	1,003	1,035	1,068	10,540 (2,237)
IN-HOUSE SUPPORT	11,998	19,284	10,958	15,405	15,345	14,897	15,795	16,468	199,460 (49,310)
GFE/ OTHER	680	0	0	0	0	6,013	0	0	6,693 (0)
TOTAL	23,264	24,135	25,218	30,247	30,486	43,543	45,624	46,849	445,183 (145,823)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603506N
PROGRAM ELEMENT TITLE: Surface Ship Torpedo Defense

PROJECT NUMBER: V2045
BUDGET ACTIVITY: 4

DATE: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The US/UK SSTD Joint Project is a collaborative program to design, develop and produce a 360° anti-torpedo self-defense capability for US Navy and Royal Navy (RN) combatant, amphibious and auxiliary surface ships. It expands upon the US National SSTD Program in that: launched from either submarine or surface craft, and will be fitted on a wide range of USN and RN platform types. The US/UK SSTD system will provide advanced detection, classification, localization and countermeasure capabilities. It will be a layered defense system composed of softkill and hardkill countermeasures to provide defense in depth. The US/UK SSTD system will maximize the use of existing ship equipment and be modular to readily fit the US/UK ship market. Every country in the world has access to the global arms export market, which offers sophisticated weaponry and advanced combat systems. Currently, twenty-four Rest-of-the-World (ROW) countries have been identified as having submarines (ranging from obsolescent CIS and Chinese-built ROMEO classes to the modern German Type 209 and CIS KILO classes). Nineteen countries have been identified as having patrol craft capable of firing US-, CIS- and European-built anti-ship torpedoes. Since shallow, confined and congested waters with poor acoustic conditions are prevalent in many Third World Regions, ASW defenses alone are inadequate to protect naval units. Naval surface combatants, their supporting units and merchant ships engaged in maritime trade are vulnerable to attack from anti-ship torpedoes during global or limited war, local confrontations, or while in proximity of a regional conflict. The ability to project, maintain and protect Naval Forces in these regional conflicts has also increased in importance due to Fleet reductions and closure of military bases overseas. With shrinking numbers of surface ships, decreasing emphasis on ASW and intensified focus on operations in littoral waters, an anti-torpedo self-defense capability is essential.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: The program has completed Risk Mitigation (RM) studies and is going forward for a Milestone I decision.

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($12,760) Conducted Risk Mitigation (RM) Countermeasure Studies, Analysis, Test and Evaluation.
- (U) ($4,252) Continued modeling and assessment efforts for RM.
- (U) ($2,708) Conducted RM Detection, Classification and Localization (DCL) trials and analysis.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603506N
PROGRAM ELEMENT TITLE: Surface Ship Torpedo Defense
PROJECT NUMBER: V2045
BUDGET ACTIVITY: 4
DATE: 7 February 1994

- (U) ($2,061) Completed Cost and Effectiveness Analysis (COEA) studies.
- (U) ($1,385) Continued Combat Control (CC) processing and interface efforts for the RM Program.
- (U) ($969) RM technical and logistic support efforts continued.

2. (U) FY 1994 PLANS:

- (U) ($13,300) Demonstration and Validation (D&V) contract options to be exercised.
- (U) ($5,613) Countermeasures studies, analysis, test and evaluation begins for D&V.
- (U) ($2,177) Initiate modeling and assessment efforts for D&V.
- (U) ($2,000) Commence DCL trials data evaluation and processing enhancement studies for D&V.
- (U) ($1,100) Combat Control processing and interface upgrade efforts begin for D&V.
- (U) ($1,028) Technical and logistic support efforts continue.

3. (U) FY 1995 PLANS:

- (U) ($13,011) Martin Marietta and Westinghouse Consortia continue D&V development efforts.
- (U) ($7,517) Continue evaluation of countermeasures.
- (U) ($3,125) Continuance of modeling and assessment efforts.
- (U) ($3,459) DCL processing enhancement studies and trial evaluations continue.
- (U) ($1,814) Continuation of processing and interface CC upgrade efforts.
- (U) ($1,321) On-going technical and logistic support efforts.

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603506N
PROGRAM ELEMENT TITLE: Surface Ship Torpedo Defense
PROJECT NUMBER: V2045
BUDGET ACTIVITY: 4
DATE: 7 February 1994

D. (U) WORK PERFORMED BY: (United States) IN-HOUSE: NAVSURFWARCENCOASTSYSTA, Panama City, FL; NCCOSC RDT&E DIV, San Diego, CA; NAVSURFWARCEN WHITE OAK DET, Silver Spring, MD; NAVUNSEAWARCENDET, New London, CT; NAVUNSEAWARCENDIV, Newport, RI; NAVUNSEAWARCENDIV, Keyport, WA. CONTRACTORS: Martin Marietta, Syracuse, NY; Alliant Techsystems, Hopkins, MN; Westinghouse, Sykesville, MD; AT&T, Whippany, NJ; Librascope, Glendale, CA. (United Kingdom) IN-HOUSE: DGUW(N); DRA Maritime; Director of Intelligence. CONTRACTORS: Dowty Maritime Systems; Marconi Underwater Systems Limited; Ferranti-Thomson; Ferranti Naval Systems; British Aerospace.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

Operational Requirement (OR) 4/80
Memorandum of Understanding (MOU) 10/88
System Specification 6/90
Common Performance Requirement (CPR) 10/93
Test and Evaluation Master Plan (TEMP) 3/91
Operational Requirements Document (ORD) (Final) 12/93
TEMP Rev 1 (Draft) 11/93

G. (U) RELATED ACTIVITIES: Not applicable.

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603506N
PROGRAM ELEMENT TITLE: Surface Ship Torpedo Defense
PROJECT NUMBER: V2045
BUDGET ACTIVITY:4
DATE: 7 February 1994

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

- (U) A US/UK SSTD Joint Project Memorandum of Understanding (MOU) was signed on 26 October 1988 by the Under Secretary of Defense (Acquisition) for the US and the Chief of Defence Procurement for the UK. It covers all four project phases (CE, D&V, EMD and Production/Deployment) as well as other issues such as cost share, exchange rates and industry participation. The MOU requires each country to seek national approvals and to formally declare its intent to continue with the program prior to each phase.

- (U) Jointly funded costs will be shared as follows:

  - (U) For CE and D&V, the cost of the Joint Project Office (JPO), its direct support, and industry contracts will be shared equally.
  - (U) For EMD, the costs of the JPO and its direct support will be shared equally.
  - (U) Cost shares for the EMD contract will be formalized by the Participants during D&V.

J. (U) TEST AND EVALUATION:

- (U) RM Testing Completed.
- (U) D&V Testing FY 94/95.
- (U) D&V Testing to be Complete FY 96.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603508N
PROGRAM ELEMENT TITLE: Ship Propulsion System

PROJECT NUMBER: S1848
BUDGET ACTIVITY: 3

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1848 Gas Turbine Engine Technology	3,897	3,394	3,152	3,135	3,111	3,326	3,487	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element (PE) provides for ship propulsion system technology developments that contribute to meeting top joint warfare capabilities established by the Joint Chiefs of Staff; namely to promptly engage regional forces in decisive combat on a global level.

(U) This PE develops and demonstrates technological improvements in components and systems for gas turbine engines in support of present and future surface ship platform assets. The goal of the program is to improve and maintain reliability and availability, reduce maintenance and overhaul costs, reduce life cycle costs, resolve fleet service revealed problems, and improve overall gas turbine performance. Technology developed via this program transitions directly to the fleet. While all surface naval platforms inherently require mobility as a primary task for Naval Warfare, this program directly relates to the Readiness and Support Joint Mission Area and indirectly relates to Joint Strike, Joint Littoral, Joint Surveillance, Joint Surface Electronic Warfare (SEW), Strategic Deterrence and Strategic Sealift Warfare relative to reduced acoustic signatures. Specifically:

(U) Readiness and Support addresses technology requirements and needs in the areas of improved methods of avoiding repair, improved methods of repair and more efficient fuels or alternative fuels and greater adaptability to commercial off the shelf components. Program includes advanced ceramic coatings for high temperature engine components, active magnetic bearings to reduce wear, simplified lubrication, and reduced acoustic signature and fuel and control system improvements to reduce exhaust gas emissions. Technologies are demonstrated on current generation engines. (General Electric LM2500, Allison 501, and Lycoming TF40B)

C. (U) JUSTIFICATION FOR PROJECTS:

(U) FY 1993 ACCOMPLISHMENTS:

- (U) LM2500 ($2,416)

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603508N
PROGRAM ELEMENT TITLE: Ship Propulsion System

PROJECT NUMBER: S1848
BUDGET ACTIVITY: 3

DATE: 7 February 1994

- (U) Initiated:
  - -- (U) development of modifications to reduce fuel consumption and nitrous oxide emissions (NOx).
  - -- (U) development of condition monitoring system.
  - -- (U) improved reliability program for Marine Gas Turbine (MGT) transducers/sensors.
  - -- (U) magnetic bearing development program to decrease maintenance requirements in the lube oil system.
  - -- (U) development of compression stage one blade life improvement to reduce engine maintenance.
- (U) Continued development of the turbine section coatings and blade life enhancements in order to reduce maintenance.
- (U) Completed the elimination of low power compressor stall.

• (U) 501: ($731)

- (U) Initiated:
  - -- (U) testing of prototype equipment monitoring system software to improve Meantime Between Failures (MTBF).
  - -- (U) magnetic bearing development program to decrease maintenance requirements in the lube oil system.
  - -- (U) development of a generic 3-D combustor Computational Fluid Dynamics (CFD) model.
- (U) Completed drawings for improved reliability of the 501 Gas Turbine (GT) accessory gearbox radial drive shaft bearing and side gear bearings.
- (U) Continued the vibration modeling prediction program.

• (U) TF40B: ($750)

- (U) Completed:
  - -- (U) design of the new combustor liner, new swiller and fuel injectors to reduce maintenance requirements.
  - -- (U) field test of TF40B compressors coated with SERMETAL 725 and CHROMALLOY to improve reliability.
- (U) Continued testing various coatings to determine the best performing turbine blade coatings in order to reduce maintenance.

(U) FY 1994 PLAN:

• (U) LM2500 ($1,994)

- (U) Initiate testing of new turbine airfoil geometry coatings and blade enhancements.
- (U) Continue fuel efficient/low NOx developments

• (U) 501: ($700)
- (U) Complete testing of prototype equipment monitoring system.
- (U) Complete and validate the vibration prediction model.

• (U) TF40B: ($700)
- (U) Initiate:
  -- (U) testing of the new seal and bearing design to evaluate performance (MTBF) and reduce life cycle costs.
  -- (U) testing of the new designed limiter to allow continued operation without engine shutdown.
- (U) Complete demonstration of compressor coatings, and continue service testing of improved combustor and turbine coatings to reduce maintenance and life cycle costs.

(U) FY 1995 PLAN:

• (U) LM2500 ($1,852)
- (U) Continue:
  -- (U) development of magnetic bearings to eliminate lube oil system problems.
  -- (U) testing of new turbine airfoil geometry coatings and blade enhancements.
  -- (U) fuel efficient/low NOx developments.
  -- (U) Continue qualification of upgraded power turbine for fuel efficiency.

• (U) 501: ($700)
- (U) Initiate an investigation intc the feasibility of utilizing recuperation to reduce fuel consumption.

• (U) TF40B: ($600)
- (U) Complete:
  -- (U) demonstration of turbine coatings to reduce maintenance and life cycle costs.
  -- (U) testing of the new seal and bearing design to evaluate performance (MTBF) and reduce life cycle costs.
  -- (U) testing of new designed limiter to allow continued operation without engine shutdown.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603508N
PROGRAM ELEMENT TITLE: Ship Propulsion System

PROJECT NUMBER: S1848
BUDGET ACTIVITY: 3

DATE: 7 February 1994

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

(U) WORK PERFORMED BY: IN HOUSE: NAVSURFWARCEN SHIPSYSENGSTA, Philadelphia, PA; NAVSURFWARCEN, Bethesda and Annapolis, MD. CONTRACTORS: General Electric, Cincinnati, OH and Daytona, FL; Allison, Indianapolis, IN; Textron Lycoming, Stratford, CT; and Westinghouse MTD, Pittsburgh, PA.

(U) RELATED ACTIVITIES:
- (U) PE 0602122N (Aircraft Technology)
- (U) PE 0602234N (Materials, Electronics and Computer Technology)
- (U) PE 0603573N (Advanced Surface Machinery Systems)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603512N
PROGRAM ELEMENT TITLE: Carrier Systems Development
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0517 CV ASW Module	3,437	407	0	0	0	0	0	0	81,213
W1722 CV Weapons Elevator Improvements	1,175	862	1,183	1,148	1,124	1,105	1,084	CONT.	CONT.
W1723 CV Launch and Recovery Systems	16,055	9,792	12,678	4,578	6,001	2,647	6,857	CONT.	CONT.
W2208 Future CV R&D	0	0	2,017	2,024	2,031	2,042	2,050	CONT.	CONT.
TOTAL	20,667	11,061	15,878	7,750	9,156	5,794	9,991	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Navy unique program addresses all technology areas associated with Navy/Marine Corps aircraft operations aboard ships. The program includes:

(U) (W1722) Development of standardized, supportable and maintainable aircraft carrier (CV) weapons elevators components.

(U) (W1723) Development of all systems required to provide approach and landing guidance and control, recovery, service, support and launch aircraft operating onto or from ships. Payoffs include increased safety, greater sortie generation rates, enhanced aircraft boarding rates, reduced manning, increased aircraft service life and fleet modernization.

(U) (W2208) Development of ship hull, mechanical and electrical (H,M&E) and combat support systems, subsystems and components to significantly improve aircraft carrier affordability, survivability and operation capabilities and to meet the requirements of existing and pending regulations and statutes critical to the operation of future aircraft carriers.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603512N
PROGRAM ELEMENT TITLE: Carrier Systems Development
PROJECT NUMBER: W1722
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W1722, CV Weapons Elevator Improvements. This project provides for the advanced development, fabrication, test, evaluation and documentation of standardized aircraft carrier (CV) weapons elevator components such as control systems, doors and hatches, safety devices and platform and hoist machinery. Emphasis is placed on the improvement of safety, maintainability, water tight integrity and weight reduction.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($250) Completed operability tests of Elevator Ballistic Water Tight Doors (EBWTD) at Land Based Engineering Site (LBES).
- (U) ($430) Completed detail drawings of Elevator Ballistic Water Tight Hatch (EBWTH).
- (U) ($90) Completed prototype tests of Hydraulic Fluid Compression Ignition Testing Machine (HFCITM) and established standardized procedure for operation.
- (U) ($135) Awarded contract to fabricate wire rope end fitting test devices.
- (U) ($110) Completed Hatch Seal Development, Fork Truck Guard Test, and Elevator Safety Stanchions.
- (U) ($160) Initiated Programmable Logic Electronic Controller (PLEC) program.

(U) FY 1994 PLAN:

- (U) ($50) Install improved seal in EBWTD and conduct hydrostatic test.
- (U) ($420) Fabricate prototype EBWTH.
- (U) ($200) Develop and procure prototype PLEC program. Install PLEC on LBES.
- (U) ($167) Conduct shipboard evaluation of wire rope end fitting test devices.
- (U) ($25) Complete HFCITM prototype tests.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

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

PROJECT NUMBER: W1722
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($83) Develop shipboard installation drawings for EBWTD.
- (U) ($350) Install and conduct prototype tests of EBWTH at LBES.
- (U) ($750) Conduct prototype PLEC tests with multiple programmers.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN SHIPSYSENGSTA Philadelphia, PA; NAVSURFWARCEN Carderock Division, Bethesda, MD. CONTRACTORS: Rosenblatt, New York, NY; Westinghouse MTD, Pittsburgh, PA.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603512N
PROGRAM ELEMENT TITLE: Carrier Systems Development
PROJECT NUMBER: W1723
BUDGET ACTIVITY: 4
Date: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W1723 CV Launch & Recovery Systems	16,055	9,792	12,678	4,578	6,001	2,647	6,857	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project addresses the advanced development systems to meet Navy unique shipboard operational requirements for:

(U) Advanced development and modernization of catapults and arresting gear and supporting shipboard systems. This area is developing the Electromagnetic Aircraft Launch System (EMALS) including its associated power generation/storage/distribution system and closed loop control system and continuation of previous efforts to integrate the EMALS with a ski-jump. The Advanced Launch & Recovery Control Systems (ALRCS) are developing modular digital control systems for existing catapults and arresting gear, replacing the antiquated and manpower intensive control systems of the 1950's.

(U) Advanced development of approach and landing systems and air operations reporting systems. This area is developing advanced optical, electro-optical and laser tracking, approach and landing control and guidance systems for pilots and Landing Signal Officers. The Improved Carrier Optical Landing System (ICOLS) which includes the Improved Fresnel Lens Optical Landing System (IFLOLS) and the Long Range Line-up System, and the Vertical/Short Take-Off and Landing Optical Landing System (VSTOL OLS) will provide optical displays so that the pilot can take early corrective actions in order to prevent landing accidents and increase the aircraft boarding rate. The Integrated Shipboard Information System (ISIS) will provide automated air operations information to decision makers via electronic status boards, replacing the current manpower intensive, hand-written status boards in all of the air operations work areas. ISIS also includes supporting systems which will optimize the flow and processing of situational management information. The Shipboard Wind Measurement System is being developed to provide more accurate wind speed and direction information to the ship's crew so that they can make decisions affecting the safety of air operations onboard ships. The Shipboard Optical Landing System is being developed to provide advanced visual landing aids to amphibious assault and air capable ships so that pilots can fly safer and more accurate approaches to these classes of ships.

(U) Within Advanced Carrier Systems (ACS), shipboard aircraft operations supporting systems are being developed. These systems will apply emerging technologies to carriers in order to reduce the acquisition and support costs of these vital air operations systems.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603512N
PROGRAM ELEMENT TITLE: Carrier Systems Development
PROJECT NUMBER: W1723
BUDGET ACTIVITY: 4
Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,619) Awarded EMALS Critical Components Demonstration contract to design, fabricate and test critical EMALS components.
- (U) ($7,642) Initiated design of Signature Managed Air Traffic Control, Approach and Landing Systems (SMATCALS) Air Traffic Control Systems (ATCS) Advanced Development Model (ADM).
- (U) ($1,389) Initiated design of ICOLS IFLOLS ADM.
- (U) ($1,112) Completed at-sea testing of VSTOL OLS ADM.
- (U) ($3,278) Completed design of ISIS ADM.
- (U) ($990) Completed test site demonstrations of ALRCS ADMs.
- (U) ($25) NAVAIRHQ CV Launch & Recovery Systems Program support travel.

2. (U) FY 1994 PLAN:

- (U) ($2,175) Complete fabrication and initiate testing of critical EMALS components and continue development of integrated EMALS/Ski-Jump.
- (U) ($2,000) Complete design and initiate fabrication of ICOLS IFLOLS ADM.
- (U) ($3,685) Complete fabrication and start shipboard installation of ISIS ADM and continue development of supporting situational management systems.
- (U) ($800) Complete qualification testing of VSTOL OLS ADM.
- (U) ($1,127) Terminate the SMATCALS ATCS ADM contract.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603512N
PROGRAM ELEMENT TITLE: Carrier Systems Development
PROJECT NUMBER: W1723
BUDGET ACTIVITY: 4
Date: 7 February 1994

- (U) ($5) NAVAIRHQ CV Launch & Recovery System Program support travel.

3. (U) FY 1995 PLAN:

- (U) ($2,035) Complete demonstration of critical EMALS components and make decision whether to proceed to design and fabrication of EMALS ADM as well as continue development of integrated EMALS/Ski-Jump.
- (U) ($2,730) Complete fabrication and acceptance testing of ICOLS IFLOLS ADM and initiate shipboard installation.
- (U) ($7,908) Complete shipboard evaluation of ISIS ADM and continue development of supporting situational management systems.
- (U) ($5) NAVAIRHQ CV Launch & Recovery Systems Program support travel.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Indianapolis, IN; NAVAIRWARCENACDIV, Lakehurst, NJ; NAVAIRWARCENACDIV Patuxent River, MD; NCCOSC RDT&E DIV, San Diego, CA; NAVELEXSYSENGACT, St. Inigoes, MD; NAVSURFWARCEN DET, Annapolis, MD CONTRACTORS: Kaman Electromagnetics, Hudson, MA; Humbug Mountain Research Laboratories, Duarte, CA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not available for comparison.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603512N
PROGRAM ELEMENT TITLE: Carrier Systems Development
PROJECT NUMBER: W1723
BUDGET ACTIVITY: 4
Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:

	ORD	AP	TEMP	COEA	LRG
ALRCS	122-05-88:12/86	06/95	06/95	10/94	02/95
EMALS	TOR:10/87	09/89	12/96	12/96	02/99
ICOLS	195-05-88:12/87	06/94	06/94	N/A	10/93
VSTOL OLS	172-05-88:08/87	N/A	N/A	N/A	03/93
ISIS		06/94	06/94	N/A	03/95

G. (U) RELATED ACTIVITIES:

- (U) 0604512N Shipboard Aviation Systems funds related Engineering and Manufacturing Development effort for ALRCS, ICOLS and ISIS.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN LINE 43SJ VSTOL/OLS	14,542	0	0	0	0	0	0	0	14,542

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

J. (U) MILESTONE SCHEDULE:

	MS I	MS II
ALRCS	N/A	09/95
EMALS	N/A	09/99
ICOLS	N/A	06/94
ISIS	06/94	12/96

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603512N
PROGRAM ELEMENT TITLE: Carrier Systems Development
PROJECT NUMBER: W2208
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W2208, Future CV R&D. This project provides for the advanced development of aircraft carrier (CV) specific technologies, the infusion of the surface ship technology base into future aircraft carriers and the potential realization of subsystem design capabilities not currently feasible. This project transitions the most promising technologies from the Navy technology base, other government laboratories and the private sector into specific advanced development efforts. All systems developed in this project have the potential to support emerging requirements and other promising systems technologies for insertion into new aircraft carrier designs. The emphasis is directed towards the development of ship hull, mechanical and electrical (H,M&E) and combat support systems and subsystems and components to significantly improve aircraft carrier affordability, survivability and operational capabilities and to meet the requirements of existing and pending regulations and statutes critical to the operation of future aircraft carriers.

(U) FY 1993 ACCOMPLISHMENTS: Not applicable.

(U) FY 1994 PLAN: Not applicable.

(U) FY 1995 PLAN:

- (U) ($885) Initiate development of critical arresting gear components.
- (U) ($600) Initiate concept definition of an integrated pulse power system capable of supporting defensive and aircraft launch systems.
- (U) ($332) Initiate development of articulated, variable angle ski-jump.
- (U) ($200) Initiate development of user system interfaces for the integrated Survivability Management System portions of an Integrated Command Information System.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN SHIPSYSENGSTA, Philadelphia, PA; NAVAIRWARCENACDIV, Lakehurst, NJ. CONTRACTORS: TBD.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

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

PROJECT NUMBER: W2208
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) RELATED ACTIVITIES:

- (U) 0604512N Shipboard Aviation Systems funds related Engineering and Manufacturing Development efforts for aircraft related systems.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603513N
PROGRAM ELEMENT TITLE: Shipboard Systems Component Development
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0382 Shipboard Auxiliary Systems Development	27,880	22,838	21,046	18,313	17,014	15,990	15,509	CONT.	CONT.
S1712 Hull, Mechanical & Electrical Improvement	3,634	4,668	5,202	7,398	7,244	6,838	1,495	CONT.	CONT.
TOTAL	31,514	27,506	26,248	25,711	24,258	22,828	17,004	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT:

(U) This program develops affordable non-propulsion machinery systems, components, and improvements for current and future surface fleet Hull, Mechanical and Electrical (HM&E) systems. It includes auxiliary machinery, hull and deck machinery, Fiber Optic (FO) systems, shipboard corrosion control, HM&E materials, Underway Replenishment (UNREP), and ship salvage systems. Fiber optics development includes the distributed combat systems under the Integrated Interior Communication and Control ((IC)2) total shipwide network engineering, Fiber Optic Data Multiplexing System (FODMS (1) & (2)), Fiber Optic Integrated Voice Communication System (FOIVCS), fiber optic shipboard cable topology, analog and digital optoelectronic interfaces, passive optical sensors, High Speed Optical Network (HSON) concept, and CVN-73 local area network installation. Material efforts include start-up development and transition of advanced materials technologies to impact ship design to reduce signature topside weight, fuel consumption, and life cycle costs and achieve greater ship design flexibility.

(U) The program is closely coordinated with Advanced Ship Machinery System (ASMS), formerly Integrated Electric Drive. The program does not duplicate any efforts and is independent of ASMS.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603513N
PROGRAM ELEMENT TITLE: Shipboard Systems Component Development
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) System developments in the Shipboard Auxiliary Systems Development Project (S0382) are usually ACAT IVT or IVM. The HM&E Improvement Project (S1712) is non-ACAT, resulting primarily in new specifications, standards, and operating procedures. The program uses technology from industry and Navy exploratory development programs, evaluates breadboard units in the laboratory, and develops prototype equipment for technical and operational evaluation in Navy platforms and facilities. Thrusts are directed towards improved affordability, performance, producibility, service life, reliability and maintainability, signature reduction, safety, commonality, and standardization, and towards reduced life cycle and acquisition costs, and reductions in weight, volume, and manning. Systems generally apply to all ships and many components may be backfitted during overhauls or equipment replacements, or implemented relatively late in a new ship design cycle. This presents many windows of opportunity to transition technology to the current and future fleet.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603513N
PROGRAM ELEMENT TITLE: Shipboard System Component Development
PROJECT NUMBER: S0382
BUDGET ACTIVITY: 4
Date: 7 February 1994

A (U) RESOURCES: (Dollars in Thousands)

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0382									
Shipboard Auxiliary Systems Development	27,880	22,838	21,046	18,313	17,014	15,990	15,509	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Develops shipboard auxiliary components and systems to improve affordability, performance, reliability, and maintainability and result in size, weight, and/or life cycle cost savings.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($3,741) Completed fabrication of shipboard Reverse Osmosis (RO) desalination unit and initiated qualification testing. Obtained MS II approval for Electrolytic Disinfectant Generator (EDG), received EDMs, and began qualification testing. Completed design of standard family composite centrifugal pumps and began critical design review. Completed Variable Capacity Centrifugal Pump (VCCP) Shipeval and prepared final report. Received MS III (AFP) approval for Gaseous Nitrogen Generator (GNG) and finalized procurement package for shipboard units. Completed Labeval of hydraulically driven booster High Pressure Air Compressor (HPAC) and prepared report. Initiated fabrication of rotary water-flood single screw HPAC air-ends concepts at Dresser-Rand and Aurora Technology. Developed specifications for 800 ton Hydrofluorocarbon (HFC) 134A air conditioner (AC) plant for CVN-76.

- (U) ($500) Continued testing of Spring Tow Hawser System and initiated development of Propeller Inspection System.

- (U) ($500) Completed development of Impressed Current Cathodic Protection (ICCP) physical scale model, computer model and initiated ICCP design manual for Hull ICCP Systems. Identified and develop coatings Non-Destructive Evaluation (NDE) techniques and environmentally compatible paints for metallics and non-metallics. Completed review of advanced composite tech-base for next generation combatant; initiated planning for advanced composite applications.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603513N
PROGRAM ELEMENT TITLE: Shipboard Systems Component Development
PROJECT NUMBER: S0382
BUDGET ACTIVITY: 4
Date: 7 February 1994

- (U) ($3,573) Developed and approved FO topology installation MIL STD 2042, installed and tested FO down-link between Global Positioning System (GPS) on USS YORKTOWN. Installed FO link between International Marine satellite on USS ABRAHAM LINCOLN. Completed cable plant design for various combatant FO networks and completed 66% QPL testing of FO components.

- (U) ($1,500) Developed FO specs for tachometer, limit switch, pressure and temperature sensors and shipboard tested two commercial sensors.

- (U) ($9,841) Completed (IC)2 engineering validation/demonstration at Wallops Island.

- (U) ($500) Developed and demonstrated switch control under management on Asynchronous Transfer Model (ATM) switch, prototype video ATM switch and simulation software, pre-prototype Synchronous Optical Network (SONET) multiplanar boards and initiated development of Fiber Distributed Data Integration (FDDI). Received and installed 64 X 64 ATM switch.

- (U) ($3,725) Completed FODMS1/machinery control system interoperability test, EDM-1 fabrication, initiated EDM-2, obtained technical Scoping session approval for 51-IIa and major design decision approval for CVN-76 baseline.

- (U) ($4,000) Completed FOIVCS ILS management, preliminary maintenance, software development and test, draft Navy training plan and Tech Manual. Released computer resource Life Cycle Management Plan and completed EDM uninterruptable power supply cabinet.

2. (U) FY 1994 PLAN:

- (U) ($5,166) Continue development of advanced HM&E systems and components that reduce maintenance man hours and life cycle costs. Labeval rotary HP air compressor stages, fabricate and begin qualification of prototype standard composite centrigufal pumps. Complete qualification of EDG, EDMs, and fabricate Low Rate Initial Production (LRIP) units for Techeval. Complete RO qualification and improvements and finalize drawings. Initiate concept development of improved machinery for auxiliary modules. Support GNG production and Shipeval units during final deployment.

- (U) ($500) Complete test of Spring Tow Hawser, continue Propeller Inspection Development, complete development of Underwater Painting Application Systems and initiate Remotely Operated Vehicle Umbilical Splicing System.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603513N
PROGRAM ELEMENT TITLE: Shipboard Systems Component Development
PROJECT NUMBER: S0382
BUDGET ACTIVITY: 4
Date: 7 February 1994

- (U) ($500) Complete ICCP hull design manual. Complete NDE technology development coatings. LABEVAL selected paints and coatings. Continue development of approaches for application of advanced composites to surface ships system and components - transition to project S1712.

- (U) ($3,534) Obtain approval decision for Limited Rate Initial Production of FODMS(1) and begin concept studies of FODMS(2).

- (U) ($8,339) Continue development of the (IC)2 system and HSON including distributed combat systems, HM&E data network, logistics and administrative network.

- (U) ($1,963) Continue development of FOIVCS and passive optical sensors.

- (U) ($2,836) Continue final stage development of shipboard cable topology design and standard input/output devices.

3. (U) FY 1995 PLAN:

- (U) ($7,287) Transition materials, corrosion control techniques and coatings to S1712 and continue development of advanced HM&E auxiliary machinery systems components and shipboard salvage systems. Conduct critical design review of high pressure compressor technology and prepare RFP. Conduct Labeval and initiate Techeval of standard composite centrifugal pumps and start Phase III pump effort. Install EDG LRIP units, conduct Techeval and receive Milestone III approval. Initiate development of circuit breaker and improved machinery for distributed auxiliary modules. Initiate functional analyses to quantify affordability benefits of applying autonomics to HME systems to apply automation and remote monitoring to reduce ship size and costs with reduced manning. HME projects planned to reduce the manning and maintenance costs of future combatants include fuel cells, advanced degaussing, solid state power electronic modules, power for pulsed system loads, and controls for HM&E equipment. Contract for high pressure membrane dehydrator and positive displacement pump.

- (U) ($500) Complete development of the Remotely Operated Vehicle Umbilical Splicing Systems and initiate development of the Underwater Inspection Sensor System.

- (U) ($7,340) Continue development of the (IC)2 including distributed combat systems, HM&E data network, logistics and administrative network with specific application/risk reduction for LX.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603513N
PROGRAM ELEMENT TITLE: Shipboard Systems Component Development
PROJECT NUMBER: S0382
BUDGET ACTIVITY: 4
Date: 7 February 1994

- (U) ($2,891) Complete FODMS(2) concept study and initiate development of FODMS(2). Complete development of FOIVCS and continue development of passive optical sensors.
- (U) ($3,028) Continue FO shipboard cable topology design with specfic application to CUN-76 and LX.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN DET, Annapolis, MD; NAVSURFWARCEN SHIPSYSENGSTA, Philadelphia, PA; NESEC, Vallejo, CA; NIST, Boulder, CO; NCCOSC RDTE DIV, San Diego, CA; NRL, Washington, D.C.; NAVSURFWARCEN DIV, Dahlgren, VA, and Crane, IN; NWS, Yorktown, VA; NAVSEAWARCEN DIV, Newport, RI; NCCOSC RDTE DIV DET, Warminster, PA; NAVAIR WARCENACDIV, Lakehurst, NJ; NWAC, Corona, CA; NSCSES, Norfolk, VA. CONTRACTOR: American Systems Corp., Arlington, VA; Gibbs & Cox Inc., Arlington, VA; Planning Research Corp., Reston, VA; Rockwell International, Anaheim, CA; Dresser-Rand, Painted Post, NY; Westinghouse MTD, Pittsburgh, PA; GEO-CENTERS Inc., Fort Washington, MD; M. Rosenblatt & Sons, Arlington, VA; Labarge Electronics, Tulsa, OK; Rix Industries, San Francisco, CA; ElTech, Cleveland, OH; Mantech, Arlington, VA; Village Marine, Gardina, CA; Ingersoll Rand, Allentown, PA; Aurora Technology, East Aurora, NY; Hydropac, Erie, PA; Brunswick Corp., Lincoln, NE; Fibertek, Springville, UT; HLA Engineering, Dallas, TX; Specialty Plastics, Baton Rouge, LA. MIT, Boston, MA; G.P.C., Alexandria, VA; Battele Lab, Columbus, OH; Seward Marine, Norfolk, VA; TRW Inc., Cambridge, MA; Oceaneering Int'l, Morgran City, LA; Sperry Marine, Charlottesville, VA; Hughes Aircraft, Fullerton, CA; Atlantic Research Corp., Washington, D.C.; PRC, Washington, D.C.; Synetics, Washington, D.C.; Dynamic Systems Inc., Alexandria, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603513N
PROGRAM ELEMENT TITLE: Shipboard Systems Component Development
PROJECT NUMBER: S0382
BUDGET ACTIVITY: 4
Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:

- (U) OR 06/91285-03-92 Electrolytic Disinfectant Generator
- (U) OR 09/89SO382 Gaseous Nitrogen Generator
- (U) OR 09/88SO382-31 400 Hz Current Limiting Device
- (U) NAPDD 11/86SO382-27 Shipboard Electrical System Ground Fault Locator
- (U) NAPDD 06/86SO382-18 Shipboard Corrosion Control
- (U) TEMP 11/85485-3 Variable Capacity Centrifugal Fire Pump
- (U) TEMP 11/85718-1 HP Single Screw Air Compressor
- (U) TEMP 11/85485-01 Standard Family Positive Displacement Pumps
- (U) TEMP 06/86106-5 Standard Family of Composite Pumps
- (U) TEMP 10/881156-01 Shipboard Salvage
- (U) OR 01/91277-03-91 FODMS1
- (U) OR 08/91289-03-91 FODMS2
- (U) OR 08/91288-03-91 Fiber Optic IVCS
- (U) NAPDD 06/90241-03 Shipboard Fiber Optics Topology Development
- (U) NAPDD 02/91254-03 Fiber Optic Sensor Standards/Specification
- (U) NAPDD 03/91255-03 (IC)2

G. (U) RELATED ACTIVITIES:

- (U) Program Element (PE) 0602121N, Surface Ship Technology
- (U) PE 0603721N, Environmental Protection - Heating, Ventilation and Air Conditioning system efforts to develop non-ozone depleting refrigerants transitioned to PE 0603721N in FY92.
- (U) PE 0603573N, ASMS - Closely coordinated to avoid redundant efforts for new systems and architectures.

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

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603513N
PROGRAM ELEMENT TITLE: Shipboard Systems Component Development
PROJECT NUMBER: S0382
BUDGET ACTIVITY: 4
Date: 7 February 1994

J. (U) MILESTONE SCHEDULE: Category III (AFRP/AFLP) milestones for the following programs are as follows:

• (U) EDG	4QTR/95
• (U) VCCP Fire Pump	2QTR/94
• (U) HP Single Screw Compressor	2QTR/97
• (U) Standard PD Pump	2QTR/96
• (U) Standard Family of Composite Pumps	2QTR/96
• (U) Shipboard Salvage Systems	Various
• (U) Gaseous N2 Generator	4QTR/92
• (U) 400 Hz Current Limiter	1QTR/97
• (U) Shipboard Corrosion Control	Various
• (U) FODMS (1)	1QTR/95
• (U) FODMS (2)	3QTR/97
• (U) Fiber Optics IVCS	3QTR/96
• (U) (IC)2 (NAPDD)	3QTR/97
• (U) Shipboard FO Topology (NAPDD)	4QTR/95
• (U) FO Sensor Stds/Spec (NAPDD)	2QTR/97
• (U) HSON Concept (NAPDD)	4QTR/93

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603513N
PROGRAM ELEMENT TITLE: Shipboard Systems Component Development

PROJECT NUMBER: S1712
BUDGET ACTIVITY: 4

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: S1712, Hull, Mechanical, and Electrical Improvement -- This project develops improved equipments which are small but critical components of non-propulsion HM&E systems. The program is directed toward improved affordability, performance, reduced life cycle cost, reliability and maintainability, signature reduction, standardization, and weight and manning reductions for the existing and future fleet.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($3,634) Identified a Navy standard rotary positive displacement pump family for development with the potential for $95M in savings over 25 years. Labevaled permeable membrane low pressure air dehydrator and supported Shipeval aboard CVN-72. Successfully Labevaled 1000 psi membrane dehydrator and completed fabrication of automatic high pressure desiccant dehydrator. Developed draft installation guidelines and fire, smoke and toxicity standards for Glass Reinforced (GRP) composite shock rated piping systems. Developed alternative zonal firemain and high pressure compressed air system architecture and submitted for critical review. Completed design of standard helo hangar door and continued development of synthetic decking, sliding block, standard vertical package conveyor, and wire rope sockets. Delivered ship magnetic model to NSWC/WO, evaluated 300 HP Permanent Magnet (PM) motor, supported fuel cell SBIR and ship impact study, completed TAG-195 power quality modelling and measurements. Conducted ship impact analysis of AQB circuit breaker, analysis of pulse power cable requirements, solid state time delay relay and other electrical auxiliaries.

(U) FY 1994 PLAN:

- (U) ($4,668) Continue development of improved, standard affordable HM&E equipment including standard PD pump family, high and low pressure membrane dehydrators, GRP fire and shock hardened piping, valves, and machinery, advanced HM&E system architectures, machinery for modules, gas turbine starting technology, hull and deck machinery, advanced degaussing systems, fuel cells, TAG power quality, power cables, electrical auxiliaries, and 60 Hz power systems analysis. Initiate autonomic shipboard feasibility analysis. Select PD pump technology and initiate development contract. Develop specification for 3000 psi membrane air dehydrator and initiate procurement. Establish survivability characteristics of zonal firemain concept. Extend TAG power system model to 24 pulse system and investigate use of polymer current limiter on 60 HZ power coordination.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603513N
PROGRAM ELEMENT TITLE: Shipboard Systems Component Development
PROJECT NUMBER: S1712
BUDGET ACTIVITY: 4
DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($2,499) Complete survivability and flammability standards for GRP pipe and valves. Labeval/Shipeval prototype standard GRP valves. Complete zonal firemain, advanced ship service air system survivability analyses and designs for future combatants, auxiliaries, and amphibious ships. Labeval/Shipeval ship service prototype low pressure membrane dehydrators. Contract for 3000 psi high pressure membrane dehydrators. Evaluate advanced power cables and auxiliary electrical system components. Labeval/Shipeval standard helo hangar door for DDG-51 IIA. Continue development of composite fluid, mechanical, electrical components, and weather deck machinery components, to obtain reduced signatures, manning, and improved maintenance. Transition PD pump adn HP membrane dehydrator to S0382.

- (U) ($2,703) Transition, from S0382. Definitize and quantify performance requirements for composite materials applications. Identify and prioritized marine-related advanced composite technical issues requiring resolution. Establish essential interfaces between composite material technologies, manufacturing technologies (MANTECH) and design technologies in order to conduct tradeoffs for cost, design concepts, and manufacturing approaches. Initiate evaluation of aerospace composite technologies for potential adaption to surface ship applications. Evaluate design tools, tecnniques and material design concepts developed in exploratory development for adaptability to meet unique marine composite design applications to be validated in demonstrations. Evaluate MANTECH capabilities for fabrication of large load-bearing marine structures. Develop structural design concepts and strategies for industry participation, and initiate industrial evaluation of design and manufacturing concepts. By the nature of advanced composites materials technologies, these efforts must be inter-related to achieve a coherent development program.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CARDEROCK DIV, Bethesda, MD; NAVSURFWARCENT DET, Annapolis, MD; NAVSURFWARCEN SHIPSYSSENGSTA, Philadelphia, PA; NAVSURFWARCEN WHITE OAK DET, Silver Spring, MD; NAVSURFWARCENT DIV, Crane, IN; NAVSURFWARCENT DIV, Port Hueneme, CA; NAVSURFWARCENT COASTSYSSTA, Panama City, FL; NCCOSC, RDT&E DIV, San Diego, CA; Navy Center of Excellence for Composited Manufacturing Technology, Kenosha, WI. CONTRACTORS: Bend Research, Bend, OR; Sepeda Associates, Louisville, KY; NKF Associates, Arlington, VA; Aeroquip, Jackson, MI; Smith Fiberglass, Little Rock, AR; Gibbs & Cox, Arlington, VA; M. Rosenblatt & Son, Washington, D.C.; Westinghouse MTD, Pittsburgh, PA.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603513N
PROGRAM ELEMENT TITLE: Shipboard Systems Component Development

PROJECT NUMBER: S1712
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) RELATED ACTIVITIES:

- (U) PE 0602121N Surface Ship Technology
- (U) PE 0602234N Materials Electronics and Computer Technology

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603514N
PROGRAM ELEMENT TITLE: Ship Combat Survivability
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0384 SHIP SURVIVABILITY (ADVANCED)	8,238	2,468	3,284	3,149	2,817	2,498	2,161	CONT.	CONT.
S1121 PERSONNEL PROTECTION	3,702	3,315	2,908	2,693	2,663	2,604	2,575	CONT.	CONT.
S1565 SHIP DAMAGE CONTROL (ADV)	7,280	8,641	6,409	6,476	6,136	6,096	5,782	CONT.	CONT.
S2053 CBR DEFENSE	3,379	2,697	1,987	2,036	1,703	1,395	1,217	CONT.	CONT.
TOTAL	22,599	17,121	14,588	14,354	13,319	12,593	11,735	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The advanced development of equipment/systems/engineering data and full scale weapons effects simulation will provide protection of ships and their personnel from conventional, chemical, and biological weapon effects, and enable the ship to continue performing assigned missions at an effective level. This program is also concerned with the effects of fire, smoke, and lethal environments created by peacetime accidents and the development of fire protection and damage control capabilities necessary to limit, control, and correct wartime and peacetime casualty situations.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603514N
PROGRAM ELEMENT TITLE: Ship Combat Survivability
PROJECT NUMBER: S0384
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: S0384, SHIP SURVIVABILITY (ADVANCED). This project undertakes development of protection concepts and specifications to meet the objectives of OPNAVINST 9070.1, "Survivability Policy for Surface Ships of the U.S. Navy", dtd 23 Sep 1988. Specifically, that combatants be able to deal with the degrading effects of damage from shaped charge (SC) and semi-armor piercing (SAP) anti-ship missiles (ASMs), torpedoes, and mines. Additionally, the lessons learned from the recent Persian Gulf experience demonstrated the need to: (1) improve the resistance of the hull girder and equipment/systems against underwater explosion (UNDEX) shock and whipping effects, and (2) provide uninterruptible shipboard power to ensure continuous combat capability.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($650) Completed Large Article Test model tests and assessments; developed design guidance manual (internal blast effects) for hardened hull/box girder.
- (U) ($555)
- (U) ($1,995) In support of developing UNDEX whipping resistant hull girder design options conducted: 1) scaled static strength tests of baseline model to characterize inelastic response, and 2) full scale UNDEX test against the Italian corvette, ex-MARGOTTINI, to validate elastic response prediction models.
- (U) ($100) Completed initial full scale testing of low-intensity conflict armor systems.
- (U) ($4,489) Completed Electromagnetic Pulse trial for CG-68.
- (U) ($449) Initiated option definition for rapid fault clearing system which isolates multiple, simultaneous short circuits caused by ASM threats, providing for uninterruptible power.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603514N
ELEMENT TITLE: Ship Combat Survivability
PROJECT NUMBER: S0384
BUDGET ACTIVITY: 4
DATE: 7 February 1994 PROGRAM

(U) FY 1994 PLAN:

- (U) ($350) Develop blast hardened door design requirements to minimize longitudinal propagation of internal blast, smoke, and fire from ASM threats.
- (U) ($1,118) Conduct static strength tests of hardened models. Finalize UNDEX resistant hull girder design options and begin construction of scaled whipping (dynamic) verification test models.
- (U) ($700) Complete option definition for rapid fault clearing system; initiate advanced development of selected option.
- (U) ($300) Participate with the U.K. Navy in assessing the vulnerability of a small waterplane area twin hull (SWATH) to UNDEX. Conduct low level UNDEX whipping and shock test.

(U) FY 1995 PLAN:

- (U) ($1,976) Conduct scaled whipping (dynamic) verification tests of UNDEX resistant hull girder hardening designs. Develop design guidance manual.
- (U) ($410) Initiate development of equipment/system hardening and mounting requirements to provide protection against the combined effects of UNDEX shock and whipping, and reduce hardening costs by permitting use of lower cost commercial equipment.
- (U) ($598) Complete advanced development of rapid fault clearing system.
- (U) ($300) Conduct high level UNDEX whipping and shock SWATH tests.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NAVSURFWARCENDIV, Dahlgren, VA; U.S. Army Combat Systems Test Activity, Aberdeen Proving Grounds, Aberdeen, MD.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603514N
ELEMENT TITLE: Ship Combat Survivability
PROJECT NUMBER: S0384
BUDGET ACTIVITY: 4
DATE: 7 February 1994 PROGRAM

(U) RELATED ACTIVITIES:

- (U) PE 0604516N, Project S1828 (Ship Survivability (Engineering)).

(U) OTHER APPROPRIATION FUNDS: Specification changes included in new construction ships (SCN funding). Procurement information not available at this level of detail.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603514N
PROGRAM ELEMENT TITLE: Ship Combat Survivability

PROJECT NUMBER: S1121
BUDGET ACTIVITY: 4

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: S1121, Personnel Protection. Provides for design/development of shipboard personnel clothing and equipment to protect ship's compliment from the effects of hostile actions and peacetime accidents.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,424) Completed Fire Fighter's Breathing Apparatus (FFBA) Engineering Development Models (EDMs) and Qualification testing.
- (U) ($150) Transitioned Auto-Inflatable Utility Life Preserver (AIULP) to Fleet Outfitting Phase.
- (U) ($50) Initiated evaluation of Auto-Inflator failure.
- (U) ($295) Developed Improved Protective Clothing.
- (U) ($120) Initiated Special Application Firefighters' Helmet evaluation.
- (U) ($100) Developed Procurement Package to DCSC for Rescue Swimmer Dry Suit (RSDS).
- (U) ($95) Initiated Fleet Evaluation of Improved Cover for the MK-1 Life Preserver and design modifications to improve reliability and reduce cost. Initiated fleet evaluation of modifications.
- (U) ($50) Purchased Portable Air Respirator [National Institute of Occupational Safety and Health (NIOSH) Approved] for Shipboard Testing.
- (U) ($180) Initiated Life Preserver consolidation and Abandon Ship Life Preserver Repackaging Studies.
- (U) ($30) Developed Commercial Item Description (CID) for FF Helmet.
- (U) ($98) Developed requirements for Laser Eye Protective Goggles.
- (U) ($110) Technical documentation improvements to incorporate new equipment/requirements.

(U) FY 1994 PLAN:

- (U) ($1,380) Conduct Technical Evaluation (TECHEVAL) and Operational Evaluation (OPEVAL) for FFBA.
- (U) ($250) Obtain NIOSH approval for FFBA.
- (U) ($50) Conduct Shipboard Testing of Portable Air Respirator (NIOSH Approved).
- (U) ($425) Conduct Emergency Escape Breathing Device (EEBD) redesign/repackaging study.
- (U) ($50) Conduct Work/Rest Guideline Study for Protective Overgarments.
- (U) ($50) Conduct Anti-Exposure Suit Effectiveness Study.
- (U) ($105) Develop Improved Firefighter's Clothing.
- (U) ($115) Develop Improved Fire Retardant Clothing.
- (U) ($23) Transition RSDS to fleet introduction phase.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603514N | PROJECT NUMBER: S1121 | DATE: 7 February 1994
PROGRAM ELEMENT TITLE: Ship Combat Survivability | BUDGET ACTIVITY: 4

- (U) ($30) Complete Fleet Evaluation of Improved Cover for the MK-1 Life Preserver.
- (U) ($250) Conduct Abandon Ship Life Preserver Repackaging Study.
- (U) ($187) Conduct Life Preserver Documentation Update.
- (U) ($[illegible]) Conduct Auto-Inflator Failure Analysis and perform design modifications.
- (U) ($100) Test and evaluate Laser Eye Protective Goggles.

(U) FY 1995 PLAN:

- (U) ($544) Complete OPEVAL and complete preparation for Milestone III for FFBA and obtain Milestone III approval for full production.
- (U) ($150) Complete documentation and transition of LASER Eye Protection Equipment to fleet introduction phase.
- (U) ($256) Develop improved Firefighters' Clothing.
- (U) ($400) Improved Emergency Escape Breathing Device (EEBD) Development Effort.
- (U) ($250) Abandon Ship Life Preserver Redesign Development Effort.
- (U) ($200) Complete design modifications to Auto-Inflator.
- (U) ($123) Life Preserver Documentation Update.
- (U) ($450) Emergent Safety Equipment Investigations.
- (U) ($125) Evaluate Non-Development Items (NDI) to replace existing Mil-spec equipment.
- (U) ($240) Develop and test Firefighting (FF) Clothing/heating for hands and feet.
- (U) ($170) Develop improved Firefighters' Clothing.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NCTRF, Natick, MA; NAVSURFCENCOASTSYSTA, Panama City, FL; NAVSURFWARCEN DET, Annapolis, MD; NAVSURFWARCEN SHIPSYSENGSTA, Philadelphia, PA; NAMRL, Pensacola, FL. CONTRACTORS: G. Sharp, Inc., Arlington, VA; American Systems Engineering Corp., Alexandria, VA; Weidlinger Associates, New York, NY and Arlington, VA; MPR Associates, Inc. Alexandria, VA; JJH Inc., Arlington, VA.

(U) RELATED ACTIVITIES: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603514N
PROGRAM ELEMENT TITLE: Ship Combat Survivability

PROJECT NUMBER: S1121
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 239	7,935	12,459	10,659	40,938	23,339	27,321	8,000	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603514N
PROGRAM ELEMENT TITLE: Ship Combat Survivability
PROJECT NUMBER: S1565
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: S1565, SHIP DAMAGE CONTROL. The Persian Gulf experience demonstrated the damaging effects of unexpended missile fuel causing compartment fire flashover and the difficulty in confining and extinguishing such fires. This project addresses solutions to wartime and peacetime fire and other damage control (DC) scenarios through the advanced development of improved equipment, devices, systems, materials, tactics and doctrine for rapid DC and recovery during peacetime operations and for mission retention in a post-hit situation. Specifically, by (1) conducting full scale tests of weapons induced fire damage, (2) developing passive and active systems, equipment and materials to rapidly contain and control damage, (3) developing improved DC sensors that provide enhanced data quality and quantity, (4) developing damage information collection, analysis and display systems that will assist in rapidly identifying the situation, prioritizing responses and allocating resources, and (5) developing reliable/survivable data communications between on-scene personnel, DC Central and repair lockers, and ship's command and control.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($475) Completed initial cost/benefit analysis and contract specification for metallic sheathed cables.
- (U) ($978) Completed small and full scale fire hazard tests of berthing space materials.
- (U) ($475) Completed baseline tests of fixed fine water mist fire extinguishing system.
- (U) ($3,745) Completed both land-based and ex-USS SHADWELL test and evaluation of networked Integrated Survivability Management System (ISMS). Successfully transitioned ISMS Version 2.1 to DDG-51, Flight IIA.
- (U) ($470) Completed development of fleet capable Flooding Casualty Control Software. Initiated preparation of configuration management plan.
- (U) ($488) Demonstrated portable Repair Team Terminal wireless datalink and capability to directly map casualty data to ISMS.
- (U) ($649) Completed evaluation of selected Non-Development Items (NDI) damage control equipment.

(U) FY 1994 PLAN:

- (U) ($1,050) Conduct full scale fire hazard test of typical shipboard storerooms to characterize fuel load and support development of fire tolerant shipboard materials.
- (U) ($700) Conduct large scale tests of fixed fine water mist extinguishing system; initiate preparation of specification.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603514N
PROGRAM ELEMENT TITLE: Ship Combat Survivability
PROJECT NUMBER: S1565
BUDGET ACTIVITY: 4
DATE: 7 February 1994

- (U) ($900) Initiate development of a DC survivability model which supports assessing DC design options, including passive fire protection, personnel routing, and DC system architecture. Begin incorporation of time-dependent architecture into the Ship Vulnerability Model (SVM) to account for the effects of fire/smoke, firefighting, crew casualties, structural integrity, and mission restoration.
- (U) ($700) Develop fleet training software for selected ships which identifies inactivated equipment and damaged or flooded compartments, as a function of threat.
- (U) ($900) Initiate evaluation of continuous reading, individually addressable NDI flooding sensors and data network interface.
- (U) ($2,591) Initiate development of DC system architecture requirements to ensure continued operation of DC systems in a realistic anti-ship missile threat environment. Conduct system level full scale blast/fragmentation vulnerability tests of shipboard data communications network, uninterruptible power supplies, and sensors.
- (U) ($1,800) Initiate development of structural assessment software module for ISMS which defines hull girder integrity after attack, and recommended dewatering and structural reinforcement locations.

(U) FY 1995 PLAN:

- (U) ($607) Conduct full scale fire test of selected shipboard compartments.
- (U) ($200) Prepare specification for fixed fine water mist fire extinguishing system.
- (U) ($650) Continue incorporation of time-dependent architecture into the SVM.
- (U) ($650) Complete evaluation of NDI flooding sensors and data network interface.
- (U) ($2,150) Continue development of DC system architecture requirements. Conduct system level full scale vulnerability tests of active firefighting systems, chilled water, and reconfiguration options.
- (U) ($1,583) Continue development of structural assessment software module for ISMS.
- (U) ($569) Complete development of fleet training software for selected ships.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NAVSURFWARCEN DET, Annapolis, MD; NAVAIRWARCENWPNDIV, China Lake, CA; NAVSURFWARCEN SHIPSYSENGSTA, Philadelphia, PA. CONTRACTORS: Advanced Marine Enterprises, Arlington, VA; Hughes Associates, Inc., Wheaton, MD; M. Rosenblatt & Son, Inc., Arlington, VA.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603514N
PROGRAM ELEMENT TITLE: Ship Combat Survivability

PROJECT NUMBER: S1565
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) RELATED ACTIVITIES:

- (U) PE 0604516N, Project S2054 (Ship Damage Control (Engineering)).

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603514N
PROGRAM ELEMENT TITLE: Ship Combat Survivability
PROJECT NUMBER: S2053
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: S2053, CBR DEFENSE. Conduct advanced development of Chemical, Biological and Radiological (CBR) defensive systems for surface ships to support the requirement to sustain operations in a CB threat environment (Defense Planning Guidance (FY94-99)). Systems developed will counter predicted new and novel threats into the next century as validated by Office of Naval Intelligence (ONI) CB Threat Assessment (TA# 004-92).

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($389) Continued and expanded (with U.S. ARMY involvement) catalytic oxidation evaluations for Advanced CBR Filtration Systems.
- (U) ($312) Continued Shipboard Inherent Contamination (SIC) analysis of Collective Protection System (CPS) filters; refined and validated filter life model.
- (U) ($1,046) Fabricated and tested Advanced Development Model (ADM), completed requisite acquisition documents and achieved MS I/II approval for the Shipboard Automatic Liquid Agent Detector(SALAD) to proceed into Engineering Development.
- (U) ($468) Developed reagents and antibody attachment chemistries for six specified challenges for the Interim Biological Agent Detector (IBAD).
- (U) ($156) Completed evaluation of an Individual Chemical Agent Detector for shipboard use.
- (U) ($437) Conducted review of operational requirements and initiated Cost and Operational Effectiveness Analysis (COEA) for Biological Agent Detection System (BADS). Completed preliminary evaluations of ultraviolet spectrometry, interferometry, and advanced particle sizing technologies.
- (U) ($110) Reviewed operational requirements and initiated COEA for Chemical Agent Remote Detection System (CARDS). Completed feasibility study of modifying the Remote Sensing Chemical Agent Alarm (RSCAAL) for use in a maritime environment.
- (U) ($461) Entered Joint Service Lightweight Integrated Suit (JSLIST) program to meet requirements for Advanced Chemical Protective Garment (ACPG). Conducted preliminary testing of candidate materials and designs for initial downselect.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603514N PROJECT NUMBER: S2053 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: Ship Combat Survivability BUDGET ACTIVITY: 4

(U) FY 1994 PLANS:

- (U) ($248) Complete catalytic oxidation evaluation for Advanced CBR Filtration Systems.
- (U) ($278) Complete SIC generated CPS filter life prediction model.
- (U) ($200) Transition IBAD management/oversight to the Joint Program Office for Biological Defense (JPO-BD). Complete attachment chemistries and alarm algorithm for IBAD.
- (U) ($800) Transition BADS management/oversight to the JPO-BD. Continue COEA development and expand to address all Services Operational Requirements. Initiate ADM design specifications, component testing, and requisite acquisition documents.
- (U) ($35) Continue COEA for CARDS.
- (U) ($695) Complete design, testing, and initial material downselect for ACPG; achieve approval for combined MS I/II. Fabricate prototype garments and initiate EDM test planning.
- (U) ($441) Initiate shipboard testing of filtration modifications for Improved CPS (ICPS) components.

(U) FY 1995 PLANS:

- (U) ($350) Conduct COEA for Advanced CBR Filtration Systems.
- (U) ($987) Achieve MS I approval for CARDS. Initiate ADM design specifications, component testing, and requisite acquisition documents.
- (U) ($650) Complete ICPS shipboard evaluations; provide feasibility report and recommended technical data package modifications.

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

(U) WORK PERFORMED BY: IN HOUSE: NRL, Washington, DC; NAVSURFWARCENDIV, Crane, IN; NAVSURFWARCENDIV, Dahlgren, VA; NAVSURFWARCEN DET, Annapolis, MD;. Contractors: Battelle, Columbus, OH; Solar Turbine, San Diego, CA; Science and Technology Corp., Hampton, VA; Brunswick Corp., Clearwater, FL; Environmental Tech Group, Inc., Baltimore, MD.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603514N
PROGRAM ELEMENT TITLE: Ship Combat Survivability
PROJECT NUMBER: S2053
BUDGET ACTIVITY: 4
DATE: 7 February 1994

(U) RELATED ACTIVITIES:

- (U) PE 0208051A (Joint Biological Defense/Non-Medical). FY 1995 resource reduction relates to PBD #109 that transfers funding, management, and oversight of biological defense programs to the Joint Program Office for Biological Defense (JPO-BD). Navy will continue to execute programs through JPO-BD funding to satisfy Navy requirements and ship integration.
- (U) PE 0602233N (Mission Support Technology). The tech base program that provides technologies for advance development.
- (U) PE 0603635M (Marine Corps Ground Combat/Support System). Supports ACPG program as a joint service project.
- (U) PE 0603747A (Soldier Support and Survivability). Supports ACPG program as a joint service project.
- (U) PE 0604516N (Ship Survivability). The transition program for CBR Defense development items.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603528N
PROGRAM ELEMENT TITLE: Non-Acoustic Anti-Submarine Warfare

PROJECT NUMBER: H0967
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
H0967 Non-Acoustic Anti-Submarine Warfare (ASW)	0	0	4,756	0	0	0	0	0	4,756

B. (U) BRIEF DESCRIPTION OF ELEMENT AND PROJECT: The purpose of this program is to ensure that Non-Acoustic ASW (NAASW) concepts are properly evaluated and exploited. The current scaled-down program focuses only on one technology which can be developed in the near term and promises to be effective against very quiet submerged diesel submarines regardless of their speed and against other submerged objects.

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS: Funded under PE 0603714D

(U) FY 1994 PLAN: Funded under PE 0603714D

(U) FY 1995 PLAN:

- (U) ($2,300) Complete integration and test of upgrades.
- (U) ($2,456) Conduct field test and analysis of Upgrades.

(U) PROGRAM TO COMPLETION:

- (U) Program scheduled to be completed at the end of FY 1995.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603528N
PROGRAM ELEMENT TITLE: Non-Acoustic Anti-Submarine Warfare
PROJECT NUMBER: H0967
BUDGET ACTIVITY: 4
DATE: 7 February 1994

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NAVAIRWARCENACDIV, Warminster, PA; Stennis Space Center, MS; NSWCCOASTSYSTA, Panama City, FL. CONTRACTORS: Applied Physics Laboratory/John Hopkins University, Laurel, MD; Lockheed Sanders Inc., Nashua, NH; ARETE Associations, Sherman Oaks, CA; Lawrence Livermore National Laboratory, Livermore, CA.

(U) RELATED ACTIVITIES:

- (U) Program Element (PE) 0603714D, OSD NAASW Program; PE 0101224N, SSBN Security/Survivability Program; PE 0603555N, Sea Control and Littoral Warfare Technology Demonstration.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603542N
PROGRAM ELEMENT TITLE: Radiological Control
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1825 Radiological Controls	212	74	88	95	96	103	108	CONT.	CONT.
S1830 RADIAC Development	3,387	3,180	3,404	3,427	3,498	3,596	3,690	CONT.	CONT.
TOTAL	3,599	3,254	3,492	3,522	3,594	3,699	3,798	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT:

(U) Project S1825 supports two major Navy-wide radiation protection efforts. The first is development of a computer modeling program for estimating potential radiation exposures in and around nuclear weapons and other radiation sources suitable for personal computers. The program Mathematical Radiation Environment Model for Ships (MREMS) utilizes all known radiation parameters particular to a weapons system as well as composition and arrangement of intervening structures. Although initially intended for use as a shipboard radiation exposure prediction system, MREMS has a significantly more important role today as a valid means for estimating potential radiation exposures received from weapons systems, and other sources of ionizing radiation, in radiation injury claims. MREMS has applicability to other sources of ionizing radiation (enter the intrinsic radiation data and composition of the surrounds) as well as for use by other military services. This project also concerns refinement of neutron measurement from weapons and other industrial sources involving scientific laboratory/field testing. The importance of this effort is that the relative risk from neutron exposure is still a question of concern and uncertainty within the scientific community.

(U) Project S1830 coordinates all Navy efforts for the development of nuclear radiation detection devices in direct support of the Navy Nuclear Propulsion Program and other users by providing accurate, reliable Health Physics instrumentation at the lowest possible life-cycle cost. Reliable radiation monitoring instruments are needed to ensure the radiological safety of Navy personnel. This includes hand-held RADIAC meters, personnel dose measurement devices, and area monitors used to measure radiation fields. The Laser Heated Thermoluminescent Dosimetry (LHTLD) System will be able to meet draft NRC regulations and will provide sensitive measurements down to the levels required to meet all new and imminent health and safety requirements. The Multifunction RADIAC will cut calibration costs by up to 75% and reduce the requirements for spare parts by 85% by

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603542N
PROGRAM ELEMENT TITLE: Radiological Control BUDGET ACTIVITY: 4 DATE: 7 February 1994

replacing several different models of obsolete equipment. This project has a 5 to 1 payback ratio. New requirements for the measurement of lower tritium and neutron levels necessitate the development of modernized instrumentation. The program is critical to joint-service radiation safety initiatives within DOD and has been coordinated with Army, Air Force, and Defense Nuclear Agency personnel to achieve the maximum cross-service applicability.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603542N
PROGRAM ELEMENT TITLE: Radiological Control

PROJECT NUMBER: S1825
BUDGET ACTIVITY: 4

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: S1825, Radiological Controls. Development of computer modeling program "Mathematical Radiation Environment Model for Ships" (MREMS) for estimating radiation exposure levels from nuclear weapons onboard ships (past and present), in shore storage, and from sources other than weapons. Additionally, refine neutron measurement capabilities of Navy dosimetry from weapons and other industrial sources. Efforts are aimed at ensuring accuracy in radiation dose determination for personnel.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($64) Verified majority of transport parameters and weapons output database for MREMS.
- (U) ($128) Developed and refined "parallel architecture" for MREMS.
- (U) ($20) Initiated evaluation of unique neutron measurement methodologies (i.e., "bubble" dosimetry).

(U) FY 1994 PLAN:

- (U) ($50) Complete verification of transport parameters and weapons output data base for MREMS.
- (U) ($24) Initiate evaluation of small neutron fields in high gamma fields associated with linear accelerators/X-ray machines.

(U) FY 1995 PLAN:

- (U) ($68) Develop/refine additional building/compartment structural composition input files, as well as other radiation source term "kernal" input files for new MREMS applications.
- (U) ($20) Continue limited study of linear accelerator radiation field characterization.

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

(U) WORK PERFORMED BY: NAVSURFWARCEN WHITE OAK DET, Silver Spring, MD. CONTRACTORS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603542N
PROGRAM ELEMENT TITLE: Radiological Control

PROJECT NUMBER: S1825
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603542N
PROGRAM ELEMENT TITLE: Radiological Control

PROJECT NUMBER: S1830
BUDGET ACTIVITY: 4

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: S1830, RADIAC Development. Project S1830 coordinates all Navy efforts for the development of nuclear radiation detection devices in direct support of the Navy Nuclear Propulsion Program and other users by providing accurate, reliable Health Physics instrumentation at the lowest possible life-cycle cost. Reliable radiation monitoring instruments are needed to ensure the radiological safety of Navy personnel. All OR's issued 25 Aug 1987.

Multifunction RADIAC (MFR), OR #176-04-86,
Laser Heated Thermoluminescent Dosimetry (LHTLD) System, OR #180-04-87
Neutron Dosimetry System, OR #179-04-87
Automated RADIAC Calibration and Diagnostics System, OR #175-04-86
Underwater RADIAC System, OR #178-04-88
Wide Range Survey Meter, OR #177-04-87
Tritium Monitors, OR #182-04-89
Explosive Ordnance Disposal (EOD) Personal Dosimeter, OR #181-04-87

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,257) Completed development of basic Multifunction RADIAC (display unit and gamma/beta probe).
- (U) ($2,075) Completed Engineering and Manufacturing Development (EMD) Phase II for LHTLD System.
- (U) ($55) Completed Check Source Kit for MFR System.

(U) FY 1994 PLAN:

- (U) ($588) Build 113 field test models of basic MFR System.
- (U) ($600) Build field test models of MFR probes (Beta, Radiography, Neutron, Transuranic X-ray).
- (U) ($1,992) Complete EMD Phase III for LHTLD System.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603542N
PROGRAM ELEMENT TITLE: Radiological Control

PROJECT NUMBER: S1830
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($1,504) Develop a direct reading Neutron Dosimeter and a Beta Dosimeter for LHTLD System.
- (U) ($800) Develop interfaces for Plastic Scintillation Probe, Alpha Probe, Gooseneck Gamma Probe, and Beta Probe for MFR System.
- (U) ($300) Resume development of EOD Personal Dosimeter.
- (U) ($200) Resume development of Neutron (bubble) Dosimetry System.
- (U) ($600) Resume development of Tritium Monitor and Underwater RADIAC.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN WHITE OAK DET, Silver Spring, MD; Oak Ridge National Labs, Oak Ridge, TN. CONTRACTORS: International Sensor Technology, Inc., Spokane, WA; Science Applications International Corporation, San Diego, CA.

(U) RELATED ACTIVITIES: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603542N
PROGRAM ELEMENT TITLE: Radiological Control

PROJECT NUMBER: S1830
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
•	(U) OPN Line 0	1,920	1,738	2,013	1,982	1,678	1,680	13,550	24,000
•	(U) OPN Line 0	433	608	745	821	962	900	17,250	12,583
•	(U) OPN Line 0	497	505	643	415	210	225	1,650	3,921
•	(U) OPN Line 200	0	810	500	500	600	600	5,066	8,276
•	(U) OPN Line 50	0	1,000	1,000	830	1,000	1,150	0	5,030
•	(U) OPN Line 0	0	1,200	0	0	0	900	0	2,100

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603553N
PROGRAM ELEMENT TITLE: Surface Anti-Submarine Warfare
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0229 Surface Ship Silencing	5,869	0	0	0	0	0	0	0	71,798
V1704 ASW Advanced Development	40,682	0	6,659	20,728	21,777	20,773	26,125	CONT.	CONT.
TOTAL	46,551	0	6,659	20,728	21,777	20,773	26,125	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program develops surface anti-submarine warfare combat system technology. The ASW Advanced Development Project provides the advanced development and validation of technology for potential sonar and combat system application. Efforts focus on resolution of technical issues associated with providing capability against the year 2000 and beyond submarine threat with emphasis on shallow water/littoral area ASW.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603553N PROJECT NUMBER: V1704
PROGRAM ELEMENT TITLE: Surface Anti-Submarine Warfare BUDGET ACTIVITY: 4 DATE: 7 February 1994

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
V1704 ASW Advanced Development	40,682	0	6,659	20,728	21,777	20,773	26,125	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project provides the advanced development and validation of technology for potential sonar and combat system application. Efforts focus on resolution of technical issues associated with providing capability against the year 2000 and beyond submarine threat with emphasis on shallow water/littoral area ASW. Key technology areas being investigated include active sonar transmissions, signal and information processing, active sonar classification, towed arrays and transducer technology, multi-static sonar, and multi-sensor data fusion.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($19,943) Conducted Multi-Static Sonar (MSS) Proof-of-Principle (POP) Sea Trial and associated data analysis. Completed low frequency transducer element and array cavitation measurements and preliminary analysis and hydrodynamic prototype tow body tests. Conducted Reconfigurable Multiline Evaluation System (RMES) shallow water modifications and at-sea evaluation. Completed Stand Alone Low Frequency Active Sonar (SALFAS) system requirements definition, and contract preparation.
- (U) ($5,875) Conducted Phase II contact management Advanced Development Model (ADM) sea trial demonstration.
- (U) ($3,044) Initiated Long Line Hydrophone Calibrator (LLHC) system/facility integration. Continued periscope detection feasibility demonstrations and fleet analysis.
- (U) ($11,820) Continued signal/information processing technology development. Completed initial analysis of shallow water detection performance and performed acoustic modeling for MSS and SALFAS. Published analysis of USS STUMP/USNS GLOVER side by side sea trial. Integrated combined Single Target Classifier software into mid-frequency active classification processor test bed and completed performance evaluation.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603553N
PROGRAM ELEMENT TITLE: Surface Anti-Submarine Warfare
PROJECT NUMBER: V1704
BUDGET ACTIVITY: 4
DATE: 7 February 1994

- (U) In FY 1994, continue warfare payoff and performance modeling funded in FY 1993 to support trade studies of system configurations and frequency/bandwidth parameters for FY 1995 effort. Modify MSS Processor to support development and validation of shallow water processing and classification algorithms. Support conduct of sea test to evaluate enhanced contact management capabilities. Investigate development of mid-frequency receive array testbed.

2. (U) FY 1994 PLAN: Not applicable.

3. (U) FY 1995 PLAN:

- (U) ($6,659) Validate and improve shallow water classification algorithms. Continue contact management improvements in preparation for at-sea evaluation. Continue development of mid-frequency receive array testbed. Perform warfare payoff, performance modeling, and operational evaluations.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCENDIV, Newport, RI; NAVUNSEAWARCEN DET, New London, CT; NAVSURFWARCENDIV, Dahlgren, VA; NRL, Washington, DC; NRL USRD, Orlando, FL. CONTRACTORS: Johns Hopkins University/Applied Physics Laboratory, Laurel, MD; University of Texas, Austin, TX; Martin Marietta, Glen Burnie, MD and Syracuse, NY; Orincon Inc., La Jolla, CA; Hughes Ground Systems, Fullerton, CA; Raytheon, Portsmouth, RI; Alliant Techsystems, Mukilteo, WA; TRW, Fairfax, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: OPNAV ltr 7100 Ser N865/3U649715 of 2 Apr 1993 required increased emphasis on shallow water USW technology and littoral warfare. This is reflected in the descriptions in paragraph C. above.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: NAPDD 154-03.

G. (U) RELATED ACTIVITIES: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603553N
PROGRAM ELEMENT TITLE: Surface Anti-Submarine Warfare

PROJECT NUMBER: V1704
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

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

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603555N
PROGRAM ELEMENT TITLE: Sea Control and Littoral Warfare Technology Demonstration

PROJECT NUMBER: R2142
BUDGET ACTIVITY: 3

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R2142 Sea Control and Littoral Warfare Technology Demo	61,153	60,609	82,134	96,708	113,290	136,769	119,884	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program focuses significant science and technology resources on Advanced Technology Demonstrations (ATDs) in support of the Joint Chiefs of Staff's Joint Warfighting Capabilities. Specifically, the ATDs are demonstrating capabilities to maintain near perfect real-time knowledge of the enemy and communicate that to all forces in near real time, and employment of capabilities which allow achievement of military objectives with minimum casualties and collateral damage. The ATDs demonstrate the high payoff technology areas required to accomplish the goals of the: Littoral Warfare, Surveillance, Strategic Deterrence and Strategic Sealift Protection Joint Mission Areas (JMAs). The ATDs are focused on demonstrating the capabilities necessary to conduct the type of warfighting campaign described in the Joint Warfare Strategy "From the Sea" and the Department of Defense (DoD) Science and Technology Strategy for Undersea Superiority. Specifically:

(U) LITTORAL WARFARE: Demonstrates high payoff technologies for mine avoidance and neutralization, with emphasis on shallow water and surf/beach zone areas in support of the warfighting capability of power projection from the sea. Ongoing ATDs are: EXPLOSIVE NEUTRALIZATION - Integrated distributed explosive nets and improved line charges to neutralize surf/beach zone mines from sea-borne platforms instride; ADVANCED LIGHTWEIGHT INFLUENCE SWEEP GEAR - Modular, lightweight, low power, high speed influence sweep system to neutralize mines using payload limited platforms.

(U) SURVEILLANCE: Demonstrates new approaches to detecting submarines, including unconventional acoustic and non-acoustic sensors. The principal objective is to significantly enhance shallow water Anti-Submarine Warfare (ASW) capabilities associated with potential littoral region conflicts. Major emphasis is techniques which will enhance the capability to detect small submarine targets in shallow water. Ongoing ATD is: AIRBORNE/SHIPBORNE PERISCOPE DETECTION. Planned FY 1995-start ATD is LIGHTWEIGHT BROADBAND VARIABLE DEPTH SONAR (LBVDS).

(U) STRATEGIC DETERRENCE/STRATEGIC SEALIFT PROTECTION: Develops and demonstrates technologies which will significantly reduce cost, increase capability and provide enhanced ship protection of future submarines and surface

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603555N
PROGRAM ELEMENT TITLE: Sea Control and Littoral Warfare Technology Demonstration

PROJECT NUMBER: R2142
BUDGET ACTIVITY: 3

DATE: 7 February 1994

ships. The effort will focus on the highest payoff areas of hull, mechanical, and electrical (HM&E) systems and new construction techniques which require demonstration before they can be considered in a design. Major emphasis will be placed on technologies providing affordable acoustic and magnetic signature reduction. The ongoing ATDs are ADVANCED VIBRATION REDUCER (AVR) and ADVANCED DEGAUSSING TECHNOLOGY. These ATDs focus, respectively, on reducing acoustic noise to conduct covert operations and reduce shipboard magnetic signatures to provide inherent ship protection against mines and other surveillance systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:
   - (U) ($11,104) EXPLOSIVE NEUTRALIZATION: Initiated development of explosive arrays, deployable from Amphibious craft for surf zone and beach clearance. Performed motion and control testing of demonstration platform (LACV-30). Developed end-to-end effectiveness model. Acquired test platform.
   - (U) ($10,179) ADVANCED LIGHTWEIGHT INFLUENCE SWEEP GEAR: Conducted mission/threat analysis. Prepared system analysis and trade-off plan. Awarded contracts for acoustic and magnetic components.
   - (U) ($4,627) ADVANCED DEGAUSSING TECHNOLOGY: Initiated ATD to develop advanced magnetic signature reduction techniques for both Mine Countermeasures (MCM) ships and steel hulled combatants.
   - (U) ($8,701) AIRBORNE/SHIPBORNE PERISCOPE DETECTION: Initiated advanced non-acoustic ASW sensor development efforts to exploit the greatest vulnerability of the threat diesel submarine, mast/periscope exposure. Modified profile radar test bed for collection of clutter and target data. Collected data from shore site. Initiated data analysis and radar system modeling. Initiated exploration of alternative technical approaches suitable for low grazing angle surface ship application. Laser and infrared sensors were used to complement radar.
   - (U) ($8,477) ACTIVE CLASSIFICATION AND PROCESSING: Initiated acquisition of Automated Situationally Adaptive Classifier (ASAC) from industry. Initiated development of high fidelity acoustic model. Initiated special studies from industry, Advanced Research Project Agency (ARPA) and Navy 6.2 and 6.3 communities via Broad Agency Announcement (BAA) and other means.
   - (U) ($16,656) AVR: Completed final design of AVR hardware/system. Began fabrication of full scale AVR hardware/system and Land Based Test Facility (LBTF).
   - (U) ($1,409) STUDIES AND SIMULATIONS: Initiated modelling and simulation efforts to evaluate warfighting payoff of current and planned ATDs. Started a mine warfare study and simulation development.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603555N
PROGRAM ELEMENT TITLE: Sea Control and Littoral Warfare Technology Demonstration
PROJECT NUMBER: R2142
BUDGET ACTIVITY: 3
DATE: 7 February 1994

2. (U) FY 1994 PLAN:
- (U) ($13,171) EXPLOSIVE NEUTRALIZATION: Deploy inert explosive arrays and fuzing. Deliver finalized rocket designs. Bench test fire control hardware. Initiate launch control algorithm development.
- (U) ($9,700) ADVANCED LIGHTWEIGHT INFLUENCE SWEEP GEAR: Fabricate and test acoustic and magnetic components. Start acoustic and magnetic subsystem procurement packages.
- (U) ($4,500) ADVANCED DEGAUSSING TECHNOLOGY: Continue work on reduced ship magnetic signatures.
- (U) ($12,046) AIRBORNE/SHIPBORNE PERISCOPE DETECTION: Collect data from P-3 aircraft in littoral areas. Complete data analysis. Complete prototype system design and component selection. Initiate brassboard system development.
- (U) ($15,000) AVR: Complete fabrication of AVR system/hardware and LBTF.
- (U) ($5,000) UNMANNED UNDERSEA VEHICLE for MINE WARFARE: Initiate ATD to demonstrate near-term capability of unmanned undersea vehicle for clandestine mine detection in very shallow water.
- (U) ($1,192) STUDIES AND SIMULATIONS: Continue modelling and simulation efforts to evaluate warfighting payoff of current and planned ATDs and document payoffs developed in the first mine warfare simulation study.

3. (U) FY 1995 PLAN:
- (U) ($18,500) EXPLOSIVE NEUTRALIZATION: Conduct small scale in-water explosive performance tests against threat mines. Integrate fire control subsystem with platform.
- (U) ($12,946) ADVANCED LIGHT WEIGHT INFLUENCE SWEEP GEAR: Finalize acoustic and magnetic component designs. Award acoustic and magnetic subsystem procurement packages to initiate subsystem fabrication based on design specification.
- (U) ($7,500) ADVANCED DEGAUSSING: For MCM ships, continue scale engine room mockup with magnetic engines and corrosion, stray, and eddy source reduction analyses. For steel-hull surface ships, develop Closed Loop Degaussing concepts and evaluate advanced deperming techniques on a full scale platform.
- (U) ($17,474) PERISCOPE DETECTION: Complete the brassboard system and begin laboratory testing. Incorporate promising technologies from shipborne periscope detection ATD.
- (U) ($17,113) AVR: Complete installation of hardware on LBTF. Complete LBTF testing.
- (U) ($1,000) STUDIES AND SIMULATIONS: Continue modelling and simulation efforts to evaluate warfighting payoffs of current and planned ATDs.
- (U) ($7,601) LIGHTWEIGHT BROADBAND VARIABLE DEPTH SONAR (LBVDS): Initiate development of a LBVDS for surface ships that will detect and classify small, quiet, slow moving submarines and mines in shallow water environments.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603555N
PROGRAM ELEMENT TITLE: Sea Control and Littoral Warfare Technology Demonstration
PROJECT NUMBER: R2142
BUDGET ACTIVITY: 3
DATE: 7 February 1994

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCEN, Norfolk, VA; NAVAIRWARCENACDIV, Warminster, PA; NAVUNSEAWARCEN, Newport, RI and New London, CT; NAVSURFWARCEN, Bethesda, MD/Annapolis, MD/Silver Spring, MD/ Panama City, FL/Dahlgren, VA/Indian Head, MD; NRL, Washington, DC; NAVAIRWARCEN, Warminster, PA/Patuxent River, MD/China Lake, CA. CONTRACTORS: ERIM, Ann Arbor, MI; Rockwell International, Location TBD; Marquest Corp, Location TBD; MITRE Corp., Reston, VA; Woods Hole Oceanographic Institute, Woods Hole, MA; ARL University of Texas, Austin, TX; AT&T, Washington, DC/Whippany, NJ; Newport News Shipbuilding, Newport News, VA; APL/JHU, Laurel, MD; Sandia National Laboratory, Albuquerque, NM; ARINC, Panama City, FL; Tetra Corporation, Albuquerque, NM; Lawrence Livermore National Laboratory, Palo Alto, CA; others TBD.

E. (U) COMPARISON WITH AMENDED FY 1994 PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES:

- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0602131M (Marine Corps Landing Force Technology)
- (U) PE 0602314N (Undersea Surveillance and Weapons Technology)
- (U) PE 0602315N (MCM, Mining and Special Warfare Technology)
- (U) PE 0602323N (Submarine Technology)
- (U) PE 0602435N (Oceanographic and Atmospheric Technology)
- (U) PE 0603226E (Experimental Evaluation of Major Innovative Technologies)
- (U) PE 0603502N (Surface and Shallow Water MCM Vehicle)
- (U) PE 0603528N (Non-Acoustic ASW)
- (U) PE 0603561N (Advanced Submarine System Development)
- (U) PE 0603569E (Advanced Submarine Technology)
- (U) PE 0603640M (Marine Corps Advanced Technology Demonstrations)
- (U) PE 0603747N (Undersea Warfare Advanced Technology)
- (U) PE 0603782N (Shallow Water MCM Demos)

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603555N
PROGRAM ELEMENT TITLE: Sea Control and Littoral Warfare Technology Demonstration

PROJECT NUMBER: R2142
BUDGET ACTIVITY: 3

DATE: 7 February 1994

- (U) PE 0604784N (Distributed Surveillance System)

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

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

J. (U) MILESTONE SCHEDULE: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
F2033 Advanced Submarine Systems Development	12,632	23,470	28,886	29,684	30,335	32,615	32,569	CONT.	CONT.
F2034 R&D Submarine	24,660	27,797	3,944	2,355	1,038	1,799	775	CONT.	CONT.
F2177 New Design HM&E	90,800	89,157	53,175	22,667	19,978	97	97	0	275,971
TOTAL	128,092	140,424	86,005	54,706	51,351	34,511	33,441	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program supports revolutionary research and development in submarine technologies and their evaluation and demonstration on a submarine platform. It will increase the submarine technology base and provide subsystem design options not currently feasible. Project F2033 identifies the most promising and emerging technologies and transitions them into specific advanced development efforts. The project transitions technologies developed by Navy technology bases, the private sector, and the Advanced Research Projects Agency (ARPA) Maritime Systems Technology Office. All advanced systems developed under this program have potential to support emerging requirements and systems technology insertions into new submarine designs. The emphasis is directed toward affordability, acoustic and non-accustic signature control technology (stealth), and/or safety alternatives for attack submarines. The project also: conducts an SSN Security Program (SSP) to develop techniques and devices that decrease the detection vulnerability of attack submarines; operates the Large Scale Vehicle (LSV) to provide at-sea test capability for propulsor, hydrodynamic control, target strength, and hull coating Research and Development (R&D); and operates the Hydrodynamic/Hydroacoustic Technology Center (H/HTC) to enhance our ability to accurately, computationally predict hydrodynamic and hydroacoustic performance of submerged bodies. Project F2034 provides resources to convert an attack submarine to a dedicated R&D platform without loss of mission capability. This will provide for a dedicated at-sea platform for testing and evaluating advanced systems technologies applicable to existing and the next generation SSN. A portion of Project F2177 is dedicated to the new attack submarine (NAS). The primary goal of the project is to develop an affordable yet capable submarine by evaluating a broad range of system technology alternatives and examining cost reduction, producibility improvement, and technical risk reduction.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

PROJECT NUMBER: F2033
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
F2033 Advanced Submarine Systems Development	12,632	23,470	28,886	29,684	30,335	32,615	32,569	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Project F2033 identifies the most promising and emerging technologies and transitions them into specific advanced development efforts. The project transitions technologies developed by Navy technology bases, the private sector, and the ARPA Maritime Systems Technology Office. All advanced systems developed under this project have potential to support emerging requirements and systems technology insertions into new submarine designs. The emphasis is directed toward affordability, acoustic and non-acoustic signature control technology (stealth) and/or safety alternatives for attack submarines. The project also: conducts an SSP to develop techniques and devices that decrease the detection vulnerability of attack submarines; operates the LSV to provide at-sea test capability for propulsor, hydrodynamic control, target strength, and hull coating R&D; and operates the H/HTC to enhance our ability to accurately, computationally predict hydrodynamic and hydroacoustic performance of submerged bodies.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($3,304) Initiated concept integration studies (e.g., integrated stern) and fatigue test efforts associated with SUPRELITE Phase II.
- (U) ($1,136) Continued design of submarine advanced electric drive system and critical components (including contracting for component manufacturing).
- (U) ($3,692) Continued use and support for the LSV.
- (U) ($1,555) Completed transition of ARPA Submarine H/HTC.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

PROJECT NUMBER: F2033
BUDGET ACTIVITY: 4

Date: 7 February 1994

- (U) ($2,945) Completed one Mediterranean extended echo range test of low frequency active acoustics (LFAA) under SSP (target strength sea trials). Completed at-sea testing of the active tactical aid. Awarded contract for LFAA test device.

- (U) Transitioned all NAS systems development to F2177.

2. (U) FY 1994 PLAN:

- (U) ($2,314) Initiate development of design and modeling procedures to address hydrodynamic issues integral to submarine modernization and future ship designs (e.g., code certifications and design tool integration).

- (U) ($3,536) Conduct concept integration studies (e.g., stealth sail and integrated stern).

- (U) ($8,300) Begin advanced planning for major LSV modification; continue LSV use and support (testing candidate propulsors for NAS, acoustic/non-acoustic detectability, and SEAWOLF propulsor performance validation); conduct procurement for replacement of LSV main propulsion battery.

- (U) ($3,370) Continue development and manufacturing of submarine advanced electric drive critical components (including completion of ship system impact assessment).

- (U) ($4,200) Fabricate low frequency active test device. Complete one extended echo range test of LFAA; develop shallow water oceanography tactical module.

- (U) ($1,750) Continue use of H/HTC to develop improvements to current and future submarine designs.

3. (U) FY 1995 PLAN:

- (U) ($3,873) Continue concept integration studies.

- (U) ($6,308) Continue advanced planning for the major LSV modification. Continue use and support for the LSV. Replace LSV battery.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

PROJECT NUMBER: R2033
BUDGET ACTIVITY: 4

Date: 7 February 1994

- (U) ($8,690) Continue design and development of submarine electric drive program and replacement of SUPRELITE aft item (Phase I), and SUPRELITE fatigue testing (Phase II).
- (U) ($1,600) Continue use of H/HTC to develop improvements to current and future submarine designs.
- (U) ($3,915) Initiate development of design and modeling procedures to address hydrodynamic issues integral to submarine modernization and future ship designs (e.g., code certifications and design tool integration).
- (U) ($4,500) Combine SSP with SSBN Security/Survivability Program and transition to PE 0101224N in FY 1996.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NAVSURFWARCEN DET, Annapolis, MD; NAVSURFWARCEN CARDEROCKDIVDET, Bayview, ID; NAVSURFWARCENCOASTSYSTA, Panama City, FL; NAVUNSEAWARCENDIV, Newport, RI; NAVUNSEAWARCEN DET, New London, CT. CONTRACTORS: General Dynamics, EBDiv, Groton, CT; Newport News Shipbuilding, Newport News, VA; ARL/Penn State Univ., State College, PA; APL/Johns Hopkins Univ., Laurel, MD; Charles Stark Draper Lab, Cambridge, MA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) Non-Acquisition Program Decision Document for Adv Sub Sys Dev (NAPDD #304-872C dated 15 May 92)

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

PROJECT NUMBER: F2033
BUDGET ACTIVITY: 4

Date: 7 February 1994

G. (U) RELATED ACTIVITIES:

- (U) PE 0101224N (SSBN Security & Survivability Program)
- (U) PE 0603555N (Sea Control and Littoral Warfare Technology Demonstration)
- (U) PE 0603569E (ARPA Advanced Submarine Technology Program)
- (U) PE 0603792N (Advanced Technology Transition)
- (U) PE 0604558N (New Design SSN Development)

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

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

J. (U) MILESTONE SCHEDULE:

- (U) Transition ARPA H/HTC to Navy management (Jan 93)
- (U) Transition ARPA SUPRELITE Phase II (Apr 95)
- (U) Transition SSP to PE 0101224N (Oct 95)
- (U) Advanced submarine electric drive 3000 hp prototype performance test (Jul 97)
- (U) Submarine electric drive system downselect (4 QTR 97)

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

PROJECT NUMBER: F2034
BUDGET ACTIVITY: 4

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: F2034, R&D Submarine. This project provides resources to convert an attack submarine to a dedicated R&D platform without loss of mission capability. This will provide for a dedicated at-sea platform for test and evaluation of advanced submarine systems technologies applicable to existing and the next generation SSNs. Developments from Navy, ARPA, and industry are accommodated. The program completes the design and prefabrication of several modifications (i.e., a turtleback to house external components, a reconfigurable stern, a large access opening, a weapon launch control system, an instrumentation system, a test center, support services, and penetrations). These modifications are intended to enhance the ability of the R&D Sub to rapidly prototype multiple, high payoff technologies. Only the instrumentation system, test center, weapon launch control system support services, and penetrations will be installed during the FY 1994 overhaul. Installation of the remaining modifications has been deferred until required to support major projects. The R&D Sub will maintain its warfighting capability in addition to a principal mission of supporting submarine R&D.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($6,750) Commenced advanced planning for the installation of the mods.
- (U) ($15,500) Continued design, material procurement, and prefabrication of all mods.
- (U) ($1,885) Continued technical review of design documentation and completed modification integration into overhaul work package.
- (U) ($525) Coordinate at-sea R&D project evaluations on the R&D Sub.

(U) FY 1994 PLAN:

- (U) ($22,600) Commence installation of the instrumentation system, test center, support services, and penetrations.
- (U) ($875) Commence engineering support for the installation.
- (U) ($2,210) Complete design, material procurement, and prefabrication of all mods.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development
PROJECT NUMBER: F2034
BUDGET ACTIVITY: 4
DATE: 7 February 1994

- (U) ($1,637) Continue technical review of design documentation and commence technical review of test documentation.
- (U) ($475) Coordinate at-sea R&D project evaluations.

(U) FY 1995 PLAN:

- (U) ($892) Continue installation of the instrumentation system, test center, support services, and penetrations.
- (U) ($875) Continue engineering support for the installation.
- (U) ($600) Certify installation of weapons launch system modification.
- (U) ($594) Continue technical review of test documentation.
- (U) ($500) Commence life cycle support of R&D modifications.
- (U) ($483) Coordinate at-sea R&D project evaluations.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NAVUNSEAWARCEN DET, New London, CT; NAVUNSEAWARCENDIV, Newport, RI; PNSY, Portsmouth, NH; SUBMEPP, Portsmouth, NH. CONTRACTORS: General Dynamics, Electric Boat Division, Groton, CT; Rosenblatt, NY, NY; J.J. McMullen, Arlington, VA; CASDE, Arlington, VA; Westinghouse MTD, Arlington, VA.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

PROJECT NUMBER: F2034
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) RELATED ACTIVITIES:

- (U) PE 0603569E (ARPA Advanced Submarine Technology)
- (U) PE 0603504N (Advanced Submarine Combat Systems Development)
- (U) PE 0603562N (Submarine Tactical Warfare Systems)
- (U) PE 0603570N (Advanced Nuclear Power Systems)
- (U) PE 0604503N (Submarine System Equipment Development)
- (U) PE 0604558N (New Design SSN Development)
- (U) PE 0604561N (SSN-21 Development)
- (U) PE 0604562N (Submarine Tactical Warfare System)
- (U) PE 0604567N (Ship Contract Design/Live Fire T&E)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

PROJECT NUMBER: F2177
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: New Design HM&E

PICTURE NOT AVAILABLE

POPULAR NAME: New Attack Submarine

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

PROJECT NUMBER: F2177
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		MS I 01/94	MS II 07/95					MS III 1 QTR/07
ENGINEERING MILESTONES		TBD - MILESTONE SCHEDULE WILL BE ESTABLISHED AT MS I						
T&E MILESTONES								
CONTRACT MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	49,638	34,966	9,520	689	585	0	0	95,398 (0)
SUPPORT CONTRACT	1,326	1,150	600	530	450	0	0	4,056 (0)
IN-HOUSE SUPPORT	39,361	44,531	30,880	15,647	14,018	97	97	144,631 (0)
GFE/ OTHER	475	8,510	12,175	5,801	4,925	0	0	31,886 (0)
TOTAL	90,800	89,157	53,175	22,667	19,978	97	97	275,971 (0)

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

PROJECT NUMBER: F2177
BUDGET ACTIVITY: 4

Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project identifies, evaluates, and selectively develops critical technologies to the New Attack Submarine (NAS) design to enable an affordable, capable submarine. Efforts in FY 1993 focused on platform concept and technology evaluations and cost effectiveness studies to identify where substantial affordability gains could be achieved. In addition, submarine systems with long lead time developments initiated concept studies and preliminary testing to establish a technical basis for ship designs and major system development. Efforts in FY 1994 and outyears are directed at maturing the promising technology alternatives into existing submarine systems to permit transition to Engineering Development (6.4). These efforts are highly integrated with industry, shipbuilder, and related DOD R&D programs to provide technical confidence in Hull, Mechanical and Electrical (HM&E) technologies being selected during the New Attack Submarine design process.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: (Funded under Project F2033)

- (U) ($39,995) Initiated concept evaluation of isolated deck structures for acoustic performance and assessment of weld system and structural design alternatives. Initiated advanced development of components such as propulsors and propulsion equipment, reverse osmosis desalination, hydraulic system components, weapon handling and launching systems, and auxiliary systems. Developed acoustic signature prediction tools. Evaluated ship control system technology. Defined coating system and advanced diesel alternatives.

- (U) ($17,823) Completed concept design studies and performance/cost tradeoffs for NAS in cooperation with industry, shipyards and Navy laboratories to support Milestone I approval.

- (U) ($6,971) Conducted combat system efforts which included the following: prepared Design Decision Memorandums (DDMs); delivered Bow/Hull and Internal Electronics Data Books in support of preliminary Ship Design government furnished information package preparation; conducted Cost Performance Tradeoff (CPT) studies; conducted inboard electronics arrangement studies that addressed packaging, location, weight and cost for the Attack Center; reviewed shipboard manning requirements and identified potential areas for reductions.

- (U) ($6,084) Supported the design process with supportability trade-off analysis. Provided program and special studies support at Navy Labs, shipyards and in-house.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

PROJECT NUMBER: F2177
BUDGET ACTIVITY: 4

Date: 7 February 1994

- (U) ($19,927) Initiated validation of analytical modeling techniques for hull dynamic strength. Initiated development of automated safety systems and shock isolation devices. Initiated development of non-chlorofluorocarbon (CFC) air conditioning and refrigeration plants. Initiated procurement of electromagnetic signature portable range in support of the non-acoustic silencing program. Initiated evaluation of no forward planes. Initiated use of the H/HTC to develop improvements to current and future submarine designs (enhancing emergency recovery and maneuverability or reducing hydrodynamic attributed signatures). Terminated development of gas generator emergency main ballast tank blow system. Continued development of advanced non-acoustic silencing technologies. Continued development of prototype composite main propulsion shaft. Continued development of ARPA radiated noise project F. Evaluated enhanced tube condensers; evaluated optimized weld joints and pressure hull design criteria for fairness tolerances.

2. (U) FY 1994 PLAN:

- (U) ($34,780) Complete concept development of large isolated deck structures. Continue development of components such as propulsor and propulsion equipment. Initiate development of integrated coating. Complete assessment of welding process and structural design alternatives. Complete breadboard testing of reverse osmosis desalination.

- (U) ($18,693) Initiate advanced development of acoustic coatings and evaluation of elastomeric ejection system. Initiate evaluation of ARPA radiated noise project P. Initiate development of propulsor systems.

- (U) ($32,368) Continue development of arc fault detection, non-CFC air conditioning and refrigeration plant development. Continue evaluation of pressure hull design criteria, non-acoustic silencing program, optimized weld joint design, and enhanced tube condensers. Continue development of prototype composite main propulsion shaft. Continue validation of analytical modeling techniques for hull dynamic strength. Continue development of shock isolation devices and ARPA radiated noise project F.

- (U) ($3,316) Complete evaluation of no forward planes. Complete development of external system shock protection. Complete development of an advanced hybrid. Complete use of the H/HTC to develop improvements to current and future submarine designs (enhancing emergency recovery and maneuverability or reducing hydrodynamic attributed signatures) propulsor. Remove the non-penetrating periscope and restore ship to original configuration.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

PROJECT NUMBER: F2177
BUDGET ACTIVITY: 4

Date: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) ($21,918) Continue evaluation of the non-acoustic silencing program. Continue development and testing of prototype composite main propulsion shaft. Continue ARPA radiated noise project P. Continue development of propulsor systems, arc fault detection, and ARPA radiated noise project F. Continue joint US/UK deepwater electromagnetic silencing test.

- (U) ($14,244) Complete evaluation of pressure hull design criteria and optimized weld joint design. Complete validation of analytical modeling techniques for hull dynamic strength. Complete development of non-CFC air conditioning, refrigeration plant development, and acoustic coatings. Complete evaluation of elastomeric ejection system.

- (U) ($17,013) Perform large-scale underwater explosion test of large isolated deck structure. Complete advanced development of propulsor and propulsion equipment.

4. (U) PROGRAM TO COMPLETION:

- Most NAS HM&E efforts are scheduled to complete by the end of FY 1997. These include the NAS propulsor, propulsor systems, shock isolation devices, isolated deck structures, arc fault detection, non-acoustic silencing program, and ARPA radiated noise project P. Efforts planned for the composite shaft program will continue through FY 1999.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD, Annapolis, MD, Philadelphia, PA, & Dahlgren, VA; NAVUNSEAWARCENDIV, Newport, RI; NAVUNSEAWARCEN DET, New London, CT. CONTRACTORS: General Dynamics, EBDiv, Groton, CT; Newport News Shipbuilding, Newport News, VA; ARL/Penn State Univ., State College, PA; APL/Johns Hopkins Univ., Laurel, MD; J.J. McMullen Assoc. Inc., Arlington, VA; Advanced Marine Enterprises, Arlington, VA; Westinghouse Marine Technology Division, Pittsburgh, PA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603561N
PROGRAM ELEMENT TITLE: Advanced Submarine System Development

PROJECT NUMBER: F2177
BUDGET ACTIVITY: 4

Date: 7 February 1994

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) Mission Needs Statement 10/91
- (U) Milestone 0 ADM 8/92

G. (U) RELATED ACTIVITIES:

- (U) PE 0602121N (Surface Ship Technology)
- (U) PE 0603504N (Advanced Submarine Combat Systems Development)
- (U) PE 0603508N (Ship Systems Advanced Technology Demo)
- (U) PE 0603513N (Shipboard Systems Component Development)
- (U) PE 0603562N (Submarine Tactical Warfare Systems)
- (U) PE 0603563N (Ship Concept Advanced Design)
- (U) PE 0603570N (Advanced Nuclear Power Systems)
- (U) PE 0603573N (Advanced Surface Machinery Systems)
- (U) PE 0604558N (New Design SSN Development)
- (U) PE 0604567N (Ship Contract Design/Live Fire T&E)

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) SCN Line 4	0	0	0	670,000	620,300	2,704,000	651,000	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Information Exchange Program B-93 (US/UK) continues through FY 1999. The UK has dedicated the HMS TURBULENT, for near-term efforts, and has begun the modification of the HMS TRIOMPHE for long-term efforts, as the platforms to support the non-acoustic silencing program.

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

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

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

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
F0770 Advanced Submarine Support Equipment Program (ASSEP)	3,952	3,476	1,013	2,742	3,128	4,759	4,895	CONT.	CONT.
V1739 Submarine Arctic Warfare Development	7,007	2,838	7,010	7,030	7,037	7,199	7,430	CONT.	CONT.
TOTAL	10,959	6,314	8,023	9,772	10,165	11,958	12,325	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Submarine Tactical Warfare Systems program element is comprised of the Advanced Submarine Support Equipment Program and the Submarine Arctic Warfare Development Program. The overall goal of the program is to improve submarine operational effectiveness through the development of advanced Research and Development (R&D) and Electronic Warfare Support Measures (ESM) technologies. The Submarine Tactical Warfare Systems program responds to the increased threat of Naval activity in the Littorals and the continuing threat of SSBN activity in the Arctic region through the development of advanced submarine R&D technology to provide improved operational capability in those regions. Particular emphasis is placed in the areas of sonar operability and maintainability, Littoral operations, mine warfare, tactical surveillance, and other submarine support missions. Efforts include assessment of combat system effectiveness, development of shallow water specific improvements for existing sonars, development of class specific shallow water operational guidelines, and the testing of ice-capable submarine structures. This program also provides the framework for various R&D programs to conduct Test and Evaluation in shallow water regions. The goal of the Advanced Submarine Support Equipment Program (ASSEP) is to increase submarine operational effectiveness through improvements in electronic warfare (i.e., threat warning, over-the-horizon targeting, and expanded tactical reconnaissance). A continuing need exists to improve submarine capabilities in the increasingly dense and sophisticated electromagnetic environment caused by the proliferation of complex radar, communications, and navigation equipment of potential adversaries.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

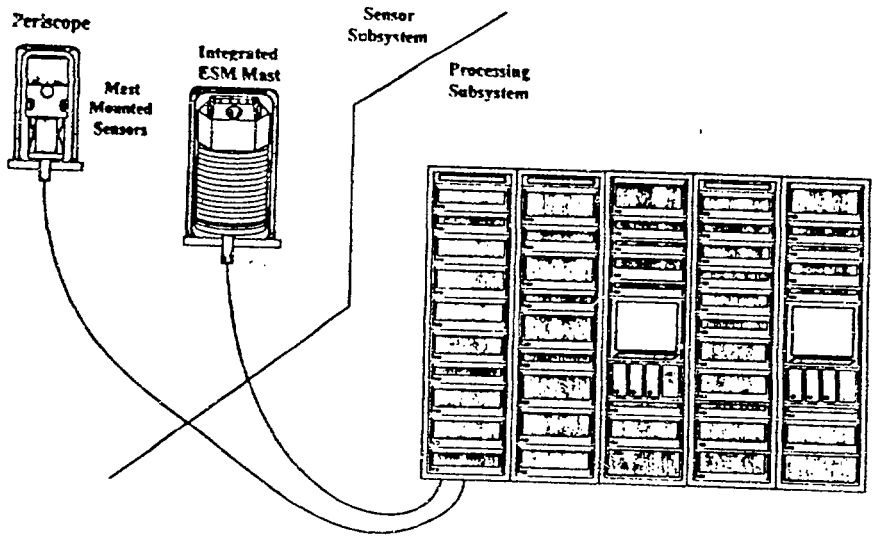
PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems

PROJECT NUMBER: F0770
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: Advanced Submarine Support Equipment Program

Advanced Submarine Tactical ESM Combat System



POPULAR NAME: ASSEP

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

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

PROJECT NUMBER: F0770
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES*		6/94 MSI/II					9/99 MS III	2QTR/02-IOC
ENGINEERING MILESTONES*				7/96 EMD PDR	1/97 EMD CDR			
T&E MILESTONES*		3/94-TEMP					6/99 DT/OTII	
CONTRACT MILESTONES*				10/95-AWARD				

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	1,765	811	593	1,842	2,217	4,031	4.141	CONT.
SUPPORT CONTRACT	687	711	110	154	145	115	135	CONT.
IN-HOUSE SUPPORT	1,500	1,954	310	746	766	613	619	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	
TOTAL	3,952	3,476	1,013	2,742	3,128	4,759	4,895	CONT.

* All Milestones are for the ASTECS program. In FY 1995 and beyond all ASTECS funding will be in PE 0604503N/F0775.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program develops submarine Electronic Warfare Support Measures (ESM) equipment technology. A continuing need exists to improve submarine capabilities in these areas in order to enhance operational effectiveness in the increasingly dense and sophisticated electromagnetic environment caused by the proliferation of complex radar, communications, and navigation equipment of potential adversaries. Improvements are necessary for submarine ESM to be effective in conducting the following mission areas: Littoral Warfare, Joint Surveillance,

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

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

PROJECT NUMBER: F0770
BUDGET ACTIVITY: 4

Date: 7 February 1994

Space and Electronic Warfare, Intelligence Gathering, Maritime Protection and Joint Strike. Specific efforts include development of: the Advanced Submarine Tactical ESM Combat System (ASTECS), Radar Cross Section Reduction (RCSR) Techniques, and Periscope Mounted Monopulse Direction Finding (DF). The ASTECS program is the next generation ESM system that will be used on the New Attack Submarine and potentially for backfit to the SEAWOLF and SSN-688 class submarines. Existing submarine tactical ESM systems are obsolete and costly to maintain, cannot process all of today's threat signals, and will be totally inadequate to handle future complex electronic signals. ASTECS will provide significant advancements in signal processing to solve these shortfalls and will reduce submarine space and manning requirements. RCSR and Periscope Monopulse DF are advanced ESM development programs that support other submarine ESM efforts, including ASTECS.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,524) Completed ASTECS Concept Exploration and Definition study contracts and COEA. Continued generation of acquisition documentation required for MSI/II approval. Cost and Operational Effectiveness Analysis (COEA) and Concept Definition study results support eliminating the Demonstration/Validation (DEM/VAL) Phase and proceeding directly to the Engineering and Manufacturing Development (EMD) Phase.
- (U) ($219) Continued investigation of innovative RCSR techniques and materials.
- (U) (2,209) Continued advanced development of Periscope Monopulse DF antenna and awarded contract for development of Feasibility Demonstration Model.

2. (U) FY 1994 PLAN:

- (U) ($2,115) Continue generation of ASTECS acquisition documentation, obtain MSI/II approval and begin EMD phase.
- (U) ($537) Continue investigation of innovative RCSR techniques and materials.
- (U) ($824) Continue advanced development of Monopulse DF Feasibility Demonstration Model.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems
PROJECT NUMBER: F0770
BUDGET ACTIVITY: 4
Date: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) ($613) Initiate technology development for a system capable of detecting laser signals above and below the surface.
- (U) ($200) Continue RCSR techniques and material investigation.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCEN DET, New London, CT. CONTRACTORS: ASTECS - Lockheed Sanders Inc., Nashua, NH; Engineering Research Associates, Vienna, VA; Martin Marietta Company, Syracuse, NY; GTE Government Systems Corporation, Mountain View, CA; Watkins Johnson Company, San Jose, CA; Condor Systems, San Diego, CA.

E. (U) COMPARISON WITH AMENDED FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology Changes: Data in previous budget not available for comparison.
2. (U) Schedule Changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) ASTECS Operational Requirement Document 10/91
- (U) ASTECS Acquisition Strategy Report 10/93

G. (U) RELATED ACTIVITIES:

- (U) PE 0604503N/F0775 (Submarine Support Equipment Program) continues ASSEP projects through the Engineering and Manufacturing Phase.

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

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

J. (U) TEST AND EVALUATION: ASTECS land-based DT/OT II testing is planned for FY 99.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare Systems
PROJECT NUMBER: V1739
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: V1739, Submarine Arctic Warfare Development. This program responds to the increased threat of Naval activity in the Littoral and the continuing threat of SSBN activity in the Arctic region through the development of advanced submarine capabilities and concepts. It places particular emphasis in the areas of sonar operability, Littoral operations, mine warfare, tactical surveillance, and other submarine support missions. Efforts include assessment of combat system effectiveness, development of shallow water (high frequency) improvements for existing sonars for use in Littoral and Arctic regions, testing of ice-capable submarine structures, and development of class specific shallow water operational guidelines. This program also provides the framework for various Research and Development (R&D) programs to conduct Test and Evaluation in the shallow water regions.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,530) Conducted Ice Exercise (ICEX) 1-93.
- (U) ($1,982) Conducted Experimental Under-Ice Sonar (EXUS) II testing and EXUS development.
- (U) ($1,170) Conducted BSY-1 at-sea testing.
- (U) ($725) Completed Ice Penetration Model Two (IPM-2) testing.
- (U) ($500) Evaluated concepts for
- (U) ($100) Began development of EXUS Tempalt System (ETS)

(U) FY 1994 PLAN:

- (U) ($738) Commence transition of EXUS technology to next generation HF sonar development efforts.
- (U) ($2,100) Conduct ICEX 1-94 and support Arctic Science Exercise.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

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

PROJECT NUMBER: V1739
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($1,150) Complete hull structures analysis of ICEX 1-93 data. Provide update of Naval Warfare Publication concerning routine and emergency under-ice surfacing operations.
- (U) ($2,650) Complete transition of EXUS technology to next generation HF sonar development efforts.
- (U) ($3,210) Conduct ICEX 1-95 and Arctic Science exercises.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCENDIV, Keyport, WA; NAVUNSEAWARCENDIV, Newport, RI; NAVUNSEAWARCEN DET, New London, CT; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NRL, Washington, DC. CONTRACTORS: APL/University of Washington, Seattle, WA; Analysis and Technology, Inc., North Stonington, CT; ARL/University of Texas, Austin, TX.

(U) RELATED ACTIVITIES:

- (U) PE 0602323N Submarine Technology provides technologies for advanced development efforts.
- (U) PE 0602435N Ocean and Atmospheric Technology provides technologies for advanced development efforts.
- (U) PE 0604524N Submarine Combat System incorporates Arctic-specific improvements.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603563N
PROGRAM ELEMENT TITLE: Ship Concept Advanced Design
PROJECT NUMBER: S2196
BUDGET ACTIVITY: 4
DATE: 7 February 1994

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

PROJECT NUMBER &	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S2196 Design Tools, Plans and Concepts	8,122	13,853	29,302	29,159	27,956	26,190	25,262	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The efforts within this PE enhance the Navy's ability to design more affordable ships with reduced manning, increased producibility, and allowing greater utilization of the latest technology. The program focuses on supporting the Navy Shipbuilding Plan with state-of-the art design tools for ship studies and developing the ship design concept studies for the new ships in that plan. The foundation of affordable surface ship design, construction, and life cycle support required as a first step, the integration of total ship systems, including combat systems and hull, mechanical and electrical (HM&E) systems. A key affordability concept of future designs is a use of common modules, comprising standard components and/or standard interfaces. These modules will be used across ship types and will be integral with standardization, distributed system architectures and generic build strategies. Increasing commonality of ship systems will reduce the total cost of ownership and becomes the cornerstone of an affordable fleet. Efforts under Project S2196 transfer directly to early stage ship design in PE 0603564N, Ship Preliminary Design.

(U) This project accomplishes the following: (1) identifies future surface ship requirements and characteristics necessary to meet future threats; (2) investigates new affordable ship concepts and evaluates potential technologies necessary to support these concepts; (3) provides design methods and automated design tools to develop and evaluate ship concepts, support early ship design, and solve processing fleet engineering problems; (4) develops design criteria and common standards to improve affordability; (5) improves the quality of the product in the design phases, to reduce or eliminate the costs of fixing problems after ships reach the fleet; (6) develops investment strategies for new concepts and technologies; (7) and supports development of Mission Need Statements (MNS) for future ships.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603563N
PROGRAM ELEMENT TITLE: Ship Concept Advanced Design
PROJECT NUMBER: S2196
BUDGET ACTIVITY: 4
DATE: 7 February 1994

- (U) ($419) Integrated new technologies in total ship concepts. Developed ship concepts for potential ships in the future Ship Construction Navy (SCN) plan, (e.g., 21st Century Surface Combatant, combat logistics support ships). Supported the development MNSs for future ships. Developed R&D investment strategies which provide cost/benefit comparisons for new concepts and technologies supporting future ship development.

- (U) ($899) Continued development and improvement of ship design methods, criteria, standards, and data bases. Continued improvements to auxiliary/amphibious assault ship and surface combatant ship synthesis models. Started improvements to ship cost estimation methods. Identified, characterized and assessed new and emergent technologies and updated the HM&E technology database.

- (U) ($2,421) Continued development and review of reliability based structural design methods/criteria. Began work on structural strength determination of ship structures. Set up for hydrodynamic loads trials on LHD 1 and started complementary towing tank hydrodynamic loads model testing. Designed grillage strength test fixture. Began fabrication on grillage, stiffener and fatigue test specimens. Conducted ship structural surveys to collect data on variability of ship fabrication details. Supported Inter-Agency Ship Structure Committee (SSC) research work on ship structures.

- (U) ($3,255) Extended Electromagnetic Interference (EMI) prevention design tool improvements to encompass multiple EMI sources and below decks installation engineering. Extended the topside installation modeling and design capability to millimeter wave (MMW) and electro-optical (EO) frequencies. Provided a Computer Aided Design II interface to improve electronic data transfer between Electromagnetic (EM) engineering and total ship design.

- (U) ($1,128) Continued identification of commonality among ships to improve affordability and producibility. Conducted systems engineering efforts, including cost/benefit evaluations, to identify ship architectures which enable the use of common modules comprised of standard components and/or standard interfaces and supports the build strategy of rapid assembly of large ship subassemblies. Started development of crew sanitary space, and reverse osmosis (RO) distillation unit modules.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603563N
PROGRAM ELEMENT TITLE: Ship Concept Advanced Design

PROJECT NUMBER: S2196
BUDGET ACTIVITY: 4

DATE: 7 February 1994

2. (U) FY 1994 PLANS:

- (U) ($543) Integrate new technologies in total ship concepts. Develop ship concepts for potential ships 5-7 years out in the SCN plan, including ship size, configuration, capabilities and rough order of magnitude (ROM) ship costs. Support the development for MNSs for future ships.

- (U) ($1,210) Continue development and improvement of design methods, criteria, standards, and data bases. Continue improvements to auxiliary/amphibious assault ship and surface combatant ship synthesis models. Include capabilities to use more advanced ship performance analysis methods, and increased capabilities to determine ship size impacts of new technologies. Support development of advanced computer aided design methods and tools for early stage ship design. Identify, characterize and assess new and emergent technologies and update the HM&E technology database.

- (U) ($2,000) Continue development of reliability based structural design methods/criteria including improvement of prediction methods for seaway hydrodynamic loads, building and testing grillage strength and slamming strength models, and initial implementation of state-of-the-art of reliability analysis methods used in other engineering disciplines. Start to analyze the results of towing tank hydrodynamic load testing on LHD 1. Begin preparation for cooperative seaway load testing on the Canadian patrol frigate model. Start analysis of the effect of fabrication variations on primary hull girder strength. Begin LHO1 long term loads trial measurements. Support SSC research work on ship structures.

- (U) ($2,100) Perform EM Engineering tool and database improvements for topside and below decks for both single and multiple EMI sources and extended frequency ranges. Bring on line a prototype transition frequency capability utilizing finite difference time domain techniques. Upgrade time domain analysis to predict the effects of anti-jam techniques on the topside electromagnetic environment. Complete transition of baseline I capabilities to the ship design CAD II UNIX environment. Investigate applications to emerging ship designs. Validate predictive tools with laboratory measurements, individual ship board in-port measurements, and participate in fleet exercises for RF system engagement sequencing analysis.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603563N
PROGRAM ELEMENT TITLE: Ship Concept Advanced Design
PROJECT NUMBER: S2196
BUDGET ACTIVITY: 4
DATE: 7 February 1994

- (U) ($8,000) Continue identification of commonality among ships to improve affordability and producibililty. Systems engineering efforts will identify the family of modules which will be the building blocks of future Navy surface ships. Build prototype crew sanitary space, start fabrication of Navy fire pump and RO unit modules. Continue development of generic and engineered build strategies for Naval ships that foster product oriented ship construction processes and incorporate alternative distributed ship systems architectures and common modules. The near-term focus of this effort is on the LPD 17 new amphibious assault ship with the ultimate focus to provide the building blocks to assist in the development of a new low cost surface combatant.

3. (U) FY 1995 PLANS:

- (U) ($1,000) Integrate new technologies in total ship concepts. Develop ship concepts for potential ships 5-7 years out in the SCN plan, including ship size, configuration, capabilities and rough order of magnitude (ROM) ship costs. Conduct pre-Milestone 0 ship concept studies for combat logistics force, mine counter-measure support, and future surface combatant ships. Analyze the cost/benefit of new concepts and technologies. Develop R&D investment strategies which provide cost/benefit comparisons for new concepts and technologies.

- (U) ($2,647) Continue development and improvement of design methods, criteria, standards and data bases. Continue improvements to auxiliary/amphibious assault ship and surface combat methods. Add capability to address minimum required shipboard manning, reduced construction cost, and increased capabilities to determine ship size impacts of new technologies. Include the lessons learned from ship modularity, production, and commonality of H,M&E systems studies done in previous FYs. Continue improvements to ship cost estimating models. Continue supporting development of advanced computer aided design methods and tools for early stage ship design. Identify, characterize and assess new and emergent technologies and update the HM&E technology database.

- (U) ($2,570) Continue development of reliability based structural design methods/criteria including predicting seaway hydrodynamic loads, testing of grillage and stiffener strength, fatigue specimens and slamming strength models, construction of large scale fatigue strength models, and begin development of reliability analysis method for surface ships. Continue long term measurements and start short term full scale trials of seaway loads on the LHD 1. Complete analysis of data from the seaway loads model tests on LHD 1. Conduct seaway loads testing on the Canadian patrol frigate model. Support SSC research work.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603563N
PROGRAM ELEMENT TITLE: Ship Concept Advanced Design
PROJECT NUMBER: S2196
BUDGET ACTIVITY: 4
DATE: 7 February 1994

- (U) ($3,500) Complete EM Engineering Baseline II. Complete updates to JF and microwave EM environment predictive techniques. Complete electro-optics and millimeter wave analytical capabilities. Bring on line a scientific visualized package to assist in data interpretation, data culling and inference and trend analysis. Investigate open system architecture design and the possible converging to a parallel processing environment. Develop requirements for the integration of frequency and time domain tools. Bring on line an expert system (rule based) below decks predictive (magnetic field, cable coupling) capability integrated into the EM Engineering architecture. Begin analytical capabilities for EMI on electro-mechanical/electronic control systems. Provide for analytical interaction with non-metallic materials (composites, frequency selective surfaces). Develop on-line access to lessons learned databases, design guidelines and other user aiding techniques. Institutionalize EMI control with auto-extraction for specifications.

- (U) ($19,585) Develop prototype modules to demonstrate design, fabrication, shipbuilding process and operational utility. Complete RO & Navy firep ump modules. Build prototype modules identified as building blocks during FY 94 work, including steering gear and officer berthing and sanitary space. Develop alternative heating, ventilation, and cooling (HVAC) distributed system architectures. Develop ventilation, chill water and other modules designs to support HVAC architecture. Begin development of specifications and standards for the common modules/standard interfaces. Continue work to identify areas/methods of commonality among ships to improve affordability and producibility. Increased FY 1995 funding provides investment in future affordable ship design architectures and develops prototype modules to demonstrate design, fabrication, shipbuilding process and operational utility. Continue to identify/develop the family of modules which will be the building blocks for future Navy surface ships, including configuration control requirements. Assess the cost/benefit trade-offs associated commonality. Continue development of generic and engineered build strategies for naval ships that foster product oriented ship construction processes and incorporate alternative distributed ship systems architectures and modules. Efforts are focused on application of commonality to LPD 17 design.

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

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT. 0603563N
PROGRAM ELEMENT TITLE: Ship Concept Advanced Design
PROJECT NUMBER: S2196
BUDGET ACTIVITY: 4
DATE: 7 February 1994

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURWARCEN CARDEROCK DIV, Bethesda, MD, Annapolis, MD, Philadelphia, PA; NAVSURWARCEN DAHLGRENDIV, Dahlgren, VA; NCCOSC RDTEDIV (NRAD), San Diego, CA; NAVUNSEAWARCEN DET, New London, CT. CONTRACTORS: J.J. McMullen Assoc. (JJMA) Inc., Arlington, VA; Advanced Marine Enterprises (AME), Arlington, VA; Gibbs & Cox, Inc., Arlington, VA; NKF Engineering, Arlington, VA; M. Rosenblatt & Son, Arlington, VA; AERA, Arlington, VA; Rockwell International Corp., Arlington, VA; Avondale Industries, New Orleans, LA; Ingalls Shipbuilding Div, Litton, Industries, Pascagoula, MS; Bath Iron Works, Bath, ME; Naval Post Graduate School, Montery, CA; Ohio State University, Columbus, OH; Dayton T. Brown, Long Island, NY.

E. (U) COMPARISON WITH AMENDED FY 1994 PRESIDENT'S BUDGET:
1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:
NAPDD #238-03 - Ship Design Methods, Plans and Concepts
NAPDD #248-03 - Electromagnetic Engineering of Ships and Shipboard Systems

G. (U) RELATED ACTIVITIES:
- (U) PE 0602121N, Surface Ship Technology.
- (U) PE 0603513N, Shipboard System Component Development.
- (U) PE 0603514N, Ship Combat Survivability.
- (U) PE 0603564N, Ship Preliminary Design and Feasibility Studies.
- (U) PE 0604567N, Ship Contract Design/Live FIre T&E.

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

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

J. (U) MILESTONE SCHEDULE:

ADC(X) MS 2Q 1994
21st Century Surface Combatant MS 0 2Q 1994

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

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

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0408 Ship Development (Advanced)	253	5,953	7,771	14,080	5,762	4,346	5,479	CONT.	CONT.
S2202 Preliminary Design	0	0	0	8,091	18,877	13,034	20,892	CONT.	CONT.
S2087 Fast Sealift Technology Development	12,688	0	0	0	0	0	0	0	12,688
F2200 New Design SSN	0	52,094	4,855	0	0	0	0	0	56,949
TOTAL	12,941	58,047	12,626	22,171	24,639	17,380	26,371	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The primary objective of Ship Preliminary Design & Feasibility Studies is to design more capable warships at reduced cost, with reduced manning and increased producibility, utilizing the latest technologies. This program directly supports the Navy's Shipbuilding (SCN) Plan by performing ship Feasibility Studies and developing Preliminary Designs for new ships in the SCN Plan.

(U) Project S0408, Ship Development (Advanced), supports post Milestone 0 ship Feasibility Studies that provide the technical definition and initial cost estimates for various ship alternatives being considered in the Cost and Operational Effectiveness Analyses (COEA). This project develops the primary supporting documentation for Milestone I decisions.

(U) Project S2202, Preliminary Design, develops all technical and programmatic documentation required after Milestone I approval for a ship acquisition program and serves as baseline engineering documentation to support the Contract Design Phase (funded by PE 0604567N). The major development work during Preliminary Design includes the systems engineering and tradeoff studies necessary to define the principal ship characteristics needed to meet the approved military requirements in the ship Operational Requirements Document (ORD). The ship characteristics are developed with sufficient specifics to permit the development of a budget quality ship cost estimate required to support SCN budgeting.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

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

DATE: 7 February 1994

(U) Project S2087, Fast Sealift Technology Development, investigated and assessed technologies suitable for the mid-term sealift ships (year 2000 and beyond). Funds to complete the program in FY's 95 and 96 have been transferred to the National Defense Sealift Fund.

(U) Project F2200 supports the Preliminary Design development for the New Attack SSN (CENTURION).

(U) In FY 1994, the work in Project S2036 (Ship Design Methods, Plans ans Concepts), previously under PE 0603564N, is transferred to a 6.3 Program Element/Project (PE 0603563N/S2196) in order to clearly identify the separate funding of the Pre-Milestone 0 (MS 0) efforts from the ship Feasibility Studies (MS 0 to MS I) and the ship Preliminary Design efforts (after MS I).

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT:0603564
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies

PROJECT NUMBER: S0408
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: Ship Development (Advanced)

PICTURE NOT AVAILABLE

POPULAR NAME: Ship Feasibility Studies

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT:0603564
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies

PROJECT NUMBER: S0408
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	See individual ship acquisition program documentation.							
ENGINEERING MILESTONES	TBD- Milestone schedule is established at MS I.							
T&E MILESTONES								
CONTRACT MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	198	3,866	5,051	9,152	3,745	2,825	3,561	CONT.
SUPPORT CONTRACT								
IN-HOUSE SUPPORT	55	2,087	2,720	4,928	2,017	1,521	1,918	CONT.
GFE/ OTHER								
TOTAL	253	5,953	7,771	14,080	5,762	4,346	5,479	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Ship concepts, identified in PE 0603563N (Ship Concept Advanced Design) are transitioned to and further developed by this project after an approved Milestone 0 (MS 0) decision. This project performs the ship Feasibility Studies required after MS 0 to address a specific Mission Needs Statement (MNS) and supports the Cost and Operational Effectiveness Analyses (COEA) for new surface ships in the Navy's Shipbuilding Program. Performs impact studies of warfare, hull, machinery and electrical subsystems on advanced ship designs. Develops the initial documentation and the design methodology required by government for the design of surface ships in the Shipbuilding Program in accordance with the requirements of the DoD 5000 directives/instructions. Supports the development of the Operational Requirements Documents (ORD) and other documentation required at Milestone I. Develops and evaluates

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603564N
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies

PROJECT NUMBER: S0408
BUDGET ACTIVITY: 4

Date: 7 February 1994

conventional and unconventional hull form alternatives suitable for future acquisition in support of a Milestone I decision. Completion of this phase allows review and approval, at Milestone I, to transfer a ship program to the Preliminary Design project, S2202. Ship Feasibility Study products include a description of the alternative ships' principal characteristics and mission critical subsystems; principal hull dimensions and form coefficients; area/volume summaries; manning estimates; speed and range predictions; weight estimates; general arrangement sketches; technical risk assessments; and Class F cost estimates. The objective is to provide the decision makers with feasible, affordable alternatives.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($253) Conducted ship Feasibility Studies, supported COEA studies and supported ORD preparation for ships in the SCN plan which reach MS 0: Completed L(X) Feasibility Studies and COEA support and all documentation for the Milestone I decision Defense Acquisition Board (DAB) completed in January 1993.

2. (U) FY 1994 PLAN:

- (U) ($5,953) Conduct ship Feasibility Studies, COEA studies and support ORD preparation for ships in the SCN plan which reach MS 0: Combat Logistics Force (CLF) requirements have identified a need for additional ships to transport various cargoes. ADC(X) and T-AO ship conversions are potential solutions that will be evaluated during the COEA process, pending MS 0 approval. Feasiblity Studies for the 21st Century Destroyer will begin, pending MS 0 approval.

3. (U) FY 1995 PLAN:

- (U) ($7,771) Conduct ship Feasibility Studies, COEA studies and support ORD preparation for ships in the SCN plan which reach MS 0: Combat Logistics Force (CLF) requirements have identified a need for additional ships to transport various cargoes. ADC(X) and T-AO ship conversions are potential solutions that will be evaluated during the continuing COEA process. Feasibility Studies for the DD 21 will continue. Feasibility Studies for a command ship will begin.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603564N
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies

PROJECT NUMBER: S0408
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN, Bethesda, MD, Annapolis, MD, Philadelphia, PA. & Dahlgren, VA; NCCOSC RDTE DIV, San Diego, CA. CONTRACTORS: J. J. McMullen Assoc. (JJMA) Inc., Arlington, VA; Advanced Marine Enterprises (AME), Arlington, VA; Westinghouse Marine Technology Division, Pittsburgh, PA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES:

- (U) PE 0603563N (Ship Concept Advanced Design)
- (U) PE 0604567N (Ship Contract Design/Live Fire T&E)
- (U) PE 0603508N (Ship Propulsion System)
- (U) PE 0603513N (Shipboard Systems Component Development)
- (U) PE 0602121N (Surface Ship Technology)
- (U) PE 0603573N (Advanced Surface Machinery Systems)

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

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

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603564N
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies

PROJECT NUMBER: F2200
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: NEW DESIGN SSN

PICTURE NOT AVAILABLE

POPULAR NAME: CENTURION

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603564N
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies

PROJECT NUMBER: F2200
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		MS I 1/94	MS II 07/95					MS III 1QTR/07
PROGRAM PHASE COMPLETION		PHASE O 1/94	PHASE 1 07/95					PHASE 2 1QTR/07
ENGINEERING MILESTONES	TBD - MILESTONE SCHEDULE WILL BE ESTABLISHED AT MILESTONE I							
T&E MILESTONES								
CONTRACT MILESTONES								

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	0	0	50,923	4,306	0	0	0	0	55,229
SUPPORT CONTRACT	0	0	371	80	0	0	0	0	451
IN-HOUSE SUPPORT	0	0	800	469	0	0	0	0	1,269
GFE/ OTHER	0	0	0	0	0	0	0	0	0
TOTAL	0	0	52,094	4,855	0	0	0	0	56,949

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603564N
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies
PROJECT NUMBER: F2200
BUDGET ACTIVITY: 4
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project encompasses the preliminary ship design efforts for New Attack Submarine. The general thrust of these efforts will be to develop an affordable attack submarine using technologies with acceptable risk levels including existing systems or components from SSN 688I, TRIDENT, and SEAWOLF. This approach to technology innovation will carefully balance military capability, development and acquisition cost, impact on ship weight and volume, and technical risk. Varying degrees of re-engineering of existing systems may be required to adapt them to the new submarine's requirements. Newly developing technologies will be utilized where doing so will offer potential payoffs in system size (volume and/or weight) or affordability without sacrificing military capability. This effort is necessary in FY 1994 for a FY 1998 lead ship construction contract award.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) Not applicable. This Project will be initiated in FY 1994. Funding for New Attack Submarine in FY 1993 is located in PE 0603561N, Project 2177.

2. (U) FY 1994 PLAN:

- (U) ($26,691) Initiate preliminary design. Determine structural design, hull confirmation and internal compartment arrangements, implementing a cost based methodology, utilizing state of the art computer aided design tools allowing two and three dimensional evaluation. Develop technical requirements for and evaluate radiated self noise, and target strength performance to ensure the proposed system will not compromise the platform stealth characteristic. Establish volume and weight allocations for all ship structures, systems, and equipment. Evaluate ship manning requirements, habitability, and maintenance concepts. Develop ship control performance goals and damage control capabilities. Determine air conditioning and refrigeration requirements and select the required plants to support this analysis. Evaluate weight margins to allow the shipbuilder greater opportunity to capitalize on cost effective construction techniques.

- (U) ($7,609) Develop the specifications package removing unnecessary requirements, reduce cost and minimize risk to the government and industry. Complete the specifications in sufficient detail to support the issue of an RFP for detail design and construction of the lead ship in FY 1998. Review submarine specifications to identify specific cost drivers. Evaluate these items as the design matures for cost reduction efforts.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603564N
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies

PROJECT NUMBER: F2200
BUDGET ACTIVITY: 4

Date: 7 February 1994

- (U) ($17,794) Develop a detail design/build plan and schedule incorporating isolated modules and identifying key system and component development requirements. Develop system arrangement drawings and perform detailed analysis of ship and system performance as the preliminary design matures. Digitally transfer reports, drawings, and specifications between Navy and shipbuilders to reduce administrative costs. Develop a Class "D" cost estimate based on all technical data.

3. (U) FY 1995 PLAN:

- (U) ($4,855) The majority of preliminary design for the New Attack Submarine will be completed in FY 1994. In FY 1995, the preliminary design will complete as the process transitions to engineering and specification design. The preliminary design must complete and transition to engineering and specification design in 1995 in order to support a lead ship construction contract in FY 1998.

4. (U) PROGRAM TO COMPLETION: Not applicable.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCENDIV, Newport, RI; NAVUNSEAWARCEN DET, New London, CT; NAVSURFWARCENT CARDEROCKDIV, Bethesda, MD; CONTRACTORS: General Dynamics/Electric Boat Division, Groton, CT; Newport News Shipbuilding, Newport News, VA; Johns Hopkins University, Baltimore, MD.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

Mission Need Statement 10/91
Milestone 0 Acquisition Memorandum 08/92

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603564N
PROGRAM ELEMENT TITLE: Ship Preliminary Design and Feasibility Studies

PROJECT NUMBER: F2200
BUDGET ACTIVITY: 4

Date: 7 February 1994

G. (U) RELATED ACTIVITIES:

- (U) PE 0603561N (Advanced Submarine System Development)
- (U) PE 0604558N (New Design SSN Development)
- (U) PE 0603570N (Advanced Nuclear Power Systems)

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) SCN	0	0	0	697,533	652,435	2,857,608	690,934	CONT.	CONT.

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

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

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603570N
PROGRAM ELEMENT TITLE: Advanced Nuclear Power Systems
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1258 Nuclear Technology Development	63,473	46,200	48,509	46,335	41,900	41,821	40,549	CONT.	CONT.
S1914 S6W Nuclear Propulsion Plant	28,653	24,350	10,665	0	0	0	0	0	436,194
S2158 S9G Nuclear Propulsion Plant Development	0	65,987	82,412	96,231	94,730	87,440	84,969	144,231	656,000
TOTAL	92,126	136,537	141,586	142,566	136,630	129,261	125,518	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: Work is directed toward the design, development and test of new and improved components and their related systems for use in nuclear propulsion plants. The intent is to develop safe, reliable, high-performance, long-life nuclear propulsion plants, systems, and components. Work includes development of a nuclear propulsion plant for the SEAWOLF attack submarine. Work in other areas includes development of propulsion plant arrangements, components, and materials, as well as plant analysis for future fleet application.

(U) Plant arrangement work is aimed at developing optimal configurations for new propulsion plants. Significant heat transfer technology improvements are being developed:

control and power generation equipment is needed. New instrumentation and

this equipment will also be developed for future ship classes. better components/systems are being developed

improve performance in new and existing nuclear ship types.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603570N
PROGRAM ELEMENT TITLE: Advanced Nuclear Power Systems
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) Beginning in FY 1994, ongoing studies and developments coalesce into significant design efforts on components and systems for a new SSN propulsion plant. Per NAVCOMPT direction, Advanced Nuclear Power Systems has been reorganized to categorize new SSN-related design efforts in one project (S2158) and generic developments in another (S1258). However, many developments in nuclear propulsion are generic in nature and may apply to many ship types.

(U) The ability to accomplish the work described is contingent upon the existence of a viable Naval nuclear industrial base.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603570N
PROGRAM ELEMENT TITLE: Advanced Nuclear Power Systems
PROJECT NUMBER: S1258
BUDGET ACTIVITY: 4

7 February 1994

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1258 Nuclear Technology Development	63,473	46,200	48,509	46,335	41,900	41,821	40,549	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The purpose is to design, develop, and test new and improved nuclear propulsion plant materials, components, and systems, and the means to assess them, for use in all types of naval nuclear propulsion plants. These efforts apply to future applications as well as backfit equipment for existing nuclear ship classes.

C. (u) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (u) FY 1993 ACCOMPLISHMENTS:

- (u) ($12,000) Continued testing to confirm design concepts. Finalized conceptual designs to begin application.
- (u) ($15,664) Conducted propulsion plant optimization work; further developed and evaluated improved components and plant configurations;
- (u) ($9,000) Tested and evaluated advanced power supplies Carried out advanced power generation equipment development.
- (u) ($7,000) Conducted tests of advanced instrumentation and control equipment and tested alternate preproduction hardware configurations to confirm improved accuracy, performance, reliability, and efficiency.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603570N
PROGRAM ELEMENT TITLE: Advanced Nuclear Power Systems
PROJECT NUMBER: S1258
BUDGET ACTIVITY: 4
7 February 1994

- (u) ($7,000) Further developed improved fluid transfer and control and electrical equipment; conducted design work on an advanced main coolant pump. Incorporated results into advanced component concepts.

- (u) ($6,000) Continued to develop plant designs. Developed computational models of plant systems and components to analyze and predict acoustic and thermal-hydraulic performance.

- (U) ($6,809) This accounts for effort aimed at understanding materials behavior and developing new materials or materials applications to improve component and plant characteristics.

2. (u) FY 1994 PLAN:

- (u) ($12,989) Conduct tests of instrumentation and control equipment and test preproduction hardware configurations to confirm improved accuracy, performance, reliability, and efficiency. Incorporate the latest in electronic technologies into development of future propulsion plant instrumentation and control equipment and associated software. Develop sensors and rod control equipment to improve reliability and performance of propulsion plant instrumentation and control equipment.

- (u) ($14,227) Develop and qualify military-grade preproduction versions of advanced power supplies. Develop advanced power generation and distribution technology to improve power system efficiency, reliability, safety, and harmonics. improve electrical system performance.

- (U) ($5,995) Develop means to lessen and analyze the effects of shock, vibration, high temperature and pressure on plant and component designs and to incorporate these characteristics into designs to ensure safe, efficient, and reliable plant operation. Develop computational models of plant systems and components to analyze and predict performance. Evaluate materials in previously untried applications, and determine innovative uses of materials and fabrication processes for high performance, lightweight, advanced nuclear propulsion plant applications.

- (u) ($4,995)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603570N
PROGRAM ELEMENT TITLE: Advanced Nuclear Power Systems
PROJECT NUMBER: S1258
BUDGET ACTIVITY: 4
7 February 1994

- (U) ($7,994) Examine materials to determine their ability to withstand irradiation, corrosion, high temperatures, and shock and to resolve emergent materials issues.

conduct long-term corrosion and thermal and hydraulic testing to confirm design concepts.

3. (U) FY 1995 PLAN:

- (U) ($17,249) Incorporate the latest in electronic technologies into development of propulsion plant instrumentation and control equipment. Develop sensors and rod control equipment to improve reliability and performance of propulsion plant instrumentation and control equipment. Develop standard instrumentation and control circuit cards to lower costs, improve reliability, and increase equipment design flexibility.

- (U) ($11,094) Develop advanced power distribution technology to improve power system efficiency, reliability, safety, and harmonics. improved electrical system performance.

- (U) ($6,050) Analyze and find ways to reduce the adverse effects of shock, vibration, high temperature and pressure and incorporate results into designs to ensure safe, efficient, and reliable operation. Conduct computer modelling analyses of plant systems and components to predict their performance. Evaluate advanced materials, explore more affordable fabrication processes, and test materials in previously untried applications to reduce weight, size, and corrosion, and improve reliability in nuclear equipment.

- (u) ($5,041)

- (u) ($9,075) Evaluate materials through stress-corrosion, corrosion-fatigue, and fracture-toughness tests to gain a better understanding of material behavior.

Conduct flow testing and long-term corrosion and thermal/hydraulic testing to confirm neat

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603570N
PROGRAM ELEMENT TITLE: Advanced Nuclear Power Systems
PROJECT NUMBER: S1258
BUDGET ACTIVITY: 4
7 February 1994

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD. CONTRACTORS: Westinghouse Electric Corp., Bettis Atomic Power Laboratory and Plant Apparatus Division, Pittsburgh, PA, and Machinery Apparatus Operation, Schenectady, New York; Martin Marietta Corp., Knolls Atomic Power Laboratory, Schenectady, NY.

E. (U) COMPARISON WITH AMENDED FY 1994 PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES:

- (U) PE 0205675N (Operational Reactor Development). There is no duplication of effort.

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

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

J. (U) MILESTONE SCHEDULE: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603570N
PROGRAM ELEMENT TITLE: Advanced Nuclear Power Systems
PROJECT NUMBER: S1914
BUDGET ACTIVITY: 4
Date: 7 February 1994

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

PROJECT TITLE	FY 1992 AND PRIOR	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1914 S6W Nuclear Propulsion Plant	372,526	28,653	24,350	10,665	0	0	0	0	0	436,194

B. (u) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This effort develops aspects of the nuclear propulsion plant for the SEAWOLF (SSN 21) attack submarine. Work is directed toward design, development, and test of pumps, instrumentation and control equipment, valves, heat transfer equipment, and plant arrangements. A key objective is to meet stringent goals giving the SEAWOLF attack submarine an advantage over potential adversaries well into the next century. Accomplishing requires applying new features throughout the plant, especially to large rotating equipment. Also, the propulsion plant will be increased to achieve the overall displacement and performance goals.

C. (u) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (u) FY 1993 ACCOMPLISHMENTS:

- (U) ($16,653) Completed detailed component, fluid system and shielding designs and evaluations. Continued drawing production to support ship construction schedule, preparing and revising system drawings, and developing and verifying operating and acceptance test procedures.

- (U) ($9,000) Continued compatibility testing of instrumentation and control systems using preproduction units, and adapted designs as necessary. Continued evaluating system parameters under varying plant conditions. Completed plant analysis.

- (u) ($3,000) Continued integrated system and component testing to confirm structural integrity and compliance with

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603570N
PROGRAM ELEMENT TITLE: Advanced Nuclear Power Systems
PROJECT NUMBER: S1914
BUDGET ACTIVITY: 4
Date: 7 February 1994

2. (u) FY 1994 PLAN:

- (U) ($15,358) Update fluid system and shielding designs and evaluations, drawings for ship construction, system drawings, and plant manuals. Complete development and verification of operating and acceptance test procedures. Resolve system performance and installation problems.
- (U) ($6,992) Perform compatibility testing of instrumentation and control systems using preproduction units. Evaluate system parameters under varying plant conditions. Validate design modifications and improvements resulting from tests.
- (U) ($2,000) Conduct integrated system and component tests to confirm acceptability, structural integrity, and compliance with [Develop test procedures and drawings for SEAWOLF test which will validate of equipment and structures in the propulsion plant.

3. (u) FY 1995 PLAN:

- (U) ($7,638) Finalize fluid system and shielding designs and evaluations, drawings for ship construction, and plant manuals. Resolve emergent performance/installation problems.
- (U) ($2,018) Complete compatibility testing of instrumentation and control systems. Evaluate and validate system parameters and designs under varying plant conditions.
- (u) ($1,009) Complete integrated system and component tests to confirm structural integrity and compliance with Complete test procedures, drawings, and on-board computer programs for SEAWOLF test, which will validate, of equipment and structures.

4. (U) PROGRAM TO COMPLETION: Not applicable.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD. CONTRACTORS: Westinghouse Electric Corporation, Bettis Atomic Power Laboratory and Plant Apparatus Division, Pittsburgh, PA, and Machinery Apparatus Operation, Schenectady, NY; Martin Marietta Company, Knolls Atomic Power Laboratory, Schenectady, NY.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603570N
PROGRAM ELEMENT TITLE: Advanced Nuclear Power Systems
PROJECT NUMBER: S1914
BUDGET ACTIVITY: 4
Date: 7 February 1994

E. (U) COMPARISON WITH AMENDED FY 1994 PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not availble for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES:

- (U) PE 0205675N (Operational Reactor Development). There is no duplication of effort.

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

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

J. (U) MILESTONE SCHEDULE: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603570N
PROGRAM ELEMENT TITLE: Advanced Nuclear Power Systems
PROJECT NUMBER: S2158
BUDGET ACTIVITY: 4

7 February 1994

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S2158 S9G Nuclear Propulsion Plant Development	0	65,987	82,412	96,231	94,730	87,440	84,969	144,231	656,000

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This effort develops the components and systems applicable to the nuclear propulsion plant for a new design SSN. Work is directed toward design, development, and testing of plant arrangements, heat transfer equipment, fluid systems, instrumentation and control equipment, and power distribution systems, with emphasis on simplifying and exploiting existing technology and current developments.

C. (u) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: Not applicable.

2. (u) FY 1994 PLAN:

- (u) ($19,986) Design propulsion plant arrangements; design and build mockups of plant configurations to ensure feasibility of construction and validate acoustic features. Design propulsion plant mounting rafts which will support all components to facilitate ship construction and improve acoustic characteristics and shock resilience.

  Develop simplified radiation shielding while maintaining standards of containment.

- (u) ($5,995) Begin design

  advanced steam separator to optimize steam generator output. Develop improved heat exchangers, such as the propulsion plant freshwater/seawater heat exchanger.

- (u) ($23,025) Develop fluid transfer and control equipment; begin reference designs of propulsion plant fluid and steam systems and associated components, such as an advanced main coolant pump, coolant loops, main seawater pump, and valves, with emphasis on simplification

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603570N
PROGRAM ELEMENT TITLE: Advanced Nuclear Power Systems
PROJECT NUMBER: S2158
BUDGET ACTIVITY: 4
7 February 1994

- (u) ($6,995) Design compatible propulsion plant instrumentation and control equipment and associated software, such as primary nuclear instrumentation and reactor plant and electric plant control panels,

- (U) ($9,986) Develop power generation/distribution equipment and systems, including power supply and conversion modules and circuit breakers, to take advantage of ongoing electrical developments to improve power system efficiency, reliability, safety, and harmonics.

3. (u) FY 1995 PLAN:

- (u) ($27,222) Further develop design of propulsion plant arrangements and foundations; design and build mockups of plant configurations to ensure feasibility of construction and validate acoustic features. Design and develop raft structures which will support all components, facilitate ship construction, and improve acoustic characteristics and shock resilience.

- (u) ($10,082) Conduct design incorporate design modifications for shipboard application based on manufacturing and test results. Conduct performance and structural analyses to confirm design, and deposition/corrosion tests necessary for selecting steam generator chemistry. Develop and qualify advanced steam separator to optimize steam generator output and improved heat exchangers such as the propulsion plant freshwater/seawater heat exchanger.

- (u) ($29,985) Continue development and qualification of fluid transfer and control equipment; design simplified propulsion plant fluid and steam systems and components, such as an advanced main coolant pump, coolant loops, main seawater pump, main condenser, and valves. Fabricate test hardware for the more developmental components

- (u) ($9,074) Further develop reference designs of propulsion plant instrumentation and control equipment and associated software, such as control panels and nuclear instrumentation, Develop instrumentation and control test hardware for qualification.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603570N
PROGRAM ELEMENT TITLE: Advanced Nuclear Power Systems
PROJECT NUMBER: S2158
BUDGET ACTIVITY: 4
7 February 1994

- (U) (S6.049) Develop power generation/distribution components and systems, such as power converter/inverter modules and [redacted] circuit breakers, to take advantage of existing electrical developments and improve power system efficiency, reliability, safety, and harmonics. Build and test engineering models of these components.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; CONTRACTORS: Westinghouse Electric Corp., Bettis Atomic Power Laboratory and Plant Apparatus Division, Pittsburgh, PA, and Machinery Apparatus Operation, Schenectady, N.Y.; Martin Marietta Corp., Knolls Atomic Power Laboratory, Schenectady, NY.

E. (U) COMPARISON WITH AMENDED FY 1994 PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES:

- (U) PE 0205675N (Operational Reactor Development). There is no duplication of effort.

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

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

J. (U) MILESTONE SCHEDULE: Not applicable.

PROGRAM ELEMENT: 0603572N
PROGRAM ELEMENT TITLE: Navy Dual-Use Technology Program

PROJECT NUMBER: R2240
BUDGET ACTIVITY: 3

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R2240 Navy Dual-Use Technology Program	0	0	15,000	0	0	0	0	0	15,000

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: New start program. Demonstration of advanced technology is the key attribute of the successful implementation of the Navy Dual-Use Technology Program (DTP). This program is the Navy's principal program for the development of new technology which has primary Navy relevance and simultaneously ensures the enhancement of the U.S. industrial base in technology areas critical to the defense of the nation, and founded upon the vitality of U.S. science and technology (S&T). The program is responsive to the S&T requirements and investment strategies of the Navy as well as being supportive of the Joint Mission Areas/Support Areas. The technical areas developed under the Navy DTP span the complete spectrum of dual-use technologies. They include demonstration of new concepts and systems in the areas of ship S&T (e.g. advanced systems for ship electric power and distribution), ocean S&T (e.g. active exploitation of ocean resources and environmental protection), manufacturing S&T (e.g. new manufacturing processes), aircraft S&T (e.g. pioneering aircraft configurations and control systems), multi-system S&T (e.g. advanced sensors and devices), and information management and human factors (e.g. embedded training systems). The results of this program element will provide a solid transition into the development of critical Navy systems based upon the most advanced commercial techniques and products. The joint cooperative effort and in-kind contributions between U.S. industry, American academia and the Navy will satisfy the Joint Warfare Operational Capabilities by producing advanced warfighting capabilities that will facilitate the achievement of critical future defense objectives.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: Not applicable.

2. (U) FY 1994 PLAN: Not applicable.

3. (U) FY 1995 PLAN:

- (U) Advanced Ship S&T: Develop advanced systems for electric powering, electric distribution, composite

PROGRAM ELEMENT: 0603572N
PROGRAM ELEMENT TITLE: Navy Dual-Use Technology Program

PROJECT NUMBER: R2240
BUDGET ACTIVITY: 3

DATE: 7 February 1994

structure for ships, zero discharge and environmentally compliant ships, advanced hull coatings, and hull-machinery and electrical systems.

- (U) Ocean S&T: Demonstrate the application of innovative uses of ocean exploitation and monitoring, weather prediction, and environmental protection.
- (U) Manufacturing S&T: Demonstrate advanced conceptual initiatives in manufacturing education known as the Teaching Factory. Create new manufacturing processes, production, and automation techniques.
- (U) Aircraft S&T: Produce pioneering Vertical/Short Takeoff and Landing configurations and control techniques to vastly improve aircraft performance.
- (U) Multi-System S&T: Deploy advanced sensors and devices, active control of noise and vibration methods, integrated diagnostics and condition-based maintenance systems, and high density energy sources.
- (U) Information Management and Human Factors: Demonstrate embedded training systems, advanced simulation technology, and virtual reality for Navy training systems. Create advanced automated recognition systems.

4. (U) PROGRAM TO COMPLETION: Not applicable.

D. (U) WORK PERFORMED BY: IN HOUSE: TBD. CONTRACTORS: TBD.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: Not applicable

G. (U) RELATED ACTIVITIES:

- (U) PE 0601572N (Navy Dual-Use Technology Program)

PROGRAM ELEMENT: 0603572N
PROGRAM ELEMENT TITLE: Navy Dual-Use Technology Program

PROJECT NUMBER: R2240
BUDGET ACTIVITY: 3

DATE: 7 February 1994

- (U) PE 0602572N (Navy Dual-Use Technology Program)
  Activities are coordinated through the Navy Dual-Use Technology Program Management Team.

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

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

J. (U) MILESTONE SCHEDULE: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603573N
PROGRAM ELEMENT TITLE: Advanced Surface Machinery Systems

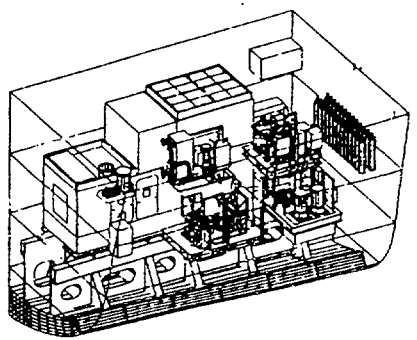
PROJECT NUMBER: S1314
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: Advanced Surface Machinery Programs

ASMP IPS MODULE DESIGN

PGM-1 POWER GENERATION MODULE



Module Summary Characteristics

DESCRIPTION. PGM-1 Power Generation Module with ICR Gas Turbine Engine-driven Generator, and propulsion support submodules and systems.

POPULAR NAME: Advanced Surface Machinery (ASM) Programs

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603573N
PROGRAM ELEMENT TITLE: Advanced Surface Machinery Systems

PROJECT NUMBER: S1314
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		ICR LLM OPTION 3Q/94						
ENGINEERING MILESTONES	ICR DESIGN REVIEW 1 3Q/93	ED HDWR 4Q/93	COMPL SSIM DEV 2Q/95		COMPL IPS FABRICATION 4Q/97			
		SMCS CDR 3Q/94						
T&E MILESTONES		ICR AD SYS TEST 3Q/94	COMPL SMCS FACTORY ACCEPT TEST 2Q/95			ICR TECHEVAL/OPEVAL 98/99		
				COMPL SMCS HOT PLANT DEMO 1Q/96				
		BEGIN AD MODEL DEMO OF SMCS 4Q/94						COMPL IPS FSAD LBES 4Q/99
			COMPL ICR AD 1Q/95			COMPL IPS FAT 2Q/98		
CONTRACT MILESTONES	AWARD SMCS 3Q/93		COMPL RSAD PM DEMO FY95					
			AWARD IPS FSAD 1Q/95					AWARD IPS FSED 1Q/00

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	65,794	74,440	64,781	77,750	76,308	67,905	56,941	CONT.
SUPPORT CONTRACT	150	-	700	200	200	200	200	CONT.
IN-HOUSE SUPPORT	7,654	7,514	6,874	12,143	12,667	7,227	8,482	CONT.
GFE/ OTHER	-	-	-	-	-	-	-	CONT.
TOTAL	73,598	81,954	72,355	90,093	89,175	75,332	65,623	CONT.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603573N
PROGRAM ELEMENT TITLE: Advanced Surface Machinery Systems
PROJECT NUMBER: S1314
BUDGET ACTIVITY: 4
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: ASM Programs develop affordable advanced machinery and subsystems for surface ship propulsion, electric and auxiliary requirements. These programs are in various phases of development ranging from concept formulation to full scale development. The goals of the ASM Programs are to: reduce acquisition and operating costs of naval ships; provide military advantages; contribute to American industrial competitiveness; and, lead to environmental compliance. These goals are to be accomplished by leveraging investments in technologies that will be usable by both the military and commercial sectors. Some technologies being developed for military application will have significant commercial viability upon completion of development, while other technologies being developed commercially have significant military applications and will be demonstrated and adapted for military use.

(U) ASM places primary emphasis on a system architecture and a systems engineering approach which maintains flexibility and minimizes investment until technologies are demonstrated, affordability is assessed, trade off decisions are made, and subsystems evaluated and brought together for optimal total ship cost effectiveness. The products of ASM addressed in this plan include: Intercooled Recuperated (ICR) Gas Turbine Engine, Standard Monitoring and Control System (SMCS), Zonal Electrical Distribution System (ZEDS), Integrated Power System (IPS), and, Systems Engineering & Modular Architecture.

(U) ICR Gas Turbine Engine. The ICR Gas Turbine Engine is a 26,400 horsepower (with 10% growth margin to 29,000 horsepower) engine designed to replace the LM2500 gas turbine. ICR will significantly reduce life cycle fuel cost and provide a minimum impact alternative to increase range.

(U) A contract for ICR Advanced Development (AD) with an option for Full Scale Development was awarded to Westinghouse Electric Corporation in December 1991. The ICR is derived from the Rolls-Royce RB211 aircraft engine and through the introduction of an intercooler, recuperator, and variable area nozzles achieves a 30% propulsion fuel savings when compared to the LM2500. The RB211 is a modern commercial aircraft engine with over 2000 engines delivered to date and production projected well into the next century.

(U) Initial ship installation is targeted for FY 99 DDG 51 class ships. A rephased program to support a FY 96 DDG 51 installation in response to fleet requirements is being evaluated. An agreement between the Royal Navy and US Navy is being finalized whereby the Pyestock engine test facility is provided to the ICR program. This will allow concurrent testing to be accomplished at Pyestock and NSWC, Philadelphia, PA test facilities.

(U) Standard Machinery and Control System (SMCS). The SMCS will integrate the sensing, transmission, interpretation and display of Hull Mechanical and Electrical (HM&E) parameters necessary for machinery control, condition monitoring/assessment, signature control and damage control management. The system design functions as an integral part of the total ship Integrated Communications and Control (IC^2) architecture and supports the functions of the proposed Integrated Survivability Management System (ISMS) and Integrated Condition Assessment System (ICAS).

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603573N
PROGRAM ELEMENT TITLE: Advanced Surface Machinery Systems
PROJECT NUMBER: S1314
BUDGET ACTIVITY: 4
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(U) A contract for SMCS hardware and software necessary for an Advanced Development Model (ADM) was awarded to CAE Link Corporation in Binghamton, New York, in May 1993. Initial ship installation is scheduled for FY 96 DDG 51 class ships and is targeted for LPD 17 class ships.

(U) SMCS offers significant potential to reduce acquisition costs and introduce a standard system for application across multiple platforms taking maximum advantage of open system architecture and industry standards. It will also provide the necessary architecture to support critical imperatives from the Ship Operational Characteristic Study (SOCS) for embedded readiness assessment, mission planning and training
and condition based maintenance.

(U) Zonal Electrical Distribution System (ZEDS). The Zonal Electrical Distribution System is a new standard architecture for electrical distribution designed to improve ship producibility and reduce ship acquisition and construction costs. ZEDS includes the architecture, hardware, and software required to produce an affordable electric distribution system having comparable survivability to conventional systems.

(U) Initial installations of ZEDS will incorporate a zonal electrical distribution architecture in order to achieve major enhancements to producibility by reducing the number of watertight compartment penetrations and facilitate testing by ship construction zones. Initial ship installation is targeted for FY 94 DDG 51 class ships and the FY 96 LPD 17 class ships.

(U) Future improvements will address rapid reconfiguration and automated control in response to incipient faults and casualty conditions; fight through capability utilizing SMCS; substituting bus duct for conventional cabling; and changing to DC electrical power (common with submarines). Significant advances in power electronics are expected with broad commercial applications.

(U) Integrated Power System (IPS). The IPS provides complete ship power management by generating power for all load requirements from any combination of prime movers. IPS employs ICR, SMCS, and ZEDS, plus additional technologies still in the initial definition stage (possible including permanent magnet (PM) motor and generators, distributed auxiliary systems, alternative propulsor concepts, and concepts for diverting and conditioning power for potential pulse power and alternative power applications). IPS components and technologies are defined through system effectiveness analyses, which include cost and performance factors. IPS address ASM Program goals through: reduced ship acquisition cost through integration of propulsion and ship's service prime movers; lower ship operational costs resulting from more flexible operating characteristics and more efficient components; reduced ship construction costs by allowing more extensive modular construction of power generation, distribution, and loads if desired; improved survivability and vulnerability through increased arrangement flexibility; reduced manning through improved monitoring and control systems and reduced on-board maintenance requirements; improved ship signature characteristics if required; Improved design flexibility to meet future requirements of multiple ship types or missions; Integrating power control and protection by fully utilizing the power electronics in the system to perform fault protection as well as power conversion and load control functions; and, reduced machinery system

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603573N
PROGRAM ELEMENT TITLE: Advanced Surface Machinery Systems
PROJECT NUMBER: S1314
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acquisition costs through utilization of commercially shared technologies and components. The full-up target application for IPS is the twenty-first century surface combatant which is in the concept formulation stage. Elements of IPS such as solid state power electronics and variable speed drives on auxiliaries will be integrated in near-term ship acquisition targets.

(U) Systems Engineering & Modular Architecture. Systems Engineering & Modular Architecture in the ASM Programs are focused on increasing the commonality of components used across ship types and in developing modules which will be integral with standardization, zonal system architectures, and generic shipbuilding strategies. The purpose of increased commonality is to reduce the total cost of ship ownership by using common modules comprised of standard components and/or standard interfaces.

(U) ASM modules are being designed to support anticipated ship construction requirements. These modules include Power Generation Modules, Propulsion Motor Modules, Electric Power Transmission/Distribution/ Conversion Modules, and Control Modules. Each of these major items consists of numerous sub-modules which, through computer aided design techniques, are integrated as necessary to fulfill unique ship requirements.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,818) Electric Drive (ED): Complete check-out of ED shaft set at GE and deliver shaft set.
- (U) ($57,188) ICR: Continued development of ICR. Conduct Design Review 1 on ICR engine contract and begin set up for land based testing.
- (U) ($4,806) SMCS: Awarded SMCS contract. Complete system design through Preliminary Design Review.
- (U) ($2,705) ZEDS: Began set up for a laboratory demo of control system and electrical distribution system. Initiated Ship Service Inverter Module (SSIM) Development.
- (U) ($2,756) PM Reduced Scale Advanced Development (RSAD): Completed preliminary design and initiate detailed design on PM 3MW generator. Began set up for laboratory demo.
- (U) ($3,325) Sys Eng: Performed systems engineering efforts including life cycle costs, producibility studies, manning studies, in support of ASMP efforts.

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PROGRAM ELEMENT: 0603573N
PROGRAM ELEMENT TITLE: Advanced Surface Machinery Systems

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2. (U) FY 1994 PLAN:

- (U) ($11,200) SMCS: Conduct advanced development model Factory Acceptance Testing (FAT) of the SMCS hardware and software. Initiate setup of SMCS hardware and software at operational test site (LBES).
- (U) ($57,000) ICR: Continue development of ICR. Build test prototype engine system. Initiate ICR AD system testing.
- (U) ($ 2,000) ICR: Begin ICR land based testing at NSWC (NAVSSES) Philadelphia, PA detachment.
- (U) ($ 3,300) ZEDS: Interface Zonal Electrical Distribution System (ZEDS) with SMCS. Award ZEDS contract for component design and hardware development with emphasis on affordability and survivability.
- (U) ($ 4,300) PM RSAD: Take delivery of a 3MW generator and NNS 3 KHP PM motor and initiate system testing.
- (U) ($ 1,200) PM Full Scale Advanced Development (FSAD): Release PM ED FSAD RFP.
- (U) ($ 2,954) Sys Eng: Perform systems engineering efforts including life cycle costs, producibility studies, manning studies, module development, system integration, architecture design, etc., in support of ASMP efforts.

3. (U) FY 1995 PLAN:

- (U) ($ 8,800) SMCS: Complete SMCS core system operational demonstration.
- (U) ($41,300) ICR: Continue development of ICR. Conduct ICR AD testing at LBES.
- (U) ($5,500) ZEDS: Perform ZEDS validation/demonstration. Initiate DC Distribution FSD. Complete DC Ship Service Generation/Distribution System configuration decision.
- (U) ($2,450) PM RSAD: Complete PM motor and generator testing and conduct scale demonstration of IPS. Take delivery of SSIM prototypes and conduct dc distribution system testing.

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- (U) ($11,300) PM FSAD: Award IPS FSAD contract and begin full scale development of components (motor, generator, inventor, bos-duct).

- (U) ($3,005) Sys Eng: Perform systems engineering efforts including life cycle costs, producibility studies, manning studies, module development, system integration, architecture design, etc., in support of ASMP efforts.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: COMNAVSEASYSCOM, Washington, DC; NAVSURFWARCEN DET, Annapolis, MD; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NAVSURFWARCEN SHIPSYSENGSTA, Philadelphia, PA; others as required. CONTRACTORS: Westinghouse Electric Corp., Pittsburgh, PA and Sunnyvale, CA; Newport News Shipbuilding and Drydock Company, Newport News, VA; EML, Hudson, MA; General Electric, Fitchburg, MA; General Electric Corporate R&D Center, Schenectady, NY; General Electric, Salem, VA; General Electric Co., Schenectady, NY; CAE-Link Corporation, Binghamton, NY; CAE Electronics, Montreal, Canada; Rolls-Royce PLC, Coventry, UK; Gibbs & Cox, Arlington, VA; Harris Semiconductor, Mountain, PA; Advanced Marine Enterprises, Inc., Arlington, VA; Allied Signal Corp., Torrance, CA; Rockwell International, Anaheim, CA; Ingalls Shipbuilding, Pascagoula, MS; SPD, Philadelphia, PA; PDI, Annapolis, MD; Purdue Univ., West Lafayette, IN; Magnatek, Torrance, CA; and others selected.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) Electric Drive and ICR Acquisition Plans (AP) and ICR RFP were revised in FY 91 to reflect program restructuring. SMCS Control System AP Revision 1 dated 21 August 92. Program Plan dated 21 Mar 91. NAPDD # 259-03 dated 03 Feb 92.

G. (U) RELATED ACTIVITIES:

- (U) PE 0602121N (Surface Ship Technology).

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- (U) PE 0603563N (Ship Concept Advanced Design).

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Cooperative Agreement with Royal Navy (UK) on ICR are under discussion.

J. (U) TEST AND EVALUATION:

- (U) Complete SMCS Factory Acceptance Testing.
- (U) Begin AD Model demonstration of SMCS.
- (U) Perform ICR systems test.
- (U) Perform ICR TECHEVAL/OPEVAL.
- (U) Perform systems test on 3MW PM generator.
- (U) Perform systems test on DC Distribution System.
- (U) Complete SMCS Hot Plant Demo.
- (U) Complete ICR AD.
- (U) Award IPS FSAD.
- (U) Complete IPS Fabrication.
- (U) Complete IPS FSAD LBES.
- (U) Complete SSIM development.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603582N
PROGRAM ELEMENT TITLE: Combat System Integration
PROJECT NUMBER: S0164
BUDGET ACTIVITY: 4
DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0164 Combat System Integration	9,625	6,237	7,911	7,931	9,550	8,422	8,827	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND PROJECT: This project provides shore based testing of integrated combat direction, weapon, sensor and computing systems prior to their installation in operational fleet units. The operational computer programs are assembled and tested to assure proper configuration and interoperability in a test environment similar to their ultimate shipboard operational environment. Included is operational assessment testing of the integrated suite of computer programs. This is the only opportunity for this range of testing of individually developed and tested combat system subsystem programs prior to shipboard delivery for operational use. Combat system level configuration control is maintained by updates to the Surface Ship Combat System Master Plan (SSCSMP). In addition, Overall Combat System Operability Tests (OCSOTs) for shipboard testing of computer programs are developed.

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($6,395) Conducted integration testing of: Antisubmarine Warfare Module (ASWM) 4.3, AN/SYS-2 Integrated Automatic Detection and Tracking (IADT)/AUTO-ID and Navy Tactical Command System Afloat in CV/CVN classes; Command and Control Processor in CGN 38 class; Fire Control System MK 92 MOD 6 in FFG 7 class. Conducted operational assessment of combat system improvements in DD 963 class.
- (U) ($2,177) Continued planning and preparations for out year testing including simulation system, test bed and test procedures design and development.
- (U) ($1,053) Continued OCSOT development and SSCSMP updates.

(U) FY 1994 PLAN:
- (U) ($4,602) Complete integration testing of Fire Control System MK 92 MOD 6 in FFG 7 class. Conduct integration testing of: AN/SQQ-89 Anti-Submarine Warfare Combat System, MK 23 Target Acquisition System and Tomahawk Weapon Control System upgrades in DD 963 class; Tomahawk Vertical Launch System-Vertical Launch Antisubmarine Rocket System interoperability. Conduct operational assessment of combat system improvements in DD 963 class.

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PROGRAM ELEMENT: 0603582N PROJECT NUMBER: S0164 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: Combat System Integration BUDGET ACTIVITY: 4

- (U) ($1,130) Continue planning and preparations for out year testing including simulation system, test bed and test procedures design and development.
- (U) ($505) Continue SSCSMP updates.

(U) FY 1995 PLAN:
- (U) ($5,734) Conduct integration testing of: Advanced Combat Direction System (ACDS) Block 1; ACDS Block 0 improvements in CV/CVN and LHD 1 classes; Cooperative Engagement Capability for CV/CVN, LHD 1 and CGN classes.
- (U) ($1,372) Continue planning and preparations for out year testing including simulation system, test bed and test procedures design and development.
- (U) ($805) Continue OCSOT development and SSCSMP updates.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN INTCOMBATSYSTESTFAC, San Diego, CA; NAVSURFWARCENDIV, Dahlgren, VA; NAVSURFWARCENDIV, Port Hueneme, CA; NAVSURFWARCEN FLTCOMBATDIRSSACT, Dam Neck, VA and NCCOSC RDTE DIV, San Diego, CA. CONTRACTORS: RGE Engineering Service Co., Springfield, VA.; Integrated System Analysts, Inc., Arlington, VA.; COMPTEK Federal Systems Inc., Arlington, VA; PRC, McLean, VA; TECHMATICS, Inc., Arlington, VA.; SYSCON Corporation, Washington, DC.

(U) RELATED ACTIVITIES: Computer programs developed under these activities are tested in their integrated configuration:

- PE 0204571N, Consolidated Training Systems Development
- PE 0205620N, Surface ASW Combat Systems Integration
- PE 0603755N, Ship Self Defense
- PE 0604301N, MK 92 FCS Upgrade
- PE 0604755N, Ship Self Defense
- PE 0604372N, New Threat Upgrade
- PE 0604518N, CIC Conversion

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

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

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0363 Insensitive Munitions Advanced Development	26,875	10,459	12,608	12,756	13,059	13,386	13,747	CONT.	CONT.
U1821 Conventional Fuze/Warhead Pkg	34,514	28,342	28,750	25,071	23,490	19,362	19,081	CONT.	CONT.
TOTAL	61,389	38,801	41,358	37,827	36,549	32,748	32,828	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: EXPLOSIVES ADVANCED DEVELOPMENT (IM) (Project S0363):
Most Navy munitions react violently when exposed to unplanned stimuli such as fire, shock and bullet impact, thus presenting a great hazard to ships, aircraft, and personnel. This program will provide, validate and transition technology to enable production of munitions insensitive to unplanned stimuli with no reduction to combat performance.

(U) CONVENTIONAL FUZE/WARHEAD PACKAGE (Project U1821): The Navy requires improved lethality of air and surface launched ordnance to defeat advanced threats. Current specific requirements and initiatives to address them include: the ability to defeat anti-ship missiles attacking at extremely low altitudes by improving SPARROW Missile through the Missile Homing Improvement Program (MHIP) to counter deceptive countermeasures; demonstrate advance missile fuzing systems to defeat extremely low-altitude and low observable targets with the Advanced Threat Fuze (ATF); develop advanced integrated guidance/fuzing and warhead mass-focusing systems to increase lethality against current and emerging threats. This project will, in future years, also provide the vehicle to address emergent requirements by transitioning mature fuze and warhead technology from conceptual developments to engineering development with minimum technical and financial risk.

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PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions
PROJECT NUMBER: S0363
BUDGET ACTIVITY: 4
Date: 7 February 1994

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0363 Insensitive Munitions Advanced Development	26,875	10,459	12,608	12,756	13,059	13,386	13,747	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Most Navy munitions react violently when exposed to unplanned stimuli such as fire, shock and bullet impact, thus presenting a great hazard to ships, aircraft and personnel. This program will provide, validate and transition technology to all new weapon developments and priority weapon systems and enable production of munitions insensitive to these stimuli with no reduction in combat performance. The Insensitive Munitions (IM) Advanced Development Program is the Navy's focused effort on propellants, propulsion units, explosives, warheads, fuzes and pyrotechnics to reduce the severity of cook-off and bullet/fragment impact reactions, minimizing the probability for sympathetic detonation, both in normal storage and in use, increasing ship survivability and satisfying performance and readiness requirements. Each technology area is divided into subtasks addressing specific munition/munition class IM deficiencies. Energetic materials producibility is demonstrated to assure national capability to produce and load munitions systems. The program is being closely coordinated with other Military Departments, NATO and allied countries to eliminate redundant efforts and maximize efficiency. A joint service IM requirement has been developed. Insensitive munitions are identified as a DoD critical technology requirement.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,623) Continued validation and shortfall analysis of weapon IM plans of action and milestones (POA&Ms). Analyzed the availability of chemicals, critical to energetic material development.
- (U) ($7,038) Developed high explosives. Accomplishments include the following highlights. Completed qualification and characterization of a booster explosive developed in France. Completed qualification testing of two candidate metal accelerating explosives for possible use in shaped charge warheads and mine counter measures. Continued evaluation of improved bomb fill candidates with improved performance and reduced shock sensitivity.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions
PROJECT NUMBER: S0363
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Date: 7 February 1994

- (U) ($5,610) Evaluated IM ordnance concepts. Ordnance accomplishments are highlighted in the areas described below. Demonstrated that dual explosive warheads can improve shock mitigation and maintain or improve performance. Demonstrated warhead configurations with potential use in surface and underwater applications. Completed evaluation and development of booster concepts for insensitive ignition systems. Continued evaluation of warhead concepts for large blast fragmentation (500 lbs) warheads and showed that sympathetic detonation requirements can be met.

- (U) ($12,604) Developed IM propellants and propulsion systems. The propulsion task accomplishments includes the following highlights. Successfully demonstrated an improved minimum smoke propellant with improved signature characteristics, reduced sensitivity and comparable to performance to in-service systems. Completed preliminary small scale testing of reduced smoke propellant and demonstrated good IM characteristics. Completed the evaluation of a booster propellant applicable to Tomahawk and Harpoon/SLAM. This propellant had satisfactory performance and improved vulnerability. Demonstrated that composite rocket motor case could be designed to meet IM and structural requirements of an advanced air-to-air missile system.

2. (U) FY 1994 PLAN:

- (U) ($709) Continue validation and analysis of POA&Ms. Analyze the availability of critical chemicals.

- (U) ($3,232) Development of high explosives includes the following efforts. Complete large scale testing of general purpose explosives and continue to evaluate melt-castable formulations applicable to large warheads, such as JSOW, Tomahawk, SLAM and JDAM. Complete optimization and qualification of an improved pressed metal accelerating explosives for potential use in MK 50 Torpedo, submunitions, or shaped charge warheads. Evaluate underwater explosives with improved shock performance and sensitivity for possible incorporation by shallow water mine clearing.

- (U) ($1,994) Evaluation of IM ordnance concepts includes the efforts below. Conduct full scale testing of technology concepts of weapon ordnance items to support transition for MK 50 Torpedo, Predator, Sidewinder, or JSOW. Continue development, improvement and application of modeling and data bases which reduce and enhance IM warhead design and reduce test efforts.

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PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions
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Date: 7 February 1994

- (U) ($4,524) Develop IM propellants and propulsion systems to include the efforts listed below. Evaluate insensitive booster and sustainer propulsion system in large scale testing. This system could be used by Standard Missile or other surface launched systems. Continue to develop and evaluate an improved performance minimum smoke propellant with less sensitivity using new ingredients such as CL-20. Demonstrate improved light weight rocket motor for application to man portable systems like Predator.

3. (U) FY 1995 PLAN:

- (U) ($899) Continue validation and analysis of POA&Ms. Analyze the availability of critical chemicals.
- (U) ($3,903) Develop high explosives which show improved IM characteristics while maintaining or improving operational performance. Qualify melt-cast general purpose explosive and evaluate performance characteristics such as long term aging. Initiate qualification, scale-up, performance and vulnerability testing of a castable CL-20 based explosive. Conduct large scale generic performance and vulnerability testing of improved underwater explosives.

- (U) ($2,456) Evaluate IM ordnance concepts. Conduct system demonstrations of new high explosives combined with improved warhead and booster designs to support technology transitions. Continue development, improvement and application of modeling and data bases which reduce and enhance IM warhead design and test efforts.

- (U) ($5,350) Develop IM propellants and propulsion systems which provide improved or comparable performance to in-service systems and better IM characteristics. Combine candidate IM propellants and case concepts to demonstrate compliance with IM and performance requirements. Evaluate concepts applicable to advanced air-to-air, shoulder launched and air-to-ground systems. Continue demonstration and evaluation of prototype IM dual thrust rocket motor for surface missile systems.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Dahlgren, VA; NAVSURWARCEN WHITE OAK DET, Silver Spring, MD; NAVSURFWARCENDIV, Indian Head, MD; NAVSURFWARCEN, Crane, IN; NAVAIRWARCENWPNDIV, China Lake, CA; NAVSURFWARCENCARDEROCKDIV, Bethesda, MD.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions
PROJECT NUMBER: S0363
BUDGET ACTIVITY: 4
Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: Non-acquisition program decision document of 7 September 1993.

G. (U) RELATED ACTIVITIES:

- (U) PE 0601153N, Defense Research Sciences
- (U) PE 0602314N, Undersea Surveillance and Weapons Technology
- (U) PE 0602315N, MCM, Mining and Special Warfare Technology
- (U) PE 0603216N, Aviation Survivability
- (U) PE 0604603N, Air-to-Surface Munitions
- (U) Cooperative technology transfer efforts with all weapons project offices are in progress. Close liaison is maintained with PE 0603514N (Shipboard Damage Control Program).

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: NATO AC/310 SG I

J. (U) MILESTONE SCHEDULE:

Transition to Engineering Development	Date
(U) New fuzing/detonator concepts	FY 1993 (4th Qtr)
(U) Continuous Processing/injection loading techniques	FY 1993 (4th Qtr)
(U) Sympathetic detonation resistant explosive for large missile warheads and GP bombs	FY 1994 (3rd Qtr)
(U) Insensitive low signature propellant	FY 1994 (4th Qtr)
(U) Insensitive metal accelerating explosive	FY 1994 (4th Qtr)
(U) Melt-cast general purpose explosive	FY 1995 (4th Qtr)
(U) Demonstration of Insensitive Munitions ordnance concepts	FY 1995 (4th Qtr)
(U) Insensitive high energy booster propellants and motors	FY 1996 (4th Qtr)
(U) Insensitive high energy underwater explosive	FY 1996 (4th Qtr)

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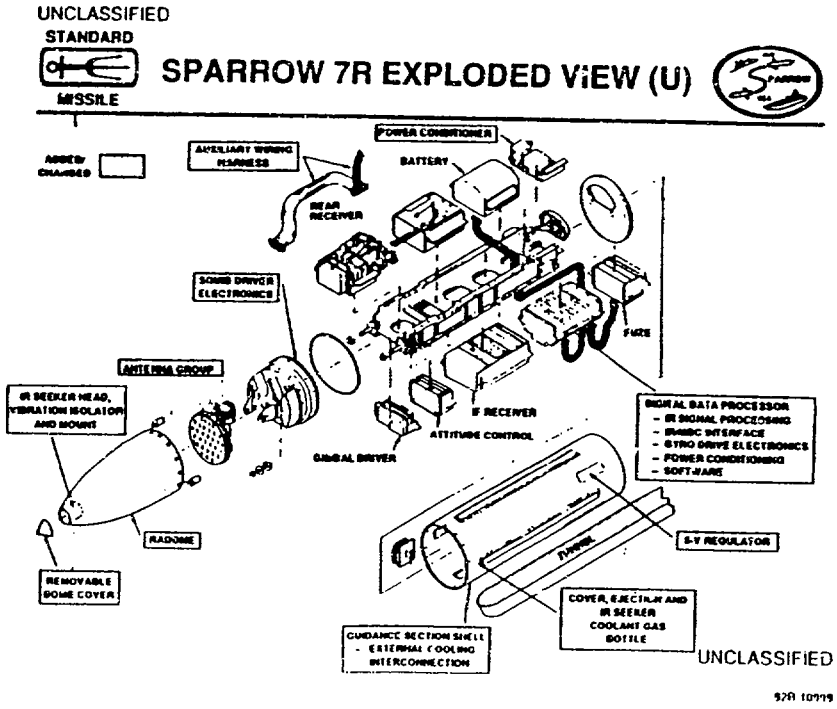
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions

PROJECT NUMBER: U1821
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: Conventional Fuze/Warhead Pkg



POPULAR NAME: Conventional Munitions

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions
PROJECT NUMBER: U1821
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Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES			SPARROW MS III 8/95					
ENGINEERING MILESTONES								
T&E MILESTONES		SPARROW PMTC FLT TEST 4/94 TECHEVAL 9/94	SPARROW OPEVAL 2/95					
CONTRACT MILESTONES		SPARROW LRIP 8/94	SPARROW PROD 9/95					

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	11,969	15,000	21,731	18,380	15,737	11,918	11,729	CONT.
SUPPORT CONTRACT	60	50	40	40	40	40	40	CONT.
IN-HOUSE SUPPORT	20,585	5,292	6,704	6,401	7,513	7,214	7,122	CONT.
GFE/ OTHER	1,900	8,000	275	250	200	190	190	CONT.
TOTAL	34,514	28,342	28,750	25,071	23,490	19,362	19,081	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Navy requires improved lethality of air and surface launched ordnance to defeat advanced threats. This project improves SPARROW missile capability to defeat existing and near term deceptive counter measures with the Missile Homing Improvement Program (MHIP). This project also addresses the combined threat of low observable, low altitude high speed encounters with the Advanced Threat Missile Fuze (ATF). This project also addresses increased lethality against current and emerging threats with development of an integrated guidance and fuzing system and a multi-focusing warhead system. This project will, in future years, also provide the vehicle to address emergent requirements by transitioning mature development with minimum technical and financial risk.

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PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions

PROJECT NUMBER: U1821
BUDGET ACTIVITY: 4

Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($4,120) ADVANCED THREAT MISSILE FUZE SUBPROJECT: Conducted analysis of fly-over test data, completed captive flight tests and archived data for use in future related programs.
- (U) ($6,386) MULTI-FUNCTION PROJECTILE FUZE SUBPROJECT: Corrected design deficiencies, completed production of 60 advanced development fuzes, and staffed acquisition plan.
- (U) ($20,121) SPARROW MISSILE HOMING IMPROVEMENT PROGRAM (MHIP) SUBPROJECT: Continue FSED.
- (U) ($2,200) GUIDANCE INTEGRATED FUZE: Project initiated to fully integrate functions of missile guidance and fuzing section to enhance performance while reducing cost, space and weight. Tasks accomplished included identification of mission, projected threats and stress parameters, defined design objectives, and system configurations.
- (U) ($1,250) ADVANCED AIMED WARHEAD: Project initiated to develop a mass focusing warhead. Tasks accomplished included initial work to define system requirements and interfaces with ordnance system components, threat vulnerability studies, and cost/benefit value added analysis.
- (U) ($437) ADVANCED AIMED FUZE: Project initiated to develop the fuzing function necessary to initiate the Advanced Aimed Warhead. Tasks accomplished included initial work defining system requirements and interfaces with warhead and initial system and component design.

2. (U) FY 1994 PLAN:

- (U) ($15,588) SPARROW MISSILE HOMING IMPROVEMENT PROGRAM (MHIP): Continue FSD; complete MSIIIA; release for LRIP, Conduct At-Sea TECHEVAL; Initiate SPARROW MHIP Pre-planned Product Improvement (P3I) Program; Commence flight testing at PMTC.
- (U) ($570) ADVANCED THREAT MISSILE FUZE SUBPROJECT: Complete analysis of all tests.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions
PROJECT NUMBER: U1821
BUDGET ACTIVITY: 4
Date: 7 February 1994

- (U) ($2,750) GUIDANCE INTEGRATED FUZE: Evaluate candidate system configurations against system requirements to identify most promising candidate system for future further development.
- (U) ($2,630) ADVANCE AIMED WARHEAD: Continue system analysis and design; define future critical test requirements.
- (U) ($1,000) ADVANCED AIMED FUZE: Continue system analyses and design; define future critical test requirements.
- (U) ($504) ORDNANCE COMPOUND TECHNOLOGY: Initiate efforts to design and develop ordnance components to support initiation systems, customized safe-arm devices and fuze contact devices.
- (U) ($5,300) Multi-Function Fuze: Evaluate 60 advanced development fuzes, achieve Milestone II, and award engineering manufacturing development contract.

3. (U) FY 1995 PLAN:

- (U) ($3,500) Conduct At-Sea, OPEVAL 2/95.
- (U) ($3,734) Continue Pre-planned Product Improvement (P3I) Program.
- (U) ($2,200) GUIDANCE INTEGRATED FUZE: Select baseline concept from candidate systems and continue detailed analysis development.
- (U) ($9,900) ADVANCED AIMED WARHEAD: Continue system analyses and design; perform critical test for evaluation of system components.
- (U) ($2,700) ADVANCED AIMED FUZE: Continue design of system components; perform critical laboratory test for evaluation of system components and perform system integration tests.
- (U) ($3,200) ADVANCED AAW WARHEAD IMPROVEMENTS: Initiate project to improve fragmenting warheads, safe and arm (S&A) devices and fuze contact devices (FCD). Conduct static warhead firings.
- (U) ($800) ADVANCED STRIKE WARHEAD IMPROVEMENTS: Initiate project to improve fuze system to allow proper warhead functioning against hard and soft targets for SLAM, Tomahawk and other strike systems. Conduct static arena tests.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions
PROJECT NUMBER: U1821
BUDGET ACTIVITY: 4
Date: 7 February 1994

- (U) ($519) ORDNANCE COMPONENT TECHNOLOGY: Continue with fabrication of demonstration hardware and conduct lab and field demonstration tests.

- (U) ($2,197) PASSIVE/ACTIVE (PACT) FUZE: Initiate project to develop a proximity fuze for a high single shot kill probability against air threats that are high speed, highly maneuverable, small in RCS and flying at extremely low altitudes above sea surface. Define requirements and formulate concept. Initiate supporting investigations.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, China Lake, CA; NAVSURFWARCENDIV, Dahlgren, VA; NAVAIRWARCENWPNDIV, Pt. Mugu, CA; NAVSURFWARCENDIV, Crane, IN. CONTRACTORS: Raytheon, Lowell, MA; Motorola, Scottsdale, AZ; Hughes Missile Systems Company (HMSC), Pomona, CA; IRISS (Joint venture of Raytheon and HMSC).

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

PMP	7/89
TEMP in OPNAV for Review	
MHIP AP SEA 89-02/88-28 (Rev 1)	approved 7/91

G. (U) RELATED ACTIVITIES:

- (U) PE 0603755N (Ship Self Defense)

- (U) PE 0604366N (STANDARD Missile Improvements), Block IIIB fully describes the common milestones for joint program that adds a common seeker to both STANDARD Missile and SPARROW Missile.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603609N
PROGRAM ELEMENT TITLE: Conventional Munitions
PROJECT NUMBER: U1821
BUDGET ACTIVITY: 4
Date: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
WPN Line 18 SPARROW Mods	19,245	26,830	26,797	30,791	59,751	71,256	89,393	CONT.	CONT.

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

J. (U) TEST AND EVALUATION:

SPARROW:

PMTC flight Test	4/94	
At-sea TEMEWAR OPEVAL	9/94	2/95

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603611M
PROGRAM ELEMENT TITLE: Marine Corps Assault Vehicles
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
B0020 Advanced Amphibious Assault Vehicle (AAAV)/1	35,714	19,822	24,558	18,698	11,387	12,355	12,010	CONT.	CONT.
B1293 Stratified Charge Rotary Engine (SCRE)	17,057	0	0	0	0	0	0	0	110,998
C2237 Amphibious Vehicle Test	0	0	1,841	1,883	1,924	1,966	2,009	CONT.	CONT.
TOTAL	52,771	19,822	26,399	20,581	13,311	14,321	14,019	CONT.	CONT.

1. FY 1994 includes Program Element (PE) 0206623M, C0021, Assault Amphibious Vehicle 7A1 (AAV7A1) funding ($2,324). FY 1993 and FY 1995 through FY 1997 AAV7A1 funding and discussion are contained in PE 0206623M.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Advanced Amphibious Assault Vehicle (AAAV) Program will design, develop, produce, and field a successor to the Marine Corps current amphibian, the AAV7A1. The AAAV will fulfill the mission needs of the Marine Corps during the FY 2004 through FY 2030 timeframe. The AAAV is a concept based requirement that supports and is the linchpin of the Department of the Navy's Concepts of "...from the Sea", "Power Projection", "Operational Maneuver from the Sea"; and "Ship to Shore Maneuver". The Amphibious Vehicle Test (AVT) provides facilities and personnel which perform a broad range of testing, repair and technical services to amphibious vehicles. The Stratified Charge Rotary Engine (SCRE) is a lightweight/low volume, high horsepower engine for combat vehicles and other Department of Defense applications. The SCRE was one of several alternatives being evaluated for AAAV application along with conventional diesels and gas turbine engines.

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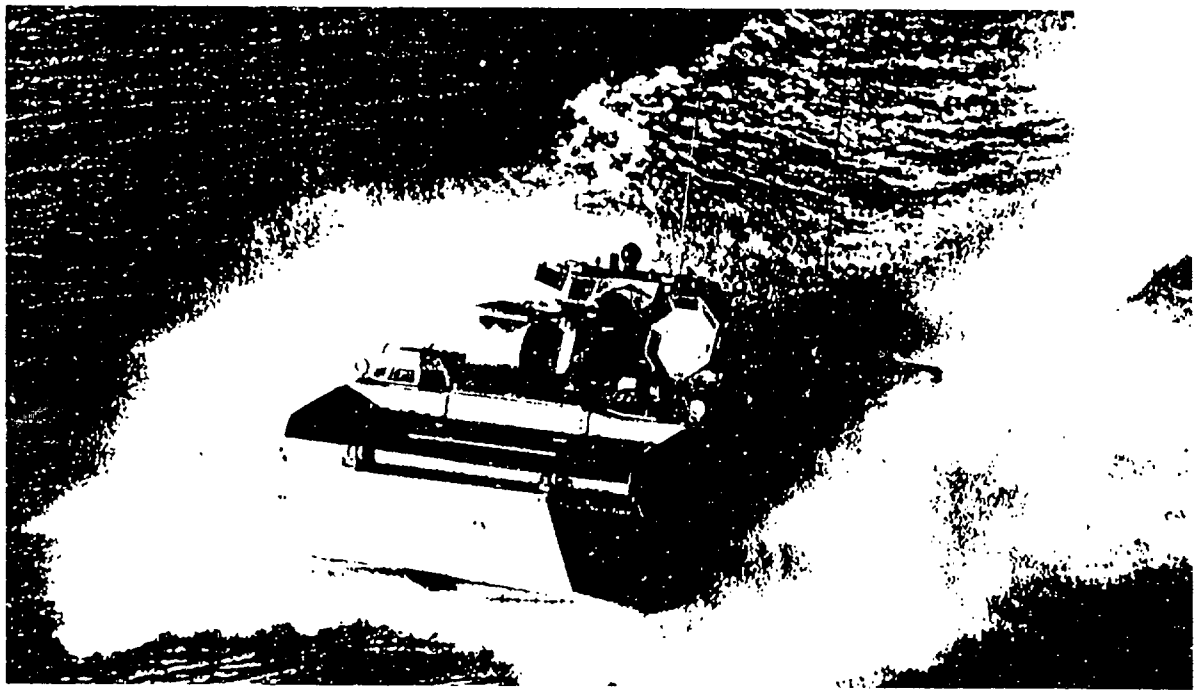
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603611M
PROGRAM ELEMENT TITLE: Marine Corps Assault Vehicles
PROJECT NUMBER: B0020
BUDGET ACTIVITY: 4
Date: 7 February 1994

PROJECT TITLE: Advanced Amphibious Assault Vehicle (AAAV)



POPULAR NAME: AAAV

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603611M
PROGRAM ELEMENT TITLE: Marine Corps Assault Vehicles
PROJECT NUMBER: B0020
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		AAAV MS I MAR 94 AAV7A1 MS II SEP 94					MS II APR 99	CONT.
ENGINEERING MILESTONES		AUTO TEST RIG (ATR) EVAL AAV7A1 Reliability Tests						CONT.
T&E MILESTONES	HYDRODYNAMIC TEST RIG	ATR SUSP. AAV7A1 DTI SEP 94 TEST	ATR MOBIL. TEST			DT I DEC 98	OT I OCT 99	CONT.
CONTRACT MILESTONES		AAV7A1 Test Articles JAN 94	DEM/VAL JAN 95					CONT.

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	25,667	8,043	16,636	13,508	4,507	5,865	7,061	CONT.
SUPPORT CONTRACT	3,103	4,958	4,814	3,124	4,125	4,051	2,700	CONT.
IN-HOUSE SUPPORT	5,686	4,596	2,688	1,108	839	1,065	918	CONT.
GFE/ OTHER	1,258	2,225	420	958	1,916	1,374	1,331	CONT.
TOTAL	35,714	19,822	24,558	18,698	11,387	12,355	12,010	CONT.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603611M
PROGRAM ELEMENT TITLE: Marine Corps Assault Vehicles
PROJECT NUMBER: B0020
BUDGET ACTIVITY: 4
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Qualitative and quantitative improvements in equipment of threat forces make the Marine Corps' current assault amphibian, the Assault Amphibious Vehicle 7A1 (AAV7A1), severely deficient. Developing a replacement system that significantly improves water and land speed, offensive firepower, armor protection, cross country mobility and overall crew and system survivability is the objective of the AAAV program. The AAAV program will eliminate multiple mission area deficiencies in the ship-to-shore movement of the amphibious assault and during subsequent combat operations ashore.

(U) The Concept Exploration/Definition phase of this program completes during FY 1994. Recently completed operational effectiveness analysis and wargames have clearly identified the Advanced Amphibious Assault Vehicle (AAAV) alternative as the best solution to established mission deficiencies. The AAAV's inherent multi-mission capabilities have made it the best choice for being the principle means of surface mobility for forward deployed Marine Air Ground Task Forces (MAGTFs). Program documentation will be completed and approved and a Milestone I Defense Acquisition Board (DAB) Review will be conducted during the second quarter of FY 1994. Ongoing technical risk reducing contracts will be completed by the end of FY 1994 in anticipation of initiating prototype development in FY 1995.

(U) The Amphibious Vehicle Test (AVT) is a one-of-a-kind Department of Defense Test Facility for amphibious vehicles and supports the requirements of all services. The AVT conducts developmental, combined developmental/operational, and follow-on testing and evaluation of production hardware. It also conducts Product Assurance Testing and substitute or alternative part and material testing for amphibious vehicles and associated equipments. Because of its year-round temperate climate, diverse terrain, and 17 miles of coastline, the AVT is ideal for amphibious vehicle, as well as, ship related testing. The amphibian vehicle test branch is in close proximity to San Clemente island which is used frequently for live fire sea to shore testing and high-speed water testing. The AVT is committed to testing product improvement programs, engineering change proposal design changes, and field change requests. FY 1995 and beyond funding and discussions are contained in Project C2237, AVT support, under this program element.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,364) Prepared for DAB review.
- (U) ($21,368) Awarded contracts to FMC and General Dynamics Land Systems to build Automotive Test Rigs (ATRs).
- (U) ($5,678) Conducted engine studies. Received first AAAV 2600 horse[illegible] prototype engine.
- (U) ($360) Conducted studies on Subsurface Obstacle Detection and Avoi[illegible]ystem.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603611M
PROGRAM ELEMENT TITLE: Marine Corps Assault Vehicles
PROJECT NUMBER: B0020
BUDGET ACTIVITY: 4
Date: 7 February 1994

- (U) ($2,278) Using in-house support, provided instrumentation, civilian salaries and travel for Laboratory and Field activities.
- (U) ($1,258) Evaluated the following Technical Risk Reduction projects: water jets, armor, and Hydrodynamic Test Rig (HTR).
- (U) ($3,408) Conducted Propulsion Systems Demonstrator (PSD) effort with high speed endurance runs, surf transit tests, and other hydrodynamic testing.

2. (U) FY 1994 PLAN:

- (U) ($8,156) Design and build full scale Automotive Test Rigs (ATRs) and conduct suspension component testing.
- (U) ($1,810) Continue engine studies, development and testing of prototype engine.
- (U) ($1,647) Continue evaluation of Turbo engine for the propulsion system.
- (U) ($906) Enlist Program Support and commence DAB Milestone I review.
- (U) ($850) Continue studies and start development testing on Subsurface Obstacle Detection and Avoidance System.
- (U) ($2,329) Using in-house support, provide civilian salaries and travel for Laboratory and Field activities.
- (U) ($810) Provide for travel, supplies and services at AVT test site to support scheduled AAV7A1 developmental testing. These funds provide organic supply support including management operations, general accounting, and a maintenance float of equipment. Services include heating, air conditioning and other power charges, long distance telephone support and other routine support such as trash removal. Provides intermediate maintenance (third echelon) of organic non-developmental communication electronic and ordnance equipment.
- (U) ($990) Provide AVT personnel civilian salaries to support scheduled AAV7A1 testing. Plan and conduct developmental tests and report results, identifying any unresolved test issues in accordance with approved test plans and procedures. Prepare analysis of field-reported problems as received. Provide recommendations pertaining to design requirements which effect both operational effectiveness and operational suitability. Perform all echelons of maintenance on developmental items, including all on-hand assets of assault amphibious vehicles, within the capabilities of on-hand personnel, tools, test, and measuring equipment and facilities. Provide technical assistance and recommendations in the test of substitute or alternate parts and materials. Prepare technical analysis of proposed product improvements as requested. Prepare analysis of proposed engineering changes. Conduct hardware testing and evaluation of design changes, including verification of both the design and the technical data, in accordance with approved test plans and procedures. Provide technical assistance in writing and revision of Technical Manuals. Provide technical reviews and recommendations regarding proposed Modification, Technical, Retrofit Instructions, and Retrofit Kit Hardware.
- (U) ($570) Integrate Bradley Fighting Vehicle (BFV) 600 horsepower (Hp) engine de-tuned to 500 Hp into the AAV7A1.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603611M PROJECT NUMBER: B0020 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Marine Corps Assault Vehicles BUDGET ACTIVITY: 4

- (U) ($150) Plan and conduct formal Developmental Test I testing of an AAV7A1 configured vehicle to include BFV engine and suspension and other available modifications in support of required operational capabilities.
- (U) ($50) Prepare AAV7A1 Cost and Operational Effectiveness Analysis.
- (U) ($1,087) Provide engineering support for AAV7A1 improvements and modifications.
- (U) ($467) Complete AAV7A1 validation of suspension technical data package.

3. (U) FY 1995 PLAN:

- (U) ($16,591) Competitively award the Demonstration and Validation effort to one contractor.
- (U) ($1,000) Continue engine studies. Conduct test on AAAV prototype engine.
- (U) ($1,159) Enlist Program Support to coordinate and update program planning and program plan updates, to include test plans.
- (U) ($3,020) Conduct development testing on Subsurface Obstacle Detection and Avoidance System.
- (U) ($2,568) Using in-house support, provide civilian salaries and travel for Laboratory and Field activities.
- (U) ($220) Conduct mobility performance testing of the ATRs at Aberdeen Proving Ground, Aberdeen, Maryland.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: MCCDC, Quantico, VA; NTSC, Orlando, FL; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; Aberdeen Proving Ground, Aberdeen, MD; Amphibious Vehicle Test Branch Directorate, Camp Pendleton, CA. CONTRACTORS: Concept Exploration and Definition (CE/D) Phase: FMC, San Jose, CA; General Dynamics Land Division, Detroit, MI; MKI, Springfield VA; MCR, Falls Church, VA; TMA, Arlington, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603611M
PROGRAM ELEMENT TITLE: Marine Corps Assault Vehicles
PROJECT NUMBER: B0020
BUDGET ACTIVITY: 4
Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:

• (U) Mission Area Analysis	December 1987
• (U) Mission Needs Statement	April 1988
• (U) Initial Life Cycle Cost Estimate	May 1988
• (U) Program Decision Memorandum	July 1988
• (U) Acquisition Decision Memorandum	August 1988
• (U) System Threat Assessment Report	March 1993
• (U) Milestone I	March 1994
• (U) Milestone II	April 1999

G. (U) RELATED ACTIVITIES:

- (U) Project B1293, Stratified Charge Rotary Engine under this Program Element examines AAAV candidate engines.

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

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

J. (U) TEST AND EVALUATION:

- (U) FY 1993: Government monitored and evaluated tests of each contractors' .75/.80 scale hydrodynamic test rigs.
- (U) FY 1994: The contractors will conduct suspension components testing in the development of their full scale ATRs.
- (U) FY 1995: Government to conduct mobility performance tests of each contractors' full scale ATRs.
- (U) FY 1998: Developmental Test I/Operational Test I

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603611M
PROGRAM ELEMENT TITLE: Marine Corps Assault Vehicles
PROJECT NUMBER: C2237
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C2237 Amphibious Vehicle Test. The Amphibious Vehicle Test (AVT) is a one-of-a-kind Department of Defense Test Facility for amphibious vehicles and supports the requirements of all services. The AVT conducts developmental, combined developmental/operational, and follow-on testing and evaluation of production hardware. It also conducts Product Assurance Testing and substitute or alternative parts and material testing for amphibious vehicles and associated equipments. Because of its year-round temperate climate, diverse terrain, and 17 miles of coastline, the AVT is ideal for amphibious vehicle, as well as, ship related testing. The amphibian vehicle test branch is in close proximity to San Clemente island which is used frequently for live fire sea to shore testing and high-speed water testing. The AVT is committed to testing product improvement programs, engineering change proposal design changes, and field change requests. FY 1994 funding and discussions contained in Project B0020 (Advanced Assault Amphibious Vehicle) under this program element.

(U) FY 1993 ACCOMPLISHMENTS: Not applicable.

(U) FY 1994 PLAN: Efforts are funded and discussed in Project B0020 under this program element.

(U) FY 1995 PLAN:

- (U) ($179) Provide for support at AVT test site for scheduled Assault Amphibious Vehicle 7A1 (AAV7A1) developmental testing. AVT support provides engineering, computer programming, archival, diving, ordnance test, and quality control support in addition to test plan data base writing and test vehicle operators and mechanics.

- (U) ($644) Provide for travel, supplies and services at AVT test site to support scheduled AAV7A1 developmental testing. These funds provide organic supply support including management operations, general accounting, and a maintenance float of equipment. The services include heating, air conditioning and other power charges, long distance telephone support and other routine support such as trash removal. Provides intermediate maintenance (third echelon) of organic non-developmental communication electronic and ordnance equipment.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603611M PROJECT NUMBER: C2237 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: Marine Corps Assault Vehicles BUDGET ACTIVITY: 4

- (U) ($1,018) Provide AVT personnel civilian salaries to support scheduled AAV7A1 developmental testing. Plan and conduct developmental tests and report results, identifying any unresolved test issues in accordance with approved test plans and procedures. Prepare analysis of field-reported problems as received. Provide recommendations pertaining to design requirements which affect both operational effectiveness and operation suitability. Perform all echelons of maintenance on developmental items, including all on-hand assets of assault amphibious vehicles, within the capabilities of on-hand personnel, tools, test, and measuring equipment and facilities. Provide technical assistance and recommendations in the test of substitute or alternate parts and materials. Prepare technical analysis of proposed product improvements as requested. Prepare analysis of proposed engineering changes. Conduct hardware testing and evaluation of design changes, including verification of both the design and the technical data, in accordance with approved test plans and procedures. Provide technical assistance in writing and revision of Technical Manuals. Provide technical reviews and recommendations regarding proposed Modification, Technical, Retrofit Instructions, and Retrofit Kit Hardware.

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

(U) WORK PERFORMED BY: IN-HOUSE: Marine Corps Tactical Systems Support Activity, Camp Pendleton, CA. CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES:

- (U) PE 0206623M (Marine Corps Ground Combat/Supporting Arms Systems)
- (U) PE 0603611M, B0020 (Marine Corps Assault Vehicles, Advanced Amphibious Assault Vehicle)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603612M
PROGRAM ELEMENT TITLE: Marine Corps Mine Countermeasures
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1992 AND PRIOR	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C2104 Wide Area Mine Clearing System	0	0	0	0	3,257	4,210	2,811	CONT.	CONT.	
C2106 Advanced Countermeasures System (ACS)[1]	0	0	2,561	6,600	5,569	0	0	0	0	14,730
TOTAL	0	2,561	6,600	5,569	3,257	4,210	2,811	CONT.	CONT.	

1 This program was formerly titled Distributed Explosive Mine Neutralization System (DEMNS). The current title is Advanced Countermeasures System (ACS). FY 1993 funding is contained in Program Element (PE) 0603640M, Marine Corps Advanced Technology Transition Demonstration, Project C2078. FY 1994 funding is split between two program elements; $2,561 in this PE and $3,487 in PE 0603640M. FY 1995 and FY 1996 funding is contained in this PE. FY 1997 through FY 1999 funding is contained in PE 0604612M, Marine Corps Mine Countermeasures (Engineering), Project C2106.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This PE focuses on the development and demonstration of mine clearing/countering devices.

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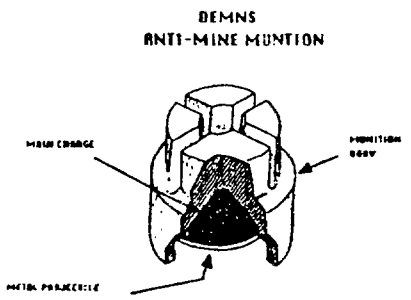
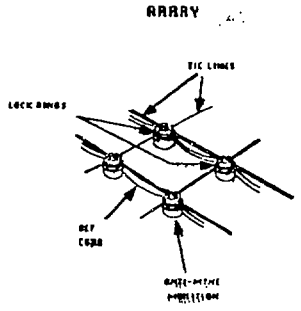
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

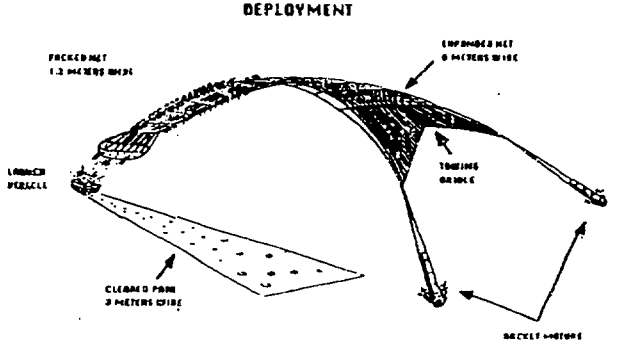
PROGRAM ELEMENT: 0603612M
PROGRAM ELEMENT TITLE: Marine Corps Mine Countermeasures
PROJECT NUMBER: C2106
BUDGET ACTIVITY: 4
Date: 7 February 1994

PROJECT TITLE: Advanced Countermeasures System (ACS)

ADVANCED COUNTERMINE SYSTEM (ACS)







POPULAR NAME: ACS

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603612M PROJECT NUMBER: C2106 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Marine Corps Mine Countermeasures BUDGET ACTIVITY: 4

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		MS I 3RD QTR			MS II 1ST QTR			MS III 1ST QTR 00
ENGINEERING MILESTONES			PDR/CDR		PDR	CDR		
T&E MILESTONES				DT/OT I		DT II 2ND QTR	OT II 2ND QTR	
CONTRACT MILESTONES								

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	0	0	925	4,824	3,974	0	0	0	9,723
SUPPORT CONTRACT	0	0	743	184	172	0	0	0	1,099
IN-HOUSE SUPPORT	0	0	893	1,592	1,423	0	0	0	3,908
GFE/ OTHER	0	0	0	0	0	0	0	0	0
TOTAL	0	0	2,561	6,600	5,569	0	0	0	14,730

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Advanced Countermeasures System (ACS) was formerly titled Distributed Explosive Mine Neutralization System (DEMNS). The ACS program focuses on the development of an Advanced Development Model to demonstrate/validate neutralization of advanced and hardened threat land mines as well as unexploded ordnance. Primary goals are: neutralization in-stride with assault operations; very high neutralization percentages against all type of mines; and neutralization with minimal hazard to personnel and equipment. This is a joint Army/Marine Corps program, with the Army as the lead service, to satisfy the Stand-off Minefield Breacher requirement. The focus of this project is on unique amphibious/expeditionary Marine Corps requirements for the joint program.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603612M
PROGRAM ELEMENT TITLE: Marine Corps Mine Countermeasures
PROJECT NUMBER: C2106
BUDGET ACTIVITY: 4
Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: Accomplishments are funded under PE 0603640M, Project C2078.

2. (U) FY 1994 PLAN:

- (U) ($693) Select candidate designs for Demonstration/Validation system, explosive warheads, and platform integration.
- (U) ($200) Prepare/review Milestone I program documentation.
- (U) ($1,668) Complete System Requirement Review. Complete Milestone I technical/program reviews. Continue joint planning with Army for the Demonstration/Validation phase. Develop contract acquisition plan, solicitations, source selection plans, and engineering trade studies. Award Demonstration/Validation contract.

3. (U) FY 1995 PLAN:

- (U) ($5,008) Continue Demonstration/Validation phase contract.
- (U) ($1,300) Perform cost, schedule and performance trade-off analysis.
- (U) ($100) Update Milestone documentation.
- (U) ($96) Complete Preliminary Design Review.
- (U) ($96) Complete Critical Design Review.

4. (U) PROGRAM TO COMPLETION:

- (U) Complete Developmental Test/Operational Test I. Complete Milestone II documentation. Develop contract acquisition plans and solicitations for Engineering and Manufacturing Development phase. Transition to Engineering and Manufacturing Development, PE 0604612M, Project C2106, the end of FY 1996.
- (U) This program completes Advanced Development at the end of FY 1996.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603612M
PROGRAM ELEMENT TITLE: Marine Corps Mine Countermeasures
PROJECT NUMBER: C2106
BUDGET ACTIVITY: 4
Date: 7 February 1994

D. (U) WORK PERFORMED BY: IN-HOUSE: Belvoir Research, Development and Engineering Center, Ft. Belvoir, VA. CONTRACTORS: To be determined.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

(U) Marine Corps Mission Need Statement September 1993

(U) Army Mission Need Statement September 1993

G. (U) RELATED ACTIVITIES:

- (U) PEs 0603606A/0603619A/0604080A (Standoff Minefield Breacher)
- (U) PE 0603640M (Marine Corps Advanced Technology Transition Demonstration)
- (U) PE 0604612M (Marine Corps Mine/Countermeasures (Engineering))
- (U) The joint program Memorandum of Understanding between Army and Marine Corps is pending final signature.
- (U) This program is in compliance with Tri-Service Reliance agreements.

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

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

J. (U) TEST AND EVALUATION:

- (U) Developmental Test/Operational Test I FY 1996

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603635M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/Support System
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1992 AND PRIOR	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C1598 Nuclear/Biological/Chemical (NBC) Equipment	1,819	0	2,786	2,566	3,775	469	937	CONT.	CONT.	
C1964 Joint Anti-Armor Weapons System (JAAWS)/Javelin	11,936	434	436	210	424	687	0	0	0	14,127
C2108 Tactical Unmanned Ground Vehicle (TUGV)[1]	0	0	0	0	1,893	1,348	945	0	0	4,186
C2112 Lightweight 155 millimeter Howitzer (LW-155)	0	12,436	0	0	0	0	0	0	0	12,436
C2113 Short Range Anti-Armor Weapon (SRAW)	7,619	20,802	8,420	5,148	3,119	6,590	11,044	34,144	105,900	
TOTAL	22,308	21,238	11,416	10,031	8,929	8,004	11,981	CONT.	CONT.	

1 Previous funding contained in Balanced Technology Initiative.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element supports advanced development of Marine Corps Ground/Supporting Arms Systems for utilization in Marine Air Ground Expeditionary Force amphibious operations.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603635M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Support System

PROJECT NUMBER: C1598
BUDGET ACTIVITY: 4

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C1598 Nuclear/Biological/Chemical (NBC) Equipment. The purpose of this project is to complete advanced development of Nuclear, Biological, and Chemical (NBC) equipment. This equipment consists of four categories: individual protection; detection; decontamination; and collective protection. Individual protection consists of the items necessary to protect the individual Marine. Items such as NBC suits, gloves, boots, ar ield protective mask are included. Detection provides the Marine and/or the unit with the ability to detect NBC agents concentrations that are sub-lethal. Decontamination is the capability to remove NBC agents from personnel and/or equipment. Collective protection is the ability to provide filtered air to specified areas that will allow those Marines inside to be free of contamination, thus not having to wear special NBC equipment for protection. The work in this project allows for continued improvement of the Marine Corps NBC defensive posture. This project also includes development of laser eye protection devices.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($269) Designed and reviewed documentation requirements to support Milestone I for the NBC Reconnaissance System (NBCRS).
- (U) ($300) Began efforts to review design, build prototypes, and field test new lightweight NBC gloves/suits.
- (U) ($350) Began field testing laser protection devices that will provide eye protection for Marines.
- (U) ($200) Conducted testing of an individual chemical detector on vehicles.
- (U) ($500) Began efforts to integrate a fielded detection system with a computer NBC Information Warning System that can be remoted up to 5 kilometers away. Continued effort to product improve the M21 Remote Sensing Chemical Agent Alarm so that it will detect chemical agents while on-the-move and up to 5 kilometers.
- (U) ($200) Began efforts to develop a second skin for th M40/M42 protective mask.

(U) FY 1994 PLAN:

- (U) Congress moved FY 1994 funds to Army PE 0603806A.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603635M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Support System

PROJECT NUMBER: C1598
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($510) Complete software integration unit to link NBC equipment into the computer system of the NBCRS.
- (U) ($295) Update documentation of NBCRS for Milestone II.
- (U) ($1,000) Upgrade the automated hazard marking system for the NBCRS to include M2i on-the-move.
- (U) ($210) Obtain radio suites, and geographical positioning systems for the NBCRS.
- (U) ($771) Acquire and conduct testing of the next generation chemical protective suit.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN, Dahlgren, VA; CBDCOM, Aberdeen, MD. CONTRACTORS: Brunswick Corporation, Deland, FL; Battelle Laboratory, Columbus, OH; Environmental Technologies Group, Baltimore, MD.

(U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 91 (BLI# 649500) Lightweight Decontamination System	2,055	0	0	0	0	0	0	0	4,155
• (U) PMC Line 97 (BLI# 666800) Chemical Agent Monitor	912	1,256	0	0	0	0	0	0	4,788

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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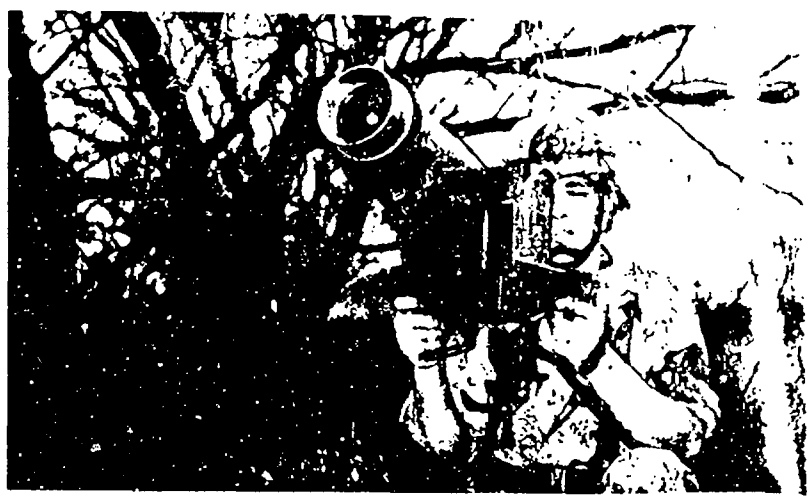
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603635M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Support System

PROJECT NUMBER: C1964
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: Joint Anti-Armor Weapons System (JAAWS)/JAVELIN



POPULAR NAME: JAAWS/Javelin

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603635M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Support System

PROJECT NUMBER: C1964
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999 TO COMPLETE
PROGRAM MILESTONES		DAB Program Review		MS III		IOC	
ENGINEERING MILESTONES							
T&E MILESTONES	FDT&E/IOT&E JOINT DT	JOINT DT	JOINT DT				
CONTRACT MILESTONES		LRIP	FRP				

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	2,096	22	0	0	0	0	0	0	2,118
SUPPORT CONTRACT	953	152	147	160	150	150	0	0	1,712
IN-HOUSE SUPPORT	8,887	260	289	50	274	537	0	0	10,297
GFE/ OTHER	0	0	0	0	0	0	0	0	0
TOTAL	11,936	434	436	210	424	687	0	0	14,127

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603635M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Support System
PROJECT NUMBER: C1964
BUDGET ACTIVITY: 4
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project provides for the Marine Corps participation in the Joint Anti-Armor program entitled Javelin (Advanced Anti-tank Weapon System-Medium (AAWS-M). This unique weapon system will provide the Marine Corps and Army with a state-of-the-art capability to destroy sophisticated and future armored threats. No such medium anti-armor system is currently available to the infantryman.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($267) Continued to monitor and participate in the joint development and operational testing of the Javelin (AAWS-M).
- (U) ($64) Developed Marine Corps supportability concepts.
- (U) ($50) Continued to prepare for Navy Weapon System Explosive Safety Review Board for shipboard qualification.
- (U) ($0) Participated in Force Development Testing and Experimentation (FDT&E).
- (U) ($53) Developed Marine Corps Integrated Logistics Support Plan in accordance with Navy Hardman Plan.

2. (U) FY 1994 PLAN:

- (U) ($204) Continue to monitor the joint development.
- (U) ($117) Continue to participate in the joint developmental testing.
- (U) ($0) Defense Acquisition Board review for Low Rate initial Production.
- (U) ($0) Brief Navy Weapon Safety Explosive Safety Review Board.
- (U) ($25) Participate in joint development of pre-planned product improvement program for new warhead.
- (U) ($90) Develop Marine Corps supportability plan and Milestone III documentation.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603635M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Support System
PROJECT NUMBER: C1964
BUDGET ACTIVITY: 4
Date: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) ($73) Continue to monitor the joint program to include Pre-planned Improvement Program.
- (U) ($65) Continue to participate in the joint program to include developmental testing Pre-planned Improvement Program.
- (U) ($72) Continue to monitor and participate in joint program to include LRIP and follow-on testing.

4. (U) PROGRAM TO COMPLETION:

- (U) No further development or operational testing is required.
- (U) ($424) FY 1996: Continue to monitor and participate in joint Milestone III and Full Rate Production decisions. Achieve Milestone III.
- (U) FY 1997: ($687) Continue to monitor and participate in the joint Full Rate Production decision.
- (U) FY 1998: Achieve Initial Operational Capability (IOC).

D. (U) WORK PERFORMED BY: IN-HOUSE: Army Missile Command, Redstone Arsenal, AL; NAVSURFWARCENDIV, Crane, IN. CONTRACTORS: Texas Instruments/Martin Marietta Joint Venture, Lewisville, TX.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: The Army, which has the lead in this joint project, reduced quantities by 50% during the first quarter of FY 1994. This realignment resulted in the Marine Corps receiving quantities later than initially scheduled, causing the IOC to delay one year.

3. Cost Changes: Data in previous budget not available for comparison.

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FY 1995 RDT&E, NAVY DESCR[illegible] SUMMARY

PROGRAM ELEMENT: 0603635M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Support System

PROJECT NUMB[illegible]: C1964
BUDGET ACTIVITY: 4

Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:

(U) Joint Service Operations Requirements	4 April 1986
(U) Milestone II	May 1989
(U) Test and Evaluation Master Plan	February 1990
(U) System Threat Assessment	August 1990
(U) Integrated Program Assessment - Draft	May 1992
(U) Program Baseline	August 1992

G. (U) RELATED ACTIVITIES:

- (U) Army Armor/Anti Armor programs for heavy and light systems

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line N/A (BLI# 301100) AAWS-M	0	0	0	29,188	43,513	99,892	101,985	CONT.	CONT.

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

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603635M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Support System

PROJECT NUMBER: C1964
BUDGET ACTIVITY: 4

Date: 7 February 1994

J. (U) TEST AND EVALUATION:

• (U) Force Development Test and Experimentation	February - April 1993
• (U) Portability Test	April - May 1993
• (U) Dirty Battlefield Test	May - June 1993
• (U) Pre-production Qualification Test	September 1992 - December 1993
• (U) Initial Operational Testing and Evaluation	October - December 1993
• (U) Joint Developmental Testing	1993-1995

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603635M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Support System

PROJECT NUMBER: C2113
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: Short Range Anti-Armor Weapon (SRAW)

POPULAR NAME: SRAW/Predator

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603635M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Support System
PROJECT NUMBER: C2113
BUDGET ACTIVITY: 4
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		MS II 3RD QTR						
ENGINEERING MILESTONES		PDR	CDR					
T&E MILESTONES								DT I/DT II (FY 2000) OT I/OT II (FY 2001)
CONTRACT MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	4,116	17,770	5,420	2,843	2,014	4,105	7,939	77,686 (29,544)
SUPPORT CONTRACT	490	432	500	105	105	105	105	2,273 (400)
IN-HOUSE SUPPORT	3,013	2,600	2,500	2,200	1,000	2,380	3,000	25,941 (4,200)
GFE/ OTHER	0	0	0	0	0	0	0	0
TOTAL	7,619	20,802	8,420	5,148	3,119	6,590	11,044	105,900 (34,144)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603635M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Support System
PROJECT NUMBER: C2113
BUDGET ACTIVITY: 4
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: SRAW/Predator will provide the Marine Corps with a lethal, disposable, fire and forget, top-attack, soft launch for firing from enclosed spaces, proliferable, accurate, night vision capable, lightweight, main battle tank killer. Modularity of the system will allow development of optimal warheads (flame, bunker-busting, multi-purpose) to fit on the flight module.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($5,000) Completed two full-up missile flights (11 March 1993).
- (U) ($2,619) Completed risk reduction phase.

2. (U) FY 1994 PLAN:

- (U) ($2,000) Achieve Milestone II.
- (U) ($17,696) Initiate Engineering and Manufacturing Development (EMD).
- (U) ($0) Predator program review by Weapons System Explosive Safety Review Board.
- (U) ($1,106) Conduct Preliminary Design Review.
- (U) ($0) Initiate actions to develop a joint program with the Army multi-purpose individual munition warhead program.

3. (U) FY 1995 PLAN:

- (U) ($7,420) Continue EMD phase of program.
- (U) ($1,000) Conduct Critical Design Review.

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603635M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Support System
PROJECT NUMBER: C2113
BUDGET ACTIVITY: 4
Date: 7 February 1994

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Dahlgren, VA. CONTRACTORS: Loral Aeroneutronic Division, Newport Beach, CA; Radian, Dumfries, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: The program is awaiting a Milestone II Decision due to funding issues. Congress has directed that the USMC Predator and US Army MPIM programs develop a joint program. Resolution of this is being completed and the Predator program will proceed into EMD in the near future.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) The following documents were approved prior to the February 1990 Milestone I decision:

  (U) Required Operational Capability
  (U) Acquisition Decision Memorandum
  (U) Acquisition Plan
  (U) Life Cycle Cost Estimate

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603635M
PROGRAM ELEMENT TITLE: Marine Corps Ground Combat/ Support System
PROJECT NUMBER: C2113
BUDGET ACTIVITY: 4
Date: 7 February 1994

- (U) The following are many of the documents which will be approved prior to the April 1994 Milestone II decision:

  (U) Operational Requirements Document
  (U) Systems Threat Assessment Report
  (U) Intelligence Report
  (U) Acquisition Program Baseline Agreement
  (U) Life Cycle Cost Estimate
  (U) Integrated Program Summary
  (U) Test and Evaluation Master Plan
  (U) Developmental Test and Evaluation Report
  (U) Cost and Operational Effectiveness Analysis
  (U) Acquisition Decision Memorandum

- (U) In addition to those listed above, the Live Fire Test and Evaluation Report will be completed prior to Milestone III decision.

G. (U) RELATED ACTIVITIES: Not applicable.

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

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

J. (U) TEST AND EVALUATION:

(U) Developmental Test I/Developmental Test II	FY 2000
(U) Operational Test I/Operational Test II	FY 2001

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations (ATD)
BUDGET ACTIVITY: 3

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1992 & PRIOR	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C2078 Mine Neutralization	3,642	5,504	3,964	5,640	5,768	5,137	1,895	CONT.	CONT.	
C2079 Standoff Mine Detection (SOMD) Systems	0	2,565	3,013	2,037	1,935	0	0	0	0	9,550
C2080 Weaponry	2,259	5,447	6,087	5,863	5,677	960	0	0	0	26,293
C2081 Battlefield Electronic Support	3,353	6,262	7,652	3,905	5,031	2,750	3,025	CONT.	CONT.	
C2082 Chemical/Biological Defense	1,919	843	457	1,676	2,403	2,870	3,804	CONT.	CONT.	
C2115 Joint Tactical Directed Energy Weapon (JTDEW) Technology	2,331	1,678	2,083	1,687	2,030	2,122	4,003	CONT.	CONT.	
C2117 Joint Armor/Anti-Armor Technology (JAAT)	2,000	850	894	1,439	1,893	2,914	4,085	CONT.	CONT.	
C2118 Advanced Engine/Propulsion Technology	2,207	0	1,803	1,924	4,315	4,768	4,922	CONT.	CONT.	
C2153 Joint Very Shallow Water Mine Countermeasures (JVSWMCM)	0	672	1,208	971	1,209	1,204	3,817	CONT.	CONT.	
C2154 Advanced OTH Communications	0	0	0	966	2,713	4,581	5,692	CONT.	CONT.	
TOTAL	23,464	24,909	25,961	25,820	26,322	26,346	31,243	CONT.	CONT.	

B. (U) BRIEF DESCRIPTION OF ELEMENT: As the land warfare component of Naval Expeditionary Forces power projection, the Marine Corps has unique and technolog.cally stressing requirements resulting from its amphibious mission, its Marine Air/Ground Task Force organizational structure, and its reliance on maneuver, logistic sustainability, and intensive

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations (ATD)
BUDGET ACTIVITY: 3

DATE: 7 February 1994

tempo of operations in diverse environments. Critical Marine Corps requirements being addressed in this program element (PE) are Reconnaissance Standoff Mine Detection for surf zone and ashore; Mine Neutralization; Chemical/Biological Defense capability for Marine personnel and material; Advanced Infantry and Vehicle Mounted Weapon Systems; application of computer technology and advanced command and control architectures to Battlefield Electronic Support Systems and Command and Control Systems; protection from, and tactical employment of, emerging laser weapons; and alternative electric very high power/low weight propulsion drive-trains and armor/armament for future vehicles. This is an ongoing program to develop and demonstrate advanced technologies and system concepts in a quasi-operational environment. Multiple transitions into the Demonstration/Validation phase are planned, as well as fieldable prototyping to reduce risk in Engineering and Manufacturing Development. Joint service efforts are in line with Science and Technology Project Reliance agreements and the Joint Chiefs of Staff Joint Warfare Capabilities. Specifically this PE directly supports the following capabilities: to promptly engage regional forces in decisive combat on a global basis, and to maintain near perfect real-time knowledge of the enemy and communicate that to all forces in near real-time. By providing the technologies to enable these capabilities this PE primarily supports the goals and objective of the Strike, Littoral Warfare and Surveillance Joint Mission Areas.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations (ATD)

PROJECT NUMBER: C2078
BUDGET ACTIVITY: 3

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project C2078 - Mine Neutralization: This program develops and demonstrates explosive, mechanical, and electro-magnetic technologies and concepts for neutralizing advanced and hardened threat land mines; wide-area, off-route smart mines; unexploded ordnance; and other obstacles during amphibious assault operations and subsequent operation ashore and in littorals. Primary goals are: neutralization in-stride with assault operations; very high neutralization percentages against all types of mines; and neutralization with minimal hazard to personnel and equipment.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($3,438) Advanced Countermeasures System (ACS) (formerly titled Distributed Explosive Mine Neutralization System (DEMNS)): Completed risk reduction design, development and testing. Optimized/tested key components and sub-systems. Initiated joint planning with Navy surf-zone applications and Army for land applications. Completed Milestone 0 documentation with Army involvement for land applications.

- (U) ($204) Off Route Smart Mine Clearance (ORSMC) (formerly titled Wide Area Mine Clearance (WAMC)): Prepared ATD documentation for planned ATD project (joint with Army).

(U) FY 1994 PLAN:

- (U) ($3,425) ACS: Conduct system demonstrations. Conduct Operational Test-O and extensive Early Operational Assessment. Prepare Level A specification. Obtain Milestone I decision. Transition to Demonstration/Validation phase in PE 0603612M, Marine Corps Mine Countermeasures Systems.

- (U) ($1,182) ORSMC: Begin ATD (joint with Army). Refine concept and optimize candidate neutralization technologies. Initiate extensive design and analysis effort. Initiate design of signature duplication software.

- (U) ($897) Joint Amphibious Mine Countermeasures (JAMC): Begin ATD for craft landing zone and beach area obstacle breaching and mine neutralization capability for near-term Shallow Water Mine Countermeasures scenario. Develop employment concept integrating line charge, distributed explosives, electro-magnetic and mechanical mine neutralization technologies with remotely operated platform. Conduct Critical Design Review. Design and fabricate test component hardware and integrate with efforts in project C2153, Joint

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations (ATD)
PROJECT NUMBER: C2078
BUDGET ACTIVITY: 3
DATE: 7 February 1994

Very Shallow Water Mine Countermeasures, under this program element.

(U) FY 1995 PLAN:

- (U) ORSMC:
- (U) ($250) Design system-level candidate neutralization technologies. Conduct Critical Design Review.
- (U) ($920) Fabricate system and sub-system component hardware.
- (U) ($350) Optimize signature duplication algorithms.
- (U) ($56) Prepare Milestone 0 documentation with Army.

- (U) JAMC:
- (U) ($1,540) Complete fabrication of system component hardware.
- (U) ($598) Conduct Developmental Test and Operational Test-0.
- (U) ($250) Prepare Milestone I/II documentation. Transition system to accelerated Engineering and Manufacturing Development phase.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Indian Head, MD; Army Belvoir Research, Development, and Engineering Center, Ft. Belvoir, VA; Wright Laboratory, Tyndall AFB, FL; Ballistics Research Laboratory, Aberdeen, MD. CONTRACTORS: Lawrence Livermore National Laboratory, Livermore, CA; HiTech Corporation, East Camden, AR; Alliant Technology Systems, Edina, MN; Foster Miller Incorporated, Waltham, MA; Eagle Picher Incorporated, Lubbock, TX.

(U) RELATED ACTIVITIES:

- (U) PE 0602131M (Marine Corps Landing Force Technology)
- (U) PE 0602315N (Mine Countermeasures, Mining and Special Warfare Technology)
- (U) PE 0603555N (Sea Control and Littoral Warfare Technology Demonstration)
- (U) PE 0603606A (Landmine Warfare and Barrier Advanced Technology) Negotiations are underway to join Army programs and the ACS/ORSMC projects into joint programs at the appropriate milestone.
- (U) PE 0603612M (Marine Corps Mine Countermeasures Systems)
- (U) PE 0603619A (Landmine Warfare and Barrier Advanced Demonstrations)

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations (ATD)

PROJECT NUMBER: C2078
BUDGET ACTIVITY: 3

DATE: 7 February 1994

- (U) PE 0603635M (Marine Corps Ground Combat/Support System)
- (U) PE 0603782N (Shallow Water Mine Countermeasures Demonstrations)
- (U) PE 0604808A (Landmine Warfare and Barrier Engineering Development)
- (U) This program is in compliance with Tri-Service Reliance Agreements.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640N
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations (ATD)

PROJECT NUMBER: C2079
BUDGET ACTIVITY: 3

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project C2079 - Standoff Mine Detection (SOMD) Systems: SOMD technologies contain the Coastal Battlefield Reconnaissance and Analysis (COBRA) system which develops technologies for Marine Corps amphibious operations and Army/Marine Corps land operations, including detection of buried land mines. Requirements are real-time high speed day/night operations, and detection at standoff ranges up to 300 meters. This program also demonstrates sensor technologies such as passive multi-spectral optical, infrared cameras, as well as advanced image processing algorithms. Program will be joint between Marine Corps, Army and Advanced Research Projects Agency, building on accomplishments of the Army Standoff Minefield Detection System and transitioning Navy/Marine Corps exploratory development multi-spectral imaging technologies. COBRA will demonstrate far-field multi-spectral/sensing techniques while operating from an air platform.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($623) Developed techniques for long-range detection of buried mines based on multi-spectral multi-sensor fusion and advanced image processing algorithms.
- (U) ($623) Defined system concepts, conducted experimental investigations of competing sensor and processing technologies, and initiated technology development.
- (U) ($1,319) Integrated COBRA Phase I sensor into a Pioneer Unmanned Aerial Vehicle.

(U) FY 1994 PLAN:

- (U) ($1,004) Draft Mission Needs Statement and Developmental Test/Operational Test-O Test Plans. Design enhanced (Phase II) sensor, ground-based operator's display, and automatic target recognition algorithm.
- (U) ($1,004) Conduct sensor trade-off study. Conduct sensor sub-component check-out/testing. Design enhanced sensor/Pioneer integration interfaces.
- (U) ($1,005) Initiate component fabrication and preliminary flight tests.

(U) FY 1995 PLAN:

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640N
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations (ATD)

PROJECT NUMBER: C2079
BUDGET ACTIVITY: 3

DATE: 7 February 1994

- (U) ($509) Complete COBRA prototype system design/integration.
- (U) ($509) Complete component and system fabrication.
- (U) ($509) Conduct Developmental Test-O for full system including flight tests.
- (U) ($510) Complete development of infrared capability within multi-spectral sensor. Conduct early operational assessment, Operational Test-O and prepare for transition to Demonstration/Validation (DEM/VAL).

(U) PROGRAM TO COMPLETION:

- (U) COBRA is scheduled to complete at the end of FY 1996, transitioning to DEM/VAL.

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENCOASTSYSTA, Panama City, FL; Army Belvoir Research, Development and Engineering Center, Ft. Belvoir, VA. CONTRACTORS: Department of Energy, Las Vegas, NV; Lawrence Livermore National Laboratory, Livermore, CA; KAMAN Aerospace, Tucson, AZ and Bloomfield, CT; University of Washington, Seattle, WA. Others to be determined.

(U) RELATED ACTIVITIES:

- (U) PE 0602131M (Marine Corps Landing Force Technology)
- (U) PE 0602315N (Mine Countermeasures, Mining and Special Warfare Technology)
- (U) PE 0603555N (Sea Control and Littoral Warfare Technology Demonstration)
- (U) PE 0603606A (Landmine Warfare and Barrier Advanced Technology)
- (U) PE 0603612M (Marine Corps Mine Countermeasures)
- (U) This program is in compliance with Tri-Service Reliance Agreements.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TASK: Marine Corps Advanced Technology Demonstrations (ATD)
PROJECT NUMBER: C2080
BUDGET ACTIVITY: 3
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project C2080 - Weaponry: The purpose of this project is to improve the combat power (lethality/tactical flexibility) of the Ground Combat Element of the Marine Air/Ground Task Force (MAGTF). Multiple Advanced Technologies will be developed and demonstrated in increased lethality, training readiness, and target acquisition/fire control. Advanced Gun Systems and mechanisms will improve MAGTF lethality, and reduce the logistics burden. Synthetic Environment Training Devices/Systems Employing Advanced Distributed Simulation Technology will vastly improve the level of individual and unit combat skills, focusing on perishable and critical combat skills. Cannon Caliber Electro Magnetic Gun (CCEMG) is a technology demonstration for Automatic Cannon Rail Gun (20-40 millimeters) for application on future Assault Amphibians using hypervelocity projectiles. Team Target Engagement Simulator (TTES) will produce the technology for individual/small unit force-on-force engagements in an urban environment. Advanced Systems for Air Defense (ASAD) will provide passive acoustic and Electronic Support Measures (ESM) sensors to detect and positively identify aerial threats permitting significantly improved engagement by vehicle and man-portable Stinger fire units. Advanced Light Weight Ground Weaponry (ALWGW) will address, in multiple sub-tasks, advanced lethal mechanisms to engage fortified positions; structural/armor targets; and enhanced targeting sensor technologies improving detection, acquisitions and engagements. Other service efforts are leveraged. Joint efforts are pursued with the other services through Tri-Service Science and Technology Reliance agreements, the Joint Services Small Arms Program, and other means.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($3,000) CCEMG: Completed system analysis and component trade-off. System design finalized. Initiated component fabrication.
- (U) ($500) ASAD: Validated cueing and target detection capability. Demonstrated acoustic/ESM sensor performance.
- (U) ($947) TTES: Initiated development of testbed. Established primitive trainee computer generated hostiles for engagement on synthetic urban environment demonstration.
- (U) ($1,000) ALWGW: Conducted technology development to demonstrate enhanced lethality for ground weapons.

(U) FY 1994 PLAN:

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TASK: Marine Corps Advanced Technology Demonstrations (ATD)
PROJECT NUMBER: C2080
BUDGET ACTIVITY: 3
DATE: 7 February 1994

- (U) ($2,890) CCEMG: Complete component fabrication. Initiate component testing, conduct single shot testing.

- (U) ($1,720) ASAD: Refine design and employment concept. Execute multiple developmental contracts for components. Initiate component fabrication.

- (U) ($1,477) TTES: Initiate multiple contracts for enabling technologies. Improve fidelity of Synthetic Urban Environment. Conduct tactical study for Behavioral representation. Test, evaluate and simulate sophisticated tactical behavior.

(U) FY 1995 PLAN:

- (U) ($1,550) CCEMG: Complete component testing. Assemble system on mobile test unit. Conduct Salvo firing demonstration.

- (U) ($1,556) ASAD: Conduct component testing. Complete system integration for vehicle based sensor. Conduct Developmental Test/Operational Test.

- (U) ($2,001) TTES: Evaluate small unit force-on-force engagements on Synthetic Urban Environment. Refine system design and build prototypes.

- (U) ($756) ALWGW: Define Advance Lethal mechanism concepts and conduct technology trade-offs for enhanced engagement of fortified positions and armored targets. Provide preliminary design concepts for Advanced Targeting Sensor concepts.

(U) PROGRAM TO COMPLETION:

- (U) CCEMG: Transition to Army Vehicle Integration ATD in FY 1998.
- (U) ASAD: At Milestone I, transition to Demonstration/Validation (DEM/VAL) during the first quarter of FY 1996.
- (U) TTES: At Milestone I, transition to DEM/VAL during the fourth quarter of FY 1996.

(U) WORK PERFORMED BY: IN-HOUSE: MARCORSYSCOM, Quantico, VA; US Army Armament Research Development and

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TASK: Marine Corps Advanced Technology Demonstrations (ATD)

PROJECT NUMBER: C2080
BUDGET ACTIVITY: 3

DATE: 7 February 1994

Engineering Center, Picatinny, NJ; NAVSURFWARCENDIV, Dahlgren, VA; Naval Training Systems Center, Orlando, FL; Missile Research Development and Engineering Center, Huntsville, AL; NAVAIRWARCENWPNDIV, China Lake, CA.
CONTRACTORS: FMC, Minneapolis, MN; Lockheed Sanders, Nashua, NH; Magnavox, Ft. Wayne, IN; AEL, Lansdale, PA; Institute for Simulation and Training, Orlando FL; University of Pennsylvania, Philadelphia, PA; Argonne National Laboratory, Argonne, IL; Kaman Technologies, Colorado Springs, CO.

(U) RELATED ACTIVITIES:

- (U) PE 0603004A (Weapons and Munitions Advanced Technology). This is an Army Electric Armaments effort.
- (U) PE 0603607A (Joint Service Small Arms Programs).
- (U) This program is in compliance with Tri-Service Reliance Agreements.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 FDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations (ATD)
PROJECT NUMBER: C2081
BUDGET ACTIVITY: 3
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project C2081 - Battlefield Electronic Support: Battlefield Electronic Support demonstrates advanced technologies to improve Marine Corps Command Control, Communications, Computers, and Intelligence (C4I) systems. Efforts are coordinated with the Marine Air/Ground Task Force (MAGTF) C4I system architecture. Technologies are demonstrated under the Naval Opportunities Initiative Program, in order to provide a vehicle for transitioning emerging C4I technologies into scheduled upgrades of MAGTF C4I systems and to establish a single Command and Control (C2) architecture. Capability for Forward Observers and Forward Air Controllers (FO/FAC) to rapidly engage moving targets by enhanced Command, Control and Communications (C3) technologies will also be demonstrated.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,400) Amphibious Assault Networking Technology (AANT): Completed assembly for AANT demonstration node at Marine Corps Tactical Systems Support Activity (MCTSSA).

- (U) ($1,953) Command and Control in the Year 2000 (C2-2000): Identified target MAGTF C4I systems for inclusion. Performed Secure Tactical Data Network (STDN)-4 exercise. Redefined C2-2000 program in light of revalidated requirements. Designed test architecture.

(U) FY 1994 PLAN:

- (U) ($4,372) C2-2000: Begin software conversion, conduct capability demonstrations, and review results of transitioning 32 Marine Corps C4I systems to an open systems environment to run as integrated applications on Joint Maritime Command Information System (JMCIS) as a unified Landing Force Module. Develop the following documentation to support movement of these components to an open systems environment: System/Segment Specification, System/Segment Design Software Requirement Specifications, and Segment Detailed Design Documents.

- (U) ($1,380) FO/FAC: Award Phase II contract and complete detailed design. Conduct Critical Design Review. Initiate component and system fabrication and Developmental Laboratory (Developmental Test-O (DT-O)) testing. This program transitioned from C2115, Joint Tactical Directed Energy Weapon Technology, to this program element, at the end of FY 1993.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations (ATD)

PROJECT NUMBER: C2081
BUDGET ACTIVITY: 3

DATE: 7 February 1994

- (U) ($510) AANT: Finalize software specifications and transition technology to Marine Corps Director for C4I.

(U) FY 1995 PLAN:

- (U) ($6,011) C2-2000: Procure computing and communications hardware to expand the brassboard configuration to simulate afloat and ashore commands. Continue software conversion, conduct capability demonstrations, and review results of transitioning the balance of 32 MAGTF C4I Systems (e.g. Tactical Combat Operations, Improved Direct Air Support Center, Tactical Remote Sensor System, etc.) software to an open systems environment to run as integrated applications on JMCIS as a unified Landing Force Module. Develop the associated software documentation to indicate movement of these components to an open systems environment.

- (U) ($320) Intentionally Short Range Communication (ISRC): Initiate task to demonstrate, in cooperation with Army Survivable Adaptive Systems-ATD, the operational utility of ISRC using unconventional electromagnetic frequencies.

- (U) ($1,321) FO/FAC: Complete DT-O testing, write reports, and upgrade system. Finalize Operational Test-O (OT-O) test plan, conduct OT-O demonstration, and prepare OT-O reports to include recommended upgrades. Integrate related technologies: Ground Target Identification Friend or Foe Technology, Lightweight Laser Target Designator Technology, and Marine Corps Fire support C2 Systems Technology. Complete Milestone I documentation: Technical Data Package/Drawings, System Specifications, Draft Test and Evaluation Master Plan, Life Cycle Cost Estimate, Draft Integrated Logistics Support, and ATD Technical Report. Transition to Demonstration/Validation phase in PE 0206623M, Marine Corps Ground Combat Supporting Arms Systems.

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

(U) WORK PERFORMED BY: IN-HOUSE: MCTSSA, Camp Pendleton, CA; NCCOSC, San Diego, CA; NESEA, St. Inigoes, MD; NAVSURFWARCENDIV, Dahlgren, VA. CONTRACTORS: Harry Diamond Laboratory, Adelphi, MD; TRANSDEC, San Diego, CA; RF Micro Systems, El Cajon, CA; Synetics, Dahlgren, VA; Rockwell, Cedar Rapids, ID.

(U) RELATED ACTIVITIES:
- (U) PE 0204163N (Fleet Communications)
- (U) PE 0206623M (Marine Corps Ground/Supporting Arms Systems)

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations (ATD)

PROJECT NUMBER: C2081
BUDGET ACTIVITY: 3

DATE: 7 February 1994

- (U) PE 0603772A (Battlefield Force Integrations)
- (U) PE 0603794N (C3 Advanced Technology)
- (U) PE 0604719M (Marine Command Control/Communications Systems (Advanced)
- (U) This program is in compliance with Tri-Service Reliance Agreements.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations (ATD)

PROJECT NUMBER: C2082
BUDGET ACTIVITY: 3

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project C2082 - Chemical/Biological Defense: This project provides for Marine Corps unique requirements in Vehicle Survivability enhancements as well as collective Chemical/Biological Defense. Efforts are extensively coordinated with the Army, and focus on leveraging Army technology to support unique Marine Corps requirements related to organic combat and support vehicles.

(U) This project develops new concepts for improved vehicle and crew nuclear/biological/chemical (NBC) survivability in Marine Corps unique fighting vehicles. Demonstrates collective protection, enhanced sustainability, increased mobility and increased survivability in expeditionary NBC environment. In FY 1994 this project transitions from NBC to a vehicle survival focus involving camouflage, low observable, blast/penetration resistance and standoff detection, identification and warning of NBC threats.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($564) Lightweight Integrated Suit Technology (LIST): Completed testing of lightweight suits/rainwear and prepared transition documentation.
- (U) ($327) Finalized candidate materials performance specifications. Transitioned to joint service program.
- (U) ($1,028) Lightweight Standoff Chemical Agent Detector (LSCAD): Completed Operational Testing of unit aboard UH-1 helicopter. Detected chemical agent stimulant while on-the-move at standoff distances up to 5 kilometers. Program transitioned to Demonstration/Validation phase in PE 0603635M, Marine Corps Ground Combat/Support Systems.

(U) FY 1994 PLAN:

- (U) Survivability Technology for Amphibious Vehicles:
  - (U) ($279) Incorporate small, catalytic oxidation filtration system for use as collective protection system into amphibious vehicle.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations (ATD)
PROJECT NUMBER: C2082
BUDGET ACTIVITY: 3
DATE: 7 February 1994

- (U) ($269) Address low observable technologies and mine/blast survivability issues. Initiate joint effort with the Army.
- (U) ($295) Utilize small lightweight detectors and sensors to construct NBC monitoring system.

(U) FY 1995 PLAN:

- (U) Survivability Technology for Amphibious Vehicles:
  - (U) ($200) Continue engineering designs and integration of filtration system, collective protection system, and NBC detection and warning systems.
  - (U) ($157) Continue low observable technology designs and mine/blast survivability vehicle improvements.
  - (U) ($100) Define performance goals for explosively formed projectile survivability.

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

(U) WORK PERFORMED BY: IN-HOUSE: US Army Natick Research and Development Center, Natick, MA; NAVSURFWARCENDIV, Dahlgren, VA; Edgewood Research, Development and Engineering Center, Aberdeen, MD; Tank Automotive Research, Development and Engineering Center, Warren, MI. CONTRACTORS: Los Alamos National Laboratory, Los Alamos, NM; Battelle, Columbus, OH; Solar Turbines, San Diego, CA; Hughes Aircraft, Santa Barbara, CA.

(U) RELATED ACTIVITIES:

- (U) PE 0603611M (Marine Corps Assault Vehicles)
- (U) PE 0603635M (Marine Corps Ground Combat/Support System)
- (U) PE 0603759A (Chemical Biological Defense and Smoke Advanced Technology)
- (U) PE 0604806A (Chemical/Biological Defense Equipment - Engineering Development)
- (U) This program is in compliance with Tri-Service Reliance Agreements.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations (ATD)
PROJECT NUMBER: C2115
BUDGET ACTIVITY: 3
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project C2115 - Joint Tactical Directed Energy Weapon Technology (JTDEW): This project provides Marine Corps participation in joint demonstrations of defensive and offensive directed energy (DE) technologies. The Tactical DE Weapon program has been classified into the categories of defensive measures, target acquisition, and advanced applications. The focus is on protection of Marines and their optics/electro-optic systems as well as development of alternative lethal and less-than-lethal weapons effects.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($146) Continued participation in joint service frequency-agile protection program. Demonstrated prototype system hardware.
- (U) ($600) Began joint (Army) service, international (United Kingdom) OUTRIDER Combat Protection System program, utilizing STINGRAY technology and demonstrated it on a High Mobility Multi-Purpose Wheeled Vehicle platform.
- (U) ($685) Conducted Developmental Test-O of a high average power diode pump laser.
- (U) ($900) Forward Observer/Forward Air Controller (FO/FAC): Completed system design and design trade-off analysis and awarded contracts for system optimization. Scheduled Developmental Testing. This program transferred to Project C2081, Battlefield Electronic Support, under this program element at the end of the fiscal year.

(U) FY 1994 PLAN:

- (U) ($100) Test prototype agile laser protection devices delivered in FY 1993.
- (U) ($50) Continue Operational Test Plan for OUTRIDER.
- (U) ($200) Initiate fabrication of self-contained OUTRIDER system (on-board power).
- (U) ($1,120) Begin technical testing of OUTRIDER. Continue joint DE measuring efforts of active countermeasure systems. Initiate integration of target hand-off system (FO/FAC) with OUTRIDER.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations (ATD)

PROJECT NUMBER: C2115
BUDGET ACTIVITY: 3

DATE: 7 February 1994

- (U) ($208) Develop high power laser applications using advanced materials and micro channel cooling technologies.

(U) FY 1995 PLAN:

- (U) ($100) Initiate early operational assessment for OUTRIDER.
- (U) ($1,524) Integrate automated target hand-off capability. Conduct Operational Test-O and prepare for transition to Demonstration/Validation (DEM/VAL). Conduct extensive modelling and simulation in support of DEM/VAL concept definition.
- (U) ($100) Prepare Milestone I transition documentation.
- (U) ($272) Investigate high-power laser enhancements.
- (U) ($87) Develop performance specifications. Draft Operational Requirements Documentation.

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

(U) WORK PERFORMED BY: IN-HOUSE: MARCORPSYSCOM, Quantico, VA; NAVAIRWARCENACDIV, Warminster, PA; Center for Night Vision and Electro-Optics, Ft. Belvoir, VA; NRDEC, Natick, MA; ARPA, Arlington, VA; Army Communications and Electronics Command, Ft. Monmouth, NJ. CONTRACTORS: Lawrence Livermore National Laboratory, Livermore, CA; Los Alamos National Laboratory, Los Alamos, NM; Martin Marrietta, Orlando FL.

(U) RELATED ACTIVITIES:

- (U) PE 0602131M (Marine Corps Landing Force Technology)
- (U) PE 0602301E (Computing Systems and Communication Technology)
- (U) PE 0604207A (STINGRAY)
- (U) PE 0604710A (Night Vision Systems - Engineering Development)
- (U) This program is in compliance with Tri-Service Reliance Agreements.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Draft Agreement in process with U.K.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TASK: Marine Corps Advanced Technology Demonstrations (ATD)

PROJECT NUMBER: C2117
BUDGET ACTIVITY: 3

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project C2117 - Joint Armor/Anti-Armor Technology (JAAT): Joint Armor/Anti-Armor Technology explores high risk, high pay-off innovative technologies to enhance the lethality and survivability of the individual Marine. Efforts are extensively coordinated with the Army and leverage Army technology to meet Marine Corps operational requirements, including situational awareness communications, target acquisition, combat identification and lightweight armor protection. The focus is lightweight technology compatible with Marine Corps operational environments.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,000) Developed advanced Chemical Energy (CE) warhead concepts - multi-purpose warhead technology, coupled CE and Kinetic Energy (KE) lethal mechanisms.
- (U) ($950) Developed advanced KE penetrators - alternate penetrator materials and hypervelocity projectile design.
- (U) ($25) Developed high-performance, lightweight, marine environment compatible armor for Marine Corps unique combat vehicles (Light Armored Vehicle/Assault Amphibious Vehicle).
- (U) ($25) Joint Advanced Research Projects Agency/Army/Marine Corps Memorandum of Understanding expired at the end of FY 1993. Transitioned promising armor and CE Warhead technologies to Marine Corps programs, and initiated joint program planning for follow-on efforts with the Army.

(U) FY 1994 PLAN:

- (U) ($50) Initiate Marine Corps participation in the Joint 21st Century Land Warrior (21CLW), Top Level Demonstration portion of the joint Army/Marine Corps/Department of Defense (DoD) Thrust Area 5, Advanced Land Combat.
- (U) ($400) Initiate design optimization of man-portable, target acquisition, anti-personnel and Anti-Armor Technologies.
- (U) ($400) Begin miniaturization efforts with Situational Awareness Technologies.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TASK: Marine Corps Advanced Technology Demonstrations (ATD)

PROJECT NUMBER: C2117
BUDGET ACTIVITY: 3

DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($44) 21CLW continues as a Top Level Demonstration in Advanced Land Combat. Army has lead on this joint project.
- (U) ($400) Demonstrate man-portable, target acquisition, anti-personnel and Anti-Armor Technologies in an integrated individual system.
- (U) ($450) Begin integration of Situational Awareness Technologies into an integrated individual system.

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

(U) WORK PERFORMED BY: IN-HOUSE: MARCORPSYSCOM, Quantico, VA; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; Combat Systems Test Activity, Aberdeen, MD. CONTRACTORS: Los Alamos National Laboratory, Los Alamos, NM; Lawrence Livermore National Laboratory, Livermore, CA; Alliant Technology Systems, Brooklyn Park, NM; DuPont, Newark, DE; Foster Miller, Waltham, MA; GDLS, Warren, MI; KAMAN, Colorado Springs, CO; FMS, San Jose, CA; Aerojet Electro-Systems, Azusa, CA; Nuclear Metals Incorporated, Concord, MA; Physics International Company, San Leandro, CA.

(U) RELATED ACTIVITIES:

- (U) PE 0602618A (Ballistics Technology)
- (U) PE 0603226E (Experimental Evaluation of Major Innovative Technologies)
- (U) This program is in compliance with Tri-Service Reliance Agreements.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstration (ATD)

PROJECT NUMBER: C2118
BUDGET ACTIVITY: 3

DATE: 7 February 1995

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project C2118 - Advanced Engine/Propulsion Technology: This program develops and demonstrates alternative electric engine and propulsion, lethality and survivability systems, and component advanced technologies to meet Marine Corps unique water and land mobility requirements. The engine technology will achieve weight, speed, range, and marine-environment compatibility requirements for future Marine tactical vehicles. The emphasis is on extreme power density, fuel efficiency, and reliability in adverse sea/salt spray environment.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($35) Completed combustion photography experiment.
- (U) ($235) Finished detail design of German Motoren Und Turbinen-Union (MTU) 2600 horsepower (Hp) engine. Procured long lead items and conducted Developmental Testing.
- (U) ($718) Tested Turbo-Rotor-Compound mono-cylinder test rig at higher Hp levels.
- (U) ($825) Tested Helicopter Transportable Multi-Mission Platform and other light strike vehicle variants.
- (U) ($394) Completed testing of Advanced Medium Tactical Vehicle Fleet 8 ton truck.

(U) FY 1994 PLAN: Not applicable.

(U) FY 1995 PLAN:

- (U) ($404) Test and evaluate all electric Amphibious Assault Vehicle-P7 Advanced Power System.
- (U) ($255) Begin fabrication of hybrid electric/internal combustion power source in a lightweight mobility test bed.
- (U) ($255) Continue testing advanced diesel engine for possible integration into a medium class armored vehicle for hybrid developments.
- (U) ($889) Begin installation/integration of crypto pulse propulsor into Propulsion Systems Demonstration.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstration (ATD)

PROJECT NUMBER: C2118
BUDGET ACTIVITY: 3

DATE: 7 February 1995

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

(U) WORK PERFORMED BY: IN-HOUSE: MARCORSYSCOM, Quantico, VA; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; Tank Automotive Research, Development and Engineering Center, Warren, MI. CONTRACTORS: MTU Corporation, Fredrichsfafen, Germany; Detroit Diesel, Detroit, MI; Engine Corporation of America, Anaheim, CA; AAI Corporation, Cockeysville, MD.

(U) RELATED ACTIVITIES:

- (U) PE 0602702E (Tactical Technology)
- (U) PE 0603005A (Combat Vehicle and Automotive Advanced Technology)
- (U) This program is in compliance with Tri-Service Reliance Agreements.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Agreement in process with FRG.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations (ATD)

PROJECT NUMBER: C2153
BUDGET ACTIVITY: 3

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project C2153 - Joint Very Shallow Water Mine Countermeasures (JVSWMCM): This project focuses on the development and demonstration of technologies and concepts for neutralizing advanced and hardened mines as well as wide-area, standoff type mines, unexploded ordnance, and obstacles in the surf zone/beach area of the Amphibious Operations Area. Primary goal is to support the approved near-term Very Shallow Water Mine Counter-measures concept of operations for the beach/craft landing zone areas for the following functions: neutralization while moving with assault operation; very high neutralization percentages against all types of mines; and neutralization with minimal hazard to personnel and equipment. This project will be the Marine Corps' share of the joint Marine Corps and Navy program and will specifically address amphibious craft landing zone needs in the foreshore/beach zone not covered by Army or Navy projects. This project is coordinated with project C2078, Mine Neutralization, under this program element which covers the land side of the transition area.

(U) FY 1993 ACCOMPLISHMENTS: Not applicable.

(U) FY 1994 PLAN:

- (U) ($144) Link mechanical/electro-magnetic/explosive technologies to Navy's Explosive ATDs. Develop concepts for employment. Design system components. Conduct Critical Design Review.
- (U) ($478) Initiate fabrication of system component hardware.
- (U) ($50) Integrate with Joint Amphibious Mine Countermeasures (JAMC) ATD in C2078.

(U) FY 1995 PLAN:

- (U) ($808) Continue fabrication of component hardware.
- (U) ($150) Conduct Developmental Test and Operational Test-O.
- (U) ($250) Integrate with JAMC and Navy Explosive Mine Neutralization ATD to unite land and surf zone countermeasure systems. Conduct live minefield test.

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TITLE: Marine Corps Advanced Technology Demonstrations (ATD)

PROJECT NUMBER: C2153
BUDGET ACTIVITY: 3

DATE: 7 February 1994

(U) WORK PERFORMED BY: IN-HOUSE: Wright Laboratory, Tyndall AFB, FL; NAVSURFWARCENDIV, Indian Head, MD; NAVCIVENGLAB, Port Hueneme, CA. CONTRACTORS: Foster Miller Engineers, Waltham, MA.

(U) RELATED ACTIVITIES:

- (U) PE 0603555N (Sea Control and Littoral Warfare Technology Demonstration)
- (U) PE 0603782N (Shallow Water Mine Countermeasures Demonstrations)
- (U) This program is in compliance with Tri-Service Reliance Agreements.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603654N
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Q0377 Joint Service Explosive Ordnance Disposal System	5,859	6,322	6,320	6,107	6,055	6,208	6,366	CONT.	CONT.
Q1317 Explosive Ordnance Disposal Diving Systems	3,249	2,659	2,603	2,731	2,781	2,787	2,723	CONT.	CONT.
TOTAL	9,108	8,981	8,923	8,838	8,836	8,995	9,089	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This is a Joint Service Program. This program provides for the development of Explosive Ordnance Disposal tools and equipment for use by all military services. The responsibility is assigned to the Navy as single service manager, by Department of Defense Directive 5160.62 of 26 April 1989, for management of the Joint Service Explosive Ordnance Disposal Research and Development Program. Increasing types of foreign and domestic weapons necessitate a continuing development program to provide Explosive Ordnance Disposal personnel of all military services with the special equipment and tools required to support this mission. This program also provides life support related equipment necessary to support the performance of Navy Explosive Ordnance Disposal tasks underwater. This equipment must have inherently low acoustic and magnetic signatures in order to allow the Explosive Ordnance Disposal technician to safely approach, render safe and dispose of sea mines and other underwater ordnance.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603654N
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development
PROJECT NUMBER: Q0377
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: Q0377, Joint Service Explosive Ordnance Disposal System. Provides Explosive Ordnance personnel of all miiitary services with the specialized equipment and tools required to support their mission of detection, location, identification, rendering safe, recovery, field and laboratory evaluation, and final disposal of nuclear, conventional, chemical, and biological munitions, including improvised explosive devices.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($4,709) Held system design reviews for Remote Ordnance Neutralization System (RONS) and Mobile Ordnance Disruption System (MODS).
- (U) ($200) Reached IOC for MK 29 All Metals Locator.
- (U) ($950) Completed TECHEVAL and OPEVAL for Diver Acoustic Navigation System (DANS).

(U) FY 1994 PLAN:

- (U) ($350) Obtain approval for production for EX 50 Mod 0 Remote Controlled Reconnaissance Monitor.
- (U) ($4,712) Complete DT-I testing and obtain Milestone II decision for MODS and RONS.
- (U) ($1,260) Initiate Lightweight Disposable Disrupter and Remote Firing Device projects.

(U) FY 1995 PLAN:

- (U) ($4,718) Complete DT-IIA testing on the RONS and MODS projects.
- (U) ($1,152) Obtain Milestone II decision for Lightweight Disposable Disrupter.
- (U) ($450) Initiate Explosively Actuated Tools project.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603654N
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development
PROJECT NUMBER: Q0377
BUDGET ACTIVITY: 4
DATE: 7 February 1994

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVEODTECHCEN, Indian Head, MD. CONTRACTORS: Datasonic, Inc., Cataumet, MA; Battelle-PNL, Richland, WA; Battelle-Columbus, OH; SPARTA, INC, Huntsville, AL; OAO, Greenbelt, MD.

(U) RELATED ACTIVITIES:

- (U) PE 0602315N (MCM, Mining and Special Warfare Technology) provides for the development of new technologies which show promise and the transition to advanced development.
- (U) PE 0604654N (Joint Service Explosive Ordnance Disposal Development) provides for the integration of specialized tools and equipment into specified procedures required for individual weapons and ordnance items.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 180	697	592	1,200	0	0	0	0	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603654N
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development
PROJECT NUMBER: Q1317
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: Q1317, Explosive Ordnance Disposal Diving Systems. Development of diving equipment and explosive charges to support Explosive Ordnance Disposal (EOD) underwater operation. The equipment must have inherently low acoustic and magnetic signatures in order to allow the EOD technician to safely approach, render safe, and dispose of sea mines and other underwater ordnance.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($390) Completed development and gained approval for Navy use status for the Underwater Fiberoptic Communications System.
- (U) ($985) Commenced evaluation of improvements in diver worn equipment and procedures which increase diver capability during 300 foot dives.
- (U) ($590) Improved diver operated non-magnetic underwater object location capabilities.
- (U) ($224) Improved EOD non-magnetic underwater object lift capability.
- (U) ($180) Commenced studies of the strength, mobility, and endurance required of Navy EOD technicians to perform their assigned missions in order to establish and validate entry level and maintenance physical fitness requirements.
- (U) ($180) Evaluated non-development item (NDI) capabilities for diving against chemical warfare agents.
- (U) ($700) Continued TECHEVAL of the MK 98 Neutralization Charge.

(U) FY 1994 PLAN:

- (U) ($2,010) Develop equipment which improves diver capability and endurance.
- (U) ($267) Develop a non-magnetic underwater laser augmented imaging system.
- (U) ($209) Develop a non-magnetic underwater lift system.
- (U) ($173) Evaluate non-magnetic acoustic firing devices.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603654N
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development
PROJECT NUMBER: Q1317
BUDGET ACTIVITY: 4
DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($1,063) Continue developing equipment which improves diver capability and endurance.
- (U) ($360) Continue developing a non-magnetic underwater imaging system.
- (U) ($220) Continue developing a non-magnetic underwater lift system.
- (U) ($465) Develop a non-magnetic acoustic firing device.
- (U) ($495) Develop a forward looking sonar.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENCOASTSYSTA, Panama City, FL; NAVSURFWARCEN WHITE OAK DET, Silver Spring, MD; NAVSURFWARCEN ORDSTA, Louisville, KY; NAVEODTECHCEN, Indian Head, MD; NEDU, Panama City, FL.; NAVSURFWARCEN MINEWARENGACT, Yorktown, VA. CONTRACTORS: Applied Physics Laboratory, University of Washington, Seattle, WA; AEROSPACE Design Inc, Carson, CA; HI-TECH INC, East Camden, AK; BREN-TRONIC INC, Long Island, NY; Victoria Machine Works, Victoria, TX; Carleton INC, Tampa, FL.

(U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 35	444	1,196	1,212	1,429	528	2,875	3,602	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603706N
PROGRAM ELEMENT TITLE: Medical Development (Advanced)
BUDGET ACTIVITY: 3

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
M0095 Fleet Health Technology	11,776	12,495	13,291	13,512	13,938	14,232	14,593	CONT.	CONT.
M0096 Fleet Health Standards	4,062	5,307	4,529	4,504	4,609	4,692	4,770	CONT.	CONT.
M2022 Bone Marrow Registry	29,814	36,969	0	0	0	0	0	0	106,087
TOTAL	45,652	54,771	17,820	18,016	18,547	18,924	19,363	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Navy Medical Department's mission includes providing medical care and treatment to Navy and Marine Corps personnel in operational theaters. Goals include increasing return-to-duty rates of troops injured in combat, enhancing personnel performance in demanding Fleet jobs (and the selection of candidates for these jobs), reducing operationally related morbidity and mortality, and ensuring the physical readiness and safety of deployed personnel. This program element supports Joint Support Areas including Readiness, Support & Infrastructure, and Manpower, Personnel & Shore Training. Specifically, this effort supports joint warfighting capabilities by enhancing the Navy's ability to promptly engage regional forces in decisive combat on a global basis. Task areas include return to duty of battlefield casualties, blood and stem cell products and substitutes, treatments for wounds and multiple organ system failure, methods for managing injuries related to extreme thermal environments, and new capabilities in field diagnostics and medical/dental support. This program element also provides validated techniques for the selection of personnel based on medical criteria and standards and procedures which will protect Fleet personnel during exposure to Navy and Marine Corps operational environments. The impact of this program element includes improved medical logistics, safety, Service-wide standards and technologies. This program element also has supported the Navy's effort to register and match donors and complete bone marrow transplants.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603706N
PROGRAM ELEMENT TITLE: Medical Development (Advanced)
PROJECT NUMBER: M0095
BUDGET ACTIVITY: 3
DATE: 7 February 1994

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
M0095 Fleet Health Technology									
	11,776	12,495	13,291	13,512	13,938	14,232	14,593	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Encompasses critical endeavors which will increase the Navy's ability to promptly engage regional forces in decisive combat on a global basis. These endeavors seek to enhance fleet health care, augment field treatment capabilities, and improve medical logistics necessary for support of Naval and Marine Corps forces and combat casualties. Ongoing projects focus on key biomedical and casualty-relevant areas including: (1) blood products, blood substitutes, and hematopoietic stem cells; (2) combat wounds and multiple organ system failure; (3) fleet health in extreme environments; and (4) field diagnostics and medical/dental support capabilities.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,352) Studies were completed on the development and testing of new therapies for septic shock and inflammation which would result in an increase in survival rate and reduce complications to enable the combatant to return to action. Specifically: (1) new treatment regimens for septic shock and related multiple organ system failure were developed and tested, and (2) the treatment of sepsis at the cellular and molecular levels was evaluated.

- (U) ($2,554) Evaluated the safety and therapeutic effectiveness of cryopreserved platelets, and received Federal Drug Administration approval of a procedure using dimethylsulfoxide (DMSO) as a cryoprotectant for human platelets. Cryopreserved platelets significantly reduces the costs and difficulties of drawing and maintaining fresh platelets at fleet hospitals, and dramatically improves the therapy for casualties suffering severe hemorrhage.

- (U) ($1,970) Completed the development of polymerase chain reaction techniques for detecting messenger ribonucleic acid (RNA) for cell surface receptors (CD28, B7, and CTLA4) from small numbers of human and mouse lymphocytes - techniques essential for detecting changes in gene expression as related to immune system recovery. These diagnostic tools serve as integral components of a pioneering therapeutic approach to manipulate the immune system and the development of innovative agents to modulate the immune system function, whether through suppression (a necessary component of "solid" organ, skin and bone marrow transplantation) or augmentation (adoptive immunotherapy and vaccination) holds great promise for treatment of combat casualties or diseases commonly encountered in the military.

- (U) ($1,092) Assessed the effects of cold stress, as it affects physiological, biochemical and behavioral variables, following attempts at psychophysiological enhancement of performance. Naval Special Warfare personnel undergoing winter field training were used to examine the effect of tyrosine administration on cognitive performance during early and late phases of cold acclimation. Tyrosine administration attenuated learning and memory deficits attributed to cold exposure. The payoffs include enhanced ability of troops to withstand adverse climatic conditions, increased safety and mission effectiveness, and reduced injury and disease.

- (U) ($2,081) Completed shipboard evaluation of the Computer Assisted Medical Diagnosis (CAMD) System. Determined the utility of the system's component decision aids for both diagnosis and patient management, and their acceptability by Navy corpsmen. Automated diagnostic modules to assist health care providers enhance medical treatment available and decrease costs due to complications, loss of manpower and unnecessary medical evacuations.

- (U) ($690) Evaluated new methods and materials to prevent and treat dental emergencies and maximize operational readiness in Navy and Marine Corps personnel. The dental treatment needs of Navy and Marine Corps reserve personnel activated for Operation Desert Shield/Storm were determined to generate a dental readiness model.

- (U) ($1,037) Completed studies to determine the role of epidemiological, orthopedic, structural and biomechanical factors related to the risk of musculoskeletal, i.e. overuse, injury among selected U.S. Navy and Marine Corps populations. Specifically: (1) collected data on 300 U.S. Marine Corps recruits to examine the relationship between stress fracture incidence and initial bone geometry; and (2) collected epidemiological data at recruit training and special warfare sites, and determined the rate and type of

musculoskeletal injury for the phase and type of training received. Conclusions: (1) proper preventive interventions during training will preclude costly injuries in terms of time lost to training, attrition, medical rehabilitation costs, and personal suffering; (2) orthotic devices are indicated for individuals determined to be at higher risk of injury due to poor biomechanics; and (3) this database can be applied to mission planning scenarios to project expected morbidity and account for combat-degrading soft-tissue injury.

2. (U) FY 1994 PLAN:

- (U) ($2,537) TREATMENT OF CASUALTIES TO PREVENT SEPSIS AND SEPTIC SHOCK AND COMPLICATIONS ASSOCIATED WITH WOUND INFECTION: Continue animal model studies with monoclonal antibodies and conventional antibodies to prevent septic shock. Complete identified animal studies involving the interaction of growth factors and antibodies to evoke the production of large, rapid immune responses and prevent septic shock. Initiate four new thrusts in sepsis and septic shock research including: (1) identify host inflammatory response differences which occur during comparison of Gram-positive sepsis with Gram-negative sepsis, (2) determine specific effects of antioxidant treatment of sepsis, (3) evaluate two classes of specific anti-inflammatory therapies; one based on inhibition of expression of cell adhesion molecules and the other based on specific inhibition of binding of cell adhesion molecules, and (4) investigate oxygen delivery to tissue during sepsis in animals to identify where oxygen transport is disturbed and how these disruptions in oxygen transport can be treated.

- (U) ($3,152) FROZEN BLOOD PRODUCTS FOR USE AT ECHELON 2 CARE LEVEL: Continue studies required to obtain Federal Drug Administration (FDA) licensure of (1) red blood cells frozen with 40% weight/volume (W/V) glycerol at -80°C for as long as 20 years, and (2) human platelets frozen with 6% dimethylsulfoxide (DMSO) and stored at -80°C for 2 years. Complete studies using different plastic bags and different containers for shipping frozen blood products. Present data to FDA to initiate licensure of methodologies for frozen red blood cells and frozen platelets.

- (U) ($2,125) MODULATION OF IMMUNE SYSTEM OF CASUALTIES: Continue and complete several stages of development of polymerase chain reaction techniques for detecting messenger RNA for different cell surface receptors on mouse and human lymphocytes. Initiate studies of T-lymphocyte costimulatory receptors and their role in regulating T-lymphocyte activation in vivo in order to determine how to regulate (i.e. turn on and off) the

immune system. Specifically: (1) using deoxyribonucleic acid (DNA) techniques, make the DNA constructs necessary to create required transgenic mouse models and introduce these DNA constructs into the mice; (2) characterize the immune system effects of the transgene in the mice; and (3) determine the effect of a cell surface receptor's (i.e. CD28) biologics on immune responses in vivo.

- (U) ($854) PSYCHOPHYSIOLOGICAL ENHANCEMENT OF PERFORMANCE IN EXTREME ENVIRONMENT CONDITIONS: Continue experimental studies on the effects of vasopressin on physiological and behavioral performance under conditions of thermal stress. These studies will support ground troops in desert warfare scenarios having large fluid requirements and a tremendous logistics burden to supply potable water. Complete cold pathophysiology research. Specific studies include: (1) evaluate the effects of tyrosine on the performance of mission related skills by Sea-Air-Land (SEAL) team members during winter training exercises, (2) evaluate new performance assessment battery tests designed to measure cognitive functions, and (3) evaluate the effect of glucose administration on Naval Special Warfare personnel learning underwater navigation skills.

- (U) ($2,008) MEDICAL MANAGEMENT TOOLS AND EQUIPMENT USED IN OPERATIONAL FIELD: Continue to integrate CAMD System and Shipboard Automated Medical System (SAMS), and expand diagnostic and treatment plan support. Complete clinical trials to evaluate the noninvasive transcutaneous analytic measurement method involving the reflection of infrared light from the skin to measure 9 blood analytes. The use of noninvasive blood analysis devices reduces the cost, logistic support, and provides immediate real time information to support casualty care at Echelon 2 care level. Initiate clinical trials to evaluate and test noninvasive transcutaneous hematocrit/oxygen saturation monitor.

- (U) ($714) DENTAL EMERGENCY READINESS: Continue testing of new methods and materials to prevent and treat dental emergencies and maximize operational readiness in Navy and Marine Corps personnel. This includes: (1) evaluating the performance of dental materials in the laboratory and clinic, especially in the area of longevity of autoclaved instruments, (2) evaluating the potential of new materials to reduce costs while improving overall infection control, and (3) field testing promising dental equipment, especially for emergency contingencies.

- (U) ($1,105) PREVENTION AND TREATMENT OF MUSCULOSKELETAL INJURIES: Continue to develop the database on the role of epidemiological, orthopedic, structural and biomechanical factors related to the risk of musculoskeletal, i.e. overuse, injury among select U.S. Navy and Marine Corps populations. Complete effort

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603706N
PROGRAM ELEMENT TITLE: Medical Development (Advanced)
PROJECT NUMBER: M0095
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to derive predictive models of stress fracture susceptibility in military personnel by use of noninvasive measurements of bone structure. Develop a general classification function from an extensive data base of biomechanical information in order to identify injury-prone individuals.

3. (U) FY 1995 PLAN:

- (U) ($2,823) SEPSIS AND SEPTIC SHOCK: Continue development of four new thrusts: (1) identify host inflammatory response differences which occur during comparison of Gram-positive sepsis with Gram-negative sepsis, (2) determine specific effects of antioxidant treatment of sepsis, (3) evaluate two classes of specific anti-inflammatory therapies; one based on inhibition of expression of cell adhesion molecules and the other based on specific inhibition of binding of cell adhesion molecules, and (4) investigate oxygen delivery to tissue during sepsis in animals to identify where oxygen transport is disturbed and how these disruptions in oxygen transport can be treated.

- (U) ($3,200) FROZEN BLOOD PRODUCTS: Complete studies required to obtain FDA licensure of red blood cells frozen with 40% W/V glycerol at -80#C for as long as 20 years. Submit report and data to FDA for licensure of human platelets frozen with 6% DMSO and stored at -80#C for 2 years, and perform any additional studies required by the FDA.

- (U) ($2,040) MODULATION OF IMMUNE SYSTEM: Continue studies with T-lymphocyte costimulatory receptors and their role in regulating T-lymphocyte activation <u>in vivo</u> to determine how to regulate (i.e. turn on and off) the immune system. Specifically: (1) characterize the immune system effects of the transgenes <u>in vivo</u>, and study the effects of a cell surface receptor's (i.e. CD28) biologics in the various <u>in vivo</u> models; and (2) create pure transgenic mouse strains for specific models.

- (U) ($864) ENHANCE PERFORMANCE IN EXTREME ENVIRONMENTAL CONDITIONS: Continued evaluation of the effects of vasopressin on physiological and behavioral performance under conditions of thermal stress.

- (U) ($2,643) MEDICAL MANAGEMENT TOOLS AND EQUIPMENT FOR TREATMENT OF CASUALTIES: Continue to interface the Epidemiological Information System (EPISYS), SAMS and selected medical databases. Continue to develop models for projecting casualty rates for various battle intensities. Continue to validate the casualty projection system for shipboard casualties.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603706N
PROGRAM ELEMENT TITLE: Medical Development (Advanced)
PROJECT NUMBER: M0095
BUDGET ACTIVITY: 3
DATE: 7 February 1994

- (U) ($672) DENTAL READINESS: Continue to develop new methods and materials to prevent and treat dental emergencies and maximize operational readiness in Navy and Marine Corps personnel. Evaluate performance of dental materials in the laboratory and clinic, especially in the area of longevity of autoclaved instruments. Evaluate potential of new materials to reduce costs while improving overall infection control. Field test promising dental equipment, especially for emergency contingencies.

- (U) ($1,049) MUSCULOSKELETAL INJURIES: Complete effort to determine role of epidemiological, orthopedic, and biomechanical factors related to the risk of musculoskeletal trauma, i.e. overuse, injury among select U.S. Navy and Marine Corps populations. Verify a general classification function generated from an extensive data base of biomechanical information and designed to identify injury-prone individuals, by employing a prospective cohort study. Design and implement intervention strategies to reduce the incidence of injury and to improve the treatment of injury.

14. (U) PROGRAM TO COMPLETION:

- (U) This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVMEDRSCHINST, Bethesda, MD; NAVAEROMEDRSCHLAB, Pensacola, FL; NAVHLTHRSCHCEN, San Diego, CA; NAVSUBMEDRSCHLAB, New London, CT; NAVRSCHLAB, Washington, DC. CONTRACTORS: SRI International, Menlo Park, CA; The New York Blood Center, New York, NY; Uniformed Services University of Health Sciences, Bethesda, MD; Boston University, Boston, MA; Veterans Administration Hospital, Washington, DC.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: NAPDD No. 295093 promulgated 12/03/92.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603706N
PROGRAM ELEMENT TITLE: Medical Development (Advanced)
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G. (U) RELATED ACTIVITIES:

- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0602233N (Readiness, Training and Environmental Quality Technology)
- (U) PE 0604771N (Medical Development, Engineering)

This program is coordinated through the Armed Services Biomedical Research Evaluation and Management Committee.

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

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

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603706N
PROGRAM ELEMENT TITLE: Medical Development (Advanced)
PROJECT NUMBER: M0096
BUDGET ACTIVITY: 3
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: M0096 - Fleet Health Standards. Develops valid medical standards for selection, training, and retention, reduces attrition and injury, and enhances personnel performance in Navy operational environments.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($449K) Enhance performance. Delivered laser glare model which predicts visual performance degradation enabling optimization of air targeting during combat operations. Continue development of methods to determine tactical implications of low energy lasers.
- (U) ($406K) Enhance performance. Delivered calibration device and improved field techniques which enhance aviators' use of night vision goggles (NVGs) to improve safety and mission effectiveness during night operations.
- (U) ($2,482K) Enhance performance/reduce attrition and injury. Provided updated procedures/methods to enhance aviators' spatial awareness and reduce spatial disorientation a leading cause of aircraft mishaps.
- (U) ($325K) Reduce attrition and injury. Provided safety standards to prevent shipboard radio frequency (RF) injuries.
- (U) ($335K) Reduce attrition and injury. Delivered validated time-to-incapacitation/time-to-recovery methodology for operational exposure to hazardous materials.
- (U) ($65K) Developed model to assess quality of safety and health programs.

(U) FY 1994 PLAN:

- (U) ($840K) Medical standards for training/enhance performance. Provide eye fatigue/distortion data related to NVG use to improve training and enhance performance in poor weather and night operations.
- (U) ($3,651K) Medical standards for training/enhance performance. Provide updated specifications for flight

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603706N
PROGRAM ELEMENT TITLE: Medical Development (Advanced)
PROJECT NUMBER: M0096
BUDGET ACTIVITY: 3
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simulators to reduce simulator sickness and improve training and operational readiness.

- (U) ($150K) Reduce attrition and injury. Compare toxicity assessment methodologies for organic nitrate propellants to improve safety screening for materials acquisition and for better exposure standards.

- (U) ($150K) Reduce attrition and injury. Develop physiological and analytical techniques to better assess the toxicity of Navy-specific hazardous materials such as a severe neurotoxicant found in turbine lubricants.

- (U) ($301K) Reduce attrition and injury. Initiate development of methods using light-emitting diodes (LEDs) to characterize the dosimetry of RF exposures for use in shipboard safety programs. Characterize Navy-relevant RF exposures.

- (U) ($215K) Reduce attrition and injury. Develop a computerized model to assess the quality of shore occupational safety and health programs, which can be used to measure and evaluate interventions for injury and illness. Continue assessment of Command Total Quality Leadership influence on health promotion.

(U) FY 1995 PLAN:

- (U) ($958K) Medical standards for training/reduce attrition and injury. Provide specifications for eye protection equipment to counter laser dazzle/agile laser threat and improve safety and reduce injury in an electromagnetic radiation saturated battlefield.

- (U) ($2,669K) Reduce attrition and injury. Deliver recommendations regarding the reduction of aviator neck stress.

- (U) ($155K) Reduce attrition and injury. Deliver to CNO (N-45) a validated model for measuring the quality of shore-based safety and health programs.

- (U) ($175K) Reduce attrition and injury. Develop a report that characterizes the toxicity of a severe neurotoxicant found in turbine lubricants; utilize results to continue development of analytical techniques.

- (U) ($172K) Reduce attrition and injury. Continue comparison of toxicity assessment methodologies for

organic nitrate propellants for NAVSEASYSCOM.

- (U) ($400K) Reduce attrition and injury. Continue development of LED dosimetry of shipboard RF exposures.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAEROMEDRSCHLAB, Pensacola, FL; NAVHLTHRSCHCEN, San Diego, CA; NAVMEDRSCHINSTITUTE TOX DET, WPAFB, Dayton, OH; NAVSUBMEDRSCHLAB, New London, CT; and NAVAIRWARCEN/AD Warminster, Warminster, PA. CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES:

- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0602233N (Readiness, Training and Environmental Quality Technology)
- (U) PE 0604771N (Medical Development, Engineering)

This program is coordinated through the Armed Services Biomedical Research and Management Committee.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603707N
PROGRAM ELEMENT TITLE: Manpower, Personnel, and Training Advanced Technology Development
BUDGET ACTIVITY: 3

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
L0542 Air Human Factors Engineering	1,064	717	987	1,083	1,144	1,165	1,188	CONT.	CONT.
L1770 Manpower and Personnel Systems	3,208	2,998	3,633	3,900	4,239	4,340	4,443	CONT.	CONT.
L1771 Ship Human Factors Engineering	1,972	1,476	2,114	2,116	2,207	2,241	2,282	CONT.	CONT.
L1772 Education and Training Development	5,982	3,870	6,013	6,057	6,182	6,325	6,470	CONT.	CONT.
L1773 Simulation and Training Devices	5,183	4,431	6,373	6,825	7,372	7,534	7,691	CONT.	CONT.
L2235 Interactive Multisensor Analysis Training Technology	0	3,758	0	0	0	0	0	0	3,758
TOTAL	17,409	17,250	19,120	19,981	21,144	21,605	22,074	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element (PE) supports the Joint Support Areas for Manpower, Personnel, Shore Training, and Readiness, Support & Infrastructure; it also supports the Joint Mission Area assessments for most warfare areas, and the Future Joint Warfighting Capabilities identified by the Joint Chiefs of Staff. It develops technologies that enable the Navy: to select, assign and manage its people; to train effectively in classroom settings, in simulated environments and while deployed; and to operate and maintain complex weapon systems. It consists of the following technologies:

1. (U) Air and Ship Human Factors Engineering: These projects develop information management techniques, advanced interface technologies, and decision support systems, all of which help ensure that complex systems will be operated and maintained more effectively, with fewer human-induced errors, and with greater safety.

2. (U) Manpower and Personnel: This project provides Navy personnel system managers with the ability to choose and retain the right people and to place them in jobs that best use their skills, training, and experience. Fleet readiness can be enhanced and personnel costs reduced via such technologies as modeling, mathematical optimization, advanced testing, statistical forecasting, and human performance measurement.

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PROGRAM ELEMENT: 0603707N
PROGRAM ELEMENT TITLE: Manpower, Personnel, and Training Advanced Technology Development
BUDGET ACTIVITY: 3

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3. (U) Education and Training Development: This project focuses on the acquisition and maintenance of complex skills through individual and team training technologies. It improves training efficiency and effectiveness by applying operations research and instructional, cognitive, and computer sciences to the logistics, development, delivery, evaluation, and execution of training.

4. (U) Simulation and Training Devices: This project improves mission effectiveness and safety by applying both simulation and instructional technology to the design of training systems. The project develops and evaluates systems to improve advanced training, skill maintenance and mission rehearsal capability.

5. (U) Interactive Multisensor Analysis Training Technology: This project will develop and demonstrate training technology to enhance sensor system employment and tactical skills in undersea warfare, with emphasis on conceptually-oriented approaches that will be applicable to other areas of Navy training.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603707N
PROGRAM ELEMENT TITLE: Manpower, Personnel and Training
PROJECT NUMBER: L0542
BUDGET ACTIVITY: 3
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project L0542 - Air Human Factors Engineering: This project develops and demonstrates advanced human factors engineering (HFE) technology to improve the integration of the human in Navy airborne weapons systems. General goals of the project are to enhance human performance effectiveness, reduce design-induced critical human performance errors, and accelerate insertion of advanced HFE technology into existing and new weapons systems. Prior work in this project has focused on developing and refining a decision aiding architecture, the Knowledgeable Observation, Analysis-Linked Advisory System (KOALAS), which is unique in that it allows for both data-driven as well as operator inputs into the decision making process.

(U) The current task focuses on the problem of integrating information from multiple aircraft to enhance performance in the multi-dimensional battle space. Since there are unique data flow requirements for each aircraft, there are risks associated with realizing the full potential of the Navy's proposed SONATA initiative. The purpose of the current task is to mitigate these risks by providing iterative demonstrations of our ability to effectively combine and present information to the operator, and to develop the guidelines and specifications for each platform necessary for the effective implementation of this technology.

(U) This project supports Joint Chiefs of Staff Future Joint Warfighting Capabilities and is responsive to numerous warfighting requirements identified in Joint Mission Area (JMA) assessments. Specific JMAs and associated requirements include the following:

- (U) Joint Strike: requirement for near-real time targeting is addressed by developing and refining a data fusion architecture which optimizes decision making; requirement for precision weapons delivery is addressed by developing optimized pilot displays.
- (U) Joint Space & Electronic Warfare/Intelligence: requirements for additional throughput capability to process large volumes of data, and for tactical communication links with high data rates and more diverse platforms, are being supported by developing the capability to effectively present information from multiple sources to operators of diverse platforms.
- (U) Joint Littoral/Strategic Sealift, and Strategic Deterrence: requirements for dealing with complex tactical situations, including rapid switching among target sets, are addressed by developing specifications for enhanced displays which minimize complexity.

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PROGRAM ELEMENT: 0603707N
PROGRAM ELEMENT TITLE: Manpower, Personnel and Training
PROJECT NUMBER: L0542
BUDGET ACTIVITY: 3
DATE: 7 February 1994

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($214) New Starts:
  - Initiated development of S-3 and ES-3 simulations.
  - Initiated investigation of crew-system integration issues related to Intelligent MultiPlatform, MultiSensor Integration (IMMSI) (e.g., optimal methods of data transmission, how information shared across the network should be displayed on platforms performing disparate missions).
- (U) ($850) Completions:
  - Two F-14D decision support system simulations interfaced to act as wing and lead.
  - Single platform F/A-18 electronic warfare simulation completed and demonstrated.
  - Demonstrated objective HFE performance criteria for testing intelligent control systems.

(U) FY 1994 PLAN:

- (U) ($717) Continuations:
  - Demonstrate advanced HFE tools for testing intelligent control systems, focusing on adaptive system components and surveillance missions.
  - Demonstrate advantages of KOALAS design philosophy to the problem of data sharing among multiple platforms.
  - Demonstrate enhanced situational awareness and tactical response in warfare scenarios using IMMSI for intra-platform F-14D, F/A-18, S-3 and ES-3 simulations.

(U) FY 1995 PLAN:

- (U) ($426) Continuation:
  - Demonstrate enhanced situational awareness and tactical response in objective warfare scenarios for inter-platform simulation of F-14D, F/A-18, S-3 and ES-3.
- (U) ($561) Completion:
  - Document results of evaluation and complete Human Factors specification and systems integration requirements for the IMMSI architecture.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV Warminster, PA, and Patuxent River, MD; NRL, Washington,

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PROGRAM ELEMENT: 0603707N
PROGRAM ELEMENT TITLE: Manpower, Personnel and Training

PROJECT NUMBER: L0542
BUDGET ACTIVITY: 3

DATE: 7 February 1994

DC. CONTRACTORS: McDonnell Douglas, St Louis, MO; Magnavox, Ft Wayne, IN; JJM Systems, Warminster, PA.

(U) RELATED ACTIVITIES:
- (U) PE 0601152N, In-House Lab Independent Research
- (U) PE 0601153N, Defense Research Sciences
- (U) PE 0602233N, Readiness, Training and Environment Quality Technology
- (U) PE 0603792N, Advanced Technology Transition

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603707N
PROGRAM ELEMENT TITLE: Manpower, Personnel and Training
PROJECT NUMBER: L1770
BUDGET ACTIVITY: 3
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project L1770 - Manpower and Personnel Systems: This project supports the Manpower & Personnel Joint Support Area by responding to requirements for technologies that will maintain or improve fleet readiness while reducing personnel end strength; enable the Navy to manage the force effectively and efficiently; and optimize the selection and assignment of personnel to highly demanding jobs. The major goals are to ensure that the Navy has a force that is flexible, integrated, and responsive; that skilled personnel are available to handle complex weapons systems when needed; and that smaller forces will have greater capabilities by placing the right person in the right job at the right time. The program supports the delivery of new technologies in modeling, mathematical optimization, advanced testing, statistical forecasting, and human performance measurement.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($976) New Starts:
  - Designed personnel assignment policy analysis model and associated computer-based technology improvements that will enable Navy policymakers to understand the interactions and tradeoffs between broad assignment policies and specific operational plans.
  - Developed and demonstrated mathematical algorithms to optimize the projection of medical workload, peacetime medical manpower requirements, and mobilization medical manpower requirements (active duty and reserves).
- (U) ($731) Continuations:
  - Evaluated computerized psychomotor, working memory, and spatial visualization tests for improving skill classification.
  - Developed model depicting relationships between Quality of Life (QOL) needs and assignment location; determined impact of QOL issues on recruits.
- (U) ($1,501) Completions:
  - Completed prototype version of an Unrestricted Line (URL) career management model for officer strength planning in order to provide planners with an integrated tool that projects accession requirements, promotion requirements, and community requirements (URL, aviation and subsurface).
  - Developed models to address reenlistment goaling, sea/shore manning objectives, and women in the Navy goals in order to minimize cost and meet all manning requirements.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603707N
PROGRAM ELEMENT TITLE: Manpower, Personnel and Training
PROJECT NUMBER: L1770
BUDGET ACTIVITY: 3
DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($2,185) Continuations:
  - Develop a Delayed Entry Program decision support system to control the timing and mix of new accessions.
  - Develop enlisted strength policy analysis model to produce compatible short and long-term recruiting, strength, and retention plans and policies; and develop detailed projection models.
  - Develop and demonstrate an assignment policy monitoring model and the associated computer-based technology improvements to support the assignment decision process.
- (U) ($813) Completions:
  - Develop scoring systems and screening techniques to ensure quality of personnel adequate to operate under expected conditions, and to find flexible and adaptable personnel who are also creative and innovative.
  - Complete development of peacetime and mobilization medical manpower models at the detailed skill level.
  - Demonstrate QOL Predictive Model that explains Navy member and family satisfaction and organizational outcomes, in order to determine the impact QOL activities such as Family Service Centers have on retention and readiness.

(U) FY 1995 PLAN:

- (U) ($2,533) Continuations:
  - Evaluate the ability of the assignment policy trade-off-system and computer-based technology enhancements to prove that policy goals are realistic and quantify the tradeoffs among policies such as moving costs, billet gapping and skill match.
  - Develop a decision support system that improves the accuracy of enlisted accession, training, retention, promotion and strength projections by integrating the management of recruiting, delayed entry program, and initial skill training pipelines.
- (U) ($1,100) Completions:
  - Develop specifications for performance-related test items to augment the advancement in rate exam; evaluate alternative scoring systems for tests which incorporate bias measures.
  - Test, evaluate and demonstrate the accuracy and skill allocation ability of the Medical Manpower Trade-off Analysis Model.
  - Evaluate the ability of the QOL socioeconomic model to predict increases in retention and readiness caused by providing the most desired QOL support.

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PROGRAM ELEMENT: 0603707N
PROGRAM ELEMENT TITLE: Manpower, Personnel and Training
PROJECT NUMBER: L1770
BUDGET ACTIVITY: 3
DATE: 7 February 1994

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVPERSRANDCEN, San Diego, CA. CONTRACTORS: B-K Dynamics, Rockville, MD; Automation Management Consultants, Inc., Rockville, MD.

(U) RELATED ACTIVITIES: This project adheres to Tri-Service Reliance Agreements on Manpower and Personnel technology. Work is related to and fully coordinated with efforts in:

- (U) PE 0601152N, In-House Lab Independent Research
- (U) PE 0601153N, Defense Research Sciences
- (U) PE 0602233N, Readiness, Training and Environmental Quality Tech
- (U) PE 0603007A, Human Factors, Personnel and Training Advanced Technology
- (U) PE 0603227F, Personnel, Training, and Simulation Technology

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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PROGRAM ELEMENT: 0603707N
PROGRAM ELEMENT TITLE: Manpower, Personnel and Training
PROJECT NUMBER: L1771
BUDGET ACTIVITY: 3
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project L1771 - Ship Human Factors Engineering: The goal of this project is to improve ship, task force and battle group operations by developing human factors technology for incorporation into operational systems and training programs. This technology is designed to reduce training and personnel requirements and to enhance mission performance in such areas as global surveillance, joint operations, mission planning, data fusion and Command and Control Warfare. The project supports Joint Chiefs of Staff Future Joint Warfighting Capabilities as well as requirements in several Joint Management Areas, including: Joint Space and Electronic Warfare/Intelligence (e.g., displays for integrating information from multiple sources); Joint Littoral/Strategic Sealift (e.g., aiding decision makers in complex tactical situations under stressful conditions); and Joint Surveillance (e.g., displaying information in formats optimized for the needs of different users).

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,972) Completions:
  - Demonstrated at Headquarters, U.S. Commander in Chief, Pacific (USCINCPAC) a prototype decision aid for evaluating multiple courses of action (COAs) and extended the aid for multiple COA analysis in humanitarian operations.
  - Completed information display requirements analysis for establishment of a Disaster Assistance anchor desk at USCINCPAC.
  - Developed and demonstrated a 3-dimensional audio and visual virtual environment, integrating numerous hardware suites with antisubmarine warfare simulation software, to improve undersea target detection and localization speed and accuracy.
  - Completed Electronic Warfare (EW) formats required for contact correlation and sensor integration. Display formats have been interfaced with operational SLQ-32 software; geographic plot displays have been approved by the OPNAV SLQ-32 Process Action Team.
  - Demonstrated improved situation assessment of tactical information with information management tools that enhanced user performance in a variety of Combat Information Center (CIC) console tasks, and developed advanced tactical symbology for joint and North Atlantic Treaty Organization maritime operations.
  - Completed experiments on the effects of complex tactical graphics, symbol size and color, on symbol readability; implemented the concept of variable coded symbology in a tactical display for fleet evaluation.

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PROGRAM ELEMENT: 0603707N
PROGRAM ELEMENT TITLE: Manpower, Personnel and Training
PROJECT NUMBER: L1771
BUDGET ACTIVITY: 3
DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($736) New Starts:
  - Develop standardized human-computer interface symbology, map representation and situational awareness displays which are applicable for tri-service use. Standardization provides significant economies of scale and reduction in training overhead; designing for the user provides improvement in effectiveness, efficiency and understanding.
  - Implement transfer of advanced user-interface methods from PC based simulation to Navy standard tactical workstation.
  - Develop and test user-interface tools to enhance Navy tactical computer performance, reduce training, and enhance skill retention.
- (U) ($740) Continuations:
  - Interface multiple COA analysis program with USCINCPAC simulation program for real-time analysis of logistic and cost consideration trade-offs in non-combatant operations.
  - Develop a user interface for utilizing Federal Emergency Management Agency damage prediction algorithms in a prototype Disaster Assistance decision support system.
  - Develop the interface between the decision support system and the logistic and COA analysis tools present in Advanced Research Project Agency's Planning Initiative program at USCINCPAC. This will reduce preplanning, option selection and training times and increase the number of options evaluated.

(U) FY 1995 PLANS:

- (U) ($725) New Starts:
  - Conduct data base requirements analysis for development and implementation of advanced display concepts for the Command and Control Warfare Commander (C2WC) workstation.
  - Identify display and information processing deficiencies in C2WC planning functions and prioritize development of visualization aids which focus on immediate payoff in reducing existing C2WC deficiencies.
- (U) ($791) Continuations:
  - Use laboratory CIC simulation to evaluate advanced alerting systems with the goal of enabling the user to adjust and shift his workload level as a function of the anticipated system deficiency, particularly in stressful environments such as failed communications, excessive track load, and conflicting sensor data.
  - Using laboratory CIC simulation, evaluate advanced system monitoring concepts which track operator

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actions and generate performance enhancement recommendations to the operator as a function of his current performance level.

- (U) ($598) Completion:
  - Complete all decision aiding and anchor desk efforts and transition them as operational modules for use in the Crisis Management System at USCINCPAC.

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

(U) WORK PERFORMED BY: IN-HOUSE: NCCOSC, San Diego, CA. CONTRACTORS: Pacific Sciences and Engineering Group, San Diego, CA; Anacapa Sciences, Santa Barbara, CA.

(U) RELATED ACTIVITIES:
- (U) PE 0601152N, In-House Lab Independent Research
- (U) PE 0601153N, Defense Research Sciences
- (U) PE 0602233N, Readiness, Training and Environment Quality Technology
- (U) PE 0604703N, Manpower, Personnel, Training, Simulation and Human Factors

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603707N
PROGRAM ELEMENT TITLE: Manpower, Personnel and Training
PROJECT NUMBER: L1772
BUDGET ACTIVITY: 3
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project L1772 - Education and Training Development: This project addresses requirements in the Shore Training Joint Support Areas by focusing advanced technology on the acquisition and maintenance of complex skills through both individual and team training. It applies operations research and instructional, cognitive, and computer sciences in order to address requirements for improving (a) training throughput, efficiency and affordability necessary for "right-sizing" both the operational forces and the training infrastructure; (b) the effectiveness of training for increasingly complex weapons systems employed in littoral warfare, under fast-paced and stressful conditions, and with limited opportunities for "real-world" practice; and (c) training assessment and training system feedback capabilities for maximizing training responsiveness to operational requirements.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,055) New Starts:
  - Developed prototype multi-media curriculum authoring and delivery system and prototype video-teletraining capability to improve classroom training capabilities, reduce curriculum development and revision time, and expand training capabilities via telecommunications.
  - Designed training seat inventory planning and control system to reduce training costs by minimizing time awaiting training.
- (U) ($2,637) Continuations:
  - Developed prototypes for antisubmarine warfare and submarine tactical skills trainers and for advanced interactive courseware (ICW) for Total Ship Survivability (TSS) training ashore and afloat.
  - Developed Navy Leadership behavioral modeling classroom applications and evaluation techniques to improve leadership training, transfer of training to the job site, and refresher training.
  - Designed Navy Corrections Retraining Assessment Model (NCRAM) that incorporates prisoner, staff, organizational, and process variables to guide corrections policy.
- (U) ($1,290) Completions:
  - Demonstrated Electronic Warfare operator advanced training prototypes which improve operator tactical situation awareness, increase ability to manage probabilistic data and surges in workload, and reduce skill degradation over time.
  - Demonstrated and evaluated computer-based training technologies to improve student problem-solving ability, comprehension, and long-term retention.

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(U) FY 1994 PLAN:

- (U) ($2,960) Continuations:
  - Develop an on-line training reservation system that will significantly reduce training system costs and improve fleet training-related readiness.
  - Develop prototypes for enhanced video-teletraining capabilities, and for a multi-media authoring and delivery system, that will provide single-instructor training to multiple sites, and allow subject matter experts to develop and modify curriculum materials that involve video, computer-generated lessonware and interactive electronic technical data.
- (U) ($910) Completions:
  - Demonstrate advanced ICW for TSS that will embed within the Integrated Shipboard Management System that is under development, in order to improve decision-making under stress, and to integrate damage control, engineering and combat systems personnel into a more effective team.
  - Evaluate the NCRAM's ability to raise the performance and retention potential of Navy personnel in corrective custody.

(U) FY 1995 PLAN:

- (U) ($1,450) New Starts:
  - Design methodology to measure quantitatively combat readiness using standardized, valid and reliable measures of effectiveness for battle groups, platforms and weapon subsystems with links to both team and individual training.
  - Design ashore/afloat interactive training prototype incorporating hypermedia and intelligent tutoring to enable individualized training, increased student achievement, and reduced instruction time and training costs.
- (U) ($3,813) Continuations:
  - Evaluate multi-media curriculum authoring and training delivery system that enables rapid development and revision of curricula and that capitalizes on the increasing availability of electronic data (e.g., Interactive Electronic Technical Manuals, Navy Paperless Ship).
  - Continue development and demonstration of Interactive Multidimensional Acoustics Trainer technology to aid tactical visualization and control; expand feasibility assessment to additional warfare areas; and expand emphasis on technologies which address the problems of skill degradation.
  - Continue development and begin evaluation of training seat reservation, school seat allocation, and course scheduling system for more efficient training throughput and increased fleet readiness.

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- (U) ($750) Completion:
  - Demonstrate and evaluate enhanced interactive video-teletraining for providing "hands-on" and behavioral-oriented training from primary delivery site to multiple remote sites.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVPERSRANDCEN, San Diego, CA. CONTRACTORS: Instructional Science & Development, San Diego, CA.; Systems Engineering Assoc., San Diego, CA.; Carlow International, Falls Church, VA.; Institute for Simulation & Training, Orlando, FL.; San Diego State Univ., San Diego, CA.

(U) RELATED ACTIVITIES: This project adheres to Tri-Service Reliance Agreements on Training Systems technology. Work is related to and fully coordinated with efforts in:

- (U) PE 0601152N, In-House Lab Independent Research
- (U) PE 0601153N, Defense Research Sciences
- (U) PE 0602233N, Readiness, Training and Environment Quality Technology
- (U) PE 0604703N, Manpower Personnel, Training, Simulation, and Human Factors
- (U) PE 0603007A, Human Factors, Personnel, and Training Advanced Technology
- (U) PE 0603227F, Personnel, Training, and Simulation Technology
- (U) PE 0605798D, Joint Services Manpower and Personnel Technology

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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PROGRAM ELEMENT: 0603707N
PROGRAM ELEMENT TITLE: Manpower, Personnel and Training
PROJECT NUMBER: L1773
BUDGET ACTIVITY: 3
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project L1773 - Simulation and Training Devices: This project supports the Shore Training Joint Support Areas, as well as most Joint Mission Areas and Joint Chiefs of Staff Future Joint Warfighting Capabilities, all of which depend on high quality training to ensure mission success. The project responds to requirements for effective and affordable training and mission rehearsal capability, by applying advanced simulation technology and innovative instructional concepts to the design of training systems. Examples of JMA requirements supported by tasks in this project include: training skilled personnel to handle complex weapons that may not be fired for extended periods (Strategic Deterrence); training for near-real time targeting (Joint Strike); training operators and decision makers to respond to data received and processed at increasing speeds (Joint Space and Electronic Warfare/Intelligence); training personnel to deal with target sets that are variable and difficult to identify as friendly or hostile (Joint Surveillance).

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($600) New Start:
  - Initiated simulator networking project for distributed joint service training and mission rehearsal. Distributed Interactive Simulation (DIS) standards will be applied to aviation simulation platforms to integrate dissimilar training systems at multiple training sites.
- (U) ($3,683) Continuations:
  - Demonstrated and evaluated the effectiveness of Non-Developmental Item helmet mounted displays (HMDs) for strike mission application, in order to enable peacetime training of forces using deployed simulators to practice perishable critical skills such as weapons employment.
  - Tested addition of radar and Electronic Warfare (EW) sensor operator stations to the Organic Combat Systems Training Technology (OCSTT) onboard ship simulation environment as part of an effort to expand training capabilities in peacetime and wartime.
- (U) ($900) Completion:
  - Completed Aircrew Coordination Training demonstrations of team training procedures which have demonstrably enhanced flight safety by ensuring that crew members are aware of each other's functions and understand how their information and decisions relate to mission success.

(U) FY 1994 PLAN:

- (U) ($500) New Start:
  - Initiate development of technology for automated, on-line assessment of individual and team performance,

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as the first stage of an effort to develop deployable instructor support that can greatly improve training for complex decision making in the high-stress, ambiguous environments of limited objective, littoral warfare.

- (U) ($500) Continuation:
  - Demonstrate ability to interface a generic flight simulation to a large scale network of dissimilar simulation systems representative of joint operations; expand the capabilities of Naval Aviation Simulation Network Training (NASNET) Interface Units in support of developing products that will meet the requirements of joint service distributed training.
- (U) ($3,431) Completions:
  - Complete development and evaluation of Forward-Deployable Aviation Simulator Technology, including evaluation of HMDs; integration of moderate cost photo image generation system; and man-in-the-loop experiments to determine required cockpit/visual system fidelity requirements.
  - Design, test and evaluate shipboard EW sensors (AN/SLQ-32)) for Battle Force Tactical Trainer (BFTT) milestone DT-IIA and provide BFTT connectivity and appropriate simulation technology for the Surface Warfare Officers School as part of the OCSTT task.

(U) FY 1995 PLAN:

- (U) ($1,543) New Start:
  - Demonstrate real-time beam forming and signal processing simulation technology combined with innovative instructional techniques, in order to strengthen submarine sonar employment training and increase utilization of the BQQ-5 Sonar System from about 30% to nearly 100% of its designed capabilities.
- (U) ($3,330) Continuations:
  - Demonstrate NASNET DIS technology on fielded F-14B and F-14D trainers as part of an effort to provide high fidelity training systems networks for affordable training that will exercise all aviation components in a realistic environment including joint operations.
  - Continue deployable instructor support program by beginning development of a guidance system to assist in diagnosing performance, selecting scenarios and implementing training strategies. This program is essential if the fleet is to realize the vast potential of embedded and onboard tactical team training systems, which currently lack support or training for instructors.
- (U) ($1,500) Completion:
  - Implement C4I-related DIS protocols and demonstrate the ability of OCSTT's Combat Direction Center to respond to a wide variety of automated and semi-automated forces; test DIS network connectivity in joint training and mission rehearsal scenarios in order to improve the Navy's ability to operate in a wide

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variety of force configurations, including some that may not be defined until units are on the scene.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENTRASYSDIV, Orlando, FL; NAVAIRWARCENACDIV, Warminster, PA and Patuxent River, MD; Air Force Armstrong Lab, Williams AFB, AZ. CONTRACTORS: Sparta, Inc., Santa Monica, CA; Paragon, Inc., Orlando, FL; Kaiser Electro-Optics, Inc., San Jose, CA; JJM Systems Inc., Ivyland, PA; University of Central Florida, Orlando, FL; Enzian Technology Inc., Orlando, FL; ISA Associates, Sterling, VA.

(U) RELATED ACTIVITIES: This project adheres to tri-service Reliance agreements on Training Systems technology. Work is related to and fully coordinated with efforts in:

- (U) PE 0601152N, In-House Lab Independent Research
- (U) PE 0601153N, Defense Research Sciences
- (U) PE 0602233N, Readiness, Training and Environment Quality Technology
- (U) PE 0603216A, Synthetic Flight Simulator Devices Development
- (U) PE 0603227F, Personnel, Training and Simulation Technology

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603709N
PROGRAM ELEMENT TITLE: Advanced Marine Biological System

PROJECT NUMBER: Q0214
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Q0214 Marine Mammal Systems	4,505	3,387	3,539	2,959	2,447	1,951	1,470	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND PROJECT: This program funds training of marine mammals to determine military worth and optimum utility. No effective man-made technology exists to duplicate the known capabilities of marine mammals.

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($500) Completed a reintroduction plan.
- (U) ($1,401) Developed a "shipboard" forward deployable MK 7 Marine Mammal System which locates and marks buried mines while forward deployed from a surface platform.
- (U) ($2,604) Provide care and feeding to the animals in the R&D inventory.

(U) FY 1994 PLAN:

- (U) ($3,000) Provide care and feeding to the animals in the R&D inventory.
- (U) ($387) Continue "shipboard" forward deployable enhancement to MK 7 Marine Mammal System.

(U) FY 1995 PLAN:

- (U) ($3,000) Provide care and feeding to the marine mammals in the R&D program.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603709N
PROGRAM ELEMENT TITLE: Advanced Marine Biological System

PROJECT NUMBER: Q0214
BUDGET ACTIVITY: 4

DATE: 7 February 1994

- (U) ($539) Complete "snipboard" forward deployment enhancement to MK 7 Marine Mammal System.

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

(U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDT&E Division, San Diego, CA. CONTRACTORS: SAIC, Maritime Services Division, San Diego, CA.

(U) RELATED ACTIVITIES:

- (U) PE 0602315N, MCM Mining and Special Warfare Technology

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 184	3,000	1,100	440	657	446	0	0	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603711N
PROGRAM ELEMENT TITLE: Fleet Tactical Dev & Eval Prog
PROJECT NUMBER: R0138
BUDGET ACTIVITY: 6
DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0138 Tactical Development Support	5,388	4,414	4,678	4,697	4,046	4,155	4,282	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element funds the Navy's capability to automate, support, and improve collecting of fleet/joint/combined operational data, and reconstructing, analyzing, and providing feedback for exercises and operations. Fleet Command and Battle Group/Joint Tasks Group flag ships and ashore commands utilize the Shipboard Tactical Information Management System (STIMS) to assess and improve tactics, training, and operational readiness.

C. (U) JUSTIFICATION FOR PROJECTS:

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,452) Provided assessment support for Intermediate and Advanced Phase Training (ITA, COMPTUEX, FLEETEX) for six CV/CVN Battle Groups.
- (U) ($612) Provided assessment support and STIMS training to deployed Battle Groups staffs for six Battle Groups.
- (U) ($997) Provided reconstruction and assessment support for CINCLANTFLT/CINCPACFLT Joint Operations (Tandem Thrust, Team Spirit, Solid Stance, and Ocean Venture) and CINCUSNAVEUR Combined and bi-lateral exercises (Display Determination, Distant Thunder, Dragon Hammer, Dynamic Guard, and real world operations).
- (U) ($2,327) Developed fleet requested capabilities for: video recording of STIMS replay; data base enhancements for AEGIS, OPFOR and SEWC products; Strike Warfare products; importing of data from fleet systems (AEGIS, LINK 11 ESM, Ship and Air Feeder Reports); track containment statistics; and data display enhancements. Issued two major STIMS software releases. Integrated STIMS systems components. Conducted system testing, quality control, and configuration management. Investigated new data sources (JTIDS/LINK 16, Marine Corps/Army PLRS, Air Force AWACS).

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603711N PROJECT NUMBER: R0138 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: Fleet Tactical Dev & Eval Prog BUDGET ACTIVITY: 6

(U) FY 1994 PLANS:

- (U) ($1,406) Provide assessment support for Intermediate and Advanced Phase Training (ITA, COMPTUEX, FLEETEX) for six CV/CVN Battle Groups.
- (U) ($590) Provide assessment support and STIMS training to forward deployed Battle Group staffs for six Battle Groups.
- (U) ($954) Provide ashore and afloat reconstruction and assessment support for four of five Joint CINCLANTFLT/CINCPACFLT operations (Tandem Thrust, Team Spirit, RIMPAC, Solid Stance, Ocean Venture) and CINCUSNAVEUR combined and bi-lateral exercises (Display Determination, Distant Thunder, Dragon Hammer, and Dynamic Guard, and real world operations).
- (U) ($1,464) Develop fleet requested upgrade to user interface; three dimensional data display; data recording and processing capabilities for new data sources (LINK-16, serial LINK 11, AWACS); and automated track segment correlation. Issue two major STIMS software releases. Integrate STIMS system components; provide testing, quality control, and configuration management. Investigate data from existing and emerging tactical and command and control systems.

(U) FY 1995 PLANS:

- (U) ($1,467) Provide assessment support for intermediate and advanced phase training (ITA, COMPTUEX, FLEETEX) for six CV/CVN Battle Group exercises.
- (U) ($655) Provide assessment support and STIMS training to forward deployed Battle Group staffs for six CV/CVN Battle groups.
- (U) ($1,003) Provide reconstruction and assessment support for four CINCLANTFLT/CINCPACFLT Joint operations (Tandem Thrust, Team Spirit, Solid Stance, and Ocean Venture) and CINCUSNAVEUR Combined and bi-lateral exercises (Display Determination, Distant Thunder, Dragon Hammer, and Dynamic Guard, and real world operations).
- (U) ($1,553) Develop fleet requested data recording and processing for new data sources (JTIDS/LINK 16 Block 1, Marine Corps/Army PLRS, TACTS Range); enhancement of scenario generation capabilities, event/engagement summaries, and detection/engagement opportunity determination. Integrate STIMS system components; provide, testing, quality control, and configuration management. Investigate data from existing and emerging tactical and command and control systems.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603711N PROJECT NUMBER: R0138 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: Fleet Tactical Dev & Eval Prog BUDGET ACTIVITY: 6

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSUPPACT, Silver Spring, MD. Contractors: United Information Systems, Inc., Beltsville, MD; Summit Research Corp., Rockville, MD; Advanced Systems Technology, Inc., Silver Spring, MD.

(U) RELATED ACTIVITIES:
- (U) Program Element 0605155N, Fleet Tactical Development and Evaluation.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603712N
PROGRAM ELEMENT TITLE: Environmental Quality and Logistics Advanced Technology
BUDGET ACTIVITY: 3

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
T1816 Logistics Technology Development (LOGDEV)	11,140	9,158	*	*	*	*	*	*	*
T1884 Rapid Acquisition of Manufactured Parts (RAMP)	12,772	0	0	0	0	0	0	0	83,912
T1910 Logistics and Affordability Advanced Technology (LAAT)	5,900	6,374	15,024 a/	15,725	16,344	16,771	17,219	CONT.	CONT.
R2206 Environmental Quality Advanced Technology	b/	b/	6,000	6,107	6,149	6,190	6,232	CONT.	CONT.
TOTAL	29,812	15,532	21,024	21,832	22,493	22,961	23,451	CONT.	CONT.

a/ Efforts in Project T1816 continue in Project T1910 beginning in FY-95.
b/ Environmental efforts funded in T1910 in FY-93 and FY-94; transfer to R2206 in FY-95 and out.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Program Element (PE) funds the Navy's advanced technology development core efforts in logistics. The focus is on Navy-unique aspects of logistics technology. The projects apply advanced technology to logistics needs and problems to: design weapons systems support to eliminate requirements for large logistics tails; reduce the high cost of maintaining weapon systems and improve readiness; assist program managers with technology to support weapon systems within shortened development cycles; and, reduce weapons system repair downtime. The results of the effort in this PE support Joint Warfare Operational Capabilities in providing the latest state-of-the-art technology for improved logistics support capability to promptly engage regional forces in decisive combat on a global basis. Additionally, it supports the Joint Mission Assessment (JMA) area of Joint Littoral/Strategic Sealift. Beginning in FY 1995, tasks formerly associated with LOGDEV will be combined into the LAAT project. Also in FY 1995, an environmental quality project will begin that is aimed at demonstrating ways to reduce shipboard pollution, remediation of harbors and shore facilities, and improving industrial treatment processes. Ongoing environmental quality efforts currently funded under LAAT will transition to this new project.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603712N
PROGRAM ELEMENT TITLE: Environmental Quality and Logistics Advanced Technology
PROJECT NUMBER: T1910
BUDGET ACTIVITY: 3
DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	To COMPLETE	TOTAL PROGRAM
T1910 Logistics and Affordability Advanced Technology (LAAT)	5,900	6,374	15,024	15,725	16,344	16,771	17,219	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Logistics and Affordability Advanced Technology (LAAT) project improves weapon system readiness and supportability through development of advanced logistics technology. Tasks in this project provide advanced diagnostic and test capabilities, and advanced industrial technology for ship maintenance and environmental compliance. Project facilitates transition of concepts from Exploratory Development to other research and development categories or directly to the fleet. Work in the Logistics Technology Development project (T1816) moved to this project in FY-95. The Non-Polluting/Biodegradable Antifouling Hull Coatings task moved from this project to new project R2206 in FY-95.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

(U) AIR VEHICLE DIAGNOSTIC SYSTEM:
- (U) ($1,713) Completed Pre-Advanced Technology Demonstration neural network design for helicopter gearbox diagnostic testing.

(U) SHIPBOARD FLEXIBLE COMPUTER INTEGRATED MANUFACTURING (FCIM):
- (U) ($492) Completed Shore Intermediate Maintenance Activity (SIMA) program and system requirements definition and conducted site survey.
- (U) ($527) Completed SIMA system and detailed software design.
- (U) ($252) Procured Computer Aided Design II equipment for testing at SIMA.

(U) HIGH PRESSURE WATER AUTOMATED CLOSED-LOOP PAINT STRIPPING SYSTEM:
- (U) ($1,690) Awarded contract to demonstrate environmentally sound paint removal. Defined system requirements; defined systems requirements and designed and purchased subsystems from contract.

(U) NON-POLLUTING/BIODEGRADABLE ANTIFOULING HULL COATINGS:
- (U) ($545) Awarded easy release coatings contracts.
- (U) ($681) Work initiated for environmental testing and shipboard testing.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603712N
PROGRAM ELEMENT TITLE: Environmental Quality and Logistics Advanced Technology

PROJECT NUMBER: T1910
BUDGET ACTIVITY: 3

DATE: 7 February 1994

(U) STANDARD HARDWARE ACQUISITION AND RELIABILITY PROGRAM (SHARP): (Funded in Project T1816)
- (U) Developed high reliability, maintainable, modular electronics and packaging system providing decreased costs, increased cooling and low weight compared to current technology.
- (U) Developed IEEE Format E Standard and EIA 396 pin connector standards transitioned to commercial technology while demonstrating advanced interconnect technology for photonics, radio frequency monolithic miniaturized integrated circuits (RF/MMIC) and multi-chip devices.
- (U) Demonstrated high reliability, no maintenance Inertial Navigation System (INS) battery and, modular battery technology.
- (U) Transitioned MIL-STD-1750A modules. Demonstrated Ground Proximity Warning System while demonstrating non-developmental item (NDI) modules, equipment and simulation techniques.

2. (U) FY 1994 PLAN:

(U) SHIPBOARD FCIM:
- (U) ($475) Complete material procurement for SIMA and tender applications.
- (U) ($1,138) Complete software development, integration and installation for SIMA testing.
- (U) ($637) Conduct system testing at SIMA.

(U) HIGH PRESSURE WATER AUTOMATED CLOSED-LOOP PAINT STRIPPING SYSTEM:
- (U) ($424) Assemble subsystems and complete testing program on recoatability of paint under contract awarded in FY 1993. Test and demonstrate at shipyard and transition technology.

(U) NON-POLLUTING/BIODEGRADABLE ANTIFOULING HULL COATINGS:
- (U) ($1,145) Award Broad Agency Announcement (BAA) contracts for Phase 2 (easy release coatings formulations).
- (U) ($462) Award natural antifoulants BAAs.
- (U) ($625) Conduct small scale testing of BAA easy release products.
- (U) ($218) Conduct ship testing of easy release BAA products.

(U) INTERACTIVE ELECTRONIC TECHNICAL MANUAL (IETM)
- (U) ($257) Initiate task and perform system requirements review.
- (U) ($993) Begin system development and initiate acquisition of automated conversion tools, using commercially available hardware and software in an open system architecture.

(U) SHARP: Funded in Project T1816
- (U) Continue development of SEM, SPS, SBS and SES reducing development costs and logistics support costs associated with non-standard components, and improving system reliability.
- (U) Transition SHARP developed enclosures, moduies, power supplies, and fiber optic interconnect hardware

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603712N
PROGRAM ELEMENT TITLE: Environmental Quality and Logistics Advanced Technology

PROJECT NUMBER: T1910
BUDGET ACTIVITY: 3

DATE: 7 February 1994

and technology into Navy/NASA Fiber Optic Control System Integration.
- (U) Develop low cost military SEM E power supplies and transition applicable commercial technology.
- (U) Develop commercial off-the-shelf (COTS) battery charger/analyzer system and family of mine warfare system batteries and related technologies.

3. (U) FY 1995 PLAN:

(U) SHARP:
- (U) ($3,230) Continue utilization of Standard Electronic Modules (SEM), Standard Power Supplies (SPS), Standard Battery Systems (SBS), and Standard Enclosure Systems (SES) for insertion of new technologies, while leveraging commercial practices, thus reducing development time and costs and logistics support costs associated with non-standard components, and improving system reliability.
- (U) ($1,820) Demonstrate advanced electronics packaging/cooling techniques.
- (U) ($840) Develop/demonstrate advanced power systems technologies.
- (U) ($910) Demonstrate improved repairability and logistics support of electronic circuit assemblies.

(U) SHIP RD FCIM:
- (U) ($1,000) Conduct system planning and design for tender application.
- (U) ($903) Complete system integration, installation and training on tender.
- (U) ($797) Conduct system testing on tender and prepare for operational transition.

(U) IETM:
- (U) ($1,800) Complete system development and integration to prototype limited production capability.
- (U) ($200) Perform test of conversion capability on sample technical manuals selected by Systems Commands.

(U) REAL-TIME INFRARED SYSTEM TEST SET:
- (U) ($924) Begin design and fabrication of infrared demonstration test set for use in diagnostics and maintenance.

(U) LASER WELD REPAIR OF NAVAL MATERIALS:
- (U) ($735) Begin integration of new laser, neural net and fiber optic technology into capability to repair shipboard mechanical components faster and more economically.

(U) NEXT GENERATION TEST GENERATOR:
- (U) ($885) Begin effort to demonstrate control flow analysis of new test generator system with application to avionic and non-avionic systems.

(U) DIAMOND FILM AS AN ELECTRONIC MODULE SUBSTRATE:

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603712N
PROGRAM ELEMENT TITLE: Environmental Quality and Logistics Advanced Technology
PROJECT NUMBER: T1910
BUDGET ACTIVITY: 3
DATE: 7 February 1994

- (U) ($845) Initiate demonstration effort to mount 500 watt capability on substrate and to downsize required cooling system.

(U) DDG-51 AUTOMATED SHIPBOARD FUELING SYSTEM:
- (U) ($835) Initiate adaptation of the existing DDG-963/CG-47 Fuel Fill and Control System simulation model for the preliminary design of the Automated DDG-51 Fuel Fill and Control System.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN, Dahlgren, VA, and Bethesda, MD; NRL, Washington, DC. CONTRACTORS: South Carolina Research Authority, Charleston, SC; GAI Inc., Sparta, NJ; Westland Helicopters, Yeovil, England; Pratt and Whitney Waterjet Systems, Huntsville,AL; others to be determined.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data from previous submission not available for comparison.
2. (U) Schedule changes: Data from previous submission not available for comparison.
3. (U) Cost changes: Data from previous submission not available for comparison.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES:
- (U) PE 0602233N (Readiness, Training and Environmental Quality Technology)
- (U) PE 0602234N (Materials, Electronics, and Computer Technology)
- (U) PE 0603792N (Advanced Technology Transition)
- (U) PE 0601153N (Defense Research Science)

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

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

J. (U) MILESTONE SCHEDULE: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603712N
PROGRAM ELEMENT TITLE: Environmental Quality and Logistics Advanced Technology

PROJECT NUMBER: R2206
BUDGET ACTIVITY: 3

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) R2206 - ENVIRONMENTAL QUALITY DEMONSTRATION: This project supports near term advances in support of the four Project Reliance environmental quality pillars: Pollution Prevention, Clean-up, Conservation, and Compliance. Primary focus will be on minimizing shipboard pollution, remediation of harbors and shore facilities, and improved methods of industrial waste treatment. The Environmental Quality task on Non-Polluting/Biodegradable Antifouling Hull Coatings moved to this project from project T1910 in FY-95.

(U) FY 1993 ACCOMPLISHMENTS: Effort funded and described under Project R1910.

(U) FY 1994 PLANS: Effort funded and described under Project R1910.

(U) FY 1995 PLANS:

(U) Environmentally Sound Ships:

(U) NON-POLLUTING/BIODEGRADABLE ANTIFOULING HULL COATINGS:
- (U) ($1,805) Award Phase 3 BAA contracts for easy release coatings and Phase 2 contracts for natural antifoulants.
- (U) ($695) Complete physical property and small scale testing of easy release and natural antifouling coatings.
- (U) ($300) Conduct ship tests of natural antifouling coatings.

(U) SHIPBOARD NON-OILY WASTEWATER TREATMENT:
- (U) ($700) Initiate effort to perform biological pre-treatment and ultraviolet post-treatment of non-oily wastewater to obtain an acceptable effluent.

(U) AUTOMATED UNDERWATER HULL MAINTENANCE/MONITORING SYSTEM:
- (U) ($1,400) Begin sensor integration on underwater robotic hull maintenance vehicle to detect cracks and repair areas on hull.

(U) Environmentally Safe Shipyards:

(U) DESTRUCTION OF HAZARDOUS WASTE BY SUPERCRITICAL WATER OXIDATION:
- (U) ($1,100) Initiate prototype testing of supercritical water oxidation technology to treat organic, toxic waste at industrial treatment facilities.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603712N
PROGRAM ELEMENT TITLE: Environmental Quality and Logistics Advanced Technology

PROJECT NUMBER: R2206
BUDGET ACTIVITY: 3

DATE: 7 February 1994

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN, Annapolis, MD; Naval Facilities Engineering Service Center, Port Hueneme, CA. CONTRACTORS: To be determined.

(U) RELATED ACTIVITIES:

- (U) PE 0602233N (Readiness, Training and Environmental Quality Technology)
- (U) PE 0602234N (Materials, Electronics and Computer Technology)
- (U) PE 0601153N (Defense Research Science)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603713N
PROGRAM ELEMENT TITLE: Ocean Engineering Development
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0394 Shallow Depth Diving Equipment	3,872	5,800	8,226	25,716	38,959	1,074	2,178	CONT.	CONT.
V0397 Deep Ocean Technology (Note 1)	5,825	0	0	0	0	0	0	0	167,239
M0099 Deep Submergence Biomedical Development	6,191	5,811	5,972	5,705	6,079	5,905	6,040	CONT.	CONT.
TOTAL	15,888	11,611	14,198	31,421	45,038	6,979	8,218	CONT.	CONT.

(U) (Note 1): Efforts developed under Project V0397 completed in FY 93 and the technology developed transitioned to PE 0603502N, V2094.

B. (U) BRIEF DESCRIPTION OF ELEMENT: Developments in this program will enable the U.S. Navy to overcome deficiencies which constrain underwater operations in the areas of search, location, rescue, recovery, salvage, construction, and protection of offshore assets. This program develops medical technology, diver life support equipment, and the vehicles, systems, and tools to permit manned and unmanned underwater operations.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603713N
PROGRAM ELEMENT TITLE: Ocean Engineering Development
PROJECT NUMBER: S0394
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: S0394 Shallow Depth Diving Equipment: This project develops systems to support conventional diver operations from surface platforms to depths of 300 feet and saturation diving to depths of 850 feet. Diver operations include ship husbandry, salvage/recovery, and submarine rescue operations to support national as well as Navy needs around the world. Modern certifiable diving systems which ensure diver safety and allow maximum work efficiency will replace currently antiquated systems. The two systems currently being developed are:

(U) Conventional Dive System (CDS) to provide for diving operations to 300 feet. It consists of a closed circuit Underwater Breathing Apparatus (UBA), Full Face Mask (FFM), Dry Helmet Assembly (DHA), and surface support equipment. The CDS will be a new lightweight, mixed gas diving system capable of long duration in all water temperatures, especially cold water. CDS will support fleet, explosive ordnance disposal (EOD), and special warfare diving operations.

(U) Submarine Rescue Diving and Recompression System (SRDRS) to provide a new rapidly deployed emergency submarine rescue system. SRDRS will fill the gap created by the decommissioning of USS PIGEON (ASR 21) and the removal of the saturation diving capability on USS ORTOLAN (ASR 22). SRDRS will be a new air transportable (fly-away) saturation diving sub-system and new fly-away recompression chamber sub-system. The SRDRS will provide a global rapid response capability to support submarine rescue missions.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,772) Conventional Dive System: Completed the UBA and FFM drawings, logistics, and certification documentation; fabricated four prototype UBA's; completed CO_2 scrubber and oxygen control testing.
- (U) ($2,100) Submarine Rescue Diving and Recompression System: Completed Milestone 0 decision in December; completed system concept studies; awarded preliminary design development contract in June for the diving subsystem; started design development to modify CDS for saturation diving.

(U) FY 1994 PLAN:

- (U) ($1,900) Conventional Dive System: Complete manned testing of the UBA; perform environmental testing of the UBA and FFM; conduct TECHEVAL of UBA and FFM and update documentation for UBA and FFM.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603713N
PROGRAM ELEMENT TITLE: Ocean Engineering Development
PROJECT NUMBER: S0394
BUDGET ACTIVITY: 4
DATE: 7 February 1994

- (U) ($3,900) Submarine Rescue Diving and Recompression System: Complete all evaluation studies and Milestone I decision; complete overall design of the system; prepare system performance specifications; procure and evaluate gas reclaimer for saturation diving.

(U) FY 1995 PLAN:

- (U) ($8,226) Submarine Rescue Diving and Recompression System: Complete system design of the saturation diving sub-system, the recompression sub-system, and all sub-system components; conduct testing of the gas reclaimer; develop submarine rescue system tools; procure and evaluate atmospheric diving suits; evaluate Submarine Rescue Vehicle Subsystem; proceed to Milestone II Decision.

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

(U) WORK PERFORMED BY: IN-HOUSE: Coastal Systems Station (CSS), Dahlgren Division, Naval Surface Warfare Center, Panama City, FL; Navy Experimental Diving Unit (NEDU), Panama City, FL. CONTRACTORS: Advanced Engineering and Research Associated Inc, Arlington, VA; ROH Inc, Arlington, VA; Oceaneering International Inc, Houston, TX & Upper Marlboro, MD; Competitive TBD.

(U) RELATED ACTIVITIES:

- (U) PE 0603654N Joint Service EOD Development.
- (U) PE 1160404BB SEAL Support Systems for CDS.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603713N
PROGRAM ELEMENT TITLE: Ocean Engineering Development
PROJECT NUMBER: M0099
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: M0099 - Deep Submergence Biomedical Development. Develops biomedical technology to increase diver safety and effectiveness; supports deeper, longer, safer, more flexible dives. Requirements: NAPDD #007-02 Rev. 1, Deep Submergence Biomedical Development, 30 Jan 92.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,639) Produced medical procedures for the conduct of submarine hull, compartment, and sonar dome pressurization tests (hyperbaric exposure), developed interim saturation abort tables in DISSUB scenarios, and delivered new tables for air and N2ON diving and underlying algorithm for multi-level diving.
- (U) ($1,428) Completed study of work tolerance in the hyperbaric environment, developed standard test to assess individual tolerance to cold water, and completed development of physiologic design criteria for UBA design.
- (U) ($2,148) Delivered interim guidelines regarding fleet SODASORB use, delivered summary of procedures for air sampling in sonar domes, delivered revision of USN diving and manned hyperbaric systems safety certification manual, and developed predictive oxygen toxicity model.

(U) FY 1994 PLAN:

- (U) ($2,520) Extend current decompression models to include multiple gasses. Report on LiOH effectiveness in DISSUB scenarios, improve saturation abort tables in DISSUB scenarios.
- (U) ($1,301) Validate cold water acclimation protocol, develop standard hand immersion tests and assess cold water exercise in the modification of peripheral and central receptor integration.
- (U) ($1,990) Achieve consensus on tool noise methodology, establish a testing program for SODASORB, conduct testing of candidate labs for Navy diver air sampling program, develop methods to determine susceptibility to and preventative strategies for oxygen toxicity in divers, identify the consequences of subclinical DCS.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 063713N
PROGRAM ELEMENT TITLE: Ocean Engineering Development
PROJECT NUMBER: M0099
BUDGET ACTIVITY: 4
DATE: 15 October 1993

(U) FY 1995 PLAN:

- (U) ($2,818) Assess oxygen as a contributor to decompression risk. Provide accurate prediction of risk in diving strategies to decrease decompression time (100% breathing in water, surface decompression, multiple inert gas diving, and gas switching).
- (U) ($1,460) Develop psychomotor tests to measure performance mission-specific scenarios.
- (U) ($1,694) Deliver diver hearing conservation program, develop a system to monitor health status of Navy divers, monitor air quality testing of diver's air, improve human performance during specific diving scenarios, SODASORB testing, develop recommendations on return to diving following DCS injury.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVMEDRSCHINSTITUTE, Bethesda, MD and NAVSUBMEDRSCHLAB, New London, CT. CONTRACTORS: State University of New York at Buffalo, Buffalo, NY; University of Pennsylvania, Philadelphia, PA; and Duke University, Durham, NC.

(U) RELATED ACTIVITIES:

- (U) PE 1160404BB, PE 1160407BB, Special Operations Command (Tampa, FL) provides funding to support Naval Special Warfare-specific scenarios.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Data Exchange Agreements with Australia and Japan.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603721N
PROGRAM ELEMENT TITLE: Environmental Protection
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0400 Ordnance Reclamation	624	1,252	1,290	1,169	1,585	1,330	1,783	CONT.	CONT.
S0401 Shipboard Waste Management	26,076	43,725	41,312	37,955	32,243	22,681	19,422	CONT.	CONT.
T2042 Plastic Substitution	146	144	147	151	153	157	163	CONT.	CONT.
Y0817 Pollution Abatement Ashore	8,584	7,732	8,352	8,521	8,740	8,963	9,208	CONT.	CONT.
TOTAL	35,430	52,853	51,101	47,796	42,721	33,131	30,576	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program develops processes, prototype hardware, systems and operational procedures that will allow the Navy to operate in the U.S., foreign and international waters, air, space, and land areas while complying with U.S. statutes and international agreements. The program also includes efforts to improve the Navy's response to salvage-related pollution incidents. Projects support the Navy's requirement to meet environmental standards outlined by the Environmental Protection Agency Executive Order 12088 of October 1978, Public Law PL100-220 and DoD Directive 6050.4 of 16 March 1982, DoD Directive 4210.15 of 27 July 1989, DoD Directive 6050.15 of 14 June 1985, and DoD Directive 6050.9 of 13 February 1989. Project S0401 also includes RDT&E efforts that allow the Navy to be in compliance with the U.S. Clean Air Act of 1990 with regard to ozone depleting substances (ODSs). Four major areas of effort are addressed: air conditioning and refrigeration, halons, chlorofluorocarbons (CFC) recovery/recycling and solvents.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603721N
PROGRAM ELEMENT TITLE: Environmental Protection
PROJECT NUMBER: S0400
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: S0400, Ordnance Reclamation. Project enables field activities to comply with environmental laws/standards and provides economically and environmentally acceptable techniques for disposing of the vast amount of ordnance and its energetic contents. Reclamation is the preferred method for this, but for those items which are carcinogenic, safe methods will be developed.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($164) Pyro Dye Incinerator - Environmental analysis performed on the Control Air Incinerator (CAI) including testing of the continuous heavy metal monitor developed by NAVAIRWARCENWPNDIV, China Lake. The incinerator met the performance standards for a Hazardous Waste Incinerator.
- (U) ($360) Metal Brazing/Commercial Mining Explosive - TPL, Inc. and Technology Development, Inc., under the Small Business Innovative Research (SBIR) program, demonstrated that reprocessed/reclaimed Plastic Bonded Explosives (PBX) produce an effective commercial explosive.
- (U) ($100) RDX/HMX Recovery - Effort limited to development of standard operating procedures/ explosive simulant grinding.

(U) FY 1994 PLAN:

- (U) ($150) Pyro Dye Incinerator - Complete testing of CAI and continue development of continuous monitoring equipment for heavy metals and toxic organics.
- (U) ($450) Metal Brazing Explosive - Complete bench scale qualification testing of Composition A-3/LX-14. Complete design/initiate procurement of the prototype manufacturing process.
- (U) ($300) Commercial Mining Explosive - Testing of the pilot unit PBX (100 lbs/day) on various types of explosives and propellants and field test at rock quarry/mine.
- (U) ($200) Explosive D Conversion/Pyro Reclaim - Initiate lab/bench scale studies for conversion of Explosive D to marketable products and recovery of ingredients from pyrotechnic flares.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603721N
PROGRAM ELEMENT TITLE: Environmental Protection
PROJECT NUMBER: S0400
BUDGET ACTIVITY: 4
DATE: 7 February 1994

- (U) ($152) RDX/HMX Recovery - Complete lab/bench scale research effort to recover RDX and HMX from explosives and propellants. Initiate design of pilot scale recovery process.

(U) FY 1995 PLAN:

- (U) ($100) Pyro Dye Incinerator - Complete final report on CAI and continuous metals monitor with recommended design for production facility for destruction of pyrotechnics.
- (U) ($437) Metal Brazing Explosive - Complete construction/installation of the prototype manufacturing process and perform testing producing sufficient explosive (200,000 pounds) for full scale testing at an explosive fabricator.
- (U) ($313) Commercial Mining Explosive - Complete construction/installation of the prototype manufacturing process and initiate testing the unit for producing commercial mining explosives.
- (U) ($170) RDX/HMX Recovery - Complete design and initiate procurement/installation of the pilot scale process for recovery of RDX and HMX.
- (U) ($50) Gun Propellant Reuse - Initiate design of a pilot manufacturing process for converting gun propellant to a commercial commodity.
- (U) ($220) Explosive D Conversion/Pyro Reclaim - Continue lab/bench scale studies for conversion of Explosive D to marketable products and recovery of ingredients from pyrotechnic flares.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURWARCENDIV, Crane, IN; NAVSURWARCENDIV DET, White Oak, MD; NAVAIRWARCENWPNDIV China Lake, CA; NAVSURWARCENDIV, Indian Head, MD. CONTRACTORS: Los Alamos National Labs, Los Alamos, NM; TPL Inc., Albuquerque, NM; Technology Development Inc. (TDI), Rolla, MO.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603721N
PROGRAM ELEMENT TITLE: Environmental Protection

PROJECT NUMBER: S0401
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0401 Shipboard Waste Management	26,076	43,725	41,312	37,955	22,243	22,681	19,422	CONT.	

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Project develops equipments and procedures for managing all shipboard waste problems. Emphasis is on developing shipboard systems for compliance with national, state, and international regulations and on achieving a pollution-free profile for future ships. This program will also develop conservation and ozone-safe replacement chemical technology for Navy solvents and shipboard air conditioning, refrigeration, and fire fighting systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($7,689) Developed a Navy Shipboard Solid Waste Management Plan to assure compliance with the Marine Plastics Pollution Research and Control Act (MPPRCA) by all ships by 31 December 96. Continued development of the Large Pulper and Plastics Processor. Initiated development and fabrication of Small Pulper and Glass Metal Shredder.
- (U) ($2,231) Completed Technical Evaluation (TECHEVAL) and achieve Approval for Full Rate Production (AFRP) and Initial Operational Capability (IOC) for Small Boat Oil Water Separator (OWS). Installed High Capacity Oil Water Separator aboard USS EISENHOWER (CVN69) in preparation of TECHEVAL. Initiated Laboratory Evaluation (LABEVAL) of membrane systems on secondary oily wastes. Conducted tests of Shipboard Compensated Fuel Ballast System.
- (U) ($772) Initiated shipboard Hazardous Material - Hazardous Waste task. Completed statutory Organotin monitoring.
- (U) ($609) Initiated LABEVAL of breadboard graywater/sewage treatment systems.

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- (U) ($665) Achieved AFRP and IOC for Off Ship Fire Fighting System. Continued LABEVAL of Laser Detection and Sampling System. Completed Underwater Hull Cleaning Impact task. Continued Development of Recovered Oil Logistic System.

- (U) ($14,110) Initiated development of alternatives and substitutes for chlorofluorocarbons (CFC) solvents. Continued investigation of alternative systems and substitute substances for Halon fire fighting systems for aircraft and ships. Continued investigation of non-CFC alternative and backfit modifications for shipboard R-12 Air Conditioning (AC) and refrigeration systems. Continued development of non-CFC alternative and backfit modifications for shipboard R-114 AC systems. Continued development of non-vapor compression AC processes.

2. (U) FY 1994 PLAN:

- (U) ($11,080) Complete design and fabrication of Plastics Processor; install on a ship and commence TECHEVAL/ Operational Evaluation (OPEVAL). Complete design and fabrication of Large Pulper, Small Pulper and Glass Metal Shredder; Ship install and conduct TECHEVAL and OPEVAL. Achieve AFRP on Large Pulper, Small Pulper and Glass Metal Shredder.

- (U) ($3,466) Initiate TECHEVAL on High Capacity Oil Water Separator aboard USS EISENHOWER (CVN69). Develop breadboard secondary/tertiary oily waste treatment system and initiate testing. Complete Small Boat Oil Water Separator tasking. Continue investigation of Shipboard Compensated Fuel Ballast System.

- (U) ($2,200) Continue testing of graywater/blackwater treatment system and low-flow water use devices. Continue development of shipboard sewage Control and Holding Tank (CHT) system upgrades.

- (U) ($930) Continue shipboard Hazardous Material - Hazardous Waste substitution and elimination task.

- (U) ($800) Continue development of Recovered Oil Logistic system. Conduct field tests of Laser Detection and Sampling System.

- (U) ($25,249) Continue development of alternatives and substitutes for CFC solvents. Continue investigation of alternative systems and substitute substances for Halon fire fighting systems for aircraft and ships. Continue investigation of non-CFC alternative and backfit modifications for shipboard R-12 AC and refrigeration systems. Continue development of non-CFC alternative and backfit modifications for shipboard R-114 AC systems. Complete detailed design and fabrication of future fleet non-CFC AC plants.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603721N
PROGRAM ELEMENT TITLE: Environmental Protection

PROJECT NUMBER: S0401
BUDGET ACTIVITY: 4

Date: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) ($3,000) Achieve AFRP for the Plastics Processor. Complete requirements for the Small Pulper, Large Pulper and Glass Metal Shredder.
- (U) ($5,000) Complete TECHEVAL and achieve AFRP/MSIII for High Capacity Oil Water Separator. Conduct LABEVAL of breadboard secondary/tertiary OWS system and initiate development of Engineering Development Model (EDM). Conduct tests on Shipboard Compensated Fuel Ballast System.
- (U) ($5,457) Continue testing of membrane graywater treatment system. Continue evaluations of low-flow water use appliances, devices and marine sanitation devices (MSD). Continue development of shipboard CHT system upgrades.
- (U) ($970) Continue shipboard Hazardous Material - Hazardous Waste substitution and elimination task.
- (U) ($828) Continue development of Recovered Oil Logistics System system. Commence development of Oil Spill Contingency Planning Program. Achieve IOC of Laser Detection and Sampling System.
- (U) ($26,057) Continue development of alternatives and substitutes for CFC solvents. Continue investigation of alternative systems and substitute substances for Halon fire fighting systems for aircraft and ships. Continue investigation of non-CFC alternative and backfit modifications for shipboard R-12 AC and refrigeration systems. Continue development of non-CFC alternative and backfit modifications for shipboard R-114 AC systems. Fabrication and qualification of future fleet non-CFC AC plants.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRSYSCOM, Arlington, VA; NAVAIRWARCENACDIV, Warminster, PA; NRL, Washington, DC; NAVSURFWARCEN DET, Annapolis, MD; NAVSURFWARCEN SHIPSYSENGSTA, Philadelphia, PA; NCCOSC RDTE DIV, San Diego, CA. CONTRACTORS: Advanced Engineering Research Associates, Inc., Arlington, VA; ARTECH, Chantilly, VA; Aspen Systems, Inc., Marlboro, MA; Battelle Pacific Northwest Labs, Richland, WA; Carrier Corp., Syracuse, NY; Geo-Centers, Inc., Boston, MA; George C. Sharp, Inc., Arlington, VA; GKY & Assoc., Springfield, VA; J.J. McMullen, Arlington, VA; Johns Hopkins University, Baltimore, MD; LaQuay Corp., Minneapolis, MN; M. Rosenblatt and Sons, Inc., Arlington, VA; MAR, Arlington, Va; NACI, Washington, DC; NKF, Fairfax, VA; Northern Research and Engineering Corporation, Woburn, MA; Omega Recovery Service, Whittier, CA; Protector, Inc., Severna Park, MD; SAN-I-PAK, Tracy, CA; Somat Corporation, Pomeroy, CA; Spauschus Associates, Atlanta, GA; York International Corp., York, PA; Westinghouse Machinery Technology Division, Pittsburgh, PA.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603721N
PROGRAM ELEMENT TITLE: Environmental Protection

PROJECT NUMBER: S0401
BUDGET ACTIVITY: 4

Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) NPDM 9 June 1993 for Solid Waste and Plastics Management Program
- (U) TEMP 067-6 of Dec 87 Small Craft OWS
- (U) TEMP 067-2 of Feb 81 Advanced Oily Waste Treatment
- (U) TEMP 067-1 of Mar 81 Advanced Oily Waste Treatment
- (U) TEMP 013-26 of Apr 88 Solid Waste Pulper
- (U) TEMP 013-27 of May 88 Offship Firefighting Systems
- (U) NAPDD May 86 CHT Tank Degreasing
- (U) NAPDD May 86 GRP Soil Drain Evaluation
- (U) NAPDD Oct 88 Advanced Non-Oily Waste Treatment
- (U) NAPDD Oct 88 Advanced Solid Waste Control
- (U) NAPDD May 86 Organotin Waste Treatment
- (U) NAPDD Oct 88 Shipboard Hazardous Waste
- (U) NAPDD Oct 87 Ship Air Emissions/VCCs
- (U) OR 273-03-90 of Sep 90 High Efficiency Air Conditioning Plant
- (U) OR 274-03-91 of Sep 90 Supplemental Cooling Units

G. (U) RELATED ACTIVITIES:

- (U) PE 0602233N (Readiness, Training and Environmental Quality Technology)

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

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603721N
PROGRAM ELEMENT TITLE: Environmental Protection

PROJECT NUMBER: S0401
BUDGET ACTIVITY: 4

Date: 7 February 1994

J. (U) MILESTONE SCHEDULE: Category III (AFRP) milestones for the following programs are as follows:

• (U) Off Ship Fire Fighting System	1Q93
• (U) Small Boat Oil Water Separator OWS	2Q93
• (U) High Capacity Oil Water Separator	1Q95
• (U) Large Pulper	TBD
• (U) Small Pulper	TBD
• (U) Glass Metal Shredder	TBD
• (U) Plastic Processor	1Q95
• (U) NAPDDs	Various

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603721N
PROGRAM ELEMENT TITLE: Environmental Protection

PROJECT NUMBER: Y0817
BUDGET ACTIVITY: 4

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: Y0817, Pollution Abatement Ashore. Develop and implement new technologies to comply with environmental laws and policies applicable to Naval shore operations in order to reduce cost, regulatory oversight, and personal liability while maintaining or enhancing the military mission.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,194) Aircraft Maintenance: Changed metal cleaning and paint specifications to comply with environmental standards. Tested alternate paint stripping. Tested plating waste reduction.
- (U) ($4,846) Facilities Operation: Continued development of water pipe lining, lead analyzer, nitrogen emission (NOx) control, oxygen breathing apparatus (OBA) disposal, low solids industrial waste (IW) treatment and 14 technologies for hazardous waste site remediation.
- (U) ($336) Materials Management: Prepared field test procedure for bulk fuel tank leak detection.
- (U) ($1,132) Ordnance Management: Determined parameters for rocket exhaust scrubber. Tested pyrotechnic dye incineration. Installed cryogenic and tested supercritical equipment for eliminating solvents. Prepared site for explosive waste boiler. Prepared instructions for Li bettery disposal.
- (U) ($1,076) Ship Repair: Continued reformulation and testing of compliant ship paints. Designed ship boiler nitrate waste treatment and sloped grid abrasive recycler. Tested enhanced abrasive blast nozzle.

(U) FY 1994 PLAN:

- (U) ($1,705) Aircraft Maintenance: Implement non-Cr anodizing. Demonstrate water-borne topcoat and non-Cr primer on aircraft and support equipment. Test non-hazardous depainting methods. Test alternatives to Cd plating. Demonstrate a treatment process for waste plastic blast media.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603721N
PROGRAM ELEMENT TITLE: Environmental Protection
PROJECT NUMBER: Y0817
BUDGET ACTIVITY: 4
DATE: 7 February 1994

- (U) ($2,590) Facilities Operation: Design fuel pipe leak detection. Test water pipe lining. Finish acceptance tests for lead analyzer and bioluminescent bioassay. Complete user instructions for reduced solids IW treatment and NOx emissions control. Adapt instruments for use in subsurface pollutant identification. Test small arms range cleanup system on clay soil, anaerobic treatment of petroleum contaminated groundwater, and neutralization of oxygen breathing apparatus (OBA) canisters. Stop work on hazardous waste site remediation technology.

- (U) ($910) Materials Management: Install and evaluate bulk fuel tank leak detection. Classify expired hazardous materials for alternates to disposal.

- (U) ($1,725) Ordnance Management: Design explosive waste boiler nozzle. Complete rocket motor scrubber design. Assess data from pyrotechnic test burns. Test supercritical fluid extraction on two more propellants. Develop double base propellent formulations without solvent. Demonstrate nitrate ester oxidation pilot plant for water and scale up air treatment system.

- (U) ($802) Ship Repair: Construct, start-up, and test ship boiler cleaning denitrification plant. Fabricate fluidized bed sloped grid abrasive recycler and complete facility design/permits. Develop low viscosity epoxy and alkyd resin alternatives and replacement for ketone solvent system.

(U) FY 1995 PLAN:

- (U) ($2,065) Aircraft Maintenance: Demonstrate a non-Cr aluminum pretreatment. Optimize low volatile organic compound (VOC) diluents. Optimize Zn-Ni and Sn-Zn alternates to Cd plating. Develop non-Cr sealants. Prepare specifications for low VOC cleaners. Develop Non-Cr bonding process. Test alternate plating and stripping chemicals and processes. Issue non-Cr primer specification.

- (U) ($1,562) Facilities Operation: Field test underground fuel pipe leak detection. Transfer epoxy pipe lining process via site demonstration. Transition OBA canister treatment to fleet users. Transfer engine modification technology for diesel engine emissions. Administer tri-service strategic environmental quality plan update. Test underground pollutant sensors. Prepare final design/operation specifications for rifle range cleanup.

- (U) ($1,100) Material Management: Improve/modify field installation and conduct tests of bulk fuel leak detection system. Implement alternate disposal of first group of expired shelf life items.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603721N
PROGRAM ELEMENT TITLE: Environmental Protection

PROJECT NUMBER: Y0817
BUDGET ACTIVITY: 4

DATE: 7 February 1994

- (U) ($2,125) Ordnance Management: Test explosive mixtures in boiler fuel. Procure, install, and test rocket motor exhaust scrubber. Test pyrotechnic dye destruction parameters on an existing commercial incinerator. Assist field installation/production use of supercritical fluid extraction to recover propellent ingredients. Install ultraviolet destruction unit for explosives in air.

- (U) ($1,500) Ship Repair: Validate ketone replacement paint system. Test prototype equipment for interior space paint removal. Negotiate contract and construct abrasive recycling facility. Complete validation and transition sodium nitrite treatment.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA; NAVSURFWARCENDIV, Indian Head, MD; NAVSURFWARCEN DET, Annapolis, MD; NRL, Washington, DC; NAVSURFWARCENDIV, Crane, IN; NCCOSC RDTE DIV, San Diego, CA; NFESC, Port Hueneme, CA; NAVSEASYSCOM, Arlington, VA; NAVAIRDEP (LMTC), Jacksonville, FL. CONTRACTORS: NACI Inc, Annapolis, MD; IGT, Chicago, IL; Clemson Univ., Clemson, SC; Engineering Science, Pasadena, CA; Ocean City Research Co, Ocean City, NJ; Univ. of Maryland, College Park, Md; Univ. of Cincinnati, Cincinnati, OH; Florida Solar Energy Center, Titusville, FL; NSF International, Lansing, MI; Lehigh Univ., Bethlehem, PA; Pennsylvania State Univ., State College, PA.

(U) RELATED ACTIVITIES:

- (U) PE 0602233N (Readiness, Training and Environmental Quality technology) produces product that transitions into this project.
- (U) PE 0603716D (Strategic Environmental R&D Program (SERDP)) has financed work in this project.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETION	TOTAL PROGRAM
• (U) ER,D R&D	7,000	Funding discontinued by Congress.							
• (U) SERDP	2,645	1,000	TBD	TBD	TBD	TBD	TBD	TBD	TBD

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603721N
PROGRAM ELEMENT TITLE: Environmental Protection

PROJECT NUMBER: T2042
BUDGET ACTIVITY: 4

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: T2042, Plastic Substitution. The purpose of this project is to investigate methods to reduce or eliminate plastic material from items going aboard Navy ships to assist the Fleet in complying with Public Law 100-220, enacted 29 December 1987, based upon Annex V to the International Convention for the Prevention of Pollution by Ships (MARPOL).

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($25) Analyzed reuseable containers, with recommended applications for use.
- (U) ($59) Reviewed food and cleaning products to identify candidates for concentration and/or bulk packaging. Completed desktop review of food items.
- (U) ($62) Research improved supply concept for automatic substitution of non-plastic items. Analyzed options of a stand-alone requisition preprocessing system, a modification to the Navy ships' requisitioning system, and integration into ships' local programs for requisition preparation.

(U) FY 1994 PLAN:

- (U) ($100) Research nonrecoverable weapon systems applications plastic items (such as projectile casings and sonobuoys). Document candidates for fabrication from marine-degradable materials.
- (U) ($44) Continue analysis of cleaning products as candidates for concentration/bulk packaging.

(U) FY 1995 PLAN:

- (U) ($147) Develop and test prototype marine-degradable weapon systems applications items selected from list of candidates developed in FY 1994. Establish feasibility of manufacture of these items from marine-degradable materials.

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603721N
PROGRAM ELEMENT TITLE: Environmental Protection

PROJECT NUMBER: T2042
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; Army Research, Development and Engineering Center, Natick, MA; NAVWPNSTA EARLE, Colts Neck, NJ. CONTRACTORS: To be determined.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

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

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0829 Energy Conservation (ADV)	3,147	2,722	2,799	2,568	2,506	2,644	2,656	CONT.	CONT.
R0838 Mobility Fuels (ADV)	1,976	1,559	1,669	1,616	1,422	1,642	1,682	CONT.	CONT.
TOTAL	5,123	4,281	4,468	4,184	3,928	4,286	4,338	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program supports projects to evaluate, adapt, and develop energy related technologies for ship, aircraft, and land-based operations to: (a) increase fuel-related weapon systems capabilities such as range and time on station; (b) conserve energy and reduce energy costs; (c) reduce Navy shore facilities dependence on petroleum fuels and apply energy technologies that improve environmental compliance; (d) make needed periodic changes to fuel specifications to ensure fuel quality and avoid fleet operating problems; (e) relax unnecessarily restrictive fuel specification features to reduce cost and increase availability worldwide; and (f) provide guidance to fleet operators for the safe use of off-specification or commercial grade fuels when military specification fuels are unavailable or in short supply. Through 1985, the Navy Energy R&D Program, of which this program element is a part, had produced energy cost avoidance estimated at $127M per year (compared to 1975 consumption rates). As currently funded, savings of $150M per year by 1995 and $289M per year by 2000 are projected compared to 1985 costs.

This program, and the companion PE 0604710N, Navy Energy Program (ENG), support the achievement of Executive Department, DOD, and Navy Energy Management Goals enunciated in Executive Order 12759 of Apr 91, Defense Energy Policy Memorandum 91-2 of May 91, OPNAV Instruction 4100.5C of July 86, and the 1992 Energy Policy Act.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program
PROJECT NUMBER: R0829
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R0829, Energy Conservation (ADV). This project improves the energy efficiency of Navy ships, aircraft, and shore facilities and thereby contributes to reduced operating costs and improved fleet sustainability and performance. Major efforts include work to increase the efficiency of aircraft engines; develop improved hull coatings and auxiliary equipment for ships; and develop renewable/alternative energy resources, energy conservation technologies, and energy use management strategies for Navy shore facilities.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($ 650) Aircraft: Initiated Integrated Flight and Propulsion Control (IFPC) tech demo program for F/A-18; performed cost/benefit analyses for various IFPC options; selected control system architecture for F/A-18E/F. Let contract to evaluate retrofit potential of tne Full Authority Digital Engine Control (FADEC) being developed for F/A-18 E/F's engine (GE F414) to the C/D engine (GE F404).
- (U) ($1,651) Ships: Characterized and tested ozone-safe refrigerants; initiated design and fabrication of components modified to minimize efficiency loss. Completed study of stress on marine environment associated with in situ underwater hull cleaning of copper antifouling (AF) paints. Evaluated methods for incorporating non-toxic AF components into practical coating systems. Developed model to assess benefits of potential efficiency improvements for LM 2500 propulsion engine and drive train.
- (U) ($ 846) Facilities: Transitioned Inverse Flash Steam Purification (IFSTEP) pierside clean steam system to 6.4 field test. Field tested intermediate to large photovoltaic (PV)/diesel control system. Established DoD selection criteria for grid interactive PV for: island grid, grid support, distributed load, and peak shedding applications. Assessed DON potential and T&E requirements for grid interactive PV.

(U) FY 1994 PLAN:

- (U) ($ 657) Aircraft: Continue IFPC Technology Demonstration Program--develop/validate hardware, software and system integration. Evaluate IFPC technology retrofit potential for F/A-18C/D. Initiate joint Energy/J52 Component Improvement Program (CIP) turbine seal replacement software program.
- (U) ($1,321) Ships: Evaluate 2nd generation ozone safe refrigerants for energy efficiency benefits; determine operating cycle requirements and equipment modification necessary to maximize energy efficiency. Conduct small to medium scale evaluation of promising non-toxic AF coating systems. Modify hull cleaning protocols/equipments to meet the needs of silicone "easy release" antifouling coatings.
- (U) ($ 744) Facilities: Establish qualifications standards for DoD use of new (thin film) PV receptor technology. Develop wind turbine selection criteria for DoD applications. Test and Evaluate (T&E) geothermal (ground source) heat pumps for space heating/cooling. Develop integrated Energy Resource

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PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program
PROJECT NUMBER: R0829
BUDGET ACTIVITY: 4
DATE: 7 February 1994

Planning (IERP) investment strategies. Develop energy efficient processes/components for industrial facilities. T&E PV/hybrid power systems for site specific applications.

(U) FY 1995 PLAN:

- (U) ($ 727) Aircraft: Demonstrate IFPC technology via bench tests of hardware/software and ground based engine tests. Transition J52 CIP turbine seal mod to NAVAIR J52 CIP program. Integrate Flight Performance Advisory System (FPAS), developed in 6.4, into IFPC program.
- (U) ($1,397) Ships: Complete redesign of major Navy air conditioning compressor impellers (sized for DD-963, CG-47, DDG-51, LHD, CV) to efficiently use ozone-safe alternative refrigerants. Transition successful non-toxic AF materials/coating systems to 6.4 ship applications. Continue to adapt hull cleaning process to needs of advanced AF coatings. Evaluate fuel cells and other transition candidates from 6.2 auxiliary machinery programs. Monitor Advanced Surface Machinery program for energy conservation opportunities.
- (U) ($ 675) Facilities: Establish criteria for DoD application of Solar Thermal Electric Systems. T&E energy efficient industrial process hardware. Develop high efficiency mobile power and steam generators. Evaluate PV integrated roof systems for distributed load center grid support applications.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN DET, Annapolis, MD; NAVAIRWARCENACDIV, Trenton, NJ; NCEL, Port Hueneme, CA; NAVAIRWARCENWPNDIV, China Lake, CA. CONTRACTORS: GE, Lynn, MA; McDonnell Aircraft, St. Louis, MO; Teledyne Inet, Torrance, CA; Northern Research Eng. Corp., Woburn, MA.

(U) RELATED ACTIVITIES:

- PE 0602121N (Surface Ship Technology)
- PE 0602122N (Aircraft Technology)
- PE 0602234N (Materials, Electronics, and Computer Technology)
- PE 0603217N (Air Systems and Weapons Advanced Technology)
- PE 0603712N (Environmental Quality and Logistics Advanced Technology)
- PE 0604710N (Navy Energy Program (ENG))

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program

PROJECT NUMBER: R0838
BUDGET ACTIVITY: 4

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R0838, Mobility Fuels (ADV). This project provides data through engine and fuel system tests which relate the effects of changes in Navy fuel procurement specification properties to the performance and reliability of Naval ship and aircraft engines and fuel systems. This information is required to: (a) determine the extent to which unnecessarily restrictive specification features can be relaxed to reduce cost and increase availability worldwide. (Compared to current fuel costs, savings of $20M per increase progressively to over $120M by 2000 are projected to be achievable); (b) provide guidance to fleet operators for the safe use of off-specification or commercial grade fuels when military specification fuels are unavailable or in short supply; and (c) make needed periodic changes to fuel specifications to ensure fuel quality and avoid fleet operating problems while accommodating evolutionary changes in the fuel supply industry. Recent problems with fuel quality have adversely affected ship and aircraft system performance and reliability and resulted in degradation of fuel in storage. The resulting readiness impacts, additional maintenance costs, and the cost of lost equipment, although difficult to quantify, are many times the cost of this project. Over the next decade, the potential for fuel quality related problems will increase because of changing industry practices required to comply with new environmental regulations. This project represents the only investment designed to maintain the Navy's ability to operate as a "smart" customer for fuels that costs approximately $3B per year to procure, transport, store and consume and are essential to fleet operations.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,086) Ships: Completed GE LM2500 main propulsion engine, combustor rig tests to determine the effect of the use of broadened specification marine diesel fuels (BSMDFs) on ignition and flame stability. Completed high-speed diesel engine test program with BSMDFs that provided data to support the continuous use of commercial specification marine gas oils which are cheaper and more widely available than military specification fuels. Completed test work to qualify a new Navy developed method to predict long term diesel fuel storage stability as an approved American Society of Testing Materials procedure.
- (U) ($ 890) Aircraft: Completed development of quantitative thermal stability measurement techniques to allow the rapid assessment of the potential for off-specification fuel to limit aircraft engine life.

(U) FY 1994 PLAN:

- (U) ($ 859) Ships: Conduct ignition, flame stability and thermal performance tests with BSMDFs for the Allison 501-K-17/34 gas turbine engine (GTE). Update the test protocol for the GE LM2500 GTE to establish performance and durability limits for BSMDFs. Initiate test work to determine the lubricity characteristics of the low sulfur, low aromatic diesel fuels that are dictated by new environmental regulations, and determine the effectiveness of commercially available lubricating additives.

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PROGRAM ELEMENT TITLE: Navy Energy Program | BUDGET ACTIVITY: 4

- (U) ($ 700) Aircraft: Complete development of a cost effective strategy for eliminating the adverse effects on JP-5 thermal stability caused by copper contamination from the copper/nickel shipboard aviation fuel system piping. Complete development of an accelerated procedure to evaluate and quantify the effects of fuel properties, additives and filter/separator components on the water coalescence of JP-5 and Marine diesel fuel. Initiate a joint effort with the Air Force to develop a non-toxic aircraft fuel system icing inhibitor (FSII).

(U) FY 1995 PLAN:
- (U) ($ 949) Ships: Complete engine tests to determine fouling tendencies of high-speed diesel engine injection systems for BSMDFs. Complete Allison 501-K17/34 GTE performance tests with BSMDFs. Complete lubricity evaluation of low sulfur, low aromatic diesel fuels. Initiate development of a shipboard test kit to determine vanadium levels in fuels (severely accelerates corrosion).
- (U) ($ 720) Aircraft: Develop and validate an Aviation Fuel Antioxidant Specification Approval Procedure. Develop preliminary revised JP-5 Thermal Stability Specification required to assure optimum fuel performance in both advanced Navy aircraft and shipboard distribution systems. Continue development of non-toxic FSII. Complete field testing of Fuel Diagnostics Troubleshooting Manual to assist field personnel in the analysis and diagnosis of fuel related fleet operational problems.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN DET, Annapolis, MD; NAVAIRWARCENACDIV, Trenton, NJ; NAVSURFWARCEN SHIPSYSENGSTA, Philadelphia, PA; NRL, Washington, DC. CONTRACTORS: Allison Gas Turbine, Indianapolis, IN; General Electric Corp, Cincinnati, OH; Pratt and Whitney, West Palm Beach, FL; Rolls Royce, Atlanta, GA; Southwest Research Institute, San Antonio, TX.

(U) RELATED ACTIVITIES:
- PE 0602234N (Materials, Electronics, and Computer Technology)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: ABCA/IEP-3 and ASCC WP15 agreements with UK, Canada, Australia and New Zealand on the use of naval marine fuels, military aircraft fuels, and allied products.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603725N
PROGRAM ELEMENT TITLE: Facilities Improvement

PROJECT NUMBER: Y0995
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Y0995 Naval Facilities Systems	1,533	1,368	2,500	923	926	931	932	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND PROJECT: This project provides for advanced developments to reduce the costs of Naval facilities infrastructure through full scale test validations of new concepts and advancing technologies: (a) A High Performance Magazine (HP Mag) to increase ammunition storage efficiency or decrease costs by a factor of 8; this will result in better land use to provide new options for base consolidations and reduce munitions storage operating costs; (b) Specialized equipment to reduce peacetime costs, capability shortfalls and risks to the Seabee Underwater Construction Teams; and (c) Compile test data for survivability of facilities. It focuses on needs where private construction R&D is lacking, and transfers university research to Navy application/acquisition.

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($884) Completed constructibility assessment of HP Magazine Design tests and other procedures to obtain facility survivability data.
- (U) ($479) Field test Arctic Underwater Remote Operating Work Vehicle (ROV) for ten fold endurance and range improvement; demonstrate feasibility of Quick Cold-Start Electric Generator for emergency electricity and heat in Arctic.
- (U) ($170) Completed test designs and test plans for Joint Camouflage Concealment Deception (JCCD); start testing.

(U) FY 1994 PLAN:

- (U) ($1,116) Design HP Magazine demonstration for full scale explosive testing. Continue with facility survivability test data compilation and analysis.

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PROGRAM ELEMENT: 0603725N
PROGRAM ELEMENT TITLE: Facilities Improvement
PROJECT NUMBER: Y0995
BUDGET ACTIVITY: 4
DATE: 7 February 1994

- (U) ($67) Complete Arctic Underwater ROV for increased productivity and economy in underwater inspection and terminate Cold-Start Generator testing.
- (U) ($185) Begin testing at NAS Fallon with aircraft sorties against targets both treated and untreated with Camouflage, Concealment and Deception (CCD) techniques using conventional and precision guided weapons.

(U) FY 1995 PLAN:

- (U) ($2,273) Design HP Magazine prototype for full scale explosive testing. Conduct tests to certify the explosive safety properties of the pit covers.
- (U) ($100) Conduct testing Small Business Innovative Research (SBIR) prototype Seawater Hydraulic Rock Drill.
- (U) ($127) Complete testing on effectiveness of CCD techniques; evaluate and report on most effective use of CCD to protect targets and train aircrews.

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

(U) WORK PERFORMED BY: IN-HOUSE: NCEL, Port Hueneme, CA; NAVAIRWARCENWPNDIV, China Lake, CA; NAVSURFWARCEN, White Oak DET Silver Spring, MD; U.S. Army Waterways Experiment Station (WES), Vicksburg, MS; CONTRACTORS: CEMCOM Research, Lannam, MD; Mission Research, Santa Barbara, CA; Benthos, North Edgerton, MA.

(U) RELATED ACTIVITIES:

- (U) PE 0602233N, Mission Support Technology
- (U) PE 0602234N, Materials, Electronics and Computer Technology
- (U) PE 0603792N, Advanced Technology Demonstrations.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603747N
PROGRAM ELEMENT TITLE: Undersea Warfare Advanced Technology
BUDGET ACTIVITY: 3

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X1933	Anti-Submarine Warfare (ASW) Advanced Technology Demonstration								
	14,282	11,746	12,670	13,306	13,533	13,910	14,395	0	111,534
X1959	Critical Sea Tests (CST)								
	27,598	23,993	23,209	22,259	4,098	0	0	0	122,752
X2100	Advanced Deployable Array								
	3,532	0	0	0	0	0	0	0	7,469
H2089	Advanced Collection Technology								
	10,386	9,972	10,488	10,753	13,707	13,951	14,210	CONT.	CONT.
V2159	ASW Target**								
	2,000	1,921	963	0	0	0	0	0	4,884
X2186	Low Low Frequency Tech								
	14,225	14,588	0	0	0	0	0	0	28,813
X2187	Shallow Water ASW System								
	2,825	0	0	0	0	0	0	0	2,825
TOTAL	74,848	62,220	47,330	46,318	31,338	27,861	28,605	CONT.	CONT.

**Funds were transferred from PE 0603254N after restructure of the MK-30 Target program.

B. (U) BRIEF DESCRIPTION OF ELEMENT: Work under this program element (PE) is focused on advanced development of Undersea Warfare technologies in support of three of the "Top 5" Future Joint Warfighting Capabilities endorsed by Joint Chiefs of Staff (JCS) as they apply to the undersea threat, namely: (a) Maintaining near perfect real-time surveillance of an enemy's undersea forces and communicating that knowledge to joint forces in near-real-time; (b) Developing a range of tactical Anti-Submarine Warfare (ASW) warfare capabilities that could be employed at the lower end of the full range of military operations with minimum risk of casualties or collateral damage to friendly forces; (c) Developing a robust, world-wide capability for detecting, localizing, and neutralizing undersea threats, including diesel electric submarines in littoral waters, in decisive conflict with minimal risk of casualties or collateral damage to friendly forces. Emphasis is on construction of prototype devices, components and systems necessary to demonstrate and validate concepts

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PROGRAM ELEMENT TITLE: Undersea Warfare Advanced Technology
BUDGET ACTIVITY: 3

DATE: 7 February 1994

and techniques previously developed in 6.1 and 6.2 or developed and suggested by industry/academia. Advanced techniques for gathering and realistic at-sea environmental data needed to benchmark developmental sonar systems are also developed. Work under this PE supports the following Joint Mission Areas: Joint Littoral Warfare, Joint Surveillance, Strategic Deterrence, Strategic Sealift/Protection and Manpower, Personnel and Shore Training. Specifically:

(U) Joint Littoral Warfare has requirements for technology developments that will enable our forces to dominate the undersea and surface battlespaces in littoral environments. Work under this PE provides technologies to obtain information necessary to develop improved ASW systems to detect track and localize threat submarines and to develop weapons which will be effective against small targets. It also provides at-sea measurement data for current and developmental sonar systems to determine their effectiveness in a wide variety of environments, with emphasis on the issues associated with operations in shallow water environments. Such information is essential for the development of new undersea surveillance and weapon systems and components with robust littoral water capabilities. This project also provides prototype and advanced development level components to validate ASW surveillance concepts, research products and technologies for Full Spectrum Processing, low frequency active transducers, and fiber optic sensors, transmission nodes and arrays for undersea surveillance systems. These systems and components address the Joint Littoral Warfare need to provide improved ASW systems capable of detecting, classifying and tracking undersea threats in shallow waters. Development and testing of acoustic warfare concepts addresses the Littoral Warfare Area need for force coordination and tactical control.

(U) Joint Surveillance addresses issues of real-time detection, localization, classification and tracking of the undersea threat. The joint project is developing and demonstrating advanced sensors and transmission methods, which will utilize lower cost/size/power sensors, as well as deployment methods for such systems. Measurements conducted under the CST program provides data necessary to evaluate the performance of current and developmental sonar sensors, including sonobuoy systems, in a wide variety of ocean environments with emphasis on the particular issues associated with sensor operation in shallow water environments. The Advanced Collection Technology project helps to provide components and systems to provide information necessary for the development of effective undersea surveillance systems.

(u) Strategic Deterrence addresses issues relating to the protection of U.S. ballistic and cruise missile-launching submarines. Full Spectrum work helps meet Strategic Deterrence needs for SSBN passive sonars that will be effective against quiet threats. The CST and Advanced Collection Technology programs provide essential measurements of sonar

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system performance in realistic at-sea environments and information on the [redacted] to help optimize sonar system performance. Continued superiority in passive sonars is essential to the continued safety of the SSBN force as it enables them to detect and avoid potential threats.

(u) Strategic Sealift/Protection requires our naval forces to sustain sea-borne power projection through local domination of the surface and undersea battlespaces in the vicinity of logistic and replenishment forces in open ocean and littoral areas. This program provides improved sonar components, [redacted] and at-sea performance measurements in a wide variety of ocean environments to help ensure our forces will maintain this dominance in the future.

(U) Mobile Acoustic Target transducer technology developed under this PE supports the Manpower, Personnel and Shore Training Joint Mission Area requirement to maintain fleet readiness through improved training of personnel at-sea and by providing the capability for more realistic evaluations of undersea combat and weapon systems.

(U) These efforts also support the Navy's joint warfare strategy "From the Sea" by providing improved capabilities to dominate the surface and undersea battlespaces.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603747N
PROGRAM ELEMENT TITLE: Undersea Warfare Advanced Technology
PROJECT NUMBER: X1933
BUDGET ACTIVITY: 3
DATE: 7 February 94

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X1933 Anti-Submarine (ASW) Advanced Technology Demonstration	14,282	11,746	12,670	13,306	13,533	13,910	14,395	CONT.	111,534

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project develops and tests prototype and developmental anti-submarine warfare system components building on the concepts, algorithms and technologies developed under the 6.1 and 6.2 programs. It also supports the advanced development of sensors, nodes and arrays and provides for transition of the [redacted] (further details are at a higher classification level). It sponsors developmental work on acoustic warfare concepts and system analysis of advanced ASW surveillance concepts to determine their suitability for further development. The five major components in this project are: the [redacted] Advanced Acoustic Source Technology, Advanced Full Spectrum Processing, Acoustic Warfare and Undersea Warfare Analysis. Joint Mission Areas supported by this project include: Joint Littoral Warfare, Joint Surveillance, Strategic Deterrence and Strategic Sealift/Protection. Specifically:

(u) Joint Littoral Warfare requires systems that will enable our forces to dominate the surface and undersea battlespaces in littoral, shallow-water environments. This project provides prototype and advanced development level components to validate ASW surveillance concepts, research products, and technologies for Full Spectrum Processing and Low Frequency Active Sonar Transducers. Both areas meet a Joint Littoral warfare need to provide improved ASW systems to detect, track, and localize threat submarines in shallow-waters. The Full Spectrum processing work focuses on the development of software and devices to detect [redacted] which emanate from both diesel-electric and nuclear threat submarines. Low Frequency Active transducer work focuses on developing lighter-weight, lower-cost [redacted] transducers for use in both wide-area and tactical undersea surveillance applications against diesel electric submarines operating in shallow waters. This work also addresses Joint Surveillance issues of real-time detection, localization, classification and tracking of undersea threats and Strategic Sealift/Protection requirements to enable our forces to dominate the local undersea battlespace in the vicinity of logistic and replenishment forces. The Full Spectrum work also helps meet Strategic Deterrence needs for SSBN passive

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sonars that will be effective against quiet threats.

(u) The Acoustic Warfare Planning and Warfighting Payoff Analysis work supports Joint Littoral Warfare requirements for force coordination and tactical control. A robust acoustic warfare doctrine is an essential element if tactical forces are to be successfully employed. Proliferation of high-power active sources and the emergence of [redacted] active sonar operating doctrines requires careful planning and coordination to avoid mutual interference and to optimize sensor utilization.

(u) The [redacted] project is developing and demonstrating advanced [redacted] sensors and transmission methods, suitable for use in the undersea environment, as well as deployment methods for such systems. This work helps address Joint Littoral Warfare and Joint Surveillance needs for ASW systems capable of detecting, tracking and localizing submarines in shallow-water environments.

(U) These efforts also support the Navy's joint warfare strategy "From the Sea" by providing an improved capability to dominate the surface and undersea battlespace. This project is service unique.

C. (u) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (u) FY 1993 ACCOMPLISHMENTS:

(u) ($2306)

- (u) Deployed regional [redacted] demonstration array, including advanced processing from Exploratory Development (6.2) programs and FY 1992 results.
- (u) Conducted:
  -- (U) regional exercises, analyzed, and reported previous year's exercise results.
  -- (u) evaluation of [redacted] array deployment and drafted performance assessment criteria.

(u) ($1588) Advanced Active Source Technology Development:

- (u) Completed:

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-- (u) procurement and testing of an array of acoustic sources, utilizing the technology.
-- (u) testing of inverse flextensional underwater acoustic transducer technology at Low Frequency Active frequencies. Results indicate potential for a design capable of Such a design would help meet Joint Surveillance and Joint Littoral Warfare needs for more effective ASW surveillance systems.
-- (U) completed evaluation of a thermo-acoustic underwater sound source. Negative results yielded decision to cancel further 6.3A development.

- (u) Initiated cooperative (Space and Naval Warfare Systems Command (SPAWAR), Naval Sea Systems Command (NAVSEA), Naval Air Systems Command (NAVAIR)) evaluation of underwater acoustic transducers developed in 6.2. Such transducers are smaller and lighter in weight than currently available alternatives which operate in the same frequency range.

(U) ($542) Acoustic Warfare:

- (U) Completed:
  -- (U) delivery of Acoustic Warfare Operating Doctrine to Navy Planners, including active/passive acoustic interoperability and Command, Control, Communications and Intelligence (C3I)/threat integration. This included analysis of supporting Critical Sea Test data. This work addresses the Joint Littoral Warfare need for improved force coordination and tactical control.

(u) ($8528) Advanced Full Spectrum Processing (FSP):

- (u) Transitioned improved into AN/BQQ-5, BEARTRAP and Integrated Undersea Surveillance Systems (IUSS) programs.
- (u) Demonstrated performance gain against activities.
- (u) Developed FSP performance prediction capability; This data base is needed to provide the information necessary to improve sonar detection capabilities against likely threat submarines operating in littoral waters.

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(u) ($1316) Undersea Warfare Analysis:

- (u) Conducted modeling and analysis to quantify and assess the expected warfighting payoffs of full spectrum and active acoustic initiatives within this program element.

2. (u) FY 1994 PLAN:

(u) ($3734)

- (U) Conduct regional exercises, analyze, and report previous year's results.
- (u) Complete:
  -- (u) deployment tests, and begin system integration for FY 1995 deployment.
  -- (u) sensor and advanced signal processing design efforts.

(U) ($1742) Advanced Active Source Technology Development:

- (U) Test array of acoustic sources, utilizing the preferred single-element technology from FY 1993 tests.

(u) ($3559) Advanced Full Spectrum Processing:

- (u) Develop optimized multifeature detectors-classifiers for and demonstrate gain. Deliver algorithms to USW platform acoustic processing system offices for availability in software system upgrades.
- (u) Continue:
  -- (u) expansion of full spectrum database for activities.
  -- (u) to determine optimal feature sets for and provide a robust performance prediction which includes clutter.

(u) ($1798) Acoustic Warfare:

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- (u) Update/revise Acoustic Warfare Operating Doctrine reflecting acoustic interoperability and C3I/threat integration developments. Address joint [IUSS, surface, Maritime Patrol Aircraft, etc., interoperability and connectivity issues in support or the cruise missile threat.

(U) ($913) Undersea Warfare Analysis:

- (U) Conduct modeling and analysis to quantify payoffs of selected advanced ASW initiatives.

3. (u) FY 1995 PLAN:

(u) ($4205) [

- (U) Complete:
  -- (u) integration of, and deploy [ ] system during regional field tests. Perform initial performance assessments.
  -- (U) field test and finalize [ ] sensor designs and advanced signal processing techniques.
- (U) Continue development of unique regional capabilities by conducting Ice Exercise (ICEX) FY95; complete analysis of previous year's work and report results.

(U) ($2062) Advanced Active Source Technology Development:

- (U) Conduct evaluation of selected acoustic source technologies. Test array of preferred single element technology from FY 1994 tests.

(u) ($5328) Advanced Full Spectrum Processing:

- (u) Transition integrated [ ] processing into a fieldable prototype; document value added.
- (u) Expand:

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-- (U) processor capabilities to include [ ] threats.
-- (U) efforts to construct embedded training for [ ] and develop special purpose processors/processing for [ ].

(U) ($487) Acoustic Warfare:

- (U) Update Acoustic Warfare Doctrine and operational models using data collected during CST.

(U) ($588) Undersea Warfare Analysis:

- (U) Assess
  -- (U) the payoff of selected current and proposed USW advanced technology developments providing decision makers the basis for investment decisions.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NCCOSC, San Diego, CA; NAVAIRWARCEN Warminster, PA; NAVSURFWARCEN, White Oak, MD; NAVUNSEAWARCEN, New London, CT; NAVPERSR&DCEN, San Diego, CA. CONTRACTORS: Polar Associates, Inc., Santa Barbara, CA; Applied Physics Laboratory/Johns Hopkins University, Laurel, MD; TRW, McLean, VA; Science Application International Corporation (SAIC), McLean, VA; ORINCON, San Diego, CA; APL/UW, Seattle, WA; ARL/UT, Austin, TX; MIT/Lincoln Labs, Boston, MA.

E. (U) COMPARISON WITH AMENDED FY 1994 PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost change. Data in previous budget not available for comparison.

F. (u) PROGRAM DOCUMENTATION:

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(U) NAPDD #326-87 for Full Spectrum 7 DEC 1992
(U)
(U) NAPDD #251-07 for Regional ASW Command Concept 7 DEC 1990
(U) (SA to NAADM MOU) Memorandum of Understanding (MOU) 29 SEP 1992
(U) USW ATD Project Execution Plans 30 AUG 1993

G. (U) RELATED ACTIVITIES:
- (U) PE 0501153N (Defense Research Sciences)
- (U) PE 0602314N (Undersea Surveillance and Weapons Technology)
- (U) PE 0602315N (MCM, Mining, and Special Warfare Technology)
- (U) PE 0602323N (Submarine Technology)
- (U) PE 0602435N (Ocean and Atmospheric Technology)
- (U) PE 0603254N (ASW Systems Development)
- (U) PE 0603553N (Surface ASW)
- (U) PE 0603555N (Sea Control & Littoral Warfare Technology Demonstration)
- (U) PE 0603792N (Advanced Technology Transition)
- (U) PE 0604261N (Acoustic Search Sensors (ENG))
- (U) PE 0204311N (Integrated Surveillance System)

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

J. (U) MILESTONE SCHEDULE: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603747N
PROGRAM ELEMENT TITLE: Undersea Warfare Advanced Technology
PROJECT NUMBER: X1959
BUDGET ACTIVITY: 3
DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X1959 Critical Sea Tests (CST)	27,598	23,993	23,209	22,259	4,098	0	0	0	122,752

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEMS CAPABILITIES: This project conducts integrated at-sea tests using the full spectrum of undersea warfare platforms to support development of mid- and low-frequency active sonar systems, passive sonars, and the scientific examination of environmental effects on sonar signals. It also facilitates testing of sonar systems interoperability, Anti-Submarine Warfare (ASW) data fusion and Command/Control/Communications/Computer/Intelligence issues for both battle group and theater level acoustic warfare. Centralizing at-sea acoustic testing provides synergism and lowers the overall cost of obtaining test data in realistic sea environments. The need to obtain data on sonar system performance in shallow-water, littoral areas and to characterize the effects of the shallow-water environment was specifically cited as an urgent need by the National Academy of Sciences Littoral Warfare Study Panel as a result of their spring 1993 review. The data provided by this project addresses this need. The project supports the Joint Mission Areas of Joint Littoral Warfare, Joint Surveillance, Strategic Deterrence, and Strategic Sealift Protection. Specifically:

(U) Joint Littoral Warfare has requirements for advanced systems that will enable our forces to dominate the undersea and surface battlespaces in littoral environments. This project provides at-sea measurement data necessary to assess the performance of current sonar systems and to develop new techniques and systems having improved performance against diesel-electric submarines in shallow water environments. This helps meet Joint Littoral Warfare needs to provide improved ASW systems to detect, track and localize threat submarines in shallow as well as deep waters and to improve the defense of both surface ships and submarines through the timely detection and classification of hostile undersea threats. Work in this project also addresses Joint Littoral Requirements for force coordination and tactical control as the sea tests are also used to develop and try out new acoustic warfare doctrines designed to minimize interference between undersea sensor systems and to test ASW data fusion concepts.

(U) Joint Surveillance needs include issues of real-time detection, localization, classification and tracking of the undersea threat. This project addresses needs in undersea sensing and the development of low-frequency active (LFA)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603747N
PROGRAM ELEMENT TITLE: Undersea Warfare Advanced Technology
PROJECT NUMBER: X1959
BUDGET ACTIVITY: 3
DATE: 7 February 1994

sonobuoys. Sea tests conducted under this program provide data to evaluate the performance of current and developmental sonar sensors, including low-frequency sonobuoy systems, in a wide variety of ocean environments with emphasis on the particular issues associated with sensor operation in shallow water. Such data is critical to provide a better understanding of the effects of the ocean environment on undersea sensors and to develop sensors that will have a robust capability in shallow water environments.

(U) Strategic Deterrence requirements include issues related to the protection of U.S. ballistic and cruise missile-launching submarines. The sea test data provided by this project provides an improved understanding of the effects of the environment on submarine sonar systems to help optimize the development and employment of SSBN sonar detection and torpedo countermeasure systems which will help our forces evade both surface and undersea threats.

(U) Strategic Sealift/Protection requires that our forces have the capability to dominate the local sea areas in the vicinity of logistic and replenishment forces in order to allow them to sustain power projection forces in open ocean and littoral areas. This project provides sea test data on current and developmental sonar systems and on the characteristics of the ocean environment with emphasis on shallow water regions. Such data is used to evaluate current undersea sensor performance and to project that of new sensors and techniques in order to develop the systems that will enable future Navy forces to dominate the local surface and undersea battlespaces and provide a robust shield against undersea threats in the vicinity of logistic forces.

(U) This effort also supports the Navy's joint warfare strategy "From the Sea" by providing an improved capability to dominate the surface and undersea battlespaces. This project is service unique.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (u) FY 1993 ACCOMPLISHMENTS:
   - (u) ($8,133) Conducted:
     -- (u) combined tactical and [redacted] sea tests in the Mediterranean Sea (CST 8/MAG I).
     -- (u) joint surface and submarine tactical sea tests in North Atlantic with [redacted] (LFA 11/AIREM).
   - (u) ($7,533) Analyzed FY 1992 tests and provided Active Acoustic [redacted] reports on both scientific and operational results to all ASW platform and development activity users. This data will aid in the

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assessment of current system performance and the development of active sonars and sonobuoys with improved shallow-water capabilities.

- (U) ($11,932) Provided sea test platforms/assets for conduct of sea tests in support of system development and science and technology programs (CST 8/MAG I/LFA 10 and 11/ARSRP/AIREM/SHAREM/SASA).

2. (u) FY 1994 PLAN:

- (u) ($7,032) Conduct:
  -- (U) combined tactical and Acoustic Warfare sea test with Fleet ASE Exercises (ASWEX) in littoral waters of the NE Pacific (CST 10/LFA 12/MAGII).
  -- (u)
  -- (u) tests using the CST portable shallow water source array against a
- (U) ($1,500) Participate in Joint Exercises to integrate and coordinate surveillance data into Command/Control/Communication infrastructure for NORAD/Navy Counter-Cruise Missile Initiative.
- (u) ($5,817) Analyze FY 1992 and FY 1993 sea test data and provide Active Acoustic and Acoustic Warfare reports on both scientific and operational results to all Undersea Warfare (USW) platform users.
- (U) ($8,119) Provide sea tests platforms/assets for conduct of sea tests in support of system development, Science and Technology programs and Acoustic Warfare issues.
- (U) ($1,525) Develop and demonstrate a portable shallow-water source array suitable for at-sea tests.

3. (u) FY 1995 PLAN:

- (u) ($10,027) Conduct:
  -- (U) Joint Science and Technology, system development and surveillance sea test with SACLANTCEN in littoral/shallow water environments.
  -- (u) combined Science and Technology and surveillance sea test in littoral/shallow water environments of the (CST 11/LFA 13).
  -- (U) combined tactical and Acoustic Warfare sea test with Fleet in littoral waters (CST 12/LFA 14/MAG III).
- (U) ($5,587) Analyze FY 1994 sea test data and provide reports on both scientific and operational results

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603747N
PROGRAM ELEMENT TITLE: Undersea Warfare Advanced Technology
PROJECT NUMBER: X1959
BUDGET ACTIVITY: 3
DATE: 7 February 1994

to all USW platform users.
- (U) ($7,595) Provide sea test platforms/assets for conduct of sea tests in support of system development, Science & Technology programs and Acoustic Warfare issues.

4. (U) PROGRAM TO COMPLETION: Conduct final sea test in shallow water site. Complete data analysis. Demobilize sea test assets. This project completes at the end of FY 1997.

D. (U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NRL-SSC, Stennis Space Center, MS; NCCOSC, RDT&E DIV, San Diego, CA; NCEL, Point Hueneme, CA; NAVAIRWARCENACDIV, Warminster, PA; and NAVUNSEAWARCEN, New London, CT. CONTRACTOR: The John Hopkins University/Applied Physics Laboratory, Laurel, MD.

E. (U) COMPARISON WITH AMENDED FY 1994 PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:
1. (U) NAPDD 138-098, Advanced Technology Transition At-Sea ASW Experiments, dated 2 October 1986 (PE 0603742N, Project R1959-01).
2. (U) NAPDD 328-911E, ASW Advanced Technology Critical Sea Test Phase II, dated 9 March 1993 (PE 0603747N, Project X1959).
3. (U) CST Phase II Program Plan (U), 10 May 1991.
4. (U) Execution Plan for PE 0603747N, Project X1959; Advanced Undersea Warfare Technology, Critical Sea Test (CST) Phase II; dated 30 August 1993.

G. (U) RELATED ACTIVITIES:

- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0602314N (Undersea Surveillance and Weapons Technology)

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PROGRAM ELEMENT: 0603747N
PROGRAM ELEMENT TITLE: Undersea Warfare Advanced Technology
PROJECT NUMBER: X1959
BUDGET ACTIVITY: 3
DATE: 7 February 1994

- (U) PE 0602435N (Ocean and Atmospheric Technology)
- (U) PE 0603254N (ASW Systems Development)
- (U) PE 0603553N (Surface ASW)
- (U) PE 0603555N (Sea Control & Littoral Warfare Technology Demonstration)
- (U) PE 0603785N (Combat Systems Oceanographic Performance Assessment)
- (U) PE 0603792N (Advanced Technology Transition)
- (U) PE 0604221N (P-3 Modernization Program)
- (U) PE 0604261N (Acoustic Search Sensors)
- (U) PE 0204311N (Integrated Surveillance System)
- (U) PE 0604503N (Submarine System Equipment Development)
- (U) PE 0604784N (Distributed Surveillance Systems)

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:
1. (U) Canadian-U.S. Supplemental Arrangement to North American Air Defense Modernization, Memorandum of Understanding 29 September 1992.
2. (U) US/CANADIAN Information Exchange Project (IEP) C-30, "Low Frequency Active Acoustics Research and Development Information."
3. (U) US/UNITED KINGDOM IEP-B85, "Exchange of Low Frequency Active Acoustics (LFAA) Research, Development and Technology Information and Technical Information Related to LFAA System Development."
4. (U) US/UNITED KINGDOM IEP-B-74, "Shallow Water Undersea Surveillance."
5. (U) TTCP "Policies, Organization and Procedures in Non-Atomic Military Research and Development," May 1991.

J. (U) MILESTONE SCHEDULE:

• (U) Complete Data Analysis from FY 1993 sea tests	FY 1994
• (U) Plan and Execute Sea Tests	FY 1994
• (U) Complete Data Analysis from FY 1994 sea tests	FY 1995
• (U) Plan and Execute Sea Tests	FY 1995
• (U) Complete Data Analysis from FY 1995 sea tests	FY 1996
• (U) Conduct Final Sea Test	FY 1996

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603747N
PROGRAM ELEMENT TITLE: Undersea Warfare Advanced Technology
PROJECT NUMBER: X1959
BUDGET ACTIVITY: 3
DATE: 7 February 1994

- (U) Demobilize Test Assets — FY 1997
- (U) Complete Data Analysis from final sea test — FY 1997

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603747N
PROGRAM ELEMENT TITLE: Undersea Warfare Advanced Technology
PROJECT NUMBER: H2089
BUDGET ACTIVITY: 3
DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
H2089 Advanced Collection Technology	10,386	9,972	10,488	10,753	13,707	13,951	14,210	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project builds advanced development and prototype devices that are used for the operational collection of

required to ensure the viability of current and future Anti-Submarine Warfare (ASW) combat systems and to aid in the development of fleet tactics for the employment of these systems. In particular, development of Collection of such data is

is to develop a family of calibrated active sonobuoys that will enable the collection of target signature data over the entire range of U.S. Navy weapon and sonar frequencies. Other efforts integrate radar, optical, and electromagnetic detection capabilities with advanced signal processors and displays suitable for An ongoing effort in this program

Strategic Deterrence and Strategic Sealift Protection. Specifically: This project supports the Joint Mission Areas of Joint Littoral Warfare, Joint Surveillance,

(U) Joint Littoral Warfare has requirements for technology developments that will enable our forces to dominate the undersea and surface battle spaces in littoral environments. This project is essential to provide the necessary to develop torpedoes which will be effective against improved ASW systems to detect, track and localize threat submarines in shallow as well as deep waters, and to improve the defense of both surface ships and submarines through the timely detection and classification of hostile undersea threats.

(U) Joint Surveillance addresses issues of real-time detection, localization, classification and tracking of the undersea threat. This project helps address issues in undersea sensing and the development of information is required to develop acoustic sensors effective against undersea threats in both shallow and deep water, systems, and high-power, smaller, for use in shallow waters, and improved sonobuoy detection systems that will be effective in shallow waters.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603747N PROJECT NUMBER: H2089 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: Undersea Warfare Advanced Technology BUDGET ACTIVITY: 3

(U) Strategic Deterrence includes the protection of U.S. ballistic and cruise missile-launching submarines. This project provides signature information to help optimize the development and employment of SSBN sonar detection systems and torpedo countermeasure systems.

(U) Strategic Sealift/Protection requires that our forces have the capability to dominate the local sea areas in the vicinity of our logistic and replenishment forces in order to allow them to sustain power projection forces in open ocean and littoral areas. This project develops sensors which are capable of collecting at-sea target signature information that will be used to enhance the development and employment of ASW detection and weapon systems that help our forces prevail against undersea threats.

(U) These efforts also support the Navy's joint warfare strategy "From the Sea" by providing an improved capability to dominate the surface and undersea battlespace. This project is service unique.

C. (u) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (u) FY 1993 ACCOMPLISHMENTS:

- (u) ($10,186) Conducted:
  -- (C) air drop tests, over-the-side tests, and operational tests of the Navy Underwater Active Multiple Ping (NUAMP) sonobuoy for
  -- (C) Analysis of data collected during NATIVE I sea test and collected additional ambient noise data for the development of the prediction model. Initiated tests to verify the model's performance and its utility in providing accurate information from at-sea data.

- (U) ($200) Integrated related signal processing software into the Advanced Processor Experimental (APEX) signal processor previously developed under this project.

2. (u) FY 1994 PLAN:

- (u) ($7,200) Complete:
  -- (u) developmental testing of the sonobuoys.
  -- (u) development and initiate testing of the sonobuoys.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603747N
PROGRAM ELEMENT TITLE: Undersea Warfare Advanced Technology
PROJECT NUMBER: H2089
BUDGET ACTIVITY: 3
DATE: 7 February 1994

- (u) ($1,238) Continue development of an capability in shallow water.

- (u) ($1,534) Initiate:
  -- (u) prototyping and integration of an advanced system to provide an extended frequency range capability to collect of submarines in shallow water environments.
  -- (u) hardware definition of a modified radar to provide a and improve for integration into the APEX signal processor to provide a better long range surveillance and detection capability against submarines operating in shallow water areas.
  -- (u) operational testing of sonobuoys.

3. (u) FY 1995 PLAN:

- (u) ($6,256) Complete operational testing of sonobuoys with the APEX signal processor. Take delivery of pre-production sonobuoys.
- (u) ($2,687) Continue:
  -- (u) development of an advanced data over the complete frequency band.
  -- (u) research on the integration of a as a sensor for MAD systems.
  -- (u) S/AR capability development
  -- (u) development of a real time capability in the APEX signal processor and associated post mission algorithms.
- (u) ($1,545) Initiate:
  -- (u) display improvements required by being developed for APEX.
  -- (u) development of an sonobuoy.
  -- (u) development of technologies for shallow water detection and of submarine data.

4. (U) PROGRAM TO COMPLETION:

- (U) This is a continuing program.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603747N
PROGRAM ELEMENT TITLE: Undersea Warfare Advanced Technology
PROJECT NUMBER: H2089
BUDGET ACTIVITY: 3
DATE: 7 February 1994

D. (U) WORK PERFORMED BY: IN-HOUSE: NAWC Aircraft Division, Warminster, PA; NAWC Aircraft Division, Patuxent River, MD; NSWC - White Oak, Silver Spring, MD; NRL, Washington, D.C. CONTRACTORS: Texas Instruments Incorporated, Dallas, TX; Sparton Electronics, Jackson, MI; John Hopkins University Applied Physics Laboratory, Laurel, MD; General Scientific Corporation, Arlington, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

Non-Acquisition Program Description Document (NAPDD) #239-98 (15/08/90).

G. (U) RELATED ACTIVITIES:

- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0602314N (Undersea Surveillance and Weapons Technology)
- (U) PE 0603254N (ASW Systems Development)
- (U) PE 0603553N (Surface ASW)
- (U) PE 0603792N (Advanced Technology Transition)
- (U) PE 0604212N (ASW and Other Helo Development)
- (U) PE 0604221N (P-3 Modernization Program)
- (U) PE 0604261N (Acoustic Search Sensors)

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

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

J. (U) MILESTONE SCHEDULE: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603747N
PROGRAM ELEMENT TITLE: Undersea Warfare Advanced Technology
PROJECT NUMBER: V2159
BUDGET ACTIVITY: 3
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: V2159 ASW TARGET. This project uses advanced transducer technology to develop a compact lightweight Very Low Frequency (VLF) transducer system for use in Mobile Acoustic Targets. Current VLF transducers are too large and heavy for use on the mobile targets needed to train personnel and assess the actual at-sea performance of advanced Anti-Submarine Warfare (ASW) systems. As submarine targets have a VLF signature, it is necessary to have mobile targets that can mimic them realistically to provide high quality training to fleet personnel and to provide for realistic assessment of the capabilities of current and planned service weapon systems. Development of a VLF transducer to improve the capabilities of mobile underwater acoustic targets is an essential part of the target development effort. The new VLF transducer technology may also find application in the development of advanced undersea weapon countermeasures.

(U) The Joint Mission Area this project supports is Manpower, Personnel and Shore Training. Specifically, the Mobile Acoustic Targets developed under this project support the requirement to maintain fleet readiness through improved training of personnel at sea and by providing the capability for more realistic evaluation of undersea combat and weapon systems.

(U) These efforts support the Navy's Joint Warfare Strategy "From the Sea" by providing an improved capability to dominate the surface and undersea battlespaces. This project is service unique.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($2,000) Completed VLF transducer specification and procurement package. Awarded contract to design, build and test VLF transducer prototype.

(U) FY 1994 PLAN:
- (U) ($1,921) Design, fabricate and assemble VLF transducer prototype.

(U) FY 1995 PLAN:
- (U) ($963) Demonstrate in-water operation of required VLF transducer performance capability for ASW target application and transition transducer to ASW Mobile Target Program.

(U) PROGRAM TO COMPLETION: This program completes at the end of FY 95.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603747N
PROGRAM ELEMENT TITLE: Undersea Warfare Advanced Technology

PROJECT NUMBER: V2159
BUDGET ACTIVITY: 3

DATE: 7 February 1994

(U) WORK PERFORMED BY: IN-HOUSE: AVUNSEAWARCENDIV, Newport, RI; NAVUNSEAWARECENDIV, Keyport, WA. CONTRACTORS: Loral Defense Systems, Akron OH; Raytheon Corporation, Porstmouth, RI; Kildare Corporation, New London, CT; Lockheed Sanders, Manchester, N.H.

(U) RELATED ACTIVITIES:

- (U) PE 0101224N (SSBN Security/Survivability Program)
- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0602314N (Undersea Surveillance and Weapons Technology)
- (U) PE 0602315N (Mine Countermeasures, Mining and Special Warfare Technology)
- (U) PE 0602323N (Submarine Technology)
- (U) PE 0602435N (Oceanographic and Atmospheric Technology)
- (U) PE 0603555N (Sea Control and Littoral Warfare Technology Demonstration)
- (U) PE 0603741D (Air Defense Initiative)
- (U) PE 0603747N (Undersea Warfare Advanced Technology)
- (U) PE 0603792N (Advanced Technology Transition)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

(U) MILESTONE SCHEDULE: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
U0172 CIWS (Phalanx)	0	3,000	0	0	0	0	0	0	3,000
U2039 Cooperative Engagement	0	200,424	134,617	102,540	97,953	100,526	103,174	CONT.	CONT.
U2133 Quick Reaction Combat Capability (QRCC)	17,181	27,078	8,646	4,496	4,677	4,719	4,874	CONT.	CONT.
U2136 LINK IRON	146,727	49,571	40,981	53,007	55,295	42,782	47,904	CONT.	CONT.
U2138 INFRARED	5,508	0	0	0	0	0	0	0	10,559
U2139 OUTLAW BANDIT	20,317	0	0	0	0	0	0	0	40,123
U2184 Force AAW Coordination Tech (FACT)	10,266	3,226	8,025	8,365	8,331	8,298	8,263	CONT.	CONT.
U2190 NULKA Decoy	1,906	0	0	0	0	0	0	0	1,906
U2191 Infrared RAM	9,487	0	0	0	0	0	0	0	9,487
U2192 Evolved SEA SPARROW	1,998	0	0	0	0	0	0	0	1,998
U2193 Sensor Integration	2,870	0	0	0	0	0	0	0	2,870
U2236 Small Caliber Gun Test	0	2,500	0	0	0	0	0	0	2,500
TOTAL	216,360	285,799	192,269	168,408	166,256	156,325	164,215	CONT.	CONT.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense
BUDGET ACTIVITY: 4

Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program incorporates efforts dedicated to the enhancement of ship self defense against Anti-Air Warfare (AAW) threats. Its primary focus is on the development of technologies, systems, and procedures necessary to defeat the evolving Anti-Ship Cruise Missile threat. A description of Project U2136, LINK IRON, is not included due to a higher level of classification.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

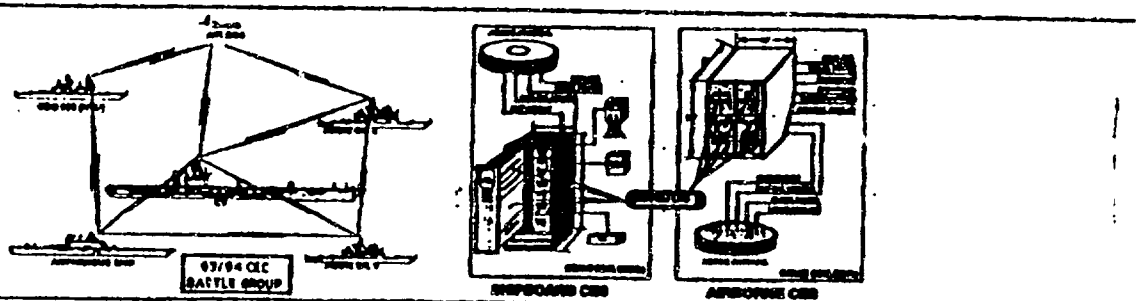
PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U2039
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: Cooperative Engagement

PROJECT TITLE: Cooperative Engagement Capability



POPULAR NAME: COOPERATIVE ENGAGEMENT CAPABILITY (CEC)

POPULAR NAME: COOPERATIVE ENGAGEMENT CAPABILITY (CEC)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U2039
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		MS I/II PDM (2/94)			MS III, IOC (6/97,9/97)			
ENGINEERING MILESTONES		PDR/CDR (1/94)	DT/OA DR (10/94)	PDR/CDR (10/95,2/96)		FRP (12/97)		
T&E MILESTONES		DT/OA,AIR DEMVAL (10/93-6/94)		DT/OT (10/95-9/96)			FOT&E (3/99-6/99)	
CONTRACT MILESTONES		ECI MOD (4/94)				FRP AWARD (10/97)		

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	0	161,872	105,969	80,772	77,384	79,566	81,758	CONT.
SUPPORT CONTRACT	0	2,400	1,956	1,411	1,333	1,359	1,388	CONT.
IN-HOUSE SUPPORT	0	29,161	24,870	17,502	16,538	16,853	17,219	CONT.
GFE/ OTHER	0	6,991	1,822	2,855	2,698	2,748	2,809	CONT.
TOTAL	0	200,424	134,617	102,540	97,953	100,526	103,174	CONT.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense
PROJECT NUMBER: U2039
BUDGET ACTIVITY: 4
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Cooperative Engagement Capability (CEC) significantly improves Battle Force Anti-Air Warfare (AAW) capability by coordinating all Battle Force AAW sensors into a single, real-time, composite track picture having fire control quality. CEC distributes sensor data from each ship and aircraft, or cooperating unit (CU), to all other CUs in the battle force through a real-time, line of sight, high data rate sensor and engagement data distribution network. CEC is highly resistant to jamming and provides accurate gridlocking between CUs. Each CU independently employs high capacity, parallel processing, and advanced algorithms to combine all distributed sensor data into a fire control quality track picture which is the same for all CUs. CEC data is presented as a superset of the best AAW sensor capabilities from each CU, all of which are integrated into a single input to each CU's combat weapon systems. CEC will significantly improve our Battle Force defense in depth, including both local area and ship defense capabilities against current and future AAW threats. CEC is designed to enhance the AAW warfighting ability of ships and aircraft and to enable coupling of the Force into a single, distributed AAW weapon system and towards more effective use of tactical data and the cooperative use of all the Force sensors and weapons. These capabilities will provide the ship defense flexibility needed to meet the threat brought about by increasing numbers of highly sophisticated weapons held by potentially hostile third world countries.

(U) CEC consists of the Data Distribution System (DDS), the Cooperative Engagement Processor (CEP), and Combat System Modifications. The DDS encodes and distributes ownship sensor and engagement data, and is a high capacity, jam resistant, directive system providing a precision gridlocking and high throughput of data. The CEP is a high capacity distributed processor which is able to process force levels of data in a timely manner that allows its output to be considered real-time fire control data. This data is passed to the ship's combat system as fire control quality data for which the ship can cue its onboard sensors or use the data to engage targets without actually tracking them.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: Not applicable.

2. (U) FY 1994 PLAN:

- (U) ($91,215) Develop and demonstrate cued and remote data missile firing engagement with AEGIS and new threat upgrade class ships.
- (U) ($42,625) Develop and demonstrate cued self defense missile firing engagements.
- (U) ($21,985) Complete Composite Identification and Cooperative Engagement Decision data collection.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense
PROJECT NUMBER: U2039
BUDGET ACTIVITY: 4
Date: 7 February 1994

- (U) ($15,358) Develop/test Fleet CEC tactics and operations.
- (U) ($6,991) Conduct Demonstration Test/Operational Analysis (DT/OA).
- (U) ($10,000) Assess potential contribution of airships to airborne components of CEC.
- (U) ($10,000) Initiate engineering to modify the E-2C to function as an air CU and begin specific design studies and integration efforts for CEC incorporation in the E-3 (AWACS) aircraft.
- (U) ($1,500) Self aligned gate technology for support of acceleration processor production used in CEC/DDS components.
- (U) ($750) Initiate testing of excess B-52G Aircraft ECM Systems on a Navy Minesweeper.

3. (U) FY 1995 PLAN:

- (U) ($18,170) Complete analysis of DT/OT lessons learned to fully support continued developmental efforts in CEC system design and fleet operations and tactics.
- (U) ($75,811) Continue development of shipboard CU to incorporate results of DT/OT testing into system design and ship integration.
- (U) ($39,136) Develop and demonstrate Airborne Early Warning Aircraft Air CU.
- (U) ($1,500) Obtain initial operating capability decision for fleet deployment of CEC.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Dahlgren, VA; NAVSURFWARCENDIV, Crane, IN; NAVSURFWARCENDIV, Port Hueneme, CA; NAVSURFWARCEN FLTCOMBATDIRSSACT, Dam Neck, VA; NCCOSC RDTE DIV, San Diego, CA. CONTRACTORS: JHU/APL, Laurel, MD; E-Systems, Inc., ECI Division, St Petersburg, FL; Martin-Marietta, Moorestown, NJ; VITRO, Silver Spring, MD; Grumman Aircraft Corp., Bethpage, NY.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U2039
BUDGET ACTIVITY: 4

Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology Changes: Data in previous budget not available for comparison.
2. (U) Schedule Changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:
- (U) CRD In Chop
- (U) MNS 02/93
- (U) COEA In Process

G. (U) RELATED ACTIVITIES: Not applicable.

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

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

J. (U) TEST AND EVALUATION: During FY 1994 DT/OA: Demonstrate cued and remote data missile firing engagement with AEGIS and new threat upgrade class ships. Demonstrate cued self defense missile firing engagements. Develop/test Fleet CEC tactics and operations. During FY 1994 AIR DEMVAL: Demonstrate Airborne Early Warning Aircraft Air CU.

- (U) DT/OA, AIR DEMVAL 10/93 - 6/94
- (U) DT/OT 10/95 - 6/96
- (U) FOT&E 3/99 - 6/99

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

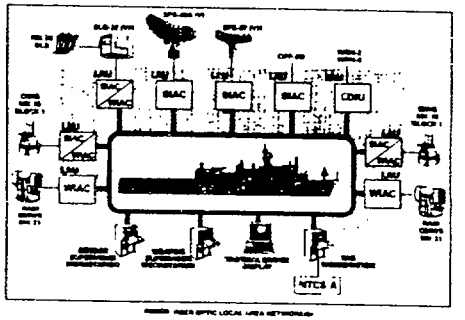
PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U2133
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: Quick Reaction Combat Capability (QRCC)

QRCC LSD-41 CLASS



POPULAR NAME: QRCC

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U2133
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	RAIDS 8/93	MS III IV/II 5/94		MK 1 MS III 1/96				
ENGINEERING MILESTONES		MK 1 CDR 7/94	MK 1 TRR TEST 2/95					
T&E MILESTONES	SSDS MK 1 DEMO 6/93		LSD-41 DT/OT II 9/95		DD 963 FOT&E 9/97	LHD FOT&E 7/98	AOE-6 FOT&E 8/99 LHA FOT&E 2/99	FOT&E FOR CV/LPD-17/FFG-7
CONTRACT MILESTONES		MK 1 EMD 6/94		MK 1 PROC 3/96				

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	5,100	8,600	1,846	1,900	2,000	2,100	2,200	CONT.
SUPPORT CONTRACT	540	542	47	47	47	47	47	CONT.
IN-HOUSE SUPPORT	11,541	16,436	5,753	1,349	1,420	1,352	1,407	CONT.
GFE/ OTHER	0	1,500	1,000	1,200	1,210	1,220	1,220	CONT.
TOTAL	17,181	27,078	8,646	4,496	4,677	4,719	4,874	CONT.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603755N | PROJECT NUMBER: U2133 | Date: 7 February 1994
PROGRAM ELEMENT TITLE: Ship Self Defense | BUDGET ACTIVITY: 4

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The QRCC program provides the multi-sensor integration and hardkill/softkill coordination to improve current system performance with respect to short range anti-air ship self defense. It is intended to leverage recent critical experiments, the Rapid Anti-Ship Missile Integrated Defense System (RAIDS) program efforts, and the Ship Self Defense System (SSDS) demonstration on USS WHIDBEY ISLAND (LSD 41) conducted in June 1993, to upgrade existing short range Anti-Air Warfare (AAW) defenses by providing a quick reaction combat capability through flexible embedded doctrine that coordinates the detect-through-engage sequence for in-service equipment. In particular, QRCC applies multi-sensor integration to existing sensors, upgrades and integrates RAIDS for support of local command and control, integrates and coordinates weapon systems, and provides a first level of hardkill/softkill integration. QRCC architecture centers on the distributed processing concept and will be incrementally implemented and demonstrated via a MK 1 SSDS focusing on integration of the Rolling Airframe Missile (RAM), Phalanx Close-In Weapon System (CIWS) and Electronic Countermeasure System (SLQ-32), followed by a MK 1 system which integrates NATO SEASPARROW, CIWS, RAM, SLQ-32, and the Target Acquisition System (TAS) across a broad ship class spectrum. It integrates existing system elements via a fiber optic local area network and uses an advanced display system currently under development for system operation, maintaining form, fit and function of the OJ-194 console. QRCC will pace the threat along a development path which captures emerging technologies to enhance short range AAW capability, transitioning to Engineering and Manufacturing Development (E&MD) programs (RDT&E category 6.4) where appropriate.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($5,100) Completed successful demonstration of integrated RAM/CIWS self defense system aboard USS WHIDBEY ISLAND (LSD 41) in June 1993.
- (U) ($3,000) Obtained RAIDS Milestone III approval for DD 963. FFG 7 RAIDS production is pending until completion of successful Follow-on Test and Evaluation (FOT&E).
- (U) ($9,081) Accomplished programmatic risk reduction efforts, systems analysis, testing preparations, and documentation to support MS III for RAIDS and Milestone IV/II for SSDS MK 1.

2. (U) FY 1994 PLAN:

- (U) ($1,800) Achieve Milestone IV/II decision for SSDS MK 1 system.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense
PROJECT NUMBER: U2133
BUDGET ACTIVITY: 4
Date: 7 February 1994

- (U) ($13,785) Continue transition to E&MD for SSDS MK 1 version for LSD class ship, to include conducting Preliminary Design Review and Critical Design Review.
- (U) ($800) Conduct RAIDS FOT&E for FFG 7 class ship.
- (U) ($300) Initiate adaptations of MK 1 system for installation aboard DD 963 and LHD class ships.
- (U) ($3,552) Conduct analysis of Ship Self Defense System capabilities in support of Investment Strategies and Cost and Operational Effectiveness Analyses (COEAs).
- (U) ($3,800) Integrate Central Identification Friend or Foe, Identification Doctrine Processor, and non-cooperative target recognition programs with SSDS.
- (U) ($3,041) Conduct development efforts in support of Self Defense Test Ship (SDTS) and Wallops Island Test Sites.

3. (U) FY 1995 PLAN:

- (U) ($3,100) Continue SDTS and Wallops Test Site Developments preparing for afloat and seaside engineering testing.
- (U) ($1,846) Continue with SSDS MK 1 Development leading to DT/OT in 4th Qtr/FY 1995 for LSD-41 class.
- (U) ($700) Initiate design development for SSDS MK 1 System aboard TAS/NATO SEA SPARROW configured ships and continue SSDS combat identification initiatives.
- (U) ($3,000) Continue analysis efforts focusing on impact of Littoral Warfare environment on SSDS architecture/elements and required design improvements.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Dahlgren, VA; NAVSURFWARCENDIV, Port Hueneme, CA; NAVSURFWARCENDIV, Crane, IN; NAVELEXACT, St. Inigoes, MD. CONTRACTORS: Hughes Missile Systems Company, Tucson, AZ; Hughes, Fullerton, CA; JHU/APL, Laurel, MD.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U2133
BUDGET ACTIVITY: 4

Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) MNS 8/92

G. (U) RELATED ACTIVITIES:

- (U) PE 0604755N (Ship Self Defense)

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 523400 Point Def. Sppt. EQ									
(RAIDS)	0	12,104	573	0	0	0	0	0	12,677
(MK 1)	0	0	0	10,631	13,108	15,691	41,189	CONT.	CONT.
• (U) OPN Line 231200 AN/SLQ-32 (RAIDS)	12,620	0	0	0	0	0	0	0	12,620
• (U) O&M,N 14D70 - Wpn Maint. QRCC/SSDS	0	3,556	4,087	4,004	6,031	5,804	6,273	CONT.	CONT.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense
PROJECT NUMBER: U2133
BUDGET ACTIVITY: 4
Date: 7 February 1994

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

J. (U) TEST AND EVALUATION:

- (U) Initial system demonstrations of advanced multi-sensor integration concepts are to be accomplished as preludes for transition to E&MD under RDT&E,N category 6.4 funding.
- (U) MK 1 system demonstration was successfully conducted 06/93.

SSDS MK 1 DEMO	6/93
MK 1 TRR	2/95
LSD-41 DT/OT-II	9/95
DD 963 FOT&E	9/97
LHD FOT&E	7/98
LHA FOT&E	2/99
AOE-6 FOT&E	8/99

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U2184
BUDGET ACTIVITY: 4

Date: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: U2184, Force Anti-Air Warfare Coordination Technology (FACT). Force Anti-Air Warfare Coordination Technology (FACT) Program is an advanced development effort designed to demonstrate Force Anti-Air Warfare (AAW) concepts and capabilities which will significantly improve our Force defense in depth, including both local area and self defense capabilities against current and future AAW threats. FACT improvements are designed to enhance the AAW warfighting ability of ships and aircraft and to enable coupling of the Force into a single, distributed AAW weapon system and towards more effective use of tactical data and the cooperative use of all the force sensors and weapons. These capabilities will provide the ship defense flexibility needed to meet the threat brought about by increasing numbers of highly sophisticated weapons held by potentially hostile third world countries. FACT defines requirements and develops prototype systems or modifications to existing systems to test new concepts for the coordination of Force AAW operations. Some examples of prototype systems now in production are AN/SPS-48C Detection Data Convertor, AN/SPS-48E Environmental Control Feature, Shipboard Gridlock System Automatic Correlation (SGS/AC), and Dial-a-Track Link-11 Quality Selection. Other FACT developments nearing production stages are the Automatic Identification System (Auto-ID) and the Multifrequency Link-11 capability. Short and long term objectives will be phased in to produce higher degrees of ship defense and battle coordination and effectiveness.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,516) Supported integration of Remote Data Engage (RDE) capability in shipboard Systems and Link interoperability between Joint and Allied forces.
- (U) ($7,000) Demonstrated advanced multi-sensor tracking and Force Identification in Force Threat Evaluation and Weapon Acquisition (FTEWA). Demonstrated Geodetic SGS/AC. Demonstrated initial development of FTEWA.
- (U) ($750) Completed feasibility of Remote Missile Launch (RML).
- (U) ($1,000) Provided further recommendations for improving Link-11 interoperability among Force participants, Joint Services, and Allied network participants. Provided recommendations for improving Link-16 integration into Force, including interoperability with existing Link-11.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense
PROJECT NUMBER: U2184
BUDGET ACTIVITY: 4
Date: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($1,918) Support integration of FTEWA into major AAW combatants.
- (U) ($308) Provide engineering for improving Link-11 interoperability among Force participants, Joint Services, and Allied network participants. Develop recommendations for improving Link-16 integration into Force, including interoperability with existing Link-11.
- (U) ($1,000) Continue RDE and RML development.

(U) FY 1995 PLAN:

- (U) ($500) Conduct experiments to determine feasibility of integrating non-organic data to identify organic Battle Group air tracks in real time.
- (U) ($500) Support Link interoperability between Joint and Allied forces, including multiple simultaneous links with emphasis on track identification, and command and control in support of FTEWA.
- (U) ($3,775) Continue advanced development of FTEWA in support of Combat Air Patrol (CAP) and Surface-to-Air Missile (SAM) integration.
- (U) ($1,500) Develop and demonstrate Auto-ID with Electronic Surveillance Measures (ESM).
- (U) ($1,000) Continue RDE development.
- (U) ($750) Support RML and Forward Pass development.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Dahlgren, VA; NAVSURFWARCENDIV, Crane, IN; NAVAIRWARCENACDIV, Indianapolis, IN; NAVSURFWARCENDIV, Port Hueneme, CA; NAVSURFWARCEN FLTCOMBATDIRSSACT, Dam Neck, VA; NCCOSC RDTE DIV, San Diego, CA; ECAC, Annapolis, MD; Fleet Analysis Center, Corona, CA. CONTRACTORS: JHU/APL, Laurel, MD; ECI, St. Petersburg, FL; PRC, Inc., Arlington, VA; SYSCON Corporation, Arlington, VA; VITRO, Rockville, MD; LOGICON, San Diego, CA; Martin-Marietta (GESD), Moorestown, NJ.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U2184
BUDGET ACTIVITY: 4

Date: 7 February 1994

(U) RELATED ACTIVITIES:

- (U) PE 0205604N (Tactical Data Links)
- (U) PE 0604307N (AEGIS Combat System Engineering)
- (U) PE 0604366N (Standard Missile Improvements)
- (U) PE 0604518N (Combat Information Center Conversion)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603763N
PROGRAM ELEMENT TITLE: Warfare Systems Architecture and Engineering
PROJECT NUMBER: X1991
BUDGET ACTIVITY: 4
DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE CONT.	TOTAL PROGRAM CONT.
X1991 WSA&E	7,908	3,297	7,204	',815	6,975	7,190	8,960	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND PROJECT: The Warfare Systems Architecture and Engineering (WSA&E) program provides the engineering, technical, and analytical underpinnings for Navy's warfighting assessment (Joint Mission Areas/Support Areas/Investment Balance Review) and acquisition processes (PPBS and COEAs). It provides the fundamental models, tools, baseline data, Measures of Effectiveness (MOE), and framework to evaluate the present and future warfare effectiveness of Navy forces. Outputs provided by WSA&E yield consistency in rational decision-making processes for the Navy and for joint service programs including force architecture options, operational effectiveness options among alternative weapon systems, prioritization of warfighting requirements, assessment of risks from downsizing, altering force structure, or programmatic delays, force presence, and evaluation of new proposals.

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($902) Developed Navy Modeling & Simulation Corporate Strategy.
- (U) ($200) Developed additional scenarios based on Defense Primary Guidance (DPG).
- (U) ($802) Updated architectural database.
- (U) ($2,599) Continued to develop and accredit multiwarfare models and tools and improve analytic methodology.
- (U) ($3,405) Performed multiwarfare analysis to support PR POM 95/96.

(U) FY 1994 PLAN:
- (U) ($80) Develop, update and maintain Navy standard scenarios based on Defense Planning Guidance.
- (U) ($211) Update architectural database and interconnectivity network.
- (U) ($100) Continue to develop and accredit Joint Mission Area/Support Area tools and improve analytic methodology.
- (U) ($2,906) Perform Joint Mission Area/Support Area analysis to support Investment Balance Review process.

(U) FY 1995 PLAN:
- (U) ($1,308) Continue to implement Navy Modeling and Simulation Corporate Strategy.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603763N
PROGRAM ELEMENT TITLE: Warfare Systems Architecture and Engineering
PROJECT NUMBER: X1991
BUDGET ACTIVITY: 4
DATE: 7 February 1994

- (U) ($503) Develop, update and maintain Navy Standard scenarios based on Defense Planning Guidance.
- (U) ($849) Update architectural database and interconnectivity network.
- (U) ($1,638) Continue to develop and accredit Joint Mission Area/Support Area tools and improve analytic methodology.
- (U) ($2,906) Perform Joint Mission Area/Support Area analysis to support Investment Balance Review process.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN, Bethesda, MD; NCCOSC, San Diego, CA; NAVSURFWARCENDIV, Dahlgren, VA; NAVAIRWARCENACDDIV, Warminister, PA; NAVAIRWARCENWPDIV, China Lake, CA; NAVSURFWARCENCOASTSYSTA, Panama City, FL; NAVUNDERSEAWARCENDIV, Newport, RI; NRL, WASHINGTON, DC; CONTRACTORS: JHU/APL, Laurel, MD; BAH, Bethesda, MD; SAIC, LaJolla, CA; TRW, McLean, VA.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603782N
PROGRAM ELEMENT TITLE: Shallow Water MCM Demonstration
PROJECT NUMBER: R2127
BUDGET ACTIVITY: 3
DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R2127 Shallow Water Mine Countermeasures (MCM) Demos	9,792	10,984	4,525	5,942	5,885	6,139	6,298	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND PROJECT: This program element (PE) supports technical demonstrations of technologies for improved performance of Naval Warfare systems in performing the mission of Shallow Water Mine Countermeasures (MCM). The technologies support the Joint Chiefs of Staff's Joint Warfighting Capability to employ a range of capabilities more suitable to actions at the lower end of the full range of military operations which allow achievement of military objectives with minimum casualties and collateral damage. MCM capability has been identified as a critical enabler for projecting power from the sea, which is a primary objective of Joint Littoral Warfare.

(U) The current focus of this PE is to demonstrate and evaluate the capability to adapt the Magic Lantern Advanced Development Model system to meet the shallow water and surf zone mine and minefield detection goals. The ability to rapidly survey a wide area of beach and surf zone has been consistently identified as the highest priority for MCM forces in support of Littoral Warfare. Results of this Phase I technical demonstration project provide the first realistic environmental field test data of laser based imaging capability in the high clutter and highly turbulent surf zone environment. Such information is critical to determining the proper technologies for further investment to support follow-on development and acquisition of a deployable system.

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($9,792) Initiated hardware fabrication effort to reorient Magic Lantern cameras to survey surf zone in a horizontal plane rather than a vertical survey. Designed and fabricated bottom follower capability which is the key feature to the hardware necessary to enable surf zone detection of minefields.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603782N
PROGRAM ELEMENT TITLE: Shallow Water MCM Demonstration

PROJECT NUMBER: R2127
BUDGET ACTIVITY: 3

DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($10,984) Develop software algorithms for integration in the system to enable initial target recognition capability. This has been identified as critical to the utilization of this technology for the mission. Fully develop test sites for at-sea verification of system performance. Complete hardware fabrication and begin initial at-sea testing of the imaging system.

(U) FY 1995 PLAN:

- (U) ($4,525) Complete testing of the system in realistic operational condition to demonstrate the proof of concept. Critical environmental and technology parameters will be identified as inputs for future investment in this technology. Develop and implement automatic target recognition capability in the imaging system. This is a necessary feature to meet the requirement of rapid, wide area surf zone reconnaissance. Develop plans for reducing the size and weight of existing hardware for the potential transition to smaller platforms.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENCOASTSYSTA, Panama City, FL. CONTRACTORS: Kaman Aerospace, Tucson, AZ and Bloomfield, CT; TBD.

(U) RELATED ACTIVITIES:

- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0602315N (MCM, Mining, and Special Warfare Technology)
- (U) PE 0602435N (Oceanographic and Atmospheric Technology)
- (U) PE 0603555N (Sea Control and Littoral Warfare Demonstration)
- (U) PE 0603612M (Marine Corps Mine Countermeasures)
- (U) PE 0604373N (Airborne Mine Countermeasures)

(U) OTHER APPROPRIATION FUNDS: Not Applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)
BUDGET ACTIVITY: 4

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0120	Advanced Environmental Acoustic Support (AEAS)								
	13,914	9,669	9,737	10,308	9,845	9,820	12,159	CONT.	CONT.
R2017	Advanced Underwater Acoustic Modeling Project (AUAMP)								
	3,028	2,086	2,219	2,248	2,311	2,371	2,434	CONT.	CONT.
V0823	Sensor Performance Prediction (SPP)								
	8,759	7,839	8,361	8,536	8,913	8,967	10,135	CONT.	CONT.
TOTAL	25,701	19,594	20,317	21,092	21,069	21,158	24,728	CONT.	CONT.

* Note: V0823 was funded under PE 0603708N in FY 1993.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Combat Systems Oceanographic Performance Assessment (CSOPA) Program Element provides oceanographic/atmospheric research and development for expanded knowledge and improved understanding of the environment and its impact on combat systems performance. Its purpose is to assess, predict and enhance the performance of current and proposed undersea surveillance, tactical and mine warfare and weapons systems. This effort is accomplished through at-sea experimentation, numerical model and data base development, development and evaluation of stand-alone and Command, Control, Communications, Computers, and Intelligence (C^4I)-system-embedded prediction/tactical decision aid products, fleet technical support, and system and area technical assessments. Emphasis is placed on shallow water and other harsh environments, and regional conflict scenarios. The Advanced Environmental Acoustic Support (AEAS) Project conducts undersea environmental and acoustic measurements, develops computer prediction products and tactical decision aids, measurement instrumentation, and data bases, and conducts analyses in support of undersea warfare and mine warfare systems. The Advanced Underwater Acoustic Modeling Project (AUAMP) is focused on the development of a family of acoustic system performance prediction products beginning with active system models and data bases in the low, mid, and high frequency regimes and culminating with high fidelity simulation products. The Sensor Performance Prediction Project implements computer-based, on-board capabilities to provide system performance predictions and operating mode selection guidance and decision aids for tactical platforms based on AEAS and AUAMP-developed models and historical data bases by using *in situ* measurements and synoptic data. These products are

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PROGRAM ELEMENT: 060[illegible]785N
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essential to the effective employment of the combat systems, particularly in the regional conflict/littoral warfare scenarios. The CSOPA Program products are being tailored for, and assimilated into, fleet trainers to provide realistic ocean environments in support of warfare simulations. Direct support to existing fleet systems is provided in the Combatant Data Collection (CDC) thrust which focuses on measurements through operational weapon systems and direct, real-time feedback to optimize system performance in tactical situations. The CSOPA Program supports the Joint Mission Areas of Joint Littoral Warfare and Joint Surveillance.

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PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)
PROJECT NUMBER: R0120
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R0120, Advanced Environmental Acoustic Support (AEAS). The Department of Defense has turned its focus from the global threat of the Soviet Union to the future regional conflict scenarios outlined in the Defense Planning Guidance (DPG). Most of the DPG scenarios require operating naval forces in the earth's littoral waters which are shallow, have highly variable (in space and time) oceanographic conditions and confined maneuvering space. Of key concern to the U.S. Navy is the dual threat posed by very quiet diesel submarines capable of opposing U.S. naval forces and sea mines which will dramatically restrict force mobility and hamper or curtail amphibious operations. To counter these threats, there is an urgent and continuing need for the Navy to fully understand the ocean areas in which they will operate in the future. This project provides the necessary research and development to: a) rapidly and automatically acquire a broad array of oceanic data in littoral areas using organic sensors on fleet platforms and use these data to optimize system performance; b) accurately predict the performance of warfighting systems under development or employed in those areas; c) develop and/or modify existing environmental acoustic models and data bases to support assessments of regional conflict ocean areas; d) develop environmentally sensitive decision aids to support tactical decisions made in real time during a regional conflict; and e) develop a synthetic environment module (virtual ocean) which will drive future simulations.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($3,983) Developed, tested and evaluated initial phase of surface ship Combatant Data Collection (CDC) system. Developed prototype airborne CDC system.
- (U) ($1,601) Developed, tested, implemented, and evaluated at-sea the Mine Warfare (MIW) Environmental Decision Aids Library (MEDAL) system.
- (U) ($2,161) Began expansion of Advanced Research Projects Agency developed synthetic ocean acoustic environment to cover higher frequencies. Completed site selection for long term measurements in shallow waters off the U.S.
- (U) ($3,800) Published an environmental assessment guide for the Northern Arabian Sea. Developed bottom scattering model for active systems. Completed Ambient Noise Data Bank system. Completed shallow water shipping data base.
- (U) ($2,369) Processed and analyzed Arctic acoustic data. Upgraded Navy standard propagation model based upon these results. Documented the accomplishments and technical contributions of the AEAS Arctic program. Tested at-sea high data capacity digital acoustic recording system. Maintained undersea data recording systems.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)
PROJECT NUMBER: R0120
BUDGET ACTIVITY: 4
DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($4,030) Update/test shipboard CDC techniques to include extraction of surface scattering strength and surface reflection loss. Complete flight testing of prototype airborne CDC system. Begin development/test of airborne shallow water area characterization techniques using SSQ-110 sonobuoy.
- (U) ($3,000) Modify virtual ocean for high frequencies and demonstrate. Design long-term acoustic measurement equipment, and design, procure, and integrate data recording systems for measurement efforts off the U.S. coast.
- (U) ($1,630) Update/evaluate MEDAL to address surface mine countermeasures (MCM) missions. Integrate MEDAL system into overall MIW Command, Control, Communications, Computers and Intelligence (C^4I) architecture. Integrate with Amphibious Warfare Decision Aid.
- (U) ($1,009) Complete environmental assessment for the Korean Waters. Develop critical environmental factors atlas for regional conflict scenarios.

(U) FY 1995 PLAN:

- (U) ($3,234) Update/evaluate airborne CDC data acquisition techniques and signal processing algorithms. Test/evaluate surface CDC techniques and algorithms. Transition to NAVSEASYSCOM PMO 411 for incorporation into AN/UYQ-25B. Begin development of CDC techniques for submarine and Unmanned Underwater Vehicles.
- (U) ($2,301) Update/evaluate MEDAL to include complete airborne MCM planning and evaluation, electronic environmental data ingest, and initial tactics and optimization algorithms. Evaluate at sea.
- (U) ($3,750) Complete the high frequency virtual acoustic ocean and demonstrate. Install acoustic and oceanographic monitoring arrays off shore and begin recording time series data.
- (U) ($ 452) Develop critical environmental factors atlases for shallow water operating areas.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL SSC, Stennis Space Center, MS; NRL, Washington, DC; NAVUNSEAWARCEN DET, New London, CT. CONTRACTORS: Planning Systems Inc., McLean, VA and Slidell, LA; Science Applications International Corp., McLean, VA; Systems Integrated, San Diego, CA; UNISYS Corporation, Reston, VA; Alliant Techsystems, Arlington, VA; BBN Systems and Technologies, Arlington, VA.

(U) RELATED ACTIVITIES:

- (U) PE 0205620N (Surface ASW Combat System Integration) - Transition of surface ship CDC efforts.
- (U) PE 0602702E (Tactical Technology) - ARPA simulation development program.

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PROJECT NUMBER: R0120
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- (U) PE 0603254N (Anti-Submarine Warfare Systems Development) - Environmental support to the Extended Echo Range sonobuoy.
- (U) PE 0603502N (Surface & Shallow Water MCM and Unmanned Undersea Vehicle) - Integration of MEDAL into combat systems.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)
PROJECT NUMBER: R2017
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R2017, Advanced Underwater Acoustic Modeling Project. As Navy sonar systems become more sophisticated and their use in shallow water is increasing, there is an urgent and continuing need to understand underwater sound boundary interactions and propagation through the oceanic medium. The shallower waters of the earth's littoral regions are characterized by extreme variability in time as well as space. This project is focused on the development of a family of acoustic models which will predict the performance of existing and future Navy sonar systems. Initial efforts have concentrated upon the development of a multi-source, multi-receiver, fully bi-static Anti-Submarine Warfare (ASW) system performance prediction capability in support of low frequency active (LFA) ASW systems currently being planned and developed for use in the 1990's [e.g., LFA-Surveillance Towed Array Sonar System (LFA-SURTASS)]. Further efforts are directed toward the stochastic prediction of performance of mid and high frequency tactical and mine warfare sonars, with an eventual goal of high fidelity simulation.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,303) Updated multi-static Active Sensor Performance Model (ASPM) with more accurate representations of surface loss and by allowing use of *in situ* reverberation and noise for real-time predictions and data basing. Evaluated ASPM at-sea during fleet exercises. Began efforts to speed up the software code to allow the operator to line up his sensor suite in reasonable time as the environment changes. ASPM is used for prediction of the performance of LFA-SURTASS and Extended Echo Range sonobuoy.
- (U) ($ 225) Began the modification of existing models for mid-frequency sonar design, development and operational performance prediction to upgrade the current Navy standard.
- (U) ($ 300) Upgraded the Navy standard ambient noise prediction model to include coastal shipping data base and new merchant ship source level data. Began investigation into wind source level.
- (U) ($ 200) Completed a Bottom Activated Sensor System model for designing deployable bottom-mounted systems for active and passive use in shallow water and slope environments.

(U) FY 1994 PLAN:

- (U) ($1,186) Develop and test phase I LFA-SURTASS Optimization algorithms for sensor suite line-up guidance. Participate in Critical Sea Tests, Low Low Frequency Active Sea Tests, and Magellan Exercise.
- (U) ($ 300) Upgrade mid-frequency model to include accepted scattering algorithms for surface and bottom interactions for Combatant Data Collection use.
- (U) ($ 100) Upgrade high frequency model used for the prediction of the AN/SQQ-32 mine hunting sonar performance.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)
PROJECT NUMBER: R2017
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- (U) ($ 400) Begin development of the techniques necessary to ascertain the geoacoustic bottom properties of shallow water areas for a High Frequency Bottom Loss (HFBL) data base.
- (U) ($ 100) Finalize upgrades to Navy standard ambient noise prediction model and transition to Naval Oceanographic Office.

(U) FY 1995 PLAN:
- (U) ($ 762) Complete and test phase II LFA-SURTASS optimization algorithms for sensor suite line-up guidance. Participate in technical and operational sea tests.
- (U) ($ 300) Complete the development of a range dependent active sonar model for surface ship active sonars in a multi-static setting. This will operate 100-3000 Hz and include multi-sources, multi-receivers and a bottom loss data base continuous over this frequency range for active and passive performance.
- (U) ($ 266) Upgrade the high frequency model to include new absorption and target strength algorithms.
- (U) ($ 500) Upgrade initial HFBL techniques to create a data base for shallow waters of the western Pacific Ocean.
- (U) ($ 391) Investigate sources of coastal noise and upgrade ambient noise prediction model to cover frequencies greater than 500Hz.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC and Stennis Space Center, MS. CONTRACTORS: Science Applications International Corp., McLean, VA; Planning Systems Inc., McLean, VA and Slidell, LA.
(U) RELATED ACTIVITIES:
- PE 0602435N (Oceanographic and Atmospheric Technology) - Joint efforts in boundary interaction physics.
- PE 0603747N (Undersea Warfare Advanced Technology) - Evaluation of ASPM during Critical Sea Tests.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603785N
PROGRAM ELEMENT TITLE: Combat Systems Oceanographic Performance Assessment (CSOPA)
PROJECT NUMBER: V0823
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: V0823, Sensor Performance Prediction (SPP). The SPP Project develops on-board software capabilities that provide sensor performance predictions and Tactical Decision Aids (TDA) for all tactical platforms using *in situ* measurements, synoptic data and new/updated environmental data bases. SPP enables the full performance potential of complex systems by increasing their detection/tracking performance. In FY-92 the program began to address non-acoustic systems and selected non-Anti-Submarine Warfare (ASW) platforms. In FY-93 the program began to focus on Shallow Water/Regional Conflict scenarios. The project title change in FY-94 from Acoustic to Sensor Performance Prediction reflects this broader focus.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($ 125) Developed mine warfare tactical decision aids.
- (U) ($2,270) Updated Submarine Fleet Mission Program Library (SFMPL) to provide expanded automatic data entry. Completed development and initial at-sea evaluation of SFMPL 5.0.
- (U) ($1,932) Completed update of ASWTDA to ingest synoptic environmental data and provide active sensor predictions. Integrated into the Navy Tactical Command System - Afloat. Evaluated at-sea.
- (U) ($2,220) Completed a major upgrade to the Integrated Carrier ASW Prediction System and the Laptop Prediction System. Evaluated at-sea.
- (U) ($2,212) Upgraded Surface SPP Advanced Development Model (ADM) to provide measured noise/reverberation data. Evaluated during Fleet regional conflict/littoral exercises.

(U) FY 1994 PLAN:

- (U) ($1,975) Update ASWTDA to include: Active search fusion, expanded measured/synoptic environmental data, non-acoustic detection/counterdetection capabilities. Begin expanding ASWTDA to address the total SPP Expeditionary Decision Support requirements for the littoral regions.
- (U) ($2,373) Update the Surface Ship SPP ADM to include SQS-53C module enhancements and littoral warfare product requirements. Evaluate at-sea.
- (U) ($2,041) Update/evaluate Submarine SPP ADM to address sensor/weapon upgrades, increased use of measured/synoptic environmental data, incorporate non-acoustic system predictions and non-acoustic vulnerability.
- (U) ($1,450) Update/evaluate the Integrated Carrier ASW Prediction System II and the P3 Maritime Patrol Aircraft Laptop Prediction System (LAPS) to include Extended Echo Ranging prediction

capability, new sonobuoy predictions, processor mode selection guidance and non-acoustic predictions. Evaluate at-sea.

(U) FY 1995 PLAN:

- (U) ($2,147) Complete the initial SPP Expeditionary Decision Support Capability to ingest and utilize expanded *in situ*/synoptic environmental data and non-acoustic detection/counterdetection capabilities specifically for littoral areas. Evaluate at-sea.
- (U) ($2,125) Expand the Surface Ship SPP ADM tc include: upgraded mine detection/avoidance aids, non-acoustic tactical decision aids and improved counterdetection predictions. Test at-sea.
- (U) ($2,125) Upgrade the Integrated Carrier ASW Prediction System and LAPS to include: new sonobuoy prediction capabilities, multi-aircraft/multi-sortie search planning and improved Electronic Warfare/Magnetic Anomaly Detection module and improved mine warfare aids. Test at-sea.
- (U) ($1,964) Expand the Submarine SPP ADM to include: predictions/line-up support, mine warfare decision aids, all sensor search fusion and improved weapon preset predictions and Expeditionary Warfare products. Test at-sea.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCENDIV, Newport, RI; NAVOCEANO, Bay St. Louis, MS; NCCOSC RDTE DIV, San Diego, CA; NAVAIRWARCENACDIV, Warminster, PA. CONTRACTORS: A&T, North Stonington, CT; Sonalysts, Waterford, CT; D.H. Wagner, Sunnyvale, CA.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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PROGRAM ELEMENT: 0603792N
PROGRAM ELEMENT TITLE: Advanced Technology Transition

PROJECT NUMBER: R1889
BUDGET ACTIVITY: 3

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R1889 Advanced Technology Demonstrations	86,494	85,627	79,863	98,448	108,785	112,468	116,587	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program demonstrates high-risk/high-payoff technologies that could significantly improve Joint Chiefs of Staff's Future Joint Warfighting Capabilities. Advanced Technology Demonstration (ATD) programs cover integrating and assessing technology in a realistic operational environment. These programs offer an opportunity to identify and move efficiently emerging technologies from laboratory experiments to fleet systems. ATD programs are selected for a match between technological potential and Navy requirements which are derived from operational issues of concern to the fleet and the Joint Mission Area/Support Area assessments. Risk-reducing ATDs are focused on laying the technical foundations for acquiring improvements to future joint warfighting capabilities. Each demonstration is designed to assess for acquisition managers the extent to which the technology is feasible, affordable and compatible with operational concepts and projected force structure.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($950) SYNTHETIC RED BLOOD CELLS AND COMBAT WOUND MANAGEMENT -- Most components successfully completed. Transitions to private industry for clinical testing or commercial development.
- (U) ($4,200) ADVANCED ELECTRONIC DECOY -- Performed system integration and final demonstration. Transitioned to the Advanced Integrated Electronic Warfare System program.
- (U) ($3,800) LIGHT WEIGHT PLANAR ARRAY -- Performed acoustic/vibration/flow noise tests. Candidate for transition to New Attack Submarine combat system.
- (U) ($3,600) SPOTLIGHT -- Completed system integration and laboratory testing. Transitioned to the Surveillance Direction System program.
- (U) ($1,000) ADVANCED SUBMARINE PROPULSOR -- Designed blade sections and sensors. Funding

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discontinued beginning FY 94.

- (U) ($2,500) HELMET-MOUNTED MISSION REHEARSAL SIMULATION SYSTEM (HMMRSS)(FORMERLY CALLED CV WEAPON SYSTEM TRAINER) -- Developed photo imagery capability. Procured monochrome helmet for application to night strike mission.
- (U) ($2,600) FERROELECTRIC LIQUID CRYSTAL ANTI-SURFACE WARFARE (ASW) IMAGE PROCESSOR -- Developed system design and conducted correlator fabrication. Funding discontinued beginning FY 94.
- (U) ($4,000) RADIANT OUTLAW (FORMERLY CALLED LONG RANGE LOW PROBABILITY OF INTERCEPT SENSORS) -- Developed sensor design.
- (U) ($2,900) AIR/SURFACE ASW WEAPON, HIGH ENERGY PROPULSION -- Completed land-based system testing and conducted in-water performance demonstrations. Component level transitioned to Mark 50.
- (U) ($3,535) QUIET PROPELLER -- Completed propeller blade installation aboard the DDG 52.
- (U) ($4,300) MULTIBEAM DETECTION/CLASSIFICATION (D/C) -- Developed interface criteria and phase 2 (multi-channel) systems. Conducted shakedown sea tests.
- (U) ($4,000) SYNTHETIC APERTURE RADAR (SAR) COUNTERMEASURES -- Fabricated hardware and integrated subassemblies into a prototype system. Initiated limited field testing of ATD designed hardware.
- (U) ($2,500) MULTI-BAND ANTI-SHIP MISSILE DEFENSE (ASMD) TACTICAL ELECTRONIC SYSTEM (MATES) -- Conducted field tests and design reviews. Ordered long lead items.
- (U) ($4,000) SUBMARINE VOLUMETRIC TOWED ARRAY -- Handling system testbed delivered. Conducted sea test.
- (U) ($3,793) MULTI-MISSION (M/M) PROPULSION -- Fabricated prototype motor and vehicle.
- (U) ($3,000) HIGH PERFORMANCE (HP) AMMUNITION MAGAZINE -- Completed roof/soil blanket and stowage cell demos. Initiated material handling demo. Initiated construction of full-scale magazine.
- (U) ($3,200) AIRCRAFT SITUATIONAL AWARENESS (ASA) -- Continued ATD.
- (U) ($3,550) LOW PROBABILITY OF INTERCEPT COMMUNICATIONS -- Defined networking approach and waveform. Characterized performance of waveform against several intercept receiver types in computer simulation.
- (U) ($3,300) ADVANCED ASW RECEIVER -- Performed engineering required to award the prime system integration contract. Developed government furnished hardware. Prime contractor initiated system design.
- (U) ($2,800) ADVANCED SELF-DEFENSE COMBAT SYSTEM -- Began design and demonstration of architecture and local area network.
- (U) ($2,200) TORPEDO TERMINAL PLACEMENT -- Initiated development of new guidance laws which will facilitate accurate torpedo warhead placement in shallow and deep water.
- (U) ($1,940) FREEZE-DRIED RED BLOOD CELLS -- Began design of system for freeze-drying, storage, and reconstitution of red cells and platelets.

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- (U) ($2,000) VOICE/DATA INTEGRATION -- Completed development of node controller software to integrate low-data-rate voice with tactical data from Joint Operations Tactical System terminal over a simple 2400 Bits Per Second (BPS) communication link.
- (U) ($650) CORONA AND PULSED POWER AGENT DESTRUCTION -- Performed conceptual engineering design.
- (U) ($4,850) MAGNETOHYDRODYNAMICS -- Initiated Congressionally directed ATD.
- (U) ($9,700) SLICE -- Completed planning and pre-award requirements for industry contract to design, construct and demonstrate a high speed, low power, stable small waterplane area twin hull ship which incorporates new split pod multi-strut design technology.
- (U) ($1,626) Performed planning and up-front work for FY 1994 start ATDs. Selected FY 1995 ATDs.

2. (U) FY 1994 PLAN:

- (U) ($465) QUIET PROPELLER -- Conduct sea trials and analyze data.
- (U) ($3,700) MULTIBEAM D/C -- Conduct multi-channel system at-sea demonstration. Prepare system data package.
- (U) ($1,500) SAR COUNTERMEASURES -- Continue airborne testing.
- (U) ($5,300) MATES -- Integrate and test hardware/software. Perform field test.
- (U) ($3,660) SUBMARINE VOLUMETRIC TOWED ARRAY -- Complete multiple-line hydro-mechanical trials.
- (U) ($6,420) M/M PROPULSION -- Finish vehicle assembly and conduct ground and flight tests.
- (U) ($2,000) HP AMMUNITION MAGAZINE -- Complete full-scale demonstration construction and conduct high explosive test.
- (U) ($2,670) ASA -- Complete ATD.
- (U) ($4,200) LOW PROBABILITY OF INTERCEPT COMMUNICATIONS -- Begin subsystem electronic design and hardware fabrication. Write system control and network software.
- (U) ($4,200) ADVANCED ASW RECEIVER -- Demonstrate key hardware components and software algorithms. Conduct critical design review.
- (U) ($4,200) ADVANCED SELF-DEFENSE COMBAT SYSTEM -- Complete development of system architecture. Develop, inter-connect and test principle elements in local area network.
- (U) ($3,800) TORPEDO TERMINAL PLACEMENT -- Complete and evaluate system modeling, perform test vehicle integration, and initiate in-water testing of heavyweight configuration.
- (U) ($2,344) FREEZE-DRIED RED BLOOD CELLS -- Increase circulation survival rate. Conduct animal testing. Develop scale-up techniques.
- (U) ($2,500) VOICE/DATA INTEGRATION -- Extend software capabilities to allow integration of low-data-rate voice and tactical data over a network consisting of multiple 2400 BPS links. Provide integration techniques that are scalable to higher-bandwidth communication media.

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- (U) ($480) CORONA AND PULSED POWER AGENT DESTRUCTION -- Conduct system demonstration.
- (U) ($2,500) AIR VEHICLE DIAGNOSTIC SYSTEM (AVDS) -- Acquire host system for AVDS and collect SH-60 seeded fault data to train neural network.
- (U) ($2,500) ADVANCED HYBRID PROPULSOR - Hydroacoustic design and fabrication of 1/16 scale model.
- (U) ($1,250) LM-2500R ENGINE -- Conduct Congressional-directed demonstration.
- (U) ($30,000) CRUISE MISSILE DEFENSE (MOUNTAIN TOP) -- Conduct Standard Missile (SM-2) flight out profile simulations and design mods for AEGIS and SM-2. Test Advanced Research Projects Agency surveillance radar against air targets and conduct atmospheric testing. Procure 2 Cooperative Engagement Concept units and plan installation for the mountain top and designated AEGIS ship. Move SPG-51 to mountain top. Initiate the engineering to modify an AEGIS ship to fire on remote track.
- (U) ($1,000) MAGNETOHYDRODYNAMICS -- Complete Congressional-directed ATD.
- (U) ($938) Select and begin planning for FY 1996-start ATDs.

3. (U) FY 1995 PLAN:

- (U) ($1,500) SAR COUNTERMEASURES -- Complete final demonstration and transition to full scale engineering development.
- (U) ($3,300) ADVANCED ASW RECEIVER -- Complete system demonstrations of hardware components and software algorithms.
- (U) ($4,000) HMMRSS -- Complete integration of helmet-mounted display with enhanced photo imagery display capability, including rapid updates of target/threat imagery.
- (U) ($2,966) FREEZE-DRIED RED BLOOD CELLS -- Complete pre-clinical trials and seek Federal Drug Administration (FDA) investigational approval for a new drug.
- (U) ($6,000) LOW PROBABILITY OF INTERCEPT COMMUNICATIONS -- Perform system integration and complete flight demonstration of both communication link performance and performance against various intercept receiver types.
- (U) ($5,500) ADVANCED SELF-DEFENSE COMBAT SYSTEM (ASDCS) -- Install in work station and conduct mulitiple target encounter simulated test to demonstrate operational capability of ASDCS.
- (U) ($4,500) RADIANT OUTLAW -- Install sensor pod on P-3C testbed aircraft and conduct flight tests and demonstrate performance.
- (U) ($4,600) TORPEDO TERMINAL PLACEMENT -- Complete final in-water demonstration of heavyweight and lightweight configuration. Prepare system and software specifications.
- (U) ($3,800) VOICE/DATA INTEGRATION -- Demonstrate integrated voice and data services over low-bandwidth, mixed-media network such as High Frequency (HF), Ultra High Frequency Satellite Communication, High Frequency Line of Sight. Demonstrate interoperability between warrior and

high speed terrestrial networks via interconnections to the Global Grid demonstration testbed.

- (U) ($6,200) AIR VEHICLE DIAGNOSTIC SYSTEM -- Test neural network diagnostic software with seeded faults.
- (U) ($4,500) ADVANCED HYBRID PROPULSOR -- Conduct water tunnel and tow tank tests at 1/16 scale. Conduct structural and shock analyses.
- (U) ($3,500) EAGER (AUTONOMOUS DECOY) -- Design airframe and propulsion system; modify existing flight control system; procure electronic payload and initiate modifications.
- (U) ($4,000) HF SURFACE WAVE SHIPBOARD RADAR -- Demonstrate a cost effective transmitter and antenna that meets the power gain and performance parameters to satisfy the baseline target detection requirements.
- (U) ($4,500) SHALLOW WATER TORPEDO GUIDANCE & CONTROL -- Initiate development of detection/classification/homing algorithms against a diesel-electric submarine in shallow water environments.
- (U) ($4,500) LONG ENDURANCE PROPULSION Unmanned Undersea Vehicle (UUV) -- Initiate development of a long endurance thermal propulsion system and conduct lab-scale testing.
- (U) ($4,700) VIBROTACTILE SPATIAL ORIENTATION -- Conduct demonstration of nonvisual, tactile feedback system in a fixed-wing aircraft.
- (U) ($4,230) INTELLIGENT DAMAGE ADAPTIVE FLIGHT CONTROL -- Establish performance of damage identification and adaptive flight control components.
- (U) ($6,200) ADVANCED ENCLOSED MAST/SENSOR SYSTEM -- Complete integrated design, verify performance predictions, and commence fabrication of structural mast full-scale land-based test article.
- (U) ($1,367) Select and begin planning for FY 1997-start ATDs.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN, Dahlgren, VA/Bethesda MD/Panama City, FL; NAVAIRWARCEN, China Lake, CA/Warminster, PA; NCCOSC, San Diego, CA; NAVUNSEAWARCEN, New London, CT/Newport, RI/Keyport, WA; NRL, Washington, DC; NCEL, Port Hueneme, CA. CONTRACTORS: ARL/PSU, State College, PA; Battelle, Columbus, OH; Kentucky Medical R&D Corp, Louisville, KY; Bioelastics, Birmingham, AL; Hughes Aircraft, Los Angeles, CA; Locus/Questech, Sunnyvale, CA; Raytheon, Waltham, MA; Texas Instruments, Dallas, TX; INTEL, Santa Clara, CA; 3M, St. Paul, MN; Varian, Palo Alto, CA; ITT, Easton, PA; Thiokol, Elkton, MD; McDonnell-Douglas Aircraft, St.Louis, MO; Textron, Valencia, CA; APL/JHU, Laurel, MD; MITRE Corporation, Bedford, MA; MIT Lincoln Labs, Boston, MA; New Mexico School of Mines, Socorro, NM; Carnegie-Mellon University, Pittsburgh, PA; E-Systems, Inc., Dallas, TX; Metron, Inc., Reston, VA; Martin Marietta Corp., Denver, CO; Cambridge Research Associates, Cambridge, MA; Hughes Aircraft, Carlsbad, CA; Bird-Johnson Co, Walpole, MA; and numerous others.

E. (U) COMPARISON WITH AMENDED FY 1994 PRESIDENT'S BUDGET:

UNCLASSIFIED

PROGRAM ELEMENT: 0603792N
PROGRAM ELEMENT TITLE: Advanced Technology Transition

PROJECT NUMBER: R1889
BUDGET ACTIVITY: 3

DATE: 7 February 1994

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: Non-acquisition Program Definition Documents (NAPDDs) for all Advanced Technology Demonstrations.

G. (U) RELATED ACTIVITIES:

- Industry Independent Research and Development programs are sources of technology opportunities for ATDs.
- All sub-projects are either Navy unique in character or fully coordinated with other Services.
- For each ATD, a transition plan is in place to facilitate transition from the ATD-stage to the next level of development.
- Related Navy PEs are:
  - (U) PE 0601153N (Defense Research Sciences)
  - (U) PE 0602111N (Surface/Aerospace Surveillance & Weapons)
  - (U) PE 0602121N (Surface Ship Technology)
  - (U) PE 0602122N (Aircraft Technology)
  - (U) PE 0602232N (Command, Control, & Communication Technology)
  - (U) PE 0602233N (Readiness, Training and Environmental Quality Tech)
  - (U) PE 0602234N (Materials, Electronics & Computer Technology)
  - (U) PE 0602270N (Electronic Warfare Technology)
  - (U) PE 0602314N (Undersea Surveillance & Weapons Technology)
  - (U) PE 0602323N (Submarine Technology)
  - (U) PE 0602435N (Oceanographic & Atmospheric Technology)

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

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

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603794N
PROGRAM ELEMENT TITLE: C^3 Advanced Technology
BUDGET ACTIVITY: 3

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X2091 Space and Electronic Warfare (SEW) Advanced Technology	1,857	2,711	15,807	15,917	25,440	25,831	15,816	CONT.	CONT.
S2188 Range Naval Tactical Data System Display Emulation System	22,364	0	0	0	0	0	0	0	37,369
R2239 Advanced Targeting (C3I)	0	0	10,749	11,059	13,392	8,800	0	0	44,000
TOTAL	24,221	2,711	26,556	26,976	38,832	34,631	15,816	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Program Element (PE) funds the Navy's advanced technology development core efforts in the Command, Control and Communications (C3) area and real-time support functions for theater commanders. Thus, this PE develops technologies which support the effective utilization of naval forces in the conduct of the Joint Mission Areas (JMAs) as defined by OPNAV (i.e., Joint Strike, Littoral Warfare, Surveillance, SEW/Intelligence, Strategic Deterrence, Sealift/Protection, and Readiness/Training). Through the development of dynamic, reliable, high capacity, low-probability-of-intercept communication networks, it is vitally associated with the Joint Warfighting Operational Capability "To maintain near perfect real-time knowledge of the enemy and communicate that to all forces in near-real-time." The PE is planned jointly in accordance with Tri-Service Reliance agreements regarding joint development of C3 technology by the Army, Navy and Air Force, and is subject to review and oversight by the Joint Directors of Laboratories Technology Panel for C3.

(U) This PE primarily supports the following JMAs: Strike, Littoral Warfare, SEW/Intelligence and Strategic Deterrence. The focus is on demonstrations of next generation communication systems and real-time support functions for U.S. Navy ships, aircraft, and submarines. There are three projects:

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603794N
PROGRAM ELEMENT TITLE: C^3 Advanced Technology
BUDGET ACTIVITY: 3

DATE: 7 February 1994

1. (U) SEW Advanced Technology -- Demonstrates multinet, multimedia communications controller that provides smart interface between user systems and Radio Frequency transmission/receive systems. Demonstrates integration of other state-of-the-art telecommunications technologies such as high-performance local-area-networks that can meet unique military requirements. Demonstrates advanced planning systems and synthetic environments that can provide real-time joint support for a consistent tactical picture for battle group and theater commanders.

2. (U) Range Naval Tactical Data System Display Emulation System (RNDES) -- The common work station is the name provided for the ship adaptation of the consoles currently being manufactured under the NAVAIR Range Navy Tactical Data System upgrade program. These consoles provide tactical displays that emulate capabilities of the UYQ-21(V), OJ-194, and OJ-451 including all manual entry action controls and display language interpretation. This program adapts, integrates, and installs a system comprised of the RNDES display suite and a modified advanced video processor.

3. (U) Advanced Targeting - The Precision Spaceborne Targeting System (PSTS) is a Joint Service/Defense Agency effort to develop and demonstrate the capability to provide tactical users with near-real-time target identification and precision targeting information, sensor-to-shooter target updating, and Battle Damage Assessment. PSTS will enhance the tactical utility/applicability of existing national assets and provide the tactical commander with performance improvements in terms of targeting accuracy, targets of interest, timeliness, and target identification.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603794N
PROGRAM ELEMENT TITLE: C^3 Advanced Technology

PROJECT NUMBER: X2091
BUDGET ACTIVITY: 3

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X2091, Space and Electronic Warfare (SEW) Advanced Technology. Demonstrate advanced technology components, subsystems and systems that will improve the complex Navy Command, Control and Communication networks in areas such as high data rates, automation, reduction of operating costs, military security of hardware and software in multi media networks (voice/data/video communications). Projects will be conducted in the following areas: (1) Automated Integrated Communication Systems (AICS) that apply to digital networking techniques to voice/data/video communications, (2) Specification Tool for Software Requirements (STSR), (3) Multi-Level Secure (MLS) systems that provide embedded security for multi security levels in Navy communications, (4) Supporting technologies; e.g., Multi-Mission Broadband Antennas (MMBA) and Command, Control and Communications (C3) Embedded Training (CET).

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($660) AICS: Completed test-bed demonstration of partial Tactical Digital Information Exchange System (TADIXS) node to achieve end-to-end system implementation.
- (U) ($595) STSR: Developed module decomposition and abstract interfaces for the tabular-specification toolset. Constructed initial version of toolset with mode table capability and enhanced version with mode and event table capability.
- (U) ($602) MLS: Developed detailed understanding of Copernicus functional and information flow requirements. Prepared Copernicus security policy and draft security architecture that implements policy that will be developed.

(U) FY 1994 PLAN:

- (U) ($529) AICS: Complete design of full TADIXS node to integrate MLS processing capabilities into external communications. Evaluate technology solutions for integrated net management.
- (U) ($698) STSR: Enhance consistency checker with module decomposition capability and abstract interfaces; apply to mode and event tables.
- (U) ($629) MLS: Develop system prototype to demonstrate hardware/software addressing cost/producibility. Develop full system documentation.
- (U) ($855) Supporting Technologies: Demonstration of MMBA and structure a CET demonstration.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603794N
PROGRAM ELEMENT TITLE: C^3 Advanced Technology

PROJECT NUMBER: X2091
BUDGET ACTIVITY: 3

DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($845) AICS: Demonstrate system connectivity from platform to platform across multinet media. Demonstrate system Information Security solutions.
- (U) ($845) STSR: Design an improved user interface for the verifier and integrate into toolset.
- (U) ($845) MLS Processing Systems: Certify system prototype.
- (U) ($1,172) Supporting Technologies: Conduct laboratory prototype system (MMBA & CET), that can be fielded in fleet platforms for at-sea exercises.
- (U) ($5,600) Multiple Component Strike Planning prototype demonstration, Force Level Rehearsal Module, integrated with existing and advanced technology planning and execution systems (e.g., Tomahawk Strike Coordination Module (TSCM), TSCM RDT&E efforts, and Contingency Tactical Air Planning System) at multiple sites.
- (U) ($4,500) Conduct in cockpit simulation and replanning demonstration with Tactical Air Mission Planning System and War Breaker, develop synthetic environment for cockpit visualization.
- (U) ($1,250) Scalable High Performance Local Area Network Laboratory Demo with Shipboard Interface.
- (U) ($750) Communications support for demonstrations and demonstration coordination.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NCCOSC, San Diego, CA. CONTRACTORS: Harris Corp., Melbourne, FL; PRC, Inc., Arlington, VA; and TBD.

(U) RELATED ACTIVITIES:

- (U) PE 0301567G (Computer Security Program)
- (U) PE 0303140N (Information Systems Security Plan)
- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0602232N (C3 Technology)
- (U) PE 0602234N (Materials, Electronics and Computer Technology)
- (U) PE 0604231N (Tactical Command Systems)
- (U) PE 0604574N (Navy Tactical Computer Resources)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603794N
PROGRAM ELEMENT TITLE: C^3 Advanced Technology

PROJECT NUMBER: X2091
BUDGET ACTIVITY: 3

DATE: 7 February 1994

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603794N
PROGRAM ELEMENT TITLE: C^3 Advanced Technology

PROJECT NUMBER: R2239
BUDGET ACTIVITY: 3

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R2239, Advanced Targeting (C3I). The Precision Spaceborn Targeting System (PSTS) is a Joint Service/Defense Agency effort to develop and demonstrate the capability to provide tactical users with near-real-time specific target identification and precision targeting information, sensor-to-shooter target updating, and Battle Damage Assessment. The proposed system will enhance the tactical utility and applicability of existing national assets so as to provide the tactical commander involved in future conflicts with significant performance improvements. These will yield a total surveillance network which is more responsive to changing world economic and political threats in terms of targeting accuracy, targets of interest, timeliness, and target identification. PSTS will develop Joint Service/Defense Agency cooperative precision targeting enhancements and Global Concepts of Operations for optimal asset cooperative utilization. Technical challenges include development of advanced signal processing and data fusion algorithms for target detection and classification; exploitation of multiple signal characteristics for precision targeting; and data compression technologies. Further details are available at a higher level of classification.

(U) FY 1993 ACCOMPLISHMENTS: Available at a higher level of classification.

(U) FY 1994 PLAN: Available at a higher level of classification.

(U) FY 1995 PLAN: Available at a higher level of classification.

(U) PROGRAM TO COMPLETION: Project completes in FY 1998.

(U) WORK PERFORMED BY: Available at a higher level of classification.

(U) RELATED ACTIVITIES:

- (U) PE 0301567G (Computer Security Program)
- (U) PE 0303140N (Information Systems Security Plan)
- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0602232N (C3 Technology)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603794N
PROGRAM ELEMENT TITLE: C^3 Advanced Technology

PROJECT NUMBER: R2239
BUDGET ACTIVITY: 3

DATE: 7 February 1994

- (U) PE 0602234N (Materials, Electronics and Computer Technology)
- (U) PE 0604231N (Tactical Command Systems)
- (U) PE 0604574N (Navy Tactical Computer Resources)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603795N
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology
DATE: 7 February 1994
BUDGET ACTIVITY: 4

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S2156 Naval Surface Fire Support	0	0	9,629	9,474	9,387	9,316	9,246	CONT.	CONT.
S2093 Gun Weapon Systems (WARSHIPS)	7,489	23,700	15,220	15,617	18,663	18,924	19,201	CONT.	CONT.
TOTAL	7,489	23,700	24,849	25,091	28,050	28,240	28,447	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Naval Surface Fire Support System (NSFS) is a new start program beginning FY 1995. This ACAT II acquisition program will develop and acquire a Naval Surface Fire Support System capable of fulfilling the range, accuracy, and lethality requirements of the Naval Surface Fire Support Mission Needs Statement (MNS) dated 11 May 1992. The requirement for this program has been established by Congressional direction, Public Law 102-90, STAT. 1318-1319. The NSFS system is comprised of a weapon system or combination of weapon systems together with ownship and remote sensors for destruction of shore targets from required standoff ranges. The program will provide critical NSFS capabilities necessary to support all phases of amphibious operations. The program received approval to proceed with a Phase 0 Cost and Operational Effectiveness Analysis by Acquisition Decision Memorandum of September 1992. The analysis is to be completed by December 1993.

(U) The Gun Weapon Systems (WARSHIPS) is a non-acquisition program identifying and exploiting emerging technologies through demonstration and validation of concepts. Advanced technologies will be necessary to fulfill projected mission requirements for large caliber gun systems in Anti-Air Warfare, Anti-Surface Warfare, and Naval Surface Fire Support. These increased requirements have resulted from deficiencies in: a) engagement and defeat of fast maneuvering surface targets, b) engagement and defeat of low flying, highly maneuverable multi-Mach air threats, c) precision fires in friendly/enemy confined areas, d) supporting amphibious assaults from beyond the horizon distances in support of the "maneuver from the sea" concept. Technologies which have been developed and funded by other agencies are also being leveraged, not only as a means to determine near term benefits to surface combatants, but with the goal of ensuring that all existing and emerging technologies are maximally exploited for the benefit of the Navy.

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FY 1995 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603795N
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology
PROJECT NUMBER: S2156
BUDGET ACTIVITY: 4
Date: 7 February 1994

PROJECT TITLE: Naval Surface Fire Support

PICTURE NOT AVAILABLE

POPULAR NAME: NSFS

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FY 1995 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603795N
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology
PROJECT NUMBER: S2156
BUDGET ACTIVITY: 4
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES			MS I 10/94			MS II 4/98		CONT.
ENGINEERING MILESTONES			PDR 9/95	CDR 8/96		PDR 6/98	CDR 9/99	CONT.
T&E MILESTONES					DT-I 4/97 OT-1 9-97			CONT.
CONTRACT MILESTONES			RFP 12/94 CA 6/95			RFP 7/97	CA 1/98	CONT.

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	0	0	0	6,629	8,014	7,927	7,856	188,105 7,786	(149 893)
SUPPORT CONTRACT	0	0	0	500	200	200	200	5,150 200	(3 850)
IN-HOUSE SUPPORT	0	0	0	2,500	1,000	1,000	1,000	1,000	25 752 (19 252)
GFE/ OTHER	0	0	0	0	260	260	260	6,045 260	(5,005)
TOTAL	0	0	0	9,629	9,474	9,387	9,316	9,246	225,052 (178,000)

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FY 1995 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603795N PROJECT NUMBER: S2156 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology BUDGET ACTIVITY: 4

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Naval Surface Fire Support System (NSFS) is a new start ACAT II program beginning in FY 1995. This acquisition program will develop and acquire a Naval Surface Fire Support system capable of fulfilling the range, accuracy, and lethality requirements as determined by the Naval Surface Fire Support Mission Needs Statement (MNS). The NSFS system is comprised of a weapon system or combination of weapon systems together with ownship and remote sensors for destruction of shore targets from required standoff ranges. The program is to provide critical NSFS capabilities necessary to support all phases of amphibious operations. The program received approval to proceed with a Phase 0 Cost and Operational Effectiveness Analysis by Acquisition Decision Memorandum of September 1992. The analysis was completed in December 1993.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: Not applicable.

2. (U) FY 1994 PLAN: Not applicable.

3. (U) FY 1995 PLAN:

- (U) ($2,500) Conduct Phase 1 Cost and Operational Effectiveness Analysis.
- (U) ($7,129) Award contracts for NSFS Demonstration/Validation.

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

D. (U) WORK PERFORMED BY: IN HOUSE: NAVAIRWARCENWPNDIV, China Lake, CA; NAVSURFWARCENDIV, Dahlgren, VA, NAVSURFWARCEN ORDSTA, Louisville, KY; NAVSURFWARCENDIV, Carderock and Indian Head, MD. CONTRACTORS: TBD.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

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FY 1995 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603795N
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology

PROJECT NUMBER: S2156
BUDGET ACTIVITY: 4

Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION: Mission Needs Statement dated 11 May 1992.

G. (U) RELATED ACTIVITIES: PE 0603795N GWS (WARSHIPS), Project S2093.

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

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

J. (U) TEST AND EVALUATION: DT-IA shall be accomplished in April 1997. OT-IA will be accomplished in September 1997.

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FY 1995 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603795N
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology
PROJECT NUMBER: S2093
BUDGET ACTIVITY: 4
Date: 7 February 1994

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S2093 Gun Weapon Systems (WARSHIPS)	7,489	23,700	15,220	15,617	18,663	18,924	19,201	CONT.	CONT.

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

(U) The Gun Weapon Systems (WARSHIPS) is a non-acquisition program identifying and exploiting emerging technologies through demonstration and validation of concepts. Advanced technologies will be necessary to fulfill projected mission requirements for large caliber gun systems in Anti-Air Warfare, Anti-Surface Warfare, and Naval Surface Fire Support. These increased requirements have resulted from deficiencies in: a) engagement and defeat of fast maneuvering surface targets, b) engagement and defeat of low flying, highly maneuverable multi-Mach air threats, c) precision fires in friendly/enemy confined areas, d) supporting amphibious assaults from beyond the horizon distances in support of the "maneuver from the sea" concept. Technologies which have been developed and funded by other agencies are also being leveraged, not only as a means to determine near term benefits to surface combatants, but with the goal of ensuring that all existing and emerging technologies are maximally exploited for the benefit of the Navy.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($7,489) Completed Phase I design concepts and began downselect process for Phase II. Performed demonstration of Range Extension Near Term (RENT) propulsion systems. Completed first generation RENT gun. Began evaluation of specialized tracking algorithms in simulations of AAW engagements. Selected White Sands Missile Range for test bed site. Began construction of 5"and 8" based gun technology test beds. Completed analysis of Anti-air Warfare threats, Anti-Surface Warfare mission and additionally the Naval Surface Fire Support mission.

FY 1995 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603795N
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology
PROJECT NUMBER: S2093
BUDGET ACTIVITY: 4
Date: 7 February 1994

2. (U) FY 1994 PLAN:

- (U) ($23,700) Complete downselect process for Phase II. Complete test series for RENT project. Construct gun mount carriages as GFE for gun and propulsion contracts. Award contracts for 155mm regenerative liquid propellant gun, 5-inch electrothermal chemical gun, and 155mm precision guided munitions for NSFS. Initiate development of fire control interface for long range NSFS system. Complete wargame simulator modifications to the Joint Conflict Model (formerly JANUS) for amphibious warfare scenarios. Continue development of high order model of regenerative liquid and electrothermal-chemical propulsion technologies. Build as GFE 155mm and 5-inch high pressure gun barrels for Advanced Technology Transition Demonstrators 1 and 2.

3. (U) FY 1995 PLAN:

- (U) ($15,220) Continuing Phase II program for NSFS/STKW/SEAD Advanced Technology Demonstrator gun weapon system including design and validation of critical components. Begin risk reduction testing of critical components for precision guided munitions and gun system. Complete construction and begin operation of gun technology test bed site. Continue design and validation of guided projectile concepts and gun/propulsion systems.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, China Lake, CA; NAVSURFWARCENDIV ORDSTA, Louisville, KY; NAVSURFWARCENDIV, Dahlgren, VA; NAVSURFWARCENDIV, Indian Head, MD; ARMY RESEARCH LABORATORY, Aberdeen, MD; ARMY RESEARCH DEVELOPMENT AND ENGINEERING LABORATORY, Picatinny, NJ. CONTRACTORS: ALLIANT TECHSYSTEMS, Edina, MN; GENERAL DYNAMICS LAND SYSTEMS DIVISION, Sterling Heights, MI; LORAL AERONUTRONIC, Newport Beach, CA; MARTIN-MARIETTA DEFENSE SYSTEMS DIVISION, Pittsfield, MA; MCDONNELL-DOUGLAS AEROSPACE, St Louis, MO.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

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FY 1995 RDT&E NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603795N
PROGRAM ELEMENT TITLE: Gun Weapons Systems Technology
PROJECT NUMBER: S2093
BUDGET ACTIVITY: 4
Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:

- NAPDD 252-03 (Non-Acquisition Program Definition Document) of January 1991.

G. (U) RELATED ACTIVITIES: Not applicable.

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

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

J. (U) MILESTONE SCHEDULE:

CA	01/94
CA	02/94
SRR	04/94
PDR	04/95
CDR	10/95
RFP	09/96
PDR	07/97
CA	01/97
PDR	07/98
CDR	04/99

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603800N
PROGRAM ELEMENT TITLE: Joint Advanced Strike Technology (JAST) Program
PROJECT NUMBER: D2209
BUDGET ACTIVITY: 4
Date: 7 February 1994

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
D2209 Joint Advanced Strike Technology (JAST) Program	0	29,663	100,037	151,652	202,857	305,446	409,275	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Joint Advanced Strike Technology (JAST) program was established to support development of affordable next generation strike weapons systems as a result of the Office of the Secretary of Defense (OSD) Bottom-Up Review (BUR). The program will focus on key technologies to meet future joint operational requirements for Navy, Air Force, and Marine Corps while reducing cost and risk. The emphasis is on maturing and demonstrating those technologies, components, concepts, and manufacturing processes which optimize commonality between the Services' next generation strike weapons systems, through prudent use of design modularity and common components.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: Not applicable.

2. (U) FY 1994 PLAN: Conduct concept exploration studies and provide in-house support as follows:

- (U) ($11,880) Strike warfare concepts.
- (U) ($7,263) Strategy-to-technology analysis.
- (U) ($3,290) Air vehicle.
- (U) ($1,190) Propulsion.
- (U) ($3,220) Manufacturing and supportability.
- (U) ($720) Avionics and weapons integration.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603800N
PROGRAM ELEMENT TITLE: Joint Advanced Strike Technology (JAST) Program
PROJECT NUMBER: D2209
BUDGET ACTIVITY: 4
Date: 7 February 1994

- (U) ($2,100) Program operations support.

3. (U) FY 1995 PLAN: Complete concept exploration, begin concept development, and provide in-house support as follows (breakout below reflects combined Navy and Air Force funding):

- (U) ($23,870) Air vehicle.
- (U) ($8,560) Manufacturing and producibility.
- (U) ($63,240) Propulsion.
- (U) ($27,400) Avionics.
- (U) ($4,220) Weapons integration.
- (U) ($14,760) Supportability.
- (U) ($12,951) Strategy-to-technology analysis.
- (U) ($40,790) Strike weapons systems concept studies.
- (U) ($5,600) Program operations support.

4. (U) PROGRAM TO COMPLETION: Complete concept development and begin concept demonstration around 1997.

D. (U) WORK PERFORMED BY: IN-HOUSE: AFMC, Dayton, OH, Fort Walton Beach, FL; NAVAIRWARCENACDIV, Patuxent River MD, Warminster, PA. CONTRACTORS: To be determined.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0603800N
PROGRAM ELEMENT TITLE: Joint Advanced Strike Technology (JAST) Program

PROJECT NUMBER: D2209
BUDGET ACTIVITY: 4

Date: 7 February 1994

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: OSD Bottom-Up Review (BUR) 9/93

G. (U) RELATED ACTIVITIES: ASTOVL is currently a separate and distinct program from JAST. However, in the future, the JAST Program will assess ASTOVL as a candidate for one of its flying concept demonstrators based on ASTOVL program progress and ASTOVL's capability to satisfy the requirements of more than one service (ASTOVL PEs 0603217N and 0603226E).

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands) This is a joint program, with no executive service. Navy and Air Force each provide approximately equal shares of annual funding for the program effective FY 1995.

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) RDT&E,F PE 0603800F (Joint Advanced Strike Technology Program)									
	0	0	101,354	151,975	200,860	305,806	415,703	CONT.	CONT.

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

J. (U) MILESTONE SCHEDULE: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N
PROGRAM ELEMENT TITLE: ASW & Other Helo Developments
BUDGET ACTIVITY: 5

Date: 7 February 1994

A. RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
H0485 ALFS	38,617	25,181	22,101	19,078	4,079	0	0	0	150,856
H1109 CH/MH-53	11,638	5,468	6,394	7,354	8,215	2,217	871	0	79,157
H1378 AH-1 A/C	9,502	5.492	15,953	45,240	16,261	9,124	7,200	0	200,042
H1707 LAMPS III IMP	34,435	44,575	42,099	49,061	38,014	34,440	32,134	0	325,014
TOTAL	94,192	80,716	86,547	120,733	66,569	45,781	40,205	0	755,069

B. (U) H0485 - This program develops an Airborne Low Frequency Sonar (ALFS) and upgrades sonobuoy processing for SH-60 aircraft and improves anti-submarine warfare (ASW) mission effectiveness against the quiet submarine threat and in shallow water environments. This dipping sonar has demonstrated capabilities 3 to 6 times (square miles of ocean searched per hr) the existing capability. This provides improved aircraft carrier battle group (CVBG) survivability and operating flexibility through improved detection, localization and classification of submarine threats from the outer zone through the CVBG inner zone. ALFS includes embedded training capability to maintain combat ready skills, and improved sonobuoy processing.

(U) H1109 - This program develops a Mid-Life Upgrade to provide for improvements to the safety, reliability and maintainability of the CH/MH-53. The upgrade will increase reliability and reduce the cost of ownership. Upgrade efforts include the helicopter drive system, tail rotor disconnect coupling engine air particle separators, and main rotor head.

(U) H1378 - This project provides for development of the AH-1 Integrated Weapons System (IWS) Cockpit Upgrade effort emphasizing workload reduction to increase margin of safety in night, nap-of-the-earth adverse weather operations. The Wing Tip station wiring is performed in conjunction with the development of the Stores Management System (SMS) providing the AH-1 with simultaneous air-to-air missile and air-to-ground capability and Advance Rocket System (ARS) delivery capability.

(U) H1707 - The Block II Upgrade improves the capability of the LAMPS MK III Weapons System to provide battle group protection and to add significant capability in coastal littorals and regional conflicts. The Block II Upgrade represents a significant avionics modification to the SH-60 by enhancing primary mission areas of ASW and Anti-Surface Warfare (ASUW). ALFS will be added to enhance the existing acoustic suite. An added multi-mode radar includes an inverse synthetic aperture

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N
PROGRAM ELEMENT TITLE: ASW & Other Helo Developments
BUDGET ACTIVITY: 5

Date: 7 February 1994

radar mode (permits stand-off classification of hostile threats). An improved electronics surveillance measures system will enable passive detection and targeting of radar sources not currently detectable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N
PROGRAM ELEMENT TITLE: ASW & OTHER HELO DEVELOPMENTS
PROJECT NUMBER: H0485
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: ALFS

POPULAR NAME: ALFS

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N
PROGRAM ELEMENT TITLE: ASW & OTHER HELO DEVELOPMENTS
PROJECT NUMBER: H0485
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE		FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES							MS III 1Q 98		
ENGINEERING MILESTONES		PDR 4/93	CDR 7/93						
T&E MILESTONES					TECHEVAL 4/96	OPEVAL 4/97			
CONTRACT MILESTONES		INTEGRATION 8/93							
BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	20,340	31,452	20,526	17,040	13,438	1,501	0	0	104,297
SUPPORT CONTRACT	0	863	476	409	409	0	0	0	2,157
IN-HOUSE SUPPORT	14,390	5,788	3,879	4,652	5,231	2,578	0	0	36,518
GFE/ OTHER	7,070	514	300	0	0	0	0	0	7,884
TOTAL	41,800	38,617	25,181	22,101	19,078	4,079	0	0	150,856

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program develops an Airborne Low Frequency Sonar (ALFS) and upgrades sonobuoy processing capability for the SH-60 helicopter to maintain and improve anti-submarine warfare (ASW) mission effectiveness against the quiet submarine threat and in shallow water environments. This project provides a dipping sonar with demonstrated capabilities typically 3 to 6 times (square miles of ocean searched per hour) the existing capability. This improvement will significantly increase aircraft carrier battle group (CVBG) inner zone submarine protection, providing improved CVBG survivability and operating flexibility. For the middle and outer zones, ALFS improves redetection and localization speed. In addition to long range active sonar search, ALFS provides detection and classification of submarine threats, an embedded training capability to maintain combat-ready skills, and improved sonobuoy processing capability.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N PROJECT NUMBER: H0485 Date: 7 February 1994
PROGRAM ELEMENT TITLE: ASW & OTHER HELO DEVELOPMENTS BUDGET ACTIVITY: 5

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($16,237) Finalized ALFS hardware and software design. Conducted Critical Design Review (CDR). Continued ALFS/UYS-2 integration. Commenced ALFS/UYS-2 system level testing.
- (U) ($12,415) ALFS integration contract awarded (a component of Block II contract).
- (U) ($7,165) Commenced government software development testing. Continued systems engineering analysis. Continued program support.
- (U) ($2,800) Continued ALFS UYS-2 non-recurring engineering.

2. (U) FY 1994 PLAN:

- (U) ($13,375) Manufacture and commence delivery of ALFS pre-production units. Conduct TEMPEST test. Conduct Electromagnetic compatibility tests.
- (U) ($6,751) Commence system integration testing.
- (U) ($4,655) Continue software development testing and systems engineering analysis. Continued program support.
- (U) ($400) Continue ALFS UYS-2 non-recurring engineering.

3. (U) FY 1995 PLAN:

- (U) ($9,309) Complete software development testing. Commence contractor support of Development Testing. Conduct Acoustic Verification Tests. Conduct Mechanical Verification Tests. Complete ALFS pre-production unit deliveries.
- (U) ($7,731) Complete system integration testing.
- (U) ($5,061) Complete Government software development testing. Commence Government developmental testing. Continue program support.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N
PROGRAM ELEMENT TITLE: ASW & OTHER HELO DEVELOPMENTS
PROJECT NUMBER: [illegible]485
BUDGET ACTIVITY: 5
Date: 7 February 1994

4. (U) PROGRAM TO COMPLETION:

- (U) During this period, ALFS TECHEVAL and OPEVAL testing will be completed. Testing deficiencies will be analyzed and corrected. Production will commence in 1998. The first ALFS aircraft to be delivered to the fleet is planned for 1999. ALFS will be installed in SH-60 helicopters as part of the program to remanufacture SH-60Bs and SH-60Fs to the SH-60R configuration.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Patuxent River, MD; NAVAIRWARCENACDIV, Warminster, PA; NAVAIRWARCENACDIV, Indianapolis, IN; NAVSURFWARCENDIV, Crane, IN. CONTRACTORS: Hughes Aircraft, Fullerton, CA; AT&T, Whippany, NJ.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: TECHEVAL and OPEVAL adjusted as approved during SH-60B Block II Upgrade (H1707) Milestone Decision meeting of 21 JUL 93.

3. (U) Cost Changes: Data in previcus budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) AP 11/91
- (U) ORD 12/91
- (U) IPS 12/91
- (U) TEMP 12/92
- (U) APBA 2/92

G. (U) RELATED ACTIVITIES:

- (U) PE 0604212N, H1707 LAMPS Improvements; PE 0604507N, Enhanced Modular Signal Processor.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N
PROGRAM ELEMENT TITLE: ASW & OTHER HELO DEVELOPMENTS
PROJECT NUMBER: H0485
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) APN BA-1, Lines 10 & 11	0	0		0	14,574	385,008	356,225	4,013,782	4,769,589
• (U) APN BA-6, Line 48	0	0	0	0	0	5,662	35,167	361,299	402,128

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

J. (U) TEST AND EVALUATION:

- (U) TECHEVAL 4/96
- (U) OPEVAL 4/97

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N
PROGRAM ELEMENT TITLE: ASW & OTHER HELO DEVELOPMENTS

PROJECT NUMBER: H1109
BUDGET ACTIVITY:5

Date: 7 February 1994

PROJECT TITLE: CH/MH53

POPULAR NAME: CH/MH-53

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N
PROGRAM ELEMENT TITLE: ASW & OTHER HELO DEVELOPMENTS
PROJECT NUMBER: H1109
BUDGET ACTIVITY:5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		TRR 2/94	PDR 6/95	CDR 1/96				
ENGINEERING MILESTONES	SIL 1/93							
T&E MILESTONES	PMQT 6/93	MQT 3/94 FLT TEST 4/94 DT-IIIC 5/94 OT-IIIC 7/94		MQT 6/96		DT 12/97 OT 6/98		
CONTRACT MILESTONES			CA 11/94					

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	TOTAL BUDGET FY 1999	(TO COMPLETE)
MAJOR CONTRACT	33,643	10,603	3,408	6,044	6,817	7,510	894	483	69,402
SUPPORT CONTRACT	211	475	156	185	314	460	263	221	2,285
IN-HOUSE SUPPORT	3,146	165	140	165	223	245	260	167	4,511
GFE/ OTHER	0	395	1,764	0	0	0	800	0	2,959
TOTAL	37,000	11,638	5,468	6,394	7,354	8,215	2,217	871	79,157

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N
PROGRAM ELEMENT TITLE: ASW & OTHER HELO DEVELOPMENTS
PROJECT NUMBER: H1109
BUDGET ACTIVITY:5
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project provides for FY-94 continuation and completion of the Main Gearbox Reliability Improvement Program (MGB) for the CH-53E, and the Integration of a Global Positioning System (GPS) into the MH-53E. FY-95 program start is the development of a Mid-Life Upgrade to provide for improvements to the safety, survivability, reliability and maintainability of the CH/MH-53E. The upgrade will increase reliability and reduce the cost of ownership through 2025. Upgrade efforts include the helicopter drive system, tail rotor disconnect coupling, engine air particle separators, and main rotor head.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) GPS ($9,124) - Continued prototype installation and detailed software development/system integration laboratory (SIL) testing Jan 93. Completed Phase II of Mission Planning Station coding and commence Phase III coding.
- (U) MGB ($2,514) - Completed Components Development Test and Military Qualification Test Plans (MQTP). Eliminated MQT Phase II. Commenced Preliminary Military Qualification Testing (PMQT) Jun 93 with additional 295 hours of testing for increased power (completion expected 1/94).

2. (U) FY 1994 PLAN:

- (U) GPS ($4,982) - Complete MPS Phase III Jan 94. Perform Test Readiness Reviews (TRR) Feb 94. Commence Technical Testing (DT-IIIC) May 94 and Operational testing (OT-IIIC) Jul 94.
- (U) MGB ($486) - Complete PMQT testing to qualify main gear box for higher power generated by the 419 engine Feb 94. Commence Military Qualification Test (MQT) 3/94 and Flight Test 4/94. Prepare engineering test reports.

3. (U) FY 1995 PLAN:

- (U) Mid-Life Upgrade ($6,394) - Award Development Contract 11/94 to commence the redesign to improve safety, survivability, reliability and maintainability of the CH/MH-53E.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N
PROGRAM ELEMENT TITLE: ASW & OTHER HELO DEVELOPMENTS
PROJECT NUMBER: H1109
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) Continuation of Mid-Life Upgrade with planned Preliminary Design Review (PDR) 6/95.

4. (U) PROGRAM TO COMPLETION:

- (U) Continue Mid-Life Upgrade.
- (U) Critical Design Review (CDR) 1/96; Military Qualification Test planned 6/96; Developmental Testing (DT) 12/97 and Operational Testing (OT) 6/98.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Indianapolis, IN; NAVAIRWARCENACDIV, Patuxent River, MD; NAVAIRWARCENACDIV, Trenton, NJ; Naval Aviation Supply Office, Philadelphia, PA; NSWC, Panama City, FL. CONTRACTORS: United Technologies Corporation, Sikorsky Aircraft Division, Stratford, CT; EER Systems, Vienna, VA; Horizons Technology, San Diego, CA; General Scientific Corp., Arlington, VA.; DUAL & Assoc., Arlington, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) GPS - DCP No. 133 Rev B 5/79; TEMP (Rev 2) 12/89
- (U) MGB - NPDM 11/86 (NON-ACAT)
- (U) MID-LIFE UPGRADE - TOR No. AAS34.06 4/93

G. (U) RELATED ACTIVITIES:

- (U) Program Element 0604777N (Navigation/ID System)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N
PROGRAM ELEMENT TITLE: ASW & OTHER HELO DEVELOPMENTS

PROJECT NUMBER: H1109
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) APN Line 27 (GPS)	2,500	9,267	14,816	10,056	10,287	2,046	0	0	50,206
(Mid-Life Upg)	0	0	0	0	0	0	4,583	CONT.	CONT.

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

J. (U) TEST AND EVALUATION:
- (U) GPS - DT-IIIC 5/94; OT-IIIC 7/94
- (U) MGB - MQT 3/94; FLT TEST 4/94
- (U) MID-LIFE UPGRADE - MQT 6/96; DT 12/97; OT 6/98

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N
PROGRAM ELEMENT TITLE: ASW & OTHER HELO DEVELOPMENTS
PROJECT NUMBER: H1378
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

PROJECT TITLE	FY 1992 AND PRIOR	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
H1378/AH-1 AIRCRAFT	91,270	9,502	5,492	15,953	45,240	16,261	9,124	7,200	0	200,042

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The mission of the AH-1W attack helicopter is to provide close-in fire support and fire support coordination in aerial and ground escort operations during the ship-to-shore phase of amphibious operations and during subsequent operations ashore. AH-1 Integrated Weapons System (IWS) emphasizes cockpit workload reduction to increase margin of safety in night, nap-of-the-earth and adverse weather operations. Integration includes on-board mission planning, communications, digital fire control, self navigation, night targeting and weapons systems. As discrete systems have been added to the aircraft, pilot workload has progressively worsened. The Board of Inspection and Survey has identified the lack of system integration as the most critical deficiency affecting mission completion. The Wing Tip station wiring is performed in conjunction with the development of the Stores Management System (SMS) and IWS, providing the AH-1 with a simultaneous air-to-air missile and air-to-ground capability, and Advanced Rocket System (ARS) delivery capability.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,987) Completed Night Targeting System TECHEVAL and OPEVAL testing.
- (U) ($2,410) Completed SMS/wing tip station wiring engineering design effort.
- (U) ($105) Initiated acquisition planning development for the IWS program.
- (U) ($5,000) STARSTREAK effort.

2. (U) FY 1994 PLAN:

- (U) ($0) Obtain Night Targeting System (NTS) Milestone III approval for Full Rate Production.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N PROJECT NUMBER: H1378 Date: 7 February 1994
PROGRAM ELEMENT TITLE: ASW & OTHER HELO DEVELOPMENTS BUDGET ACTIVITY: 5

- (U) ($3,368) Complete engineering design effort and begin Stores Management Systems (SMS)/wing tip station wiring integration.
- (U) ($2,124) Conduct technical review of Integrated Weapon System (IWS) proposals and prepare documentation in support of Milestone IV/II approval.

3. (U) FY 1995 PLAN:

- (U) ($0) Obtain IWS MS IV/II approval for Engineering and Manufacturing Development (E&MD) and award competitive contract.
- (U) ($14,378) Begin engineering design effort for IWS.
- (U) ($1,575) SMS/wing tip station wiring prototype incorporation.

4. (U) PROGRAM TO COMPLETION:

- (U) Continue EMD efforts on the IWS leading to Milestone III approval.
- (U) Incorporation of software changes as a result of Advanced Rocket System (ARS) DT/OT testing leading to Low Rate Production decision.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, China Lake, CA; NAVAIRWARCENACDIV, Patuxent River, MD; NADEP, Pensacola, FL; NADEP, Jacksonville, FL; NAVAIRWARCENACDIV, Warminster, PA. CONTRACTORS: ISRAEL AIRCRAFT INDUSTRIES, Tamam Plant, Yehud Industrial Zone, Israel; SEQUA, INC./KOLLSMAN, Merrimack, NH; BELL HELICOPTER, TEXTRON, INC., Ft. Worth, TX; Charles Stark Draper Laboratory, Cambridge, MA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not available for comparison.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N
PROGRAM ELEMENT TITLE: ASW & OTHER HELO DEVELOPMENTS
PROJECT NUMBER: H1378
BUDGET ACTIVITY: 5
Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:

- (U) Night Targeting System

	Date
• (U) Operational Requirements Document	12/85
• (U) Test and Evaluation Master Plan	04/88
• (U) Integrated Program Summary	05/92
• (U) Acquisition Plan	08/93

- (U) Stores Management System/Wing Tip Station Wiring

• (U) Operational Requirements Document	04/88
• (U) Test and Evaluation Master Plan	01/93
• (U) Integrated Program Summary	02/93
• (U) Acquisition Plan	07/91

- (U) Integrated Weapon System
  - (U) Operational Requirements Document (AAS-35) In Staffing at OPNAV (estimated approval 4/94).
  - (U) TEMP 1435 in staffing (estimated approval 3/95).
  - (U) Integrated Program Summary 4/94.
  - (U) Acquisition Plan 4/94.

G. (U) RELATED ACTIVITIES: PE 0604603N, Air-to-Surface Munitions

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) APN: H-1 (B.A. 5), Line 29	0	0	0	0	0	0	14,842	578,174	593,016

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N
PROGRAM ELEMENT TITLE: ASW & OTHER HELO DEVELOPMENTS
PROJECT NUMBER: H1378
BUDGET ACTIVITY: 5
Date: 7 February 1994

J. (U) MILESTONE SCHEDULE:

	Date
• (U) Night Targeting System (NTS)	
• (U) DTIIC & OTIIA Completed	04/92
• (U) Milestone IIA (Limited Prod.)	06/92
• (U) TECHEVAL/OPEVAL Completed	09/93
• (U) Milestone III (Full Prod.)	01/94
• (U) Integrated Weapon System (IWS)	
• (U) Competitive Proposal Review	07/94
• (U) Milestone IV/II	03/95
• (U) EMD Contract Award	04/95
• (U) Design Review	11/95
• (U) Fabricate Prototype Complete	04/97
• (U) Contractor Test Completes	05/97
• (U) DTIIB/OTIIA Test Completes	11/97
• (U) DTIIC TECHEVAL Completes	11/98
• (U) DTIID TECHEVAL Completes	04/99
• (U) DTIIB OPEVAL Completes	10/99
• (U) Milestone III	12/99

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N
PROGRAM ELEMENT TITLE: ASW & OTHER HELO DEVELOPMENTS
PROJECT NUMBER: H1707
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: LAMPS III IMPROVEMENTS

POPULAR NAME: LAMPS

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N
PROGRAM ELEMENT TITLE: ASW & OTHER HELO DEVELOPMENTS
PROJECT NUMBER: H1707
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	MS II 7/93							MS III 1Q/01
ENGINEERING MILESTONES	SDR 6/93	SSR 10/93	PDR 4/94	CDR 8/95		TRR 3Q97;		1Q99
T&E MILESTONES			DT IIA 6/95	DT IIB 6/96	OT IIA 6/97		TECHEVAL 6/99	OPEVAL 3/00
CONTRACT MILESTONES	PHASE II 8/93							

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	37,698	28,882	40,727	37,883	43,226	31,226	30,254	25,341	275,237 (0)
SUPPORT CONTRACT	0	1,286	140	120	140	170	170	155	2,181 (0)
IN-HOUSE SUPPORT	11,299	3,443	3,508	3,696	3,695	3,418	3,416	3,438	35,913 (0)
GFE/ OTHER	1,259	824	200	400	2,000	3,200	600	3,200	11,683 (0)
TOTAL	50,256	34,435	44,575	42,099	49,061	38,014	34,440	32,134	325,014

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Block II Upgrade improves the capability of the LAMPS MK III Weapons System to provide battle group protection and adds significant capability in coastal littoral and regional conflicts. The Block II Upgrade entered Engineering and Manufacturing Development (EMD) in FY93 and represents a significant avionics modification to the SH-60 greatly enhancing both primary mission areas of Anti-Submarine Warfare (ASW) and Anti-Surface Warfare (ASUW). The Airborne Low Frequency Sonar (ALFS) will be added to enhance the existing acoustic suite. ASUW effectiveness will be improved with the addition of a multi-mode radar which includes an inverse synthetic aperture radar (ISAR) mode to permit stand-off classification of hostile threats. An improved electronics surveillance measures (ESM) system will enable passive detection and targeting of radar sources not detectable with the current system. Aircrew and aircraft survivability in hostile environments will be significantly improved through software integration of the self-defense

equipments. Provisions for a tactical data transfer (TDT) system to improve platform interoperability by rapid, secure transfer of mission information between multiple air and surface units is included in the upgrade.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,536) Incremental funding payment for GFE ALFS engineering development models (EDM) contract.
- (U) ($7,730) Completed contractor furnished subsystem competitions, detailed system and subsystem Requirement Specifications culminating in a successful System Design Review (SDR).
- (U) ($18,566) Developed, designed hardware and software System and interface requirement specifications for the Integrated Mission Processor. Entered Engineering & Manufacturing Development phase, began detailed system and subsystem design analysis and design, air vehicle interface control documents and specifications and began procurement of subsystem long lead hardware.
- (U) ($5,603) Provided Navy engineering support for review of system and subsystem requirements, planning for developmental and operational testing, began software and hardware independent verification and validation (IV&V) and program management support for completing MS II review.

2. (U) FY 1994 PLAN:

- (U) ($38,615) Continue EMD including continuation of system and subsystem design and development; continue hardware developmental procurement; begin airframe modification for avionics upgrade; begin laboratory integration and test; conduct preliminary Design Review (PDR) and conduct System Software Review (SSR).
- (U) ($2,112) Incremental funding payment for GFE ALFS EDM payment.
- (U) ($3,848) Provide continued Navy engineering support, program management and software verification and validation.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N PROJECT NUMBER: H1707 Date: 7 February 1994
PROGRAM ELEMENT TITLE: ASW & OTHER HELO DEVELOPMENTS BUDGET ACTIVITY: 5

3. (U) FY 1995 PLAN:

- (U) ($37,883) Continue EMD including continuation of system level design leading to a System Critical Design Review (CDR); laboratory simulation/stimulation completes; system software coding begins; complete airframe modification.
- (U) ($4,216) Navy system engineering support for system CDR; continue hardware and software independent verification and validation and conduct initial ASW/ALFS developmental testing (DTIIA).

4. (U) PROGRAM TO COMPLETION: The SH-60B and selected SH-60F aircraft will be remanufactured into a zero flight hour aircraft designated the SH-60R. The remanufactur process includes installation of LAMPS III Block II avionics Service Life Extension Program Modifications and Standard Depot Level Maintenance effort.

- (U) EMD FY93-FY00.
- (U) DT II/OT II to support Program Review FY97-FY98.
- (U) Remanufacture Technical Directive Validation and commencement of remanufacture FY99-FY00.
- (U) Techeval/Opeval FY99-FY00.
- (U) IOC FY01.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA; NAVAIRWARCENACDIV, Paxtuxent River, MD; NAVAIRWARCENACDIV, Indianapolis, IN; NAVSURFWARCEN FLTCOMBATDIRSSACT, Dam Neck, VA; NRL, Washington DC. CONTRACTORS: International Business Machines, Owego, NY; Sikorsky, Stratford, CT; AT&T, Whippany, NJ, for UYS-2; Hughes Aircraft, Fullerton, CA, for ALFS.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: TECHEVAL and OPEVAL adjusted as approved during SH-60B Block II Upgrade Milestone Decision Meeting of 21 JUL 93.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N PROJECT NUMBER: H1707 Date: 7 February 1994
PROGRAM ELEMENT TITLE: ASW & OTHER HELO DEVELOPMENTS BUDGET ACTIVITY: 5

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

OR	5/88
ORD	8/92
AP	8/92; updated 7/93
TEMP	1/94
COEA	1/93
STAR	8/92

G. (U) RELATED ACTIVITIES:

- (U) PE 0604212N, ASW and Other Helo Developments, Project H0485, ALFS.
- (U) PE 0604507N, Enhanced Modular Signal Processor (integration into ALFS system).
- (U) PE 0604261N, Acoustic Search Sensors.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) OPN	24,494	4,587	4,449	14,247	13,573	22,664	285	0	369,599
(U) APN-1 Line 10 & 11	0	0	0	0	14,574	385,008	356,225	4,013,782	4,769,589
(U) APN-6 Line 48	0	0	0	0	0	5,662	35,167	361,299	402,128

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

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604212N
PROGRAM ELEMENT TITLE: ASW & OTHER HELO DEVELOPMENTS
PROJECT NUMBER: H1707
BUDGET ACTIVITY: 5

Date: 7 February 1994

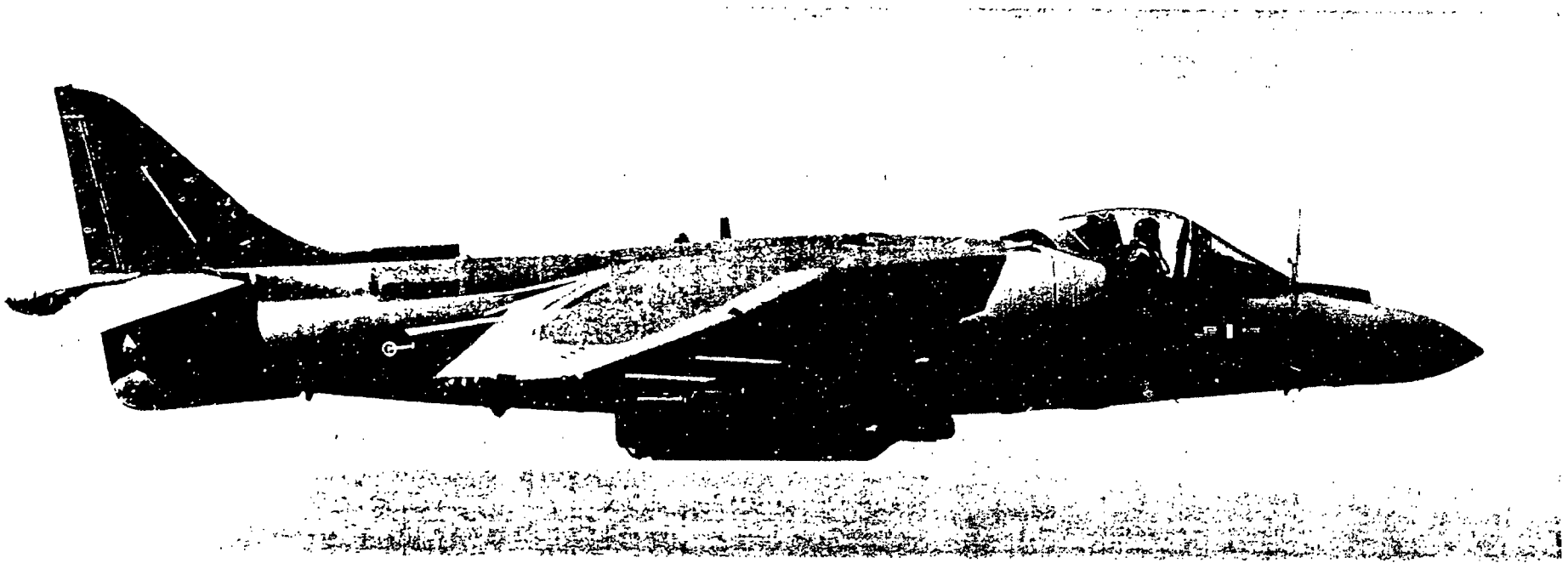
J. (U) TEST AND EVALUATION:

- (U) DTIIA 6/95
- (U) DTIIB 6/95
- (U) OTIIA 6/97
- (U) TECHEVAL 6/99
- (U) OPEVAL 3/00

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604214N
PROGRAM ELEMENT TITLE: AV-8B Aircraft (Engineering)
PROJECT NUMBER: H0652
BUDGET ACTIVITY: 5
Date: 7 February 1994

PROJECT TITLE: AV-8B



POPULAR NAME: HARRIER II

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FY 1994 RDT&E, NAVY DESCRIPTIVE SUMMARY

E PROGRAM ELEMENT: 0204N — PROJECT NUMBER: R0641 — Date: 7 February 1994
PE PROGRAM ELEMENT TITLE: AV-8B Aircraft (Engineering) — BUDGET ACTIVITY: 5

A. RESOURCES (BUDGET) AND PERFORMANCE INFORMATION (Dollars in Thousands)

RESOURCE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PE 0604	PAP AP IPL			PEMAN DEL				
MILEST NE	7 93			RTF 06/96				
ENGINEERING				I.T./OT TESTING				
MILES : NES				COMPLETE 10 97				
TAS		P1 S/W						
MILE . NES		RTF 12/93						
		P2 S/W	R3 S/W	C1 S/W		C2 S/W		
		RTF 4 94	RTF 10 94	RTF 10 96		RTF 10/98		
IMPACT								
MILESTONES								

COST	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL COST TO COMPLETE
COST P								
MILEST NT	4	5.9		5.02	2.3	4	250	TBD
MILE PT								
MILESTONE	2,314	2.9	1.81	1.45	1.46	5.9	300	TBD
IN H USE								
TOTAL PT	5,771	5,951	6,274	5,455	5,2.7	1,112	1,872	TBD
A/C								
INH P								TBD
								TBD

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604214N
PROGRAM ELEMENT TITLE: AV-8B Aircraft (Engineering)
PROJECT NUMBER: H0652
BUDGET ACTIVITY: 5
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program provides AV-8B airframe integration and testing of various aircraft improvements including: installation of the AN/APG-65 multitimode radar; incorporation of F402-RR-408 engine improvements; flight test of modifications that improve aircraft flight performance; and limited evaluation of advanced concepts and activities to coordinate with ongoing independent advanced weapons developments. AN/APG-65 radar integration is a joint development effort among the Governments of the United States, Italy, and Spain to install, integrate, and test the AN/APG-65 radar (currently in use on the F/A-18) which provides enhanced air-to-ground and air-to-air weapons delivery capability. The F402-RR-408 is a derivative of the -406A engine presently in service; it provides increased thrust for improved performance, safety, and survivability. Airframe improvements include expansion of the flight envelope and 100% Leading Edge Root Extention (LERX), a joint development with the United Kingdom that increases instantaneous turn rate and combat capability. Advanced weapons coordination includes requirements liaison with efforts such as the Advanced Rocket System, Joint Direct Attack Munitions, Joint Standoff Weapon, and AIM-9X.

C. PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($672) Continued on-going Pre-Planned Product Improvement (P^3I) projects.
- (U) ($330) Ground and flight testing of redesigned F402-RR-408 engine case.
- (U) ($1,099) Commenced contractor radar flight testing 10/92.
- (U) ($5,581) Commenced Three-Phase Radar Software (R1, R2 and R3) validation and verification efforts.
- (U) ($2,553) Commenced Radar Integration and Flight Testing (FQ&P, Loads, Avionics, OFP).
- (U) ($1,500) Integration testing of Rail Chaff.

2. (U) FY 1994 PLANS:

- (U) ($328) Conduct advanced studies/advanced weapons coordination.
- (U) ($145) Release block 1 (R1) Radar Software to USMC R1 S/W RTF 12/93.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604214N
PROGRAM ELEMENT TITLE: AV-8B Aircraft (Engineering)
PROJECT NUMBER: H0632
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($8,867) Release block 2 (R2) Radar Software to the USMC and Italy to provide air-to-surface radar modes. R2 S/W RTF 4/94.
- (U) ($7,500) Determine airframe installation/integration requirements for the Joint Missile Approach Warning Systems (MAWS).
- (U) ($400) Conduct BOL CHAFF capabilities demonstration.
- (U) ($325) Conduct flight performance testing of various modifications.
- (U) ($614) Conduct ground and flight testing for F402-RR-408 engine improvement. Issue final fleet operating clearances.

3. (U) FY 1995 PLANS:

- (U) ($562) Conduct advanced studies/advanced weapons projects.
- (U) ($500) Release Block 3 (R3) Radar Software to the USMC and GOI to provide Initial Operational Capability (IOC) with full Air-to-Surface and Air-to-Air radar modes. R3 S/W RTF and IOC 10/94.
- (U) ($5,295) Commence development of common configurations integrated night attack/radar software (C1).
- (U) ($3,846) Commmence integration validation/verification and ground and flight testing of integrated night attack/radar software (C1) in USMC radar aircraft.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV Patuxent River MD:NAVAIRWARCENWPNDIV China Lake CA; NAVAIRWARCENACDIV Trenton, NJ; NAVAIRWARCENACDIV Indianapolis IN; NADEP Cherry Point NC; NATSF Philadelphia PA. CONTRACTORS: McDonnell Douglas Corporation, Saint Louis, MO; Rolls Royce PLC, Bristol, United Kingdom; Hughes Aircraft Company, Los Angeles, CA.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604214N
PROGRAM ELEMENT TITLE: AV-8B Aircraft (Engineering)
PROJECT NUMBER: M0652
BUDGET ACTIVITY: 5
Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: The Missile Approach Warning System (MAWS) has been restructured, delayed and moved to PE 0604270N. The MAWS requirement (Air Force Lead) has been incorporated into the IDECM program under PE 0604270N to ensure commonality between all three services' TACAIR aircraft (AV-8B, A-10, F-14, F-15, F-16, and F/A-18).

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) OR AV-8B 10/75; NIGHT ATTACK 10/84; RADAR 8/88
- (U) DCP 160 REV 1/87; PMP (RADAR) 7/90;
- (U) TEMP AV-8B REV 7/91; RADAR 8/92.

G. (U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) APN Line 2 AV-8B RADAR	24,802								
• (U) APN Line 1 REMAN		144,134	145,744	256,388	377,238	368,717	486,423	CONT.	CONT.
QTY	0	4	4	7	12	13	18		
• (U) APN 5 Line 21	13,734	22,797	22,915	19,054	25,128	41,615	59,012	CONT.	CONT.
• (U) APN 6 Line Spares	256	5,202	4,150	17,719	10,142	18,861	10,217	CONT.	CONT.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604214N
PROGRAM ELEMENT TITLE: AV-8B Aircraft (Engineering)
PROJECT NUMBER: H0652
BUDGET ACTIVITY: 5
Date: 7 February 1994

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

- (U) A Memorandum of Understanding (MOU) between the Governments of the United States (USG) and the United Kingdom (UKG) entitled the "AV-8B/GR5 Agreement" was signed in 1981. Under the Agreement the USG and UKG fund their own program and share in the cost of changes common to AV-8B/GR5 aircraft. USG procures AV-8B aircraft from McDonnell Douglas Aerospace who subcontracts the aft fuselage from British Aerospace. The UKG procures its GR5 aircraft from British Aerospace who subcontracts the forward fuselage and wing from McDonnell Douglas Aerospace. In July 1987 a supplement to the MOU was signed detailing AV-8B Night Attack cooperative development. In November 1988 a supplement to the MOU was signed covering joint development of a 100% LERX.

- (U) A MOU with the Government of Spain (GOS) and the Government of Italy (GOI) for the integration and test of the AN/APG-65 radar in the AV-8B aircraft was signed in September 1990. A second MOU governing production, remanufacturing and in-service support was signed in December 1992.

J. (U) TEST AND EVALUATION:

	RELEASE TO FLEET
• (U) R1 S/W	12/93
• (U) R2 S/W	04/94
• (U) R3 S/W	10/94
• (U) C1 S/W	10/95
• (U) C2 S/W	10/98

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604215N
PROGRAM ELEMENT TITLE: Standards Development
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1857 Calibration Standards	3,688	3,340	4,585	4,021	4,120	4,214	4,324	CONT.	CONT.
W0572 Joint Services/Navy Standard Avionics Components and Subsystems	7,866	10,026	11,402	12,266	23,976	25,791	31,351	CONT.	CONT.
TOTAL	11,554	13,366	15,987	16,287	28,096	30,005	35,675	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: Project W0572, Joint Service/Navy Standard Avionics Components and Subsystems: This project addresses the proliferation in Naval Aviation of unique avionics equipment that increases with each new or modified aircraft. This proliferation of unique Contractor Furnished Equipment (CFE), due to non-availability of off-the-shelf Government Furnished Equipment (GFE), has resulted in a growing cost burden in the areas of development, procurement, logistics, and maintenance. This project addresses the issue by developing common avionics for new programs and retrofit programs, if applicable. All acquisition approaches are followed for the least-cost solution to this need, including joint programs, GFE breakout of peculiar items for broad use, foreign and non-development item investigations (funded under those headings when appropriate) and, when practicable and cost effective, dedicated development efforts. These products have application to new architecture "integrated avionics" aircraft, and also older technology "black box" or federated aircraft with major new efforts directed at bridging the gap between these technologies. This forward and retrofit application of common avionics technology is required to maximize aircraft capabilities at a minimum procurement and support cost. The program will specifically address in-service-out-of-production avionics with costly reliability and maintainability deficiencies and includes planning for the development of components/subsystems which have high reliability, are easily maintained and have low life cycle costs. An example of a past successful task under this project is the Standard Central Air Data Computer (SCADC) jointly developed with the Air Force and now in production as a common system on Navy and Air Force aircraft. Using an integrated common module approach, the reliability of SCADC is 10 to 50 times greater than the 13 types of air data computers it replaced. This project unit also funds Navy participation and activities involving the Joint Service Review Committee (JSRC) for Avionics Standardization.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604215N
PROGRAM ELEMENT TITLE: Standards Development
BUDGET ACTIVITY: 5

DATE: 7 February 1994

(U) Project S1857, Calibration Standards: This project is a Navy-wide program to develop required field level calibration standards (hardware) in all major measurement technology areas. It funds Navy lead-service responsibilities in the DOD metrology RDT&E program.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604215N
PROGRAM ELEMENT TITLE: Standards Development
PROJECT NUMBER: S1857
BUDGET ACTIVITY: 5
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: S1857, Calibration Standards. This project provides the engineering development of measurement reference/calibration standards (hardware) required to ensure measurement accuracy in support/maintenance of new advanced technology weapon systems and associated support equipment. These individual tasks have been assigned to the Navy as lead service responsibilities as part of a Joint Service/DoD program.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($407) Completed development of 5 standards. (2 standards started and completed in FY 93)
- (U) ($1,423) Continued development of 3 Electro-Optical and 2 Physical/Mechanical standards.
- (U) ($1,858) Started development of 7 Physical/Mechanical, 6 Electro-Optical, and 3 Electronic/Electrical standards.

(U) FY 1994 PLAN:

- (U) ($1,824) Complete development of 14 standards.
- (U) ($1,076) Continue development of 4 Physical/Mechanical and 2 Electro-Optical standards.
- (U) ($440) Start development of 1 Microwave/Millimeter wave and 2 Electro-Optical standards.

(U) FY 1995 PLAN:

- (U) ($1,441) Complete development of 9 standards.
- (U) ($543) Continue development of 1 Microwave/Millimeter wave and 1 Electro-Optical standards.
- (U) ($2,601) Start development of 5 Physical/Mechanical, 3 Electro-Optical, 2 Microwave/Millimeter wave, and 2 Electronic/Electrical standards.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604215N
PROGRAM ELEMENT TITLE: Standards Development
PROJECT NUMBER: S1857
BUDGET ACTIVITY: 5
DATE: 7 February 1994

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

(U) WORK PERFORMED BY: IN-HOUSE: Naval Warfare Assessment Center, Corona, CA; NSWC Carderock Division Detachment, Annapolis, MD; Navy Primary Standards Laboratory, San Diego, CA; Naval Research Laboratory, Washington, DC. OTHER GOVERNMENT: National Institute of Standards and Technology, Washington, DC.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604215N
PROGRAM ELEMENT TITLE: Standards Development
PROJECT NUMBER: W0572
BUDGET ACTIVITY: 5
DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0572 Joint Services/Navy Standard Avionics Components and Subsystems	7,866	10,026	11,402	12,266	23,976	25,791	31,351	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Joint Service/Navy Standard Avionics Components and Subsystems project provides for the identification, design, development, test, evaluation and qualification of standard avionics for Navy use and wherever practicable use across all services. Standard avionics systems include the Standard Attitude Heading and Reference System (SAHRS), Ground Proximity Warning Systems (GPWS) for Tactical Aircraft (TACAIR) and Helicopters (HELO), a joint service program development with the Air Force; Compass/Attitude Heading Reference System (C/AHRS), a joint service Solid State Barometric Altimeter (SSBA), and Low Probability of Intercept (LPI) Altimeter. Future user needs analysis, including joint service requirements, will continue. Standard avionics systems are procured and installed on many aircraft, including F/A-18, F-14, EA-6B, AV-8B, E-2C, P-3, T-45, CH-46, C/MH-53, SH-60B/F, HH-60, SH-3, UH-1N, S-3 and KC-130.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,714) Completed GPWS TACAIR software testing by simulator and flight tests.
- (U) ($2,967) Continued Engineering & Manufacturing Development (E&MD) design and development testing for C/AHRS.
- (U) ($2,356) Awarded GPWS HELO E&MD contract.
- (U) ($15) Completed E&MD development for SAHRS.
- (U) ($814) Performed Common systems planning, risk assessment and evaluation. Participated in Joint Service Review Committee (JSRC) for tri-service coordination to promote commonality and joint programs.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604215N
PROGRAM ELEMENT TITLE: Standards Development
PROJECT NUMBER: W0572
BUDGET ACTIVITY: 5
DATE: 7 February 1994

2. (U) FY 1994 PLAN:

- (U) ($2,931) Continue qualification testing for C/AHRS.
- (U) ($3,657) Continue E&MD development of GPWS HELO.
- (U) ($1,605) Complete GPWS TACAIR algorithm development; transition capability to aircraft platforms.
- (U) ($1,008) Conduct risk assessment for LPI Altimeter.
- (U) ($100) Complete integration and testing of SSBA.
- (U) ($725) Participate in JSRC tri-service coordination to promote commonality and joint programs.

3. (U) FY 1995 PLAN:

- (U) ($3,183) Complete Technical Evaluation (TECHEVAL) and commence Operational Evaluation (OPEVAL) for C/AHRS.
- (U) ($2,277) Commence TECHEVAL of GPWS HELO in the CH-53E.
- (U) ($4,115) Award E&MD development contract for LPI Altimeter.
- (U) ($852) Plan GPWS TACAIR algorithm integration into multiple platforms.
- (U) ($975) Participate in JSRC tri-service coordination to promote commonality and joint programs.

4. (U) PROGRAM TO COMPLETION: This is a continuing program. POM-94 resulted in a plus-up for Common Tactical Mission Recorder beginning in FY-97.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA, Patuxent River, MD, and Indianapolis, IN.
CONTRACTOR: C/AHRS: Smiths Industries, Grand Rapids, MI; GPWS HELO: Cubic Corporation, San Diego, CA; LPI Altimeter; TBD.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604215N
PROGRAM ELEMENT TITLE: Standards Development
PROJECT NUMBER: W0572
BUDGET ACTIVITY: 5
DATE: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

PROGRAM	MNS	OR/ORD	AP	TEMP
GPWS TACAIR		01/87	N/A	N/A
GPWS HELO		01/87	07/92	06/93
SAHRS		N/A	07/89	03/91
C/AHRS		01/86	01/91	06/91
LPI Altimeter	12/92	DRAFT	DRAFT	

G. (U) RELATED ACTIVITIES: A tri-service formal charter exists to promote joint development of standard avionics components and subsystems through the JSRC on Avionics Standardization. Separate JSRC memorandums of agreement have been established for the SAHRS, GPWS, C/AHRS; Air Force PE 0604201F, Common Avionics, and SSBA; Air Force PE 0708026F, Producibility, Reliability, Availability and Maintainability.

H. (U) OTHER APPROPRIATION FUNDS: Details not available but application airframe appropriations that will use these systems include: F/A-18, F-14, EA-6B, AV-8B, E-2C, P-3, T-45, CH-46, C/MH-53, SH-60B/F, HH-60, SH-3, UH-1N, S-3 and KC-130.

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

J. (U) MILESTONE SCHEDULE:

PROGRAM	CONTRACT AWARD	CDR	DT	OT
GPWS HELO	93/4Q	94/2Q	95/2Q	96/1Q
SAHRS	85/2Q	86/3Q	N/A	N/A
C/AHRS	91/3Q	93/4Q	95/4Q	96/3Q
LPI Altimeter	95/1Q	96/3Q	97/4Q	98/2Q

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604217N
PROGRAM ELEMENT TITLE: S-3 Weapon System Improvement (WSIP)

PROJECT NUMBER: H0489
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

PROJECT TITLE	FY 1992 AND PRIOR	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
H0489 S-3 WSIP	252,663	1,094	4,087	14,115	16,128	5,619	4,324	4,529	9,300	311,859

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The current program provides FY 1993 continuation of a series of progressive modular improvements which began with the S-3 Weapon System Improvement Program (WSIP) Phase I (S-3A modified to S-3B configuration). Based upon the S-3 WSIP Operational Requirements Document, the full program achieves the required multi-mission operational capability through time-phased, selective mission avionics/processing upgrades that are pursued in priority order. Initial Nunn-funded development focused on the Co-Processor Memory Unit (CPMU) hardware, a joint U.S./Canadian industrial base development program which provides the core processing capability and open architecture required for future modular S-3B modification. This program will complete CPMU integration and test and rewrite existing Tactical Mission Program (TMP) code into Ada high order language.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,054) Designed, developed, and produced Advanced Development Models (ADM) of the CPMU hardware. Commenced software development and initiated contractor checkout of ADM/software combination. Hardware Program Design Review and software Critical Design Review complete.
- (U) ($40) Developed systems engineering plan for Air Deployed Active Receiver hardware and software integration.

2. (U) FY 1994 PLAN:

- (U) ($854) Continue translation of existing AN/AYK-10 CMS-2 software code for CPMU compatibility.
- (U) ($1,541) Commence TMP Ada software development.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604217N
PROGRAM ELEMENT TITLE: S-3 Weapon System Improvement (WSIP)

PROJECT NUMBER: H0489
BUDGET ACTIVITY: 5

Date: 7 February 1994

- (U) ($1,692) Continue CPMU hardware and software development and integration.

3. (U) FY 1995 PLAN:

- (U) ($1,703) Perform initial CPMU developmental testing.
- (U) ($9,626) Continuation of Ada software development for the CPMU.
- (U) ($2,786) Continue hardware and software development and integration.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA and Patuxent River, MD. CONTRACTORS: Lockheed Aeronautical Systems Company, Marietta, GA; Paramax, St. Paul, MN; Paramax, Winnipeg, Canada; Canadian Commercial Corporation, Ottawa, Canada and competitively selected contractors.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: S-3 Weapon System Improvement Program (WSIP) OR-927-AS of 27 Mar 1977.

G. (U) RELATED ACTIVITIES:

- (U) PE 0604261N - ADAR/Low Frequency Active (LFA)
- (U) PE 0603790D (Nunn funds) - CPMU (previously Mass Memory Unit)

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604217N
PROGRAM ELEMENT TITLE: S-3 Weapon System Improvement (WSIP)

PROJECT NUMBER: H0489
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) APN Line Item 054100 (S-3 Modification)	0	0	0	5,250	13,874	26,172	19,085	18,463	82,844

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Project Agreement (PA) between U.S. Navy/Canadian Department of Industry, Science and Technology for development of CPMU, signed 2 Jun 1991. Total R&D funding: Canadian, $4.3M (U.S. $); OSD, $4.0M, Navy, $3.5M. Development contract signed with Paramax, St. Paul, MN on 20 Nov 1991; with Paramax, Winnipeg, Canada, on 20 Dec 1991. This is a Canadian prime/U.S. subcontractor relationsnip in accordance with the PA.

J. (U) MILESTONE SCHEDULE:

- (U) CPMU (ACAT IVT) Low Rate Initial Production (LRIP) decision, MS-IIA, in 4th QTR 95.
- (U) CPMU (ACAT IVT) MS-III 1st QTR 98.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604218N
PROGRAM ELEMENT TITLE: Air/Ocean Equipment Engineering
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0532 FLEET AIR OCEAN EQUIPMENT	2,788	2,543	2,151	2,721	2,861	2,977	4,079	CONT.	CONT.
R1740 AIR/OCEAN SURVEY ENGINEERING	1,151	1,169	1,249	1,276	1,343	1,395	1,431	CONT.	CONT.
X1752 TACTICAL ENVIRONMENTAL SUPPORT SYSTEM - TESS (ENG)	2,149	1,205	2,397	2,446	2,585	2,522	2,763	CONT.	CONT.
TOTAL	6,088	4,917	5,797	6,443	6,789	6,894	8,273	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Program Element (PE) provides for the engineering development of sensors, communication interfaces, and processing and display equipment to measure, ingest, store, distribute and display atmospheric and oceanographic parameters essential to the optimum employment of Naval warfare systems. The PE also develops upgrades and improvements to the shipboard and shore based Tactical Environmental Support System - TESS(3). Engineering development of oceanographic survey sensors is also performed under this PE.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604218N
PROGRAM ELEMENT TITLE: Air/Ocean Equipment Engineering

PROJECT NUMBER: X0532
BUDGET ACTIVITY: 5

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT·

(U) PROJECT NUMBER AND TITLE: X0532, Fleet Air Ocean Equipment. This project provides for the engineering development of sensors communication interfaces, and processing and display equipment to measure, ingest, store, distribute and display atmospheric and oceanographic parameters. Major emphasis areas include the Navy Intgrated Tactical Environment Subsystem (NITES), Automated Surface Observing System (ASOS), the Marine Corps Meteorological Mobile Facility (METMF), the AN/SMQ-11 satellite receiver/recorder and other satellite ground equipment, weather radars and the engineering development of new sensors such as active and passive atmospheric profilers for incorporation into the Shipboard Meteorological and Oceanographic Observing System (SMOOS).

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,203) Continued engineering development of the NITES workstation to comply with the Joint Maritime Command Information System (JMCIS).
- (U) ($606) Completed engineering development of the Synthetic Aperture Radar tactical workstation.
- (U) ($979) Continued engineering development of ASOS to incorporate Navy-unique requirements; continued engineering development of METMF and AN/SMQ-11.

(U) FY 1994 PLAN:

- (U) ($1,173) Continue engineering development of NITES to comply with the JMCIS.
- (U) ($870) Continue engineering development of ASOS to incorporate Navy-unique requirements; continue engineering development of METMF and AN/SMQ-11.
- (U) ($500) Begin engineering development of Light Detection and Ranging (LIDAR) atmospheric profiler to incorporate latest laser and optics technologies.

(U) FY 1995 PLAN:

- (U) ($464) Complete engineering development of NITES to comply with the JMCIS.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604218N
PROGRAM ELEMENT TITLE: Air/Ocean Equipment Engineering

PROJECT NUMBER: X0532
BUDGET ACTIVITY: 5

DATE: 7 February 1994

- (U) ($687) Complete engineering development of ASOS to incorporate Navy-unique requirements; continue engineering development of METMF and AN/SMQ-11.
- (U) ($1,000) Continue engineering development of LIDAR atmospheric profiler to incorporate latest laser and optics technologies.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NISE West, Vallejo, CA; NAWCAD, Indianapolis, IN. CONTRACTORS: ARL/PSU, State College, PA.

(U) RELATED ACTIVITIES:

- (U) PE 0603207N, Air/Ocean Tactical Applications.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 4226	10,941	6,851	14,667	10,976	9,574	11,559	10,894	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604218N
PROGRAM ELEMENT TITLE: Air/Ocean Equipment Engineering
PROJECT NUMBER: R1740
BUDGET ACTIVITY: 5
Date: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND PROJECT TITLE: R1740, Air/Ocean Survey Engineering. The project provides engineering development for fleet transition of promising 6.3 sponsored projects of highly specialized ultra-high resolution instrumentation systems and measurement techniques in support of CNO endorsed requirements. The objectives are to ruggedize and package systems, sensors and instruments to survive the harsh and demanding requirements of fleet operational use. Engineering is accomplished in the Research, Development Test and Evaluation (RDT&E) phase to meet requirements for 1) air and safety certification for deployment from fleet aircraft or ships, and 2) proper data formats for integration into existing or planned communications and displays. The end products are ruggedized sensors and systems that will 1) provide the military near real time, in-situ Environmental assessment capability in littoral regions, 2) field a capability to provide the regional commander with continuous environmental data for operational use, and 3) provide baseline data for predictive models in areas of potential interest. Real Time Environmental Data is needed because climatological forecasting does not work in the littoral. The majc. challenges include instrumentation for collection and dissemination of data in highly variable meteorological and oceanographic conditions under stressful environmental situations in denied or inaccessible areas over relatively long periods of time.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($200) Continued Wind Observation through Ambient Noise (WOTAN) acoustic sensing wind speed/direction development and testing on mini drifting data buoys (MDDBs).
- (U) ($500) Completed testing of Ambient Noise Sensor (ANS) design of a 300M Temperature Tail (TZ) for the MDDBs.
- (U) ($200) Completed testing of ice penetration package in Arctic Oceanographic Buoy (AOB).
- (U) ($251) Initiate Compact Meteorological and Oceanographic Drifter (CMOD) with combined TZ/ANS sensor suite (CMOD/TZ/ANS) for MDDB.

(U) FY 1994 PLAN:

- (U) ($837) Complete testing of CMOD/TZ/ANS MDDB.
- (U) ($82) Initiate 6.4 transition of expendable optical probe from PE 06032[illegible].

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604218N
PROGRAM ELEMENT TITLE: Air/Ocean Survey Engineering
PROJECT NUMBER: R1740
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($250) Initiate 6.4 transition of drifting buoy display software/PC card development for local user terminal upgrades.

(U) FY 1995 PLAN:

- (U) ($800) Complete development of combined 300 meter thermistor chain/ambient noise sensors for AN/WSQ-6 buoys (NAVY designator for MDDB), transition buoys to NAVAIR PMA 264 for OT&E.
- (U) ($229) Transition from 6.3 development of new wind speed/direction sensor for AN/WSQ-6 buoy prototype.
- (U) ($220) Initiate 6.4 development of wave sensor package for AN/WSQ-6 buoys.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL-SSC, Stennis Space Center, MS; NAVAIRWARCEN ACDIV, Indianapolis, NAVSURFWARDEVCEN, Crane, IN. CONTRACTORS: METOCEAN Data Systems Ltd, Dartmouth, Nova Scotia, Canada. Sparton of Canada, London, Ontario, Canada.

(U) RELATED ACTIVITIES: PE 0602435N, Ocean and Atmospheric Technology; PE 0603207N/R0118, Air/Ocean Tactical Applications, Ocean Measurement Sensors.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: $2.0M U.S./Canadian Defense Development Sharing Program (DDSP) Agreement for joint development of ice penetrator (AOB). $2.8M U.S./Canadian DDSP for development of Mini Drifting Data Buoy, signed May 91. Cost sharing 50% by Canada.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604218N
PROGRAM ELEMENT TITLE: Air/Ocean Equipment Engineering

PROJECT NUMBER: X1752
BUDGET ACTIVITY: 5

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X1752, Tactical Environmental Support System - TESS (ENG). This project develops improvements to the Navy's computer-based tactical shipboard and shore capability used to predict and assess the impact of the atmospheric and oceanographic environment on the performance of platforms, weapons and sensor systems. Pre-Planned Product Improvement (P3I) provides for the testing of newly developed application software to meet the evolutionary requirements of the fleet and also enable TESS to maintain compatibility with common software standards and operating environments.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($582) Continued NRL Lead Laboratory tasks of software integration, assisting model developers and providing technical assistance to other activities.
- (U) ($685) Continued integration of Phase I software upgrade to include complete TESS 2.3 functionality in TESS(3).
- (U) ($882) Continued software Pre-Planned Product Improvement (P3I); began hardware P3I and engineering development of interim TESS(3) remote workstation.

(U) FY 1994 PLAN:

- (U) ($368) Continue NRL Lead Laboratory tasks of software integration, assisting model developers and providing technical assistance to other activities.
- (U) ($324) Complete Phase I software upgrade integration. Begin integration of Phase II software upgrade in accordance with the TESS(3) Software Integration Plan (SIP).
- (U) ($188) Continue software and hardware P3I; complete engineering development of interim TESS(3) remote workstation.
- (U) ($325) Begin software upgrades with X-Windows implementation in interim remote workstation to upgrade system capabilites and improve Human Machine Interface.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604218N
PROGRAM ELEMENT TITLE: Air/Ocean Equipment Engineering

PROJECT NUMBER: X1752
BUDGET ACTIVITY: 5

DATE. 7 February 1994

(U) FY 1995 PLAN:

- (U) ($631) Continue NRL Lead Laboratory tasks of software integration, assisting model developers and providing technical assistance to other activities.
- (U) ($808) Complete Phase II software upgrade integration. Begin integration of Phase III software upgrade in accordance with the TESS(3) Software Integration Plan (SIP).
- (U) ($708) Continue software P3I; begin engineering development of next generation TESS(3) hardware suite.
- (U) ($250) Complete X-Windows implementation.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NISE West, Vallejo, CA. CONTRACTOR: Lockheed, Austin, TX.

(U) RELATED ACTIVITIES:

- (U) PE 0603207N, Air Ocean Tactical Applications - provides atmospheric and oceanographic computer models used to generate data in support of Navy Command and Control, Data Base Management Systems and satellite data processing software.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 4226	13,000	2,738	3,083	8,844	7,350	3,591	4,240	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604221N
PROGRAM ELEMENT TITLE: P-3 Modernization Program
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
H1152 P-3 Sensor Integration	7,748	4,952	5,392	7,436	7,921	8,114	8,410	CONT.	CONT.
H1588 P-3 UPDATE IV Avionics	5,277	0	0	0	0	0	0	0	508,727
TOTAL	13,025	4,952	5,392	7,436	7,921	8,114	8,410	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program provides upgrades to the P-3C's aircraft systems to enhance its surface and subsurface tracking, classification, and attack capability. The P-3C Sensor Integration (H1152) Project develops improved acoustic software to process more advanced active and passive sonobuoys and increase the operational capability of the P-3C UPDATE III Acoustic System by the addition of advanced algorithms.

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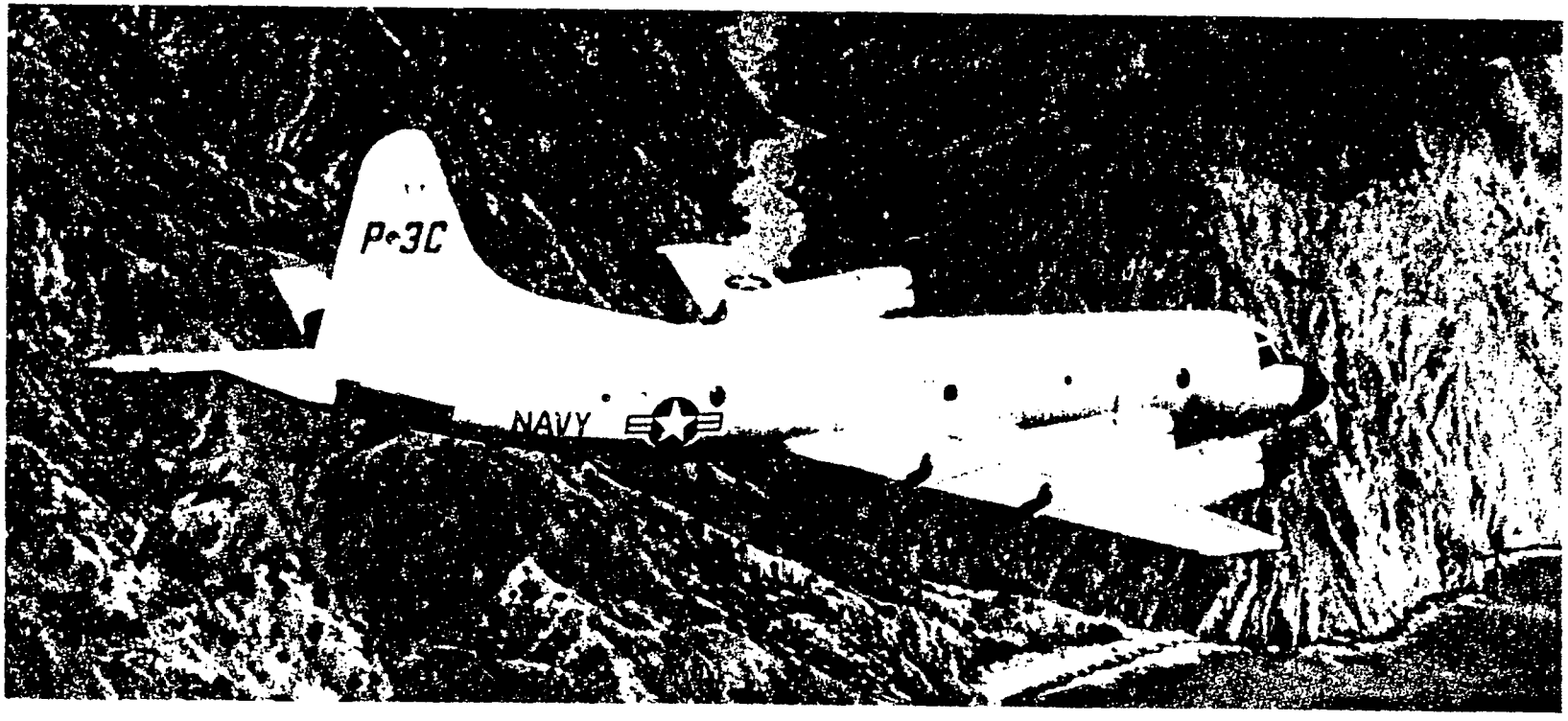
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604221N
PROGRAM ELEMENT TITLE: P-3 Modernization Program

PROJECT NUMBER: H1152
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: P-3 Sensor Integration



POPULAR NAME: P-3 SENSOR INTEGRATION

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604221N
PROGRAM ELEMENT TITLE: P-3 Modernization Program
PROJECT NUMBER: H1152
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
ENGINEERING MILESTONES	TMS/Broadband A4.8/C4.8 CDR 4/93			A4.9/C4.9(ADAR) CDR 6/96		SWALAS CDR 6/98		
T&E MILESTONES			A4.8/C4.8 DT III 8/95	A4.8/C4.8 OT III 4/96			A4.9/C4.9(ADAR) DT III 1/99 OT III 6/99	
CONTRACT MILESTONES		OMNI RFP 10/93	OMNI AWD 11/94					

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	4,203	3,301	2,809	4,082	4,926	5,051	5,235	CONT.
SUPPORT CONTRACT	0	0	0	0	0	0	0	CONT.
IN-HOUSE SUPPORT	3,545	1,651	1,733	2,054	2,545	2,613	2,725	CONT.
GFE/ OTHER	0	0	850	1,300	450	450	450	CONT.
TOTAL	7,748	4,952	5,392	7,436	7,921	8,114	8,410	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Primarily a software upgrade, this project will increase the operational capability of the P-3C UPDATE III Acoustic System by integrating the current hardware/software configuration with advanced sonobuoys and detection algorithms.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($3,874) Completed Critical Design Review for Tactical Mission Software (TMS) (software version A4.8).

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604221N
PROGRAM ELEMENT TITLE: P-3 Modernization Program
PROJECT NUMBER: H1152
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($3,874) Completed Critical Design Review for incorporation of Broadband (software version C4.8) processing.

2. (U) FY 1994 PLAN:

- (U) ($1,951) Commence coding and debugging of TMS (software version A4.8).
- (U) ($1,951) Commence coding and debugging of Broadband (software version C4.8) capability.
- (U) ($1,050) Exercise final option for OMNIBUS contract for systems engineering support.
- (U) (0) Release RFP to compete OMNIBUS contract.

3. (U) FY 1995 PLAN:

- (U) ($4,342) Conduct Developmental Testing of TMS/Broadband (software version A4.8/C4.8).
- (U) ($1,050) Award OMNIBUS contract for systems engineering support.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA; NAVAIRWARCENACDIV, Patuxent River, MD. CONTRACTORS: IBM, Manassas, VA; Computer Sciences Corporation, Warminster, PA; Pacer, Bedford, MA; PARAMAX, St. Paul, MN; RBC, Incorporated, Arlington, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604221N
PROGRAM ELEMENT TITLE: P-3 Modernization Program
PROJECT NUMBER: H1152
BUDGET ACTIVITY: 5
Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:

- (U) TEMP 4/93
- (U) NDCP 6/81

G. (U) RELATED ACTIVITIES:

- (U) Program Element 0603254N, Shallow Water ASW Localization and Attack System.
- (U) Program Element 0604261N, Acoustic Search Sensors developing software and acoustic algorithms.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) (OSIP 80-94) APN-5	6,955	17,661	6,090	0	0	0	0	0	98,391

* Funds applicable only to CP-2044 Computer Systems.

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

J. (U) TEST AND EVALUATION:

- (U) TMS/Broadband (A4.8/C4.8) DT III - 8/95
- (U) TMS/Broadband (A4.8/C4.8) OT III - 4/96
- (U) TMS/Broadband (A4.9/C4.9) DT III (ADAR) - 1/99
- (U) TMS/Broadband (A4.9/C4.9) OT III (ADAR) - 6/99

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0486 ASW Operations Center	5,487	4,290	4,538	4,393	4,657	3,290	2,473	CONT.	CONT.
X0709 NCCS (TFCC)	6,866	7,458	11,798	12,277	8,175	8,133	8,183	CONT.	CONT.
X2009 OBU/OSG	2,621	2,142	2,743	2,679	2,099	2,217	2,293	CONT.	CONT.
X2041 Operations Support System (OSS)	8,217	11,219	11,718	9,570	8,220	8,994	8,430	CONT.	CONT.
X0521 * Shipboard Tactical Intelligence Processing (STIP)	*2,367	4,720	4,999	6,198	6,195	6,383	6,620	CONT.	CONT.
TOTAL	25,558	29,829	35,796	35,117	29,346	29,017	27,999	CONT.	CONT.

*Transferred from PE 0205670N after FY 93

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program develops and upgrades the Navy's Command and Control (C2) information management systems supporting commanders afloat and ashore. Included among these C2 systems are: the unified command centers of CINCPAC and CINCLANT, the Navy Command Center, the Fleet command centers of CINCLANTFLT, CINCPACFLT, and CINCUSNAVEUR, the Submarine Operating Authority (SUBOPAUTH) command center, the command centers supporting the Ashore Sector Commander, the Fleet Ocean Surveillance Information Centers (FOSICS) and Fleet Ocean Surveillance Information Facilities (FOSIFS), Tactical Flag Command Centers (TFCC) afloat and the command and control suites of various combatant ship classes. The TFCC and ship command and control suites are now consolidated in the Navy Tactical Command System - Afloat (NTCS-A) program. All these projects develop information processing and display systems for afloat and ashore commanders providing decision makers the ability to make rapid, informed tactical decisions. TCS develops systems which fuse tactical data between shipboard organic sensors and ashore and space-based non-organic sensors. TCS includes total system definitization to include each of the major afloat and ashore command centers and the integration of warfare systems within them. The functions provided by TCS are consistent with the Navy's Over-The-Horizon Detection, Classification, and Targeting Architecture.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

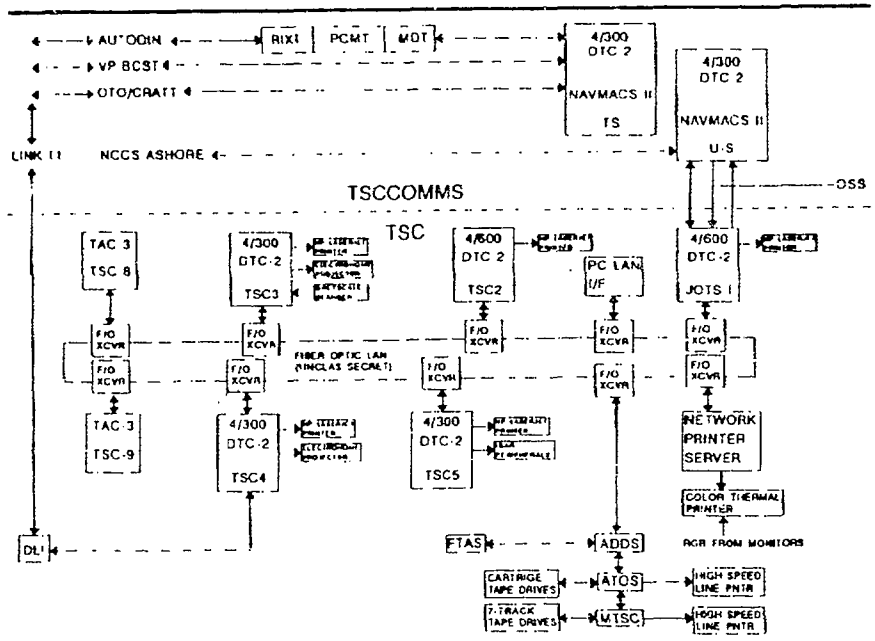
PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System

PROJECT NUMBER: X0486
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: ASW Operations Center

TSC MODERNIZATION 1.0 ARCHITECTURE



POPULAR NAME: Tactical Support Centers (TSC)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System

PROJECT NUMBER: X0486
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES			M/S IIIA	Q1	M/S IIIB	Q3		CONT.
ENGINEERING MILESTONES		Q1 ORE	Q1 MOCC ORE	Q2 TMS 2.0 CDR	Q3 REL 2.0			CONT.
T&E MILESTONES		Q3 DTIIA Q4 OTIIA	Q3 MOCC OT IIA	Q4 DT IIB	Q3 OT IIB			CONT.
CONTRACT MILESTONES								CONT.

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	3,851	3,123	3,426	3,280	3,549	2,249	1,517	CONT.
SUPPORT CONTRACT	716	733	750	762	752	741	701	CONT.
IN-HOUSE SUPPORT	920	434	362	351	356	300	255	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	CONT.
TOTAL	5,487	4,290	4,538	4,393	4,657	3,290	2,473	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: ASN Operations Centers. The Tactical Support Centers are nodes of the Navy Command and Control System (NCCS) Ashore, with fixed sites and mobile components (Mobile-Miniature Operations Control Center (MOCCs)) provide the Maritime Sector Commander (Ashore) with the capability to plan, direct and control the tactical operations of joint and Naval Expeditionary Forces and other assigned units within his respective area of responsibility. These operations include littoral and open ocean surveillance, anti-surface warfare, over-the-horizon targeting, counter-drug operations, power projection, antisubmarine warfare, mining, search and rescue, and

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System
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special operations. TSCs consist of C'I systems (based on the Joint Maritime Command Information System (JMCIS) common architecture); air-ground, satellite and point-to-point communications systems; sensor analysis capabilities; avionics and weapons system interfaces and facilities equipment. MOCC is a rapidly-deployable, self-contained, take-what-you-need C'I system which can be transported in two fleet-configured P-3 aircraft for contingency operations. The ongoing TSC C' Modernization (TSM) Program will: support expeditionary warfare requirements; replace a centralized computer system with Navy-standard desktop computers and a distributed data base on a local area network to provide a fused, all-source tactical data display with detailed source data and relevent tactical decision/planning aids; provide ELINT, imagery and ACINT sensor analysis capabilities; automate communications functions/interfaces and facilitate rapid data exchange with key Navy, joint, other service and allied forces ashore, afloat and airborne; and develop automated interfaces to evolving tactical weapons/sensor/ avionics systems and additional USN/USAF/allied aircraft. This program assures the existing TSC system remains interoperable with updated aircraft, sensors and weapons systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($330) Completed installation of Tactical Support Modernization Systems (TMS) release i.0.4 and Inverse Synthetic Aperture Radar (ISAR) workstations at designated TSCs.
- (U) ($200) Developed common Joint Maritime Command Information System (JMCIS) software (formerly described as JOTS/GOTSS) in conjunction with other programs.
- (U) ($1,028) Developed Pre-flight Insertion Data (PID)(P3/S3), Aircrew Briefing, Mission Monitoring, Generic Mission Replay (P3/S3) and System Management/Administration software.
- (U) ($730) Captured data server updates and data base administration software, and integrated these with TMS data bases.
- (U) ($700) Continued development of common Navy Modular Automated Communications System (NAVMACS) message handling software in conjunction with other programs to include AUTODIN/LDMS, Covered Radio Teletype, SATCOM interfaces.
- (U) ($377) Continued development/integration of Link 11 software.

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PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System
PROJECT NUMBER: X0486
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($1,800) Completed system integration, testing, documentation, training for Objective I (Incremental Fleet Release i.0.5) to improve TSC C^2 capabilities: by integrating system components on a local area network; by supporting P-3/S-3 aircraft in terms of mission planning and PID, tactical mission replay and reduction/validation; and by improving communications support and message handling.
- (U) ($135) Conducted automated data processing security testing.
- (U) ($97) Began Defense Message System (DMS) Component Approval Process (CAP) and functional testing.
- (U) ($90) Conducted USMTF pre-certification interoperability testing.

2. (U) FY 1994 PLAN:

- (U) ($25) Continue USMTF pre-certification interoperability testing.
- (U) ($196) Complete DTIIA and update the TMS at TSC Brunswick to an operational test configuration.
- (U) ($1,111) Integrate TMS 1.0 at all TSC sites with site-specific communications interfaces.
- (U) ($241) Integrate selected TMS 1.0 software components into a modular configuration which can be used to support TSC forward basing requirements.
- (U) ($29) Conduct FOT&E of TSC forward basing capabilities.
- (U) ($37) Complete the DMS CAP for AUTODIN interface.
- (U) ($45) Achieve interoperability certification for OTH-T/Gold and USMTF message processing.
- (U) ($110) Complete a systems requirements review and systems design review Objective II (TMS 2.0).
- (U) ($164) Develop common JMCIS software updates, in conjunction with other programs.
- (U) ($282) Capture/integrate data server updates and antisubmarine warfare tactical decision aids.

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PROGRAM ELEMENT: 0604231N
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- (U) ($266) Continue automation of message processing to support AUTODIN, air-to-ground, point-to-point and SATCOM connectivity.
- (U) ($324) Develop/integrate tactical planning, PID, aircrew brief and mission replay interfaces and interoperability updates for improved aircraft support.
- (U) ($246) Continue development of Sensor Analysis Stations (ISAR, ESM, Imagery).
- (U) ($139) Complete integration of tactical computer-based Link 11 software module and obtain certification on TAC-3.
- (U) ($1,014) Complete systems integration, testing, documentation of Incremental Release i.1.1 to provide: message processing updates, tactical decision aids updates, aircraft interface updates, integrated Link 11 capability, automation of PID and generic mission replay development as applications of the JMCIS Unified Build.
- (U) ($61) Complete OTIIA at TSC Brunswick leading to a Milestone IIIA (Q1 FY95) decision for Fleet Release of TMS 1.0 (i.0.5.x).

3. (U) FY 1995 PLAN:

- (U) ($362) Install Incremental Release i.1.1 at TSC sites (as part of Milestone IIIA decision).
- (U) ($201) Develop common JMCIS software updates, in conjunction with other programs.
- (U) ($789) Upgrade data server to: operate on a TAC-3; include additional USMTF, Link 11 message data, technical data (Electronic Warfare Support Measures (ESM), acoustic, NWTDB); begin using trusted computing base software.
- (U) ($244) Capture/integrate tactical decision aids updates.
- (U) ($376) Develop/integrate a TMS Local Area Network (LAN) interface to the Fast Time Analysis System (FTAS--acoustic processor) for improved post mission data analysis and reconstruction.
- (U) ($264) Start to develop/integrate an ESM Analysis Workstation.

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- (U) ($201) Start to develop/integrate Tactical Environmental Support System (TESS) interface.
- (U) ($114) Capture/integrate TADIXS B interface capability.
- (U) ($369) Continue development/integration of communications automation to include an integrated technical control capability.
- (U) ($1,618) Begin system integration, testing, documentation, training for Objective II (Incremental Fleet Release i.1.2) to incorporate updated mission planning, communication, and post mission analysis capabilities, as well as interoperability among post-mission analysis, aircrew brief, PID, and tactical planning modules.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NCCOSC ISE DIV, EAST DETS, Charleston, SC and St. Inigoes, MD; NCCOSC RDTE DIV, San Diego, CA; NAVELEXSYSCENs, Charleston, SC and Vallejo, CA; NAVAIRWARCENACDIV, Warminster, PA; NCTSI, San Diego, CA. CONTRACTORS: Potomac Systems Engineering, Inc., Annandale, VA; Inter-National Research Institute, Arlington, VA; Booz-Allen Hamilton, Bethesda, MD; Digital Systems Corp., Walkersville, MD; Planning Research Corporation, McLean, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not available for comparison.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System

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F. (U) PROGRAM DOCUMENTATION:

Operational Requirement #117-094-86 (ASWOC)	08/86
Operational Requirement #208-05-88 (MOCC)	03/88
ASW Master Plan	03/89
Program Change Approval Document	08/90
Decision Coordinating Paper (DCP)	10/90
Acquisition Plan (A/P) #90-15-1	06/91
ASWOC TEMP #911-2(Draft) (Rev 1)	04/93
Computer Resources Life Cycle Management Plan (CRLCMP) (Update)	05/93

G. (U) RELATED ACTIVITIES:

- (U) PE 0604261N: (Acoustic Search Sensors): TSC maintains interoperability with S-3 weapon systems and future improvements.
- (U) PE 0604221N: (P-3 Modernization): TSC maintains interoperability with, and fully supports P-3 system changes and enhancements.

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PROJECT NUMBER: X0486
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Date: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN LI 2246	18,750	6,628	3,346	8,469	10,752	7,948	8,872	CONT.	CONT.
• (U) OPN LI 2608 (Subset)	30,430	1,789	1,442	2,707	2,389	3,398	3,870	CONT.	CONT.
• (U) OMN AG/SAG 1C1C	5,952	7,856	7,037	7,540	8,589	9,609	1.,211	CONT.	CONT.
• (U) OMN AG/SAG 4B7N	5,715	5,621	4,077	5,278	4,792	4,931	4,860	CONT.	CONT.
• (U) MIL CON PROJ P-209	0	0	9,800	0	0	0	0	0	9,800

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

J. (U) TEST AND EVALUATION:

- (U) FY 1994 Q3: Install an Operational Test Configuration and conduct DTIIA for the TMS Objective I System (Software Release 1.0) at the first operational site.
- (U) FY 1994 Q4: Complete OTIIA to achieve a Milestone IIIA decision (FY95).
- (U) FY 1995 Q3: Conduct OT IIA for MOCC.
- (U) FY 1996 Q4: Install an Operational Test Configuration for TMS Objective II (Software Release 1.1.3) at the first operational site and conduct DTIIB.
- (U) FY 1997 Q3: Conduct OTIIB (OPEVAL) and achieve a Milestone IIIB decision.

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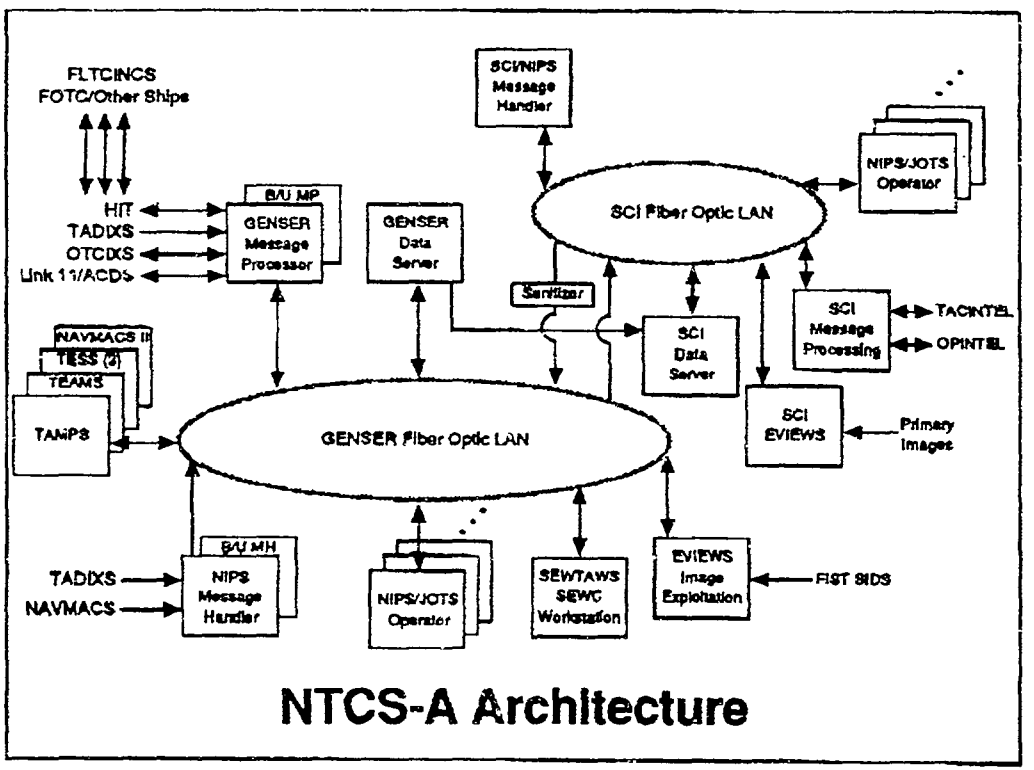
PROGRAM ELEMENT:0604231N
PROGRAM ELEMENT TITLE: Tactical Command System

PROJECT NUMBER: X0709
BUDGET ACTIVITY:'5

Date: 7 February 1994

PROJECT TITLE: NCCS (TFCC)



POPULAR NAME: NTCS-A

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT:0604231N
PROGRAM ELEMENT TITLE: Tactical Command System
PROJECT NUMBER: X0709
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES			MS-IIIC 10/94 MS-IIID 08/95		MS-IIIE 02/97	MS-IIIF 08/98		CONT.
ENGINEERING MILESTONES	SOFTWARE UPDATE	SOFTWARE UPDATE	SOFTWARE UPDATE	SOFTWARE UPDATE	SOFTWARE UPDATE	SOFTWARE UPDATE	SOFTWARE UPDATE	CONT.
T&E MILESTONES	DT-IIC OT-IIC	DT-IICa,C1 OT-IICa,C1	DT-IID OT-IID	DT-IID1,DE OT-IID1	DT-IIE1 OT-IIE,E1	DT-IIF OT-IIF	DT-IIF1,G OT-IIF1	CONT.
CONTRACT MILESTONES	AWARDED CONTRACT	EXERCISE OPTION	EXCERISE OPTION	EXERCISE OPTION	AWARD NEW CONTRACT	EXERCISE OPTION	EXERCISE OPTION	CONT.

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	5,416	4,921	7,486	8,006	6,177	6,284	6,319	CONT.
SUPPORT CONTRACT	298	772	971	1,301	497	494	498	CONT.
IN-HOUSE SUPPORT	969	1,665	3,234	2,860	1,383	1,238	1,240	CONT.
GFE/ OTHER	183	100	107	110	118	117	126	CONT.
TOTAL	6,866	7,458	11,798	12,277	8,175	8,133	8,183	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Navy Tactical Command System-Afloat (NTCS-A) program consolidates the formerly identified Tactical Flag Command Center (TFCC), Afloat Correlation Systems (ACS), Electronic Warfare Coordination Module (EWCM), Joint Operational Tactical System (JOTS), Prototype Ocean Surveillance Terminal (POST), and Naval Intelligence Processing System (NIPS) programs and provides a tactical command, control, communications, computers and intelligence (C4I) system to U.S. Navy Ships. NTCS-A provides the Tactical Flag Command Center (TFCC) pillar of the Copernicus Architecture to Joint Task Force Commanders, Numbered Fleet Commanders (NFC), Officers in Tactical Command (OTC), Composite Warfare Commanders (CWC), Subordinate Warfare Commanders (SWC), Commander Amphibious Task Force (CATF), Commander Landing Force (CLF), and Commanding Officers/Tactical Action Officers (CO/TAO). It also integrates both joint and service-unique command and control projects in order to support joint task force and Navy afloat requirements. Efforts include design, integration, and test of Tactical Decision Aids (TDAs) and Tactical Intelligence Analytical Aids, in a multi-level secure mode to provide the Battle Group/Force Commanders with warfighting Command and Control capabilities.

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PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System

PROJECT NUMBER: X0709
BUDGET ACTIVITY: 5

Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,270) Continued to support the tenets of the Copernicus Architecture by fully developing and implementing the open systems architecture support as initiated by consolidation of Command and Control (C^2) and intelligence programs into NTCS-A.
- (U) ($300) Continued integration of USAF software modules for processing Air Tasking Orders and display of target locations on US Navy workstations at sea, for the Joint Navy Interoperability with the USAF.
- (U) ($425) Continued integration of USMC/Navy Joint Interoperability requirements to include interfaces with the Position Location Reporting System (PLRS) and the Intelligence Analysis System (IAS). Continued development of Anti-Air Warfare Tactical Decision Aids (TDAs).
- (U) ($1,017) Initiated Operational Testing and deployment of the all source (SCI/GENSER) network. Initiated the incorporation of necessary aspects of multi-level security within the NTCS-A system.
- (U) ($1,922) Initiated developmental integration and testing of the FY 1993 unitary software release.
- (U) ($2,032) Integrated functionalities of EWCM, Advanced Tactical Processor (ATP) and Strike Plot into the Space and Electronic Warfare Commander (SEWC) module. Continued the development and integration of Electronic Support Measures (ESM) capabilites and correlation in NTCS-A.

2. (U) FY 1994 PLAN:

- (U) ($1,320) Continue to support the tenets of the Copernicus Architecture by fully developing and implementing the open systems architecture support as consolidation of C^2 programs into NTCS-A. Investigate the architecture necessary to support distributed data base access to all fleet users to support the "Pull" tenet of the Architecture.
- (U) ($200) Complete development of downsized JOTS. Test downsized JOTS at sea and in the field.
- (U) ($1,760) Develop integration and testing of the FY 1994 unitary software base.

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- (U) ($640) Continue to develop C4I TDAs and conduct advanced integration testing.
- (U) ($538) Continue to integrate additional video source information into NTCS-A. Initiate integration of all digital imagery products such as TAMPS, DS and VIEW into an Imagery LAN based on NTCS-A VIEWS architecture. Initiate software development to incorporate multi-media (i.e., imagery, audio and cable grade video) capability into workstation.
- (U) ($1,100) Continue development of SEW C2W and Cryptologic support and analysis.
- (U) ($150) Continue the incorporation of necessary aspects of multi-level security in the NTCS-A system.
- (U) ($500) Continue NTCS-A 3.0 development to include full SCI JOTS/NIPS. Merge functionality and video distribution capabilities of closed circuit TV into NTCS-A. Test NTCS-A 3.0 at sea and complete the integration of CCTV.
- (U) ($640) Integrate functionality of Cryptologic Combat Work Station (CCWS) into NTCS-A.
- (U) ($120) Initiate integration of Extended Position Location Reporting System (EXPLRS) into NTCS-A 3.0.
- (U) ($490) Initiate development of advanced TDAs in Anti-Air Warfare (AAW).

3. (U) FY 1995 PLANS:

- (U) ($1,920) Develop, integrate and test the FY 1995 software release.
- (U) ($1,000) Initiate development of Artificial Intelligence (AI) analysis tools for incorporation into GENSER and SCI software for analyst workstations.
- (U) ($1,290) Complete development and integration of Cryptologic Combat Support software tools.
- (U) ($200) Incorporate advanced mapping and geodesy capabilities into NTCS-A.
- (U) ($1,838) Continue the incorporation of necessary aspects of multi-level security within the NTCS-A system.

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PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System
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BUDGET ACTIVITY: 5
Date: 15 October 1993

- (U) ($1,500) Continue development of the architecture necessary to support distributed world-wide database access to all fleet users to support the "PULL" tenet of the Copernicus Architecture.
- (U) ($4,050) Initiate integration of Marine Corps, USAF and other joint intelligence systems into NTCS-A/JMCIS to meet DOD standardization requirements.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDTE DIV, San Diego, CA; NRL, Washington, DC; NAVAIRWARCENACDIV, Warminster, PA; OPTEVFOR, Norfolk, VA. CONTRACTORS: INRI, Reston, VA; SAIC, Vienna, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

NTCS-A Acquisition Plan	07/92
NPDM	04/91
TFCC TEMP	11/92
JOTS TEMP	08/89

G. (U) RELATED ACTIVITIES: (U) PE 0604231N Tactical Command Systems, Shipboard Tactical Intelligence Proccessing(STIP) allows access to the centralized intelligence database file.

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PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System

PROJECT NUMBER: X0709
BUDGET ACTIVITY: 5

Date: 15 October 1993

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) OPN Line 2608	46,377	43,015	20,701	8,518	17,703	13,638	18,626	CONT.	CONT.

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

J. (U) TEST AND EVALUATION: Yearly OT&E as necessary to support the Evolutionary Acquisition Strategy.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

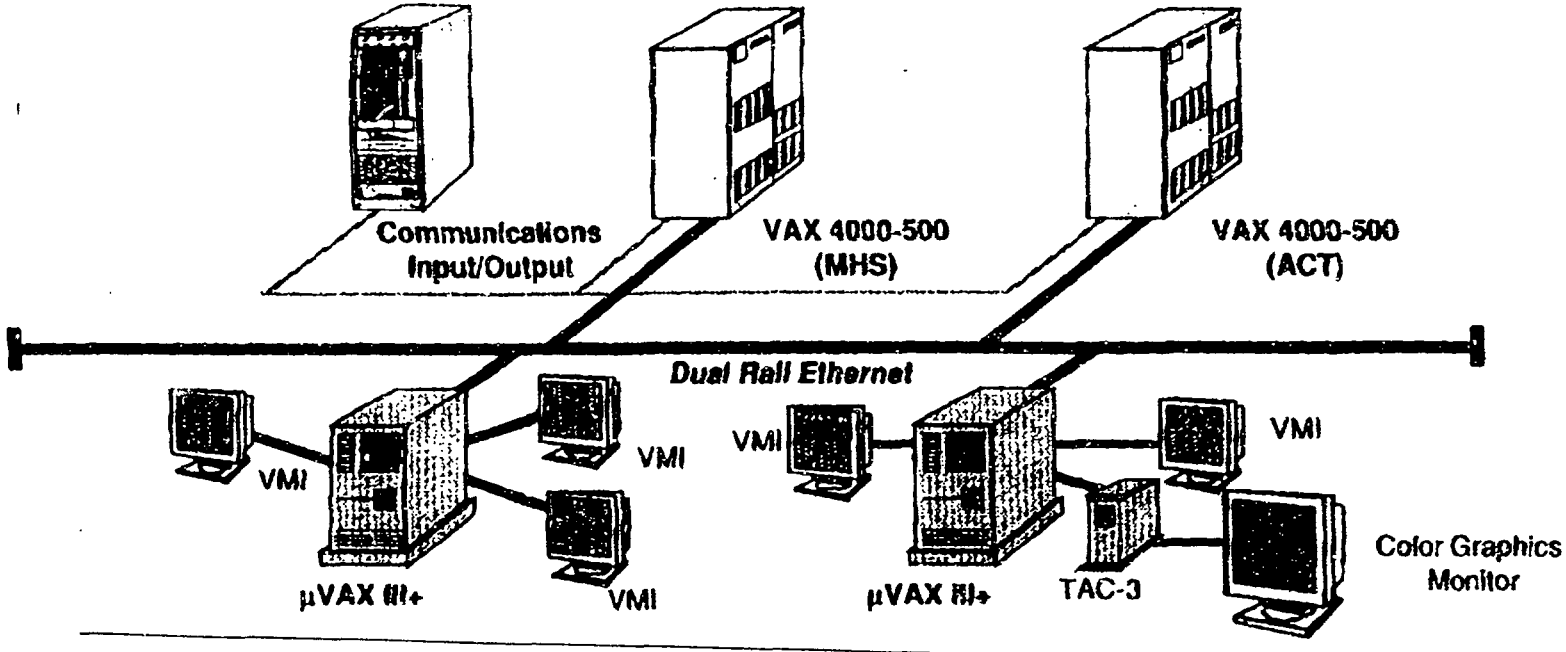
PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System

PROJECT NUMBER: X2009
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: OBU/OSG

OBU Hardware Architecture



POPULAR NAME: OBU/OSG

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PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System
PROJECT NUMBER: X2009
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	ARB NPDM		ARB NPDM		ARB NPDM		ARB NPDM	CONT.
ENGINEERING MILESTONES	SDR	SDR	SDR	SDR	SDR	SDR		CONT.
T&E MILESTONES	OT-IIC RELOOK	DT-IID OT-IID		DT-IIE OT-IIE		DT-IIF OT-IIF		CONT.
CONTRACT MILESTONES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	1,050	1,219	1,908	1,873	1,230	1,300	1,341	CONT.
SUPPORT CONTRACT	150	150	150	150	150	150	150	CONT.
IN-HOUSE SUPPORT	1,421	773	685	656	719	767	802	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	CONT.
TOTAL	2,621	2,142	2,743	2,679	2,099	2,217	2,293	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Ocean Surveillance Information System (OSIS) Baseline Upgrade (OBU) development is a subsystem of the Navy Command and Control System (NCCS) Ashore. OBU provides for the analysis of intelligence information from multiple sources to produce a comprehensive report of foreign forces and potential hostile activity. OSIS provides positional data and operational intelligence to commanders at all levels. It consists of two Joint Intelligence Centers, two Fleet Ocean Surveillance Information Facilities (FOSIFs), a software support activity, and a training site. OBU functions encompass establishing and maintaining characteristics and performance data on hostile weapons platforms systems, collecting non-organic data from ashore and afloat sensors, developing an all-source tactical picture, and analyzing intelligene information. The data derived from this process is disseminated as an Operation Intelligence (OPINTEL) product to the operating forces for tactical threat warnings, decision making support, and support of Over-the-Horizon-Targeting.

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PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System
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(U) OBU uses the Joint Logistics Commander's Guidance of March 1987 on Evolutionary Acquisition (EA) as the strategy for future software development which includes a plan for incremental achievement of desired capability building on the core system provided by OBU Phases I and II. The OBU Phase III EA strategy will provide a mechanism for adding future capabilities including the incorporation of proven fleet initiated prototypes.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($100) Conducted OT-IIC.
- (U) ($200) Addressed OT-IIC discrepancies.
- (U) ($50) Conducted OT-IIC Relook.
- (U) ($700) Began to develop prototype and update baseline.
- (U) ($306) Continued evaluation of prototype functional enhancements.
- (U) ($540) Deployed graphics workstation and alphanumeric workstation upgrade prototypes.
- (U) ($500) Began development of security architecture for target DODIIS compliant (open) systems.
- (U) ($225) Continued Phase III software development.

2. (U) FY 1994 PLAN:

- (U) ($50) Conduct DT-IID.
- (U) ($100) Conduct OT-IID.
- (U) ($500) Continue to develop prototype and update baseline.
- (U) ($300) Continue evaluation of prototype functional enhancements.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N PROJECT NUMBER: X2009 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Tactical Command System BUDGET ACTIVITY: 5

- (U) ($400) Complete workstation upgrade.
- (U) ($292) Continue Phase III software development.
- (U) ($500) Commence transition to file server architecture.

3. (U) FY 1995 PLAN:

- (U) ($400) Continue to develop prototype and update baseline.
- (U) ($355) Continue evaluation of prototype functional enhancements.
- (U) ($300) Continue Phase III software development.
- (U) ($700) Continue transition to file server architecture.
- (U) ($300) Address OT-IID discrepancies.
- (U) ($688) Begin software development to meet joint interoperability standards.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDT&E DIV, San Diego, CA; NAVSURFWARCENDIV, Dahlgren, VA. CONTRACTORS: Not applicable.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not available for comparison.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System
PROJECT NUMBER: X2009
BUDGET ACTIVITY: 5
Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:

Specific Operational Requirements	SEP 70
OBU Navy Decision Coordinating Paper	MAY 87
OSIS Decision Coordinating Paper	JAN 90
Program Change Approval Document	JAN 91
OBU TEMP 240-5	NOV 92
OBU Acquisition Plan	APR 93

G. (U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN LI #2906	438	297	2,739	2,514	2,256	1,765	1,916	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: U.S. navy has entered into agreements with the Japan Maritime Self Defense Force, the Royal Navy in the United Kingdom, and the Royal Australian Navy in Australia for delivery of OBU under Foreign Military Sales (FMS) provisions.

J. (U) TEST AND EVALUATION:

FY 94	DT-IID MAJOR UPGRADES	06/94	FY 98	DT-IIF MAJOR UPGRADES	06/98
	OT-IID MAJOR UPGRADES	08/94		OT-IIF MAJOR UPGRADES	08/98
FY 96	DT-IIE MAJOR UPGRADES	06/96			
	OT-IIE MAJOR UPGRADES	08/96			

*Each major upgrade/enhancement will undergo formal testing by OPTEVFOR.

UNCLASSIFIED

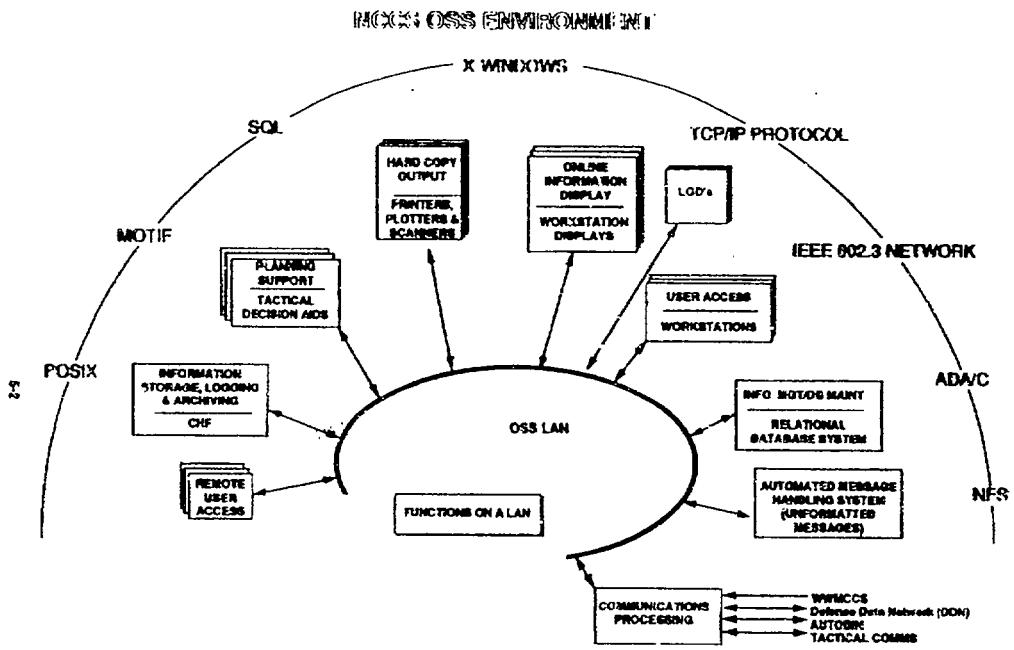
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System

PROJECT NUMBER: X2041
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: Operations Support System (OSS)



POPULAR NAME: Operations Support System (OSS)

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System

PROJECT NUMBER: X2041
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONE		ASN IPR 10/93	NPDM 9/95 M/S III B		NPDM 9/97 M/S III C		NPDM 9/99 M/S III D	CONT.
ENGINEERING MILESTONES	INC II/III PDR/CDR	INC II/III PDR/CDR	INC II/III PDR/CDR	INC III/IV PDR/CDR	INC III/IV PDR/CDR	INC IV PDR/CDR	INC IV PDR/CDR	CONT.
T&E MILESTONES			DT-IIB OT-IIB		DT-IIC OT-IIC		DT-IID OT-IID	CONT.
CONTRACT MILESTONES		INC II/III Contract awards		INC IV Contract awards				CONT.

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	5,945	8,204	8,315	6,769	5,663	6,218	5,732	CONT.
SUPPORT CONTRACT	375	456	487	385	400	367	403	CONT.
IN-HOUSE SUPPORT	1,897	2,559	2,916	2,416	2,157	2,409	2,295	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	CONT.
TOTAL	8,217	11,219	11,718	9,570	8,220	8,994	8,430	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Chief of Naval Operations (CNO), Fleet Commanders in Chief (CINCs) and Unified Commanders (USCINCLANT and USCINCPAC) require a single, integrated command and control system at the Navy Command Center (NCC), Fleet Command Centers (FCC), and the Unified Command Centers, respectively, to receive, process, display and assess the readiness and disposition of own, neutral, and potentially hostile forces. The OSS Program uses the Joint Logistics Commanders Guidance of March 1987 on Evolutionary Acquisition (EA) as the strategy for development. The EA concept includes a plan for incremental achievement of desired capability, early fielding of initial incremental operational capability and continual feedback from the users. OSS Increment I integrates existing prototype command center support systems on a Local Area Network (LAN) and provides a baseline command center support capability to designated OSS sites. Increment II will develop an integrated, logistically supportable, and cost effective single system,

which includes Ocean Surveillance Information System (OSIS) Baseline Upgrade (OBU) interface, Navy Worldwide Military Command and Control System (WWMCCS) Software Standardization (NWSS) replacement, Status of Forces data (Status of Readiness and Training System (SORTS), Casualty Reporting (CASREP), Movement Reporting (MOVREP), and Employment Scheduling (EMPSKD)) current system functionality improvement, and latest state-of-the-art Commercial Off The Shelf (COTS) technologies to local as well as remote users. Increment III will transition Shore Targeting Terminal (STT) and Force High Level Terminal (FHLT) functionality to OSS and will incorporate Employment Scheduling System (ESS) and Information Presentation and Distribution System (IPDS) capabilities. Increment IV (FY 96-99) will continue the evolutionary development of OSS in response to emergent Joint and Navy C4I requirements, the changing threat and new technology. Multi-Level Security (MLS) features will be incorporated as they become commercially available. International, as well as Intra and inter-service Command, Control, Communication and Computer integration, will be established and achieved through the implementation of OSS at selected NATO and U.S. Navy sites and Unified Commands. OSS is being developed and implemented in conjunction with the open system C4I For The Warrior (C4IFTW), Global Command and Control System (GCCS) and Joint Maritime Command Information System (JMCIS) architectures.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($875) Designed, developed and tested remote user access and NWSS common routines including Route Generation and Land Mass avoidance.
- (U) ($600) Continued design and development of Casualty Reporting (CASREP) message processing.
- (U) ($540) Developed, tested, integrated and implemented tactical module (Unified Build) Baseline under X-Windows.
- (U) ($820) Implemented Consolidated History File (CHF), remote user access and NWSS common routines.
- (U) ($3,002) Continued system engineering efforts to perform system definition, design and implementation in conjunction with the NWSS transition and commenced system engineering in conjunction with FHLT, STT and ESS.
- (U) ($175) Conduct analysis of state-of-the-art multi-level security (MLS) COTS packages.
- (U) ($1,750) Designed, developed, tested, integrated and conducted Preliminary Design Reviews (PDR) on Employment Scheduling (ESS), and Movement Report (MOVREP) positional processing, tactical module, decision aid functions, database and communications software enhancements.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System
PROJECT NUMBER: X2041
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($250) Commenced upgrading equipment at OSS sites to next generation capability (i.e., TAC3 Workstation).
- (U) ($205) Continued evolving OSS into the GCCS, and C4IFTW and JMCIS architectures.

2. (U) FY 1994 PLAN:

- (U) ($1,750) Incrementally test and field Release 93-1 containing CASREP, MOVREP, SORTS and EMPSKD features as well as priority NCRs from previous releases.
- (U) ($400) Complete design documents and implementation plans for completing the transition of NWSS to OSS.
- (U) ($250) Perform system engineering and software design and conduct Critical Design Reviews (CDRs) on remaining Increment II components to be included in Release 94-1.
- (U) ($1,454) Develop, test and field incremental FHLT and STT capabilities at Shore ASW Command Centers (SACCs) and Submarine Operational Command Centers (SOCCs), respectively.
- (U) ($625) Develop and implement a comprehensive scheduling capability as part of ESS for use by Fleet schedulers at the Type, Group and Unit Commander Level.
- (U) ($775) Perform system engineering and analysis to upgrade and extend the OSS LANs to a Government Open Systems Interconnnect Profile (GOSIP) compliant architecture in conjunction with IPDS. Interface OSS with WWMCCS.
- (U) ($1,650) Continue enhancing Unified Build software to satisfy OSS requirements; integrate successive UB versions into OSS baseline.
- (U) ($300) Integrate Tactical Decision Aids (TDAs) and Artificial Intelligence (AI) applications developed through other programs.
- (U) ($425) Continue IPDS development for other OSS sites.
- (U) ($275) Continue database integration and standardization efforts including architecture coordination, internal data content and format consolidation.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System
PROJECT NUMBER: X2041
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($500) Participate in Global Command and Control System (GCCS) prototyping efforts.
- (U) ($450) Begin design for complete OSS site inter-connectivity for Diagnostics, Software Code Transfer and other Data exchange.
- (U) ($335) Continue integrating TAC-3 products and state-of-the-art large screen displays, video switches and briefing technology into the OSS architecture.
- (U) ($1,225) Continue evolution of OSS into GCCS, C4IFTW and JMCIS architectures.
- (U) ($575) Conduct Navy and Joint Interoperability Certification Tests.
- (U) ($105) Explore requirements for expanding the scope of OSS to include additional Joint, Allied (NATO and other), Foreign (through FMS cases) and Navy users. Continue execution of Cooperative Development MOA with SACLANT.
- (U) ($125) Develop and implement Joint requirements in support of the USCINCPAC Command Center Improvement Program (CCIP), Joint Crisis Management System (JCMS)/Joint Crisis Analysis Tools (JCAT) and PAC Crisis Management System (PACCMS).

3. (U) FY 1995 PLAN

- (U) ($460) Conduct Developmental Testing, Interoperability testing and Operational Testing (OT-IIB) on OSS increment II (NWSS transition to OSS complete) and resolve outstanding deficiencies.
- (U) ($1,950) Complete development and testing of any remaining Increment II functionality required to satisfy outstanding Navy Command and Control Systems Change Requests (NCRs) and emergent user requirements. Release 95-1 will be the final Increment II release.
- (U) ($1,500) Continue developing, testing and fielding incremental FHLT, STT (OSS replacements) and ESS upgrades.
- (U) ($210) Explore requirements for expanding the scope of OSS to include additional Joint, Allied (NATO and other), Foreign (through FMS cases) and Navy users. Continue execution of Cooperative Development with SACLANT.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N | PROJECT NUMBER: X2041 | Date: 7 February 1994
PROGRAM ELEMENT TITLE: Tactical Command System | BUDGET ACTIVITY: 5

- (U) ($650) Continue to integrate/analyze OSS sites in conjunction with TAC-3/TAC-4 hardware upgrades, and state-of-the-art displays, video distribution systems and briefing aids (including multimedia, 3-D visualization and very high resolution images). Continue security engineering efforts.
- (U) ($1,250) Continue enhancing UB software to satisfy OSS requirements; integrate successive UB releases into OSS baseline.
- (U) ($2,814) Continue integrating OSS into the GCCS, C4IFTW, and JMCIS architectures.
- (U) ($750) Continue efforts to improve distribution of data between OSS sites, provide seamless access of disparate and separate databases, and improve the depth, quality and type of data available to OSS users.
- (U) ($685) Continue efforts to improve and extend OSS network throughout command center/headquarters at all OSS sites. Continue development of network prototypes, and perform modelling and analysis of LANs, Wide Area Networks (WANs) and Metropolitan Area Networks (MANs).
- (U) ($150) Commence efforts to incorporate super computer and/or parallel processor solutions into OSS to improve system performance.
- (U) ($150) Continue systems engineering and prototype development on AI/Expert System driven decision aids to provide real time decision making support to operational commanders.
- (U) ($724) Perform Navy and Joint Interoperability Certification Tests and resolve technical deficiencies.
- (U) ($175) Develop and upgrade joint requirements in support of the CCIP, JCMS/JCAT and PACCMS.
- (U) ($250) Perform system engineering and analysis to upgrade the OSS LAN to a GOSIP compliant architecture in conjunction with IPDS.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDTE DIV, San Diego, CA. CONTRACTORS: Booz, Allen and Hamilton, Inc., McLean, VA; Science Applications International Corp (SAIC), McLean, VA; Planning Research Corporation (PRC), McLean, VA; FGM, Inc., Reston, VA; Inter-National Research Institute (INRI), Yorktown, VA.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System
PROJECT NUMBER: X2041
BUDGET ACTIVITY: 5

Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

OSS Operational Requirement 12/87 OSS Acquisition Plan 8/92
OSS Computer Resources Life Cycle Management Plan (CRLCMP) 11/92
OSS Decision Coordinating Paper 9/89 OSS TEMP 12/92
OSS Operational Logistic Support Summary (OLSS) 6/92

G. (U) RELATED ACTIVITIES:

- (U) PE: 0303152N (WWMCCS Information System)

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE CONT.	TOTAL PROGRAM CONT.
(U) OPN 2906	4,319	10,007	6,650	8,359	5,326	9,338	6,450		

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Agreement between U.S. DoD and SACLANT concerning the OSS and Command, Control and Information System (CCIS) Cooperative Project of 18 December 1992.

J. (U) TEST AND EVALUATION: OT-IIB is planned for FY 95 on OSS Increment II (NWSS transition to OSS). OT-IIC is planned for FY 97 to verify completion of Increment III (FHLT, ESS, STT integration). OT-IID is planned for FY 99 to verify completion of Increment IV.

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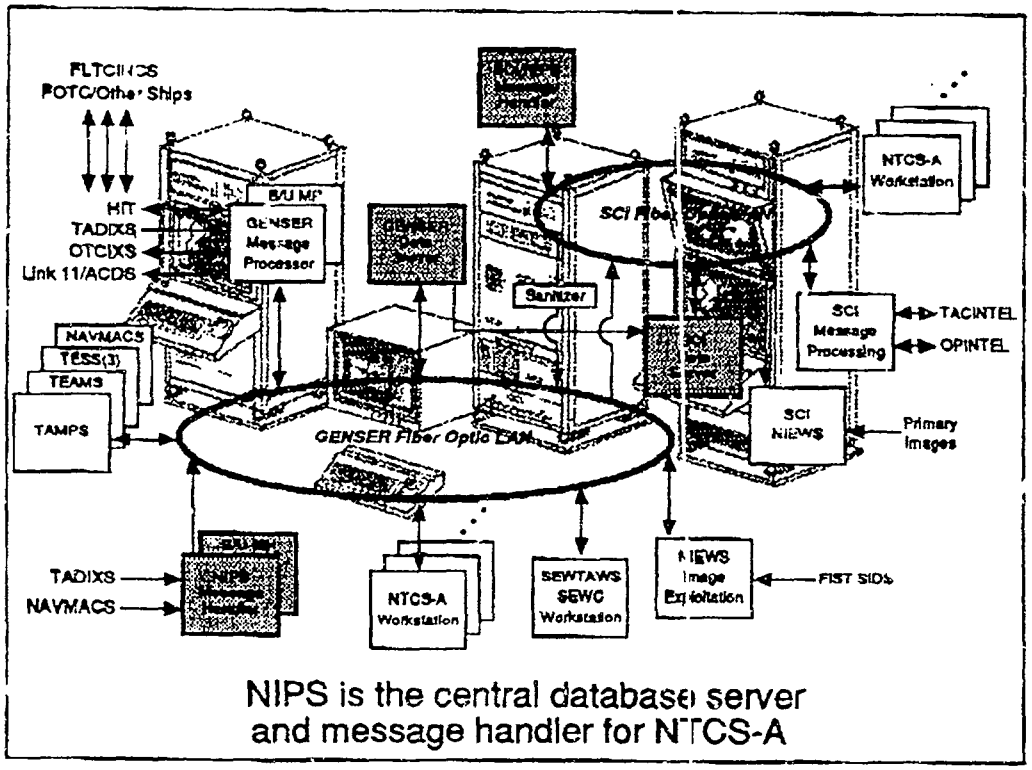
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System

PROJECT NUMBER: X0521
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: Shipboard Tactical Intelligence Processing (STIP)



POPULAR NAME: STIP (NIPS)

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System

PROJECT NUMBER: X0521
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES			MSIIIC 10/94 MSIIID 08/95		MSIIIE 02/97	MSIIIF 08/98		CONT.
ENGINEERING MILESTONES	SOFTWARE UPDATE	SOFTWARE UPDATE	SOFTWARE UPDATE	SOFTWARE UPDATE	SOFTWARE UPDATE	SOFTWARE UPDATE	SOFTWARE UPDATE	CONT.
T&E MILESTONES	DT-IIC DT-IICa,C1 OT-IIC	DT-IID OT-IICa,D1	DT-IID1,E OT-IID	DT-IIE1 OT-IID1	DT-IIF OT-IIE,E1	DT-IIF1,G OT-OOF	OT-IIF1	CONT.
CONTRACT MILESTONES	AWARDED CONRACT	EXERCISE OPTION	EXERCISE OPTION	EXERCISE OPTION	AWARD NEW CONTRACT	EXERCISE OPTION	EXERCISE OPTION	CONT.

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	1,950	2,976	2,810	3,861	3,853	3,970	4,131	CONT.
SUPPORT CONTRACT	0	0	0	0	0	0	0	CONT.
IN-HOUSE SUPPORT	331	1,493	1,915	2,023	2,030	2,093	2,159	CONT.
GFE/ OTHER	86	251	274	314	312	320	330	CONT.
TOTAL	*2,367	4,720	4,999	6,198	6,195	6,383	6,620	CONT.

* In FY93, STIP was funded in PE 0205670N Tactical Intelligence Processing.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Shipboard Tactical Intelligence Processing System (STIP) is an integrated tactical intelligence shipboard processing system which is the central database for the Tactical Flag Command Center (TFCC), Space and Electronic Warfare Commander (SEWC) and tactical mission planning systems. Development this integrated database server provides for data distribution (dynamic update of Naval Warfare Tactical Data base (NWTDB) and Military integration with digital map and imagery systems. STIP began interface development with the Joint Services Imagery Processing - Navy (JSIPS) in FY 1990.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System

PROJECT NUMBER: X0521
BUDGET ACTIVITY: 5

Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($592) Completed integration of NIPS Central Data Base Server/Advanced Message Handler (CDBS/AMH) into NTCS-A 2.0.
- (U) ($1,179) Continued development of CDBS/AMH and Intelligence applications for NTCS-A 2.1.
- (U) ($268) Commenced development of database support for Tactical Decision Aids (TDAs) in the CDBS. Commenced Integration of mission planning requirement into the CDBS.
- (U) ($118) Commenced NIPS/DIWS integration and test.
- (U) ($210) Commenced integration of improved digital imagery/transmission capabilities to FIST into NTCS-A architecture.

2. (U) FY 1994 PLAN:

- (U) ($2,075) Complete development of CDBS/AMH and intelligence applications for NTCS-A 2.1.
- (U) ($481) Commence development of CDBS/AMH and applications for NTCS 3.0.
- (U) ($240) Complete NIPS/DIWS integration and test.
- (U) ($337) Commence Integration and testing of Marine Corps systems.
- (U) ($567) Continue integrations of advanced digital imagery processing capabilities.
- (U) ($385) Commence development of real time updates to CDBS/AMH.
- (U) ($150) Commence Integrated of CD ROM scanner Multimedia devices into NTCS-A.
- (U) ($150) Commence integration of Compartmented Mode Workstation functionality into NIPS/NTCS-A.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System
PROJECT NUMBER: X0521
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($335) Commence integration and testing of mission planning systems requirements.

3. (U) FY 1995 PLAN:

- (U) ($1,015) Continue development of database support for TDA's in the CDBS.
- (U) ($830) Complete integration of mission planning requirements into the CDBS.
- (U) ($746) Complete integration of Marine Corps requirements into NTCS-A.
- (U) ($585) Complete integration advanced digital image processing capabilities into NIPS/NTCS-A 3.0
- (U) ($993) Complete development of CDBS/AMH and intelligence applications
- (U) ($340) Continue integration of compartmented Workstation functionlity
- (U) ($490) Commence development of improved CDBS/AMH and intelligence application for NTCS-A 4.0.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVELEXACT, St.Inigoes, MD; NAVELEXSYSTEMENGACT DET Philadelphia, PA; OPTEVFOR, Norfolk, VA. CONTRACTORS: Planning Research Corp,. Mclean, VA; Inter-National Research Insititute, Reston, VA; Booz Allen Hamilton, Inc., Mclean, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not available for comparison.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604231N
PROGRAM ELEMENT TITLE: Tactical Command System

PROJECT NUMBER: X0521
BUDGET ACTIVITY: 5

Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:

NIPS TEMP	11/91
NIPS OR	06/89
FIST TEMP	07/86
FIST OR	04/84

G. (U) RELATED ACTIVITIES: PE 0604231N, Tactical Command Systems, Navy Tactical Command System-Afloat (NTCS-A). STIP is the control database server for NTCS-A.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U)	7,506*								

*Beginning in FY94, NIPS OPN funds transferring to OPN Line # 84 (NTCS-A)

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

J. (U) TEST AND EVALUATION: NTCS-A/NIPS OT will be conducted each year, FY93-99.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604256N
PROGRAM ELEMENT TITLE: Threat Simulator Development
BUDGET ACTIVITY: 6

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
E0602* Electronic Warfare Environment Simulation (ECHO)	18,268	18,418	15,621	19,026	20,690	21,473	21,158	CONT.	CONT.
E0672* Effectiveness of Navy Electronic Warfare Systems (ENEWS)	10,763	11,017	12,382	13,474	14,721	15,120	15,513	CONT.	CONT.
TOTAL	29,031	29,435	28,003	32,500	35,411	36,593	36,671	CONT.	CONT.

*W0602 and W0672 became E0602 and E0672 in FY 1993.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This is a continuing program that consolidates the design, fabrication and integration of naval threat radar simulators for increased managerial emphasis and coordination. These simulator development efforts provide realistic Developmental and Operational Test and Evaluation (DT&E/OT&E) environments to test Tri-Services Electronic Warfare (EW) systems and defensive tactics. These projects develop former Soviet and Free-World Anti-Air and Anti-Ship weapon systems simulators in accordance with the Services requirements.

(U) The E0602 Project, EW Environment Simulation (ECHO) provides airborne system component level Test and Evaluation (T&E) at the Electronic Combat Simulation and Evaluation Laboratory (ECSEL), Naval Air Warfare Center Weapons Division (NAVAIRWARCENWPNDIV), Pt. Mugu, CA. ECHO also provides a secure anechoic closed loop T&E facility for fully integrated, aircraft-installed systems testing at the EW Integrated Systems Test Laboratory (EWISTL) at the Naval Air Warfare Center Aircraft Division (NAVAIRWARCENACDIV), Patuxent River, MD. Included in this Project is the T&E of airborne systems and tactics in flight, against the open air range at the Electronic Combat Range (ECR) complex located at the Naval Air Warfare Center Weapons Division (NAWC-WD), China Lake, CA.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604256N
PROGRAM ELEMENT TITLE: Threat Simulator Development
BUDGET ACTIVITY: 6

DATE: 7 February 1994

(U) The E0672 Project, Effectiveness of Navy EW Systems (ENEWS), is a Department of the Navy (DON) unique project that supports testing of Ship Self Defense efforts. ENEWS provides T&E of surface and subsurface shipboard systems and tactics in digitally modeled battle scenarios at the component, fully integrated single ship, multi-ship and full-up multi-platform battle group levels. ENEWS also provides a secure anechoic closed loop T&E facility specifically designed to test shipboard systems at the stand alone component or fully integrated systems level. The last and largest portion of this project addresses the flyable Infrared and Radio Frequency simulators flown on specially configured EP-3B aircraft to provide at-sea open air T&E of systems and tactics. All ENEWS assets are developed and maintained by the Naval Research Laboratory (NRL), Washington, D.C.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604256N PROJECT NUMBER: E0602 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Threat Simulator Development BUDGET ACTIVITY: 6

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
E0602* Electronic Warfare Environment Simulation (ECHO)	18,268	18,418	15,621	19,026	20,690	21,473	21,158	CONT.	CONT.

*W0602 became E0602 in FY 1993.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The objective of this project is development of necessary simulation facilities and approaches to allow determination of the effectiveness of EW in real world engagement situations and to support the introduction of modern, effective systems into Naval Aviation. The heavy use of test resources by all Services demonstrates the importance of these assets. The Navy has been very successful in executing all of its major programs, and to date have had no major technical problems.

(U) The EW Environment Simulation (ECHO) project is unique in that it is the only program within the Department of Defense (DOD) which develops and provides Naval anti-air warfare threat assets for Testing and Evaluation (T&E) and is a critical part of the Office of the Secretary of Defense (OSD) Test Resource Master Plan. The OSD Master Plan employs many ECHO project resources for planning, analysis, testing and verification of airborne EW equipment.

(U) This project directly supports the T&E requirements for the following programs as identified in the FY-94 DOD EW Master Plan: High Speed Anti-Radiation Missile, ALR-67(V)2,3,4, ALQ-126B, AN/ALQ-156, Advanced Airborne Expendable Decoy (AAED), EW Advanced Technology (EWAT), AVR-2, AAR-47, as well as other Tri-Service EW systems with initial operational capability dates in the 1990's.

(U) This project also provides for the development of an Integrated Air Defense T&E capability to be fielded at each of the three sites comprising the Navy's Tri-Center complex: NAVAIRWARCENWPNDIV, China Lake and Pt. Mugu in CA, and NAVAIRWARCENACDIV, Patuxent River, MD.

(U) T&E resource requirements are coordinated through the OSD CROSSBOW-S committee to avoid unwarranted duplication of effort among the services. The Navy Tri-Center approach to T&E resource development ensures project efficiency by cost reductions achievable through common development efforts which provide consistent, repeatable test results between test centers.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604256N
PROGRAM ELEMENT TITLE: Threat Simulator Development
PROJECT NUMBER: E0602
BUDGET ACTIVITY: 6
Date: 7 February 1994

C. (u) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (u) FY 1993 ACCOMPLISHMENTS:

- (U) ($279) Continued threat simulator validation program.
- (U) ($2,306) Continued EW simulation systems engineering investigation.
- (u) ($3,796) Continued antenna modification to the [redacted] Simulator.
- (U) ($1,551) Continued development of the Generic Acquisition Radar (GAR).
- (U) ($888) Continued development of the laboratory EW/acquisition radar simulations.
- (U) ($2,074) Commenced development of the Communications Environment Simulator (CES).
- (U) ($5,240) Initiated development of the Expanded Threat Environment Simulator.
- (U) ($650) Initiated development of the J-Band Advanced Technology Simulator (JBATS).
- (J) ($850) Initiated development of the Electronic Surveillance Measures and Electronic Countermeasures (ESM/ECM) simulation.
- (U) ($634) Initiated development of the Infrared (IR) Seeker simulation. Consolidated with Multi-Spectral Anti-Air Test System (MATS) program in FY 1994.

2. (u) FY 1994 PLAN:

- (U) ($410) Continue threat simulator validation program.
- (U) ($2,513) Continue EW simulation systems engineering investigation.
- (U) ($2,500) Complete antenna modification to the [redacted] Simulator.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604256N PROJECT NUMBER: E0602 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Threat Simulator Development BUDGET ACTIVITY: 6

- (U) ($860) Complete development of the laboratory EW/acquisition radar simulations.
- (U) ($2,950) Continue development of the CES. Includes Command, Control, and Communications System for the Electronic Warfare Integrated System Test Laboratory, Patuxent River, MD.
- (U) ($1,840) Continue development of the Expanded Threat Environment Simulator.
- (U) ($241) Continue development of the JBATS.
- (U) ($2,750) Complete development of the ESM/ECM simulation and procurement of 8 NATO AN/ALT-40 Systems for the Electronic Combat Range, China Lake, CA.
- (U) ($3,246) Continue IR Seeker initiated in FY 1993. Initiate development of a laser and electro-optic capability. These efforts have been consolidated into MATS.
- (U) ($458) Initiate Requirements Development Program.
- (U) ($650) Complete development of Generic Acquisition Radar (GAR).

3. (U) FY 1995 PLAN:

- (U) ($400) Continue threat simulator validation program.
- (U) ($2,646) Continue EW simulation systems engineering investigation.
- (U) ($800) Complete development of the CES.
- (U) ($933) Complete development of the Expanded Threat Environment Simulator.
- (U) ($4,675) Continue development of the JBATS.
- (U) ($4,750) Continue MATS.
- (U) ($500) Initiate development of Command and Control (C2 Group 2) at Electronic Combat Range, China Lake, CA.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604256N
PROGRAM ELEMENT TITLE: Threat Simulator Development
PROJECT NUMBER: E0602
BUDGET ACTIVITY: 6
Date: 7 February 1994

- (U) ($917) Continue Requirement Development Program.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, China Lake, CA and Pt. Mugu, CA; NAVAIRWARCENACDIV, Patuxent River, MD. CONTRACTORS: Martin Marietta, Moorestown, NJ; VIASAT, Carlsbad, CA; ERA, Ridgecrest, CA; COMARCO, Ridgecrest, CA.

(U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Not applicable for this submission.

2. (U) Schedule changes: Not applicable for this submission.

3. (U) Cost Changes: Not applicable for this submission.

F. (U) PROGRAM DOCUMENTATION:

- APDD 306-091; 24 Jul 1992

G. (U) RELATED ACTIVITIES:

- (U) Navy efforts under this project are coordinated with other service requirements through the OSD Joint Executive Committee on Air Defense Threat Simulators (EXCOM), the OSD CROSSBOW-S Committee and the Joint Coordination Group for Electronic Warfare/Joint Coordination Group for Test and Evaluation (JCGEW/JCGT&E).

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

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

J. (U) MILESTONE SCHEDULE:

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- (U) GAR (China Lake)
- (U) } antenna modification (China Lake)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604256N
PROGRAM ELEMENT TITLE: Threat Simulator Development

PROJECT NUMBER: E0602
BUDGET ACTIVITY: 6

Date: 7 February 1994

- (U) EW/Acquisition Radar simulator (Pt. Mugu & Pax River)
- (u) ESM/ECM simulation (China Lake)
- (u) IR Seeker simulation (China Lake)
- (u) CES (Pax River)
- (U) Expanded Threat Environment Simulator (Pt. Mugu)
- (U) Command and Control (China Lake)
- (U) JBAT Simulator (Pax River & China Lake)
- (u) Advanced Emitter Simulators (China Lake)
- (u) (China Lake)
- (u) Low-Band Radar (Tri-Center)
- (u) Low Probability of Intercept Radar (China Lake)
- (u) MATS (China Lake)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604256N
PROGRAM ELEMENT TITLE: Threat Simulator Development
PROJECT NUMBER: E0672
BUDGET ACTIVITY: 6
Date: 7 February 1994

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
E0672* Effectiveness of Navy EW Systems (ENEWS)	10,763	11,017	12,382	13,474	14,721	15,120	15,513	CONT.	CONT.

*W0672 became E0672 in FY 1993.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The objective of the Effectiveness of Navy EW Systems (ENEWS) project is the development and application of necessary simulation assets to determine the effectiveness of EW in real-world engagement situations and primarily supports the introduction of modern, effective shipboard EW systems, and tactics for the surface Navy. The heavy use of ENEWS resources by NAVSEA and other developers speaks to the overall importance of these assets. The project provides support for EW system design, Development Test (DT), Operational Test (OT), and the development of tactics. Its quick reaction capabilities have had great impact on crisis situations such as the Falklands conflict, the Iran Harpoon threat, the Persian Gulf crisis, and Operation Desert Shield/Storm.

(U) The primary threat to surface ships is Anti-Ship Missile (ASM) systems. The ENEWS project is unique in that it is the only project within the Department of Defense (DOD) dedicated to developing and providing assets to test and evaluate the effectiveness of shipboard EW systems and tactics against ASMs.

(U) The ENEWS project is a critical part of the OSD Test Resource Master Plan. This plan employs many of the ENEWS assets for planning, analysis, testing and verification of shipboard EW systems and tactics. During FY 1994 and FY 1995 ENEWS is projected to provide Test and Evaluation (T&E) support for Combat Systems At Sea Qualification Testing (CSSQT) for CG-47, DDG-51 and CV/CVN class ships. DT and OT support will be provided for the SLQ-32 PHASE improvements, SLQ-32 (V)1-5, RAIDS, OUTLAW BANDIT systems, MATES, and other Ship Self-Defense initiatives including RDT&E 6.3A Advanced Technology Demonstrations.

(U) Computer simulation and modeling, hardware in the loop (HITL) test facilities, and ASM simulators flown on a specially configured EP-3B aircraft are the major program assets. Resources are used in combination to measure EW system effectiveness in a cost efficient manner.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604256N
PROGRAM ELEMENT TITLE: Threat Simulator Development
PROJECT NUMBER: E0672
BUDGET ACTIVITY: 6

Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($5,496) Continued systems readiness for T&E.
- (U) ($150) Continued upgrade of ENEWS reference library.
- (U) ($1,769) Continued digital modeling/scenario development.
- (U) ($670) Continued [redacted] controller upgrade.
- (U) ($150) Completed Infrared High Resolution Camera.
- (U) ($100) Completed [redacted]
- (U) ($100) Commenced ALQ-170 [redacted] Variants simulator.
- (U) ($100) Commenced ALQ-170 [redacted] simulator
- (U) ($100) Completed ALQ-170 [redacted] simulator.
- (U) ($100) Initiated Low Probability of Intercept (RF) Seeker.
- (U) ($130) Initiated [redacted] instrumentation.
- (U) ($160) Initiated [redacted] simulator.
- (U) ($200) Initiated [redacted] H-pod simulator.
- (U) ($388) Initiated [redacted] simulator.
- (U) ($100) Initiated [redacted] simulator.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604256N
PROGRAM ELEMENT TITLE: Threat Simulator Development
PROJECT NUMBER: E0672
BUDGET ACTIVITY: 6

Date: 7 February 1994

- (U) ($100) Initiated [redacted] simulator.
- (U) ($950) Initiated simulator evaluation.

2. (U) FY 1994 PLAN:

- (U) ($5,425) Continue systems readiness for T&E.
- (U) ($150) Continue upgrade of ENEWS reference library.
- (U) ($1,852) Continue digital modeling/scenario development.
- (U) ($700) Continue [redacted] controller upgrade.
- (U) ($155) Continue ALQ-170 [redacted] Variants simulator.
- (U) ($100) Complete ALQ-170 [redacted] simulator.
- (U) ($100) Continue Low Probability of Intercept (RF) Seeker.
- (U) ($80) Complete [redacted] instrumentation.
- (U) ($260) Continue [redacted] simulator.
- (U) ($150) Continue [redacted] H-pod simulator.
- (U) ($311) Continue [redacted] simulator.
- (U) ($100) Continue [redacted] simulator.
- (U) ($400) Continue [redacted] simulator.
- (U) ($150) Commence ALQ-170 [redacted] simulator.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604256N
PROGRAM ELEMENT TITLE: Threat Simulator Development
PROJECT NUMBER: E0672
BUDGET ACTIVITY: 6
Date: 7 February 1994

- (U) ($175) Commence ALQ-170[ ]simulator.
- (U) ($799) Continue simulator validation.
- (U) ($110) Initiate ALQ-170[ ]simulator.

3. (U) FY 1995 PLAN:

- (U) ($6,197) Continue systems readiness for T&E.
- (U) ($150) Continue upgrade of ENEWS reference library.
- (U) ($1,940) Continue digital modeling/scenario development.
- (U) ($600) Complete[ ]controller upgrade.
- (U) ($165) Continue ALQ-170 [ ]Variants simulator.
- (U) ($200) Continue Low Probability of Intercept (RF) Seeker.
- (U) ($360) Continue [ ]simulator.
- (U) ($145) Complete [ ]H-pod simulator.
- (U) ($450) Continue [ ]simulator.
- (U) ($120) Continue [ ]simulator.
- (U) ($700) Continue [ ]simulator.
- (U) ($150) Continue ALQ-170[ ]simulator.
- (U) ($200) Continue ALQ-170 [ ]simulator.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEME : 0604256N
PROGRAM ELEM: TITLE: Threat Simulator Development
PROJECT NUMBER: E0672
BUDGET ACTIVITY: 6
Date: 7 February 1994

- (U) ($840) Continue simulator validation.
- (U) ($165) Continue ALQ-170[redacted] simulator.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: Naval Research Laboratory (NRL), Washington, DC. CONTRACTORS: Digital Modeling - LOCUS Corp, Alexandria, VA; Readiness - Eagle System, Lexington Park, MD, Kaman Sciences, Alexandria, VA, and QuesTech, Falls Church, VA; Battelle Memorial Institute, Columbus, OH.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Not applicable for this submission.

2. (U) Schedule changes: Not applicable for this submission.

3. (U) Cost Changes: Not applicable for this submission.

F. (U) PROGRAM DOCUMENTATION:

- NAPDD 307-091 24 JUL 92

G. (U) RELATED ACTIVITIES: Not applicable.

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

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

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604256N
PROGRAM ELEMENT TITLE: Threat Simulator Development

PROJECT NUMBER: E0672
BUDGET ACTIVITY: 6

Date: 7 February 1994

J. (U) MILESTONE SCHEDULE:

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604258N
PROGRAM ELEMENT TITLE: Target Systems Development
BUDGET ACTIVITY: 6

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
A0609 Aerial Target Systems Development	13,845*	11,980	13,984	23,077	25,129	20,736	20,256	CONT.	CONT.
A0610 Weapon Systems T&E Training Development/Procurement	15,561*	13,994	13,202	12,392	12,256	12,590	12,895	CONT.	CONT.
A0611 Supersonic Sea Skimming Target	6,476*	2,000	0	0	0	0	0	CONT.	CONT.
S0612 Surface Target Development	1,733	1,586	856	813	783	803	815	CONT.	CONT.
TOTAL	37,615	29,560	28,042	36,282	38,168	34,129	33,967	CONT.	CONT.

* A transfer of funds from A0609 to A0611 ($300K) for the Supersonic Sea Skimming Target (SSST) studies as well as $1,554K from A0609 to A0610 for a reprocurement of 3 QF-4N aircraft was completed this year.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element (PE) funds the development and procurement of aerial and surface targets and associated Target Augmentation and Auxiliary Systems (TA/AS) necessary to duplicate or simulate threat characteristics in support of weapons systems performance test and evaluation and fleet training. Included within this PE are joint QF-4 development; continued development of Navy QF-4S for procurement instead of QF-4N as part of DOD Tri-Service QF-4 full scale aerial target development program; BQM product improvement (PI) upgrade renamed, Subsonic Aerial Target (SAT); development of MQM-8G Extended, Extended Range (EER) and various TA/AS development (A0609); procurement of QF-4N and TA/AS for Navy Weapons Systems Test and Evaluation (A0610); Cost and Operational Effectiveness Analysis (COEA) and technical investigation of the SSST (A0611); and continued development of surface towed targets, improved target control system and an anti-radiation missile target (S0612).

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604258N
PROGRAM ELEMENT TITLE: Target Systems Development

PROJECT NUMBER: A0609
BUDGET ACTIVITY: 6

Date: 7 February 1994

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
A0609 Aerial Target Systems Development	13,845*	11,980	13,984	23,077	25,129	20,736	20,256	CONT.	CONT.

* Transferred $300K to A0611 for SSST and $1,554K to A0610 for the reprocurement of 3 German QF-4N's

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Aerial Target Systems and associated target augmentation and auxiliary systems are developed in response to the need to test and provide training for anti-air-warfare (AAW) and anti-surface warfare (ASUW) systems required to defend fleet surface and air units in a hostile environment. The threat envelope covered extends from the surface to 100K feet for speeds in the low subsonic range to MACH 4.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($753) Continued Target Augmentation/Auxillary Systems (TA/AS) kit integration into Navy Standard Tow Target System (NSTTS)(TDU-34, RMK-34).
- (U) ($1,270) Continued Joint QF-4 Engineering Manufacturing Development (EMD)
- (U) ($1,407) Continue development of QF-4S for procurement instead of QF-4N as part of DOD Tri-Service QF-4 full scale target development program.
- (U) ($1,061) Initiated EMD phase of tri-service Non-cooperative Airborne Vector Scorer (NAVS).
- (U) ($1,364) Continued development and support of ULQ-21/Electronic Countermeasures (ECM) modules.
- (U) ($998) Initiated pre-MS I documentation of Subsonic Aerial Target (SAT).
- (U) ($3,950) Initiated development of MQM-8G Extended, Extended Range (EER).

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604258N
PROGRAM ELEMENT TITLE: Target Systems Development
PROJECT NUMBER: A0609
BUDGET ACTIVITY: 6
Date: 7 February 1994

- (U) ($810) Developed support plans for conversion/flight demonstration of SS-N-2D/22 missiles.
- (U) ($235) Provided TA/AS support.
- (U) ($587) Support for development of project reliance master plan.
- (U) ($1,410) Continued target support.

2. (U) FY 1994 PLAN:

- (U) ($410) Complete TA/AS Kit integration into NSTTS.
- (U) ($1,000) Initiate EMD phase of the SAT program.
- (U) ($4,722) Continue NAVS EMD development.
- (U) ($300) Continue Joint QF-4 EMD.
- (U) ($1,523) Continue development of QF-4S for procurement instead of QF-4N.
- (U) ($404) Continue development and support of ULQ-21/ECM modules.
- (U) ($2,144) Complete development of MQM-8G (EER).
- (U) ($135) Continue TA/AS support.
- (U) ($1,342) Continue target support.

3. (U) FY 1995 PLAN:

- (U) ($5,800) Continue EMD phase of the SAT program.
- (U) ($596) Complete development of QF-4S for procurement instead of QF-4N.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604258N
PROGRAM ELEMENT TITLE: Target Systems Development
PROJECT NUMBER: A0609
BUDGET ACTIVITY: 6
Date: 7 February 1994

- (U) ($4,384) Continue NAVS EMD development.
- (U) ($1,237) Continue development and support of ULQ-21/ECM modules.
- (U) ($541) Continue TA/AS support.
- (U) ($1,426) Continue target support.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, China Lake, CA, and Point Mugu, CA; NAVAIRWARCENACDIV, Warminster, PA, and Lakehurst, NJ; NAVAVNDEPOT, Cherry Point, NC; NAVSURFWARCENDIV, Indian Head, MD. CONTRACTORS: Marquardt, Van Nuys, CA; Allied Signal, Mishawaka, IN

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Not applicable for this submission.

2. (U) Schedule changes: Not applicable for this submission.

3. (U) Cost Changes: Not applicable for this submission.

F. (U) PROGRAM DOCUMENTATION:

	MNS	ORD/OR	TEMP
NAVS	11/92	7/93	
SAT	1/93		
MQM-8G(EER)	7/92	4/93	
QF-4S		12/86	3/89

G. (U) RELATED ACTIVITIES:

- (U) Program Element (PE) 0604372N/New Threat Upgrade (Tartar/Terrier); PE 0604366N/Standard Missile Improvements (Standard Missiles 1 and 2); PE 0604755N/CIWS (Phalanx); PE 0204136N F-18 Improvement/Upgrade; PE 0205667N/F-14 Upgrade.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 06C4258N
PROGRAM ELEMENT TITLE: Target Systems Development
PROJECT NUMBER: A0609
BUDGET ACTIVITY: 6
Date: 7 February 1994

- (U) Systems currently in development or test and evaluation: PE 0604366N/Standard Missile Improvements (Standard Missile II block upgraded); PE 0604366N/AEGIS ER(SM-2 Block IV); PE0204229N/Tomahawk; PE 0604755N/5' Rolling AIr Frame Missile; PE 0604755N/NATO Sea Sparrow.

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

FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) WPN Line # 27								
152,105	113,013	122,242	123,059	112,634	124,579	119,544	CONT.	CONT.

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

J. (U) MILESTONE SCHEDULE:

	I	II	III	IOC
TA/AS RMK-34	N/A	FY83/2Q	FY94/4Q	FY95/1Q
NAV SCORER	N/A	FY93/4Q	FY96/3Q	FY97/4Q
SAT	N/A	FY94/3Q	FY99/2Q	FY01/2Q
NSTTS PI	N/A	FY98/1Q	FY01/1Q	FY02/1Q
A/C INTEG	N/A	FY96/1Q	FY00/2Q	FY01/2Q
MQM-8G(EER)	N/A	FY93/2Q	FY95/1Q	FY96/3Q
QF-4S	N/A	FY90/2Q	FY96/2Q	FY96/4Q

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604258N
PROGRAM ELEMENT TITLE: Target Systems Development

PROJECT NUMBER: A0610
BUDGET ACTIVITY: 6

Date: 7 February 1994

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
WEAPON SYSTEMS T&E TRAINING DEVELOPMENT/PROCUREMENT	15,561*	13,994	13,202	12,392	12,256	12,590	12,896	CONT.	CONT.

* A transfer from A0609 to A0610 ($1,554K) was completed this year.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project provides for the development and procurement of aerial targets used solely for test and evaluation of Naval Weapons Systems which closely replicate current and projected threats to fleet units in the Anti-Air Warfare (AAW) and Anti-Surface Warfare (ASW) environments. This replication must include characteristics related to size, performance envelope, and electromagnetic and infrared signatures. As threats change, changes must be made to keep the targets as threat representative as possible. This is done in response to changes in the requirements of the developers of naval weapons systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:
   - (U) ($9,631) Converted and supported 6 F-4N aircraft into QF-4N targets.
   - (U) ($2,448) Procured 3 QF-4N aircraft from German Government.
   - (U) ($2,498) Procured/supported 10 Advanced Radar Missile Scorers (ARMS).
   - (U) ($750) Performed aviation depot level repair work for QF-4N aircraft.
   - (U) ($234) Provided miscellaneous target support.
2. (U) FY 1994 PLAN:
   - (U) ($11,046) Convert and support 6 F-4N aircraft into QF-4N targets.
   - (U) ($2,114) Procure/support 10 ARMS.
   - (U) ($250) Aviation depot level repair work for QF-4N aircraft.
   - (U) ($584) Miscellaneous target support.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604258N
PROGRAM ELEMENT TITLE: Target Systems Development
PROJECT NUMBER: A0610
BUDGET ACTIVITY: 6
Date: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) ($10,437) Convert and support 5 F-4N aircraft into QF-4N targets.
- (U) ($1,563) Target Augmentation/Auxillary Support (TA/AS) support for ARMS.
- (U) ($685) Aviation depot level repair work for QF-4N aircraft.
- (U) ($517) Miscellaneous target support.

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

D. (U) WORK PERFORMED BY: NAVAIRWARCENWPNDIV, China Lake, CA; NAVAIRWARCENACDIV, Warminster, PA; NAVAIRWARCENWPNDIV, Point Mugu, CA; NAVAVNDEPOT, Cherry Point, NC; NAVAIRWARCENACDIV, Lakehurst, NJ; NAVSURFWARCENDIV, Indian Head, MD. CONTRACTORS: Cambridge Limited, Cambridge, UK.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Not applicable for this submission.

2. (U) Schedule changes: Not applicable for this submission.

3. (U) Cost Changes: Not applicable for this submission.

F. (U) PROGRAM DOCUMENTATION:

- (U) QF-4N TEMP (#1172) 9/85

G. (U) RELATED ACTIVITIES:

- (U) Test and evaluation of current in-service weapons systems: PE 0604372N/New Threat Upgrade (Tartar/Terrier); PE 0604366N/Standard Missile Improvements (Standard Missile 1 and 2); PE 0604755N/CIWS (Phalanx); PE 0204136N/F-18 Improvement/Upgrade; PE 0205567N/F-14 Upgrade.
- (U) Systems currently in development or test and evaluation: PE 0604366N/Standard Missile Improvements (Standard Missile II block upgraded); PE 0604366N/AEGIS ER (SM2-Block IV); PE 0604755N/5' Rolling Air Frame Missile; PE 0604755N NATO Sea Sparrow.

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

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

J. (U) MILESTONE SCHEDULE: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604258N
PROGRAM ELEMENT TITLE: Target Systems Development
PROJECT NUMBER: S0612
BUDGET ACTIVITY: 6
Date: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: S0612 Surface Targets Development. This project develops seaborne targets systems and their related target augmentation systems in support of air-to-surface and surface-to-surface weapons test and evaluation and fleet training.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($125) Continued Command and Control Augmentation development.
- (U) ($75) Commenced requirements analysis.
- (U) ($393) Continued Ship Simulator Platform (SSP). (Configuration selection)
- (U) ($340) Continued Weapons Systems/Emitter, Target Augmentation Systems (TAS) upgrade.
- (U) ($120) Completed Anti-Radiation Missile Emitter (ARME).
- (U) ($680) Continued Surface Target Radar Simulator (STRS).

(U) FY 1994 PLAN:

- (U) ($150) Continue Command and Control Augmentation development.
- (U) ($50) Continue requirements analysis.
- (U) ($341) Continue Weapons Systems/Emitter, TAS upgrade.
- (U) ($1,043) Continue STRS.

(U) FY 1995 PLAN:

- (U) ($165) Continue Command and Control Augmentation Development.
- (U) ($80) Continue requirements analysis.
- (U) ($210) Continue Weapons System/Emitter, TAS upgrade.
- (U) ($145) Complete STRS.
- (U) ($256) Transition SSP to 40 meter Mobile Ship Target (MST). (New start)

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604258N
PROGRAM ELEMENT TITLE: Target Systems Development

PROJECT NUMBER: S0612
BUDGET ACTIVITY: 6

Date: 7 February 1994

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, Pt, Mugu, CA

(U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 551800	8,151	0	5,393	4,846	0	4,920	0	CONT.	CONT.
• (U) WPN Line 302227	0	660	0	0	0	0	0	0	660

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604261N
PROGRAM ELEMENT TITLE: Acoustic Search Sensors
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
H0478 Expendable Reliable Acoustic Path Sonobuoy (ERAPS)	515	0	0	0	0	0	0	0	31,145
H0480 ASW Sensors & Processing	16,665	16,864	4,799	14,588	20,894	19,487	18,072	CONT.	CONT.
H2000 Air Deployed Active Receiver (ADAR)	13,894	13,975	14,217	5,804	2,174	470	0	0	72,965
TOTAL	31,074	30,839	19,016	20,392	23,068	19,957	18,072	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT:

(U) H0480 - This project provides improved air Anti-Submarine Warfare (ASW) mission effectiveness through engineering development of hardware and software associated with acoustic systems, sensors, processing, post-processing, data recording, and displays for air ASW platforms. Key objectives: improved detection, classification, localization and tracking; and increased capacity and flexibility to handle multi-sensor data. Programs being funded during the period identified are the Acoustic Intercept System (AIS) which is a full spectrum acoustic processor and the Generic Acoustic Stimulator System (GASS) which is an ocean, sensor and target-modeling combination that will couple with all ASW trainers. Future programs planned for this project include the Shallow Water ASW Localization and Attack System (SWALAS) to provide improved localization and attack in regional conflict environments and the Advanced Extended Echo Ranging (AEER) system to provide an improved bistatic acoustic source for harsh water environments. Based upon Fleet recommendations to consider non-acoustic sensors as an alternative to acoustic sensors, SWALAS will make maximum use of data derived under non-acoustic Advanced Technology Demonstration projects as inputs to its COEA.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604261N
PROGRAM ELEMENT TITLE: Acoustic Search Sensors
BUDGET ACTIVITY: 5

DATE: 7 February 1994

(U) H2000 - The Air Deployable Active Receiver (ADAR) sonobuoy is an expendable air-launched acoustic receiver utilized by ASW aircraft. The ADAR sonobuoy functions as the acoustic receiver for the Improved Extended Echo Ranging (IEER) system. IEER is a mono/multistatic acoustic sensor system that utilizes an ASW aircraft, supporting acoustic source, and acoustic receiver in a coordinated ASW search and surveillance mission against conventionally powered submarines operating in shallow water environments as well as all submarines capable of operating in deep water. The ADAR Sonobuoy will also be capable of functioning in a passive mode to track high speed targets.

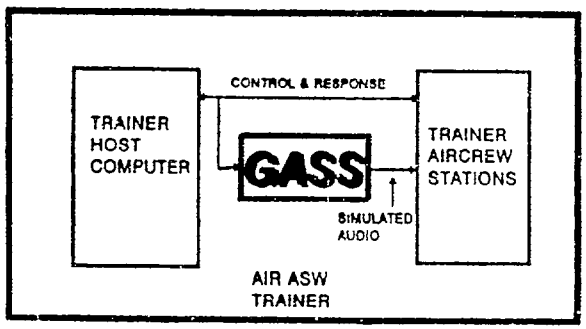
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604261N
PROGRAM ELEMENT TITLE: Accustic Search Sensors

PROJECT NUMBER: H0480
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: ASW Sensors & Processing



POPULAR NAME: ASW S&P

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604261N
PROGRAM ELEMENT TITLE: Acoustic Search Sensors
PROJECT NUMBER: H0480
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM		PROTO DEMO 7/94				AEER MS II 10/97		
MILESTONE GASS			MS II 2/95			MS III 4/98		
ENGINEERING							AEER PDR 12/98	
MILESTONES GASS				PDR 3/96	CDR 12/96			
T&E						TEE 11/97		
MILESTONES GASS						RFT 3/98		
CONTRACT						AEER EMD AWARD 2/98		
MILESTONES GASS			EMD AWARD 4/95					

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	6,504	6,499	1,844	11,550	16,950	14,100	12,350	CONT.
SUPPORT CONTRACT	2,702	2,220	1,150	505	505	755	755	CONT.
IN-HOUSE SUPPORT	7,459	8,145	1,805	2,533	3,439	4,632	4,967	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	CONT.
TOTAL	16,665	16,864	4,799	14,588	20,894	19,487	18,072	CONT.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604261N
PROGRAM ELEMENT TITLE: Acoustic Search Sensors
PROJECT NUMBER: H0480
BUDGET ACTIVITY: 5
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project provides improved air ASW mission effectiveness through engineering development of hardware and software associated with acoustic systems, sensors, processing, post-processing, data recording, and displays for air ASW platforms. Key objectives: improved detection, classification, localization and tracking; and increased capacity and flexibility to handle multi-sensor data. Programs being funded during the period identified are the Acoustic Intercept System (AIS) which is a full spectrum acoustic processor and the Generic Acoustic Stimulator System (GASS) which is an ocean, sensor and target-modeling combination that will couple with all ASW trainers. Future programs planned for this project are the Shallow Water ASW Localization and Attack System (SWALAS) to provide improved localization and attack in regional conflict environments and the Advanced Extended Echo Ranging (AEER) system to provide an improved bistatic acoustic source for harsh water environments.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) AIS
  - (U) ($4,548) Continued Full Spectrum Processing (FSP) software development.
  - (U) ($520) Completed data collection and analysis efforts.
  - (U) ($530) Continued procurement of Commercial Off-The-Shelf (COTS) hardware.
  - (U) ($308) Other engineering support and contract support services.
- (U) GASS
  - (U) ($2,049) Completed prototype hardware procurement.
  - (U) ($2,914) Continued prototype software development and hardware/software integration.
  - (U) ($1,065) Continued GFE environmental software modifications.
  - (U) ($2,040) Initiated EMD phase procurement and specification preparation.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604261N
PROGRAM ELEMENT TITLE: Acoustic Search Sensors
PROJECT NUMBER: H0480
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($2,691) Other engineering support and contract support services.

2. (U) FY 1994 PLAN:

- (U) AIS
  - (U) ($2,312) Complete FSP software development.
  - (U) ($1,798) Complete procurement of COTS hardware.
  - (U) ($600) Complete FSP software/COTs implementation demonstrations.
  - (U) ($990) Other engineering support and contract support services.
- (U) GASS
  - (U) ($3,250) Conduct prototype lab demonstration and 2F140(T) Weapon System Trainer (WST) demonstration.
  - (U) ($900) Complete GFE environmental software modifications.
  - (U) ($4,460) Release EMD solicitation for pre-production units.
  - (U) ($2,554) Other engineering support and contract support services.

3. (U) FY 1995 PLAN:

- (U) GASS
  - (U) ($1,026) Conduct Source Selection Evaluation.
  - (U) ($2,083) Complete Milestone II and Award EMD contract.
  - (U) ($200) Continue GFE environmental software support.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604261N
PROGRAM ELEMENT TITLE: Acoustic Search Sensors
PROJECT NUMBER: H0480
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($1,490) Other engineering support and contract support services.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Indianapolis, IN; NAVAIRWARCENACDIV, Warminster, PA; NAVSURFWARCENDIV, Crane, IN; NAVSURFWARCEN WHITE OAK DET, Silver Spring, MD; ONR, Arlington, VA; NAVAIRWARCENACDIV, Patuxent River, MD; PATWINGSLANT DET JAX, Jacksonville, FL. CONTRACTOR: AP LABS, San Diego, CA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: GASS MS II slipped due to a slip in the prototype demonstration schedule, thus PDR and CDR slipped accordingly. FY 1995 funding has been reduced in recognition of this slip.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) GASS
  - (U) TDRD 07/91 AP
  - (U) ASR 12/92 IPS (Process)
- (U) AIS
  - (U) ORD 12/91 TEMP 92
  - (U) AP 10/91 COEA 92
- (U) AEER
  - (U) EER ORD MOD in proc.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604261N
PROGRAM ELEMENT TITLE: Acoustic Search Sensors
PROJECT NUMBER: H0480
BUDGET ACTIVITY: 5
Date: 7 February 1994

G. (U) RELATED ACTIVITIES:

- (U) Program Element 0603254N, ASW Systems Development.
- (U) Program Element 0604221N, P-3 Modernization Program (host platform).

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

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

J. (U) TEST AND EVALUATION:

- (U) GASS
  - (U) PRE-EMD DEMO 7/94
  - (U) TEE 11/97

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

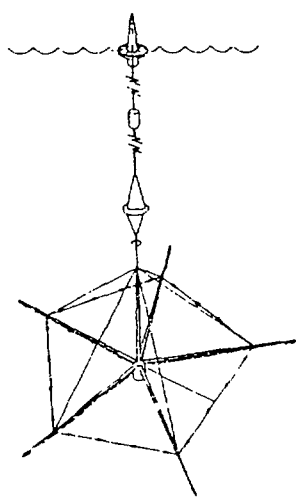
PROGRAM ELEMENT: 0604261N
PROGRAM ELEMENT TITLE: Acoustic Search Sensors

PROJECT NUMBER: H2000
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: Air Deployed Active Receiver (ADAR)

ADAR DEPLOYED CONFIGURATION



POPULAR NAME: ADAR

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604261N
PROGRAM ELEMENT TITLE: Acoustic Search Sensors

PROJECT NUMBER: H2000
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999 TO COMPLETE
PROGRAM MILESTONES					MS-III 11/97		
ENGINEERING MILESTONES	EMD SDR 2/93		EMD PDR 5/95	EMD CDR 2/96			
T&E MILESTONES				TECHEVAL 4/97 OPEVAL 8/97			
CONTRACT MILESTONES				EXERCISE PROD OPTION 1/98			

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	4,487	5,998	6,699	6,580	3,052	1,930	0	0	28,746
SUPPORT CONTRACT	4,066	408	551	540	549	110	75	0	6,299
IN-HOUSE SUPPORT	12,845	6,398	5,503	5,916	1,499	0	395	0	32,556
GFE/ OTHER	1,033	1,090	1,222	1,181	704	134	0	0	5,364
TOTAL	22,431	13,894	13,975	14,217	5,804	2,174	470	0	72,965

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604261N
PROGRAM ELEMENT TITLE: Acoustic Search Sensors
PROJECT NUMBER: H2000
BUDGET ACTIVITY: 5
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Air Deployable Active Receiver (ADAR) sonobuoy is an expendable air launched acoustic receiver utilized by ASW aircraft. The ADAR sonobuoy functions as the acoustic receiver for the Improved Extended Echo Ranging (IEER) system. IEER is a mono/multistatic acoustic sensor system that utilizes an ASW aircraft supporting acoustic source, and acoustic receiver in a coordinated ASW search and surveillance mission against conventionally powered submarines operating in shallow water environments as well as all submarines capable of operating in deep water. The ADAR sonobuoy will also be capable of functioning in a passive mode to track high speed targets.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($7,903) Completed System Design Review (SDR). Continued EMD contractor subassembly design development. Initiated subassembly Contractor Engineering Tests (CETs).
- (U) ($1,487) Continued ADAR/ACAP software development. Completed high level design and software system review. Completed Preliminary Design Review (PDR).
- (U) ($1,303) Continued S-3B/ADAR software requirements development.
- (U) ($1,000) Completed P-3/ADAR software requirements definition.
- (U) ($1,160) Initiated development of alternative detection algorithms under technical risk reduction plan.
- (U) ($1,041) Continued other engineering support and contractor support services.

2. (U) FY 1994 PLAN:

- (U) ($6,938) Complete EMD contractor subassembly design and CETs. Complete sonobuoy integration. Initiate airdrop CETs.
- (U) ($1,989) Complete ADAR/ACAP Critical Design Review (CDR), code and test.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604261N
PROGRAM ELEMENT TITLE: Acoustic Search Sensors
PROJECT NUMBER: H2000
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($2,055) Complete S-3B/ADAR System Design Review (SDR) and PDR. Initiate final design documentation.
- (U) ($2,993) Continue other engineering support and contractor support services.

3. (U) FY 1995 PLAN:

- (U) ($9,460) Complete EMD contractor airdrop CETs and PDR. Initiate airdrop Contractor Development Tests (CDTs).
- (U) ($1,660) Complete S-3B/ADAR CDR followed by code and unit test. Initiate integration of ADAR/ACAP into the S-3B/ADAR system.
- (U) ($3,097) Continue other engineering support and contractor support services.

4. (U) PROGRAM TO COMPLETION:

- (U) Complete EMD contractor CDR in FY96. Complete system IV&V, TECHEVAL and OPEVAL in FY97 leading to Milestone III in 11/97.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA; NAVAIRWARCENACDIV, Indianapolis, IN; NAVSURFWARCENDIV, Crane, IN; NAVAIRWARCENACDIV, Patuxent River, MD; NAVSURFWARCEN, WHITE OAK DET, Silver Spring, MD. CONTRACTORS: ERAPSCO (MAGNAVOX, Ft Wayne, IN; SPARTON, Jackson, MI).

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Not applicable for this submission.

2. (U) Schedule changes: Due to extended contractor requirement definition phase and additional design activity, PDR and CDR have slipped accordingly.

3. (U) Cost Changes: Not applicable for this submission.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604261N
PROGRAM ELEMENT TITLE: Acoustic Search Sensors
PROJECT NUMBER: H2000
BUDGET ACTIVITY: 5
Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:

- (U) AP 7/91
- (U) ORD 3/92
- (U) TEMP 5/92
- (U) IPS 5/92
- (U) COEA 5/92

G. (U) RELATED ACTIVITIES:

- (U) Program Element 0603254N, ASW Systems Development.

H. (U) OTHER APPROPRIATION FUNDS:

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN (SSQ-101)	0	0	0	0	0	23,925	33,406	CONT.	CONT.
• (U) QTY						7,000	16,700		

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

J. (U) TEST AND EVALUATION:

AIRDROP CETs	10/94 - 07/95
AIRDROP CDTs	7/95 - 03/96
TECHEVAL	11/96 - 04/97
OPEVAL	5/97 - 08/97

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604262N
PROGRAM ELEMENT TITLE: V-22
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
H1425 V-22	714,556	5,165	496,930	711,708	588,668	448,433	216,154	CONT.	CONT.
W2088 MEDIUM LIFT REPLACEMENT	0	4,628	0	0	0	0	0	0	26,628
TOTAL	714,556	9,793	496,930	711,708	588,668	448,433	216,154	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element funds the development of a replacement aircraft to meet the medium lift needs of the U.S. Marine Corps and the special operations needs of the United States Special Operations Command.

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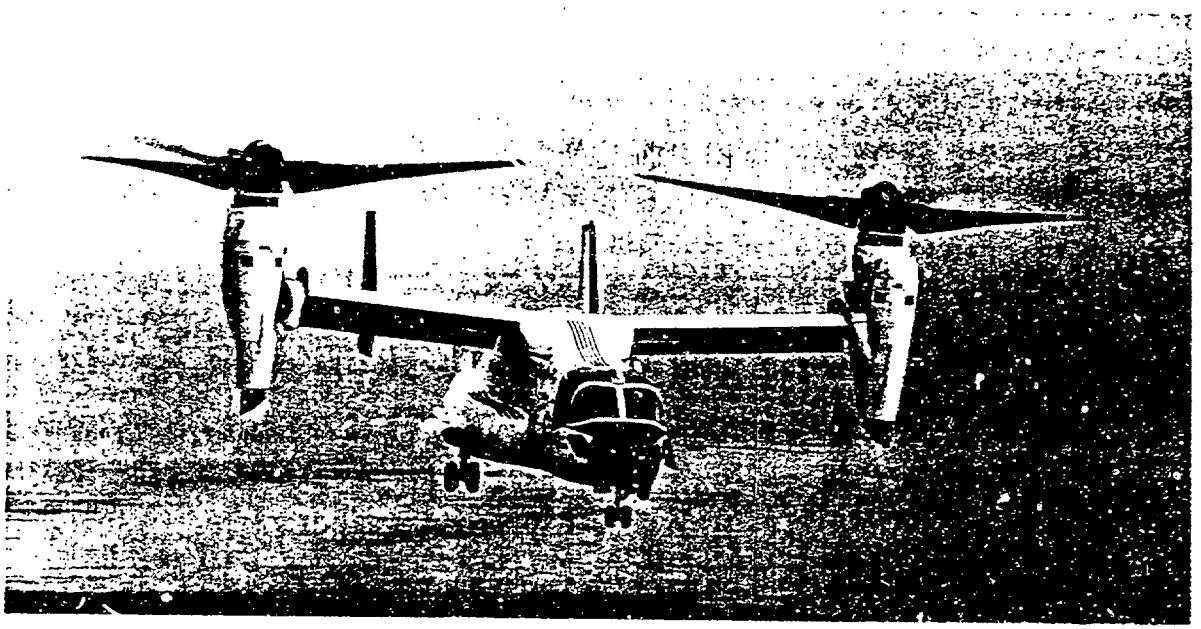
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604262N
PROGRAM ELEMENT TITLE: V-22

PROJECT NUMBER: H1425
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: V-22



POPULAR NAME: V-22 OSPREY

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604262N
PROGRAM ELEMENT TITLE: V-22

PROJECT NUMBER: H1425
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

SCHEDULE	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES			MSII+ SEP94						
ENGINEERING MILESTONES			PDR APR94	CDR DEC94					
T&E MILESTONES									
CONTRACT MILESTONES			EMDDef MAR94						

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	723,300	657,698	2,500	437,030					CONT.
SUPPORT CONTRACT	3,000	1,565	TBD	1,600	OUTYEAR FUNDING SPLIT DEPENDENT ON				CONT.
IN-HOUSE SUPPORT	23,268	37,899	2,665	42,200	DEVELOPING AN INTEGRATED NAVY/USSOCOM				CONT.
GFE/ OTHER	6,800	17,394	TBD	16,100	PROGRAM PLAN AND COST ESTIMATE.				CONT.
TOTAL	758,368	714,556	5,165	496,930	711,708	588,668	448,433	216.154	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The V-22 program is designed to provide an aircraft to meet the medium lift amphibious/vertical assault needs of the United States Marine Corps (USMC) and the special operations needs of the United States Special Operations Command (USSOCOM). The aircraft will be capable of operations from aviation and air capable ships, as well as from unimproved landing sites throughout the world. This tiltrotor aircraft combines the speed, range and fuel efficiency normally associated with turboprop aircraft with the vertical take-off/landing and hover capabilities of helicopters.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604262N
PROGRAM ELEMENT TITLE: V-22

PROJECT NUMBER: H1425
BUDGET ACTIVITY: 5

Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($657,698) Signed letter contract for Engineering and Manufacturing Development (E&MD) which will modify 2 Full Scale Development (FSD) aircraft and build 4 new production representative aircraft (initiated with FY 1992 funds). Contract continues through TECHEVAL/OPEVAL. Completed 43 affordability trade studies to reduce cost (potential savings at $2.4M per aircraft if all are implemented). Contracted engineering technical services and logistics support services.

- (U) ($56,858) Funds used to support in-house planning, management, engineering, test and evaluation efforts during FY 1994. The government's principal test site is located at Patuxent River, MD.

2. (U) FY 1994 PLAN:

- (U) Predominance of FY 1994 efforts are being financed with FY 1993 funds in addition to $5,165 of FY 1994 funds.

- (U) Develop an integrated Navy/USSOCOM program plan and cost estimate, and evaluate the potential funding and schedule impact to the baseline V-22 program. This effort should be completed in the March 1994 timeframe, given that joint requirements are delineated and approved in late February.

- (U) Continue E&MD program, Program Design Review (PDR) scheduled for April 1994 and Critical Design Review (CDR) for December 1994. MS II+ Defense Acquisition Board (DAB) scheduled for September 1994.

- (U) Continue Developmental Testing (DT) and Operational Testing (OT). Tests planned in FY 1994: OT-IIA Aircraft Flight Envelope Expansion Tests and Artificial Icing Trials utilizing two FSD aircraft.

3. (U) FY 1995 PLAN:

- (U) ($496,930) The majority of funds will be used to continue contract efforts related to the E&MD program, including the fabrication/assembly of E&MD aircraft. Funds will also be used to support in-house/Navy flight test activities, integrated test teams (ITTs), integrated product teams (IPTs), support equipment development, logistics and training activities, the manned flight simulator and numerous other development and test efforts at the government's in-house activities, including USSOCOM participation in the joint V-22 program.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604262N
PROGRAM ELEMENT TITLE: V-22

PROJECT NUMBER: H1425
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA, Patuxent River, MD, Indianapolis, IN, Lakehurst and Trenton, NJ; NAVAVNDEPOT, Cherry Point, NC. CONTRACTORS: Bell-Boeing, Arlington, VA; Allison Gas Turbine Division, General Motors Corp., Indianapolis, IN.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Program will now fund SOF Development. Cost and schedule impact are still being assessed.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: Formal program documentation for the E&MD program has not been approved. A MSII+ DAB review is scheduled for September 1994.

G. (U) RELATED ACTIVITIES: Not applicable.

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

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

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

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604264N
PROGRAM ELEMENT TITLE: Aircrew Systems Development

PROJECT NUMBER: W0606
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0606 Aircrew Systems Development	20,689	14,512	12,157	12,209	13,109	13,440	13,634	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Aircrew Systems Development program provides engineering and manufacturing development (EMD) of Aviation Life Support Systems (ALSS) to protect aircrews from current known and future threats including: directed energy weapons, chemical/biological/radiological agents/fallout, ballistic projectiles, temperature extremes, heat/fire, low concentration oxygen environments, high dynamic forces during emergency egress, and high "G" forces. The program also provides development for the following capabilities: head protection, inflight restraint, emergency egress and descent, escape and evasion, survival and rescue, and anthropometric sizing for female aircrew. Acquisition initiatives include competition, the application of streamlining, use of nondevelopment items, joint and tri-service developments, and the pursuit of NATO/allied cooperative ventures to expedite introduction into Navy and Marine Corp fixed and rotary wing aircraft, reduce costs, and promote commonality.

(U) SUBPROJECTS:

- (U) IN-FLIGHT SYSTEMS: On Board Oxygen Generating System (OBOGS), Navy Combat Edge (NCE), Advanced Technology Crew Station (ATCS), Advanced Integrated Life Support System (AILSS).
- (U) ESCAPE/CRASH SAFETY: Naval Aircrew Common Ejection Seat Pre-Planned Product Improvement (NACES P^3I), Advanced Crashworthy Aircrew Seat System (ACASS), and Joint Inflatable Body and Head Restraint System (IBAHRS).
- (U) SURVIVAL AND RESCUE: Passenger Anti-Exposure Survival System (PAESS), Extreme Cold Weather Improvement Program (ECWIP), Joint Combat Survivor/Evader Locator (CSEL) and Helicopter Emergency Egress Device System (HEEDS) P^3I, and Aircrew Modified Equipment Leading to Increased Accomodations (AMELIA).
- (U) SPECIAL MISSION EQUIPMENT: Joint Laser Eye Protection Spectacle (LEP) and Navy Chemical Biological (CB).
- (U) MISSION SPECIFIC: Helicopter Helmet Replacement Program (HHRP), Aircrew Integrated Survival Armor Protection (AISAP), Cats-Eye Emergency Detachment System (CEEDS), Joint Night Vision System (NVS), Night Vision Non Development Item (NDI), and High Off-Boresight Cueing/Display System (HOBCDS).

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604264N
PROGRAM ELEMENT TITLE: Aircrew Systems Development
PROJECT NUMBER: W0606
BUDGET ACTIVITY: 5
Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: (Dollars in Thousands)

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($6,149) OBOGS: Continued Development Testing (DT) on the P^3I monitor, and prepared/approved ECP. NCE: Conducted operational assessment and initiated DT. ATCS: Program being rescoped for joint effort.
- (U) ($4,084) NACES P^3I: Completed design analysis for high speed escape system, continued DT for restraint system, continued trade studies of other NACES subsystems and continued development of passive leg restraint system. ACASS: Inertial Reel specification approved; completed NDI crashworthy troop seat down select evaluation.
- (U) ($2,229) PAESS: System deficiencies identified and redesign initiated. ECWIP: Conducted DT. HEEDS P^3I: Initiated DT. AMELIA: Identified female aviator equipment problems and initiated corrective action.
- (U) ($3,329) Navy CB: Initiated competitive NDI request for proposal. LEP: Prepared NDI procurement documentation for spectacle.
- (U) ($4,898) HHRP: Completed Operational Evaluation (OPEVAL), Milestone (MS)III. AISAP: Completed Phase III DT and prepared Engineering Change Proposal (ECP). CEEDS: Submitted helmet and airframe ECPs. Completed DT qualification testing. HOBCDS: Received requirement.

2. (U) FY 1994 PLAN:

- (U) ($4,527) OBOGS: Complete DT. NCE: Continue DT. ATCS: Continue joint efforts. AISAP: Approve ECP.
- (U) ($3,491) NACES P^3I: Continue DT for restraint system and passive leg restraint. ACASS: Detailed analysis and assessment of rotary wing crashworthy improvements and continue developing emergency egress. IBAHRS: Complete joint DT and approve ECP's, Approval for Low Rate Initial Production and initiate joint commercial airbag technology for survival protection.
- (U) ($2,260) PAESS: Prepare and submit ECP. ECWIP: Continue DT and initiate operational assessment for candidate items. HEEDS P^3I: Continue DT and prepare ECP. AMELIA: Continue to identify female aviator equipment problems and initiate corrective action.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604264N
PROGRAM ELEMENT TITLE: Aircrew Systems Development
PROJECT NUMBER: W0606
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($1,583) Navy CB: Evaluate NDI proposals and conduct DT on acceptable candidate items. LEP: Update Operational Requirement and issue Request for Information.

- (U) ($2,651) Joint NVS: Monitor Preliminary Design Review /Critical Design Review and USAF down selection. Night Vision NDI: Complete test/evaluation, develop Request for Proposal package. HOBCDS: Begin hardware/software (HW/SW) development, test/evaluation planning.

3. (U) FY 1995 PLAN:

- (U) ($1,703) NCE: Conduct OPEVAL. ATCS: Continue joint verification testing of design tools. Initiate ECP's. AILSS: Initiate EMD DT, MSII.

- (U) ($2,994) NACES P^3I: Continue DT for restraint system and passive leg restraint system. ACASS: Continue analysis and assessment of rotary wing crashworthy improvements and conduct DT on crashworthy improvements. IBAHRS: Approve ECP's.

- (U) ($1,302) ECWIP: Complete OT. HEEDS P^3I: Evaluate NDI candidates, MSIII. AMELIA: Continue deficiency correction.

- (U) ($3,116) Navy CB: NDI source selection; procure Technical Evaluation (TECHEVAL) and OPEVAL hardware. LEP: Initiate source selection and initiate DT.

- (U) ($3,042) Joint NVS: Procure test hardware; begin DT. Night Vision NDI: Competitive source selection. HOBCDS: Continue HW/SW development; begin Test and Evaluation.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA; NAVAIRWARCENACDIV, Indianapolis, IN; NAVAIRWARCENWPNDIV, China Lake, CA; NAVSURFWARCENDIV, Indian Head, MD.; NAVSURFWARCEN Crane, IN; NAVAIRWARCENACDIV, Patuxent River, MD. CONTRACTORS: Martin Baker Aircraft Co, Ltd., Middlesex, England; Litton Industries, Davenport, IA.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604264N
PROGRAM ELEMENT TITLE: Aircrew Systems Development

PROJECT NUMBER: W0606
BUDGET ACTIVITY: 5

Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

	OR	TEMP	ECP		OR	TEMP	ECP
• (U) OBOGS	4/75	5/83	9/93	ECWIP	8/86	N/A	7/95
• (U) NCE	9/93	9/94	N/A	ATCS	9/89	N/A	9/95
• (U) AILSS	10/94	8/95	N/A	NVS	2/86	TBD	N/A
• (U) LEP	6/86	N/A	N/A	HOBCDS	9/93	N/A	TBD
• (U) Navy CB	11/86	4/94	N/A	HHRP	1/88	5/90	N/A
• (U) ACASS	9/88	N/A	10/96	MSAP	3/88	N/A	3/94
• (U) IBAHRS	9/88	N/A	10/94	CEDS	2/86	N/A	9/93
• (U) PAESS	8/86	N/A	3/94	HEEDS P^{3}I	6/84	N/A	1/96
• (U) NACES P^{3}I	2/83	12/89	6/96	Night Vision NDI	2/86	N/A	TBD

G. (U) RELATED ACTIVITIES:

I. (U) PE 0603216N, Aviation Survivability.
II. (U) PE 0604706F, Life Support Equipment, related Air Force efforts.
III. (U) PE 0604713A, Combat Feeding, Clothing and Equipment, related Army efforts. Coordinated through the OSD sponsored Tri-Service Life Support RDT&E Steering Committee.

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

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604264N
PROGRAM ELEMENT TITLE: Aircrew Systems Development

PROJECT NUMBER: W0606
BUDGET ACTIVITY: 5

Date: 7 February 1994

J. (U) MILESTONE SCHEDULE:

	II	III
• (U) HHRP		4Q/93
• (U) Navy CB		2Q/97
• (U) NVS		3Q/97
• (U) AILSS	3Q/95	1Q/01

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N
PROGRAM ELEMENT TITLE: Electronic Warfare Development
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0066 Communication/Non-Communication ECM	1	0	0	0	0	0	0	CONT.	CONT.
C1961 Mobile Electronic Warfare Support System	0	0	2,558	3,185	0	0	0	0	13,495
E0556 EW Counter Response	72,012	15,328	20	3,869	3,110	3,093	3,122	CONT.	CONT.
E0619 ASPJ Common Development	7,171	3,437	0	0	0	0	0	CONT.	CONT.
E0638 Airborne Defensive ECM	15,683	0	0	0	0	0	0	CONT.	CONT.
E2175 Tactical Air Electronic Warfare	40,212	76,186	75,355	121,304	139,847	90,901	70,455	CONT.	CONT.
R1742 EW Technical Development and Testing	1,150	832	846	844	832	852	878	3,400	14,819
R1882 Data Link Vulnerability Analysis	742	1,165	1,201	1,214	1,204	1,176	993	26,000	35,000
TOTAL	136,971	96,948	79,980	130,416	144,993	96,022	75,448	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This element includes development of electronic warfare systems for the United States Navy (USN), United States Marine Corps (USMC), and United States Army (USA) tactical aircraft, USMC helicopters, surface combatants, data link vulnerability assessments, USMC communications and non-communications jammers, and development and testing of electronic warfare devices for emergency contingencies.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N
PROGRAM ELEMENT TITLE: Electronic Warfare Development
PROJECT NUMBER: C1961
BUDGET ACTIVITY: 5
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C1961, Mobile Electronic Warfare Support System (MEWSS). Mobile Electronic Warfare Support System (MEWSS) is an electronic warfare suite of equipment configured in the highly mobile, survivable Light Armored Vehicle. This program develops a material change for the current, outdated Electronic Warfare (EW) suite. Threat tactical communications are rapidly advancing to complex, advanced modulations requiring computer-intensive, open architecture solutions. MEWSS fulfills the requirement to provide responsive EW support to maneuver commanders, which enhance the ability to defeat the enemy by isolating and suppressing the opposing fire control and command and control nets at a critical point of time in the battle. MEWSS will provide electronic over-watch of the entire electronic spectrum, freeze the enemy in place and help eliminate enemy counter-fire. MEWSS accomplishes this by detecting and locating threat sensors and advanced communications and also jamming advanced threat tactical communications. MEWSS incorporates Army Intelligence and Electronic Warfare Common Sensor (IEWCS) electronics including TACJAM-A EW/Communications Intelligence subsystem, Communications High Accuracy Location System-Exploitable, and the Common Module Electronic Intelligence (ELINT) system.

(U) FY 1993 ACCOMPLISHMENTS: Not applicable.

(U) FY 1994 PLAN: Not applicable.

(U) FY 1995 PLAN:

- (U) ($579) Integration into MEWSS EDM the objective CHALS-X subsystem and SILO 3 N-Channel direction finding system.
- (U) ($229) Design and installation of the MEWSS Product Improvement Program (PIP) reporting data link hardware.
- (U) ($700) Design and installation of the MEWSS PIP power unit and power distribution system.
- (U) ($750) Complete IEWCS equipment integration and factory testing.
- (U) ($300) Conduct multi-service developmental and operational tests on MEWSS EDM with other IEWCS platforms.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N
PROGRAM ELEMENT TITLE: Electronic Warfare Development
PROJECT NUMBER: C1961
BUDGET ACTIVITY: 5
DATE: 7 February 1994

(U) PROGRAM TO COMPLETION:

- (U) FY 1996: Conduct Milestone III on MEWSS PIP. Adapt and integrate into MEWSS EDM the TACJAM ECM subsystem. Conduct Follow on Operation Test and Evaluation for TACJAM. Design the incorporation of MEWSS modifications to allow targeting of additional advanced communications threats.

(U) WORK PERFORMED BY: IN-HOUSE: Army Project Manager, Signals Warfare, Warrenton, VA; Army CECOM Intelligence and Electronic Warfare Directorate, Warrenton, VA; NISE-W, Vallejo, CA; Sacramento Air Logistics Center, Sacramento, CA. CONTRACTORS: Electrospace, Incorporated, Richardson, TX; Lockheed-Sanders, Nashua, NH; American Electronics Laboratories Incorporated, Lansdale, PA; Watkins-Johnson Company, Savage, MD; ETA Technologies, Stafford, VA.

(U) RELATED ACTIVITIES:

- (U) PE 0604270A (IEWCS, TACJAM-A)
- (U) MEWSS is fully integrated in the IEWCS program as a fourth platform. A Memorandum of Agreement between Commander, Marine Corps Systems Command and Army Program Executive Office - IEW allows for close coordination.
- (U) PE 0305885G (Tactical Cryptologic Program)
- (U) The MEWSS program is joint with National Security Agency's Tactical Cryptologic Program, which provides a portion of the funds required for the system integration and development of the passive portion of TACJAM-A and the precision location system.

(U) OTHER APPROPRIATION FUNDS: Procurement funding ended in FY-92. Budget line item was 474900. Funding should be reinstated during POM process starting in FY-96.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N
PROGRAM ELEMENT TITLE: Electronic Warfare Development

PROJECT NUMBER: E0556
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: EW Counter Response

POPULAR NAME: EA-6B ADVANCED CAPABILITY (AC

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N
PROGRAM ELEMENT TITLE: Electronic Warfare Development
PROJECT NUMBER: E0556
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
ENGINEERING MILESTONES								
T&E MILESTONES	OT IIA 3/93		OT-IIIA (UEU) 3/95					
CONTRACT MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	52,506	1,669	0	0	0	0	0	CONT.
SUPPORT CONTRACT								
IN-HOUSE SUPPORT	18,266	12,255	0	3,869	3,110	3,093	3,122	CONT.
GFE/ OTHER	1,240	1,404	20	0	0	0	0	CONT.
TOTAL	72,012	15,328	20	3,869	3,110	3,093	3,122	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The EA-6B Weapon System is designed for jamming and destruction of enemy landbased, shipborne and airborne command, control and communications (C3) and radars associated with early warning, target acquisition surveillance, anti-aircraft artillery, and air-to-surface, surface-to-surface and surface-to-air missiles. In this capacity, it will support carrier based tactical aircraft and battle group operations in dense radar controlled environments. The efforts under this PE provide for the electronic countermeasure response to these advanced threat weapon systems and C3 networks which are expanding in density and technical complexity. This PE funds the continuing

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N
PROGRAM ELEMENT TITLE: Electronic Warfare Development
PROJECT NUMBER: E0556
BUDGET ACTIVITY: 5
Date: 7 February 1994

development or integration of all EW systems for the EA-6B Electronic Countermeasures Support Aircraft.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($16,898) Continued software development, logistics and test support for Radar Processor Group (RPG) and ALQ-149 (ADVCAP).
- (U) ($4,852) Continued integration of the RPG and ALQ-149 on the EA-6B ADVCAP.
- (U) ($30,000) Continued UEU Development Program.
- (U) ($4,650) Continued COCM and PCM programs for the EA-6B.
- (U) (N/A) Continued contractor acceptance test for Band 2/3.
- (U) (N/A) Continued delivery of Band 2/3 Engineering Development Models (EDM) 1 through 5.
- (U) ($682) USN continued Band 2/3 qualification and Electro Magnetic Interference (EMI) testing.
- (U) ($2,520) Continued Technology Upgrade for Teams (TUT) and ADVCAP Teams (ATEAMS) integration.
- (U) ($200) Began groundwork for integration of Software Development Station (SDS) at Naval Air Warfare Center Weapons Division (NAVAIRWARCENWPNDIV), Point Mugu, CA.
- (U) ($1,240) Completed OT-IIA testing of ALQ-149/RPG in support of Milestone IIA.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N
PROGRAM ELEMENT TITLE: Electronic Warfare Development
PROJECT NUMBER: E0556
BUDGET ACTIVITY: 5
Date: 7 February 1994

2. (U) FY 1994 PLAN:

- (U) ($300 FY 1993 Funding) Complete wing fatigue study analysis.
- (U) ($2,477 FY 1993 Funding) Commence integration of UEU into Improved Capability (ICAP) II.
- (U) ($8,193 FY 1993 Funding) Continue software development, logistics and test support for ICAP-II development programs.
- (U) ($10,000) Complete Joint Tactical Air Electronic Warfare Study (JTAEWS).
- (U) Accept delivery of five UEU EDMs.
- (U) Complete TUT integration.
- (U) Complete the UEU development program.
- (U) Complete delivery of Band 2/3 Engineering Development Models (EDM) 1 through 5.
- (U) Termination of ADVCAP by Assistant Secretary of the Navy, Research, Development and Acquisition (ASN(RDA)).

3. (U) FY 1995 PLAN.

- (U) ($5,328 FY 1994 Funding) Continue software support, logistics and test support for ICAP-II development programs.
- (U) ($20) In-house field support.
- (U) Complete ICAP-II UEU follow on test and evaluation (FOT&E) (OT-IIIA/MAR 95).
- (U) Complete integration of UEU on ICAP-II.
- (U) Continue COCM and PCM programs for the EA-6B. Level of effort commensurate with available funds.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N
PROGRAM ELEMENT TITLE: Electronic Warfare Development
PROJECT NUMBER: E0556
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, Pt. Mugu, CA; NAVAIRWARCENACDIV, Patuxent River, MD; NAVAIRWARCENWPNDIV, China Lake, CA; NRL, Washington, DC; NAVAIRWARCENACDIV, Trenton, NJ; NAVAIRWARCENACDIV, Warminster, PA; NAVAIRWARCENACDIV, Indianapolis, IN; and NAVSURFWARCENDIV, Crane, IN; COMOPTEVFOR, Norfolk, VA. CONTRACTORS: Grumman Aircraft Systems Division, Bethpage, NY; Lockheed Sanders, Inc., Nashua, NH; AIL Systems, Inc., Deer Park, NY; PRB Associates, Hollywood, MD; Teledyne ET, Mountain View, CA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Program reflects termination of Advanced Capability (ADVCAP) program. Remaining program consists of on-going efforts related to EA-6B ICAP II.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: The UEU Navy Decision Coordinating Paper (NDCP) was approved in 1985/4Q. The ALQ-149 NDCP was approved in FY 1988/2Q. TEMP 604 has been consolidated into the UEU/ALQ-149 TEMP (157-10 Revision 2). This will be the EA-6B TEMP and will address each of the individual Research and Development (R&D) programs and was approved by the Office of the Secretary of Defense (OSD) 27 May 1992.

G. (U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) APN Line 5	59,773	21,802	38,372	90,239	91,275	89,977	62,280	81,400	535,118
• (U) APN Line 1	36,283	0	0	0	0	0	0	0	53,260

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N
PROGRAM ELEMENT TITLE: Electronic Warfare Development

PROJECT NUMBER: E0556
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

J. (U) TEST AND EVALUATION:

	ADVCAP	MO/YR
	OT-IIA (OPERATIONAL TEST)	3/93

	UEU	MO/YR
	OT-IIIA (ICAP II FOT&E)	3/95

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N
PROGRAM ELEMENT TITLE: Electronic Warfare Development
PROJECT NUMBER: E2175
BUDGET ACTIVITY: 5
Date: 7 February 1994

PROJECT TITLE: Tactical Air Electronic Warfare

PICTURE NOT AVAILABLE

POPULAR NAME: TACAIR EW

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N PROJECT NUMBER: E2175 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Electronic Warfare Development BUDGET ACTIVITY: 5

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	ALE-47 NAVY MSIII 9/93	NAVY SSA FACILITY COMPLETE 6/94	NAVY SSA OPERATIONAL 6/95					
ALR-67(V)3			MSIIA 4/95	MSIII 2/96				
ALR-67(V)3 DOA		PDR 1/94		PDR 7/96	CDR 12/96			MSIII 4/00
AAED		CDR 6/94			MS II 8/97		MSIII 10/98	
IDECM			MSI/I. 4/95					MSIII 4/01
ENGINEERING MILESTONES		GENX INTERFACE COMPLETE 6/94	EXTENDED DISPENSERS COMPLETE 6/95					
ALR-67(V)3 DCR 10/93								
T&E MILESTONES								
ALR-67(V)3	DT/OT 5/93-4/94	TECHEVAL 4/94-4/95	OPEVAL 7/95-3/96					
ALR-67(V)3 DOA						DT 4/98	OT 4/99	
AAED	DTIIE 8/93-11/94	DECOY DT/OT 7/94	DECOY OPEVAL 12/94-6/95		MPLC DT II 12/96	SYSTEM OPEVAL 11/97-6/98 OT 11/97 FOT&E 7/98		
IDECM							DT 11/99	OT 12/00

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N
PROGRAM ELEMENT TITLE: Electronic Warfare Development
PROJECT NUMBER: E2175
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	* FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
CONTRACT MILESTONES								
ALR-67(V)3		OPTII 6/94	OPTIII 4/95					
AAED					LRIP 10/96	FRP 4/98		
IDAP					LRIP 7/97			
IDECM						DOWN SELECT	FRP 10/98	
IDECM			CONTRACT AWARD 4/95			OPTION 10/97		FRP 4/01

BUDGET	*FY 1993	**FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	23,692	53,091	47,874	86,180	98,550	58,210	45,110	CONT.
SUPPORT CONTRACT	4,970	1,882	2,274	1,710	1,710	1,740	1,740	CONT.
IN-HOUSE CONTRACT	23,233	9,023	12,262	27,064	29,387	11,987	9,741	CONT.
GFE/ OTHER	4,000	12,190	12,945	6,350	10,200	18,964	13,864	CONT.
TOTAL	55,895	76,186	75,355	121,304	139,847	90,901	70,455	CONT.

* In FY93, the project was E0638.
**In FY94 project E0638 and E2175 consolidated.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project develops various EW equipment including Radar Warning Receivers (RWR), Countermeasures (CM) dispenser systems, Radio Frequency Countermeasures (RFCM), Realistic Hostile EW threat training simulators for use by the Fleet Electronic Warfare Support Group (FEWSG) and Defensive Electronic Countermeasures (DECM). RFCM, Infrared (IR) jammers, expendable devices (flares, chaff and electronic expendables), laser warning receivers, missile warning equipment and hostile threat training simulators for use by FEWSG are to increase survivability. Numerous laboratory Electronic Warfare (EW) efforts (hardware and software), improvements to existing EW systems, Electronic Warfare Software Support Activity (EWSSA) and system integration efforts for the ALR-67(V)3 (Advanced Special Receiver (ASR)), ALQ-156A Integrated Defense Avionics Program (IDAP), and ALE-50 (Advanced Airborne Expendable Decoy (AAED)) programs are funded under this project. The IDAP program was terminated after early retirement of the A-6 was

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announced. As risk reduction for the ALE-50, a subsystem of IDAP testing continued on the A-6 test bed and the QF-4. No follow-on customer for the ALQ-156A (IDAP) exists. The F-18 E/F is the lead platform for the ALE-50.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($19,231) ALR-67(V)3: Continued Engineering and Manufacturing Development (EMD). Delivered 7 systems and began Development Test (DT).
- (U) ($20,981) AAED: Conducted DT, Live Fire Test, Aircraft Integration Test, and System Quality Test. IDAP: Conducted DT, Live Fire Test, Aircraft Integration Test, and System Quality Test.
- (U) ($1,800) FEWSG: Continued FEWSG mission and Tactical Simulation Development (TSD) avionics upgrades. Initiated dual-mode AN/ALQ-170 development. Completed AN/ULQ-21s development.
- (U) ($ 2,151) ALE-47: Continued FOT&E on various Navy aircraft. Production decision 4Q/FY93.
- (U) ($ 2,115) IR Decoys, IRCM and LASER CM: Participated with Air Force in Joint Advanced development.
- (U) ($ 200) EWSSA: Continued software development and development of EWSSA lab facilities.
- (U) ($ 450) Electro-Optical Countermeasures (EOCM): Monitored Advanced Research Projects Agency advanced development.
- (U) ($3,740) RFCM: Continued technique development.
- (U) ($3,346) APR-39(XE-2): Incorporated corrections to OPEVAL deficiencies and entered DT/OT.
- (U) ($1,881) Included travel cost for Project E0638 and Management/Professional Support Services.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N PROJECT NUMBER: E2175 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Electronic Warfare Development BUDGET ACTIVITY: 5

2. (U) FY 1994 PLAN:

- (U) ($60,230) ALR-67(V)3: Conduct Development Test/Operational Test (DT/OT) flight testing; continue EMD; procure additional test articles for OPEVAL.
- (U) ($6,552) AAED: Conduct DT/OT Live Fire on Decoy; begin development. IDAP: Close out program with live fires as risk reduction for IDECM program.
- (U) ($5,060) IDECM: Field support to initiate program related documentation including Statements of Work (SOW), specifications; participation in Cost and Operational Effectiveness Analysis (COEA) efforts; funding for performance of F-18 EW COEA; McDonnell Douglas (MCAIR) A-Kit study contract for first look at integration into F/A-18E/F.
- (U) ($1,872) FEWSG: Continue AN/ALQ-170 dual mode development. Initiate FEWSG Airborne Electronic Warfare Systems (FAEWS) Electronic Support Measures (ESM) upgrades; initiate Adaptive Cross Polarization development for AN/ALQ-167; Complete airborne intercept development; initiate pre-launch lock-on development; initiate dual mode transmit development for AN/AST-6.
- (U) ($200) EWSSA: Continue software development and development of EWSSA Lab facilities. Focus on automating the user data file (threat file).
- (U) ($500) APR-39 (XE-2): Complete DT and begin OT.
- (U) ($480) AN/ALE-47: Conduct engineering and development of AN/ALE-47 extended dispenser assemblies and component item breakout and complete development and testing of the interface hardware and software for the AN/ALE-47 to program GEN-X.
- (U) ($1,292) Includes travel and Management/Professional Support Services.

3. (U) FY 1995 PLAN:

- (U) ($18,835) ALR-67(V)3: Complete DT/OT flight testing; conduct OPEVAL; develop Consolidated Automated Support System Test Program Sets (CASS TPS) (2nd increment); update contractor system to support OPEVAL; develop Software Support Activity (SSA); continue Logistics Development.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 06042? PROJECT NUMBER: E2175 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Electronic Warfare Development BUDGET ACTIVITY: 5

- (U) ($4,000) ALR-67(V)3: Begin development of a Direction of Arrival (DOA) Improvement Program.
- (U) ($20,294) AAED: Complete OT on decoy; begin integration efforts on F-18 E/F and F-14 A/B/D.
- (U) ($26,769) IDECM: Award contract to two vendors to start repackage and integration phase; MCAIR A-Kit study contract for integration into F/A-18E/F.
- (U) ($2,761) FEWSG: Complete AN/ALQ-170 dual mode development. Continue FAEWS ESM system upgrades. Complete ANQ-167 adaptive Cross Polarization development. Continue dual mode transmit development for AN/AST-6. Complete pre-launch lock-on development for AN/AST-6.
- (U) ($500) EWSSA: Continue software development and development of EWSSA lab facilities.
- (U) ($200) AN/ALE-47: Complete all training of AN/ALE-47 SSA personnel and certify organic capability. Complete development and test of AN/ALE-47 extended dispensers for kinematic expendables.
- (U) ($500) APR-39 (XE-2): Continue and complete OT.
- (U) ($1,496) Includes travel and Management/Professional Services Support.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NAWC-AD, Patuxent River, MD; NAWC-WD, Pt. Mugu, CA; NAWC-WD, China Lake, CA; NADEP, Jacksonville, FL; NAWC-AC, Indianapolis, IN NAWC-AD, Warminster, PA; NAVWPNSUPPCEN, Crane IN; NAWC-AD, Trenton NJ and Lakehurst, NJ. CONTRACTORS: RAYTHEON, Goleta, CA; Lockheed Sanders, Nashua, NH; Hughes Aircraft, Los Angeles, CA; Grumman Aerospace, Bethpage, NY; Westinghouse, Baltimore MD; ITT, Nutley, NJ: Tracor, Austin TX; Loral Infrared and Imaging Systems, Lexington, MA.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N PROJECT NUMBER: E2175 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Electronic Warfare Development BUDGET ACTIVITY: 5

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: The ALR-67(V)3 program has been modified to include a DOA capability beginning in FY-95 in order to enhance systems ability to meet requirements for Passive Precision Ranging/Targeting. The DOA will contribute to Multi-Sensor Integration targeting solutions by providing air-to-ground passive emitter location and air-to-air precision direction finding. In addition, an Integrated Defensive Electronic Countermeasures System (IDECM) will be initiated in FY94 which integrates Radar Warning Receivers, Decoys, a New Technique Generator, MAWS and Advanced Expendables with associated cockpit displays to provide increased survivability against IR/RF threats.

2. (U) Schedule changes: AAED: Inventory objective for ALE-50 shifted from A-6 Block 1A to F-18 E/F and F-14 Block 1 upgrade with the cancellation of the A-6 program. ALR-67(V)3: The MSIIA (7/94 in FY94 submission) decision associated with the test asset procurement has been canceled; these assets are now being procured as part of the E&MD program. MSIIB (3Q95 in FY94 submission) formerly associated with the LRIP procurement has been redesignated as MSIIA.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

ALR-67(V)3: OR Update 7/93
TEMP Update 9/93
AAED: OR Update 10/93
TEMP Update 12/93
IDAP: OR 8/86
TEMP 3/88
EWSG/Master Plan CINCLANTFLT N95/5273 dtd 9/3/91

G. (U) RELATED ACTIVITIES:

- (U) PE 0604270F, Joint Service programs: ALE-47 Air Force Lead.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N PROJECT NUMBER: E2175 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Electronic Warfare Development BUDGET ACTIVITY: 5

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) APN Line 47 AN/ALR-67(V)2	56,850	0	0	0	0	0	0	0	206,099
• (U) APN Line 47 AN/ALR-67(V)3	0	0	0	54,243	100,753	86,836	84,590	375,685	702,107
• (U) APN Line 39 FEWSG	6,609	11,506	8,931	560	478	92	95	0	130,846
• (U) APN Line 47 APR-39	10,014	35,552	4,424	19,895	0	0	0	65,796	173,584

- (U) Applicable airframe appropriations will have these EW systems installed for training and tactical self-protection. Potential users include EP-3J, EA-6B, F-14, F/A-18, NKC-135A, and a wide array of USMC & USN helicopters.

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

J. (U) TEST AND EVALUATION:

- (U) ALR-67(V)3: DT/OT 5/93-4/94 TECHEVAL 4/94-4/95 OPEVAL 7/95-3/96
- (U) AAED: DECOY DT/OT-7/94 DTIIE 8/93-11/94 DECOY OPEVAL 12/94-6/95 MPLC DT II 12/96 OT 11/97 SYSTEM OPEVAL 11/97-6/98 FOT&E 7/98
- (U) IDECM: DT 11/99 OT 12/00

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N
PROGRAM ELEMENT TITLE: Electronic Warfare Development
PROJECT NUMBER: R1742
BUDGET ACTIVITY: 5
Date: 7 February 1994

C. (u) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R1742, EW Technical Development and Testing. This program, referred to as "Skunkworks", establishes a standing research group for developing and testing low cost, high payoff electronic warfare (EW) systems to meet warfighting requirements during crisis situations. The program typically produces a new product at the end of each 12 month period. This unique requirement ensures that the team continually functions in a quick reaction mode, and is therefore well trained in all aspects of rapid response systems engineering and fabrication. Each year, in the absence of a critical situation, the team develops, demonstrates and tests a prototype EW system which meets a specific Navy requirement.

(u) FY 1993 ACCOMPLISHMENTS:

- (u) ($670) Developed and tested an airborne pod which dispenses a

- (u) ($430) Modified program to provide response to ADM Boorda (CINCUSNAVEUR) to meet specific,

- (u) ($50) Conducted developmental flight tests which verified the technical performance of the

(u) FY 1994 PLAN:

- (u) ($332) Conduct additional "operationally realistic" developmental testing on the FY-93 Phase I and Phase II products in response to continued CINCUSNAVEUR interest Develop test plan required to posture project for optimal participation in the Band 4 Tests planned for May 1994. Participate in tests and evaluate results.

- (u) ($500) Obtain flight clearance for in the ALE-37 Pod. Obtain clearance for for carriage up to knots, maneuvering up to G's and G. Objective is to test realistic and scenarios using theater/mission specific dispensing platform.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N
PROGRAM ELEMENT TITLE: Electronic Warfare Development
PROJECT NUMBER: R1742
BUDGET ACTIVITY: 5
DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($665) Develop a miniature [ ] capable of combating signal modulated, [ ] including those which incorporate [ ] techniques.
- (U) ($181) Plan and conduct laboratory and field demonstrations. Plan and conduct system field tests.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington D.C.; NAVAIRWARCENACDIV, Patuxent River, MD; NAVSURFWARCENDIV, Dahlgren, VA. CONTRACTORS: Alloy Surfaces Co., Wilmington, DE.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N
PROGRAM ELEMENT TITLE: Electronic Warfare Development
PROJECT NUMBER: R1882
BUDGET ACTIVITY: 5
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R1882 Datalink Evaluation Analysis (DVAL), DVAL is an Office of the Secretary of Defense directed program with the Commander, Naval Security Group designated as Executive Agent. It is the only program in the Navy that evaluates anti-jam (AJ) and low probability of intercept (LPI) capabilities in Navy systems using the electromagnetic spectrum. DVAL typically assesses systems during the developmental stages of the acquisition cycle. It identifies methods for reducing signal vulnerabilities to hostile exploitation. It is also employed after fleet introduction for use in developing countermeasure tactics. In FY-94 it will incorporate another facet of vulnerability assessment, an Electronic Counter-Countermeasures (ECCM) Requirements and Assessment Manual (ERAM) which, when completed, will provide a tool for program sponsors and managers to clearly state ECCM requirements "up front" in the research and development process. ERAM consists of five manuals (increments) providing realistic engagement scenarios and measures of effectiveness to facilitate writing of contract specifications, defining of testing environments and provision of tools for fleet training and tactics.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($150) Completed Common High Band Data Link (CHBDL) susceptibility reports, ending project.
- (U) ($65) Completed PIANO Radio assessment with report on at-sea collection and analysis.
- (U) ($70) Completed final Joint Tactical Information Distribution System (JTIDS) susceptibility report with recommendations.
- (U) ($257) Developed DVAL Military Strategic Tactical and Relay Satellite (MILSTAR) test plan and identified test equipment for Follow-on Test and Evaluation (FOT&E).
- (U) ($85) Completed susceptibility report of Single Channel Ground Airborne Radio System (SINCGARS).
- (U) ($55) Began pre-test analysis of Battle Group Cooperative Engagement Capability (BGCEC).
- (U) ($60) Began pre-test analysis of the Tactical Intelligence/Integrated Special Intelligence Communications Subsystems (TACINTEL II/INSICOM).

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604270N
ELEMENT TITLE: Electronic Warfare Development

PROJECT NUMBER: R1882
BUDGET ACTIVITY: 5

DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($330) Complete pre-test analysis of BGCEC and TACINTEL II/INSICOM. Begin susceptibility assessments of these systems.
- (U) ($360) Develop test plan and equipment for assessment of Navy Extremely High Frequency (EHF) Satellite Program (NESP) terminals that enable communications via the MILSTAR satellite system. FOT&E schedule depends on date of launch of MILSTAR satellite.
- (U) ($475) Publish ERAM Increment V; produce draft of Joint Army/Navy developed ERAM Communications Annex; release revision 2, ERAM Increment III; release revision 3, ERAM Increment II.

(U) FY 1995 PLAN:

- (U) ($310) Complete susceptibility assessments of BGCEC and (TACINTEL II/INSICOM).
- (U) ($400) Begin pre-test analysis of new system(s) to be designated by OPNAV.
- (U) ($491) Publish ERAM Communications Annex; release revision 4, ERAM Increment I; release revision 1, ERAM Increment IV.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL Washington DC; NRAD RDT&E DIV San Diego CA, CONTRACTORS: Johns Hopkins University, Applied Physics Laboratory, Laurel, MD; ERAM work performed by NAVAIRWARCENWPNDIV China Lake, CA.

(U) RELATED ACTIVITIES:

- (U) PE 0603261N, Tactical Airborne Reconnaissance.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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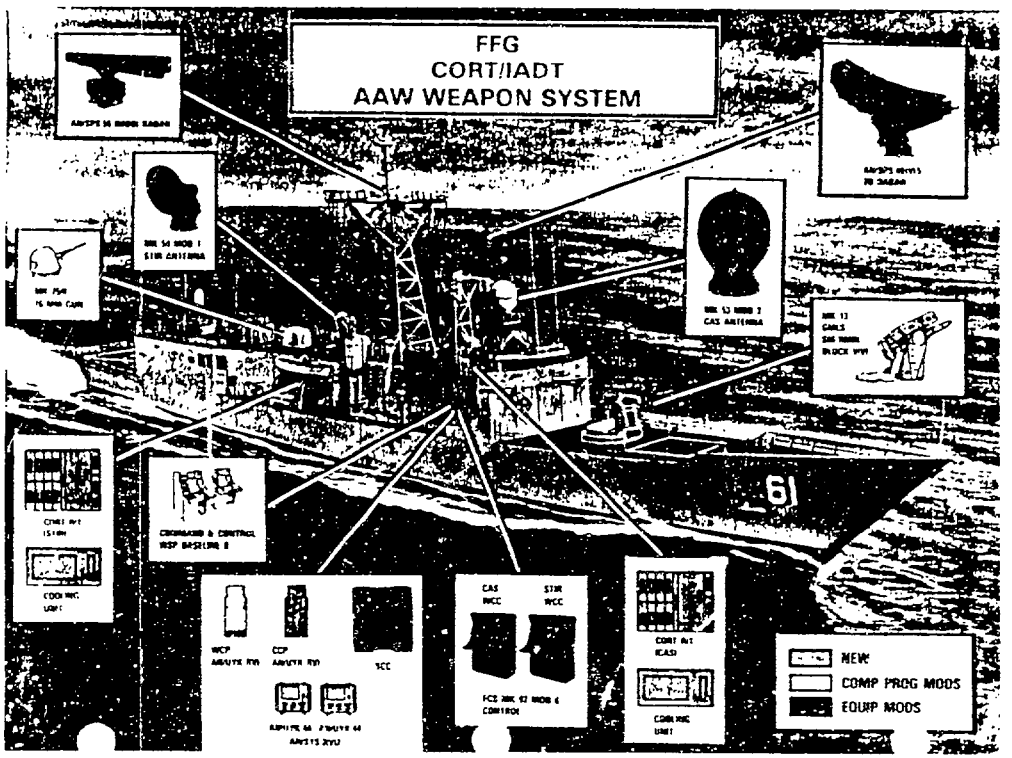
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604301N
PROGRAM ELEMENT TITLE: MK 92 Fire Control System (FCS) Upgrade

PROJECT NUMBER: S0179
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: MK 92 FCS Upgrade



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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604301N
PROGRAM ELEMENT TITLE: MK 92 Fire Control System (FCS) Upgrade
PROJECT NUMBER: S0179
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
ENGINEERING MILESTONES								
T&E MILESTONES								
CONTRACT MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	1,405	766	1,646	1,632	1,557	1,413	1,422	CONT.
SUPPORT CONTRACT								
IN-HOUSE SUPPORT	426	285	330	331	325	375	375	CONT.
GFE/ OTHER								
TOTAL	1,831	1,051	1,976	1,963	1,882	1,788	1,797	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program element supports development, integration and testing of improvements to the FCS MK 92 Mod 2 and the FCS MK 92 Mod 6 Coherent Receiver Transmitter (CORT) Upgrade. This program includes system engineering, integration and testing of all components of the FFG 7 Class Anti-Ship Missile Defense (ASMD) mid-life upgrade.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604301N
PROGRAM ELEMENT TITLE: MK 92 Fire Control System (FCS) Upgrade
PROJECT NUMBER: S0179
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($819) Developed the FCS MK 92 MOD 6 Frigate AAW Weapon System Trainer (FAST) to support FFG-7 Class Battle Force Tactical Training (BFTT) program milestones. Evaluated FCS MK 92 MOD 6 FAST Advanced Development Model (ADM) at the land-based test facility. Planned execution of FCS MK 92 MOD 6 FAST ADM testing at-sea.
- (U) ($411) Evaluated FCS MK 92 MOD 6/Standard Missile-1 Block VIB concept at-sea firing test (completed in September 1992) in support of FY 94 IOC milestones.
- (U) ($95) Planned execution and supported FCS MK 92 MOD 6/Standard Missile-1 Block VIB full up round at-sea firing test in support of FY 94 IOC milestones.
- (U) ($481) Continued analysis of weapon system capabilities and limitations in operating against various threat in various environments.
- (U) ($25) Support analysis/tradeoff studies to coordinate and define element roles for the FFG 7 AAW Weapon System within the ship self defense strategy.

2. (U) FY 1994 PLAN:

- (U) ($225) Continue evaluation of FCS MK 92 MOD 6 FAST in preparation for production prototype procurement FY 96 milestone. Conduct FCS MK 92 Mod 6 FAST ADM at-sea testing.
- (U) ($303) Evaluate Standard Missile-1 Block VIB full up round at sea test data. Support FCS MK 92 MOD 6/Standard Missile-1 BLK VIB full up round at-sea firing test in support of FY 94 IOC milestones.
- (U) ($195) Develop an improved automatic weapon system scheduler for FCS MK 92 Combat System integration.
- (U) ($23) Support analysis/tradeoff studies to coordinate and define element roles for the FFG 7 AAW Weapon System within the ship self defense strategy.
- (U) ($25) Evaluate and at-sea test CAS Antenna heavy duty transmission.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604301N
PROGRAM ELEMENT TITLE: MK 92 Fire Control System (FCS) Upgrade
PROJECT NUMBER: S0179
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($280) Develop Commercial-off-the-shelf Affordable Near Term Deficiency Correcting ORDALT (CANDO) concepts to engineer solutions to FCS MK92 MODS 2/6 to detect small targets in near-land environments, within regions of Multiple Interval Clutter (MIC).

3. (U) FY 1995 PLAN:

- (U) ($959) Test and evaluate the FCS MK92 MOD2 CAS CANDO solution to reliably detect, acquire and automatically engage low-flying, small radar cross section anti-ship missile threats, defending ship against today's threat. Evaluate integration of SM 1 V1B into the FFG7 AAW FCS MK92 MOD 2 configuration with at-sea testing.

- (U) ($100) Develop FCS MK 92 MOD 6 track processing improvement to reduce susceptibility to clutter and electromagnetic counter measures and improve coast mode.

- (U) ($100) Investigate concepts to improve low elevation continuous wave illuminator performance against small targets.

- (U) ($50) Support analysis/trade-off studies to coordinate and define elements roles for the FFG 7 AAW Weapon System within ship self defense strategy.

- (U) ($767) Continued engineering and prototype development to test concepts to solve detection and engagements of threat targets in MIC.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: COMOPTEVFOR, Norfolk, VA; NAVSURFWARCENDIV, Port Hueneme, Ca; NAVAIRWARCENWPNDIV, Pt Mugu, Ca; NAVAL WARFARE ASSESSMENT CENTER, Seal Beach, Ca; SURFACE WARFARE DEVELOPMENT GROUP, Norfolk, Va.; Naval Research Lab, Washington, D.C.; CONTRACTORS: Paramax Systems Corporation, Great Neck, NY; Johns Hopkins University, Applied Physics Laboratory, Laurel, MD; Vitro Corporation, Silver Spring, MD.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604301N
PROGRAM ELEMENT TITLE: MK 92 Fire Control System (FCS) Upgrade
PROJECT NUMBER: S0179
BUDGET ACTIVITY: 5
Date: 7 February 1994

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN# 34520800									
	28,740	697	6,642	8,336	9,158	3,625	3,057	CONT.	60,455

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

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

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604307N
PROGRAM ELEMENT TITLE: AEGIS Combat System Engineering
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
K1447 Combat Systems Improvements	76,274	75,994	79,044	64,858	52,548	61,726	75,345	CONT.	CONT.
K1776 AEGIS Weapon System Mods	6,896	2,653	4,802	4,722	4,685	4,652	4,616	CONT.	CONT.
K1937 DDG Weapons Development	27,394	23,985	10,361	0	0	0	0	0	167,017
TOTAL	110,564	102,632	94,207	69,580	57,233	66,378	79,961	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The AEGIS Combat System provides immediate and effective capability to counter the current and expected air, surface and sub-surface threats as articulated in Office of Naval Intelligence (ONI) System Threat Assessment Report, ONI TA #046-93 dated May 1993. Since the CG 47 and DDG 51 ships extend into the 21st century, changes in the threat capability and advances in technology such as fiber optics and distributed architecture, local area networks will require corresponding Weapon System and Combat System changes. This program provides the Combat System engineering and selected weapons development necessary for such a continued increase in the capability of the AEGIS Combat System in AEGIS cruisers and destroyers. It will also allow later ships to take advantage of maturing equipments, weapons systems and computer architectures developed in other Navy Research and Development programs. Modifications of AEGIS Weapon System computer programs must be made to integrate these capabilities into the AEGIS Combat System so that battle effectiveness will be retained against the evolving threat. Weapon and Combat System upgrades will be backfitted into CG 47 Class and DDG 51 Class ships already in the Fleet.

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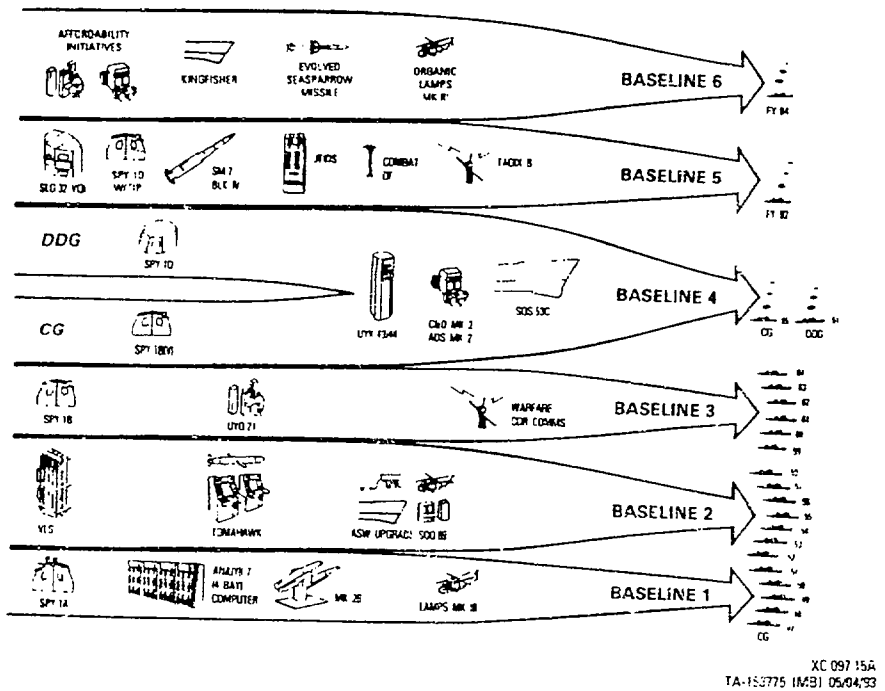
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604307N
PROGRAM ELEMENT TITLE: AEGIS Combat System Engineering
PROJECT NUMBER: K1447
BUDGET ACTIVITY: 5
DATE: 7 February 1994

PROJECT TITLE: Combat Systems Improvements

COMBAT SYSTEM EVOLUTION



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POPULAR NAME: Combat Systems Improvements

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604307N PROJECT NUMBER: K1447 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: AEGIS Combat System Engineering BUDGET ACTIVITY: 5

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	M/S III 1/93							
ENGINEERING MILESTONES	B/L5 PHI SQT 7/93 B/L5 PHII CDR 1/93 B/L5 PHIII SDR 2/93 B/L5 PHIII PDR 6/93	B/L5 PHII SQT 9/94 B/L5 PHIII CDR 1/94 B/L6 SDR 4/94 B/L6 PDR 9/94	B/L5 PHIII SQT 9/95 B/L6 CDR 3/95		B/L7 SDR TBD/97 B/L6 SQT 11/96	B/L7 PDR TBD/98	B/L7 CDR TBD/99	
T&E MILESTONES								
CONTRACT MILESTONES	B/L5 PHII Award 11/92	B/L5 PHIII Award 1/94	B/L6 FLIIA Award 2/95		B/L7 AP 12/96	B/L7 Award TBD/98		

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	67,972	67,855	70,008	55,508	43,031	51,114	63,755	CONT.
SUPPORT CONTRACT	149	222	222	222	222	222	222	CONT.
IN-HOUSE SUPPORT	8,038	7,792	8,689	9,008	9,170	10,265	11,243	CONT.
GFE/ OTHER	115	125	125	120	125	125	125	CONT.
TOTAL	76,274	75,994	79,044	64,858	52,548	61,726	75,345	CONT.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604307N
PROGRAM ELEMENT TITLE: AEGIS Combat System Engineering
PROJECT NUMBER: K1447
BUDGET ACTIVITY: 5
DATE: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENTS AND SYSTEM CAPABILITIES: This project provides AEGIS Cruiser and Destroyer Combat System upgrades to integrate new equipments and systems to maintain pace with the threat and to capture advances in technology such as fiber optics and distributed architecture. The ships are upgraded in blocks and the Combat System in baselines. Baseline 2 (CG 52-58) consisted of the Vertical Launching System, TOMAHAWK Weapon System, and Anti-Submarine Warfare upgrades. Baseline 3 (CG 59-64) included the AN/SPY-1B radar and AN/UYQ-21 consoles. Baseline 4 (CG 65-73) integrated the AN/UYK-43/44 computers with superset computer programs developed for the DDG 51. Baseline 4 is the base Combat System for DDG 51-67. Baseline 5 is targeted for FY 1992 ships and includes the Joint Tactical Information Distribution System (JTIDS)/Command and Control Processor, TADIL J, Combat Direction Finding, Tactical Data Information Exchange System, AN/SLQ-32(V)3 Active Electronic Countermeasures and AEGIS Extended Range (ER) Missile. Baseline 5 will be developed in three steps (phases): Phase I integrates AEGIS ER and supports the missile Initial Operational Capability; Phase II integrates all planned upgrades except for JTIDS so they can be backfitted into Baseline 4 ships (the computer programs can operate in Baseline 4 ships whether any or all of the Baseline 5 new systems are installed); and Phase III integrates JTIDS into the AEGIS Combat System. Baseline 6 is planned for the last ship in FY 1994 and will include embarked helicopters, Evolved SEA SPARROW Missile (when available), Fiber Optics as applied to Data Multiplexing System and Interior Voice Communications System, and implementation of affordability initiatives. In addition, the Radar Set Controller Environment Simulator (RSCES) and Battle Force Tactical Trainer (BFTT) will be integrated into the Baseline 6 Combat System. The AEGIS Combat System will continue to be upgraded at approved intervals. Beginning with the first ship in FY 1999, modifications planned as Baseline 7 upgrades include upgrades to the AN/SPY-1D radar system, integration of Cooperative Engagement Capability and Anti-Tactical Ballistic Missile capability, and distributed computer architecture with fiber optics.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:
   - (U) ($4,600) Completed computer program coding, debugging and testing of AEGIS ER integration into the AEGIS Weapon System (Baseline 5 Phase I). Conducted system demonstration at the Combat System Engineering Development (CSED) Site.
   - (U) ($16,500) Completed design specifications and conducted Critical Design Review (CDR) of Baseline 5 Phase II (less JTIDS). Commenced computer program coding, debugging and testing at the CSED Site for integration into AEGIS Combat System.
   - (U) ($12,406) Completed system definition, conducted System Design Review (SDR) and Preliminary Design Review (PDR), and commenced design specifications for Baseline 5 Phase III (with JTIDS).
   - (U) ($6,400) Performed system definition to integrate Baseline 6 upgrades into the AEGIS Combat System.
   - (U) ($8,900) Provided the RDT&E shares of operations and maintenance of the CSED Site, Program Generation Center, Computer Program Test Site, and Land Based Test Site.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604307N
PROGRAM ELEMENT TITLE: AEGIS Combat System Engineering
PROJECT NUMBER: K1447
BUDGET ACTIVITY: 5
DATE: 7 February 1994

- (U) ($17,781) Provided for the participation of Navy laboratories and field activities to perform the engineering and scientific services necessary to monitor and direct the baseline efforts.
- (U) ($3,000) Began development of optical disk upgrade to memory storage device (UYK-16s).
- (U) ($6,687) Began development of adjunct processor which will provide additional computing capacity required for any future (post Baseline 5 Phase III) Combat System upgrade.

2. (U) FY 1994 PLAN:
- (U) ($400) Resolve any problems identified during CSED Site system demo of Baseline 5 Phase I.
- (U) ($12,600) Complete Baseline 5 Phase II computer program coding, debugging, and testing, and perform the Systems Qualification Test (SQT) at the CSED Site.
- (U) ($17,797) Conduct Baseline 5 Phase III CDR and commence computer progr coding, debugging, and testing at the CSED Site to integrate Baseline 5 Phase III into the AEGIS Combat System.
- (U) ($18,258) Conduct Baseline 6 SDR and PDR. Commence design specifications.
- (U) ($9,000) Provide the RDT&E share of operations and maintenance of the CSED Site, Program Generation Center, Computer Program Test Site, and Land Based Test Site.
- (U) ($17,939) Provide for the participation of Navy laboratories and field activities to perform the engineering and scientific services necessary to monitor and direct the baseline efforts.

3. (U) FY 1995 PLAN:
- (U) ($3,000) Resolve any problems identified during CSED Site system demo of Baseline 5 Phase II.
- (U) ($12,208) Complete computer program coding, debugging, and testing to integrate Baseline 5 Phase III into the AEGIS Combat System. Conduct integration of Baseline 5 Phase II at the CSED Site and conduct system demonstration.
- (U) ($20,550) Continue Baseline 6 design specifications and conduct a CDR. Start computer program coding, debugging, and testing to integrate Baseline 6 into the AEGIS Combat System.
- (U) ($2,000) Begin system definition to integrate RSCES and BFTT into the Baseline 6 Combat System.
- (U) ($14,210) Begin system definition to integrate Baseline 7 upgrades including AN/SPY-1D radar upgrade Engineering Development Model 4B into the AEGIS Combat System.
- (U) ($9,200) Provide the RDT&E share of operations and maintenance of the CSED Site, Program Generation Center, Computer Program Test Site, and Land Based Test Site.
- (U) ($17,876) Provide for the participation of Navy laboratories and field activities to perform the engineering and scientific services necessary to monitor and direct the baseline efforts.

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

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604307N
PROGRAM ELEMENT TITLE: AEGIS Combat System Engineering
PROJECT NUMBER: K1447
BUDGET ACTIVITY: 5
DATE: 7 February 1994

D. (U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDTE DIV, San Diego, CA; NAVSURFWARCENDIV, Dahlgren, VA; NWS, Concord, CA; NWAC, Corona, CA; NAVAIRWARCENWPNDIV, Point Mugu, CA; and NRL, Washington, DC. CONTRACTORS: Martin Marietta, Moorestown, NJ, and Syracuse, NY; Raytheon Corporation, Wayland, MA; VITRO Corporation, Silver Spring, MD; and Johns Hopkins Univ/APL, Laurel, MD.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology Changes: Data in previous budget not available for comparison.

2. (U) Schedule Changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

•	(U) TLR, Rev 1, Chg 1	8/85
•	(U) NDCP 1337, Rev 1, Chg 1	9/86
•	(U) TEMP 801, Rev 6	2/92
•	(U) NTP S-30-8512D/D	6/92
•	(U) Acq Plan AEGIS PMS400G-91-01	12/92

G. (U) RELATED ACTIVITIES:

- (U) PE 0603755N (Ship Self Defense)
- (U) PE 0604366N (Standard Missile Improvements)
- (U) PE 0603216C (Theater Ballistic Missile Defense)
- (U) PE 0604216C (Theater Ballistic Missile Defense)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604307N
PROGRAM ELEMENT TITLE: AEGIS Combat System Engineering
PROJECT NUMBER: K1447
BUDGET ACTIVITY: 5
DATE: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) SCN LI2122	3,230,015	2,637,872	2,697,690	2,822,982	2,849,891	2,915,874	3,016,974	CONT.	CONT.
• (U) OPN LI5246	107,763	29,594	35,567	60,631	31,632	13,293	45,252	CONT.	CONT.

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

J. (U) TEST AND EVALUATION: T&E milestones are to be determined.

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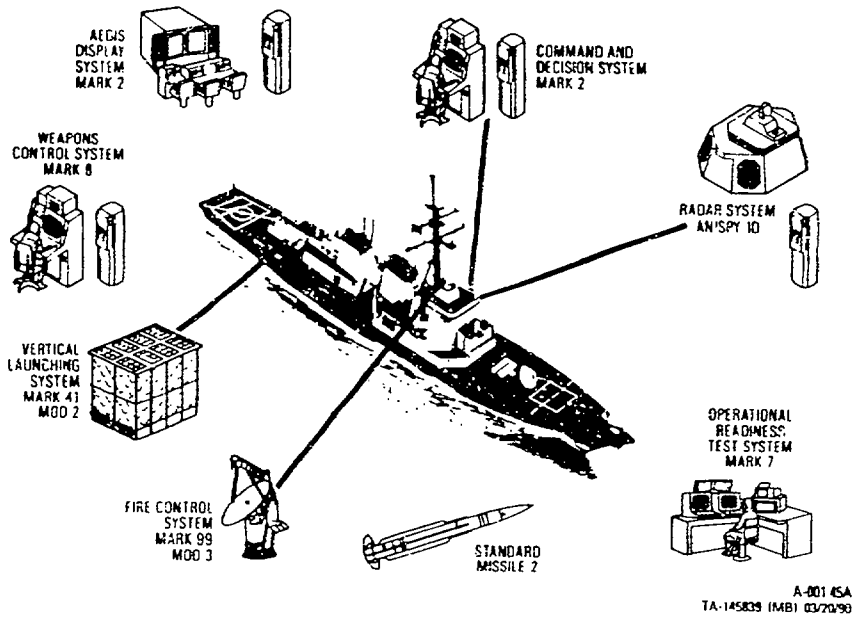
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604307N
PROGRAM ELEMENT TITLE: AEGIS Combat System Engineering
PROJECT NUMBER: K1776
BUDGET ACTIVITY: 5
DATE: 7 February 1994

PROJECT TITLE: AEGIS Weapon System Mods

AEGIS WEAPON SYSTEM MARK 7 MOD 6



POPULAR NAME: AEGIS Weapon System Mods

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604307N PROJECT NUMBER: K1776 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: AEGIS Combat System Engineering BUDGET ACTIVITY: 5

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
ENGINEERING MILESTONES								
T&E MILESTONES								
CONTRACT MILESTONES	Award 9/93							

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL PROGRAM (TO COMPLETE)
MAJOR CONTRACT	5,804	2,553	4,382	4,302	4,265	4,232	4,196	CONT.
SUPPORT CONTRACT	134	0	120	120	120	120	120	CONT.
IN-HOUSE SUPPORT	858	0	200	200	200	200	200	CONT.
GFE/ OTHER	100	100	100	100	100	100	100	CONT.
TOTAL	6,896	2,653	4,802	4,722	4,685	4,652	4,616	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENTS AND SYSTEM CAPABILITIES: This program provides for modifications to the AEGIS Weapon System MK-7 to counter the threat as articulated in Office of Naval Intelligence (ONI) System Threat Assessment Report, ONI TA #046-93 dated May 1993. The modifications will be backfitted into CG 47 Class and DDG 51 Class ships already in the fleet.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604307N
PROGRAM ELEMENT TITLE: AEGIS Combat System Engineering
PROJECT NUMBER: K1776
BUDGET ACTIVITY: 5
DATE: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($3,600) Coded, tested, and debugged computer program for Operational Readiness Test System (ORTS) Man-Machine Interface (MMI) upgrade. Commenced design of ORTS MMI upgrade equipment.
- (U) ($3,296) Continued to develop computer program algorithms to improve Anti-Air Warfare (AAW) system performance against various Deceptive Electronic Countermeasures (DECM) threats.

2. (U) FY 1994 PLAN:

- (U) ($2,400) Complete ORTS MMI upgrade equipment fabrication and computer program code, test, and debug.
- (U) ($253) Conduct system testing in preparation for demonstration of ORTS MMI upgrade at the Combat System Engineering Development (CSED) Site in FY 95.

3. (U) FY 1995 PLAN:

- (U) ($334) Conduct ORTS MMI upgrade CSED Site demonstration.
- (U) ($2,000) Develop ORTS MMI upgrade Ordnance Alteration proof-in kit for land-based integration and test.
- (U) ($2,468) Continue to develop computer program algorithms to improve AAW system performance against various DECM threats.

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

D. (U) WORK PERFORMED BY: IN HOUSE: NAVSURFWARCENDIV, Dahlgren, VA; NAVSURFWARCENDIV, Port Hueneme, CA; and NWS, Concord, CA. CONTRACTORS: Martin Marietta, Moorestown, NJ; Raytheon Corporation, Wayland, MA; Motorola Corp., Scottsdale, AZ; and FMC, Minneapolis, MN.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604307N
PROGRAM ELEMENT TITLE: AEGIS Combat System Engineering
PROJECT NUMBER: K1776
BUDGET ACTIVITY: 5
DATE: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) DCP-134 3/78 (except waiver ltr)
- (U) TLR, Rev 1, Chg 1 12/82
- (U) ILS Plan 123-P/S 5/83
- (U) NTP-30-7707B 2/88
- (U) TEMP 100, Rev 3 1/89

G. (U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN LI5246	107,763	29,594	35,567	60,631	31,632	13,293	45,252	CONT.	CONT.

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

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

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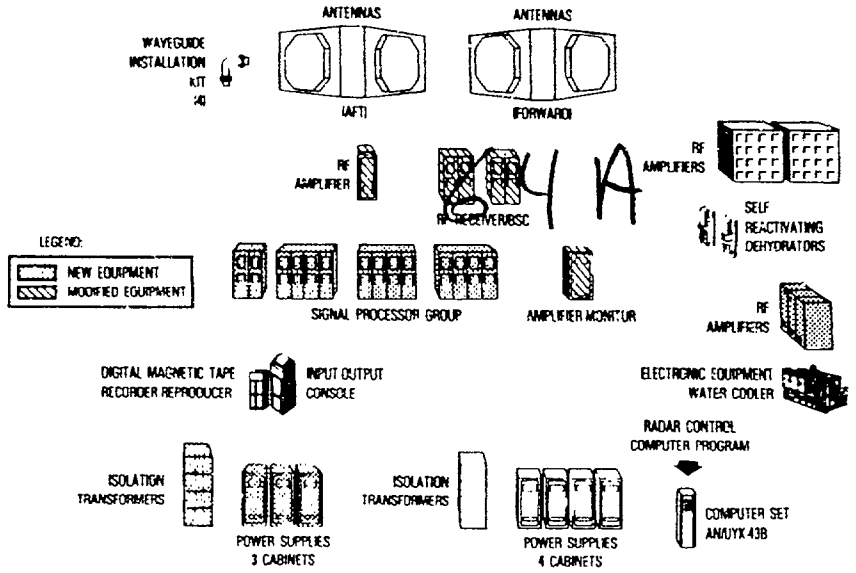
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604307N
PROGRAM ELEMENT TITLE: AEGIS Combat System Engineering
PROJECT NUMBER: K1937
BUDGET ACTIVITY: 5
DATE: 7 February 1994

PROJECT TITLE: DDG Weapons Development

RADAR SYSTEM AN/SPY-1D
EDM-4B EQUIPMENT CONFIGURATION



ARR 738 45G

POPULAR NAME: SPY-1 Radar Upgrades

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604307N
PROGRAM ELEMENT TITLE: AEGIS Combat System Engineering
PROJECT NUMBER: K1937
BUDGET ACTIVITY: 5
DATE: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	M/S III 1/93							
ENGINEERING MILESTONES	EDM CDR 10/92		EDM SQT 11/94					
T&E MILESTONES		EDM SQT 11/94	EDM DT-IIF 8/95 EDM OT-IIF 9/95					
CONTRACT MILESTONE								

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL PROGRAM (TO COMPLETE)
MAJOR CONTRACT	99,613	24,826	23,535	9,911	0	0	0	0	157,885 (0)
SUPPORT CONTRACT	0	450	450	450	0	0	0	0	1,350 (0)
IN-HOUSE SUPPORT	5,664	2,118	0	0	0	0	0	0	7,782 (0)
GFE/ OTHER	0	0	0	0	0	0	0	0	0 (0)
TOTAL	105,277	27,394	23,985	10,361	0	0	0	0	167,017 (0)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENTS AND SYSTEM CAPABILITIES: This program is required to develop selected systems and subsystems for the ARLEIGH BURKE (DDG 51) class ships. This project funds development of equipment for the AEGIS Combat System, as opposed to the costs of integrating elements into the Combat System which is funded in Project K1447. Current funding provides for development of an upgrade to the current AN/SPY-1D radar, Engineering Development Model 4B (EDM-4B), to enhance its capability against seaskimming targets in increasingly more severe electronic countermeasures and in near-land clutter environments. The changes are in the transmitter, signal processor, and radar control computer program. The EDM-4B radar upgrade represents essential transitional technologies for the radar system.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604307N
PROGRAM ELEMENT TITLE: AEGIS Combat System Engineering

PROJECT NUMBER: K1937

DATE: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($3,100) Completed design specifications and conducted a Critical Design Review (CDR).
- (U) ($5,800) Continued system engineering and commenced generation of computer program code. Debugged and tested computer program modifications.
- (U) ($11,900) Continued equipment procurement and EDM-4B fabrication and assembly.
- (U) ($6,594) Conducted element unit testing of the EDM-4B.

2. (U) FY 1994 PLAN:

- (U) ($6,700) Complete computer program code generation. Complete debugging and testing.
- (U) ($8,700) Complete EDM-4B fabrication and element integration and testing.
- (U) ($8,585) Install and perform system level integration at the Combat System Engineering Development (CSED) Site.

3. (U) FY 1995 PLAN:

- (U) ($1,661) Complete system integration and test.
- (U) ($4,300) Conduct System Qualification Tests (SQT) and system demonstration at the CSED Site.
- (U) ($4,400) Conduct Developmental Test/Operational Test at the CSED Site.

4. (U) PROGRAM TO COMPLETION: Not applicable.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Dahlgren, VA; and NAVSURFWARCENDIV, Port Hueneme, CA. CONTRACTORS: Martin Marietta, Moorestown, NJ; and Johns Hopkins University APL, Laurel, MD.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604307N
PROGRAM ELEMENT TITLE: AEGIS Combat System Engineering
PROJECT NUMBER: K1937
BUDGET ACTIVITY: 5
DATE: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology Changes: Data in previous budget not available for comparison.

2. (U) Schedule Changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

• (U) TLR, Rev 1, Chg 1	8/85
• (U) NDCP 1337, Rev 1, Chg 1	9/86
• (U) PMP 88-03	10/88
• (U) PMP 89-01	10/89
• (U) TEMP 124-2, Rev 3	2/92
• (U) NTPS-30-8512D/D	6/92
• (U) Acq Plan, AEGIS PMS400G-91-01 Rev 1/92	12/92

G. (U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) SCN LI2122	3,230,015	2,637,872	2,697,690	2,822,982	2,849,891	2,915,874	3,016,974	CONT.	CONT.
• (U) OPN LI5246	107,763	29,594	35,567	60,631	31,632	13,293	45,252	CONT.	CONT.

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604307N
PROGRAM ELEMENT TITLE: AEGIS Combat System Engineering
PROJECT NUMBER: K1937
BUDGET ACTIVITY: 5
DATE: 7 February 1994

J. (U) TEST AND EVALUATION:

- (U) EDM-4B SQT will be conducted at the CSED Site in November 1994.
- (U) Developmental Test DT-IIF will be conducted at the CSED Site in August 1995.
- (U) Operational Test OT-IIF will be conducted at the CSED Site in September 1995.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604312N
PROGRAM ELEMENT TITLE: Tri-Service Standoff Attack Missile

PROJECT NUMBER: A1992
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: TSSAM

PICURES CLASSIFIED

POPULAR NAME: TSSAM

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604312N
PROGRAM ELEMENT TITLE: Tri-Service Standoff Attack Missile
PROJECT NUMBER: A1992
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONE			LRIP	LONG LEAD	MAR 97	LRIP MAR 98	MILESTONE III	
ENGINEERING MILESTONES			PCA Jul 95 FCA May 95		INTEGRATION	F/A-18		
T&E MILESTONES	A-6 DT	A-6 DT F/A-18 DT	F/A-18 DT	F/A-18 OT	F/A-18 OT			
CONTRACT MILESTONES	TSSAM DEV	TSSAM DEV	TSSAM DEV	TSSAM DEV	TSSAM DEV	TSSAM DEV	TSSAM DEV	

BUDGET	FY 1992 *AND PRIOR	*FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT			27,245	13,210	15,820	19,661	10,000		85,936 (0)
SUPPORT CONTRACT			15,873	23,938	22,320	13,038	8,680	210	84,059 (0)
IN-HOUSE SUPPORT			30,966	29,514	10,984	16,528	3,701	10,963	102,656 (0)
GFE OTHER			500	0	0	0	0	0	500 (0)
TOTAL			74,584	66,662	49,124	49,227	22,381	11,173	273,151 (0)

* NOTE 1: FY93 and previous years funding remains Special Access Required

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604312N
PROGRAM ELEMENT TITLE: Tri-Service Standoff Attack Missile

PROJECT NUMBER: A1992
BUDGET ACTIVITY: 5

Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF ELEMENT: Tri-Service Standoff Attack Missile (TSSAM) is a joint service program with the Air Force as the executive service. The program objective is to develop a family of highly survivable, conventional, stealthy cruise missiles which will satisfy tri-service requirements to effectively engage a variety of high-value land and sea targets. The technical approach is to develop a modular stealthy cruise missile which: can employ several payloads and guidance systems to engage the required targets, emphasizes commonality and producibility to reduce costs, and can be integrated with a variety of launch platforms. The Navy and the Air Force unitary warhead missiles use a GPS-aided inertial navigation system and an imaging infrared terminal sensor for autonomous recognition and homing on fixed land targets and moving sea targets. The other Air Force variant contains Combined Effects Bomblets (CEB) submunitions for attack on land targets. The Air Force plans to integrate the missile with the B-52H, F-16C/D (Block 50), B-2, and B-1. The Navy plans to integrate the missile with the F/A-18.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) FY93 and previous years funding remains Special Access required.
- (U)Continued EMD
- (U)Integrated F-A/18
- (U)Continued development testing

2. (U) FY 1994 PLAN:

- (U)($27,245) Continue Engineering and Manufacturing Development (EMD) on prime contract.
- (U)($36,739) Continue flight testing.
- (U)($10,600) Developmental Testing (DT) is transitioned from the A-6 platform and begins using the F/A-18 platform.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604312N
PROGRAM ELEMENT TITLE: Tri-Service Standoff Attack Missile

PROJECT NUMBER: A1992
BUDGET ACTIVITY: 5

Date: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) ($13,210) Continue EMD on prime contract including Physical Configuration Audit (PCA) and Functional Configuration Audit (FCA).
- (U) ($53,452) Continue development, flight test, and evaluation.

4. (U) PROGRAM TO COMPLETION:

- (U) Complete TSSAM development including OT, DT, LRIP, and Milestone III.

D. (U) WORK PERFORMED BY: IN-HOUSE: Aeronautical Systems Center, Wright-Patterson Air Force Base, Ohio. CONTRACTOR: Northrop Aircraft Division, Hawthorne CA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) US Navy Operational Requirement for Advanced Strike Weapon System (ASWS), 10 Aug 85
- (U) Joint Services Operational Requirement, 17 Jun 91 Anticipate next updated competed by May 94
- (U) TSSAM Program Management Plan, 6 Aug 93
- (U) Test and Evaluation Master Plan (TEMP), Jul 93

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604312N
PROGRAM ELEMENT TITLE: Tri-Service Standoff Attack Missile
PROJECT NUMBER: A1992
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) System Threat Assessment Report (STAR), Jun 93

G. (U) RELATED ACTIVITIES:

- (U) PE 0207160F, Air Force TSSAM
- (U) PE 0604315A, Army TSSAM
- (U) This is an Air Force lead Joint Progam

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• WPN-2 Line Item 32250000	0	0	0	0	24,433	62,619	112,226	CONT.	CONT.
• MILCON,N	0	0	0	0	8,200	0	0	0	8,200

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

J. (U) TEST AND EVALUATION:

- Completion of A-6 DT FY94
- Conduct F/A-18 DT FY94-FY95
- Conduct F/A-18 OT FY96-FY97

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604366N
PROGRAM ELEMENT TITLE: Standard Missile Improvements
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
U0439 Standard Missile Improvements	33,060	53,514	10,751	10,801	1,996	1,508	1,490	CONT.	CONT.
U1632 AEGIS ER (SM-2 Block IV)	17,055	8,758	1,060	0	0	0	0	0	382,925
TOTAL	50,115	62,272	11,811	10,801	1,996	1,508	1,490	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: STANDARD MISSILE IMPROVEMENT (Project S0439): STANDARD Missile fuze and guidance performance degrades when the target is in close proximity to the sea surface. The low altitude improvement program will improve performance against low and very low altitude targets. It will be implemented in two phases: Phase I added a fuze altimeter and trajectory shaping enabling improved target detection and reducing the effect of multipath on radar returns on guidance performance. Phase II will add a

will improve lethality throughout the SM-2 Block III/IIIA/IIIB engagement envelope and will also improve lethality throughout the SM-2 Block IV. The SM-2 BLK IIIB (MHIP) will add a dual mode (RF/IR) capability to engage existing threats in a severe RF countermeasures environment. This capability is currently being developed for AEGIS ships and will be expanded to TARTAR ships with development commencing in FY 1994. Additionally, a limited P3I effort will be started to improve performance against IR counter countermeasures.

(U) AEGIS ER (SM-2 BLOCK IV) (Project S1632): This project was moved from PE 0603318N. The AEGIS ER missile is the latest member of the STANDARD Missile family of area defense missiles, specifically designed to take maximum advantage of AEGIS and the vertical launching system (VLS). This missile, also known as SM-2 Block IV, builds upon the SM-2 Block IIIA baseline with its improved low altitude performance and Adding significant propulsion guidance and control enhancements, AEGIS ER extends STANDARD Missile engagement capability to very high altitudes, increases maneuverability and cross range capability and improves guidance homing accuracy in stringent environments.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604366N
PROGRAM ELEMENT TITLE: Standard Missile Improvements
PROJECT NUMBER: U0439
BUDGET ACTIVITY: 5
Date: 7 February 1994

PROJECT TITLE: Standard Missile Improvements

POPULAR NAME: SM-2 BLOCK IIIA/IIIB

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604366N
PROGRAM ELEMENT TITLE: Standard Missile Improvements
PROJECT NUMBER: U0439
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		BLK IIIA IOC 11/93 BLK IIIB MS IIA 8/94	BLK IIIB MS III 8/95	BLK IIIB				
ENGINEERING MILESTONES								
T&E MILESTONES		BLK IIIB WSMR	BLK IIIB TECHEVAL OPEVAL					
CONTRACT MILESTONES		BLK IIIB LRIP 8/94	BLK IIIB FRP 9/95					

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	21,991	16,683	7,801	9,157	1,568	1,187	1,184	CONT.
SUPPORT CONTRACT	175	190	205	100	50	50	50	CONT.
IN-HOUSE SUPPORT	10,202	7,188	2,745	1,544	378	271	256	CONT.
GFE/ OTHER	692	29,453	0	0	0	0	0	CONT.
TOTAL	33,060	53,514	10,751	10,801	1,996	1,508	1,490	CONT.

B. (u) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: STANDARD Missile fuze and guidance performance degrades when the target is in close proximity to the sea surface. The low altitude improvement program will improve performance against low and very low altitude targets. It will be implemented in two phases: Phase I added a fuze altimeter and trajectory shaping, enabling improved target detection and reducing the effect of multipath on radar

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604366N
PROGRAM ELEMENT TITLE: Standard Missile Improvements
PROJECT NUMBER: U0439
BUDGET ACTIVITY: 5
Date: 7 February 1994

returns on guidance performance. Phase II will improve lethality throughout the SM-2 Block III/IIIA/IIIB engagement envelope and will also improve the lethality of the SM-2 Block IV. SM-2 will recieve Phase I (Block III) and be upgraded by Phase II (Block IIIA). the importance of these improvements derive from the fact they address threats known to exist today. Additionally, the Missile Homing Improvement Program (MHIP) SM-2 Block IIIB will expand this effort by incorportaing a dual mode RF/IR seeker to improve the missile's capability to resolve seeker ambiguities and engage targets in severe RF countermeasure enviroments. These improvements are being developed in such a way that current systems in the fleet can be backfitted with this capability. Specific threats for SM-2 Block III/IIIA/IIIB are identified in Navy Decision Coordinating Paper (NDCP) and approved MNS and ORD BLK IIIB. The current minimum target altitude capability of [redacted] Future improvements may include additional very low altitude performance enhancements, two missiles per VLS canister (Dual Pack), insensitive munitions enhancements, and a common MR/ER missile, and improved IR counter countermeasures.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($22,583) Continue EMD (Block IIIB).
- (U) ($10,477) Initiate further enhancements of very low altitude performance enhancments versus Low Radar Cross Section (RCS) targets, 1/93 (Block IIIA)

2. (U) FY 1994 PLAN:

- (U) ($3,500) Commence Flight Test at WSMR. [redacted] (Block IIIB).
- (U) ($6,022) Continue further enhancements of very low altitude performance enhancements versus Low RCS targets, 9/94 (Block IIIA).
- (U) ($8,000) Initiate MHIP modifications for the TARTAR missile.
- (U) ($4,000) Initiate MHIP Pre-planned Improvement (P3I) Program.
- (U) ($31,992) Continue MHIP EMD Program.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604366N
PROGRAM ELEMENT TITLE: Standard Missile Improvements
PROJECT NUMBER: U0439
BUDGET ACTIVITY: 5
Date: 7 February 1994

3. (u) FY 1995 PLAN:

- (u) ($2,500) Conduct At-Sea, OPEVAL
- (U) ($4,000) Continue MHIP modifications for TARTAR missile.
- (U) ($4,251) System for improved Low Altitude Performance: Finalize design of systems, Conduct Preliminary and Critical Design Review, Fabricate hardware for flight tests.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, China Lake, CA; NAVSURFWARCENDIV, Dahlgren, VA. CONTRACTORS: Hughes Missile Systems Company (HMSC), Pomona, CA; Raytheon Company, Bedford, MA; Motorola GEG, Scottsdale, AZ; Allied Signal, Communications Division, Baltimore, MD; GE, Moorestown, NJ.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

AP 408-85 Amendment 2 TAB approved:	6/86
PEM signed	10/85
J&A approved	3/86
PMP 85-02 approved	5/86
PMP IIIB (MHIP) 89-1 approved	7/89
III/IIIA TEMP 623-1 REV 1, Change 2 approved	10/91
NDCP approved	5/88
IIIB (MHIP) NDCP submitted to OPNAV	9/91
IIIB (MHIP) AP SEA 89-02/AIR 88-28 (Rev 1) approved	7/91
IIIB TEMP 623-3 Under revision to incorporate baseline schedule chages.	
Updated IIIB documentation (IPSO, ORD, MNS, ASR, COEA, and Baseline) approved by ASN (RD&A) for approval	12/92

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604366N
PROGRAM ELEMENT TITLE: Standard Missile Improvements
PROJECT NUMBER: U0439
BUDGET ACTIVITY: 5
Date: 7 February 1994

G. (U) RELATED ACTIVITIES:

- (U) PE 0604366N. Project Number: Ui632 (SM-2 Block IV Missile)

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) WPN 223400	247,000	209,000	102,100	142,200	133,300	126,200	128,300	CONT.	663,500

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

J. (U) TEST AND EVALUATION:
Block IIIB WSMP
Block IIIB TECHEVAL
Block IIIB OPEVAL

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604366N
PROGRAM ELEMENT TITLE: Standard Missile Improvements

PROJECT NUMBER: U1632
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: AEGIS ER (SM-2 BLOCK IV)

POPULAR NAME: SM-2 BLOCK IV

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604366N
PROGRAM ELEMENT TITLE: Standard Missile Improvements
PROJECT NUMBER: U1632
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES			MS III 1/95					
ENGINEERING MILESTONES	1st GUID FLT 4/93		PRR 10/94					
T&E MILESTONES	WSMR 4/93-2/94							
CONTRACT MILESTONES			PROD 2/95					

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	7,504	1,790	532					326,611
SUPPORT CONTRACT	165	180	150					495
IN-HOUSE SUPPORT	8,286	6,788	378					54,719
GFE/ OTHER	1,100	0	0					1,100
TOTAL	17,055	8,758	1,060					382,925

B. (u) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project was moved from PE 0603318N. The AEGIS ER missile is the latest member of the STANDARD Missile family of area defense missiles, specifically designed to take maximum advantage of AEGIS and the vertical launching system (VLS). This missile, also known as SM-2 Block IV, builds upon the SM-2 Block IIIA baseline with its improved low altitude performance and Adding significant propulsion, guidance and control enhancements, AEGIS ER extends STANDARD Missile engagement capability to very high altitudes, increases maneuverability and cross range capability and improves guidance homing accuracy in stringent environments. The resulting extension of STANDARD Missile engagement envelope will permit utilization of the full SPY-1 B/D radar range capability.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604366N
PROGRAM ELEMENT TITLE: Standard Missile Improvements
PROJECT NUMBER: U1632
BUDGET ACTIVITY: 5
Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($9,258) TEST & EVALUATION - Support and conduct ground and flight testing, including pre- and post-test analyses. Verify and validate test missile-booster design. Complete safety hazards assessment testing and continue electromagnetic environment vulnerability assessment.
- (U) ($6,809) SYSTEM ENGINEERING/INTEGRATION - Conduct round and systems level engineering analyses to demonstrate readiness for at-sea testing and to refine performance predictions. Continue development of AEGIS tactical computer programs for use in DT/OT and in-service.
- (U) ($997) PRODUCTION TRANSITION - Continue support for MSIII/production transition, including the following: complete documentation (e.g., specifications, Integrated Program Summary, Program Protection Plan, TEMP) and update the Technical Data Package (TDP); and support technical reviews of the program (e.g., Production Readiness Review, Pre-Production Reliability Review, Logistics Review Group).

2. (U) FY 1994 PLAN:

- (U) ($1,750) Complete GTV series at WSMR.
- (U) ($800) Prepare for MS III.
- (U) ($500) Conduct E-cubed Testing.
- (U) ($5,708) Test and Evaluation.

3. (U) FY 1995 PLAN:

- (U) ($100) Finalize reformation of performance estimates based on DT and OT testing.
- (U) ($732) Conduct Production Transition Round (PTR) tests.
- (U) ($118) Transition to production (MSIII) 2nd QTR FY95.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604366N
PROGRAM ELEMENT TITLE: Standard Missile Improvements
PROJECT NUMBER: U1632
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($110) PRR 1st Quarter, FY95.

4. (U) PROGRAM TO COMPLETION: Program completes in FY95.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, China Lake, CA; NAVSURFWARCENDIV, Port Hueneme, CA; NAVSURFWARCENDIV, Dahlgren, VA; NAVSURFWARCENDIV, Indian Head, MD. CONTRACTORS: Johns Hopkins University/APL, Laurel, MD; Raytheon Company, Bedford, MA; General Dynamics, Pomona, CA; Motorola, Scottsdale, AZ, Allied Signal, Communications Division, Baltimore, MD; C.E. GSD, Moorestown, NJ.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

AP 541-86 approved	3/87
PRM signed	6/87
J&A approved	4/87
PMP 87-01 approved	4/87
TEMP 623-2, under review to incorporate COTF comments and revise schedule.	10/93
IPS/Baseline approved by OSD	12/93

G. (U) RELATED ACTIVITIES:

- (U) PE 0604366N Project Number U0439 (SM-2 Block IIIA/IIIB)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604366N
PROGRAM ELEMENT TITLE: Standard Missile Improvements

PROJECT NUMBER: U1632
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) WPN 223400	0	0	84,400	111,600	0	0	0	0	196,000

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

J. (U) TEST AND EVALUATION:

WSMR	4/93
DT/OT	5/94-7/94

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604372N
PROGRAM ELEMENT TITLE: New Threat Upgrade
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0188 NEW THREAT UPGRADE	553	4,610	1,701	1,586	1,589	1,145	1,643	CONT.	CONT.
S0964 TARTAR SM-2 NTU	3,789	0	0	0	0	0	0	0	164,238
TOTAL	4,342	4,610	1,701	1,586	1,589	1,145	1,643	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element develops shipboard weapon engagement system improvements needed to counter current and projected anti-ship cruise missile threats at extended ranges and

The New Threat Upgrade (NTU) program is applicable to NTU guided missile cruiser and destroyers. This project supports modification of the NTU AAW engagement systems to provide compatibility between the upgraded NTU detection system and the SM-2 Block III/IIIA/IIIB missile, as appropriate, to enhance performance against

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

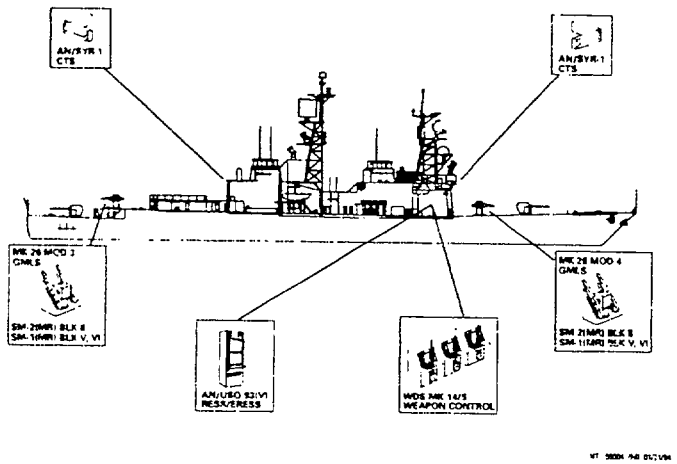
PROGRAM ELEMENT: 0604372N
PROGRAM ELEMENT TITLE: New Threat Upgrade

PROJECT NUMBER: S0188
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: New Threat Upgrade (NTU)

NEW THREAT UPGRADE SYSTEM



POPULAR NAME: NTU

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604372N
PROGRAM ELEMENT TITLE: New Threat Upgrade
PROJECT NUMBER: S0188
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
ENGINEERING MILESTONES		DT/OT CORRECTIONS WDS PDR CTS PDR	WDS CDR CTS CDL					
T&E MILESTONES	AT-SEA TEST							
CONTRACT MILESTONES		INITIATE SM-2 BLK III IMP. TEST						

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	417	4,210	1,414	1,315	1,320	952	1,443	CONT.
SUPPORT CONTRACT								
IN-HOUSE SUPPORT	136	400	287	271	269	193	200	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	CONT.
TOTAL	553	4,610	1,701	1,586	1,589	1,145	1,643	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program develops shipboard weapon engagement system improvements needed to counter current and projected anti-ship cruise missile threats at extended ranges and

anti-ship missiles continue to increase in capability and to proliferate both in the total number of missiles in service and in the number of navies which have these missiles at sea. The first generation of much faster missiles, with much more Air, surface and underwater-launched

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604372N
PROGRAM ELEMENT TITLE: New Threat Upgrade
PROJECT NUMBER: S0188
BUDGET ACTIVITY: 5
Date: 7 February 1994

variable flight patterns, is in service. A new generation of missiles is expected to have a second seeker in conjunction with radar seeking guidance systems. Enhancements due to variable flight paths with terminal maneuvers, High G, High G plus barrel roll, reduce warning time and increase reaction time. The TARTAR New Threat Upgrade progam develops capabilities to counter the aforementioned threats and provides compatibility between NTU detection systems and the evolving Standard Missile-2 Block II/III/IIIA/IIIB missile family to enhance performance against the above threats.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($553) TERRIER platforms now undergoing accelerated decommissioning. (Funds in FY 94 and out are for TARTAR platforms)

2. (u) FY 1994 PLAN:

- (u) ($3,410).

- (U) ($1,200) Complete design/development/testing of modifications correcting deficiencies identified during testing and lessons learned during Fleet operations.

3. (U) FY 1995 PLAN:

- (U) ($1,701) Continue design/develoment of SM-2 Block IIIB compatibility algorithms for the ship systems software. Conduct TARTAR WDS/CTS critical design review (CDR) for SM-2 Block IIIB integration.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN FLTCOMBATDIRSSACT, Dam Neck, VA; NAVSURFWARCENDIV, Dahlgren, VA; NAVSURFWARCENDIV, Port Huneme, CA; NAVSURFWARCEN INTCOMBATSYSTESTFAC, San Diego, CA; NAVAIRWARCENWPNDIV, PT Mugu, CA. CONTRACTORS: Johns Hopkins University/Applied Physics Laboratory, Laurel, MD; VITRO Corporation, Silver Spring, MD; Hughes Missile Systems Corp., Tucson, AZ, FMC/ASD, Minneapolis, MN; E-System/ECI Division, ST. Petersburg, FL; RAYTHEON Company, Wayland, MA; Republic Electronics, Hauppage, NY.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604372N
PROGRAM ELEMENT TITLE: New Threat Upgrade
PROJECT NUMBER: S0188
BUDGET ACTIVITY: 5
Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

TARTAR NTU

TEMP 731	FEB 88
Navy Training Plan	FEB 92
Engagement System)	
Intergrated Logistic	MAR 88
Support Plan (306-P/D	
NDCP	FEB 81

G. (U) RELATED ACTIVITIES: Program Element 0604366N (Standard Missile Improvements) supports development of improvements to SM-2 Block II/III/IIIA/IIIB missiles.

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

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

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

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604373N
PROGRAM ELEMENT TITLE: Airborne Mine Countermeasures
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Q0528 Advanced Airborne Mine Countermeasures Equipment	1,179	5,448	1,396	3,464	1,536	0	0	0	42,785
Q0529 Airborne Mine Hunt Systems	16,462	16,524	285	9,738	9,692	0	0	0	122,268
Q2047 Magic Lantern	12,739	10,397	18,740	27,902	29,134	9,212	0	0	141,105
TOTAL	30,380	32,369	20,421	41,104	40,362	9,212	0	0	306,258

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program develops airborne mine countermeasures systems that are required to counter known and projected mine threats. Provides a

Light Detection and Ranging (LIDAR) tehniques.

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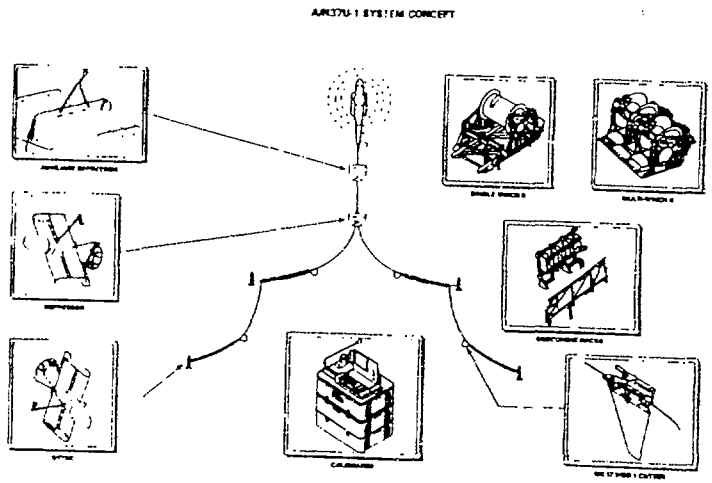
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604373N
PROGRAM ELEMENT TITLE: Airborne Mine Countermeasures
PROJECT NUMBER: Q0528
BUDGET ACTIVITY: 5
Date: 7 February 1994

PROJECT TITLE: Advanced Airborne Mine Countermeasures Equipment



POPULAR NAME: AIRBORNE MINE SWEEPING EQUIPMENT

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604373N
PROGRAM ELEMENT TITLE: Airborne Mine Countermeasures
PROJECT NUMBER: Q0528
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		37U-III (8/94) MAG CABLE-II (3/94)			MAG CABLE-III (6/97)			
ENGINEERING MILESTONES		MAG CABLE PDR(9/94)	MAG CABLE CDR(1/95)					
T&E MILESTONES		37U(DT-IIC 3/94) 37U(OT-IIB 5/94)			MAG CABLE(DT-IIB) (1/97)			
CONTRACT MILESTONES		MAG CABLE E&MD(3/94)						

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	20,362	371	1,607	1,000	2,164	0	0	0	25,504
SUPPORT CONTRACT	225	0	38	0	0	0	0	0	263
IN-HOUSE SUPPORT	8,378	708	3,053	396	508	1,218	0	0	14,261
GFE/ OTHER	797	100	750	0	792	318	0	0	2,757
TOTAL	29,762	1,179	5,448	1,396	3,464	1,536	0	0	42,785

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: There is a requirement to expand helicopter mine countermeasures by developing a more effective capability to sweep [redacted] mines. The A/N37U-1 Controlled Depth Moored Sweep is being developed to [redacted]. The new magnetic sweep array is being developed to provide higher current capacity, smaller diameter, and lower weight. The Cluster Pretzel Sweep has been terminated.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604373N
PROGRAM ELEMENT TITLE: Airborne Mine Countermeasures
PROJECT NUMBER: Q0528
BUDGET ACTIVITY: 5
Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: ($1,179) A/N37U-1 - Procured EMD models; conducted Contractor Demonstration Tests; conducted EMI testing.

2. (U) FY 1994 PLAN:

- (U) ($1,450) A/N37U-1 - Conduct TECHEVAL; conduct operational evaluation (OPEVAL); obtain Milestone III (Approval for Full Rate Production (AFRP)).

- (U) ($3,998) Magnetic Cable Improvement - Obtain Milestor II; award EMD contract and conduct Preliminary Design Review (PDR).

3. (U) FY 1995 PLAN: ($1,396) Magnetic Cable Improvements - Conduct CDR and initiate fabrication of EMD models. Those efforts are partially funded with FY 1994 funds available from terminated cluster pretzel program.

4. (U) PROGRAM TO COMPLETION: Magnetic Cable Improvements - Complete fabrication and test of EMD models; conduct TECHEVAL; obtain Milestone III (AFRP).

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENCOASTSYSTA, Panama City, FL; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD. CONTRACTORS: General Systems Solutions, Groton, CT.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Cluster pretzel sweep has been terminated. FY 1995 request assumes FY 1994 funding for cluster pretzel will be available to partially fund FY 1995 efforts.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:
A/N37U-1 TEMP: 7/91

(U) Other documentation in process.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604373N
PROGRAM ELEMENT TITLE: Airborne Mine Countermeasures
PROJECT NUMBER: Q0528
BUDGET ACTIVITY: 5

Date: 7 February 1994

G. (U) RELATED ACTIVITIES:

- (U) PE 0602315N, MCM, Mining and Special Warfare Technology: Cable fairing and towed body technologies.
- (U) PE 0603502N, Surface and Shallow Water MCM.
- (U) PE 0603555N, Sea Control and Littoral Warfare Technology Demonstration.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN LINE 161	0	5,998	0	3,855	4,600	2,000	675	17,128	CONT.

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

J. (U) TEST AND EVALUATION:

- (U) A/N37U-1: TECHEVAL - MAR/94; OPEVAL - MAY/94
- (U) Magnetic Cable Improvements: TECHEVAL - JAN 97

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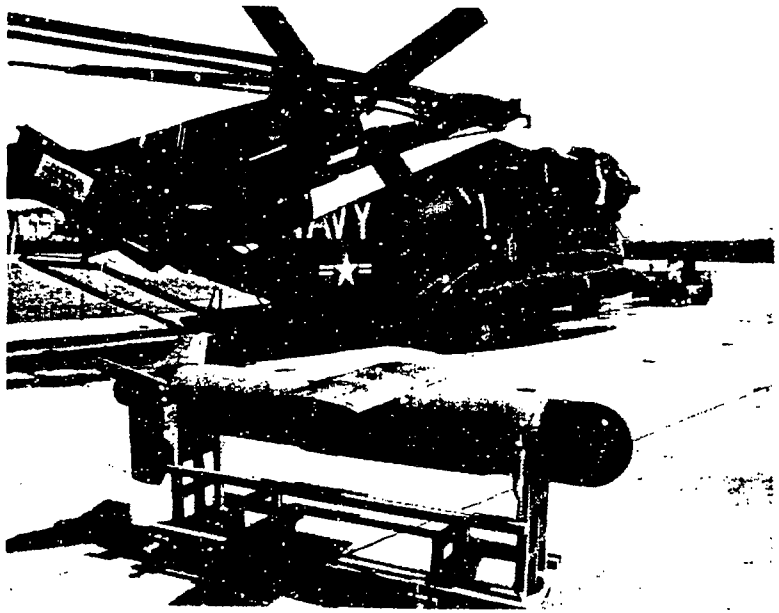
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604373N
PROGRAM ELEMENT TITLE: Airborne Mine Countermeasures
PROJECT NUMBER: Q0529
BUDGET ACTIVITY: 5
Date: 7 February 1994

PROJECT TITLE: Airborne Mine Hunt Systems



POPULAR NAME: AIRBORNE MINE HUNT SYSTEM

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604373N
PROGRAM ELEMENT TITLE: Airborne Mine Countermeasures
PROJECT NUMBER: Q0529
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES				Q20-III (8/97)				
ENGINEERING MILESTONES	Q-20 PDR (11/93)	Q-20 CDR (2/94)						
T&E MILESTONES			DT-IIB(11/96) OT-IIB(6/97)					
CONTRACT MILESTONES								

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	46,336	8,229	10,665	0	3,000	3,000	0	0	71,230
SUPPORT CONTRACT	159	0	272	0	0	0	0	0	431
IN-HOUSE SUPPORT	23,172	8,233	5,587	0	4,261	4,225	0	0	45,478
GFE/ OTHER	0	0	0	285	2,477	2,467	0	0	5,229
TOTAL	69,567	16,462	16,524	285	9,738	9,692	0	0	122,368

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project includes a sonar for mine detection and classification, and a system for mine neutralization by explosive charge, with equipment designed to[illegible]

The:

The Airborne Mine Neutralization Set has been terminated resulting in a funding asset to be applied to FY 1995 efforts.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604373N PROJECT NUMBER: Q0529 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Airborne Mine Countermeasures BUDGET ACTIVITY: 5

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($9,000) AN/AQS-20 - Conducted PDR; continued design of EMD models.
- (U) ($7,462) Airborne Mine Neutralization Set - Conducted subsystem demonstrations.

2. (U) FY 1994 PLAN:

- (U) ($16,524) AN/AQS-20 - Conduct CDR; initiate fabrication of EMD models, and begin in-plant testing.

3. (U) FY 1995 PLAN:

- (U) ($285 FY 1995 funds and $6,224 FY 1994 funds.) Complete AN/AQS-20 software development. Begin system qualification and environmental tests.

4. (U) PROGRAM TO COMPLETION:

- (U) Complete fabrication and test of AQS-20 EMD models.
- (U) Conduct TECHEVAL and OPEVAL.
- (U) Obtain Milestone III (AFRP).

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENCOASTSYSTA, Panama City, FL; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NAVSURFWARCEN WHITE OAK DET, Silver Spring, MD. CONTRACTORS: Raytheon Submarine Signal Division, Portsmouth, RI.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604373N
PROGRAM ELEMENT TITLE: Airborne Mine Countermeasures
PROJECT NUMBER: Q0529
BUDGET ACTIVITY: 5
Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

AQS-20
Operational Requirements Document: 6/92
Integrated Program Summary: 6/92
Cost and Operational Effectiveness Analysis: 6/92
Test and Evaluation Master Plan #053-3: 7/92
Acquisition Program Baseline: 6/92

G. (U) RELATED ACTIVITIES:

- (U) PE 0602315N, MCM, Mining and Special Warfare Technology: Computer aided detection/classification, cable fairing, and towed body technologies.
- (U) PE 0603502N, Undersea Warfare and MCM Development.
- (U) PE 0603555N, Undersea Superiority Technology Demonstration.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN	0	0	0	0	0	17,701	19,017	CONT.	CONT.

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

J. (U) TEST AND EVALUATION: TECHEVAL - NOV/96; OPEVAL - JUN/97

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604373N
PROGRAM ELEMENT TITLE: Airborne Mine Counte measures
PROJECT NUMBER: Q2047
BUDGET ACTIVITY: 5
Date: 7 February 1994

PROJECT TITLE: Airborne Laser Mine Detection System (ALMDS)

POPULAR NAME: AIRBORNE LASER MINE DETECTION SYSTEM (ALMDS)/ML 90

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604373N
PROGRAM ELEMENT TITLE: Airborne Mine Countermeasures
PROJECT NUMBER: Q2047
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		ML/ALMDS-II (8/94)				ALMDS-III (4/98)		
ENGINEERING MILESTONES			CDR (9/95)					
T&E MILESTONES		DT-IA (3/94)			DT-IIA(6/97)	OT-IIA(12/97)		
CONTRACT MILESTONES			ALMDS-E&MD (1/95)					

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	24,420	7,300	6,450	11,836	18,949	20,438	3,713	0	93,106
SUPPORT CONTRACT	5,238	298	650	502	600	600	600	0	8,488
IN-HOUSE SUPPORT	1,460	1,341	3,297	5,402	6,553	6,296	3,250	0	28,599
GFE/ OTHER	1,863	3,800	0	0	1,800	1,800	1,649	0	10,912
TOTAL	32,981	12,739	10,397	18,740	27,902	29,134	9,212	0	141,105

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Non-Acoustic Mine Detection program, which is developing the Airborne Laser Mine Detecting System (ALMDS), is designed to develop a light detection and ranging (LIDAR) system for rapid detection and localization of floating and near surface tethered mines.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: ($12,739) Completed fabrication of Advanced Development Models (ADM); initiated documentation for Milestone II; provided a contingency capability with ADM.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604373N
PROGRAM ELEMENT TITLE: Airborne Mine Countermeasures
PROJECT NUMBER: Q2047
BUDGET ACTIVITY: 5
Date: 7 February 1994

2. (U) FY 1994 PLAN:

- (U) ($10,397) Initiate and complete DT-I testing; obtain Milestone II approval; release RFP for two (2) engineering and manufacturing development models (EMD) for developmental and operational testing.

3. (U) FY 1995 PLAN: ($18,740) Award contract for fabrication of EMD including Interim Publications, Peculiar Support Equipment, and ILS support; conduct CDR.

4. (U) PROGRAM TO COMPLETION:

- (U) Deliver EMD model
- (U) Conduct DT-II and OT-II
- (U) Obtain Milestone III

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENCOASTSYSTA, Panama City, FL; NAVAIRWARECENACDIV, Patuxent River, MD; NAVAIRWARCENACDIV, Indianapolis,, IN; NAVAIRWARCENACDIV, Warminster, PA. CONTRACTORS: METRON Reston, VA; KAMAN Aerospace Corp., Bloomfield CT and Tucson, AZ.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

Operational Requirements Document: In N85 review
Test and Evaluation Master Plan: Draft in review
Acquisition Program Baseline: Document in review

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604373N
PROGRAM ELEMENT TITLE: Airborne Mine Countermeasures

PROJECT NUMBER: Q2047
BUDGET ACTIVITY: 5

Date: 7 February 1994

G. (U) RELATED ACTIVITIES: PE 0603555N, Undersea Superiority Technology Demonstration.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) OPN	0	0	0	0	0	21,249	19,700	CONT.	CONT.

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

J. (U) TEST AND EVALUATION:
- (U) DT-IA 3/94
- (U) DT-IIA 6/97
- (U) OT Readiness Review 7/97
- (U) OT IIA 12/97

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
F0775 Submarine Support Equipment Program	21,239	5,144	7,552	26,865	46,699	54,938	30,056	CONT.	CONT.
S0219 Submarine Sonar Improvement (Eng)	35,201	32,055	27,952	48,133	50,664	55,004	60,799	CONT.	CONT.
X0742 Submarine Integrated Antenna Systems	11,505	14,873	4,604	9,255	2,311	2,305	651	CONT.	CONT.
X1411 Submarine Tactical Communications System	2,362	1,538	1,828	1,678	1,720	1,738	1,736	CONT.	CONT.
TOTAL	70,307	53,610	41,936	85,931	101,394	113,985	93,242	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Submarine Sonar Improvement program delivers block updates to Submarine Sonar Systems installed on SSN 688, 688I and TRIDENT Class Submarines. The goal is to ensure submarine stealth by maintaining clear acoustical, tactical and operational superiority over the entire spectrum of submarine and surface combatant threats to a variety of missions. The AN/BQQ-5E with TB-29 Array will provide quantum improvements in long-range detection and localization for all platforms and significantly enhance the defensive capability of SSBN 726 Class Submarines. The AN/BSY-1 Depot Modernization Period (DMP) Upgrade will provide Low Frequency Active (LFA) Interference Rejection, Dual Towed Array Processing and Full Spectrum Processing to SSN 688 and 688I Platforms as well as TB-29 capability to 688I platforms. Future improvements for the AN/BQQ-5 and 688I sonars may include Full Spatial Vernier Processing for TB-29 Arrays and Active Improvements. Onboard Trainers will provide dockside and at-sea operational team training to improve operator efficiency in search, detection, classification, localization, and weapons launch. Towed Array development focus is on tow cable and Vibration Isolation Module (VIM) improvements to reduce self-noise. Towed Array hydrophone and telemetry development will focus on hardware affordability.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development
BUDGET ACTIVITY: 5

DATE: 7 February 1994

(U) The Submarine Support Equipment Program (SSEP) develops and improves submarine Electronic Warfare Support Measures (ESM) techniques and components, equipment, and systems that will increase submarine operational effectiveness in the increasingly dense and sophisticated electromagnetic environment caused by the proliferation of complex radar, communications, and navigation equipment of potential adversaries. Improvements are necessary for submarine ESM to be effective in conducting the following mission areas: Littoral Warfare, Joint Surveillance, Space and Electronic Warfare, Intelligence Gathering, Maritime Protection, and Joint Strike. The major effort in this area is engineering and manufacturing development of the Integrated ESM Mast (IEM) and the Advanced Submarine Tactical ESM Combat System (ASTECS) for the New Attack Submarine and for potential backfit on the SSN 21 and SSN 688 Class.

(U) The Submarine Integrated Antenna Systems (SIAS) project develops the antennas needed to communicate in networks such as Ultra High Frequency Satellite Communications, Extremely Low Frequency (ELF), Extremely High Frequency (EHF), and Global Positioning System. Hardware developments include: (a) mast-mounted systems; (b) buoyant cable systems; and (c) expendable buoy systems.

(U) The Submarine Tactical Communications Systems project provides attack submarine with an exterior communications system which: (a) minimizes time required at communications depth; (b) enhances operability, reducing errors and manpower requirements; and (c) provides flexibility for low impact growth and change throughout the life of the submarine. Design efforts will provide increased antenna signal distribution and interconnection subsystems to accommodate ELF, EHF and Mini-Demand Assigned Multiple Access and a message storage and processing subsystem.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

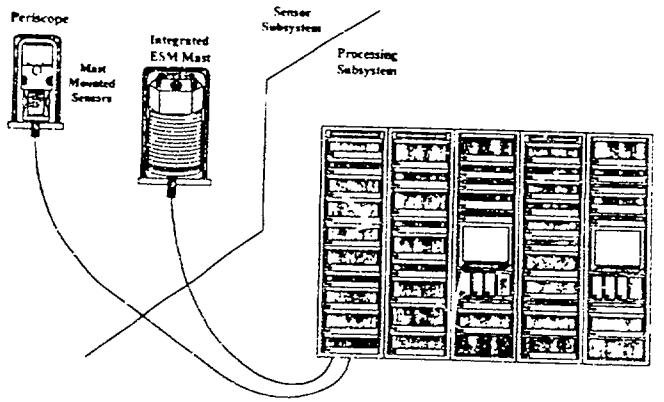
PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development

PROJECT NUMBER: F0775
BUDGET ACTIVITY: 5

DATE: 7 February 1994

PROJECT TITLE: Submarine Support Equipment Program

Advanced Submarine Tactical ESM Combat System



POPULAR NAME: SSEP

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development

PROJECT NUMBER: F0775
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
IEM Program							5/99 MS III	
ASTECS Program		6/94 MS I/II					9/99 MS III	
ENGINEERING MILESTONES								
IEM Program			1/95-PDR	10/95-CDR				
ASTECS Program				7/96 EMD PDR	1/97 EMD CDR			
T&E MILESTONES								
IEM Program							2/99 DT/OTII	
ASTECS Program		3/94 TEMP					6/99 DT/OTII	

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development
PROJECT NUMBER: F0775
BUDGET ACTIVITY: 5
DATE: 7 February 1994

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
CONTRACT MILESTONES								
IEM EMD	4/93 Award							
ASTECS EMD				10/95 AWARD				

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	14,243	3,000	4,724	19,825	39,789	47,988	25,656	CONT.
SUPPORT CONTRACT	1,889	1,100	1,300	2,650	2,510	2,300	1,950	CONT.
IN-HOUSE SUPPORT	1,698	604	912	1,766	1,900	1,800	1,500	CONT.
GFE/ OTHER	3,409	440	616	2,624	2,500	2,850	950	CONT.
TOTAL	21,239*	5,144	7,552	26,865	46,699	54,938	30,056	CONT.

* Budgeted in FY 1993 under P.E. 0604515N

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program develops and improves Electronic Warfare Support Measures (ESM) techniques and components, equipment, and systems that will increase submarine operational effectiveness in the increasingly dense and sophisticated electromagnetic environment caused by the proliferation of complex radar, communications, and navigation equipment of potential adversaries. Improvements are necessary for Submarine ESM to be effective in conducting the following mission areas: Littoral Warfare, Joint Surveillance, Space and Electronic Warfare, Intelligence gathering, Maritime Protection, and Joint Strike. Specific efforts include development of the: (1) Integrated ESM Mast (IEM) that replaces the AN/BRD-7 and AN/BLD-1 Direction Finding (DF) Systems on SSN-688 Class Submarines, SSN-21 Class Submarines and is required for the New Attack Submarine; (2) the Improved Early Warning Receiver; and (3) the Advanced Submarine Tactical ESM Combat System (ASTECS) that will provide the next generation ESM system for the New Attack Submarine and possibly for backfit on SSN-21 and SSN-688 Class Submarines. The ASTECS program is being developed to meet both today's and tomorrow's threat signal environment and to meet the space and marning limitations expected on the New Attack Submarine. Existing submarine tactical ESM systems are not capable of processing all of today's threat signal environment and are obsolete.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development
PROJECT NUMBER: F0775
BUDGET ACTIVITY: 5
DATE: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($16,541) Continued the IEM Engineering and Manufacturing Development (EMD) Phase and awarded the IEM EMD Phase I contract.
- (U) ($1,217) Continued generation of documentation required for ASTECS Milestone I/II approval. Cost and Operational Effectiveness Analysis and Concept Exploration and Definition study results supported eliminating the Demonstration/Validation phase and proceeding directly to EMD.
- (U) ($472) Completed development of the Improved Electronic Warfare Receiver.
- (U) ($3,009) Awarded contract for procurement of Scenario Simulator/Stimulator.

2. (U) FY 1994 PLAN:

- (U) ($5,144) Continue IEM EMD project by completing System Design Review (SDR) and Software Specification Review (SSR).

3. (U) FY 1995 PLAN:

- (U) ($6,552) Continue IEM EMD project by completing the system design and the Preliminary Design Review (PDR).
- (U) ($1,000) Begin ASTECS EMD Phase by completing EMD Contract Source Selection.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development
PROJECT NUMBER: F0775
BUDGET ACTIVITY: 5
DATE: 7 February 1994

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NAVUNSEAWARCEN DET, New London, CT; NISEWEST, San Diego, CA. CONTRACTORS: Raytheon, Goleta, CA; ST Research, Newington, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology Changes: Data in previous budget not available for comparison.

2. (U) Schedule Changes: The Demonstration/Validation (DEM/VAL) phase has been eliminated due to the low risk established for the ASTECS program documented by the Cost and Operational Effectiveness Analysis (COEA) Report and the Concept Definition (CD) trade studies. By eliminating this phase, the schedule for EMD CDR has actually moved up 9 months (from 1Q/98 to 1/97 since the FY 1994 Congressional submission.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) IEM Operational Requirement 07/91
- (U) IEM Acquisition Program Baseline 05/92
- (U) IEM Test and Evaluation Master Plan 06/92
- (U) IEM Integrated Program Summary 06/92

- (U) ASTECS Operational Requirements Document 10/91
- (U) ASTECS Acquisition Strategy Report 10/93

G. (U) RELATED ACTIVITIES:

- (U) PE 0603562N/F0770 (Advanced Submarine Support Equipment Program (ASSEP)).

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

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

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development

PROJECT NUMBER: F0775
BUDGET ACTIVITY: 5

DATE: 7 February 1994

J. (U) TEST AND EVALUATION:

- (U) ASTECS DT/OT II testing is planned for FY 1999.
- (U) IEM DT/OT II testing is planned for FY 1999.

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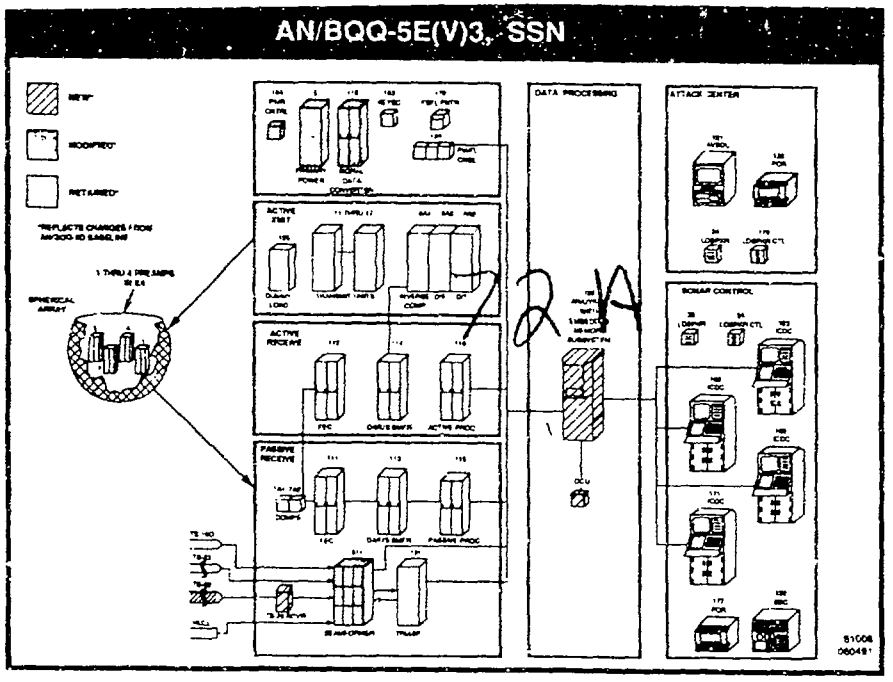
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development

PROJECT NUMBER: SC219
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: Submarine Sonar Improvement (Eng)



POPULAR NAME: Submarine Sonar System (Engineering)

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development

PROJECT NUMBER: S0219
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
BQQ-5E			MS III 11/94					
TB-29		MS IIA 3/94	MS III 11/94					
AN/BSY-1 ECP 1000		MS II 5/94						
ENGINEERING MILESTONES								
TB-29	SDCT 1/93							
AN/BSY-1 ECP 1000				CDR 10/95		SDCT 7/98		
T&E MILESTONES								
BQQ-5E		DT IIM 8/93 OT IIC 4/94						
TB-29		DT IIM 8/93 OT IIC 4/94						
AN/BSY-1 ECP 1000							DT/OT 3Q/99	
CONTRACT MILESTONES								
TB-29			LRIP 3/94					
AN/BSY-1 ECP 1000		EMD AWARD 6/94						

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development
PROJECT NUMBER: SO219
BUDGET ACTIVITY: 5
Date: 7 February 1994

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	24,259	24,603	20,208	27,550	32,208	36,966	39,576	CONT.
SUPPORT CONTRACT	899	529	600	628	642	658	672	CONT.
IN-HOUSE SUPPORT	9,543	6,423	7,094	19,855	17,714	17,230	20,401	CONT.
GFE/ OTHER	500	500	50	100	100	150	150	CONT.
TOTAL	35,201	32,055	27,952	48,133	50,664	55,004	60,799	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program delivers block updates to Sonar Systems installed on SSN 688, 688I and TRIDENT Class Submarines. The goal is to maintain clear acoustical, tactical and operational superiority over submarine and surface combatants in all scenarios through detection, classification, localization and contact following. Current developments, detailed below, are focused on supporting Littoral Warfare, Regional Sea Denial, Battle Group Support, Diesel Submarine Detection, Surveillance, and Peacetime Engagement. TECHEVAL and OPEVAL are completing for AN/BQQ-5E and the TB-29 Array; these will provide quantum improvements in long range detection and localization for SSN 688 and TRIDENT Class Submarines. Engineering Change Proposal (ECP) 7001 to AN/BQQ-5E will provide Low Frequency Active (LFA) Interference Rejection, Dual Towed Array Processing and Full Spectrum Processing to SSN 688 and TRIDENT Class Submarines. The Onboard Trainer is being developed to provide pierside and at-sea operational and team training to improve operator efficiency. ECP 1000 to AN/BSY-1 will incorporate AN/BQQ-5E and TB-29 capabilities, including those of AN/BQQ-5E ECP 7001, as well as Medium Frequency (MF) Active Post Processing and additional MF Active Waveforms to enhance shallow water performance and diesel submarine detection. High Frequency (HF) Active Post Processor Shape Filter to improve shallow water performance, under-ice navigation and ship safety, HF Under-Ice Fixes to correct Follow-on Test and Evaluation deficiencies and provide operability enhancements. An early break-out of software and the utilization of Commercial Off the Shelf hardware are being considered. Towed Array development will focus on: (a) tow cable improvements for shallow water towing; (b) reliability improvements for all module type couplings, connectors, strength members and hoses; and (c) hydrophone and telemetry cost reduction alternatives.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development
PROJECT NUMBER: S0219
BUDGET ACTIVITY: 5
Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,500) Started Development Test (DT) IIM for AN/BQQ-5E and TB-29.
- (U) ($22,230) Completed engineering development model and System Design Certification Testing (SDCT) for TB-29 Array.
- (U) ($8,011) Modified AN/BQQ-5E development contract for ECP 7001.
- (U) ($500) Started preparations for AN/BSY-1 ECP 1000.
- (U) ($2,960) Continued development for Probe Alert, Desk Top Calculator (DTC) Improvements and the Acoustic Measurement Facility Improvement Program (AMFIP).

2. (U) FY 1994 PLAN:

- (U) ($746) Complete DT IIM and Operational Test (OT) IIC for AN/BQQ-5E and TB-29 Array.
- (U) ($2,093) Award development contract and complete Critical Design Review (CDR) for Onboard Trainer.
- (U) ($7,633) Obtain Milestone II approval for AN/BSY-1 ECP 1000; award development contract.
- (U) ($13,183) Continue development of AN/BQQ-5E ECP 7001.
- (U) ($5,200) Complete development of TB-29 Array.
- (U) ($3,200) Continue development for Probe Alert, DTC Improvements and the AMFIP.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development
PROJECT NUMBER: SO219
BUDGET ACTIVITY: 5
Date: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) ($9,859) Complete development of AN/BQQ-5E ECP 7001.
- (U) ($6,416) Complete development of Onboard Trainer.
- (U) ($8,477) Continue development of AN/BSY-1 ECP 1000.
- (U) ($3,200) Continue development for Probe Alert, DTC Improvements and the AMFIP.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCENDIV, Newport, RI; NAVUNSEAWARCENDET, New London, CT; NRL, Washington, DC; NAVSURFWARCENDIV, Crane, IN; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; COMOPTEVFOR, Norfolk, VA. CONTRACTORS: IBM, Manassas, VA; Martin Marietta, Glen Burnie, MD; EG&G, Rockville, MD.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

• (U) Navy Decision Coordinating Paper S0219AS	02/86	(AN/BQQ-5)
• (U) Test and Evaluation Master Plan 137-8 (Rev 2)	01/91	(AN/BQQ-5E and TB-29)
• (U) Operational Requirement 167-02-89 (Rev 1)	08/91	(Onboard Trainer)
• (U) Acquisition Program Baseline Agreement	08/92	(AN/BQQ-5E and TB-29)
• (U) Acquisition Plan 424-87 (Change 5)	01/94	(AN/BQQ-5 and Towed Systems)

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development

PROJECT NUMBER: S0219
BUDGET ACTIVITY: 5

Date: 7 February 1994

G. (U) RELATED ACTIVITIES:

- (U) PE 0604524N (Submarine Combat System)
- (U) PE 0604558N (New Design SSN Development)
- (U) PE 0604561N (SSN-21 Development)
- (U) PE 0604562N (Submarine Tactical Warfare System)

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 52 *	0	27,200	40,884	56,206	72,898	86,105	89,453	CONT.	CONT.

* OPN Line 52 (SSN ACOUSTICS) is a new P-1 Line Item beginning in FY 1994. Prior year funds are found in P-1 Line Items 51 (AN/BQQ-5 Sonar) and 61 (AN/BSY-1 Submarine Advanced Combat System).

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

J. (U) TEST AND EVALUATION:

- (U) AN/BQQ-5E TECHEVAL 8/93; OPEVAL 4/94
- (U) TB-29 TECHEVAL 8/93; OPEVAL 4/94

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development

PROJECT NUMBER: X0742
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: Submarine Integrated Antenna Systems

PICTURE NOT AVAILABLE

POPULAR NAME: SIAS

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development

PROJECT NUMBER: X0742
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		EHF NPM MSII 9/94 HSBCA MSIII 3/94	AN/BST-1 MSIII 4/95	I-BRA 34 MSIII 9/96				
ENGINEERING MILESTONES								
T&E MILESTONES	HSBCA DTIIB 3/93 HSBCA OTII 8/93	AN/BST-1 DTII 12/94 I-BRA 34 DTIIA 3/95 I-BRA 34 DTIIB 9/95		ADS DT 11/96 OT 6/96	EHF NPM DTII 4/98		EHF NPM OT 10/98	
CONTRACT MILESTONES		EHF NPM E&MD PHI 11/93 EHF NPM E&MD PHII 3/95		ADS E&MD 2/96				

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	5,549	9,261	1,870	6,480	1,320	1,200	0	CONT.
SUPPORT CONTRACT	300	200	200	200	150	100	0	CONT.
IN-HOUSE SUPPORT	5,656	5,412	2,534	2,575	841	1,005	651	CONT.
GFE/ OTHER								
TOTAL	11,505	14,873	4,604	9,255	2,311	2,305	651	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project provides submarines with antenna systems designed to: (a) permit greater operational flexibility through improved speed/depth performance; (b) improve reliability and availability; and (c) be compatible with existing and emerging communications systems.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development
PROJECT NUMBER: X0742
BUDGET ACTIVITY: 5
Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($3,211) Continued development of the AN/BST-1 upgrade.
- (U) ($2,214) Continued engineering efforts and issued Engineering and Manufacturing Development (E&MD) option in contract to build two Improved AN/BRA-34 antennas.
- (U) ($3,464) Continued engineering efforts for the Extremely High Frequency (EHF) Non-Penetrating Mast (NPM).
- (U) ($400) Conducted Development Testing (DT)-IIB and started Operational Testing (OT)-II testing for the High Speed Buoyant Cable Antenna (HSBCA).
- (U) ($2,216) Conducted a risk assessment and design and engineering studies to support the Cost and Operational Effectiveness Analysis (COEA) for the SSN Towed Buoy Antenna.

2. (U) FY 1994 PLAN:

- (U) ($100) Complete Milestone III for HSBCA.
- (U) ($2,700) Continue engineering efforts and start DT-II for the AN/BST-1 upgrade.
- (U) ($2,100) Continue engineering efforts for the Improved AN/BRA-34.
- (U) ($7,287) Complete Milestone II and issue E&MD Phase I contract for EHF NPM antenna.
- (U) ($2,286) Start systems engineering analysis efforts for the Robust Antenna.
- (U) ($400) Start design efforts for the Antenna Distribution System (ADS).

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development
PROJECT NUMBER: X0742
BUDGET ACTIVITY: 5
Date: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) ($400) Complete DT-II and Milestone III for AN/BST-1 Upgrade.
- (U) ($200) Conduct DT-IIA and DT-IIB and continue engineering efforts for the Improved AN/BRA-34.
- (U) ($4,004) Complete EHF NPM E&MD Phase I efforts and start Phase II.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCEN DET, New London, CT; NAVUNSEAWARCENDIV, KEYPORT, WA; NAVSURFWARCEN SHIPSYSENGSTA, Philadelphia, PA; CONTRACTORS: AMERIND, Alexandria, VA; Spears Associates, Norwood, MA; Raytheon, Newport, RI; and Consolidated Cable, Riverside, CA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not availble for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

• (U) SIAS NDCP	03/80
• (U) Improved AN/BRA-34 Antenna PCAD	03/89
• (U) AN/BST-1 TEMP	09/89
• (U) HSBCA OR 236-02-90	12/88
• (U) EHF NPM OR 270-02-89	11/91

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development

PROJECT NUMBER: X0742
BUDGET ACTIVITY: 5

Date: 7 February 1994

G. (U) RELATED ACTIVITIES:

- (U) PE 0602232N (Command, Control and Communications Technology) provides input to this program.
- (U) PE 0303109N (Satellite Communications) provides for the EHF transmitter and receiver that utilizes the antenna developed under this program.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 117	5,161	1,492	1,403	1,670	5,810	8,312	17,562	CONT.	CONT.

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

J. (U) TEST AND EVALUATION:

- (U) HSBCA — DT-IIB 3/93, OT-II 8/93
- (U) I-AN/BRA-34 — DT-IIA 3/95, DT-IIB 9/95, OT-II 6/96
- (U) AN/BST-1 — DT-II 12/94
- (U) EHF NPM — DT-II 4/98, OT-II 10/98
- (U) ADS — DT-II 11/96

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development

PROJECT NUMBER: X1411
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: Submarine Tactical Communications System

PICTURE NOT AVAILABLE

POPULAR NAME: SSN Integrated Communications (SSN-ICS)

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development

PROJECT NUMBER: X1411
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	SMB MSI II 7/93							SMB MSIV 1/00
ENGINEERING MILESTONES								
T&E MILESTONES	SMB DT IIB 3/93				SMB (P3I) DT IIIA 10/96			SMB (P3I) DT IIIB 10/99
CONTRACT MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT								
SUPPORT CONTRACT	165							2,724
IN-HOUSE SUPPORT	2,197	1,538	1,828	1,678	1,720	1,738	1,736	CONT.
GFE/ OTHER								
TOTAL	2,362	1,538	1,828	1,678	1,720	1,738	1,736	CONT.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development

PROJECT NUMBER: X1411
BUDGET ACTIVITY: 5

Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Submarine Tactical Communications System project provides attack submarines with communications systems designed to: (a) enhance data throughput; (b) copy tactical data networks such as Tactical Data Information Exchange System (TADIX); (c) be inter-operable with other U.S. and allied military networks; and (d) improve reliability, maintainability, and availability. This can be accomplished by providing the attack submarine with a properly integrated mix of Navy standard communication equipment covering a wide range of frequencies and modes. Included in this project is the Submarine Communications System Engineering Program (SCSEP) which provides a system engineering approach for the design and evaluation of new and existing submarine radio rooms. In addition, the project provides support for the Land-Based Submarine Radio Room (LBSRR) for new systems evaluation and integration. The project includes system engineering efforts associated with demonstration of new technology which will allow the submarine to be a participant in battle group and joint operations. The new technology will increase the submarine's communications, command, and control capability.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($243) Evaluated radio room miniaturization, integration, and automation systems and candidate equipments for new radio rooms.
- (U) ($555) Conducted Development Testing (DT) IIB and completed Milestone III for the Submarine Message Buffer (SMB).
- (U) ($179) Started SMB Pre-Planned Improvement (P3I).
- (U) ($708) Continued SCSEP engineering development efforts.
- (U) ($191) Continued LBSRR evaluation.
- (U) ($486) Continued LINK 16/JTIDS and wideband receiver development.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development
PROJECT NUMBER: X1411
BUDGET ACTIVITY: 5
Date: 7 February 1994

2. (U) FY 1994 PLAN:

- (U) ($841) Continue evaluation of radio room miniaturization, integration, and automation systems and candidate equipments for new radio rooms.
- (U) ($471) Continue SMB P3I efforts.
- (U) ($226) Continue SCSEP engineering development efforts.

3. (U) FY 1995 PLAN:

- (U) ($1,023) Continue evaluation of radio room miniaturization, integration, and automation systems and candidate equipments for new radio rooms.
- (U) ($275) Continue SCSEP engineering development efforts.
- (U) ($530) Continue SMB P3I efforts.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCEN DET, New London, CT; NCCOSC RDT&E DIV, San Diego, CA; NAVELEXCEN, Charleston, SC. CONTRACTORS: Mitre Corp., McLean, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604503N
PROGRAM ELEMENT TITLE: Submarine System Equipment Development
PROJECT NUMBER: X1411
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) Submarine Message Buffer TEMP (Rev 1) 2/93

G. (U) RELATED ACTIVITIES:

- (U) PE 0602232N (Command, Control and Communications Technology) provides input to this program.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 123	799	3,706	5,220	7,930	11,590	13,388	7,948	CONT.	CONT.

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

J. (U) TEST AND EVALUATION:

- (U) Submarine Message Buffer DT IIB 3/93
- (U) Submarine Message Buffer P3I DT IIIA 10/96
- (U) Submarine Message Buffer P3I DT IIIB 10/99

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604504N
PROGRAM ELEMENT TITLE: Air Control
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0993 Carrier Air Traffic Control	2,443	2,721	2,135	4,283	6,580	7,416	1,948	CONT.	CONT.
W1657 Air Traffic Control (ATC) Improvements	6,879	6,243	4,369	2,485	1,140	149	1,050	CONT.	CONT.
X0718 Marine Air Traffic Control Automatic Landing System (MATCALS)	2,732	845	1,629	1,582	1,646	1,588	1,698	CONT.	CONT.
TOTAL	12,054	9,809	8,133	8,350	9,366	9,153	4,696	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element provides for the development, integration, and testing of automated Air Traffic Control (ATC) hardware and software required to provide improved flight safety and more reliable all-weather ATC and landing capabilities ashore and afloat. Funded programs are required to upgrade or replace aging ATC and approach/landing equipment on aircraft, aircraft carriers, amphibious ships, Naval Air Stations, and Navy/Marine Corps tactical/expeditionary airfields and remote landing sites. Development of a Global Positioning System data link will enable the transfer of precise positioning information between ships and aircraft.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604504N
PROGRAM ELEMENT TITLE: Air Control

PROJECT NUMBER: W0993
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: Carrier Air Traffic Control

PICTURE NOT AVAILABLE

POPULAR NAME: Automated Carrier Landing System (ACLS)

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604504N
PROGRAM ELEMENT TITLE: Air Control

PROJECT NUMBER: W0993
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	None	None	None	None	None	None	None	CONT.
ENGINEERING MILESTONES	Comp.EQT& Sftw.Recomp for AN/SPN-46	MTD/SPN-46 Integration	In-house MTD Test/ Validation		MTD Testing	None	In house testing/GPS Landing Sys	CONT.
T&E MILESTONES								CONT.
CONTRACT MILESTONES	Comp.SPN-46 FSD Contract	Award MTD	MTD Contract	MTD Contract	GPS Landing Sys Contract	None	None	CONT.

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	1,835	1,900	1,500	3,200	5,706	6,253	1,052	CONT.
SUPPORT CONTRACT	50	42	50	100	100	150	150	CONT.
IN-HOUSE SUPPORT	408	629	530	923	724	963	721	CONT.
GFE/ OTHER	150	150	55	60	50	50	25	CONT.
TOTAL	2,443	2,721	2,135	4,283	6,580	7,416	1,948	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Shipboard Air Traffic Control Centers identify, marshal, and direct aircraft within 50 Nautical Miles (nm) to a ship's Automatic Carrier Landing System (ACLS) and Independent Landing Monitor (ILM). The ACLS and ILM then provide precise automatic control and verification of aircraft during their final approach and landing sequence. Due to the AN/SPN-46 radar's acquisition limitation in rain, a Moving Target Detection (MTD) capability is required. The next generation landing system will require a Global Positioning System (GPS) data link for precise positioning information transfer from ship to aircraft.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604504N
PROGRAM ELEMENT TITLE: Air Control

PROJECT NUMBER: W0993
BUDGET ACTIVITY: 5

Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($335) Completed AN/SPN-46(V) software recompile and environmental qualification testing.
- (U) ($1,500) Awarded contract for MTD engineering development.
- (U) ($608) Provided engineering support; test and evaluation efforts and project management support for AN/SPN-46(V) MTD; software recompile and environmental qualification testing.

2. (U) FY 1994 PLAN:

- (U) ($1,900) Continue MTD development for AN/SPN-46(V) to increase performance capability in rain.
- (U) ($75) Begin investigation into GPS shipboard data link/landing system.
- (U) ($746) Provide engineering, test and evaluation, and project management support efforts for AN/SPN-46(V) and MTD.

3. (U) FY 1995 PLAN:

- (U) ($1,500) Continue MTD engineering. Begin initial testing/incorporation efforts.
- (U) ($75) Continue GPS landing system efforts.

(U) ($560) Provide engineering, test and evaluation, and project management support for MTD.

) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NESEA, St. Inigoes, MD; NAVAIRWARCENACDIV, Patuxent River, MD; and Indianapolis, IN; NRL, Washington, DC. CONTRACTORS: Textron Defense Systems, Wilmington, MA; and Sierra Nevada, Reno, NV.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604504N
PROGRAM ELEMENT TITLE: Air Control
PROJECT NUMBER: W0993
BUDGET ACTIVITY: 5
Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

AP	10/89	NTP	01/85
TEMP	07/89	ILSP	08/89

G. (U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN line 91									
	*15,935	9,328	12,338	963	9,846	7,424	5,830	CONT.	CONT.

* Does not reflect $2.2M Internal Navy reprogramming for AN/SPN-41 installation (LHD1).

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

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

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604504N
PROGRAM ELEMENT TITLE: Air Control

PROJECT NUMBER: W1657
BUDGET ACTIVITY: 5

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W1657, ATC Improvements. This program provides for engineering development, integration, adaptation, and testing of new and/or modernized real-time Air Traffic Control (ATC) systems, air navigational aids and landing systems, ATC communications systems i.e., Fleet Area Control and Surveillance Facility (FACSFAC) and Ranges that must be modified to ensure continued interoperability with the National Airspace System (NAS).

(U)FY 1993 ACCOMPLISHMENTS:

- (U) ($1,830) Continued development of FACSFAC software and hardware upgrades to ensure interoperability with Military Airspace Management System (MAMS).
- (U) ($1,578) Evaluated Department of Defense (DOD) Common Console.
- (U) ($383) Determined Global Positioning System (GPS) impact on Navy ATC requirements and began development of Navy unique GPS software.
- (U) ($915) Provided unique logistics and training development analyses for DOD Common Console, MAMS and for NAS modernization project.
- (U) ($100) Established a MAMS prototype site at Naval Air Station Patuxent River.
- (U) ($2,073) Provided engineering, test and evaluation, and project management support.

(U)FY 1994 PLAN:

- (U) ($605) Complete various software and hardware for FACSFAC upgrades.
- (U) ($1,775) Continue DOD Common Console testing.
- (U) ($350) Continue Navy unique range/ATC interface.
- (U) ($700) Participate in GPS studies and ensure any Navy ATC unique requirements are addressed

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604504N
PROGRAM ELEMENT TITLE: Air Control

PROJECT NUMBER: W1657
BUDGET ACTIVITY: 5

DATE: 7 February 1994

- (U) ($2,813) Provide engineering, technical, and program management support for projects.

(U)FY 1995 PLAN:

- (U) ($1,105) Install DOD Common Console Prototypes at Marine Corps Air Station, Camp Pendleton for testing/validation.
- (U) ($950) Continue GPS/ATC Research and Development (R&D) Analyses.
- (U) ($150) Continue with US Air Force in MAMS development efforts in preparation for FY 1996 testing.
- (U) ($2,164) Provide engineering, technical, test and evaluation, and program management support for projects.

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

(U)WORK PERFORMED BY: IN-HOUSE: NESEC, Charleston, SC; NCCOSC WEST ISE DIV, Vallejo, CA; NESEA, St. Inigoes, MD; NAVAIRWARCENACDIV, Patuxent River, MD, Warminster, PA and Indianapolis, IN; NCCOSC RDTE DIV, San Diego, CA; SOUTHNAVFACENGCOM, North Charleston, SC. CONTRACTORS: TBD.

(U)RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 92	0	0	0	1,311	2,068	14,791	41,195	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604504N
PROGRAM ELEMENT TITLE: AIR CONTROL

PROJECT NUMBER: X0718
BUDGET ACTIVITY: 5

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X0718 - MATCALS. Provide for continued development, integration, and testing of hardware and software to meet requirements for all-weather operation and improved flight safety of Air Traffic Control and Automated Landing System (ALS) at Navy/Marine Corps expeditionary airfields.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($595) Developed, tested and certified software and procedures for MODE I ALS capability to assure reliability and safety of flight.
- (U) ($2,037) Developed, tested, and began certification of Version K of the Marine Air Traffic Control Automatic Landing System (MATCALS) Operational Software which provides for the control and safety of aircraft in landing/take-off operations including TADIL-B (ground-to-ground radio data link) with the AN/TPS-73 radar configuration.
- (U) ($100) Studied effectiveness of model-following algorithms to ensure more accurate landing system performance.

(U) FY 1994 PLAN:

- (U) ($258) Complete certification and field software for MODE I ALS capability.
- (U) ($565) Develop, test and certify TADIL-B/C Version L Operational Software.
- (U) ($22) Study AN/TPN-22 Modulator design changes and Communications system Remote Landing Site Tower (RLST) compatibility issues.

(U) FY 1995 PLAN:

- (U) ($508) Develop, test, and begin certification of Version M software for increased automation for MATCALS control of fleet air.
- (U) ($53) Analyze and evaluate performance and safety improvements from applications of Differential Global Positioning Satellite data.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604504N
PROGRAM ELEMENT TITLE: AIR CONTROL

PROJECT NUMBER: X0718
BUDGET ACTIVITY: 5

DATE: 7 February 1994

- (U) ($1,068) Develop, test and certify improvements in TADIL-B/C software to obtain improved flight safety and control of aircraft in tactical operations and Version M of the MATCALS Operational Software.

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

(U) WORK PERFORMED BY: IN-HOUSE: COMSPAWARSYSCOM, Washington, D.C.; NISE WEST DET, Vallejo, CA; NESEA, St. Inigoes, MD; NAVAIRWARCENACDIV, Patuxent River, MD. CONTRACTORS: UNISYS, St. Paul, MN; GTRI, Atlanta, GA; MITECH, Inc, Rockville, MD; JIL INC., Arlington, VA.

(U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 89 NAVCOMPT	3,533	4,004	4,348	3,989	4,378	4,577	7,932	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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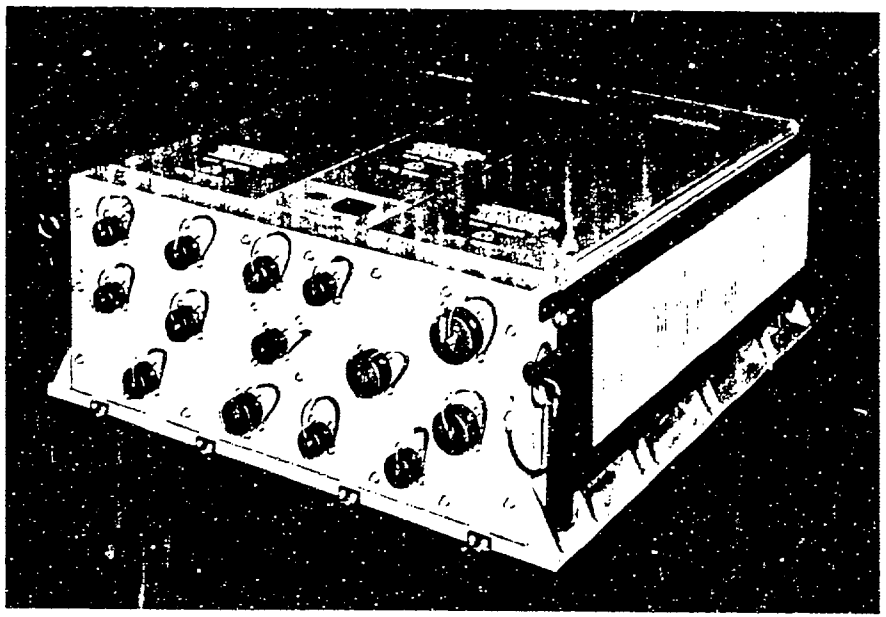
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604507N
PROGRAM ELEMENT TITLE: Enhanced Modular Signal Processor

PROJECT NUMBER: V1440
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: EMSP



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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604507N
PROGRAM ELEMENT TITLE: Enhanced Modular Signal Processor

PROJECT NUMBER: V1440
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM REV	8/93					CONT.		MILESTONES PROG
ENGINEERING MILESTONES	6/93 S/W Accept	9/94 ASIP NTDS-B DEV Units						CONT.
T&E ENCL Accept.	SEM E Tests	9/94 NTDS-B					CONT.	MILESTONES S/W
CONTRACT MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	6,962	8,223	9,270	6,869	4,458	2,074	2,291	CONT.
SUPPORT CONTRACT	1,010	1,100	1,000	600	600	550	550	CONT.
IN-HOUSE SUPPORT	6,518	3,850	1,700	1,700	1,000	950	750	CONT.
GFE/ OTHER	38	0	0	0	0	0	0	CONT.
TOTAL	14,528	13,173	11,970	9,169	6,058	3,574	3,591	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Enhanced Modular Signal Processor (EMSP) is a modular, distributed parallel state-of-the-art signal processor to provide increased performance capability for multi-platform ASW weapon systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604507N
PROGRAM ELEMENT TITLE: Enhanced Modular Signal Processor
PROJECT NUMBER: V1440
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($2,179) Completed DT-IID Testing and operational assessment.
- (U) ($5,811) Conducted risk mitigation IV&V testing and Beta Level Application Testing.
- (U) ($6,538) Support software development, integration, testing, critical engineering design support for Development and Operational Testing (DT/OT) for user systems (SEM E).

2. (U) FY 1994 PLAN:

- (U) ($1,976) Continue DT-III Testing (Reliability Demonstration) and continue ASIP including acceptance testing.
- (U) ($7,245) Support software development, integration, testing, critical engineering design support for Development and Operational Testing (DT/OT) for user systems (SEM E).
- (U) ($3,952) Continue Beta Level Application Testing and risk mitigation IV&V testing.

3. (U) FY 1995 PLAN:

- (U) ($1,197) Continue DT-III Testing (Reliability Demonstration) and ASIP development.
- (U) ($8,379) Support software development, integration, testing, critical engineering design support for Development and Operational Testing (DT/OT) for user systems (SEM E).
- (U) ($2,394) Continue risk mitigation IV&V testing.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA; NADIPSD, Concord, CA; NRL, Washington, DC. CONTRACTORS: American Telephone & Telegraph Co, Greensboro, NC.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604507N
PROGRAM ELEMENT TITLE: Enhanced Modular Signal Processor

PROJECT NUMBER: V1440
BUDGET ACTIVITY: 5

Date: 7 February 1994

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:
DCP 3/90
TEMP 1/90 (revision 3.0 in signature cycle)
AP 9/93

G. (U) RELATED ACTIVITIES:

- (U) PE 0204311N, Integrated Surveillance System - Provides funding for SURTASS unique interfaces and requirements for the Acoustic Systems Implementation Program (ASIP).

- (U) Program Element 0205620N, Surface ASW Combat System Integration - Provides funding for AN/SQQ-89 unique interfaces and requirements for the Acoustic Systems Implementation Program (ASIP).

- (U) Program Element 0604212N (SH-60B) & (SH-60F), Anti-Submarine Warfare and Other Helicopter Development - Provides funding for ALFS unique interfaces and requirements for the Acoustic Systems Implementation Program (ASIP).

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 112	3,658	7,218	5,513	10,019	3,123	3,190	3,263	CONT.	CONT.
• (U) OPN Line 87	67,200	46,600	33,963	24,366	0	0	0	CONT.	CONT.

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

J. (U) TEST AND EVALUATION: Conduct Beta Level Application and risk mitigation IV&V testing. Complete DT-IID testing and continue ASIP development testing.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604512N
PROGRAM ELEMENT TITLE: Shipboard Aviation Systems
PROJECT NUMBER: W2232
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W2232 CV Launch and Recovery Systems	0	1,388	1,543	13,770	9,270	13,224	9,307	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND PROJECT: This Navy unique program addresses the Engineering and Manufacturing Development (E&MD) of all systems required to recover and launch Navy/Marine Corps aircraft (fixed wing, rotary wing and Vertical/Short Take-Off and Landing (VSTOL)) operating aboard aircraft carriers (CV/CVN), amphibious assault ships (LHD/LHA/LPH) and aviation facility ships. This program includes E&MD of:

- (U) The Improved Carrier Optical Landing System (ICOLS) which includes the Improved Fresnel Optical Landing System (IFLOLS) and the Long Range Line-up System (LRLS), to provide longer range, higher accuracy visual landing aids for pilots landing on aircraft carriers,
- (U) The Mod 4 version of the Mark 7 (MK 7 MOD 4) arresting gear on aircraft carriers, which allows increased aircraft landing weight capability.
- (U) The Integrated Shipboard Information System (ISIS) to employ existing and emerging technology to enable rapid input, collection, processing and distribution of relevant air operations information and then display this information on electronic monitors in all air operations work centers throughout the ship.
- (U) The Advanced Launch and Recovery Control Systems (ALRCS) to introduce modern, modularized computer control systems to the catapults and arresting gear on aircraft carriers.

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604512N
PROGRAM ELEMENT TITLE: Shipboard Aviation Systems
PROJECT NUMBER: W2232
BUDGET ACTIVITY: 5
Date: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($1,049) Complete design of the ICOLS LRLS Engineering Development Model (EDM) and conduct shipboard prototype demonstration.
- (U) ($339) Complete preliminary design of Mark 7 Mod 4 arresting gear EDM.

(U) FY 1995 PLAN:

- (U) ($1,543) Award contract for the ICOLS LRLS EDM.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Indianapolis, IN; Lakehurst, NJ; and Patuxent River, MD. CONTRACTORS: Humbug Mountain Research Laboratories, Duarte, CA.

(U) RELATED ACTIVITIES:

- (U) PE 0603512N (Carrier Systems Development) funds related Advanced Development efforts which transition to this program.

(U) OTHER APPROPRIATION FUNDS: Information is not available at this level of detail.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604516N
PROGRAM ELEMENT TITLE: Ship Survivability
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S0410 BR/CW COUNTERMEASURES	5,665	4,869	2,671	2,084	2,039	2,118	2,149	CONT.	CONT.
S1828 SHIP SURVIVABILITY (ENGINEERING)	1,989	1,230	1,382	1,031	926	908	896	CONT.	CONT.
S2054 SHIP DAMAGE CONTROL	3,242	4,078	4,483	4,097	3,948	3,856	3,772	CONT.	CONT.
TOTAL	10,896	10,177	8,536	7,212	6,913	6,882	6,817	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program supports the full scale development of equipment/systems to enable continued, effective combat missions through protection from weapons effects due to hostile actions and peacetime accidents. This program also supports the engineering development of improved Damage Control/Fire Protection and Firefighting equipment, devices, and systems for rapid control/suppression of damage/fire with retention of ship mission.

(U) This program also develops chemical, biological, and radiological (CBR) defensive systems and concepts for surface ships, required to counter CBR threats in the near term (1990s) as identified in Defense Planning Guidance. Development addresses individual and collective protection, detection and monitoring, and decontamination equipment.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604516N
PROGRAM ELEMENT TITLE: Ship Survivability
PROJECT NUMBER: S0410
BUDGET ACTIVITY: 5
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) S0410, BR/CW COUNTERMEASURES: Develops Chemical and Biological (CB) defensive systems for surface ships to support the requirement to sustain operations in a CB threat environment (Defense Planning Guidance (FY94-99)). Systems developed will counter threats in the near term and predicted emerging threats as validated by Office of Naval Intelligence (ONI) CB Threat Assessment (TA# 004-92).

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($300) Completed Selected Area Collective Protection System (SACPS) OPEVAL recommended actions and supported Fleet introduction.
- (U) ($1,469) Completed OPEVAL and achieved MS III (Jul 93) approval for Collective Protection System (CPS). System has been installed on DDG-51, LHD-1, LSD-41, and AOE-6 ship classes.
- (U) ($356) Completed preliminary testing of CPS high pressure supply fan incorporating redesign for flat plate stator/diffuser.
- (U) ($267) Completed design options study for Shipboard Chemical Agent Monitor - Portable (SCAMP).
- (U) ($1,710) Continued TECHEVAL for Improved Chemical Agent Point Detection System (IPDS), fabricated Engineering Development Models (EDMs), and undated technical drawings and documentation.
- (U) ($1,068) Completed Interim Biological Agent Detector (IBAD) EDM fabrication and test and checkout and conducted joint service field trials at Dugway Proving Grounds.
- (U) ($495) Achieved MS I/II (May 93) approval for Shipboard Automatic Liquid Agent Detector (SALAD), initiated Engineering Development including hardware refinement and revisions to requisite acquisition documents.

(U) FY 1994 PLAN:

- (U) ($110) Continue fleet introduction of SACPS.
- (U) ($179) Complete CPS OPEVAL recommended actions and support FOT&E on DDG-51 class.
- (U) ($248) Complete evaluation of CPS high pressure fans.
- (U) ($496) Procure and conduct TECHEVAL of SCAMP Non-Developmental Item (NDI) alternatives and revise requisite acquisition documents.
- (U) ($2,191) Complete EDM fabrication of IPDS and component/system testing, conduct shipboard TECHEVAL, prepare for shipboard OPEVAL, and continue development of technical drawings, and requisite acquisition documents.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604516N
PROGRAM ELEMENT TITLE: Ship Survivability
PROJECT NUMBER: S0410
BUDGET ACTIVITY: 5
DATE: 7 February 1994

- (U) ($950) Transition IBAD management oversight to the Joint Program Office for Biological Defense (JPO-BD). P.E. 0208051A/Project DBD1, Joint Biological Defense/non-medical. Complete operational assessment and initiate IBAD prototype procurement and component/system testing. Continue development of technical documentation, including user and trainer materials.
- (U) ($705) Initiate fabrication and testing of SALAD EDM components/systems, and update technical drawings and documentation including requisite acquisition documents.

(U) FY 1995 PLAN:

- (U) ($50) Continue fleet introduction of SACPS.
- (U) ($96) Support additional CPS FOT&E on other ship classes.
- (U) ($125) Conduct final evaluations of CPS high pressure fan.
- (U) ($900) Complete SCAMP system specifications and fabrication of EDM systems, incorporating results of NDI evaluations.
- (U) ($525) Support OPEVAL and MS III (Jun 95) decision for IPDS.
- (U) ($525) Conduct SALAD component/system testing, including shipboard TECHEVAL, initiate planning for OPEVAL and revise requisite acquisition documentation.
- (U) ($450) Support Joint Service Lightweight Integrated Suit (JSLIST) program EDM procurement and lab/field testing.

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

(U) WORK PERFORMED BY: IN HOUSE: NAVSURFWARCENDIV, Crane, IN; NAVSURFWARCENDIV, Dahlgren, VA. CONTRACTORS: Battelle, Columbus, OH; Science and Technology Corp., Hampton, VA; Brunswick Corp., Clearwater, FL; Integrated Systems Analysts, Inc., Arlington, VA.

(U) RELATED ACTIVITIES:

- (U) FY 1995 and beyond resource reduction relates to PBD #109 that transfers funding management and oversight of biological defense programs to the Joint Program Office for Biological Defense (JPO-BD). Navy will continue to execute programs through JPO-BD funding, to satisfy navy requirements and ship integration. P.E. 0208C51A/Project DBD1, Joint Biological Defense/ non-medical.
- (U) Program Element (PE) 0603514N, Ship Combat Survivability. The transition program for CB advanced development.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604516N PROJECT NUMBER: S0410 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: Ship Survivability BUDGET ACTIVITY: 5

- (U) ($950) Transition IBAD management oversight to the Joint Program Office for Biological Defense (JPO-BD). P.E. 0208051A/Project DBD1, Joint Biological Defense/non-medical. Complete operational assessment and initiate IBAD prototype procurement and component/system testing. Continue development of technical documentation, including user and trainer materials.
- (U) ($705) Initiate fabrication and testing of SALAD EDM components/systems, and update technical drawings and documentation including requisite acquisition documents.

(U) FY 1995 PLAN:

- (U) ($50) Continue fleet introduction of SACPS.
- (U) ($96) Support additional CPS FOT&E on other ship classes.
- (U) ($125) Conduct final evaluations of CPS high pressure fan.
- (U) ($900) Complete SCAMP system specifications and fabrication of EDM systems, incorporating results of NDI evaluations.
- (U) ($525) Support OPEVAL and MS III (Jun 95) decision for IPDS.
- (U) ($525) Conduct SALAD component/system testing, including shipboard TECHEVAL, initiate planning for OPEVAL and revise requisite acquisition documentation.
- (U) ($450) Support Joint Service Lightweight Integrated Suit (JSLIST) program EDM procurement and lab/field testing.

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

- (U) WORK PERFORMED BY: IN HOUSE: NAVSURFWARCENDIV, Crane, IN; NAVSURFWARCENDIV, Dahlgren, VA. CONTRACTORS: Battelle, Columbus, OH; Science and Technology Corp., Hampton, VA; Brunswick Corp., Clearwater, FL; Integrated Systems Analysts, Inc., Arlington, VA.

(U) RELATED ACTIVITIES:

- (U) FY 1995 and beyond resource reduction relates to PBD #109 that transfers funding management and oversight of biological defense programs to the Joint Program Office for Biological Defense (JPO-BD). Navy will continue to execute programs through JPO-BD funding, to satisfy navy requirements and ship integration. P.E. 0208051A/Project DBD1, Joint Biological Defense/ non-medical.
- (U) Program Element (PE) 0603514N, Ship Combat Survivability. The transition program for CB advanced development.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604516N
PROGRAM ELEMENT TITLE: Ship Survivability
PROJECT NUMBER: S0410
BUDGET ACTIVITY: 5
DATE: 7 February 1994

- (U) PE 0602233N, Mission Support Technology. The tech base program that provides CB technology for advanced development

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN LINE 30 (CHEMICAL WARFARE DETECTOR)	3,956	0	977	5,552	7,686	7,508	7,435	CONT.	CONT.
• (U) OPN LINE 239 (COSAL OUTFITTING)	3,127	3,429	4,119	2,059	10,800	14,300	14,300	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604516N
PROGRAM ELEMENT TITLE: Ship Survivability

PROJECT NUMBER: S1828
BUDGET ACTIVITY: 5

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) S1828, SHIP SURVIVABILITY (ENGINEERING): This project supports the full scale development of systems and components to provide protection from weapons effects, and to enable continued combat missions.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($785) Developed construction drawings for the LX Live Fire Test and Evaluation (LFT&E) scaled whipping model. (Transitioned to P.E. 0604567N, S2198, LFT&E in FY 94).
- (U) ($590) Conducted environmental testing of the Navy Standard Electronic Power Supply (NSEPS).
- (U) ($275) Completed operational improvements to the Ship Survivability Model.
- (U) ($339) Procured prototype shock hardened combat system circuit breakers.

(U) FY 1994 PLAN:

- (U) ($472) Initiate development of blast tolerant missile and torpedo magazine boundaries designed to prevent impact of the boundary with stowed munitions. Construct full scale blast chamber and begin testing.
- (U) ($358) Conduct shipboard demonstration of NSEPS and prepare specification.
- (U) ($300) Conduct test and evaluation of prototype shock hardened combat system circuit breakers.
- (U) ($100) Conduct fire vulnerability tests of Low-Intensity-Conflict (LIC) armor systems.

(U) FY 1995 PLAN:

- (U) ($948) Complete blast tolerant magazine boundary testing; prepare standard drawings.
- (U) ($284) Prepare specification for shock hardened combat system circuit breakers.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604516N
PROGRAM ELEMENT TITLE: Ship Survivability
PROJECT NUMBER: S1828
BUDGET ACTIVITY: 5
DATE: 7 February 1994

- (U) ($150) Develop engineering drawings/specifications for LIC arm system.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NAVSURFWARCENDIV Dahlgren, VA; U.S. Army Combat Systems Test Activity, Aberdeen Proving Grounds, Aberdeen, MD.

(U) RELATED ACTIVITIES:

- (U) PE 0603514N, Project S0384, Ship Survivability (Advanced).

(U) OTHER APPROPRIATION FUNDS:

- (U) Specification changes included in new construction ships (SCN funding). Procurement information not available at this level of detail.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604516N
PROGRAM ELEMENT TITLE: Ship Survivability

PROJECT NUMBER: S2054
BUDGET ACTIVITY: 5

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: S2054, SHIP DAMAGE CONTROL: This project supports the engineering development of improved damage control (DC), fire protection, and firefighting systems for rapid damage control and recovery during peacetime operations and for mission retention in a post-hit situation.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($100) Completed fabrication of prototype quick acting watertight (QAWT) door; conducted tests.
- (U) ($1,000) Conducted integrated fire tests at full scale test facilities to develop improved tactics and doctrine.
- (U) ($1,676) Initiated installation of Integrated Survivability Management System (ISMS) on selected amphibious ships.
- (U) ($220) Procured portable non-developmental item pump for evaluation.
- (U) ($246) Conducted qualification tests on new fire insulation material.

(U) FY 1994 PLAN:

- (U) ($200) Modify QAWT door as required and complete standard drawings.
- (U) ($972) Complete multi-station at-sea evaluation of ISMS onboard USS JOHN L. HALL (FFG-32).
- (U) ($538) Complete multi-station evaluation of ISMS in actual firefighting environment onboard ex-USS SHADWELL.
- (U) ($474) Complete ISMS software documentation and configuration management plan.
- (U) ($590) Initiate packaging optimization of the hand-held Repair Team Terminal (RTT) device which provides for communication with ISMS.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604516N
PROGRAM ELEMENT TITLE: Ship Survivability
PROJECT NUMBER: S2054
BUDGET ACTIVITY: 5
DATE: 7 February 1994

- (U) ($1,304) Initiate multi-compartment integrated firefighting experiments onboard ex-USS SHADWELL in support of developing improved tactics and doctrine for vertical entry into Class B fires, simultaneous firefighting and dewatering, and ventilation of compartments during active firefighting.

(U) FY 1995 PLAN:

- (U) ($965) Complete packaging optimization and MIL-SPEC qualifications testing of RTT.
- (U) ($1,851) Initiate ISMS improvements to provide for rapid actuation of the smoke ejection system via the ISMS terminal and interface to DC sensors to provide real-time status on the location and extent of damage.
- (U) ($1,667) Continue multi-compartment integrated firefighting experiments onboard ex-USS SHADWELL in support of developing improved tactics and doctrine.

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

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NAVSURFWARCEN SHIPSYSENGSTA, Philadelphia, PA; NSCSES, Norfolk, VA. CONTRACTORS: Westinghouse MTD, Pittsburgh, PA.

(U) RELATED ACTIVITIES:

- PE 0603514N, Project S1565, Ship Damage Control.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 16 (Firefighting Equipment)	9,645	5,183	5,629	5,596	4,800	1,396	1,085	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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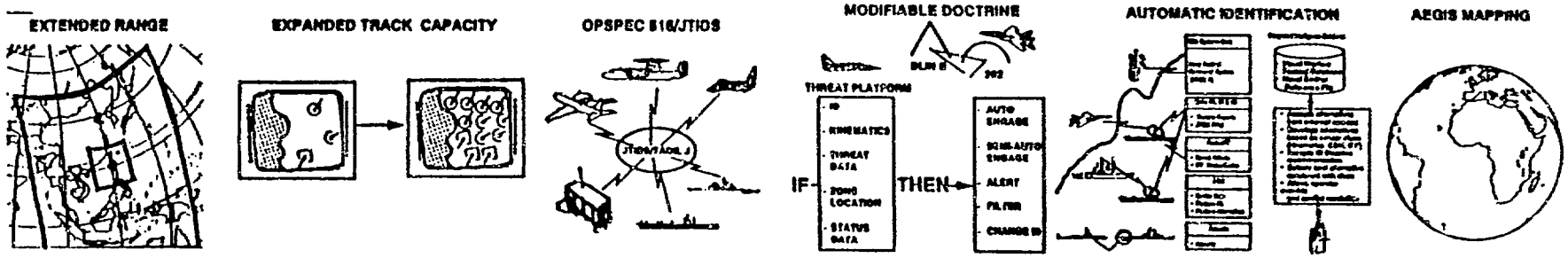
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604518N
PROGRAM ELEMENT TITLE: Combat Information Center Conversion

PROJECT NUMBER: U1604
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: NTDS Software Improvements



POPULAR NAME: Advanced Combat Direction System (ACDS) Block 1

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604518N
PROGRAM ELEMENT TITLE: Combat Information Center Conversion

PROJECT NUMBER: U1604
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES					MS III (7/97)			
ENGINEERING MILESTONES	FQR(CV)	TRR(SAT)		CDR(LHD)				
T&E MILESTONES		CV 64 DEMO	SAT(CV) CSIT(CV)	CSIT(CV) TECHEVAL	OPEVAL CSIT(LHD)	CSIT(LHD)	FOT&E(LHD)	FOT&E(LHA) (LCC)
CONTRACT MILESTONES	FQR(CV) AWARD FEE	CONTRACT AWARD						

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	9,924	5,364	7,538	9,365	9,400	10,977	10,401	CONT.
SUPPORT CONTRACT	0	0	0	0	0	0	0	CONT.
IN-HOUSE SUPPORT	3,912	4,290	3,761	5,202	6,884	7,518	6,659	CONT.
GFE/ OTHER	3,906	1,705	2,359	2,375	2,315	1,200	850	CONT.
TOTAL	17,742	11,359	13,658	16,942	18,599	19,695	17,910	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program element supports the development of the Advanced Combat Direction System (ACDS) Block 1 and the follow on efforts for advanced display systems, multiple sensor coordination and distributed computer architecture for the 21st Century destroyer (DD 21).

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604518N
PROGRAM ELEMENT TITLE: Combat Information Center Conversion
PROJECT NUMBER: U1604
BUDGET ACTIVITY: 5
Date: 7 February 1994

(U) The ACDS Block 1 program replaces 1960's vintage Naval Tactical Data System (NTDS) operating systems and applications algorithms and implements advanced concepts for Tactical Data System upgrades for surface ships in response to future threats, operational deficiencies, and new and existing operational requirements. The recent increased emphasis on joint operations (following Desert Storm/Shield) and littoral warfare has heightened the importance of ACDS Block 1's joint interoperability and increased track/range capabilities. The program's objective is to develop integrated, coherent ship's command and control systems that will increase operational capabilities; promote standardization and introduce new shipboard tactical displays and support equipment; and provide integration between sensor/weapons systems which are organic to and outside the battle force. This program provides for significant Combat Direction System (CDS) improvements including implementation of the Joint Tactical Information Data System (JTIDS)/ Tactical Data Information Link (TADIL) J (LINK 16) message standard to support interoperability/joint operations with U.S. Navy/Army/Air Force/Marine and NATO forces; implementation of the Aegis Tactical Executive System (ATES); and integration and interface with the Command and Control Processor (C^2P).

(U) Developments in advanced display systems, multiple sensor coordination and distributed computer architecture make them candidates for advanced development for introduction into the combat direction systems aboard the 21st century destroyer and other combatants. This effort's funding begins in FY97. Some of these include solid state active array technology, wide band radar operation, new radar wave forms, advances in signal processing, commercial display enhancements, and the HIPER-D distributed computing initiative. This program will integrate developments such as these using a disciplined systems engineering approach into the DD21 combat system and into upgrade schedules of other ship class combat systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($3,773) Completed contractor test and conducted Formal Qualification Review (FQR) on the core elements of ACDS Block 1 computer program.
- (U) ($500) Established crew training plan and prepared training materials, test procedures, and installation preparations for USS Constellation (CV 64) demonstration.
- (U) ($12,769) Began coding of the lead ship elements of ACDS Block 1 computer program and started contractor testing on those elements.
- (U) ($700) Continued development of Multi Data Link Certification and Test System.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604518N
PROGRAM ELEMENT TITLE: Combat Information Center Conversion
PROJECT NUMBER: U1604
BUDGET ACTIVITY: 5
Date: 7 February 1994

2. (U) FY 1994 PLAN:

- (U) ($7,686) Complete coding, development, and contractor test of the ACDS Block 1 lead ship program.
- (U) ($100) Complete test procedures for System Acceptance Tests (SAT).
- (U) ($100) Conduct Test Readiness Review (TRR) for SAT.
- (U) ($1,488) Begin SAT on lead ship program.
- (U) ($30) Conduct Combat System Integration Test (CSIT) Readiness Review.
- (U) ($1,130) Conduct platform integration testing on USS Constellation (CV 64). (11/93 - 4/94)
- (U) ($825) Begin system engineering and design efforts for Followship including CEC integration.

3. (U) FY 1995 PLAN:

- (U) ($4,494) Conduct SAT and CSIT on lead ship program (12/94 - 12/95).
- (U) ($390) Begin plans and procedures for TECHEVAL and OPEVAL.
- (U) ($2,516) Begin USS Constellation (CV64) installation preparations and develop training for crew.
- (U) (6,258) Begin modification of code for USS John C. Stennis (CVN 74) and CEC integration.

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

D. (U) WORK PERFORMED BY: IN HOUSE: NCCOSC RDT&E DIV, San Diego, CA; NAVSURFWARCEN INTCOMBATSYSTESTFAC, San Diego, CA; NAVSURWARCENDIV, Dahlgren, VA. CONTRACTORS: Hughes Aircraft Co., San Diego, CA; QuesTech Inc., San Diego, CA; UNISYS, St Paul, MN; Martin Marietta, Moorestown, NJ; John Hopkins Univ/Applied Physics Lab, Laurel, MD.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604518N
PROGRAM ELEMENT TITLE: Combat Information Center Conversion
PROJECT NUMBER: U1604
BUDGET ACTIVITY: 5
Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2 (U) Schedule changes: Data in previous budget not available for comparison.

3 (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) DCP - 22 Aug 89 (ACDS Block 1)
- (U) TEMP #935 - Approved 15 Dec 88 (ACDS Block 1)

G. (U) RELATED ACTIVITIES:

- (U) PE 0603512N, Carrier Systems Development (CV ASW Module)
- (U) PE 0603582N, Combat System Integration
- (U) PE 0205604N, Tactical Data Links
- (U) PE 0603513N, Shipboard Systems Component Development
- (U) PE 0603573N, Advanced Surface Machinery Systems
- (U) PE 0603382N, Advanced Combat System Technology
- (U) PE 0603564N, Ship Preliminary Design and Feasibility Studies.

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

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

J. (U) TEST AND EVALUATION: The schedule is as follows:

- (U) CV 64 System Demonstration 11/93 - 4/94
- (U) System Acceptance Test (SAT) 7/94 - 12/94
- (U) Combat System Integration (CSIT) 1/95 - 12/95
- (U) Technical Evaluation (TECHEVAL) 3rd QTR FY96
- (U) Operational Evaluation (OPEVAL) 2nd QTR FY97

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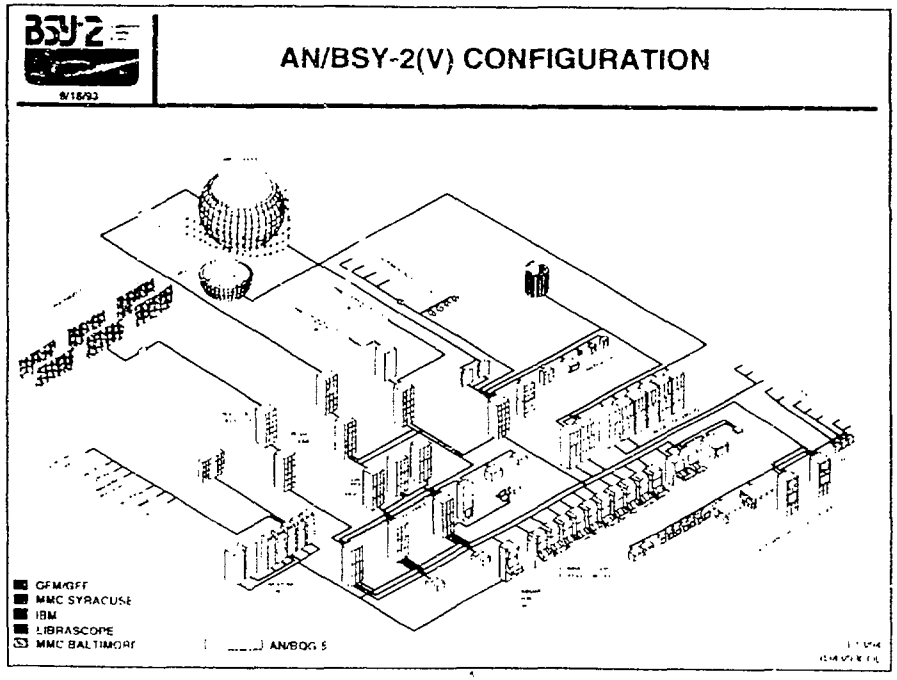
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604524N
PROGRAM ELEMENT TITLE: Submarine Combat System

PROJECT NUMBER: F1941
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: AN/BSY-2



POPULAR NAME: AN/BSY-2 Submarine Combat System

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604524N
PROGRAM ELEMENT TITLE: Submarine Combat System
PROJECT NUMBER: F1941
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
ENGINEERING MILESTONES	Delivered AN/BQG-5 8902 and 8903 Arrays 11/92 Completed AN/BQG-5 8901 Outboard Array Installation on SSN 710 8/93 Completed Thread 3 (AN/BQG-5) Integration Testing 9/93	Complete Thread 4 Testing 5/94 Complete Thread 5 Testing 8/94	Complete Thread 6 Testing 8/95					

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604524N
PROGRAM ELEMENT TITLE: Submarine Combat System
PROJECT NUMBER: F1941
BUDGET ACTIVITY: 5
Date: 7 February 1994

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
T&E MILESTONES		Complete AN/BQG-5 System Design Certification Test (SDCT) 2/94	Complete AN/BSY-2 SDCT 1 12/94	Complete AN/BSY-2 SDCT 2 11/95 Complete Combat System Installation Certification (CSIC) 6/96		Complete Weapon System Accuracy Trials (WSAT) 12/97 Complete CSIC II 3/98 Complete WSAT II 3/98 Complete Post Shakedown Availability (PSA) 3/98	Complete Development Testing DT-II 3/99 Complete Operational Testing OT-II 9/99	
CONTRACT MILESTONES		Deliver AN/BQG-5 to SSN 710 12/93	Deliver AN/BSY-2 to SSN 21 2/95	Deliver AN/BSY-2 to SSN 22 12/95				

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604524N
PROGRAM ELEMENT TITLE: Submarine Combat System
PROJECT NUMBER: F1941
BUDGET ACTIVITY: 5
Date: 7 February 1994

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	1,116,497	24,455	51,620	55,223	5,700	-	-	-	1,253,495 (0)
SUPPORT CONTRACT	72,681	12,228	14,118	15,829	9,277	5,943	1,821	337	132,234 (0)
IN-HOUSE SUPPORT	251,000	14,984	18,809	18,174	11,905	9,577	4,059	573	329,081 (0)
GFE/ OTHER	48,131	807	-	500	1,000	1,000	2,162	500	54,100 (0)
TOTAL	1,488,309	52,474	84,547	89,726	27,882	16,520	8,042	1,410	1,768,910 (0)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Chief of Naval Operations established the SSN 21 SEAWOLF and the AN/BSY-2 Combat System Top Level Requirements (TLR). The development objectives for AN/BSY-2 are: Meet the SEAWOLF combat system related TLR; develop an architecture which facilitates tactical improvements and future growth; and provide computer processes that improve response time from initial threat detection to weapon launch. AN/BSY-2 will provide new acoustic arrays which have improved self-noise characteristics and improved detection performance. It will provide computer aids to assist the operator in sensor, contact and weapon management, and will support employment of the most advanced submarine weapons from eight torpedo tubes. Software development is being conducted by dividing the total software into six (6) Threads to be built and tested in phases throughout the development. The system architecture will be partitioned to facilitate tactical improvements, future growth, and high availability.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($15,000) Delivered AN/BQG-5 8902 and 8903 arrays.
- (U) ($7,474) Completed AN/BQG-5 8901 outboard array installation on SSN 710.
- (U) ($30,000) Completed Thread 3 (AN/BQG-5) integration and test.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604524N
PROGRAM ELEMENT TITLE: Submarine Combat System
PROJECT NUMBER: F1941
BUDGET ACTIVITY: 5
Date: 7 February 1994

2. (U) FY 1994 PLAN:

- (U) ($7,481) Complete delivery of AN/BQG-5 8901 to SSN 710.
- (U) ($25,000) Complete Thread 4 test and integration.
- (U) ($25,000) Complete Thread 5 test and integration.
- (U) ($27,066) Complete AN/BQG-5 SDCT.

3. (U) FY 1995 PLAN:

- (U) ($50,000) Complete Thread 6 test and integration.
- (U) ($25,000) Complete AN/BSY-2 SDCT 1.
- (U) ($14,726) Deliver AN/BSY-2 8903 system to SSN 21.

4. (U) PROGRAM TO COMPLETION:

- (U) Complete AN/BSY-2 SDCT 2 1Q/96.
- (U) Deliver AN/BSY-2 9103 system to SSN 22 1Q/96.
- (U) Complete CSIC 3Q/96.
- (U) Complete WSAT 1Q/98.
- (U) Complete PSA 2Q/98.
- (U) Complete CSIC II 2Q/98.
- (U) Complete WSAT II 2Q/98.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604524N
PROGRAM ELEMENT TITLE: Submarine Combat System
PROJECT NUMBER: F1941
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) Complete Development test and integration 2Q/99.
- (U) Complete Operational test and integration 4Q/99.

D. (U) WORK PERFORMED BY: IN-HOUSE: Program Executive Officer - Submarines (PMO 418), Washington, DC (Program management, development and procurement); NAVUNSEAWARCENDIV, Newport, RI; NAVUNSEAWARCEN DET, New London, CT; NAVSURFWARCENDIV, Crane, IN; Navy Training Systems Center (NTSC), Orlando, FL; NAVUNSEAWARCEN DET, Norfolk, VA. CONTRACTORS: Martin Marietta Corporation, Syracuse, NY, Moorestown, NJ, Pittsfield, MA and Baltimore, MD; IBM Corporation, Manassas, VA; Librascope, Glendale, CA; Computer Sciences Corporation, Moorestown, NJ; AT&T, Greensboro, NC; EG&G Washington Analytical Services Center, Rockville, MD; MITRE Corporation, Arlington, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technolcgy changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) APB 2/91
- (U) TEMP 8/90
- (U) DCP 4/89

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604524N
PROGRAM ELEMENT TITLE: Submarine Combat System
PROJECT NUMBER: F1941
BUDGET ACTIVITY: 5
Date: 7 February 1994

G. (U) RELATED ACTIVITIES:

- (U) Weapons development programs providing combat system and weapon launch interface information to the AN/BSY-2 combat system are: PE 0603691N (MK 48 ADCAP), PE 0204229N (Tomahawk & TMPC), and PE 0604601N (Mine Development).
- (U) PE 0604503N (Submarine System Equipment Development) provides development of submarine towed arrays and towed array interfaces, Electronic Support Measures for combat system targeting, and enhanced antenna suite for navigation and improvements in tactical data processing which supports combat system targeting and command control.
- (U) PE 0604507N (Enhanced Modular Signal Processor) provides signal processing for AN/BSY-2.
- (U) PE 0604707N (SEW Architecture/Engineering Support) provides improved algorithms for third party targeting.

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

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

J. (U) TEST AND EVALUATION:

- (U) AN/BQG-5 SDCT 2Q/94
- (U) AN/BSY-2 SDCT 1 Complete 1Q/95
- (U) AN/BSY-2 SDCT 2 Complete 1Q/96
- (U) DT-II 2Q/99
- (U) OT-II 4Q/99

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604558N
PROGRAM ELEMENT TITLE: New Design SSN Development
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
F1947 New Design SSN HM&E									
	0	155,581	138,888	255,569	308,633	239,730	123,626	657,662	1,879,689
F1950 New Design SSN Combat Systems Development									
	0	80,877	127,267	106,638	113,540	115,258	47,249	191,338	782,167
TOTAL	0	236,458	266,155	362,207	422,173	354,988	170,875	849,000	2,661,856

B. (U) BRIEF DESCRIPTION OF ELEMENT: A principal challenge to the U.S. Navy is to maintain the submarine fleet essential to defend American interests. The New Attack Submarine (NAS) is being designed to meet the potential threats of the next century in a multi-mission capable submarine that has the ability to provide covert, sustained presence in denied waters. The primary goal of the program will be to develop an affordable yet capable submarine by evaluating a broad range of system and technology alternatives, and examining cost reduction, producibility improvement, and technical risk reduction. This Program Element (PE) provides the advances technology, prototype components, and systems to design and construct the NAS and its combat system. This PE directly supports the following NAS missions: (1) covert strike warfare; (2) anti-submarine warfare (ASW); (3) covert intelligence collection/surveillance, indication and warning, and electronic warfare; (4) anti-surface ship warfare (ASUW); (5) special warfare; (6) mine warfare; and (7) battle group support. Funding for NAS in FY 1993 is located in PE 0603561N, project F2033.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604558N
PROGRAM ELEMENT TITLE: New Design SSN Development

PROJECT NUMBER: F1947
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: New Design SSN HM&E

PICTURE NOT AVAILABLE

POPULAR NAME: NEW ATTACK SUBMARINE

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604558N
PROGRAM ELEMENT TITLE: New Design SSN Development
PROJECT NUMBER: F1947
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		MS-I 1/94	MS II 7/95					MS III 08
ENGINEERING MILESTONES		TBD - MILESTONE SCHEDULE WILL BE ESTABLISHED AT MS I						
T&E MILESTONES								
CONTRACT MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	0	97,582	85,353	156,062	188,507	146,445	76,351	1,158,050 (407,750)
SUPPORT CONTRACT	0	4,799	3,622	8,657	10,381	8,024	4,153	59,366 (19,730)
IN-HOUSE SUPPORT	0	53,200	49,913	90,850	109,745	85,261	43,122	662,273 (230,182)
GFE/ OTHER	0	0	0	0	0	0	0	0 (0)
TOTAL	0	155,581	138,888	255,569	308,633	239,730	123,626	1,879,689 (657,662)

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604558N
PROGRAM ELEMENT TITLE: New Design SSN Development

PROJECT NUMBER: F1947
BUDGET ACTIVITY: 5

Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project encompasses all the Hull, Mechanical and Electrical (HM&E) development efforts for the New Attack Submarine (NAS). The thrust of these efforts will be to develop and apply HM&E system technologies which enable design of an attack submarine system. This approach to technology innovation will carefully balance military capability, development and acquisition cost, impact on ship weight and volume, and technical risk. Leveraging and capitalizing on existing technologies and vendor bases for existing components from SSN-688I, TRIDENT, and SEAWOLF will minimize both cost and risk. Varying degrees of re-engineering of existing systems may be required to adapt them to the new submarine's requirements and minimize vendor risks of constructing a new ship with concurrent technology development. Newly developing technologies will be transitioned from ongoing industry and government R&D programs where doing so will offer substantial affordability payoffs, without sacrificing military capability. HM&E development will support a FY 1998 lead ship construction contract award.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: Not applicable.

2. (U) FY 1994 PLAN:

- (U) ($68,304) Initiate system verification testing and analysis to support ship preliminary design including, e.g., pressure hull structure confirmation models, hydrodynamic modeling, and acoustic signature modeling and predictions. Initiate development of components and technologies such as high speed diesel, secondary propulsion motor, modular masts and electric power distribution components. Initiate studies to apply electromagnetic signature reduction to the NAS. Transition from advanced development technologies and components such as ship control station, main propulsion unit, gas management system, hydraulic actuators, trim and drain pump, and the weapon stowage, handling, and launcher systems.

- (U) ($11,689) Initiate development of design/build strategy, with emphasis on cost-reduction. Execute process improvements, including early vendor involvement in specifications, build strategy, concurrent engineering, and commonality of parts. Perform cost-based review of ship and design/construction process to integrate new and previously-identified improvements. Continue initiatives to simplify system design and component design for affordability. Review database of cost-reduction ideas for continuing incorporation into the process.

- (U) ($12,148) Support the design process with supportability trade-off analysis. Provide program and special studies support at Navy Labs, shipyards and in-house.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604558N
PROGRAM ELEMENT TITLE: New Design SSN Development
PROJECT NUMBER: F1947
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($63,440) Implement the concurrent engineering development of the NAS through design/build teams at the shipbuilder for all non-propulsion efforts. Establish and staff concurrent engineering project management teams and develop a comprehensive design and construction data base to provide information for arrangement and installation drawings, material ordering data, manufacturing plans, and integrated construction schedules. Establish and maintain an electronic mock-up of the forward ship areas.

3. (U) FY 1995 PLAN:

- (U) ($138,888) Continue system verification studies, tests and analysis in support of ship contract design. Continue development of technologies and components such as high speed diesel, secondary propulsion motor, electric power distribution components, EM signature reduction, ship control station, gas management system, and main propulsion unit. Initiate transition of technologies such as propulsor, ship service turbine generator, reverse osmosis desalination, and main shaft seal from Advanced Development. Prepare refined ship cost estimate. Continue projects which improve producibility and reduce procurement costs. Support the design process with supportability trade-off analysis. Provide program and special support at Navy Labs, shipyards and in-house.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD, Annapolis, MD, Philadelphia, PA, & Dahlgren, VA; NAVUNSEAWARCEN, Newport, RI; NAVUNSEAWARCEN DET, New London, CT; Oak Ridge National Laboratory, Oak Ridge, TN; NSSES/CD, Philadelphia, PA; additional in-house performing activities TBD. CONTRACTORS: General Dynamics, Electric Boat Division, Groton, CT; Newport News Shipbuilding, Newport News, VA; Westinghouse Marine Division, Sunnyvale, CA; General Electric, Lynn, MA; ARL/Penn State Univ., State College, PA; MIT, Cambridge, MA; Allied Signal, Tempe, AZ; Westinghouse Electric Corporation, Cheswick, PA; TBD subsystem vendors, integration contractors and management and engineering support contractors.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604558N
PROGRAM ELEMENT TITLE: New Design SSN Development

PROJECT NUMBER: F1947
BUDGET ACTIVITY: 5

Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:
- (U) Mission Needs Statement 10/91
- (U) Milestone 0 ADM 8/92

G. (U) RELATED ACTIVITIES:

- (U) PE 0101226N (Submarine Acoustic Warfare Development)
- (U) PE 0603504N (Advanced Submarine Combat Systems Development)
- (U) PE 0603508N (Ship Propulsion System)
- (U) PE 0603561N (Advanced Submarine System Development)
- (U) PE 0603563N (Ship Concept Advanced Design)
- (U) PE 0603570N (Advanced Nuclear Power Systems)
- (U) PE 0604503N (Submarine System Equipment Development)
- (U) PE 0604567N (Ship Contract Design/Live Fire T&E)

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) SCN Line 5	0	0	0	697,533	652,435	2,857,608	690,934	CONT.	CONT.

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

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604558N
PROGRAM ELEMENT TITLE: New Design SSN Development
PROJECT NUMBER: F1950
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: New Design SSN Combat Systems Development

PICTURE NOT AVAILABLE

POPULAR NAME: New Attack Submarine

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604558N
PROGRAM ELEMENT TITLE: New Design SSN Development
PROJECT NUMBER: F1950
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		MS-I 1/94	MS II 7/95					MS III 08
ENGINEERING MILESTONES	TBD - MILESTONE SCHEDULE WILL BE ESTABLISHED AT MILESTONE I							
T&E MILESTONES								
CONTRACT MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	0	63,268	84,850	72,451	85,660	90,379	25,318	548,209 (126,283)
SUPPORT CONTRACT	0	3,639	6,143	5,180	5,084	5,035	4,925	43,400 (13,394)
IN-HOUSE SUPPORT	0	13,970	36,274	29,007	22,796	19,844	17,006	190,558 (51,661)
GFE/ OTHER	0	0	0	0	0	0	0	0 (0)
TOTAL	0	80,877	127,267	106,638	113,540	115,258	47,249	782,167 (191,338)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project encompasses the development and integration of the New Attack Submarine Combat System which includes 15 Non-Propulsion Electronics (NPE) subsystems. The scope of the typical Combat System is expanded from Acoustics and Combat Control subsystems to include Electronics Surveillance Measures (ESM), Exterior Communications, Submarine Defensive Warfare System (SDWS), Navigation, Noise Monitoring, Periscopes, Tactical Acoustic Communications, Radar, Data Transfer, Interior Communications, Acoustics Intelligence, Tactical Support Devices, and Identification Friend or Foe. The Research, Development, Test and Evaluation (RDT&E) funds identified encompass New Attack Submarine specific development efforts (not programmed in other program lines) and integration of these 15 subsystems at a Navy Land Based Test Site (LBTS) prior to ship delivery.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604558N PROJECT NUMBER: F1950 Date: 7 February 1994
PROGRAM ELEMENT TITLE: New Design SSN Development BUDGET ACTIVITY: 5

(U) New Attack Submarine plans to use an evolutionary approach to a current submarine combat system to satisfy New Attack Submarine requirements. The recurring cost of future combat systems must be reduced in order to meet the program's affordability goals. Modifications to a current combat system baseline must be developed in order to: (1) reduce the SCN recurring costs through the use of Commercial-Off-the-Shelf (COTS) components; (2) use proven computer technologies to evolve toward an Open Architecture design; (3) enhance capabilities to support expanded operational requirements, reduced manning, or reduced shipboard footprint.

(U) To meet the combined threat, the submarine force must continue to operate as effectively in shallow water regions as we traditionally have in deep water. Close coordination with the surface battle group and air forces is essential to mission accomplishment. In order to support the New Attack Submarine mission, the following functional capabilities are provided/supported by the New Attack Submarine combat system: (1) Passive/Active detection of multiple contacts, including early warning threat determination through processing and analysis of sensor data; (2) classification of sensor data for the purpose of identifying contacts; (3) localization (tracking) of contacts through target motion analysis; (4) present, launch, and control of weapons and countermeasures; (5) improved communication/connectivity with other battle group elements, air forces, and special operations forces; and (6) incorporation of Vertical Launch System to enhance strike warfare.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: Not applicable.

2. (U) FY 1994 PLAN:

- (U) ($21,940) Initiate system level activities associated with Combat System requirements in the following areas: system level specifications development; interface control document preparation; phase 2 Open System Architecture Demonstrations; preparation of a landbased integration plan; and preparation of a competitive Request for Proposal (RFP) for the selection of a Combat System Integrator contractor.

- (U) ($45,064) Begin evolutionary development and transition for Combat Control and Acoustics subsystems which includes: the transition to COTS hardware and software; the procurement of Engineering Development Models (EDMs); the transition of acoustic advanced development (PE# 6.3) efforts.

- (U) ($13,873) Start development efforts to support New Attack Submarine unique requirements for other combat system subsystems such as Exterior Communications, Periscopes, and Navigation.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604558N
PROGRAM ELEMENT TITLE: New Design SSN Development
PROJECT NUMBER: F1950
BUDGET ACTIVITY: 5
Date: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) ($15,186) Continue system level development activities in the following areas: complete system level specifications and interface control documents; conduct phase 3 Open System Architecture Demonstrations; complete landbased integration plan; and award Combat System Integrator contract.
- (U) ($100,255) Combat Control and Acoustics subsystems development will continue the transition to COTS hardware and software, the development and integration of an AN/UYK-43 Open System Module, and provide incremental funding for the EDMs.
- (U) ($11,826) Continue development efforts to support New Attack Submarine unique requirements for other combat system subsystems.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCENDIV, Newport, RI; NAVUNSEAWARCEN DET, New London, CT; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD. CONTRACTORS: TBD Subsystem vendors; TBD Integration contractor and management and engineering support contractors.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) Mission Needs Statement 10/91
- (U) MILESTONE 0 Acquisition Memorandum 8/92

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604558N PROJECT NUMBER: F1950 Date: 7 February 1994
PROGRAM ELEMENT TITLE: New Design SSN Development BUDGET ACTIVITY: 5

G. (U) RELATED ACTIVITIES:

- (U) PE 0101226N (Submarine Acoustic Warfare Development) Development of the Submarine Defensive Warfare System (SDWS) is continuing under this PE.
- (U) PE 0204229N (Tomahawk & Theatre Mission Planning Center)
- (U) PE 0603504N (Advanced Submarine Combat Systems Development)
- (U) PE 0603561N (Advanced Submarine System Development) HM&E systems concepts related to NAS completing advanced development will be transitioned to engineering development.
- (U) PE 0603562N (Submarine Tactical Warfare Systems) Includes SSN combat control system improvements.
- (U) PE 0603564N (Ship Preliminary Design and Feasibility Studies)
- (U) PE 0603570N (Advanced Nuclear Power Systems) Development of the NAS propulsion plant.
- (U) PE 0603691N (MK 48 ADCAP)
- (U) PE 0604503N (Submarine System Equipment Development) Includes development of sonar improvements, integrated ESM masts, integrated antenna systems, and tactical communications.
- (U) PE 0604707N/X0798 (Space Electronic Warfare/Architecture/Engineering Support)

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

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

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

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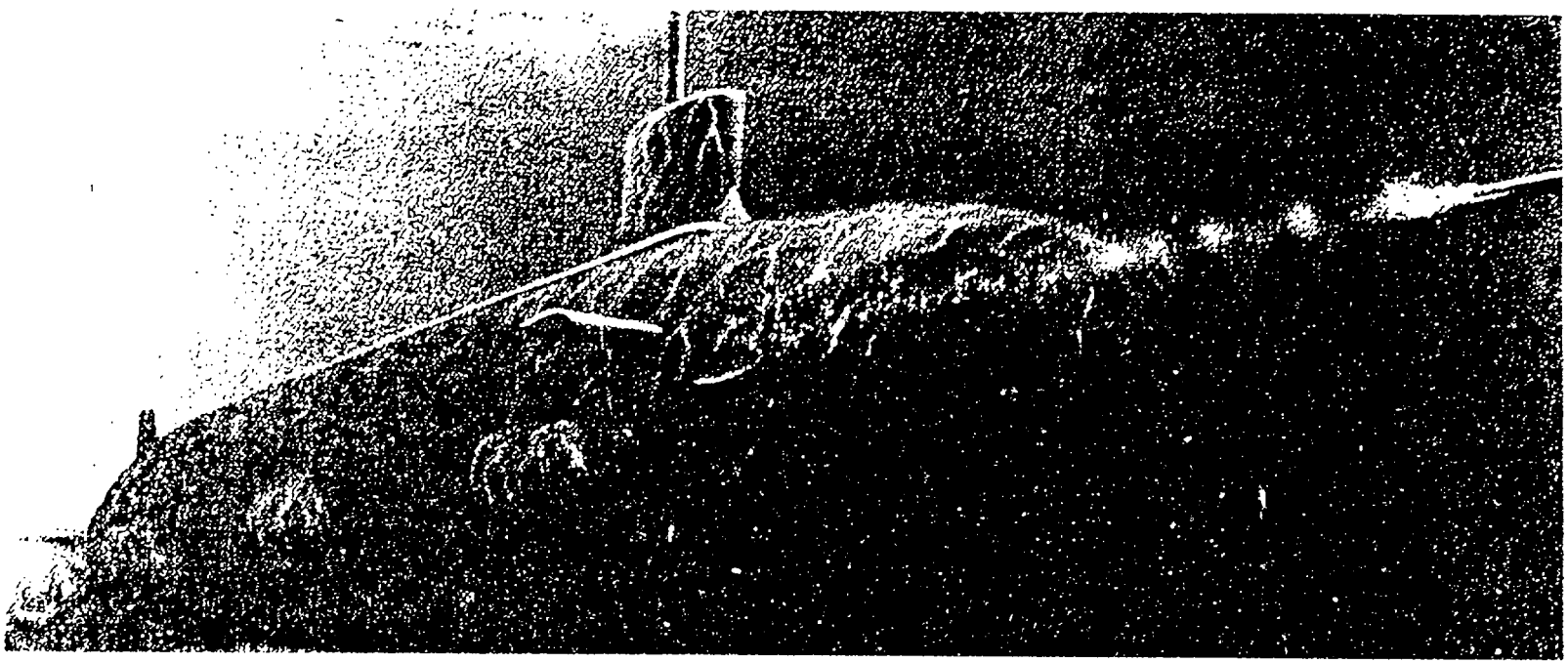
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604561N
PROGRAM ELEMENT TITLE: SSN 21 Development

PROJECT NUMBER: F1946
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: SSN 21 Development



POPULAR NAME: SEAWOLF

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604561N
PROGRAM ELEMENT TITLE: SSN 21 Development
PROJECT NUMBER: F1946
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
ENGINEERNG MILESTONES		PROPULSOR COMP 2Q/94						
T&E MILESTONES				DT-IIIA 3Q/96		DT-IIIB 1Q/98	OT-III 2Q/99	
CONTRACT MILESTONES		AWARD CONFORM CONTR 3Q/94						

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	420,379	30,025	18,894	12,430	15,774	24,492	2,112	781	524,887 (0)
SUPPORT CONTRACT	27,726	6,580	6,515	10,176	5,369	5,030	2,812	522	64,730 (0)
IN-HOUSE SUPPORT	652,294	33,753	22,611	12,531	22,450	7,264	7,659	3,362	761,924 (0)
GFE/ OTHER	60,788	20,742	25,722	33,393	40,140	61,260	22,728	20,498	285,271 (0)
TOTAL	1,161,187	91,100	73,742	68,530	83,733	98,046	35,311	25,163	1,636,812 (0)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The SSN 21 Class multi-mission submarine will be quiet, fast, heavily armed, survivable, and capable of contending with the projected enemy threat well into the 21st century. The program provides the advanced technology, prototype components and systems to design and construct the lead ship of the SSN 21 Class and SSN 22, using cost effective modular construction initiatives and technical risk reduction initiatives. Significant technical advances in areas such as silencing, survivability, depth, speed and combat system integration are also included.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604561N
PROGRAM ELEMENT TITLE: SSN 21 Development
PROJECT NUMBER: F1946
BUDGET ACTIVITY: 5
Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: The following information is intended to highlight major Research and Development (R&D) efforts and does not include all SEAWOLF R&D efforts.

1. (U)FY 1993 ACCOMPLISHMENTS:

- (U) ($63,088) Commenced planning for Live Fire Test, continued shock qualification testing of SSN 21 components, testing of Large Scale Vehicle (LSV), electromagnetic silencing testing, qualification testing of various SSN 21 components; completed development of Noise Vibration Monitoring System.
- (U) ($7,192) Continued development of Advanced Special Hull Treatment Mold In Place (ASHT MIP) installation technology, ASHT at-sea test patches, and completed development of fire retardant paint specification.
- (U) ($17,586) Continued hardware/software interface testing of Ship Control System (SCS); commenced interface of Data Distribution System (DDS).
- (U) ($3,234) Commenced Performance Trials preparations, including technical assessment of 155V DC power supply equipment in preparation for refurbishment.

2. (U) FY 1994 PLAN:

- (U) ($44,019) Continue planning for Live Fire Test, shock qualification testing of SSN 21 components, tests utilizing the LSV, electromagnetic silencing testing, and qualification testing of various SSN 21 components.
- (U) ($16,610) Continue hardware/software interface testing of the SCS, interface the DDS, and system and component interface support during ship construction.
- (U) ($8,212) Continue development of ASHT MIP installation technology, ASHT at-sea test patches, and ASHT (low volume) installation.
- (U) ($4,901) Continue Performance Trials preparations, including technical assessment of 155V DC power supply equipment in preparation for refurbishment.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604561N
PROGRAM ELEMENT TITLE: SSN 21 Development
PROJECT NUMBER: F1946
BUDGET ACTIVITY: 5
Date: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) ($38,999) Continue planning for Live Fire Test, shock qualification testing of SSN 21 components, testing utilizing the LSV, qualification testing of various components of the SSN 21.
- (U) ($12,242) Continue hardware/software interface testing of the SCS, interface of the DDS, and system and component interface support during ship construction.
- (U) ($6,675) Continue development of ASHT MIP installation technology, ASHT at-sea test patches, and ASHT (low volume) installation.
- (U) ($10,614) Continue Performance Trials preparations, including technical assessment of 155V DC power supply equipment in preparation for refurbishment.

4. (U) PROGRAM TO COMPLETION:

- (U) Future efforts include actual Live Fire Test conduct and analysis, Performance and Operational Evaluation Trials, Noise and Weapon System Test, etc.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NAVSURFWARCEN DET, Annapolis, MD; NAVSURFWARCEN SHIPSYSENGSTA, Philadelphia, PA; NAVUNSEAWARCENDIV, Newport, RI; NAVUNSEAWARCEN DET, New London, CT; MINAVSHPYD, Vallejo, CA; PORTSNAVSHPYD, Portsmouth, NH; DOE, Oak Ridge, TN; USACSTA, Aberdeen Proving Ground, MD; SUBMEPP, Portsmouth, NH; TRICCSMA, Newport, RI. CONTRACTORS: General Dynamics, Electric Boat Division, Groton, CT; Newport News Shipbuilding, Newport News, VA; Westinghouse Electric Corporation, Pittsburgh, PA; ELS, Inc., Chantilly, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology Changes: Data in previous budget not available for comparison.

2. (U) Schedule Changes: Data in previous budget not available for comparison.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604561N PROJECT NUMBER: F1946 Date: 7 February 1994
PROGRAM ELEMENT TITLE: SSN 21 Development BUDGET ACTIVITY: 5

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) TLR (OPNAVINST C9010.332) 12/85
- (U) DCP 5/88
- (U) TEMP REV 2 8/90
- (U) TLR (OPNAVINST C9010.332A) 9/91

G. (U) RELATED ACTIVITIES:

- (U) PE C603570N (Advanced Nuclear Power Systems)
- (U) PE 0604524N (Submarine Combat Systems)
- (U) PE 0604567N (Ship Contract Design/Live Fire T&E)

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) SCN #3	324,900	19,500	32,900	1,530,900	25,600	26,200	0	0	7,955,800
• (U) MILCON P-398	0	0	1,950	0	0	0	0	1,950	29,250

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

J. (U) TEST AND EVALUATION:

- (U) DT-IIIA 3Q/96
- (U) DT-IIIB 1Q/98
- (U) OT-III 2Q/99

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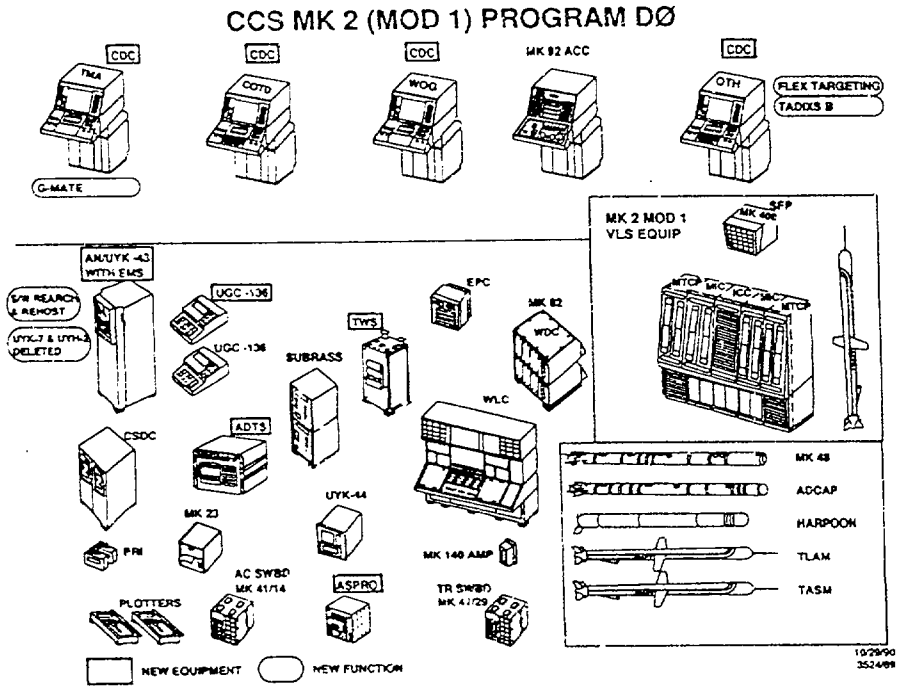
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare System

PROJECT NUMBER: S0236
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: SSN Combat Control System Improvement (Eng)



POPULAR NAME: CCSIP

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare System
PROJECT NUMBER: S0236
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
CCS MK2 DO Block 1 C				MS II 2/96				
CCS MK2 DO Block 1 A/B		MS II 2/94			MS III 6/97		MS III	2QTR/00
CCS MK1 C4.2 Rev 1		MS III 4/94						
CCS MK2 Mod 0/1 (Program DO)			MS III 11/94					
Common Ring Laser Gyroscope AN/BSY-1 ECP 134			MS I/II 9/94 MS III 2/94		MS III 1/97			
ENGINEERING MILESTONES								
AN/BSY-1 ECP 134	SDCT 4/93							
CCS MK2 (Program DO) (Mod 0/1)	SDCT 6/93							
CCS MK2 DO Block 1 A/B		PDR 6/94	CDR 11/94	SDCT 2/96				
CCS MK2 DO Block 1 C				PDR 9/96	CDR 2/97 SDCT 7/97			
T&E MILESTONES								
CCS MK1 C4.2 Rev 1	DT 8/93	OT 11/93						
AN/BSY-1 ECP 134		DT 1/94 OT 4/94						
CCS MK2 (Program DO) (Mod 0/1)	DT 8/93	OT 4/94 (Mod 0/1)						
CCS MK2 DO Block 1 A/B				DT 7/96	OT 11/96			
CCS MK2 DO Block 1 C						DT 11/98	OT 8/99	
Common Ring Laser Gyroscope				DT 4/96 OT 8/96				

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare System
PROJECT NUMBER: S0236
BUDGET ACTIVITY: 5
Date: 7 February 1994

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
CONTRACT MILESTONES								
CCS MK2 DO Block 1 A/B		Award 3/94						
CCS MK2 DO Block 1 C				Award 2/96				
CCS MK2 DO Block 2								
Common Ring Laser Gyroscope		Award 9/94			Production 1/97		Award 12/98	

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	25,541	8,797	0	0	8,344	13,851	14,690	CONT.
SUPPORT CONTRACT	3,473	2,830	2,106	2,035	2,082	2,129	2,178	CONT.
IN-HOUSE SUPPORT	26,399	17,566	19,846	15,632	14,876	11,849	11,565	CONT.
GFE/ OTHER	6,325	4,488	3,309	2,820	5,095	7,948	7,937	CONT.
TOTAL	61,738	33,681	25,261	20,487	30,397	35,777	36,370	CONT.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare System
PROJECT NUMBER: S0236
BUDGET ACTIVITY: 5
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program develops software upgrades to integrate improved weapons capabilities within submarine Combat Control System (CCS) MK1, MK2, and AN/BSY-1 (Combat Control) and, as a part of the Obsolete Equipment Replacement, program develops improvements to hardware which has become increasingly difficult and uneconomical to maintain. In FY 94 and beyond the thrust of the CCS Improvement program is the fleet introduction of CCS MK2 program D0, AN/BSY-1 Engineering Change Proposal (ECP) 134 and Navy Tactical Command System-Afloat (NTCS-A), and the development of CCS MK2 Program D0 Blocks 1 and 2. ECP 134 provides Tomahawk Blocks I and III capabilities to AN/BSY-1 equipped submarines. NTCS-A provides battlegroup interoperability and Over The Horizon correlation algorithm updates to AN/BSY-1 and CCS MK1 equipped submarines. CCS MK2 converged multiple submarine combat system developments into a single effort to minimize submarine life cycle costs, i.e., SSN 688, SSN 688I and SSBN 726 Classes. CCS MK2 Program D0 provides a modular software architecture, introduces Tomahawk Block III and Harpoon Block IC capabilities, introduces Advanced Capability (ADCAP) on TRIDENT, and replaces obsolete equipment. CCS MK2 Program D0 Block 1 integrates CCS MK2 into AN/BSY-1 systems, replaces additional obsolete equipment, provides updates to the World Vector Shoreline data base and incorporates a direct interface to the Global Positioning System, incorporates NTCS-A into CCS MK2, and implements Tomahawk Block III Phase III (Tomahawk Strike Planning System) and ADCAP torpedo improvements. Ring Laser Gyroscope Navigation is a possible replacement system for existing inertial navigators.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($36,334) Completed System Design Certification Testing (SDCT) for CCS MK2 Mods 0/1.
- (U) ($5,926) Started Technical Evaluation (TECHEVAL) for CCS MK2 Mods 0/1.
- (U) ($9,865) Completed SDCT and TECHEVAL for CCS MK1 Program C4.2 Rev.1.
- (U) ($5,546) Completed SDCT for AN/BSY-1 ECP 134.
- (U) ($2,009) Started development and integration of NTCS-A into CCS MK1 and AN/BSY-1.
- (U) ($2,058) Developed CCS MK2 Program D0 Block 1 specifications.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare System
PROJECT NUMBER: S0236
BUDGET ACTIVITY: 5
Date: 7 February 1994

2. (U) FY 1994 PLAN:

- (U) ($5,571) Complete TECHEVAL/Operational Evaluation (OPEVAL) for CCS MK2 Mods 0/1.
- (U) ($3,800) Complete OPEVAL and release CCS MK1 Program C4.2 Rev 1 to the fleet.
- (U) ($5,328) Conduct TECHEVAL/OPEVAL and release AN/BSY-1 ECP 134 to the fleet.
- (U) ($1,303) Complete SDCT for CCS MK2 Program D0 (ECP 6).
- (U) ($4,500) Obtain Milestone I/II approval for Ring Laser Gyroscope Navigation Program and procure Production Suitability Models.
- (U) ($4,500) Modify NDI Design to meet Common Ring Laser Gyroscope specification and qualify.
- (U) ($3,025) Conduct Independent Software Nuclear Safety Analysis (ISNSA) for CCS MK2 Mod 0/1.
- (U) ($600) Obtain Milestone II approval for CCS MK2 Program D0 Block 1 A/B contract.
- (U) ($300) Certify NTCS-A for CCS MK1 and AN/BSY-1 .
- (U) ($4,754) Conduct Preliminary Design Review for CCS MK2 Program D0 Block 1 A/B.

3. (U) FY 1995 PLAN:

- (U) ($500) Obtain Milestone III approval for CCS MK2 Mod 0/1.
- (U) ($22,349) Conduct Critical Design Review and SDCT for CCS MK2 Program D0 Block 1 A/B.
- (U) ($2,412) Continue ISNSA for CCS MK2 Mod 0/1.

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

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare System
PROJECT NUMBER: S0236
BUDGET ACTIVITY: 5
Date: 7 February 1994

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCENDIV, Newport RI; NCCOSC RDT&E DIV, San Diego CA; COMOPTEVFOR, Norfolk, VA. CONTRACTORS: International Business Machines, Manassas, VA; Paramax Systems Corporation, Eagan, MN; Raytheon Company, Portsmouth, RI; Lockheed Missiles and Space Company, Inc., Austin, TX; EG&G Washington Analytical Services Center, Inc., Rockville, MD.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: CCS MK 2 DO Block 1 A/B CDR and SDCT dates changed to reflect availability of Submarine Advanced Tomahawk Weapon Control System Government Furnished Information.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

• (U) Acquisition Plan (AP) 11-87	09/87 (CCS MK2 Program DO)
• (U) NDCP (S0236-AS)	12/87 (Programs C4 and C5)
• (U) Navy Decision Coordinating Paper (NDCP)(S0236-05)	09/88 (CCS MK2)
• (U) Test and Evaluation Master Plan (TEMP) 234-9	09/88 (CCS MK2)
• (U) Operational Requirements (S0236)	11/88 (CCS MK2)
• (U) TEMP 234-8	07/90 (Program C4.2)
• (U) AP 89-025 (Rev. 2 (91))	08/91 (CCS MK2 Program DO Block 1)
• (U) Acquisition Program Baseline Agreement (APBA)	06/93 (CCS MK2 Program DO)
• (U) Acquisition Category (ACAT) Assignment (ACAT IVT)	10/93 (Ring Laser Gyro)

G. (U) RELATED ACTIVITIES:

- (U) PE 0204229N (Tomahawk & TMPC)
- (U) PE 0603504N (Advanced Submarine Combat Systems Development)
- (U) PE 0603691N (MK 48 ADCAP)
- (U) PE 0604503N (Submarine System Equipment Development)
- (U) PE 0604558N (New Design SSN Development)
- (U) PE 0604707N (SEW Architecture/Engineering Support)

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604562N
PROGRAM ELEMENT TITLE: Submarine Tactical Warfare System
PROJECT NUMBER: S0236
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 176	58,311	14,374	19,752	19,314	30,552	60,747	52,265	CONT.	CONT.

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

J. (U) TEST AND EVALUATION:
- (U) CCS MK1 C4.2 Rev 1 TECHEVAL: 8/93
- (U) CCS MK1 C4.2 Rev 1 OPEVAL: 11/93
- (U) AN/BSY-1 ECP 134 TECHEVAL: 1/94
- (U) AN/BSY-1 ECP 134 OPEVAL: 4/94
- (U) CCS MK2 Program DO TECHEVAL: 8/93
- (U) CCS MK2 Program DO OPEVAL: 4/94
- (U) Common Ring Laser Gyroscope TECHEVAL: 4/96
- (U) Common Ring Laser Gyroscope OPEVAL: 8/96
- (U) CCS MK2 Program DO Block 1 A/B TECHEVAL: 7/96
- (U) CCS MK2 Program DO Block 1 A/B OPEVAL: 11/96
- (U) CCS MK2 Program DO Block 1 C TECHEVAL: 11/98
- (U) CCS MK2 Program DO Block 1 C OPEVAL: 8/99

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N
PROGRAM ELEMENT TITLE: Ship Contract Design/Live Fire T&E
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1803 Ship Contract Design	32,506	31,704	18,428	5,968	5,420	16,982	20,731	CONT.	CONT.
S2197 Ship Specifications	3,575	2,763	3,317	5,936	4,437	6,514	6,470	CONT.	CONT.
S2198 Live Fire Test and Evaluation	0	7,060	1,025	0	1,096	12,377	14,009	CONT.	CONT.
F2199 New Design SSN	0	0	137,322	9 410	0	0	0	0	146,732
TOTAL	36,081	41,527	160,092	21,314	10,953	35,873	41,210	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element (PE) provides for the development of all required engineering and programmatic documentation, including ship specifications and contractual documents, for acquisition of ships in the Navy's Shipbuilding (SCN) Plan. In FY 1993, this PE funded all work after Milestone I. PBD 130 (12/23/92) realigned the funding to conform with DOD direction and shifted preliminary design to PE 0603564N. This PE funds development of all ship acquisition products after the preliminary design phase in the ship design and acquisition process. The PBD also transferred R&D funding to this line to fund the New Attack Submarine contract design.

(U) Contract Design is the engineering development of the technical and contractual definition of the ship design (including ship specifications and drawings) to a level of detail sufficient for prospective shipbuilders to make a sound estimate of the construction cost and schedule. Additionally, the contract design package developed under this PE provides the technical baseline from which the Navy selects the shipbuilder who then develops the detail design package required to support the construction and eventual delivery of the ship. This PE also develops design methodologies which facilitate and optimize the transition from ship design documents to efficient production of new ships and ship conversions, and conducts engineering planning and ship affordability studies.

(U) This PE also funds Live Fire Test and Evaluation (LFT&E) of new ship designs.

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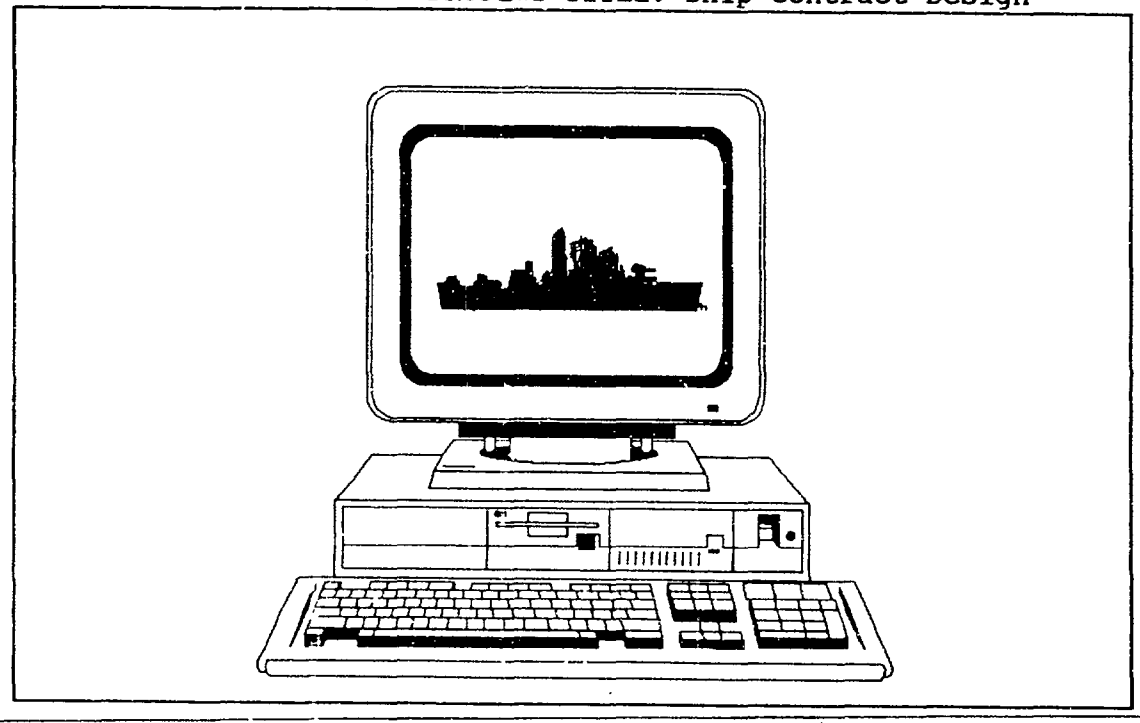
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N
PROGRAM ELEMENT TITLE: Ship Contract Design/Live Fire T&E
PROJECT NUMBER: S1803
BUDGET ACTIVITY: 5
DATE: 7 February 1994

PROJECT TITLE: Ship Contract Design

PROJECT NUMBER: S1803 PROJECT TITLE: Ship Contract Design



POPULAR NAME: Ship Contract Design

FY 1995 PDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N
PROGRAM ELEMENT TITLE: Ship Contract Design/Live Fire T&E
PROJECT NUMBER: S1803
BUDGET ACTIVITY: 5
DATE: 7 February 1994

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

SCHEDULE*	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	See Individual Ship Acquisition Program Documentation							
ENGINEERING MILESTONES	See Individual Ship Acquisition Program Documentation							
T&E MILESTONES	See Individual Ship Acquisition Program Documentation							
CONTRACT MILESTONES	See Individual Ship Acquisition Program Documentation							

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	9,754	10,568	6,143	1,989	1,806	5,660	6,910	CONT.
SUPPORT CONTRACT	3,902	3,170	1,843	797	542	1,698	2,073	CONT.
IN-HOUSE SUPPORT	18,850	17,966	10,442	3,382	3,072	9,624	11,748	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	CONT.
TOTAL	32,506	31,704	18,428	5,968	5,420	16,982	20,731	CONT.

* This project supports a number of acquisition programs. Individual acquisition milestones are identified in the individual ship program documentation. Ship award years are identified in paragraph C.4.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N
PROGRAM ELEMENT TITLE: Ship Contract Design/Live Fire T&E
PROJECT NUMBER: S1803
BUDGET ACTIVITY: 5
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program provides all the required technical, programmatic and contractual documentation after Milestone I (FY 1993) and after Preliminary Design (FY 1994 and out), for the acquisition of ships in the Navy's Shipbuilding (SCN) Program. The major effort is the engineering development of the technical and contractual definition of the ship design (e.g., ship specifications and drawings), with sufficient details for the prospective shipbuilder(s) to make a sound estimate of construction cost and schedule. It also serves as the contractual technical definition from which the selected builder develops the shipbuilding detail design, construction and testing package required to build and deliver the ship. For FY 1993, this project also developed design methods which support the transition from the Navy's Contract Design to the shipbuilder's Detail Design and Construction; ship conversion studies, engineering and planning documents; and ship affordability studies. Also for FY 1993, this project funded survivability analysis of ship designs in support of Live Fire Test and Evaluation (LFT&E) policy.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($10,000) Began L(X) Preliminary Design.
- (U) ($7,000) Began MCS(CONV) Conversion Design.
- (U) ($601) Began Flagship Conversion Studies.
- (U) ($815) Began TAGS 60 Contract Design.
- (U) ($12,000) Continued CVN-76 Contract Design.
- (U) ($1,390) Continued TAGOS-19/23 testing.
- (U) ($700) Continued CRAFT Contract Design.
- (U) Continued Specification Improvement Program (1).
- (U) Continued Designing for Production Program (1).

Note: (1) Costs identified under S2197

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N
PROGRAM ELEMENT TITLE: Ship Contract Design/Live Fire T&E
PROJECT NUMBER: S1803
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) Continued Fiber Optics (FO) Topology Program (1).
- (U) Cancelled Flagship Conversion Studies.

2. (U) FY 1994 PLAN:

- (U) ($19,400) Begin L(X) Contract Design.
- (U) ($127) Begin CLF(TAO) CONV Conversion Design.
- (U) ($10,500) Continue CVN-76 Contract Design.
- (U) ($628) Continue TAGOS 19 seakeeping testing/data reduction.
- (U) (N/A) Complete L(X) Preliminary Design.
- (U) ($789) Complete MCS(CONV) Contract Design.
- (U) ($260) Complete TAGS 60 Contract Design.

3. (U) FY 1995 PLAN:

- (U) ($5,000) Complete CVN-76 Contract Design.
- (U) ($6,000) Continue L(X) Contract Design.
- (U) ($500) Continue TAGOS 19/23 testing.
- (U) ($6,928) Continue CLF(TAO) CONV.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N
PROGRAM ELEMENT TITLE: Ship Contract Design/Live Fire T&E
PROJECT NUMBER: S1803
BUDGET ACTIVITY: 5
Date: 7 February 1994

4. (U) PROGRAM TO COMPLETION: This is a continuing program. Individual ship award years follow.

• (U) Ship	Fiscal Year of Award
MCS(CONV)	FY 1994
TAGS 60	FY 1994
CVN-76	FY 1995
L(X)	FY 1996
TAGOS 25	FY 1997
CLF(TAO)CONV	FY 1997
New Attack Submarine	FY 1998
CLF(NEW)/ADC(X)	FY 2001
SC-21	FY 2003
CV(X)	FY 2006

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN SHIPSYSENGSTA, Philadelphia, PA.; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD.; NAVAIRWARCENACDIV, Lakehurst, NJ; CONTRACTORS: John J. McMullen & Assoc., Inc., Arlington, VA; Advanced Marine Enterprises, Arlington, VA; Vitro Laboratories, Silver Spring, MD; Bath Iron Works, Bath, ME; Gibbs & Cox, New York, NY; and Newport News Shipbuilding Inc., Newport News, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: See individual ship program documentation.

G. (U) RELATED ACTIVITIES: PE 0603564N, Ship Preliminary Design and Feasibility Studies.

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

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

J. (U) TEST AND EVALUATION: See individual ship program acquisition documentation.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

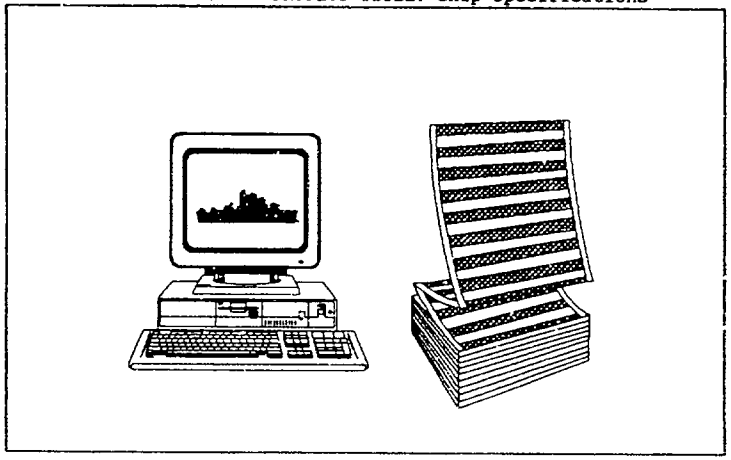
PROGRAM ELEMENT: 0604567N
PROGRAM ELEMENT TITLE: Ship Contract Design/Live Fire T&E

PROJECT NUMBER: S2197
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: Ship Specifications

PROJECT NUMBER: S2197 PROJECT TITLE: Ship Specifications



POPULAR NAME: SHIP SPECS

POPULAR NAME: SHIP SPECS

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N
PROGRAM ELEMENT TITLE: Ship Contract Design/Live Fire T&E

PROJECT NUMBER: S2197
BUDGET ACTIVITY: 4

Date: 7 February 1994

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

SCHEDULE*	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	See individual Ship Acquisition Program Documentation							
ENGINEERING MILESTONES	Not applicable							
T&E MILESTONES	Not applicable							
CONTRACT MILESTONES	Not applicable							

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	1,500	921	1,106	1,979	1,479	2,171	2,157	CONT.
SUPPORT CONTRACT	375	276	332	594	444	651	647	CONT.
IN-HOUSE SUPPORT	1,700	1,566	1,879	3,363	2,514	3,692	3,666	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	CONT.
TOTAL	3,575	2,763	3,317	5,936	4,437	6,514	6,470	CONT.

* This project supports a number of acquisition programs. Individual acquisition milestones are identified in the individual program documentation. Ship award years are identified in paragraph C.4.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N
PROGRAM ELEMENT TITLE: Ship Contract Design/Live Fire T&E
PROJECT NUMBER: S2197
BUDGET ACTIVITY: 5
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES. This project funds development, improvement and update of NAVSEA cognizant acquisition specifications including Federal and Military Specifications, Handbooks and General Specifications for Ships of the U.S. Navy. NAVSEA is responsible for 4600 Military Specifications and Standards, 149 Federal Specifications and Standards, 3100 Standard/Type Drawings and Design Data Sheets, 362 Ship General Specification sections and 122 Non-Government Standards. These documents are required to reflect the latest technologies (i.e., fiber optics), manufacturing techniques, environmental requirements, hazardous material reduction, safety and legal/Congressional requirements. This project also funds the development and implementation of computer-aided design/computer aided-manufacturing (CAD/CAM) systems to improve the transition from the Navy's contract design to the shipbuilders' detail design and production. Additionally, the project funds the integration of the new fiber optic (FO) technology into the basic ship design process.

(U) This project was an integral part of S1803 Ship Contract Design in FY 1993. FY 1994 is the first year this has been identified as a distinct project.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($875) Updated various outdated Federal/Military Specifications, Design Standards and Drawings. Continued to update portions of General Specifications for Ships of the U.S. Navy. Continued development of Specification data base and Open Systems Architecture.
- (U) ($1,200) Continued development of CAD II ship design systems and modeling techniques. Completed development of CAD II system architecture. (Note: These are being utilized for L(X) Preliminary and Contract Design.)
- (U) ($1,500) Began development of FO high speed transmitter and receiver specification and backplane/switch standards. Continued development of FO Topology systems.

2. (U) FY 1994 PLAN:

- (U) ($600) Continue to update outdated Federal/Military Specifications, Design Standards and Drawings. Continue to update portions of General Specifications for Ships of the U.S. Navy. Continue development of Specification data base and Open Systems Architecture.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N
PROGRAM ELEMENT TITLE: Ship Contract Design/Live Fire T&E
PROJECT NUMBER: S2197
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($967) Commence development of CAD II analysis programs and program integration. Continue development of CAD II ship design systems and modeling techniques for application on L(X), CVN-76 and CLF(TAO)CONV.

- (U) ($1,196) Continue development of FO Topology systems. Continue development of optical cable and fiber connectors, required specifications and standards, and optical waveguide measurements and standards. Integrate existing components and standards into L(X) and CVN-76 designs.

3. (U) FY 1995 PLAN:

- (U) ($940) Continue to update outdated Federal/Military Specifications, Design Standards and Drawings. Continue to update portions of General Specifications for Ships of the U.S. Navy. Continue development of Specification data base and Open Systems Architecture.

- (U) ($1,236) Continue development of CAD II analysis programs, program integration, CAD II ship design systems and modeling techniques.

- (U) ($1,141) Continue development of FO Topology systems. Continue development of optical cable and fiber connectors, required specifications and standards, and optical waveguide measurements and standards. Integrate existing components and standards into L(X) and CVN-76.

4. (U) PROGRAM TO COMPLETION: This is a continuing program. Individual ship award years follow.

- (U)

Ship	Fiscal Year of Award
MCS(CONV)	FY 1994
TAGS 60	FY 1994
CVN-76	FY 1995
L(X)	FY 1996
TAGOS 25	FY 1997
CLF(TAO)CONV	FY 1997
New Attack Submarine	FY 1998
CLF(NEW)/ADC(X)	FY 2001
SC-21	FY 2003
CV(X)	FY 2006

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N
PROGRAM ELEMENT TITLE: Ship Contract Design/Live Fire T&E
PROJECT NUMBER: S2197
BUDGET ACTIVITY: 5
Date: 7 February 1994

D. (U) WORK PERFORMED BY: IN-HOUSE: NCCOSC, San Diego, CA; NAVSURFWARCEN SHIPSYSENGSTA, Philadelphia, PA; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NRL, Washington, DC; COMNAVUNSEAWARCEN, Norfolk, VA; Naval Institute of Standards and Technology, Electromagnetic Tech Div, Boulder, CO. CONTRACTORS: Gibbs & Cox, Alexandria, VA.; Atlantic Research Corp., Rockville, MD; PRC, Arlington, VA; John J. McMullen Assoc., Inc., Arlington, VA; Advanced Marine Enterprises, Arlington, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: See documentation for individual ship programs.

G. (U) RELATED ACTIVITIES:

- (U) PE0603564N, Ship Preliminary Design and Feasibility Studies.

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

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

J. (U) TEST AND EVALUATION: Not applicable. (The specifications, standards, drawings, modeling and analysis techniques developed under this project form the basis for testing and evaluating ships and ship systems.)

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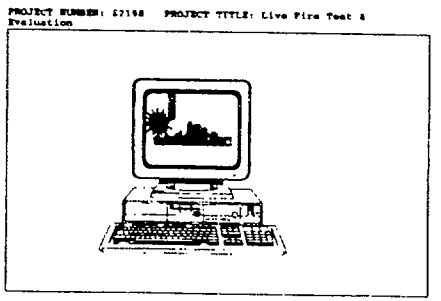
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N
PROGRAM ELEMENT TITLE: Ship Contract Design/Live Fire T&E

PROJECT NUMBER: S2198
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: Live Fire Test and Evaluation



POPULAR NAME: LFT&E

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N
PROGRAM ELEMENT TITLE: Ship Contract Design/Live Fire T&E
PROJECT NUMBER: S2198
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE*	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	See individual Ship Acquisition Program Documentation							
ENGINEERING MILESTONES	Not applicable							
T&E MILESTONES	Not applicable							
CONTRACT MILESTONES	Not applicable							

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	0	2,353	342	0	365	4,126	4,670	CONT.
SUPPORT CONTRACT	0	706	103	0	110	1,238	1,401	CONT.
IN-HOUSE SUPPORT	0	4,001	580	0	621	7,013	7,938	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	CONT.
TOTAL	0	7,060	1,025	0	1,096	12,377	14,009	CONT.

* This project supports a number of acquisition programs. Individual acquisition milestones are identified in the individual ship program documentation. Ship award years are identified in paragraph C.4.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N
PROGRAM ELEMENT TITLE: Ship Contract Design/Live Fire T&E
PROJECT NUMBER: S2198
BUDGET ACTIVITY: 5
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This new project specifically responds to the Congressionally mandated Live Fire Test and Evaluation (LFT&E) legislation which requires realistic survivability testing be conducted under all major acquisition programs before production approval is granted. Evaluations concerning the vulnerability and lethality of ships against known threat systems will be conducted using analytical prediction techniques and model testing. A less detailed analysis was an integral part of ship design funding under S1803 in FY 1993 but was never separately broken out. This is a new project for FY 1994.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) (Costs included under CVN-76 program in S1803.) Continued survivability analysis for CVN-76.
- (U) (Costs included under MCS(CONV) program in S1803.) Continued survivability analysis for MCS(CONV).

2. (U) FY 1994 PLAN:

- (U) ($7,060) Commence evaluation of L(X) design for HM&E and weapon system vulnerability. Commence and complete L(X) full scale surrogate underwater and air explosion testing. Commence analysis of test results.
- (U) (Costs included under MCS(CONV) program in S1803.) Complete MCS(CONV) survivability analysis.

3. (U) FY 1995 PLAN:

- (U) ($1,025) Complete L(X) LFT&E analysis.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N
PROGRAM ELEMENT TITLE: Ship Contract Design/Live Fire T&E
PROJECT NUMBER: S2198
BUDGET ACTIVITY: 5
Date: 7 February 1994

4. (U) PROGRAM TO COMPLETION: This is a continuing program. Individual ship award years follow.

• (U) Ship	Fiscal Year of Award
MCS(CONV)	FY 1994
TAGS 60	FY 1994
CVN-76	FY 1995
L(X)	FY 1996
TAGOS 25	FY 1997
CLF(TAO)CONV	FY 1997
New Attack Submarine	FY 1998
CLF(NEW)/ADC(X)	FY 2001
SC-21	FY 2003
CV(X)	FY 2006

D. (U) WORK PERFORMED BY: IN-HOUSE: U.S. ARMY Aberdeen Proving Grounds, Aberdeen, MD; NNSY, Norfolk, VA. CONTRACTORS: John J. McMullen, Assoc., Inc., Arlington, VA; Advanced Marine Enterprises, Arlington, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: See documentation for individual ship program.

G. (U) RELATED ACTIVITIES: PE0603564N, Ship Preliminary Design and Feasibility Studies.

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

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

J. (U) TEST AND EVALUATION: See individual ship T&E doucmentation.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N
PROGRAM ELEMENT TITLE: Ship Contract Design/ Live Fire T&E

PROJECT NUMBER: F2199
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: New Design SSN

PICTURE NOT AVAILABLE

POPULAR NAME: CENTURION

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N
PROGRAM ELEMENT TITLE: Ship Contract Design/ Live Fire T&E
PROJECT NUMBER: F2199
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		MSI 1/94	MSII 7/95					MS III 1QTR/07
PROGRAM PHASE COMPLETION		PHASE 0 1/94	PHASE I 7/95					PHASE 2 1QTR/07
ENGINEERING MILESTONES	TBD - MILESTONE SCHEDULE WILL BE ESTABLISHED AT MILESTONE I							
T&E MILESTONES								
CONTRACT MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	0	0	115,414	7,885	0	0	0	123,299
SUPPORT CONTRACT	0	0	573	69	0	0	0	642
IN-HOUSE SUPPORT	0	0	21,335	1,456	0	0	0	22,791
GFE/ OTHER	0	0	0	0	0	0	0	0
TOTAL	0	0	137,322	9,410	0	0	0	146,732

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project encompasses the design efforts for New Attack Submarine (NAS). The general thrust of these efforts will be to translate the preliminary design suitable for the NAS into a well defined set of specifications and drawings suitable for a Request for Proposal (RFP) package that supports an effective nuclear attack submarine. Submarine systems will be specified with extreme sensitivity for vendor/manufacturing capability. Engineered systems will carefully balance military capability with the total life cycle cost and technical risk. This effort is necessary in FY 95 for a FY 98 lead ship construction contract award.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N PROJECT NUMBER: F2199
PROGRAM ELEMENT TITLE: Ship Contract Design/ Live Fire T&E BUDGET ACTIVITY: 5

Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: Not applicable.

2. (U) FY 1994 PLAN: Not applicable.

3. (U) FY 1995 PLAN:

- (U) ($76,937) Develop Engineering and Specification Design which implements cost based methodology at all levels of the design. Develop contract drawings, revised Contract Data Requirements List and develop contract design weight estimate. Continue tradeoffs to improve and integrate systems for NAS. Establish Government Furnished Equipment and Contractor Furnished Equipment vendor commitments with respect to cost, schedule and performance. Develop overall schedules integrating both government and contractor developments within overall ship development. Work in close collaboration with the entire manufacturing industry throughout engineering and specification design to ensure established requirements are clearly understood, achievable, reasonable, and biddable with minimum risk to industry.

- (U) ($7,453) Continue refining the System Definition Documents to determine the most cost effective system approach for the NAS design.

- (U) ($10,932) Refine the specifications package from FY 1994 continuing to remove unnecessary requirements, reduce cost and minimize risk to the government and industry. Complete the specifications in sufficient detail to support the issue of an RFP for detail design and construction of the lead ship.

- (U) ($34,200) Initiate design and engineering studies for the Main Propulsion Unit and Ships Service Turbine Generators.

- (U) ($7,800) Conduct supportability analyses and studies to support ship design specification and component development efforts. Establish critical ship and system logistic support guidance and philosophies.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N PROJECT NUMBER: F2199
PROGRAM ELEMENT TITLE: Ship Contract Design/ Live Fire T&E BUDGET ACTIVITY: 5
Date: 7 February 1994

4. (U) PROGRAM TO COMPLETION:

- (U) ($9,410) In FY 96, engineering and specification design will be completed to support transition to detail design at the end of the fiscal year. The lead ship construction contract is scheduled for award in FY 98.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCENDIV, Newport, RI; NAVUNDEAWARCEN DET, New London, CT; NAVSURWARCEN CARDEROCKDIV, Bethesda, MD. CONTRACTORS: General Dynamics/Electric Boat Division, Groton, CT; Newport News Shipbuilding, Newport News, VA; Johns Hopkins University, Baltimore, MD.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

Mission Needs Statement	10/91
Milestone 0 Acquisition Memorandum	08/92

G. (U) RELATED ACTIVITIES:

- (U) PE 0603561N (Advanced Submarine System Development)
- (U) PE 0604558N (New Design SSN Development)
- (U) PE 0603570N (Advanced Nuclear Power Systems)
- (U) PE 0603564N (Ship Preliminary Design and Feasibility Studies).

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604567N
PROGRAM ELEMENT TITLE: Ship Contract Design/ Live Fire T&E
PROJECT NUMBER: F2199
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) SCN #4	0	0	0	697,533	652,435	2,857,608	690,934	CONT.	CONT.

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

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604574N
PROGRAM ELEMENT TITLE: Navy Tactical Computer Resources
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
S1353 Standard Hardware	8,117	4,180	5,484	4,422	3,283	3,364	3,454	CONT.	CONT.
W0845 AN/AYK-14	2,091	1,849	1,886	1,850	1,821	1,870	1,917	CONT.	CONT.
X1976 Next Generation Computer Resources	21,887	11,138	8,404	8,480	8,501	5,431	5,403	CONT.	CONT.
TOTAL	32,095	17,167	15,774	14,752	13,605	10,665	10,774	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: Standard Embedded Computer Resources include computers, display systems, peripherals, and associated software. These equipments are integral building blocks of larger weapons, sensor, and combat direction systems. This program provides the technical planning and engineering support for development and evolution of the Navy's high performance embedded computer resources for transition to an open system architecture. The program includes product improvement of current generation computers AN/AYK-14, AN/UYK-43 and AN/UYK-44; development of state-of-the-art mass memory storage devices (MMSD); and development of interconnects, interfaces, protocols, and standards (hardware and software) for the highly flexible architectures needed for the Navy's next generation of open systems, COTS/NDI shipboard computers.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604574N PROJECT NUMBER: S1353 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Navy Tactical Computer Resources BUDGET ACTIVITY: 5

PROJECT TITLE: Standard Hardware

PICTURE NOT AVAILABLE

POPULAR NAME: SECR

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604574N
PROGRAM ELEMENT TITLE: Navy Tactical Computer Resources
PROJECT NUMBER: S1353
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM	II-A(MMSD)							
MILESTONES	11/92	12/93						
ENGINEERING	PDR(43)	CDR(43)						
MILESTONES	03/93	11/93						
T&E	DTI(43)	DTI(43)						
	11/92	09/94						
	DTI(44)							
MILESTONES	12/92							
CONTRACT								
MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	5,429	2,615	4,062	926	0	0	0	00,000
SUPPORT CONTRACT	660	350	314	400	400	400	400	CONT.
IN-HOUSE SUPPORT	1,954	1,115	1,008	3,046	2,833	2,914	3,004	CONT.
GFE/ OTHER	74	100	100	50	50	50	50	CONT.
TOTAL	8,117	4,180	5,484	4,422	3,283	3,364	3,454	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Planning and support for development and modification of the Navy's high performance embedded computer resources to meet Open Systems Architecture standards via the Computer Open Systems Implementation Program (COSIP), specifically, transitional improvements to the UYK-43 and UYK-44 computers, assessment of Open Architecture display components, the Mass Memory Storage Device (MMSD), and other standard peripherals.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604574N
PROGRAM ELEMENT TITLE: Navy Tactical Computer Resources
PROJECT NUMBER: S1353
BUDGET ACTIVITY: 5
Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,394) For UYK-43, completed High Bandwidth Memory (HBM) development.
- (U) ($3,396) For UYK-44, completed Open Systems Module (OSM) design.
- (U) ($1,410) For COSIP, completed evaluation plans.
- (U) ($917) For MMSD, completed independent Government testing; achieved Milestone II-A.

2. (U) FY 1994 PLAN:

- (U) ($500) For UYK-43, complete OSM development and assess initial Open System products.
- (U) ($500) For UYK-44, assess initial Open System products.
- (U) ($3,180) For COSIP, complete engineering model Computer Resources Information Base (CRIB) and begin to populate CRIB with Non-developmental Item (NDI) products.

3. (U) FY 1995 PLAN:

- (U) ($250) For UYK-43, certification of initial Open Systems products.
- (U) ($250) For UYK-44, certification of initial Open Systems products.
- (U) ($4,984) For COSIP, complete production model of CRIB and continue to populate CRIB with NDI components.

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

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604574N
PROGRAM ELEMENT TITLE: Navy Tactical Computer Resources
PROJECT NUMBER: S1353 Date: 7 February 1994
BUDGET ACTIVITY: 5

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCENDET, Norfolk, VA; NAVSURWARCENDIV, Crane, IN; NCCOSC RDTE DIV, San Diego, CA; NAVUNSEAWARCENDIV, Newport, RI; NAVSURWARCENDIV, Dahlgren, VA; CONTRACTORS: Unisys, St. Paul, MN; Computing Devices International, Minneapolis, MN; Johns Hopkins University/Applied Physics Laboratory, Laurel, MD; ELS, Arlington, VA; Syscon, Arlington, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: All Navy non-avionic programs using SECR, including:

- (U) PE 0604366N STANDARD MISSILE IMPROVEMENTS
- (U) PE 0603502N SURFACE AND SHALLOW WATER MCM
- (U) PE 0603270N ADVANCED ELECTRONIC WARFARE TECHNOLOGY
- (U) PE 0604301N MK-92 FCS UPGRADE
- (U) PE 0604755N SHIP SELF DEFENSE
- (U) PE 0604372N NEW THREAT UPGRADE
- (U) PE 0604507N ENHANCED MODULAR SIGNAL PROCESSOR

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

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

J. (U) TEST AND EVALUATION: Developmental Test (DT) I for the following:

- (U) UYK-43 HBM 11/92
- (U) UYK-44 OSM 12/92
- (U) UYK-43 OSM 9/94

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604574N
PROGRAM ELEMENT TITLE: Navy Tactical Computer Resources
PROJECT NUMBER: W0845
BUDGET ACTIVITY: 5
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W0845, AN/AYK-14. The AN/AYK-14 project provides for airborne digital computer requirements with a standard design that has permitted state-of-the-art technology infusion through pre-planned product improvements. The focus of the Advanced AYK-14 (AAYK-14) development is to provide the bridge necessary to evolve new platforms to an Open Systems Architecture (OSA). The AAYK-14 program includes: (1) the development of a commercially based Reduced Instruction Set Computer (RISC) Processor Module (RPM) that will permit communications between existing AYK-14 16 bit Compiler Monitor System (CMS-2) modules and AAYK-14 32-bit Ada modules, (2) development of a backplane based on the commercial Institute of Electrical and Electronic Engineers (IEEE)/Next Generation Computer Resources (NGCR) OSA standard Futurebus+ interface, (3) support of the additional design, test and qualification necessary to meet multi-user requirements and bring other program's Futurebus+ OSA modules into the AAYK-14 family.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,700) Continued development of SH-60 LAMPS MK III Integrated Mission Processor (IMP)/AAYK-14.
- (U) ($391) Investigated militarizing commercial OSA developments for applicability to AAYK-14 family.

(U) FY 1994 PLAN:

- (U) ($1,368) Implement commonality design/test into IMP/AAYK-14 and conduct Preliminary Design Review (PDR)/Critical Design Review (CDR).
- (U) ($180) Coordinate integration of AAYK-14 into V-22's Advanced Mission Computer (AMC).
- (U) ($301) Investigate/support new implementations of the AAYK-14 architecture.

(U) FY 1995 PLAN:

- (U) ($1,400) Continue IMP/AAYK-14 test, conduct qualification test, begin Reliability Development Test (RDT).
- (U) ($160) Continue integration of AAYK-14 into V-22.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604574 PROJECT NUMBER: W0845 DATE: 7 February 1994 PROGRAM ELEMENT
TITLE: Navy Tactical Computer Resources BUDGET ACTIVITY: 5

- (U) ($326) Continue militarization of OSA commercial product to AAYK-14 family.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIVIND, Indianapolis, IN; NAVAIRWARCENACDIV, Patuxent River, MD; NADEP, Norfolk, VA. CONTRACTORS: Computing Devices International Incorporated, Bloomington, MN; and International Business Machines, Owego, NY.

(U) RELATED ACTIVITIES: PE 0604212N ASW and Other Helo Development.

(U) OTHER APPROPRIATION FUNDS: Applicable airframe appropriations include: V-22, F/A-18, E-2C, AV-8B, EA-6B, SH-60B, EP-3, ES-3, F-14D, P-3 AEW, ALQ-149, MK 50 Torpedo, Automatic Carrier Landing Systems (ACLS), CV-FTAS, VP-FTAS, AIR Force Tactical Operations Center (TAOC), and the Army JSTARS. Procurement appropriation information not available at this level of detail.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604574N
PROGRAM ELEMENT TITLE: Navy Tactical Computer Resources
PROJECT NUMBER: X1976
BUDGET ACTIVITY: 5
Date: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X1976, Next Generation Computer Resources. The Next Generation Computer Resources (NGCR) program operating in conjunction with industry is establishing a set of commercially based computer hardware and software interface standards that leverage commercial open system architecture and standardization trends. The program encompasses all future tactical computer resources for the full range of Navy warfighting shipboard, airborne and shore-based systems. NGCR influenced commercial standards will enable Navy tactical systems to transition to open systems architectures for interoperability and commonality of multi-vendor products, competition for system upgrades, and application of state-of-the-practice technologies.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($200) Completed Backplane, LAN standards laboratory test model contract.
- (U) ($1,175) Completed Navy requirements for inclusion in the definition and approval of the following Institute of Electrical and Electronic Engineers (IEEE) documents: 1) IEEE P1003.0 -POSIX Guide, 2) P1003.1 -Language Independent Specification, 3) P1003.4a/b -POSIX Real Time, 4) P1003.5 -Ada Bindings 5) P1003.7 -System Administration, 6) P1003.12 -Protocol Independent Specifications, 7) P1003.17 - Directory Services, 8) P1238 - File Transfer.
- (U) ($1,085) Completed the Navy requirements for inclusion in the definition and approval of the following American National Standards Institute (ANSI), ISO and IEEE network documents: 1) ANSI X3T9.5 - Fiber Distributed Data Interface, 2) ISO X3S.3, IEEE 802.1 - Network Management, 3) IEEE 802.2 - Logical Link Control, 4) IEEE 802.5 - Fiber Optics. Continued standards group work with The National Institute of Standards (NIST) Network Management Standards.
- (U) ($4,591) Awarded OS evaluation model contracts.
- (U) ($2,536) Continued conformance test (CT) certification methodology, procedures and test capability for Backplane and LAN; and completed OS conformance test procedure methodology.
- (U) ($7,655) Continued industry/Navy working groups for Backplane, LAN, Operating System (OS), High Speed Data Transfer Network (HSDTN), Project Support Environment (PSE), Data Base Management Systems (DBMS), Graphics, and High Performance Network (HPN) interface standards to meet NGCR users needs.
- (U) ($2,526) Continued Security/Fault Tolerance requirements analysis, and user support.
- (U) ($919) Continued Backplane and LAN systems integration support with users.
- (U) ($1,200) Continued significant joint C4I architecture planning and engineering for secure tactical data network (STDN-4) to evaluate network cryption devices.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604574N PROJECT NUMBER: X1976 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Navy Tactical Computer BUDGET ACTIVITY: 5

(U) FY 1994 PLAN:
- (U) ($508) Publish first update to LAN standards.
- (U) ($4,790) Continue industry/Navy working groups for Backplane, OS, HSDTN, DBMS, Graphics, and HPN interface standards to meet NGCR users needs.
- (U) ($347) Continue Fault Tolerance requirements analysis and user support.
- (U) ($1,750) Continue conformance test certification for Backplane; and complete finalization of certification methodology and procedures.
- (U) ($1,325) Continue Backplane and LAN systems integration support for users programs.
- (U) ($2,418) Continue OS evaluation model contracts.

(U) FY 1995 PLAN:
- (U) ($700) Publish OS standards.
- (U) ($7,704) Continue industry/Navy working groups for OS, HSDTN, DBMS, HP LAN, and Graphics, interface standards to meet NGCR user needs

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

(U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDTE DIV, San Diego, CA; NAVAIRWARCENACDIV, Warminster, PA, Indianapolis, IN, Patuxent River, MD; NAVSURFWARCENDIV, Dahlgren, VA, Crane, IN; NAVSURFWARCEN WHITE OAK DET, Silver Spring, MD; NAVAIRWARCENWPNDIV, China Lake, CA; NAVUNSEAWARCENDIV, Newport, RI; NIST, Gathersburg, MD. CONTRACTORS: Numerous companies participating in the working groups (at their expense). Competitive contracts awarded with Cable & Computer Technology, Anaheim, CA; Litton Systems, Pascagoula, MS; Raytheon, Sudbury, MA, Booz-Allen and Hamilton, Bethesda, MD; Raytheon, Portsmouth, RI; Paramax Systems Corp., St. Paul, MN; Lockheed Sanders, Inc., Nashua, NH.

(U) RELATED ACTIVITIES: The following Program Elements fund broadbase computer systems technology and products provide technology transition to the NGCR program.
- (U) PE 0601101E (Defense Research Sciences)
- (U) PE 0602708E (Integrated Command and Control Technology)
- (U) PE 0603223C (Systems Concepts and Battle Management)
- (U) PE 0204163N (Fleet Communications)
- (U) PE 0602234N (Materials, Electronics and Computer Technology)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604601N
PROGRAM ELEMENT TITLE: Mine Development
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Q0267 Mine Improvements	1,810	2,692	3,223	3,175	3,212	3,565	3,789	CONT.	CONT.
Q0272 QUICKSTRIKE	6,233	2,889	0	0	0	0	0	0	116,698
TOTAL	8,043	5,581	3,223	3,175	3,212	3,565	3,789	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program provides for engineering and manufacturing development of mines and their support systems to counter current and projected enemy submarines, surface ships, and mine warfare tactics.

(U) The Mine Improvements project (Q0267) modifies or improves existing mine systems to maintain their effectiveness, quality, reliability, and readiness against evolving threat targets and tactics in littoral warfare scenarios. Typical Mine Improvements efforts include obtaining and analyzing threat target signature and damage data, determining optimal mine settings/algorithms, updating minefield planning models and the databases supporting them, and improving the performance of mine sensors, flight gear, and power supplies.

(U) The QUICKSTRIKE project (Q0272) develops major subsystems for the QUICKSTRIKE MK62, MK63, and MK65 bottom mines. The current development effort is the QUICKSTRIKE Mod 3 system, which includes the MK71 Target Detecting Device (TDD) and the MK75 Safety and Arming (S&A) device.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604601N
PROGRAM ELEMENT TITLE: Mine Development

PROJECT NUMBER: Q0267
BUDGET ACTIVITY: 5

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: Q0267 Mine Improvements. This non-acquisition project maintains the effectiveness and readiness of mine systems and mine warfare support systems to accommodate evolving mine targets and mining tactics and scenarios expected in littoral warfare. Data on threat targets, minefield locations, and enemy tactics are collected; mine settings and/or algorithms are optimized for those targets; mine warfare planning models and supporting databases are updated to include these new data; and needed modifications to mine components (e.g. sensors, power supplies, flight gear) are developed, built, tested, and evaluated.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($350) Began Follow-on Operational Testing and Evaluation (FOT&E) of the MK164 Flight Gear Kit.
- (U) ($280) Continued development of advanced power supplies.
- (U) ($1,130) Continued improvements and updating of the target database, mine algorithms and settings, and minefield performance models.
- (U) ($50) Satisfied Insensitive Munitions (IM) program requirements for all in-service mines.

(U) FY 1994 PLAN:

- (U) ($327) Complete FOT&E and obtain approval for Fleet use and Full-Rate Production of the MK164 Flight Gear Kit.
- (U) ($1,845) Continue to update target databases, mine algorithms and settings, and minefield models to accommodate changing mine warfare tactics and priority threats identified by Commander Mine Warfare Command: collect and characterize target signature and damage contour data; develop and improve mine algorithms and optimal mine settings; and improve/develop mine warfare planning models.
- (U) ($500) Continue the development of standard lithium cells for use in mine warfare system power supplies.
- (U) ($20) Monitor the Joint Direct Attack Munition (JDAM) program to assure that new bombs will be compatible with QUICKSTRIKE mine components.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604601N
PROGRAM ELEMENT TITLE: Mine Development

PROJECT NUMBER: Q0267
BUDGET ACTIVITY: 5

DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($20) Continue close interface with the Joint Direct Attack Munition (JDAM) program to assure that new bombs will be compatible with QUICKSTRIKE mine components.
- (U) ($2,828) Continue to update target signature and damage contour databases, mine algorithms and settings, and minefield models to accommodate changing mine warfare tactics and priority threats identified by Commander Mine Warfare Command: collect and characterize target signature and damage contour data; develop and improve mine algorithms and optimal mine settings; and improve/develop mine warfare planning models.
- (U) ($375) Continue the development of standard lithium cells for use in mine warfare system power supplies.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN DAHLGREN DIVISION WHITE OAK DET, Silver Spring, MD; NAVSURFWARCEN POINT HUENEME DIVISION MINEWARENGACT, Yorktown, VA. CONTRACTORS: Vredenburg, Reston, VA.

(U) RELATED ACTIVITIES:

- (U) The Mine Improvements program is closely associated with the QUICKSTRIKE program, PE 0604601N Q0272.
- (U) The Mine Improvements program is closely monitoring and working with the Joint Direct Attack Munitions program, PE 0604618N and 0604603N.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604603N
PROGRAM ELEMENT TITLE: Air [illegible]-Surface Munitions
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
A2183 Improved SLAM	0	18,902	62,337	43,570	31,168	23,658	5,369	0	185,004
E1341 Advanced Rocket System	11,663	10,612	14,765	10,015	7,424	4,164	2,864	CONT.	CONT.
TOTAL	11,663	29,514	77,102	53,585	38,592	27,822	8,233	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT:

(U) E1341/ADVANCED ROCKET SYSTEM (ARS) description: The ARS is an ACAT III joint service program with the Navy, Army, and Air Force (Navy lead) that will "neck down" existing 2.75-inch and 5-inch Zuni rocket systems to one that can satisfy both helicopter and fixed wing requirements. It will provide enhanced survivability through increased standoff delivery capability and improved lethality. It will also satisfy fleet safety requirements by integrating Insensitive Munitions (IM) characteristics.

(U) A2183/STANDOFF LAND ATTACK MISSILE EXPANDED RESPONSE (SLAM ER) description: This program funds the development of SLAM ER (SLAM Expanded Response or Improved SLAM) designed to maintain baseline SLAM capability while improving performance in the areas of launch and control aircraft survivability, immunity to countermeasures, probability of kill against hardened targets and improved user interfaces for both mission planning and launch aircraft integration. The SLAM ER consists of both hardware and software upgrades to the missile. SLAM ER will maintain backward compatibility with current launch and control aircraft.

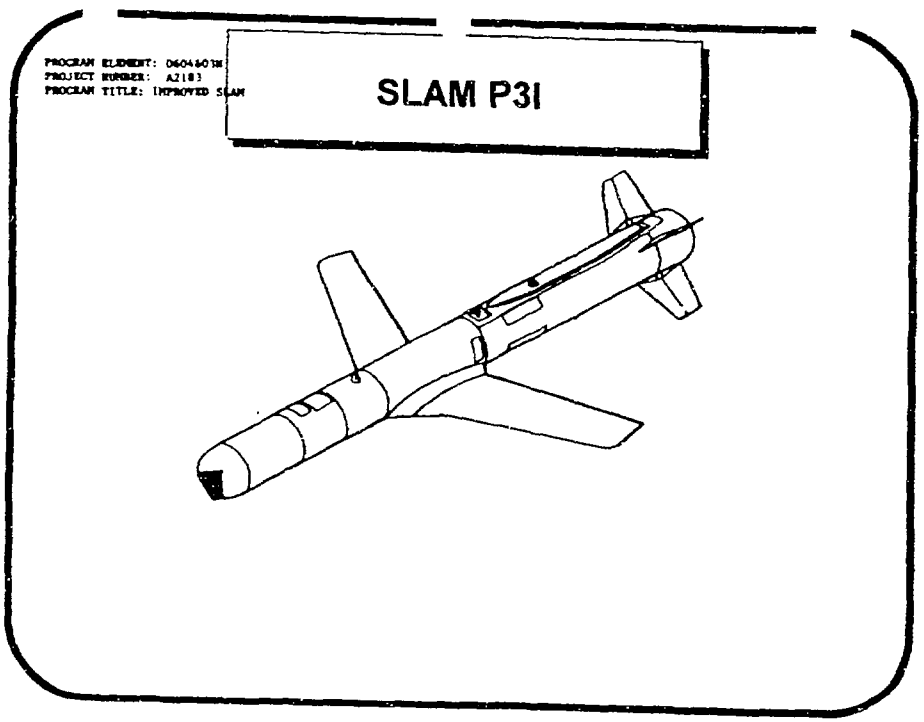
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604603N
PROGRAM ELEMENT TITLE: Air-to-Surface Munitions

PROJECT NUMBER: A2183
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: IMPROVED SLAM



POPULAR NAME: SLAM EXPANDED RESPONSE (SLAM ER)

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604603N
PROGRAM ELEMENT TITLE: Air-to-Surface Munitions

PROJECT NUMBER: A2183
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		MSIV/II 4/94				MS III 9/98		
ENGINEERING MILESTONES			HDW CDR 8/95 SFTWR PDR 1/95 HDW PDR 11/94	SFTWR CDR 10/95 SEP TEST 1/96	FRR 5/97			
T&E MILESTONES		TEMP 4/94			CC-11/96 DT-11/96	DT/OT 10/97 DT-12/97 CTRR 1/98 OPEVAL Report 8/98		
CONTRACT MILESTONES		E&MD 6/94			LRIP 1 4/97	LRIP 2 2/98	FRP 1/99	

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL PROGRAM (TO COMPLETE)
MAJOR CONTRACT	0	0	13,602	49,237	30,296	18,550	16,409	4,404	132,498
SUPPORT CONTRACT	0	0	300	300	300	300	300	100	1,600
IN-HOUSE SUPPORT	0	0	4,200	12,000	11,974	6,518	2,149	865	37,706
GFE/ OTHER	0	0	800	800	1,000	5,800	4,800	0	13,200
TOTAL	0	0	18,902	62,337	43,570	31,168	23,658	5,369	185,004

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604603N
PROGRAM ELEMENT TITLE: Air-to-Surface Munitions
PROJECT NUMBER: A2183
BUDGET ACTIVITY: 5
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Standoff Land Attack Missile (SLAM) is designed to provide an intermediate range day/night/adverse weather air-to-surface weapon for use against land and in-port surface targets. The SLAM Expanded Response (SLAM ER also known as Improved SLAM) program upgrades the hardware increasing SLAM's range between 50 and 100 percent by incorporating Tomahawk planar wings to increase maneuverability; increasing hardened target penetration capability with a replacement warhead; adding multi-channel GPS set and Navy's integrated SLAM mission planning into the Tactical Aircraft Mission Planning System (TAMPS), to reduce mission planning time and eliminate SLAM unique mission planning hardware; increasing stability and seeker dome rain protection using the aero nose; adding new technology memory enabling missile software updates at O and I level maintenance sites potentially curtailing future recurring retrofit costs; enhancing software to provide a retargeting capability before launch against pop up targets and upgrading terrain following capability; making man-in-loop improvements, enhancing anti-laser counter counter measures and search-while-track capability enabling aim point refinement while maintaining target track. This improved weapon will ultimately be compatible with the F/A-18, with potential for application/integration with other aircraft.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: Not applicable.

2. (U) FY 1994 PLAN:

- (U) ($4,200) Government in-house support to prepare Acquisition Documentation and support Milestone IV/II Decision, commence warhead modification efforts, and F/A-18 aircraft integration.
- (U) ($13,902) E&MD Contract - Initial Engineering and Design Efforts
- (U) ($800) Commence Test and Evaluation.

3. (U) FY 1995 PLAN:

- (U) ($49,537) E&MD Contract to support PDR and CDR and to procure 17 missiles to replace T&E assets.
- (U) ($800) Continue test and evaluation.
- (U) ($12,000) Government in-house to support warhead development integration, F/A-18 aircraft integration efforts and support PDR, CDR and test planning.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604603N
PROGRAM ELEMENT TITLE: Air-to-Surface Munitions

PROJECT NUMBER: A2183
BUDGET ACTIVITY: 5

Date: 7 February 1994

4. (U) PROGRAM TO COMPLETION:

- (U) FY96 - Retrofit Kit Design; Commence Fabrication, Testing Qualification, and aircraft separation test.
- (U) FY97 - Captive Carry Flight Test; SDT Firings; LRIP Contract Award.
- (U) FY98 - Second LRIP Contract Award; Completion of DT/OT; Milestone III.
- (U) FY99 - IOC; Full Rate Production.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, China Lake, CA; NAVAIRWARCENWPNDIV, Pt. Mugu, CA; NAVAIRWARCENACDIV, Patuxent River, MD; NAVAIRWARCENACDIV, Indianapolis, IN; NAVSURFWARCENDIV, Indian Head, MD; NAVSURFWARCENDIV, Dahlgren, VA; NAVWPNSTA, Earle, NJ. CONTRACTORS: McDonnell Douglas Missiles System Company, St. Louis, MO.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: In process, will be completed before MSIV/II Review in FY94.

G. (U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) WPN Line 7 Quantity 90	75	58*	75						408
• (U) SLAM BASELINE	89,498	86,257	68,738	87,436					331,929
• (U) SLAM RETROFIT			6,478	7,978	26,820	42,542	79,329		163,147

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604603N
PROGRAM ELEMENT TITLE: Air-to-Surface Munitions

PROJECT NUMBER: A2183
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

J. (U) TEST AND EVALUATION: To commence and support Test and Evaluation for the following: TEMP-4/94, CC-11/96, DT 11/96, DT/OT-10/97, DT-12/97 completion, OTRR-1/98, and OPEVAL Report-8/98.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

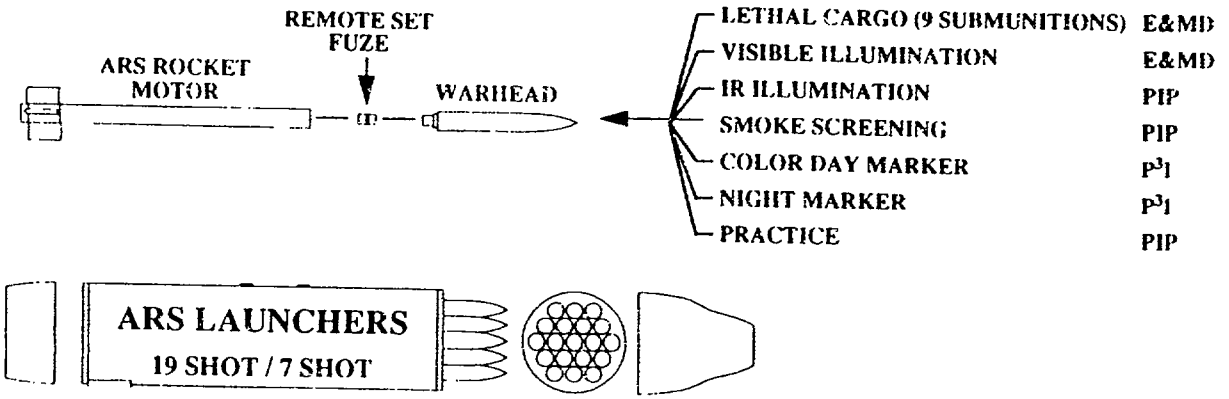
PROGRAM ELEMENT: 0604603N
PROGRAM ELEMENT TITLE: Air-to-Surface Munitions

PROJECT NUMBER: E1341
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: Advanced Rocket Systems (ARS)

ARS SYSTEM



POPULAR NAME: ARS

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604603N
PROGRAM ELEMENT TITLE: Air-to-Surface Munitions
PROJECT NUMBER: E1341
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	MS-II 10/92				MS-III 4/97			
ENGINEERING MILESTONES		PDR 10/93	CDR 1/95	FCA/PRR 2/96 PCA/FQR 4/96				
T&E MILESTONES		DT-IIA 10/93	DT-IIB 1/95 LFT&E 6/95	OT-IIA 11/95	OT-IIB 10/96 OT-IIIA 8/97	OT-IIIB 2/98 OT-IIC 8/98		
CONTRACT MILESTONES	E&MD 10/92		P3I OPTION 2/95					

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	8,599	9,049	10,174	6,226	2,779	2,100	1,900	CONT.
SUPPORT CONTRACT	75	130	300	400	400	283	101	CONT.
IN-HOUSE SUPPORT	2,889	843	3,047	2,938	2,990	1,307	581	CONT.
GFE/ OTHER	100	590	1,244	451	1,255	474	282	CONT.
TOTAL	11,663	10,612	14,765	10,015	7,424	4,164	2,964	CONT.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604603N
PRCGRAM ELEMENT TITLE: Air-to-Surface Munitions
PROJECT NUMBER: E1341
BUDGET ACTIVITY: 5
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Advanced Rocket System is an ACAT III joint service program with the Navy, Army, and Air Force (Navy lead) that will "neck down" existing 2.75-inch and 5-inch Zuni rocket systems to one that can satisfy both helicopter and fixed wing requirements. Concept is to field an inexpensive, highly flexible, level of effort weapon, which can be fielded in large quantities to satisfy a variety of lethal and non-lethal warfighting requirements. It will provide enhanced survivability through increased standoff delivery capability and improved lethality. The ARS will provide greater mission area capabilities through interchangeable mission-oriented warheads. It will also satisfy fleet safety requirements by integration of Insensitive Munitions (IM) characteristics. The system will consist of a new IM-qualified rocket motor, several IM-qualified interchangeable warheads, two new aerodynamic launchers with zone select capability, and a remote (inflight) set capable fuze. The system will be integrated onto the AH-1W Cobra helicopter initially, followed by the fixed wing AV-8B and F/A-18 aircraft.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($42) Started ARS aircraft integration.
- (U) ($100) Obtained ARS MS-II approval, Oct 1992.
- (U) ($8,094) Awarded ARS Engineering and Manufacturing (E&MD) contract to Lockheed Austin Division in Oct 1992 for baseline. Contract contains program with options for PrePlanned Product Improvement (P3I), Product Improvement Program (PIP), and Low Rate Initial Production (LRIP).
- (U) ($165) Started joint Navy, Army, and Air Force cost and operational effectiveness analysis (COEA).
- (U) ($2,799) Government technical oversight in support of Preliminary Design Review (PDR).
- (U) ($463) Continued oversight of the cooperative Navy/Marine Corps AMP program.

2. (U) FY 1994 PLAN:

- (U) ($100) Conduct ARS baseline Preliminary Design Review (PDR).
- (U) ($1,518) Continue aircraft integration.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604603N
PROGRAM ELEMENT TITLE: Air-to-Surface Munitions
PROJECT NUMBER: E1341
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($7,411) Lockheed will begin ARS baseline Development Testing (DT-IIA) and preparation for Critical Design Review (CDR) under E&MD contract.
- (U) ($1,463) Government technical support and review of contractor efforts outlined above.
- (U) ($120) Draper Lab - Visible Illumination Warhead Algorithms.

3. (U) FY 1995 PLAN:

- (U) ($9,492) Lockheed completes Advanced Rocket System baseline DT-IIA and conducts Baseline Critical Design Review (CDR).
- (U) ($4,673) Government participates in ARS Baseline Critical Design Review (CDR) and begins ARS baseline TECHEVAL (DT-IIB) testing at NAVSURFWARCENDIV, Indian Head, MD.
- (U) ($400) Begin flight clearance with Bell at Yuma.
- (U) ($200) Exercise ARS P3I option.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, China Lake CA; NAVAIRWARCENWPNDIV, Point Mugu CA; NAVSURFWARCENDIV, Indian Head MD; NAVSURFWARCENDIV, Crane IN; NAVSURFWARCENDIV, Dahlgren VA; NAVAIRWARCENACDIV, Patuxent River MD. CONTRACTORS: Lockheed, Austin TX (ARS); Bell Helicopter, Ft. Worth TX (Integration); Hughes Aircraft Company, Tucson AZ (TOW); OLIN, St. Petersburg FL (25MM AMP).

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Test and evaluation milestones have been accelerated in order to reach Milestone III approval for full rate production in FY 1997 as stated in the Acquisition Program Baseline Agreement.

3. (U) Cost Changes: Data in previous budget not available for comparison.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604603N
PROGRAM ELEMENT TITLE: Air-to-Surface Munitions
PROJECT NUMBER: E1341
BUDGET ACTIVITY: 5
Date: 7 February 1994

F. (U) PROGRAM DOCUMENTATION:

- (U) Operational Requirements Document — JUN 92 (ARS)
- (U) Acquisition Plan — JUN 92 (ARS)
- (U) Justification & Approval — JUN 91 (ARS)
- (U) TEMP — OCT 92 (ARS)
- (U) Integrated Program Summary — OCT 92 (ARS)
- (U) Operational Requirement — AUG 88 (TOW IIA (AIR))

G. (U) RELATED ACTIVITIES: Not applicable.

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) WPN Line 52	0	0	0	16,817	29,780	43,240	46,579	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: For ARS the following programs have been evaluated under the NATO Comparative Test Program funded with Foreign Weapon Evaluation funds. All evaluations are complete: Rocket Motor - Canada - Briston Co; Warhead - France - Thompson Brandt Co; Warhead - Norway - Raufoss Co. None for the TOW 2A (AIR).

J. (U) TEST AND EVALUATION:

- (U) Baseline:
  - (U) ARS DT-IIA 10/93
  - (U) ARS DT-IIB 1/95
  - (U) ARS OT-IIA 11/95
  - (U) ARS OT-IIB 10/96
  - (U) ARS OT-IIIA 8/97
  - (U) ARS OT-IIIB 2/98
  - (U) ARS OT-IIC 8/98
  - (U) P3I (OPTION) 2/95
  - (U) LFT&E 6/95

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FY 1995 RDT&E, NAVY DLSCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604610N
PROGRAM ELEMENT TITLE: Lightweight Torpedo Development

PROJECT NUMBER: V2234
BUDGET ACTIVITY: 4

Date: 7 February 1994

PROJECT TITLE: MK46 TORPEDO IMPROVEMENT

POPULAR NAME: MK46 TORPEDO IMPROVEMENT

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604610N
PROGRAM ELEMENT TITLE: Lightweight Torpedo Development
PROJECT NUMBER: V2234
BUDGET ACTIVITY: 4
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		MS IV 6/94				NPR	MS III	
ENGINEERING MILESTONES						FCA	PCA	
T&E MILESTONES				DT I	OT/DT II	TECH EVAL	OPEVAL	
CONTRACT MILESTONES			EDM	PPM		LRIP 1/98		

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	0	0	0	7,000	10,500	7,000	0	0	23,200 (0)
SUPPORT CONTRACT	0	0	800	1,600	3,200	3,200	2,500	2,500	14,500 (1,300)
IN-HOUSE SUPPORT	0	0	8,099	1,684	8,141	6,776	8,070	10,233	51,953 (8,700)
GFE/ OTHER	0	0	0	0	0	0	0	0	1,650 (0)
TOTAL	0	0	8,899	10,284	21,841	16,976	10,570	12,733	91,303 10,000

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The funding is to design, integrate and test a Lightweight Hybrid Torpedo by taking advantage of current USN investments in torpedo hardware and torpedo technology. The torpedo will be comprised of components from the MK46 Torpedo, MK50 Torpedo and MK48 ADCAP Torpedo. The Lightweight Hybrid Torpedo will incorporate improvements in the shallow water, littoral warfare Counter Countermeasure environment.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604610N PROJECT NUMBER: V2234 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Lightweigt Torpedo Development BUDGET ACTIVITY: 4

2. (U) FY 1994 PLAN:

- (U) ($4,000) Development of Lightweight Hybrid Torpedo configuration.
- (U) ($4,000) Conduct risk reduction efforts on components to be integrated into the Lightweight Hybrid Torpedo.
- (U) ($899) Conduct digital and Hybrid simulations to quantify configuration performance and to determine sea run predictions.

3. (U) FY 1995 PLAN:

- (U) ($7,000) Development and procurement of EDM's to demonstrate capability.
- (U) ($3,284) Development of processes and documentation to allow transition from R&D to production. Improve tactical software for countermeasures and terminal homing improvements for short ranges.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCENDIV, Newport, RI and NAVUNSEAWARCENDIV, Keyport, WA.
CONTRACTORS: ARL/PSU, State College, PA, contractor program support cost TBD in September 1994.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

ORD TBD
TEMP TBD

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604610N PROJECT NUMBER: V2234 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Lightweight Torpedo Development BUDGET ACTIVITY: 4

G. (U) RELATED ACTIVITIES:

- (U) PE 0603691N MK48 ADCAP (ADV), PE 0603610N LTWT TORP (ADV)

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) MK46 TORP, WPN, 321500	35,769	27,947	2,571	19,429	4,148	19,615	10,392	CONT.	CONT.
Initial Spares, 612030	1,000	1,755	0	0	0	0	0	0	3,545
Torpedo Support Equipment, 330100	11,441	10,226	11,475	9,467	11,365	10,717	11,506	CONT.	CONT.
O&M,N	26,800	19,695	16,477	15,740	16,520	12,784	15,827	CONT.	CONT.

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

J. (U) TEST AND EVALUATION:

- (U) DT-I FY96
- (U) OT/DT-II FY97
- (U) TECHEVAL FY98
- (U) OPEVAL FY99

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604612M
PROGRAM ELEMENT TITLE: Marine Corps Mine Countermeasures (Engineering)
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0080 Mine Warfare (Engineering)[1]	780	0	0	0	0	0	0	0	19,759
C1969 Mine Neutralization Equipment	2,719	2,204	440	21	0	0	0	0	20,566
C2106 Advanced Countermeasures System (ACS)[2]	0	0	0	0	4,547	7,190	3,559	CONT.	CONT.
TOTAL	3,499	2,204	440	21	4,547	7,190	3,559	CONT.	CONT.

1 FY 1994 and beyond funding transfers to Project C1969.

2 This program was formerly titled Distributed Explosive Mine Neutralization System (DEMNS). The current title is Advanced Countermeasures System (ACS). FY 1993 funding is contained in Program Element (PE) 0603640M, Project C2078, Marine Corps Advanced Technology Demonstrations. FY 1994 funding is split between two PEs; $2,561 thousand in PE 0603612M Marine Corps Mine Countermeasures, Project C2106 and $3,487 thousand in PE 0603640M, Project C2078. FY 1995 and FY 1996 funding is contained in PE 0603612M, Marine Corps Mine Countermeasures, Project C2106.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This PE covers a wide variety of present and emerging technologies which are projected to contribute to the Marine Corps mine/countermine capability. Largely focused on countermine efforts, this program element will specifically develop systems which will neutralize mines. The dynamic nature and complexity of the countermine problem and its relative urgency necessitates the advanced development of a variety of systems which will each contribute to achieving overall countermine effectiveness.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604612M
PROGRAM ELEMENT TITLE: Marine Corps Mine Countermeasures (Engineering)
PROJECT NUMBER: C1969
BUDGET ACTIVITY: 5
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C1969 Mine Neutralization Equipment. This program will test and evaluate existing mine neutralization systems for both individuals and vehicles, and will provide the engineering development of new technology for mine neutralization applications. Anti-personnel Obstacle Breaching System (APOBS) is being developed and tested to replace the World War II vintage Bangalore Torpedo. APOBS will breach a 1 X 45 meter footpath through wire obstacles and anti-personnel minefields. The Assault Amphibious Vehicle (AAV) mounted Full Width Mine Rake (FWMR) is being developed to provide minefield proofing for amphibious assaults from the high water mark inland, where tanks with mine plows cannot be employed. Magnetic Countermine System (MACS) is designed to neutralize magnetically influenced anti-tank mines. The system mounts on a host vehicle (Battle Tank, AAV, Light Armored Vehicle) as a kit, and uses host vehicle power to project a false magnetic signature in front of the host vehicle. The system can be used as a stand alone unit with the host vehicle, or in conjunction with other countermine assets mounted on the host vehicle.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($788) Completed APOBS Operational Test (OT): Completed OT failure investigation, initiated corrective action/reliability program.
- (U) ($1,474) Completed AAV/FWMR Final Design and Testing of mine rake/AAV interface, completed cost and operational effectiveness analysis and trade-off analyses of rake face design. Designed and tested active rake faces. Prepared Milestone (MS) I documentation.
- (U) ($40) Completed tradeoff study on 3 candidate materials to be used for flexible armor on MACS field coil.
- (U) ($289) Completed design of chosen flexible armor for the field coil.
- (U) ($30) Completed Level II drawings for armored coil.
- (U) ($98) Completed developmental live fire fragmentation testing against armor coil.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604612M
PROGRAM ELEMENT TITLE: Marine Corps Mine Countermeasures (Engineering)

PROJECT NUMBER: C1969
BUDGET ACTIVITY: 5

DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($1,633) Continue APOBS reliability program. Conduct reliability program flight tests. Prepare MS III documentation.
- (U) ($251) Finalize AAV/FWMR development of complete mine rake system. Finalize Level III drawing package. Conduct DT II.
- (U) ($60) Finalize design of armored coil.
- (U) ($20) Complete Level III drawings for the armored coil.
- (U) ($25) Conduct operational evaluation of coil interface and survivability.
- (U) ($15) Draft purchase description for main coil and armor.

(U) FY 1995 PLAN:

- (U) ($200) Obtain final APOBS Weapon System Explosive Safety Review Board approval. Finish APOBS MS III documentation. Achieve APOBS MS III during the second quarter of FY 1995.
- (U) ($215) Finalize MACS MS III documentation. Achieve MS III for MACS.
- (U) ($25) Finalize contract Statement of Work and specifications.

(U) PROGRAM TO COMPLETION:

- (U) ($21) FY 1996: Transition to Production for MACS.
- (U) MACS completes at the end of FY 1996.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604612M
PROGRAM ELEMENT TITLE: Marine Corps Mine Countermeasures (Engineering)

PROJECT NUMBER: C1969
BUDGET ACTIVITY: 5

DATE: 7 February 1994

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CSS, Panama City, FL; NAVSURFWARCEN Indian Head Division, Indian Head, MD; NAVSURFWARCEN Crane Division, Crane, IN; NAVSURFWARCEN Dahlgren Division, White Oak Detachment, Silver Spring, MD; NAVORDSTA, Louisville, KY; NAVCIVENGRLAB, Port Hueneme, CA; Army BRDEC, Ft. Belvoir, VA; ARDEC, Picatinny Arsenal, NJ; TECOM, Aberdeen Proving Ground, MD. CONTRACTORS: COMARCO, Crane, IN; Vitro Corporation, Alexandria, VA; MKI Incorporated, Dumfries, VA; Pacer, Panama City, FL; Paramax, Panama City, FL.

(U) RELATED ACTIVITIES:

- (U) PE 0604612M Marine Corps Mine Countermeasures (Engineering) Project C0080, Mine Warfare (Engineering)

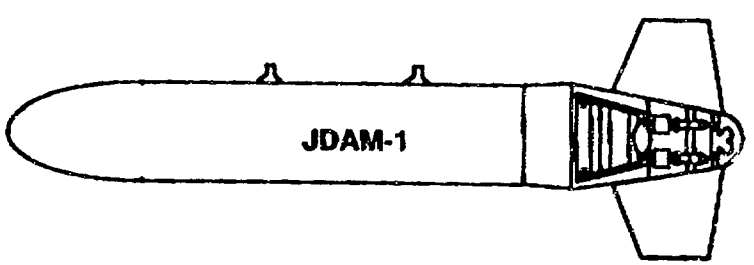
(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604618N
PROGRAM ELEMENT TITLE: Joint Direct Attack Munition
PROJECT NUMBER: E2137
BUDGET ACTIVITY: 5
Date: 7 February 1994

PROJECT TITLE: Joint Direct Attack Munition



POPULAR NAME: JDAM

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604618N
PROGRAM ELEMENT TITLE: Joint Direct Attack Munition
PROJECT NUMBER: E2137
BUDGET ACTIVITY: 5
Date: 7 February 1994

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		MS-I 10/93	MS-II 9/95				MS-III 7/99	
ENGINEERING MILESTONES			PDR/CDR 10/94 8/95					
T&E MILESTONES				DT IIA 11/95 DT IIB 6/96	OT IIA 1/97	OTIIB 10/97	FOT&E 9/99	
CONTRACT MILESTONES		PHASE I E&MD 3/94	DOWNSELECT 9/95					

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	3,734	2,241	14,061	32,419	23,155	2,480	0	CONT.
SUPPORT CONTRACT	1,725	1,300	1,000	1,100	1,100	1,100	1,000	CONT.
IN-HOUSE SUPPORT	8,037	5,052	8,612	11,971	16,550	13,181	8,757	CONT.
GFE/ OTHER	9,701	1,300	1,500	1,700	1,600	1,500	2,100	CONT.
TOTAL	23,197	9,893	25,173	47,190	42,405	18,261	11,857	CONT.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604618N PROJECT NUMBER: E2137 Date: 7 February 1994
PROGRAM ELEMENT TITLE: Joint Direct Attack Munition BUDGET ACTIVITY: 5

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: JDAM is a joint acquisition program combining Department of Navy and Air Force requirements for upgrading existing General Purpose Bomb capabilities in adverse weather and medium to high altitude releases. The Air Force is the executive service. The Navy's participation in JDAM involves joint development of JDAM components and support of Navy-Marine Corps unique requirements such as aircraft integration on the F/A-18. JDAM will provide an accurate (defined as not more than 13 meters) adverse weather capability. The program will incorporate, where feasible, INS/GPS commonality with the Joint Standoff Weapon. The IDAM Product Improvement Program will field improvements to the JDAM system with initial emphasis on attaining precision (3 meters or less) accuracy through non-seeker and seeker initiaitves.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($10,297) Performed systems engineering for joint MS I decision.
- (U) ($5,200) Supported preparation and release of JDAM-1 RFP.
- (U) ($4,000) Purchased BLU-109 and MK 84 Test Articles.
- (U) ($2,800) Defined JDAM-1 F/A-18 interface and instrumented two aircraft.
- (U) ($900) Supported preparation and USAF award of JPF contract.

2. (U) FY 1994 PLAN:

- (U) ($4,552) Support two JDAM-1 DEMVAL contracts.
- (U) ($3,100) Perform systems engineering for joint program office.
- (U) ($1,741) Refine JDAM-1 F/A-18 interface and conduct wind tunnel tests.
- (U) ($500) Support USAF E&MD contract for JPF.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604618N
PROGRAM ELEMENT TITLE: Joint Direct Attack Munition
PROJECT NUMBER: E2137
BUDGET ACTIVITY: 5
Date: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) ($11,273) Support two JDAM-I DEMVAL contracts.
- (U) ($7,100) Perform systems engineering for joint MS II decision.
- (U) ($6,200) Develop F/A-18 software for JDAM-1 test program.
- (U) ($600) Support USAF E&MD contract for JPF.

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

D. (U) WORK PERFORMED BY: IN-HOUSE: Aeronautical Systems Division, Eglin AFB, FL and NAVAIRWARCENWPNDIV, China Lake, CA. CONTRACTORS: TBD

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: The JDAM program evolved during the last two years based on the Milestone I DAB approval. The program is now sufficiently defined to enter into DEMVAL.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U PROGRAM DOCUMENTATION: Joint Program documentation under development.

G. (U RELATED ACTIVITIES:

- (U) Air Force PE 0604618F, Joint Direct Attack Munitions.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604618N
PROGRAM ELEMENT TITLE: Joint Direct Attack Munition
PROJECT NUMBER: E2137
BUDGET ACTIVITY: 5

Date: 7 February 1994

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

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) WPN	0	0	0	0	0	43,800	53,700	1,094,400	1,191,900

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

J. (U) TEST AND EVALUATION:

DT&E - 12/95
DT IIA - 11/95
DT IIB - 6/96
OT IIA - 1/97
OT IIB - 10/97
IOT&E - 9/97

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604654N
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development

PROJECT NUMBER: Q1829
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Q1829 Explosive Ordnance Disposal Procedures	5,737	6,196	6,273	6,035	6,187	6,332	6,422	CONT.	CONT.

B. (u) BRIEF DESCRIPTION OF ELEMENT AND PROJECT: This is a Joint Service Program. DOD assigned development responsibility for Explosive Ordnance Disposal (EOD) procedures and equipment to the Navy in support of the Joint Services. This program provides for the technical development, validation, preparation, joint service verification and approval of EOD render-safe procedures for all known domestic and foreign conventional and nuclear ordnance. This program also provides for the implementation of the

C. (u) JUSTIFICATION FOR PROJECT:

(u) FY 1993 ACCOMPLISHMENTS:

- (U) ($4,433) Obtained foreign ordnance and developed EOD render-safe procedures for new sophisticated domestic and foreign ordnance.
- (u) ($1,174) Continued development of specialized tools and equipment and countermeasure procedures to access and disable
- (u) ($130) Coordinated and participated in exercises to prove concepts and procedures.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604654N
PROGRAM ELEMENT TITLE: Joint Service Explosive Ordnance Disposal Development (Engineering)
PROJECT NUMBER: Q1029
BUDGET ACTIVITY: 5
DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($4,746) Obtain foreign ordnance and develop EOD render-safe procedures for additional domestic and foreign ordnance.
- (U) ($1,305) Develop [redacted] procedures.
- (U) ($145) Continue to coordinate and participate in exercises and joint working groups.

(U) FY 1995 PLAN:

- (U) ($4,873) Obtain foreign ordnance and develop EOD render-safe procedures for additional domestic and foreign ordnance.
- (U) ($1,260) Develop [redacted] procedures.
- (U) ($[illegible]) Continue to coordinate and participate in exercises and joint working groups.

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVEODTECHCEN, Indian Head, MD. CONTRACTORS: EG&G, Las Vegas, NV; BATTELLE-PNL, Richland, WA.

(U) RELATED ACTIVITIES:

- (U) All conventional or nuclear ordnance related developments, both domestic and foreign, manufactured or improvised.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604703N
PROGRAM ELEMENT TITLE: Manpower, Personnel, Training, Simulation and Human Factors
PROJECT NUMBER: L1822
BUDGET ACTIVITY: 5
DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
L1822 Manpower, Personnel, Training, Simulation and Human Factors	1,087	1,057	1,136	1,149	1,197	1,242	1,292	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program applies advanced technologies to operational requirements in manpower, personnel, training, and human factors, and transitions into operation those projects demonstrated in advanced development. Enabling technologies include adaptive testing, math optimization, statistical and econometric forecasting, computer-based simulation, and decision support systems (DSS).

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($200) Completed enlisted cost/performance trade-off model.
- (U) ($230) Completed expansion of Computerized Enlisted Detailing Support System to all skill areas.
- (U) ($207) Began engineering development of a prototype Military Strategic and Tactical Relay System Operators' Requirement Aid (MORA).
- (U) ($150) Expanded the Manpower Trade-off demonstration project to encompass total Navy.
- (U) ($300) Completed development of the Distributable Inventory Management Information System.

(U) FY 1994 PLANS:

- (U) ($150) Begin expansion and evaluation of the Brig Retraining System.
- (U) ($150) Complete MORA prototype validation on USS Coronado.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604703N
PROGRAM ELEMENT TITLE: Manpower, Personnel, Training, Simulation and Human Factors
PROJECT TITLE: L1822
BUDGET ACTIVITY: 5
DATE: 7 February 1994

- (U) ($288) Begin engineering development of officer community management system, brig retraining system.
- (U) ($300) Expand the Navy training reservation system demonstration project to include "C" schools.
- (U) ($169) Refine the Job Performance Equation and construct a School Performance equation for the Personnel Quality Requirements System.

(U) FY 1995 PLANS:

- (U) ($300) Transition prototype version of unrestricted line officer career management model to other officer communities.
- (U) ($378) Complete engineering development of the Navy training reservation system.
- (U) ($200) Complete development of the Brig Retraining System and prepare for transition into operational.
- (U) ($258) Field test, evaluate, transition DSS linking management of recruiting, delayed entry program (DEP), and initial skill training.

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

(U) WORKED PERFORMED BY: IN-HOUSE: NAVPERSPRANDCEN, San Diego, CA; NCCOSC, RDT&E Division, San Diego, CA. CONTRACTORS: B-K Dynamics, Rockville, MD; Man Tech, Alexandria, VA; HumRRO, Alexandria, VA; Pacific Sciences and Engineering, San Diego, CA.

(U) RELATED ACTIVITIES: 0602722A, Personnel and Training; 0602703F, Personnel Utilization Technology; 0603731A, Manpower and Personnel; 0603707N, Manpower, Personnel and Training Advanced Technology Development; and 0603704F, Manpower and Personnel Systems Technology.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: Space and Electronic Warfare Architecture/Engineering Support
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0798 OTH Targeting	3,625	1,550	2,175	2,101	2,083	2,018	1,912	CONT.	CONT.
X2144 SEW Engineering	0	450	3,982	3,444	6,586	6,463	6,806	CONT.	CONT.
TOTAL	3,625	2,000	6,157	5,545	8,669	8,481	8,718	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: Space Electronic Warfare Architecture/Engineering Support ensures the effective development and integration of naval command, control, communications, computers and intelligence (C^{4}I) systems under the aegis of the Copernicus Architecture along with surveillance and electronic combat systems to support the conduct of Space and Electronic Warfare (SEW). This effort includes both Fleet Engineering and top-level SEW systems engineering. Fleet Engineering encompasses the performance of critical experiments, technology enhancements, and insertions into deploying Fleet units and emerging operational opportunities, i.e., exercises and tests. The top-level SEW systems engineering process: (a) integrates systems developers in support of these operational opportunities; (b) ensures a consistent requirement-driven focus; and (c) extracts the lessons-learned from Fleet Engineering as a stimulus to the planning and programming, technology, and research, development and acquisition systems.

(U) The Over-the-Horizon Targeting (OTH-T) program conducts important OUTLAW-series demonstration projects to transition advanced technologies and/or new capabilities to the fleet, and conducts critical tests and evaluations for C^{4}I systems within the Copernicus Architecture for SEW. The program office is also responsible for developing and maintaining system level specifications and conducting Navy and joint interoperability testing to certify compliance for systems that support employment of TOMAHAWK and HARPOON cruise missiles beyond the sensor range of the launch platforms. Major at sea system tests are also conducted under OTH-T Fleet Exercises (SLAMEXs). The OTH-T Program also provides configuration control for Navy OTH-T/SEW systems.

(U) Point Defense Demonstrations (PDD). The PDD program is to demonstrate laser kill of low flying anti-ship cruise missiles in a realistic ship self defense scenarios. This program investigates the opportunities presented by the directed energy

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: Space and Electronic Warfare Architecture/Engineering Support
BUDGET ACTIVITY: 5

DATE: 7 February 1994

weapons to enhance the Navy's warfighting capabilities particularly in the ultra low altitude threats. The effectiveness of the Navy's directed energy weapons system will be demonstrated in a series of tests at tri-services test facility High Energy Laser System Test Facility (HELSTF) located at WSMR, N.M. The Navy has provided five targets and a launcher for this program. These funds are to modify the test facility and conduct a series of static tests.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: Space and Electronic Warfare Architecture/Engineering Support

PROJECT NUMBER: X0798
BUDGET ACTIVITY: 5

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X0798, OTH Targeting. The Over-the-Horizon Targeting (OTH-T) program conducts important OUTLAW-series demonstration projects to transition advanced technologies and/or new capabilities to the fleet, and conducts critical tests and evaluations for C^4I systems within the Copernicus Architecture for SEW. The program office is also responsible for developing and maintaining system level specifications and conducting Navy and joint interoperability testing to certify compliance for systems that support employment of TOMAHAWK and HARPOON cruise missiles beyond the sensor range of the launch platforms. Major at sea system tests are also conducted under OTH-T Fleet Exercises (SLAMEXs). The OTH-T Program also provides configuration control for Navy OTH-T/SEW systems.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($500) Developed and deployed the Airborne Sensor Interface System (OASIS) for S-3 (OUTLAW VIKING).
- (U) ($500) Provided Technical C4I expertise Afloat and Ashore during fleet exercises and technology demonstrations.
- (U) ($340) Conducted Pre-deployment Battle Group workups for both Second and Third Fleet units.
- (U) ($205) Developed and conducted OTH-T masters level SEW/OTH-T Systems Engineering course.
- (U) ($300) Conducted 45 OTH-T Synthetic exercises (SLAMEXs).
- (U) ($150) Developed and demonstrated SSN data satellite connectivity.
- (U) ($120) Monitored and controlled the Officer in Tactical Command Information Exchange (OTCIXS) global satellite network.
- (U) ($600) Tested Navy tactical data processors to ensure compliance with interoperability requirements in accordance with OPNAVINST 9410.5 and Joint directives.
- (U) ($910) The HELSTF has been modified, Mobile Air flow facility installed and operated, targets were installed and successfully completed the static test planned for the period. NRL and NAWC(HELSTF) have provided PDD experiment support in this period.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT:0604707N
PROGRAM ELEMENT TITLE: Space and Electronic Warfare Architecture/Engineering Support

PROJECT NUMBER: X0798
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($1,550) System engineering support providing engineers to CINCPACFLT (Pearl Harbor, HI and San Diego, CA) and CINCLANTFLT. Specifically:
  - (U) Monitor technical performance of the Officer in Tactical Command Information Exchange (OTCIXS) global satellite network during testing of new capabilities.
  - (U) Provide technical C4I expertise afloat and ashore to ensure smooth integration of new capabilities during major fleet exercises and demonstrations.

(U) FY 1995 PLAN:

- (U) ($1,600) System engineering support providing engineers to CINCPACFLT (Pearl Harbor, HI and San Diego, CA) and CINCLANTFLT. Specifically:
  - (U) Monitor technical performance of the Officer in Tactical Command Information Exchange (OTCIXS) global satellite network during testing of new capabilities.
  - (U) Provide Technical C4I expertise afloat and ashore to ensure smooth integration of new capabilities during major Fleet exercises and demonstrations.
- (U) ($575) Provide test engineers at the Reconfigurable Land-based Test Site (RLBTS) San Diego, CA to test Navy tactical data processors to ensure compliance with interoperability requirements in accordance with OPNAVINST 9410.5 and Joint directives.

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

(U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDTE DIV, San Diego, CA. CONTRACTORS: Delfin Systems Sunnyvale, CA.; Tiburon Systems San Jose, CA.; SAIC Arlington, VA.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT:0604707N
PROGRAM ELEMENT TITLE: Space and Electronic Warfare Architecture/Engineering Support

PROJECT NUMBER: X0798
BUDGET ACTIVITY: 4

DATE: 7 February 1994

(U) RELATED ACTIVITIES:

- (U) PE 0204229N (Tomahawk and Theatre Mission Planning Center)
- (U) PE 0204163N (Fleet Communications)
- (U) PE 0604231N (Tactical Command Systems (TCS))
- (U) PE 0205604N (Tactical Data Links)
- (U) PE 0604777N (Navigation/ID System)
- (U) PE 0303109N (Satellite Communications)
- (U) PE 0204413N (Amphibious Assault OTH Command and Control)
- (U) PE 0604574N (Navy Tactical Computer Resourses)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE:Space and Electronic Warfare Architecture/Engineering Support

PROJECT NUMBER: X2144
BUDGET ACTIVITY: 5

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X2144, SEW Engineering. This initiative ensures the effective development and integration of naval command, control, communications, computers and intelligence (C4I) systems under the aegis of the C4I for the Warrior Architecture to support the conduct of Space and Electronic Warfare (SEW). This effort includes both Fleet Engineering and top-level SEW systems engineering.

(U) FY 1993 ACCOMPLISHMENTS: Not applicable.

(U) FY 1994 PLAN:

- (U) ($450) SEW/C4I for the Warrior Systems Architecture and Engineering - Top level overarching systems architecture and engineering for Naval SEW/C4I systems will be developed and documented for specific Naval Expeditionary Forces. The documentation will include specific C4I systems descriptions; current and planned C4I configurations; current and planned SEW/C4I capabilities and improvements; and interface and connectivity requirements.

(U) FY 1995 PLAN:

- (U) ($300) Systems Engineering - Top level overarching systems engineering and analysis to support acnievement of the goals in the Non-Acquisition Program Definition Document for SEW/Copernicus/OTH-T Supporting Technologies (NAPDD #305-94) and "C4I for the Warrior."
- (U) ($850) SEW/C4I for the Warrior Systems Architecture and Engineering including:
  - (U) Top level overarching systems architecture and engineering for Naval SEW/C4I systems will be developed and documented for specific Naval Expeditonary Forces. The documentation will include specific C4I systems descriptions; current and planned C4I configurations; current and planned SEW/C4I capabilities and improvements; and interface and connectivity requirements.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: Space and Electronic Warfare Architecture/Engineering Support

PROJECT NUMBER: X2144
BUDGET ACTIVITY: 5

DATE: 7 February 1994

- (U) Critical early liaison with Fleet CINCs for SEW/C4I demonstration/exercise planning.

- (U) ($1,500) Project Execution - Technical and management oversight of the insertion and prototyping of new COTS/GOTS SEW operational capabilities in Joint C4I for the Warrior initiatives such as the JCS(J6) sponsored Joint Warrior Interoperability Demonstration (JWID) series.

- (U) ($1,332) Test and Evaluation - Interoperability testing in accordance with DOD Directive 4630.5 and DOD Instruction 4630.8 to ensure Joint interoperability of Navy systems.

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

(U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDTE DIV, San Diego, CA. CONTRACTORS: JHU/APL, Laurel, MD; Booz Allen Hamilton, Arlington, VA.

(U) RELATED ACTIVITIES:
- (U) PE 0204229N (Tomahawk and Theatre Mission Planning Center)
- (U) PE 0204163N(Fleet Communications)
- (U) PE 0604231N(Tactical Command Systems (TCS))
- (U) PE 0205604N(Tactical Data Links)
- (U) PE 0604777N(Navigation/ID System)
- (U) PE 0303109N(Satellite Communications)
- (U) PE 0604574N(Navy Tactical Computer Resources)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604710N
PROGRAM ELEMENT TITLE: Navy Energy Program (ENG)
PROJECT NUMBER: R0371
BUDGET ACTIVITY: 5
DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0371 Energy Conservation (ENG)	3,857	3,101	3,165	3,078	3,117	2,998	3,015	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND PROJECT: Develop energy-efficient systems and practices for ships, facilities, and aircraft. Resulting energy efficiency gains contribute to fleet sustainability, combat capability (e.g., greater range, time on station), and reduced operating costs. Efforts include fuel use optimization aids for aircraft; anti-fouling paints, air conditioning and lighting for ships; adaption of commercially available energy conservation and renewable energy technologies to Navy facility needs. Provide test and evaluation support to the companion PE 0603724N Project R0829. As currently funded, annual savings for the combined 6.3/6.4 program are projected to be $130M by 1995 and $169M by 2000 compared to 1985 cost.

This program, and the companion PE 0603724N Navy Energy Program (ADV), support the achievement of Executive Department, DoD, and Navy Energy Management Goals enunciated in Executive Order 12759 of Apr 91, Defense Energy Policy Memorandum 91-2 of May 91, OPNAV Instruction 4100.5C of July 86, and the Energy Policy Act of 1992. Navy is TRISERVICE lead for the implementation of renewable/alternative energy systems across DoD.

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($ 968) Aircraft: Incorporated fleet requested enhancements in the Flight Optimization Routines for Energy Management (FOREM) software for F-14A, A-6E, EA-6B, and F/A-18 (-400 engine). Developed Pocket-Sized Aircraft Performance Advisory Computer (P-S APAC) for C-9B. Achieved Initial Operational Capability (IOC) of Flight Performance Advisory System (FPAS) on F/A-18C/D (-400 engine). Extended FPAS development to F/A-18 C/D (-402 engine).
- (U) ($1,621) Ships: Enhanced high efficiency AC fluorescent lighting system by adding integral emergency ballasts. Initiated full-scale T&E of refrigerant HCFC-124 in redesigned centrifugal compressor. Evaluated refrigerant HFC-134a for centrifugal applications. Conducted full scale shock/performance tests of titanium and composite air to seawater heat exchangers. Continued

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604710N
PROGRAM ELEMENT TITLE: Navy Energy Program (ENG)
PROJECT NUMBER: R0371
BUDGET ACTIVITY: 5
DATE: 7 February 1994

ship trial of advanced antifouling (AF) coating systems and development of improved hull cleaning procedures/equipment for ablative copper paints.

- (U) ($1,268) Facilities: Field tested 3 intermediate PV/diesel hybrid systems; developed T&E plan for large PV/diesel test. Developed T&E plan for grid support and island grid PV application. Supported 6 MILCON PV power systems installation projects. Continued Inverse Flash Steam Purification (IFSTEP) pierside clean steam system tests.

(U) FY 1994 PLAN:

- (U) ($ 748) Aircraft: T&E enhanced FOREM for F/A-18 (-400 engine), F-14A, A-6E, EA-6B and distribute to fleet. Develop FOREM for F/A-18(-402 engine), F-14B/D, and TA-4J. T&E P-S APAC for C-9B and distribute to fleet. Enhance P-S APAC for C-2A and KC-130 as requested by fleet. T&E FPAS for F/A-18C/D (-402 engine).
- (U) ($1,318) Ships: Complete SHIPEVAL of AC lighting system with integral emergency ballasts. Optimize design of centrifugal compressor for HFC-134a refrigerant; complete evaluation of HCFC-124 and initiate equipment modifications to allow retrofit. Expand AF coating ship trials to include silicone "easy release" products. Develop efficiency improvements for LM2500 gas turbine engine and powertrain.
- (U) ($1,035) Facilities: T&E PV/hybrid power systems at four large sites. Support 10 MILCON PV power system projects. Demonstrate industrial process energy saving technologies identified in 6.3. Monitor pierside power metering/power demand control techniques in field applications.

(U) FY 1995 PLAN:

- (U) ($ 716) Aircraft: T&E FOREM for F/A-18 (-402 engine), F-14B/D, and T/A-4J; distribute to fleet. Develop FOREM for P-3C and T-45, T&E P-S APAC for C-2A and KC-130 and distribute. Initiate development of FPAS for F/A-18E/F.
- (U) ($1,397) Ships: Assess relative merits of ozone safe refrigerants and select candidates for forward fit airconditioning. Prepare detailed design packages for back-fit of ozone-safe refrigerant. Complete MILSPEC for high efficiency lighting with integral emergency ballast. Continue full-scale ship trials of promising non-toxic AF coatings. T&E efficiency improvements for gas turbine ships.
- (U) ($1,052) Facilities: T&E PV systems for peak shedding and distributed load center applications. Support 10 Renewable Energy MILCON installations as lead service. Field test geothermal heat pumps and electrical conservation technologies identified in 6.3. Issue design guidance and guide specifications for large PV hybrid and PV grid support/island grid systems.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604710N
PROGRAM ELEMENT TITLE: Navy Energy Program (ENG)
PROJECT NUMBER: R0371
BUDGET ACTIVITY: 5
DATE: 7 February 1994

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

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN DET, Annapolis, MD; NAVAIRWARCENACDIV, Warminster, PA; NCEL, Port Hueneme, CA; NAVAIRWARCENWPNDIV, China Lake, CA. CONTRACTORS: IOTA Eng., Tucson, AZ; Lawrence Berkeley Lab, Berkeley, CA; McDonnell Aircraft, St. Louis, MO; York Intl., York, PA.

(U) RELATED ACTIVITIES:
- PE 0603508N (Ship Propulsion System)
- PE 0603712N (Environmental Quality and Logistics Advanced Technology)
- PE 0603724N (Navy Energy Program)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604719M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/Communications Systems
BUDGET ACTIVITY: 5

DATE: 7 February 1994

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

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0053 Joint Tactical Information Distribution System (JTIDS)	3,934	5,966	3,766	3,733	3,713	3,693	3,675	CONT.	CONT.
C1929 Advanced Tactical Air Command Central (ATACC)	0	8,349	2,314	480	476	239	237	CONT.	CONT.
C2085 Advanced Field Artillery Tactical Data System (AFATDS)	7,652	10,648	5,291	2,861	4,741	3,304	2,815	CONT.	CONT.
C2101 Amphibious Assault Networking Technology (AANT)[1]	0	0	0	0	0	190	190	CONT.	CONT.
C2109 Command and Control in the Year 2000 (C2 2000)[2]	0	0	0	0	0	284	282	CONT.	CONT.
TOTAL	11,586	24,963	11,371	7,074	8,930	7,710	7,199	CONT.	CONT.

1 FY 1993 through FY 1995 funding is contained in Program Element (PE) 0603640M, Marine Corps Advanced Technology Demonstrations, Project C2081, Battlefield Electronic Support. FY 1996 and FY 1997 funding is contained in PE 0603731M, Marine Corps Command/Control/Communications Systems (Advanced), Project C2101.

2 FY 1993 through FY 1995 funding is contained in PE 0603640M, Marine Corps Advanced Technology Demonstrations, Project C2081, Battlefield Electronic Support. FY 1996 and FY 1997 funding is contained in PE 0603731M, Marine Corps Command/Control/Communications Systems (Advanced), Project C2109.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This PE provides funds for the engineering development of Marine Corps Command, Control, and Communications Systems which include Marine Tactical Command and Control Systems development and improvements. The projects are aimed toward more effective command and control of tactical forces during both amphibious and expeditionary land operations. This concept envisions an integrated air/ground tactical command and control system oriented towards amphibious expeditionary environments to meet unique command, control and interoperability requirements of the Landing Force Commanders.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604719M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C0053
BUDGET ACTIVITY: 5
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJE ' NUMBER AND TITLE: C0053, Joint Tactical Information Distribution System (JTIDS). Joint Tactical Information Distribution stem (JTIDS) integrates the high capacity, jam resistant, secure, digital communications capability provided by the JTIDS Class 2/2H terminal into the Radio Terminal Set AN/TSC-131 (JTIDS Module). The JTIDS Module (JM) will in turn be used as part of the AN/TYQ-23 Tactical Air Operations Module (TAOM) Joint Tactical Information Distribution System/Tactical Air Data Information Link-Joint (JTIDS/TADIL-J) integration program. JTIDS also provides engineering and technical assistance to the JTIDS/TADIL-J integration programs for the AN/TYQ-51 Advanced Tactical Air Command Central and Air Defense Communications Platform.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,900) Completed formal testing of the JTIDS interface box (JIB) hardware and software.
- (U) ($597) Began formal testing of the JM.
- (U) ($437) Continued to monitor the Mass Memory Controller Project under the Air Force Module Control Equipment - Pre-Planned Product Improvement program (MCE-P3I).

(U) FY 1994 PLAN:

- (U) ($2,411) Complete formal testing of the JM.
- (U) ($935) Monitor completion and testing of the JM.
- (U) ($2,200) Begin integration of JTIDS/TADIL-J into TAOM.
- (U) ($420) Provide interim JTIDS capability to fleet.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604719M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C0053
BUDGET ACTIVITY: 5
DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($534) Provide pre-operations support of Class 2H Full Scale Development Terminals which will be used in JM/JIB integration into TAOM.
- (U) ($2,160) Complete JM/JIB final test report and delivery of JM Engineering Design Model #1-4.
- (U) ($1,072) Continue integration of JTIDS/TADIL-J into the TAOM.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: MARCORSYSCOM, Quantico, VA; MCTSSA, Camp Pendleton, CA; NISE West, San Diego, CA; Electronic System Division, Bedford, MA. CONTRACTORS: GEC MARCONI, Wayne, NJ; Litton, Van Nuys, CA; Eldyne Incorporated, San Diego, CA; Madentech, Woodbridge, VA.

(U) RELATED ACTIVITIES:

- (U) PEs 0604771D and 0604754F (MCE-P3I Joint Program) The Marine Corps is the lead service for development of the Joint TAOM.
- (U) PE 0604719M (Marine Corps Command/Control/Communications Systems) Project C1929, Advanced Tactical Air Command Central (ATACC).

(U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) PMC Line 47 (BLI# 421300) JTIDS Integration	0	1,743	8,596	9,652	15,504	4,221	2,218	0	41,934

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604719M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C1929
BUDGET ACTIVITY: 5
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C1929, Advanced Tactical Air Command Central (ATACC). The Advanced Tactical Air Command Central (ATACC) will integrate hardware and software into a replacement system, capable of overcoming the current operational deficiencies of the AN/TYQ-1 Tactical Air Command Central (TACC), and the AN/TYQ-3A Tactical Data Communications Central. The system will automate and enhance the now manual decision support/mission planning functions of the TACC. Additionally, the ATACC will provide increased interoperability through the integration of Joint Tactical Information Distribution System/Tactical Air Data Link-Joint (JTIDS/TADIL-J), and automate Joint Interoperability of Tactical Communications Systems (JINTACCS) message receipt and origination.

(U) FY 1993 ACCOMPLISHMENTS: Accomplishments are funded under PE 0605873M, Project C0033.

(U) FY 1994 PLAN:

- (U) ($2,000) Commence development of shelter upgrades necessary due to the results of operational testing and evaluation (OT&E).
- (U) ($4,000) Commence development of Communication System upgrades necessary due to results of OT&E.
- (U) ($2,349) Commence Conversion of ATACC functionality to open system architecture.

(U) FY 1995 PLAN:

- (U) ($1,600) Complete integration and testing of upgraded software and hardware.
- (U) ($714) Conduct and complete Follow on Test and Evaluation.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: MARCORSYSCOM, Quantico, VA; MCTSSA, Camp Pendleton, CA. CONTRACTORS: Grumman Data Systems, Springfield, VA.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604719M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems

PROJECT NUMBER: C1929
BUDGET ACTIVITY: 5

DATE: 7 February 1994

(U) RELATED ACTIVITIES:

- PE 0605873M, Marine Corps Support Program Wide Manpower System, Project C0033.

(U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 54 (BLI# 459700) ATACC	6,751	9,619	0	17,850	0	0	0	0	34,220

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604719M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems

PROJECT NUMBER: C2085
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: Advanced Field Artillery Tactical Data System (AFATDS)

PICTURE NOT AVAILABLE

POPULAR NAME: AFATDS

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604719M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C2085
BUDGET ACTIVITY: 5
Date: 7 February 1994

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	TEMP		MS III 1ST QTR					
ENGINEERING MILESTONES								
T&E MILESTONE	DT&E I 2ND QTR	IOT&E 4TH QTR						
CONTRACT MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	6,664	8,182	3,798	1,786	3,591	2,204	1,740	CONT.
SUPPORT CONTRACT	457	677	240	350	425	375	350	CONT.
IN-HOUSE SUPPORT	311	648	653	350	350	350	350	CONT.
GFE/ OTHER	220	1,141	600	375	375	375	375	CONT.
TOTAL	7,652	10,648	5,291	2,861	4,741	3,304	2,815	CONT.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604719M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C2085
BUDGET ACTIVITY: 5
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Advanced Field Artillery Tactical Data Systems (AFATDS) will consist of digital fire support Command and Control automated software, fielded on Marine Corps common hardware. AFATDS will automate for the Marine commander the integration and coordination of supporting arms. AFATDS development is in three versions, each adding new capabilities and refining existing capabilities. The Marine Corps plans to field version 2 software baselined on the Lightweight Computer Unit.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($6,091) Completed Code and Integration of version 1 software.
- (U) ($390) Conducted version 1 Formal Qualification and System software test.
- (U) ($1,171) Concurrently develop AFATDS version 2 software.

2. (U) FY 1994 PLAN:

- (U) ($1,157) Conduct Developmental Test and Evaluation/Experimentation of version 1 software.
- (U) ($1,157) Conduct Initial Operational Test and Evaluation of version 1 software.
- (U) ($2,312) AFATDS Army System Acquisition Review Council III.
- (U) ($6,022) Start Preliminary Design Review of version 2 software.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604719M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C2085
BUDGET ACTIVITY: 5
Date: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) ($4,242) Complete version 2.0 software code.
- (U) ($525) Complete version 2.1 software System Design and conduct System Design and software Specification Reviews.
- (U) ($524) Conduct version 3 software System Design.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: MARCORSYSCOM, Quantico, VA; MCTSSA, Camp Pendleton, CA; Army Program Manager, FATDS, Ft. Monmouth, NJ; and TSM, Fort Sill, OK. CONTRACTORS: Magnavox Systems, Incorporated, Fort Wayne, IN.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: DT&E was delayed three months (from October 1993 to January 1994) because the Army was experiencing maturity problems with version 1 software. This delay in DT&E caused a corresponding shift in Initial Operational Testing and Evaluation, which moved from February - March 1994 to July - August 1994. These delays lead to a shift in the AFATDS Milestone III from the fourth quarter of FY 1994 to the first quarter of FY 1995. Although this is a joint Army/Marine Corps program, the delay in Army software development will not further effect the Marine Corps AFATDS schedule, which remains within the approved program baseline.

3. (U) Cost Changes: Data in previcus budget not available for comparison.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604719M
PROGRAM ELEMENT TITLE: Marine Corps Command/Control/ Communications Systems
PROJECT NUMBER: C2085
BUDGET ACTIVITY: 5
Date: 15 October 1993

F. (U) PROGRAM DOCUMENTATION: The Army Program Managers' Office has complete program documentation.

(U) Required Operational Capability	May 1989
(U) Memorandum of Agreement	August 1989
(U) Test and Evaluation Master Plan (Revision H, Change 6)	June 1993
(U) Milestone III	December 1995

G. (U) RELATED ACTIVITIES:

- (U) PE 0203726A (Advanced Field Artillery Tactical Data System), Project D322.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) PMC Line 56 (BLI# 461100) Multi-Service Advance Field Artillery Tactical Data System	0	9,594	5,140	9,958	154	159	164	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:

- (U) Memorandum of Understanding signed with ADLER (Germany) in 1991.

J. (U) TEST AND EVALUATION:

- (U) Developmental Testing and Evaluation I — January - February 1994
- (U) Initial Operational Testing and Evaluation — July - September 1994

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604721N
PROGRAM ELEMENT TITLE: Battle Group Passive Horizon Extension System
BUDGET ACTIVITY: 5

DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X2134 BGPHES-ST	5,409	8,402	6,160	4,180	1,388	1,170	103	CONT.	CONT.
X2135 Common High Bandwidth Data Link - Shipboard Terminal (CHBDL-ST)	5,301	15,633	13,098	5,166	2,524	2,332	1,298	CONT.	CONT.
TOTAL	10,710	24,035	19,258	9,346	3,912	3,502	1,401	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Battle Group Passive Horizon Extension System - surface Terminal (BGPHES-ST) extends the Battle Group's line of sight radio horizon by using remote receivers in the ES-3A's sensor payload, and sends this information via the Common High Bandwidth Data Link - Surface Terminal (CHBDL-ST) to the surface ships.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

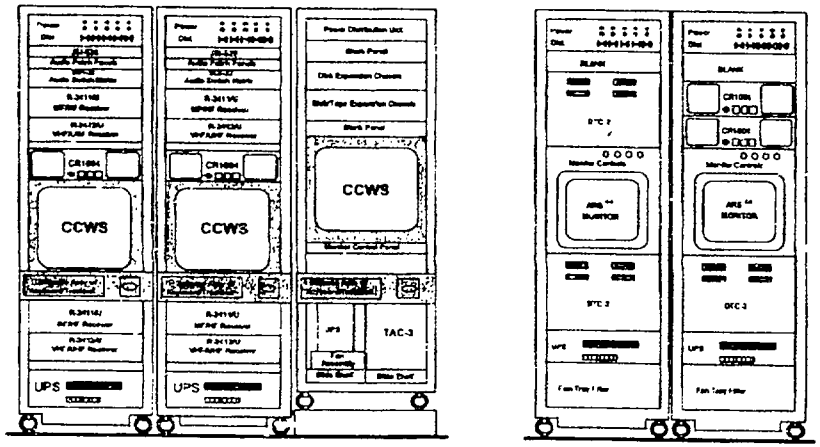
PROGRAM ELEMENT: 0604721N
PROGRAM ELEMENT TITLE: Battle Group Passive Horizon Extension System

PROJECT NUMBER: X2134
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: BGPHES - ST

BGPHES-ST
CV/CVN NOTIONAL RACK CONFIGURATION



POPULAR NAME: BGPHES

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604721N
PROGRAM ELEMENT TITLE: Battle Group Passive Horizon Extension System
PROJECT NUMBER: X2134
BUDGET ACTIVITY: 5
Date: 7 February 1994

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES			IOC 8/95	MSIII 6/96				
ENGINEERING MILESTONE	Fabrication	TRR 8/94	FCA/PCA					
T&E MILESTONES	DT-IID-E 6/93		DT-IIG-H 3/95 USAF INTEROP 3/95 AT-SEA TECHEVAL 8/95	OPEVAL 3/96		FOT&E 3/98		
CONTRACT MILESTONES			Award Prod. Contract	6/96				

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	3,460	6,052	3,760	2,099	500	400	60	CONT.
SUPPORT CONTRACT	660	900	700	481	191	143		CONT.
IN-HOUSE SUPPORT	939	1,200	1,500	1,500	697	627	43	CONT.
GFE/ OTHER	350	250	200	100				CONT.
TOTAL	5,409	8,402	6,160	4,180	1,388	1,170	103	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Battle Group Passive Horizon Extension System Surface Terminal (BGPHES-ST) extends the Battle Group's line-of-sight radio horizon by using remote receivers in the ES-3A's sensor payload, via the Common High Bandwidth Data Link Shipboard Terminal (CHBDL-ST). BGPHES-ST will be located in LHD, LHA and CV/CVN Ships Signal Exploitation Space (SSES). The BGPHES-ST 5-position, 5-rack cryptologic control, analysis and

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604721N
PROGRAM ELEMENT TITLE: Battle Group Passive Horizon Extension System
PROJECT NUMBER: X2134
BUDGET ACTIVITY: 5
Date: 7 February 1994

reporting center uses Navy-standard DTC/TAC-N series workstations and integral local intercept receivers. The design downsizes and corrects deficiencies from the 14-rack AN/SLQ-50 (XN-1) model tested on USS EISENHOWER (CVN-69) during FY87 (factory verification completion in fall 1989). Development will proceed in two stages, first reducing risk by demonstrating operation with the ship's local receivers (the Ship's Signals Exploitation Equipment (SSEE) Phase II)), then (timed to meet CHBDL-ST development) adding control and use of the remote airborne payload (the AN/SLQ-50 (XN-3)).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($79) Conducted functional and physical configuration audits (FCA/PCA) on initial configuration (core local receiver segment).
- (U) ($4,750) Completed development and integration testing for core local receiver capability. Conducted inplant testing on initial configuration (DT-IID-E).
- (U) ($280) Analyzed rehost of software to TAC-N computers.
- (U) ($300) Initiated planning of integration and test of the (XN-3) with the BGPHES data link and aircraft sensors.

2. (U) FY 1994 PLAN:

- (U) ($5,973) Develop, fabricate and integrate the hardware and software to control BGPHES' airborne payload segment via the BGPHES data link. Start formal factory test program.
- (U) ($729) Develop and test software to be uploaded to the Navy airborne receiver segment.
- (U) ($250) Define software interfaces to host ships' Command, Control, Communication, Computers, and Intelligence (C4I) systems.
- (U) ($750) Initiate rehost of software to TAC-N computer.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604721N
PROGRAM ELEMENT TITLE: Battle Group Passive Horizon Extension System
PROJECT NUMBER: X2134
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($250) Initiate software interfaces for Pre-planned Product Improvement (P3I) and USAF interoperability.
- (U) ($450) Complete planning for integration and test of the (XN-3) with the BGPHES data link and aircraft sensors.

3. (U) FY 1995 PLAN:

- (U) ($2,392) Complete factory integration and qualification testing with remoted receiver payload. Demonstrate access to ES-3A prime mission equipment (PME) direction-funding system. Conduct FCA/PCA.
- (U) ($1,068) Conduct integration and test of the BGPHES-ST with the BGPHES data link (CHBDL) and ES-3A remoted sensor payload at the Land Based Test Site (LBTS).
- (U) ($900) Perform DT and IOT&E on overall BGPHES at the LBTS (i.e., BGPHES-ST with CHBDL and Navy airborne segments), followed by completion of at-sea TECHEVAL on CVN initiation of OPEVAL.
- (U) ($300) Complete definition of software interfaces for P3I and USAF interoperability; conduct U-2 interoperability demonstration of RS-6B, RAS-1/COMINT.
- (U) ($1,000) Continue rehost of software to TAC-N computer and definition of software interfaces to host ship's C4I system.
- (U) ($250) Initiate P3I access to other ES-3A PME, including special signals.
- (U) ($250) Initiate hardware design for LHD and LHA ship configurations.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Dahlgren, VA; NISEWEST San Diego, CA; NISEEAST, Charleston, SC; NAWC Indianapolis, IN; NCCOSC, San Diego, CA. CONTRACTOR: E-Systems, Inc., Melpar Division, Falls Church, VA; SSA, Inc., Tysons Corner, VA.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604721N
PROGRAM ELEMENT TITLE: Battle Group Passive Horizon Extension System
PROJECT NUMBER: X2134
BUDGET ACTIVITY: 5
Date: 7 February 1994

E (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:
OR 08/85
DCP 05/91

G. (U) RELATED ACTIVITIES: Not applicable.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) OPN Line 52XU	0	0	0	17,843	35,874	25,031	15,838	3,000	97,586
(U) O&M,N 4B7N & 1B2B	0	0	0	3,718	2,923	3,006	3,328	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION:

- (U) BGPHES DT-IID-E - Design Qualification Test - FY93 6/93
- (U) BGPHES DT-IIG-H - Design Qualification Test - FY95 3/95
- (U) TECHEVAL 8/95
- (U) OPEVAL 3/96
- (U) FOT&E 3/98

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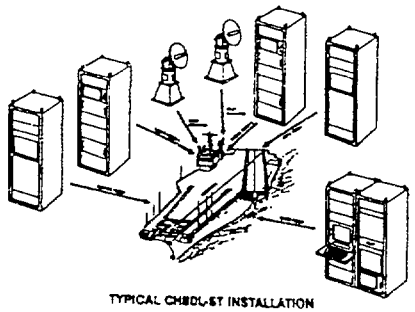
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604721N
PROGRAM ELEMENT TITLE: Battle Group Passive Horizon Extension System

PROJECT NUMBER: X2135
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: Common High Bandwidth Data Link - Shipboard Terminal (CHBDL-ST)



TYPICAL CHBDL-ST INSTALLATION

POPULAR NAME: CHBDL - ST

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604721N
PROGRAM ELEMENT TITLE: Battle Group Passive Horizon Extension System
PROJECT NUMBER: X2135
BUDGET ACTIVITY: 5
Date: 7 February 1994

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES				Milestone III 6/96				
ENGINEERING MILESTONES								
T&E MILESTONES			Start DT/OT 11/94	Complete DT/OT 3/96				
CONTRACT MILESTONES			Deliver To Govt 11/94					

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	3,601	12,133	8,974	4,216	1,774	1,582	798	CONT.
SUPPORT CONTRACT	800	800	1,100	250	250	250	250	CONT.
IN-HOUSE SUPPORT	900	2,700	3,024	700	500	500	250	CONT.
GFE/ OTHER								
TOTAL	5,301	15,633	13,098	5,166	2,524	2,332	1,298	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The CHBDL-ST equipment will provide a common high bandwidth data link shipboard terminal for the receipt of signal and imagery intelligence data from remote airborne sensors and the transmission of link and sensor control data to airborne platforms. Signal intelligence data is received from the Battle Group Passive Horizon Extension System (BGPHES) Airborne Component (AC) and delivered to the BGPHES Shipboard Terminal. Imagery intelligence data is received from various tactical airborne reconnaissance system and delivered to the Joint Service Imagery Processing System - Navy (JSIPS-N).

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604721N
PROGRAM ELEMENT TITLE: Battle Group Passive Horizon Extension System

PROJECT NUMBER: X2135
BUDGET ACTIVITY: 5

Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($4,155) Continued Prime Equipment Fabrication for Development Test/Operational Test - II (DT/OT-II).
- (U) ($900) Continued design and preparation of Land-Based Test Site (LBTS) at NAVAIRWARCENACDIV, Patuxent, MD.
- (U) ($246) Started shipboard installation design for at-sea DT/OT-II.

2. (U) FY 1994 PLAN:

- (U) ($11,783) Complete prime equipment fabrication, integration and acceptance tests for DT/OT-II. Initiating prime equipment fabrication for factory environmental and qualification testing.
- (U) ($3,500) Complete preparation of the LBTS at Patuxent River, MD.
- (U) ($150) Complete DT/OT-II CV/CVN installation design, obtain design approval and initiate work planning.
- (U) ($200) Initiate LHD installation design planning.

3. (U) FY 1995 PLAN:

- (U) ($5,441) Complete prime equipment fabrication for factory qualification testing.
- (U) ($3,507) Deliver DT/OT-II equipment to LBTS for Navy acceptance testing; integrate and begin DT/OT-II.
- (U) ($500) Complete CVN installation work plans for DT/OT-II equipment and initiate DT/OT-II.
- (U) ($250) Initiate LHA installation design planning.
- (U) ($3,400) Initiate rehost of TAC-N computer, initiate design for AC data link output power control, initiate design capability to handle two data links simultaneously.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604721N
PROGRAM ELEMENT TITLE. Battle Group Passive Horizon Extension System

PROJECT NUMBER: X2135
BUDGET ACTIVITY: 5

Date: 7 February 1994

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Dahlgren, VA; NAVELEXCEN, Portsmouth, VA; ECAC, Annapolis, MD; NAVAIRWARCENACDIV Patuxent River, MD. CONTRACTORS: Paramax Systems Corp, Salt Lake City, UT; Datron, Simi Valley, CA; JHU/APL, Laurel, MD; MITRE Corp, Reston, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes. Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: Operational Requirement 03/91

G. (U) RELATED ACTIVITIES: PE 0603261N, project A2174 Joint Service Imagery Processing System - Navy (JSIPS-N).

Airborne reconnaissance imagery is transmitted over CHBDL and processed on JSIPS-N. The initial contract award funded the design and fabrication of one system using Defense Special Projects Office funds.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line Item 2434 Battle Group Passive Horizon Extension System	0	0	0	87,114	68,110	53,865	45,123	8,470	262,682
• (U) O&M,N (HQ Support)	0	0	0	833	1,740	1,770	1,610	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604721N
PROGRAM ELEMENT TITLE: Battle Group Passive Horizon Extension System

PROJECT NUMBER: X2135
BUDGET ACTIVITY: 5

Date: 7 February 1994

J. (U) TEST AND EVALUATION:

- (U) LBTS Integration and Test 6/94 to 8/95
- (U) Ship integration and at-sea DT/OT 8/95 to 3/96
- (U) Quality control and Environmental System tests 7/95 to 6/96

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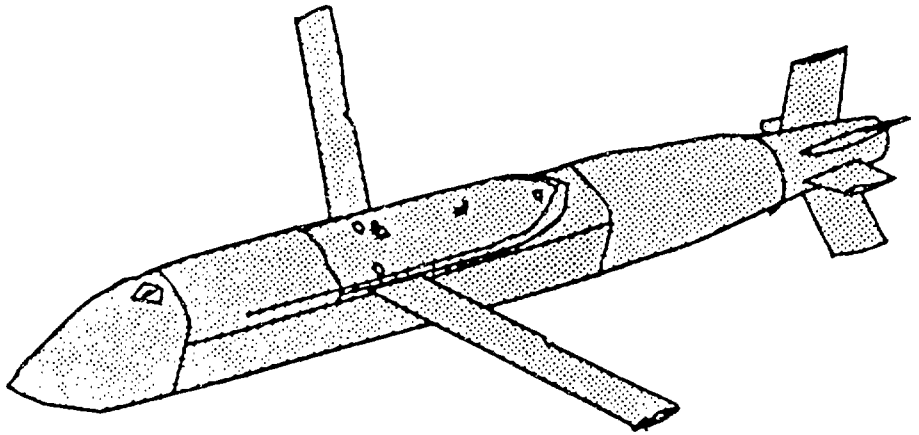
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604727N
PROGRAM ELEMENT TITLE: Joint Standoff Weapon Systems
PROJECT NUMBER: E2068
BUDGET ACTIVITY: 5
Date 7 February 1994

PROJECT TITLE: Advanced Interdiction Weapon System (AIWS)



POPULAR NAME: JSOW

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604727N
PROGRAM ELEMENT TITLE: Joint Standoff Weapon Systems
PROJECT NUMBER: E2068
BUDGET ACTIVITY: 5
Date 7 February 1994

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
BASELINE					LRIP 12/96		MS-III 10/98	
P3I		MS-I 8/94				MS-II 8/98		MS-III 3Q/04
BLU-108		MS-II 8/94						MS-III 4Q/99
ENGINEERING MILESTONES								
BASELINE	PDR 1/93		CDR 4/95	FCA 12/95 PRR 8/96 PVR 6/96				
P3I				SRR 5/96	SDR 5/97	PDR 6/98		CDR 1Q/00 FCA 4Q/01 PVR 1Q/01 PRR 1Q/01
BLU-108		SDR 6/94	PDR 7/95	CDR 7/96	PRR 4/97	FCA 12/97 PVR 12/97		

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604727N
PROGRAM ELEMENT TITLE: Joint Standoff Weapon Systems
PROJECT NUMBER: E2068
BUDGET ACTIVITY: 5
Date 7 February 1994

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
T&E MILESTONES								
BASELINE		DT-IIA 2/94 DT-IIB 8/94		DT-IIC 10/95 OT-IIA 10/95	OT-IIB 10/96			
P3I								DT-IIA 1Q/00 DT-IIB 4Q/00 OT-IIA 2Q/01 DT-IIC 4Q/01 OT-IIB 1Q/03
BLU-106			DT&E 6/95		IOT&E 4/97			
CONTRACT MILESTONES								
BASELINE				ST/STE 12/95	LRIP OPTION 12/96	PCA 8/98		
P3I			DEM/VAL (OPTION) 10/94				E&MD 12/98	LRIP 3Q/02
BLU-108			E&MD CONTRACT AWARD 10/94			LRIP 1/98	PCA 12/98	

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	38,799	57,400	75,700	54,800	49,800	26,800	44,200	CONT.
SUPPORT CONTRACT	1,646	2,120	2,485	2,485	2,485	1,500	1,500	CONT.
IN-HOUSE SUPPORT	16,273	14,635	27,942	26,094	25,353	16,63-	15,554	CONT.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604727N
PROGRAM ELEMENT TITLE: Joint Standoff Weapon Systems
PROJECT NUMBER: E2068
BUDGET ACTIVITY: 5
Date 7 February 1994

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
GFE/ OTHER	6,626	7,700	5,000	3,590	1,500	0	0	CONT.
TOTAL	63,344	81,855	111,127	86,969	79,138	44,933	61,254	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Joint Standoff Weapon (JSOW) is an air-to-ground weapon designed to attack a variety of targets during day, night and adverse weather conditions. JSOW will enhance aircraft survivability as compared to current interdiction weapon systems by providing the capability for launch aircraft to standoff outside the range of most target area surface-to-air threat systems. The JSOW launch-and-leave capability will allow several target kills per aircraft sortie.

(U) The JSOW program will first develop a baseline weapon for use against fixed area targets. This weapon will be designed upfront for pre-planned product improvements (P3I) to enable the attack of blast/frag sensitive or moving point targets. The baseline JSOW variant will include a kinematically efficient airframe, an integrated Inertial/Global Positioning System (INS/GPS) navigation capability, and a BLU-97/B submunition payload. The P3I variant will add a terminal seeker, a man-in-the-loop data link, and a unitary warhead.
P3I will provide increased accuracy and lethality, and the capability for aimpoint selection, target discrimination, and bomb impact assessment. JSOW/BLU-108 variant incorporates the Sensor Fuze Weapon submunition into the baseline variant. The BLU-108 variant submunition will provide a standoff delivery capability against massed land combat vehicles.

(U) Through adherence to MIL STDs 8591 and 1760, and minimized weight and dimension considerations, JSOW will be compatible with Air Force or NATO aircraft. Agreements are being definitized with the Air Force to initiate the JSOW program which will integrate the BLU-108 submunition into the baseline JSOW for use on F-16 and other Air Force aircraft. The agreements will also detail studies of mid-course guidance and terminal seeker commonality between JSOW and the USAF/USN Joint Direct Attack Munition (JDAM) programs.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) JSOW Baseline:
  - (U) ($11,428) Conducted Preliminary Design Review (PDR), Jan/93
  - (U) ($7,991) Hardware Deliveries

- (U) ($6,726) Systems Test and Evaluation
- (U) ($25,973) Prime Item Design Spec (PIDS) and Critical Item Design Spec (CIDS)
- (U) ($6,626) Integration

- (U) P3I:
  - (U) ($3,100) Continue Pre-Demonstration and Validation (DEM/VAL) efforts
  - (U) ($1,500) Continue Cost and Operational Effectiveness Analysis (COEA) and DAB documentation efforts.

2. (U) FY 1994 PLAN:

- (U) JSOW Baseline:
  - (U) ($29,933) Continue Engineering & Manufacturing Development (E&MD) efforts
  - (U) ($27,834) Hardware Deliveries
  - (U) ($11,388) Systems Test and Evaluation
    - (U) Conduct Developmental Test and Evaluation (DT-IIA)
    - (U) Conduct Developmental Test and Evaluation (DT-IIB)
  - (U) ($7,700) Integration

- (U) P3I:
  - (U) Prepare for P3I Milestone (MS-I)
  - (U) ($1,500) Continue Pre-Demonstration Validation (DEM/VAL) efforts
  - (U) ($1,100) Continue Cost Operational Effectiveness Analysis (COEA) and DAB documentation effort.

- (U) BLU-108:
  - (U) ($2,400) Continue Pre-Engineering & Manufacturing Development (E&MD) DAB documentation efforts
  - (U) Conduct Systems Design Review

(U) FY 1995 PLAN:

- (U) JSOW Baseline:
  - (U) ($38,363) Conduct Critical Design Review (CDR)
  - (U) ($34,464) Hardware Deliveries
  - (U) ($5,000) Integration

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604727N
PROGRAM ELEMENT TITLE: Joint Standoff Weapon Systems
PROJECT NUMBER: E2068
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) P3I:
  - (U) ($7,800) Begin Demonstration/Validation (DEM/VAL) efforts
- (U) BLU-108:
  - (U) ($25,500) Begin Engineering & Manufacturing Development (E&MD) contract
  - (U) Conduct Preliminary Design review (PDR)

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, China Lake, CA; NAVAIRWARCENACDIV, Patuxent River, MD; NAVSURFWARCEN, Indian Head, MD; NAWCAD, Patuxent River, MD. CONTRACTORS: Texas Instruments, Inc. Lewisville, Texas.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: To meet the requirements of the JSOW JORD, the USN must integrate and procure the JSOW/BLU-108. The Air Force is paying the development costs for the JSOW/BLU-108 weapon and integration on Air Force aircraft platforms. The Navy must pay for any Navy unique development or integration requirements, which include Insensitive Munitions (IM), F/A-18 aircraft integration, mission planning on the Tactical Aircraft Mission Planning System (TAMPS), and logistics support.

2. (U) Schedule changes: The SRR schedule was adjusted to reflect changes in the Navy's JSOW P3I DEMVAL plan. Because of funding constraints, the start of JSOW's P3I DEMVAL was delayed by approximately a year and its duration was stretched by a year from three years to four.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) Justification for Major System New Start December 1985
- (U) Operational Requirement Document April 1992
- (U) Acquisition Plan March 1991
- (U) Test and Evaluation Master Plan March 1992
- (U) Integrated Program Summary June 1992

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604727N
PROGRAM ELEMENT TITLE: Joint Standoff Weapon Systems
PROJECT NUMBER: E2068
BUDGET ACTIVITY: 5
Date: 7 February 1994

G. (U) RELATED ACTIVITIES:

- (U) Under Air Force RDT&E Program Element (PE) 0604727F, the Air Force will fund integration of the BLU-108 submunition as a payload for the JSOW baseline vehicle and integrate it on Air Force aircraft to provide a standoff delivery capability against massed armor. A Memorandum of Agreement between the Navy and Air Force was signed 15 July 1991 to address joint service Interoperability and cooperation. It details the JSOW/JDAM requirements and acquisition approach. Funding under (PE) 0604727F commenced in FY 1993.
- (U) PE 0604618N, Joint Direct Attack Munition (JDAM): developing an Inertial Navigation Set/Global Positioning System (INS/GPS) that is to be functionally equivalent to the JSOW INS/GPS. When the JDAM program down selects to one contractor, the costs of qualification on the JSOW airframe and benefits of increased quantities/competition will be analyzed. The analysis results will be used to determine the production strategy.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE	TOTAL PROGRAM
• (U) WPN (BA-2, Other Missiles)	0	0	0	26,455	132,900	137,694	170,690	7,017,471	7,485,300
QUANTITY	0	0	0	0	300	387	550	16,563	17,800
• (U) USAF RDT&E,F PE: 0604727F	5,500	24,600	48,800	43,700	9,600	9,800	10,000	21,800	173,800
MP, AF Line 3020	0	0	0	0	0	25,759	62,044	TBD	TBD
USAF QUANTITY	0	0	0	0	0	40	135	4,825	5,000

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604727N
PROGRAM ELEMENT TITLE: Joint Standoff Weapon Systems

PROJECT NUMBER: E2068
BUDGET ACTIVITY: 5

Date: 7 February 1994

J. (U) TEST AND EVALUATION:

- (U) BASELINE:
  - (U) DT-IIA 2/94
  - (U) DT-IIB 8/94
  - (U) OT-IIA 10/95
  - (U) DT-IIC 10/95
  - (U) OT-IIB 10/96
- (U) P3I:
  - (U) DT-IIA 1Q/00
  - (U) DT-IIB 4Q/00
  - (U) DT-IIC 4Q/01
  - (U) OT-IIA 2Q/01
  - (U) OT-IIB 1Q/03
- (U) BLU-108:
  - (U) DT&E 6/95
  - (U) IOT&E 4/97

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense
BUDGET ACTIVITY: 5

DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
U0166 SPS Improvement Program	7,773	9,784	6,543	4,273	1,777	1,585	1,747	CONT.	CONT.
U0167 5" Rolling Airframe Missile	0	8,960	18,678	28,117	24,798	19,625	8,913	60,000	387,008
U0172 Close-In Weapons System (Phalanx)	15,894	32,431	26,455	12,956	14,912	15,739	15,210	CONT.	CONT.
U0173 NATO Sea Sparrow	5,960	27,729	50,354	62,944	57,621	28,631	4,358	50,154	287,751
U0665 I/R Search & Track	0	16,388	22,503	23,590	18,708	4,617	892	CONT.	CONT.
U0954 Shipboard EW Improvements	31,022	28,388	29,573	20,212	19,027	32,061	31,151	CONT.	CONT.
U2176 SSD Engage Improvements	0	0	0	0	12,027	34,656	45,856	CONT.	CONT.
U2178 Quick Reaction Combat Capability (QRCC)	0	4,291	27,395	30,744	24,900	24,878	28,211	CONT.	CONT.
U2190 NULKA Decoy	0	8,100	0	0	0	0	0	0	8,100
TOTAL	60,649	136,071	181,501	182,836	173,770	161,792	136,338	CONT.	CONT.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense
BUDGET ACTIVITY: 5

DATE: 7 February 1994

B. (U) DESCRIPTION: This program element, effective for FY 1994, consolidates currently ongoing and planned programmatic efforts related to Ship Self Defense (SSD). The consolidation facilitates effective planning and management of these efforts, exploiting the synergistic relationship inherent in each. These projects are directed by a single program manager in Program Executive Office for Theater Air Defense. Analysis and demonstration have established that surface SSD based on single-sensor detection, point-to-point control architecture performs marginally against current and projected Anti-Ship Cruise Missile (ASCM) threats. The supersonic seaskimming ASCM reduces the effective battle space to the horizon and the available reaction time-line to less than 30-seconds, from first opportunity to detect until the ASCM impacts its target ship. Against such a threat: multi-sensor integration is required for effective detection; parallel processing is essential to reduce reaction time to acceptable levels and to provide vital coordination/integration of hardkill and softkill assets; and improvements in terminal gun system effectiveness and in missile kinematics, control and homing accuracy are required for successful hardkill engagement. These SSD projects address and coordinate the detect, control, and engage functions necessary to meet the rigorous SSD requirements within a development structure dedicated to systems engineering.

(U) DETECTION: Improved coordinated sensor performance is to be achieved through the efforts of SPS Improvements (U0166), Infrared Search and Track (IRST) (U0665), Shipboard Electronic Warfare (EW) Improvements (U0954), and NULKA Decoy (U2190). These efforts address both active and passive detection capability exploiting the radar, infrared (IR), and electronic countermeasures, decoys, and ship signature reduction technology being pursued through project U0954.

(U) CONTROL: Multi-sensor integration, parallel processing and the coordination of hardkill/softkill capabilities in an automated response to the ASCM threat are the cornerstones of Ship Self Defense System (SSDS) being developed through Quick Reaction Combat Capability (QRCC) (U2178) efforts. In addition, that project provides for the central system engineering management of SSD developments.

(U) ENGAGEMENT: Both missile and terminal gun system requirements are being addressed via NATO Seasparrow Missile System (NSSMS) (U0173), 5" Rolling Airframe Missile (RAM) (U0167), and CIWS (PHALANX) (U0172). Missile improvements are to include improved kinematic performance plus advanced seeker and low elevation fuzing/warhead capabilities. Gun system improvements address system detection, rate-of-fire, number of rounds on target, first round accuracy, and reliability and maintenance.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

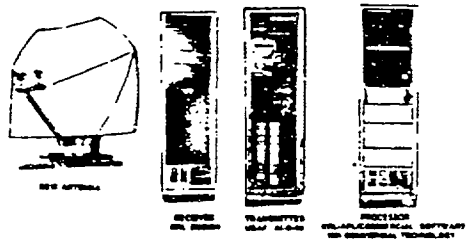
PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U0166
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: SPS Improvement Program

SPQ-9(I) RADAR IMPROVEMENT PROGRAM



POPULAR NAME: SPS IMPROVEMENTS

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U0166
BUDGET ACTIVITY: 5

Date: 7 February 1994

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		SPQ-9( ) MS IV/II 6/94			SPQ-9( ) MS III 9/97			CONT.
ENGINEERING MILESTONES			SPQ-9( ) CDR 12/94	SPQ-9( )FAT 4/96				CONT.
T&E MILESTONES	SPQ-9( ) ADM LBT 4/93	SPQ-9( ) ADM 9/94	SEA TEST		SPQ-9( ) DT/OT 8/97	SPQ-9( ) FOT&E 5/98		CONT.
CONTRACT MILESTONES		SPQ-9( ) CA 4/94		SPQ-9( ) LRIP 11/95		SPQ-9( ) FRP 10/97		CONT.

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	5,010	7,297	5,348	1,077	671	405	387	CONT.
SUPPORT CONTRACT	313	132	150	275	25	25	25	CONT.
IN-HOUSE SUPPORT	2,450	2,355	1,045	2,921	1,081	1,155	1,335	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	CONT.
TOTAL	7,773	9,784	6,543	4,273	1,777	1,585	1,747	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program develops and tests performance and reliability upgrades for search radar equipment to meet the evolving threat.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense
PROJECT NUMBER: U0166
BUDGET ACTIVITY: 5
Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: (Dollars in Thousands)

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($200) Supported continuing analysis/trade-off studies and implementation of functional and performance allocations among elements comprising integrated Ship Self Defense System (SSDS), including system interface adaptations and preparation/conduct of associated tests and demonstrations.
- (U) ($1,200) Completed testing of Anti-Ship Missile Defense (ASMD) modification to AN/SPQ-9 Radar. Completed risk reduction design efforts and tests.
- (U) ($6,273) Completed specification, Statement of Work, and finalized and issued Request for Proposal (RFP) for design and development of an ASMD Upgrade to the AN/SPQ-9 Radar. The RFP includes Low Rate Initial Production (LRIP).
- (U) ($100) Continued SSDS integration studies.

2. (U) FY 1994 PLAN:

- (U) ($182) Support continuing analysis/trade-off studies and implementation of functional and performance allocations among elements comprising integrated SSDS, including system interface adaptations and preparation/conduct of associated tests and demonstrations.
- (U) ($7,297) Award contract for ASMD upgrade to AN/SPQ-9 Radar.
- (U) ($705) Monitor AN/SPQ-9 ASMD Upgrade contract including conduct of Preliminary Design Review (PDR).
- (U) ($1,500) At-sea test/operational assessment of AN/SPQ-9( ) ADM Radar.
- (U) ($100) Continue SSDS integration studies.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U0166
BUDGET ACTIVITY: 5

Date: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) ($200) Support continuing analysis/trade-off studies and implementation of functional and performance allocations among elements comprising integrated SSDS, including system interface adaptations and preparation/conduct of associated tests and demonstrations.
- (U) ($6,243) Monitor AN/SPQ-9 ASMD upgrade contract including conduct of Critical Design Review (CDR) and Production Readiness Review (PRR) and procure one ordnance alteration (ORDALT) validation kit for the MK86 Gun Fire Control System.
- (U) ($100) Continue SSDS integration studies.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Port Hueneme, CA; NAVSURFWARCENDIV, Crane, IN; NRL, Washington, DC. CONTRACTORS: Support - EG&G WASC, Inc., Rockville, MD; Prime - To be determined by competition.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) ORD 5/94
- (U) TEMP 3/94

G. (U) RELATED ACTIVITIES:

- (U) PE 0603755N (Ship Self Defense) - Program Planning to be integrated with SSD Master Plan which captures this activity.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense
PROJECT NUMBER: U0166
BUDGET ACTIVITY: 5
Date: 7 February 1994

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN 14UK040	0	7,394	395	18,569	27,703	24,960	25,078	30,100	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION:

- (U) DT/OT Planned 2/97 - 8/97.
- (U) FOT&E Planned 5/98.

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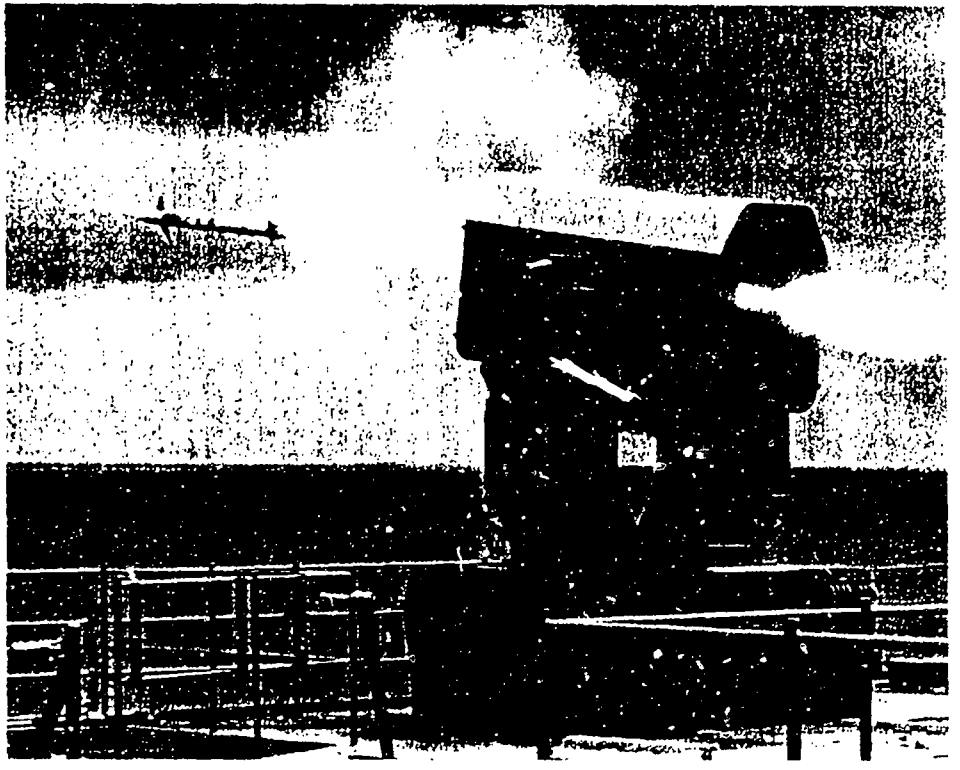
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U0167
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: 5" Rolling Air Frame Missile



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UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U0167
BUDGET ACTIVITY: 5

Date: 7 February 1994

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	GMRP Block 0 MS III 5/93	GMRP BLOCK 0 MS IV 4/94 GMRP BLOCK 1 MS II 4/94				Block I MS III 7/98		
ENGINEERING MILESTONES			PDR-1/95	LRIP 3/96 CDR-2/96				CONT.
T&E MILESTONES	Breadboard Demo 4/93		EDM-4/95	CNTE 2/96	CTE/CNTE 7/97	OTE 10/97 NTE 10/97		CONT.
CONTRACT MILESTONES		EMD Block I 5/94				FRP Block I 9/98		CONT.

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	150,619	0	6,877	14,604	18,583	20,435	14,763	3,678	269,408 (39,849)
SUPPORT CONTRACT	21,030	0	299	306	313	320	327	334	24,131 (1,202)
IN-HOUSE SUPPORT	45,968	0	1,784	3,295	4,612	2,659	1,309	1,675	71,597 (10,295)
GFE/ OTHER	300	0	0	473	4,609	1,384	3,226	3,226	21,872 (8,654)
TOTAL	217,917	0	8,960	18,678	28,117	24,798	19,625	8,913	387,008 (60,000)

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense
PROJECT NUMBER: U0167
BUDGET ACTIVITY: 5
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The purpose of this program is to develop a surface-to-air self-defense system utilizing a d mode, passive Radio Frequency/Infrared 5" Rolling Airframe Missile. The baseline system provided a self-defense capabilit, against active radar guided anti-ship missiles and was developed on an equal cost share basis with the Government of the Federal Republic of Germany. The planned effort will provide a capability against passive anti-ship missiles, very low altitude missiles, and maneuvering missiles through the incorporation of an infrared all-the-way guidance mode and improved fuze. This system is designed to counter anti-ship cruise missile raids and provide for ship survivability with accurate terminal guidance, proven lethality, and no shipboard fire control dependence.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: (Dollars in Thousands)

(U) FY 1993 ACCOMPLISHMENTS: Not applicable.

(U) FY 1994 PLAN:

- (U) ($6,364) Initiate engineering and manufacturing development on Block I Upgrade, including IR electronics and software, simulation/Engineering Module (EM) testing, critical experiments, and fabrication of test rounds.
- (U) ($2,500) Initiate engineering and manufacturing development effort for improved fuze design.
- (U) ($96) Continue to support analysis/trade-off studies to coordinate and refine element roles within ship self defense strategy. Support development of system interface adaptations as necessary to provide effective ship self defense (SSD) integration.

(U) FY 1995 PLAN:

- (U) ($15,000) Complete Preliminary Design Review (PDR) of infrared (IR) seeker design and integration into the current missile. Complete design models. Conduct Integrated Seeker/IR Processor Experiment. Continue development of Algorithms for IR Processor.
- (U) ($3,678) Continue to support analysis/trade-off studies to coordinate and refine element roles within SSD strategy. Support development of system interface adaptations as necessary to provide effective SSD integration.

(U) Program to Completion: This is a continuing program.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense
PROJECT NUMBER: U0167
BUDGET ACTIVITY: 5
Date: 7 February 1994

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, China Lake, CA (Acquisition Engineering Agent and Design Agent for GMRP); NAVAIRWARCENWPNDIV, PT Mugu, CA; NAVAIRWARCENWPNDIV DET, White Sands, NM; Naval Warfare Assessment Center, Corona, CA; NAVSURFWARCENDIV, Dahlgren, VA and NAVSURFWARCENDIV, Port Hueneme, CA (AEA for GMLS, ISEA for GMWS). CONTRACTORS: Hughes Missile Systems Company, Pomona, CA; RAMSYS GmbH, Ottobrunn, Germany; TRANSLANT, Inc., Pomona, CA; Johns Hopkins University/Applied Physics Laboratory, Laurel, MD; and EG&G, Washington Analytical Services Center, Rockville, MD.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not availble for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) PRODUCTION MOU: 8/87
- (U) ILSP: 8/90
- (U) PDM: 5/93 (MS III)
- (U) AP: 7/93
- (U) ASR: 11/93
- (U) IPS: 12/93
- (U) ORD: 1/94
- (U) TEMP: 1/94

G. (U) RELATED ACTIVITIES:

- (U) PE 0603755N (Ship Self Defense), Project U2191 (Infrared RAM)

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U0167
BUDGET ACTIVITY: 5

Date: 7 February 1994

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) WPN LINE 224200:	8,229	51,121	63,547	72,812	74,445	66,894	62,862	CONT.	CONT.
• (U) OPN LINE 523400:	5,630	50,290	55,314	60,010	69,821	63,132	80,493	CONT.	CONT.
• (U) O&M,N AG/SAG 1D4D:	2,331	2,884	3,995	3,890	4,586	4,855	5,418	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: A production MOU was approved and signed by both countries (US/Germany) on 3 August 1987. The MOU describes production of the Guided Missile Round Pack and the Guided Missile Launching System. The BLK I development commenced as a follow-on development under this production MOU. Block I development is currently planned as US only. Germany is considering participation in Block I. Depending on national budgets, the national shares will either be equal or on a pro rata basis dependent on workshare.

J. (U) TEST AND EVALUATION: Milestone IV of RAM BLK 0 in 4/94 will authorize the development of an IR upgrade program that allows RAM to counter the entire spectrum of anti-ship missile threats. This development will complete with a combined NTE/OTE in FY 1998 and a Milestone III decision for production of BLK I Missile in FY 1998.

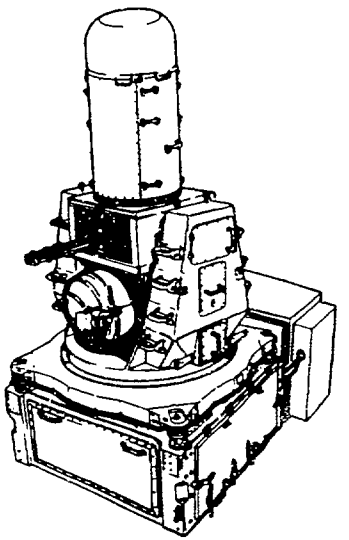
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U0172
BUDGET ACTIVITY: 5

DATE: 7 February 1994

PROJECT TITLE: Close-In Weapons System (Phalanx)



POPULAR NAME: PHALANX

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense
PROJECT NUMBER: U0172
BUDGET ACTIVITY: 5
DATE: 7 February 1994

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES					MS III 6/97			
ENGINEERING MILESTONES		B/L 3 PDR 7/94	B/L 3 CDR 5/95					
T&E MILESTONES				NTE 7/96	DT/OT 3/97			
CONTRACT MILESTONES	EDM CA 7/93				FRP CA 8/97			

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	11,809	20,044	14,534	5,566	4,847	5,274	4,799	CONT.
SUPPORT CONTRACT	400	794	900	500	500	500	500	CONT.
IN-HOUSE SUPPORT	2,435	7,343	7,271	3,140	4,515	4,915	4,861	CONT.
GFE/ OTHER	1,250	4,250	3,750	3,750	5,050	5,050	5,050	CONT.
TOTAL	15,894	32,431	26,455	12,956	14,912	15,739	15,210	CONT.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N | PROJECT NUMBER: U0172 | Date: 7 February 1994
PROGRAM ELEMENT TITLE: Ship Self Defense | BUDGET ACTIVITY: 5

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Phalanx Close-in Weapons System (CIWS) is an automatic, fast-reaction, computer-controlled radar and gun system. It functions as the last segment in the Navy's layered ship self defense concept. Its mission is to detect, engage, and destroy hostile anti-ship missiles that have penetrated the ship's other defense systems. The program requirements are contained in the CIWS Block I (MK 15 MODS 11-14) TEMP 142-1 (Rev 2). It automatically detects, evaluates, tracks, and engages threats and then returns to search mode for another target. CIWS Block I provides increased search elevation coverage, increased velocity coverage, a larger magazine, augmented reliability, built-in test equipment, and improvements to system operability test and fault isolation test programs. On 16 October 1992, based on the results of a Cost and Operational Effectiveness Analysis (COEA) and subsequent executive review, the Assistant Secretary of Navy (Research, Development & Acquisition) (ASN(RDA)) directed that the Advanced Minor Caliber Gun System (AMCGS) requirement be fulfilled via an Ordnance Alteration (ORDALT) to the Phalanx CIWS to provide a Phalanx Surface Mode (PSuM) capability. PSuM will modify Block I systems to counter small surface threats and low, slow-flying air threats. System upgrades will include a non-developmental item (NDI) forward looking infrared sensor and automatic video tracker (AVT), manual acquisition controls, video monitors, and operating program modifications.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: (Dollars in Thousands)

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($6,954) Continued development of improved sensor capabilities which could better counter low elevation, low Radar Cross Section (RCS) targets, be more capable in an Electronic Countermeasures (ECM) environment, and provide a detection sensor for Rolling Airframe Missile (RAM).
- (U) ($1,940) Developed and tested the High Order Language Computer (HOLC) and Advanced Fire Control (AFC) programs which will counter the capabilities which are projected to be fielded in anti-ship missiles in the near future.
- (U) ($2,000) Continued ongoing design and engineering efforts to incorporate all FY 1993 Phalanx improvements into the Ship Self Defense System, an element of the total ship self defense concept.
- (U) ($5,000) Initiated development of PSuM ORDALT on 12 July 1993.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense
PROJECT NUMBER: U0172
BUDGET ACTIVITY: 5
DATE: 7 February 1994

2. (U) FY 1994 PLAN:

- (U) ($8,855) Continue development of PSuM to include: (1) Selection of NDI automatic acquisition video tracker and advanced electro-optic equipments; and (2) Integration of these equipment capabilities to also improve overall system operation in AAW.
- (U) ($13,394) Continue development of Baseline 3 to include: (1) Developing a radar Search-Through Track capability to allow longer range detection and engagement of targets; and (2) Developing the hardware/software interfaces to allow integration into the Ship Self Defense System.
- (U) ($10,182) Continue ongoing design and engineering efforts to incorporate all FY 1994 Phalanx improvements into the Ship Self Defense System, an element of the total SSD concept.

3. (U) FY 1995 PLAN:

- (U) ($7,104) Continue developmental testing and evaluation of the PSuM. Continue software development, integration and proofing.
- (U) ($15,200) Complete development of Baseline 3 and prepare for contractor and Navy Test and Evaluation.
- (U) ($4,151) Continue ongoing design and engineering efforts to incorporate all FY 1995 Phalanx improvements into the Ship Self Defense System, an element of the total SSD concept.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Dahlgren, VA; NAVSURFWARCEN ORDSTA, Louisville, KY; NAVSURFWARCENDIV, Port Hueneme, CA; NAVAIRWARCENWPNDIV, Pt. Mugu, CA. CONTRACTORS: Defense Technology, Inc., Arlington, VA; Technautics, Inc., Arlington, VA; Bird Engineering, Vienna, VA; Hughes Missile System Company, Tuscon, AZ.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U0172
BUDGET ACTIVITY: 5

Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) CIWS Block I TEMP 142-1 (Rev 2) 8/89

G. (U) RELATED ACTIVITIES:

- (U) PE 0603755N (Ship Self Defense)

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) SCN (var)	54,500	0	0	0	0	0	0	0	960,800
• (U) SCN ORDALTS	0	24,400	21,800	0	12,000	0	32,800	CONT.	CONT.
• (U) WPN CIWS MODS	58,061	51,804	49,047	80,414	77,808	76,157	74,507	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION: Developmental testing for improvement concepts related to Baseline 3 is ongoing. Testing for product improvements developed to solve current Fleet problems continue. FOT&E for Baseline 3 will be in FY 1996.

UNCLASSIFIED

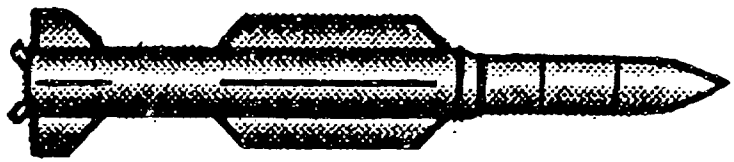
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U0173
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: NATO SEA SPARROW



ESSM

POPULAR NAME: NSSMS/ESSM

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U0173
BUDGET ACTIVITY: 5

Date: 7 February 1994

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		IV 6/94				ASN PM R(IIA) 11/97	III 1/99	CONT.
ENGINEERING MILESTONES			PDR 8/95	CDR 4/96				CONT.
T&E MILESTONES					7/97-1/98	DT IIB 5/98-10/98	OT II B	FOT&E 12/99
CONTRACT MILESTONES		EMD CA 08/94				LRIP CA 6/98		FRP CA 10/99

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	5,357	4,010	17,079	39,901	54,508	49,047	20,005	994	226,009 (35,108)
SUPPORT CONTRACT	1,000	1,200	3,553	3,007	3,297	3,350	3,371	1,367	26,163 (6,018)
IN-HOUSE SUPPORT	1,175	750	4,045	4,365	5,139	5,224	5,255	1,997	36,978 (9,028)
GFE/ OTHER	0	0	3,052	3,081					6,133 (0)
TOTAL	7,532	5,960	27,729	50,354	62,944	57,621	28,631	4,358	295,283 (50,154)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program encompasses two (2) primary efforts to enhance ship self defense:

1. (U) Enhancing the kinematic capability of the SEA SPARROW missile to counter the high speed Anti-Ship Cruise Missile (ASCM) including associated system integration. This program consists of evolving the SEA SPARROW missile through development of a new rocket motor (10" diameter) and tail control section and ordnance upgrade. The program also includes associated modification to the MK-41 Vertical Launching System (VLS) to provide the capability to store four (4) modified missiles in a single VLS cell ("quad-pack").

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U0173
BUDGET ACTIVITY: 5

Date: 7 February 1994

2. (U) Improvements to the SWY-1 (NATO SEA SPARROW and Target Acquisition System (TAS)) and SWY-2 (TAS and Rolling Airframe Missile (RAM)) weapon systems to sustain effective capability. This program focuses primarily on modifications to the TAS Operational Computer Program (OCP) to support SWY-1/2 integration on multiple ship classes and design/develop hardware and software modifications to remote the NATO SEA SPARROW system on the Self Defense Test Ship (SDTS).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: (Dollars in Thousands)

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,260) Delivered TAS integration OCP for Self Defense Surface Missile System (SDSMS) SWY-2 to support RAM in LHA-5.
- (U) ($1,400) Continued integration of TAS common OCP for SDSMS SWY-1 for CV/CVN, LHD-1, DD, AOR, and AOE classes and for SWY-2 (LHA-1) class ships.
- (U) ($3,300) Design NSSMS hardware and software modifications required for the Self Defense Test Ship (SDTS) to provide remote control and monitoring capability.

2. (U) FY 1994 PLAN:

(a) (U) KINEMATIC MISSILE (ESSM) PROGRAM

- (U) ($4,800) Complete Evolved SeaSparrow Missile (ESSM) Cost and Operational Effectiveness Analysis (COEA) and Milestone IV documentation which was initiated in FY 1993 under PE 0603755N Project U2192.
- (U) (Not Separately Priced (NSP)) Achieve ESSM Milestone IV decision.
- (U) ($8,026) Award ESSM Engineering & Manufacturing Development (EMD) Contract.
- (U) ($2,720) Commence ordnance upgrade.
- (U) ($5,284) Commence system modifications to integrate ESSM, including MK 41 VLS quad pack EMD.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U0173
BUDGET ACTIVITY: 5

Date: 7 February 1994

(b) (U) OTHER SDSMS (SWY-1/2)

- (U) ($2,462) Continue integration of TAS common OCP for SDSMS SWY-1 for CV/CVN, LHD-1, DD, AOR and AOE classes; SWY-2 (LHA-1) ships and the SDTS coincident with RIM-7P FOT&E.
- (U) ($4,437) Support Combat System Integration Testing (CSIT) on CV/CVN, LHD and DD SWY-1 type ships for TAS OCP & NATO SeaSparrow Missile System (NSSMS) computer programs with Combat Direction System (CDS) and Advanced CDS (ACDS).

3. (U) FY 1995 PLAN:

(a) (U) KINEMATIC MISSILE (ESSM) PROGRAM

- (U) ($42,218) Continue EMD of ESSM and associated system modification/integration.
- (U) (NSP) Conduct Preliminary Design Review (PDR) on ESSM/system modifications.

(b) (U) OTHER SDSMS (SWY-1/2)

- (U) ($3,026) Complete SDSMS OCP integration program with at-sea testing on LHD-5.
- (U) ($5,110) Continue integration of NSSMS on SDTS to provide remoting capability.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Port Hueneme, CA; NAVSURFWARCEN, Dahlgren, VA; NAVAIRWARCENWPNDIV, China Lake, CA. CONTRACTORS: Hughes Aircraft Company, Fullerton, CA; Raytheon Company, Equipment Division, Wayland, MA; Raytheon Company, Missile Systems Division, Bedford, MA; Ball Corporation, Broomfield, CO; Hughes Missile System Division, Ontario, CA; FMC, Minneapolis, MN; Martin Marietta, Baltimore, MD; JHU/APL, Laurel, MD.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U0173
BUDGET ACTIVITY: 5

Date: 7 February 1994

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) TOR: 09/86 TOR for advanced Short Range Anti-Air Warfare (SRAAW) Combat System
- (U) ORD: In Staffing, final 5/94
- (U) ESSM TEMP: In review, final 5/94
- (U) COEA REPORT: Final 4/94
- (U) Milestone IV documentation: in process, final 5/94

G. (U) RELATED ACTIVITIES:

- (U) PE 0603609N (Conventional Munitions)
- (U) PE 0603755N (Ship Self Defense)
- (U) PE 0604307N (AEGIS Combat System Engineering)

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) WPN BA-2 Other Missiles Sparrow Missile Mods						29,084	39,901	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: ESSM as a cooperative program will be pursued via a "Supplemental Agreement" to the NATO SEA SPARROW Consortium Development/Production/Support MOU.

J. (U) TEST AND EVALUATION:

- (U) Test and Evaluation Master Plan to be completed for Milestone IV.
- (U) DT-IIA/OT-IIA for ESSM will support Low Rate Initial Production (LRIP) FY 1998.
- (U) ESSM FOT&E with MK-41/AEGIS FY 2000.

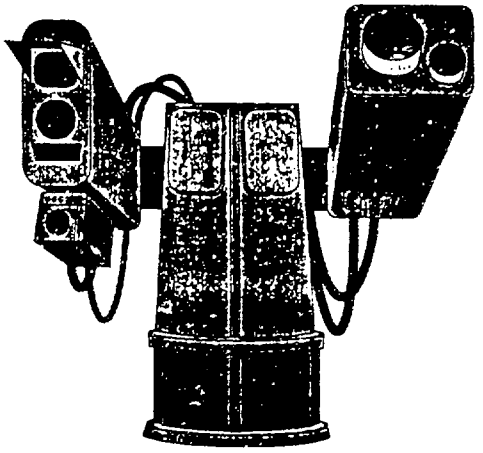
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

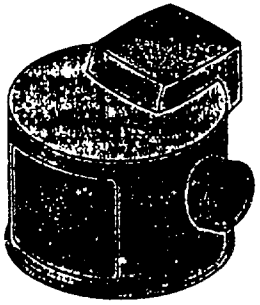
PROJECT NUMBER: U0665
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: I/R SEARCH & TRACK



Thermal Imaging Sensor System (TISS)



Infrared Search and Track (IRST)

POPULAR NAME: IRST/TISS

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U0665
BUDGET ACTIVITY: 5

Date: 7 February 1994

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		MS II[1,2] 6/94			MS III[2] (4Q/97)			
ENGINEERING MILESTONES			PDR/CDR[2]					
T&E MILESTONES			TECH/OPEVAL[1]	MS III[1]	QUAL TEST[2] TECH/OPEVAL			
CONTRACT MILESTONES		AWARD[1,2] E&MD				PROD[2] CONTRACT		

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	0	10,425	17,643	18,227	12,045	2,105	330	CONT.
SUPPORT CONTRACT	0	300	300	140	140	140	0	CONT.
IN-HOUSE SUPPORT	0	5,663	3,560	4,060	5,560	1,510	500	CONT.
GFE/ OTHER	0	0	1,000	1,163	963	862	62	CONT.
TOTAL	0	16,388	22,503	23,590	18,708	4,617	892	CONT.

(1) Applies to Thermal Imaging Sensor System (TISS) program
(2) Applies to Infrared Search & Track (IRST) program

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense
PROJECT NUMBER: U0665
BUDGET ACTIVITY: 5
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This is a new start. The sophistication and diversity of threats facing naval surface combatants is increasing with respect to lower radar cross-section, use of passive anti-radiation missile (ARM), increased speed, and lower altitudes. This program element provides funding for two infrared sensors - the Infrared Search & Track (IRST) and Thermal Imaging Sensor System (TISS). The IRST will provide passive augmentation to compiement radar, electronic support measures (ESM) and visual surveillance systems for air targets. It will declare those air targets to the ship's combat system. The TISS will provide surface ships with a day/night high resolution surveillance capability for small cross-section targets. It also supports anti-surface warfare (ASUW), mine warfare (MIW) and anti-submarine warfare (ASW) missions. The system will be a non-developmental item (NDI) procurement.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: (Dollars in Thousands)

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) Cost and Operational Effectiveness Analysis (COEA) was conducted via funding provided in PE 0603755N, Project U2138 in preparation for FY 1994 program initiation.

2. (U) FY 1994 PLAN:

- (U) ($1,924) Develop system specifications for TISS and IRST system.
- (U) ($30) Prepare acquisition plans (AP).
- (U) ($1,203) Prepare request for proposal (RFP).
- (U) ($2,806) Obtain Milestone (MS) II decision to enter Engineering and Manufacturing Development(E&MD) phase.
- (U) ($4,841) Award E&MD contract for IRST.
- (U) ($5,584) Award E&MD contract for TISS.

3. (U) FY 1995 PLAN:

- (U) ($13,718) Build IRST Engineering Development Models (EDMs).

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U0665
BUDGET ACTIVITY: 5

Date: 7 February 1994

- (U) ($60) Conduct Critical Design Review (CDR) for the IRST.
- (U) ($1,800) Support Ship Self-Defense System (SSDS) MK 1 sensor integration.
- (U) ($5,925) Deliver E&MD TISS and integrate within the Land Based Test Site (LBTS).
- (U) ($750) Conduct technical evaluation (TECHEVAL) and operational evaluation (OPEVAL) for the TISS.
- (U) ($250) Prepare to obtain Milestone III decision for TISS to enter full rate production.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Dahlgren, VA; NAVSURFWARCENDIV, Port Hueneme, CA. CONTRACTORS: To be determined.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) COEA in process.
- (U) MNS 6/92.

G. (U) RELATED ACTIVITIES:

- (U) PE 0603755N (Ship Self Defense)

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U0665
BUDGET ACTIVITY: 5

Date: 7 February 1994

H. (U) OTHER APPROPRIATION FUNDS:

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line 49	0	0	7,158	7,172	16,155	21,685	38,790	CONT.	CONT.
• (U) O&M,N AG/SAG 1D4D	0	1,201	1,114	1,021	1,140	1,755	2,454	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION: Operational testing of the TISS is to be conducted 6/95 to support Milestone III full production decision.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

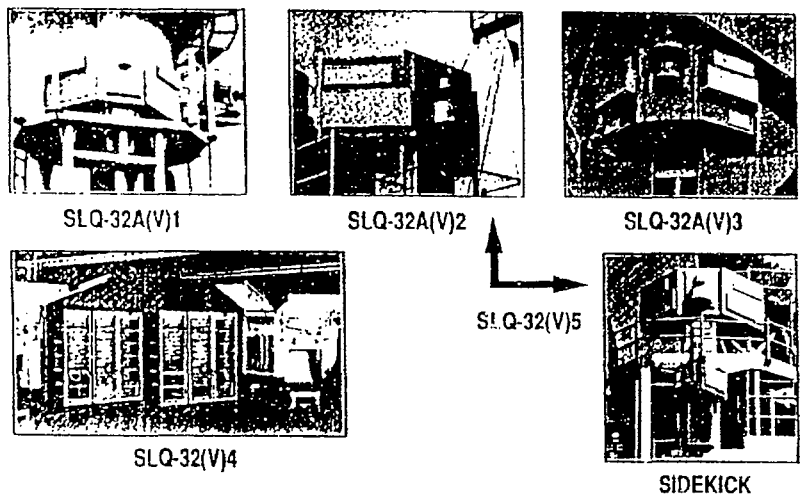
PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U0954
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: Shipboard EW Improvements

SLQ-32(V) - MODULAR FAMILY OF EW SYSTEMS



- (V)1 AND (V)2 - SURVEILLANCE, WARNING, IDENTIFICATION, DECOY DEPLOYMENT
- (V)3, (V)4, AND SIDEKICK - ADD ACTIVE COUNTERMEASURES
- SLQ-32A(V)2 + SIDEKICK = SLQ-32(V)5

POPULAR NAME: Shipboard EW Improvements

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense
PROJECT NUMBER: U0954
BUDGET ACTIVITY: 5

7 February 1994

A . (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PPROGRAM RAIDS MS III 8/93		AIEWS/OACM	ADCAP	PHASE E		AIEWS MSII		
MILESTONES OUTLAW BANDIT		MS I 5/94	MS III	MS III		5/98		
MS IIIA 7/93			2/95	2/96				
ENGINEERING	PHASE E	PHASE E		AIEWS				
MILESTONES	PDR 6/93	CDR 3/94 H/W		CDR 12/96				
T&E	ADCAP	ADCAP/DDI	PHASE E			AIEWS		
MILESTONES	DTIIA 8/93	DT/OTII 4/94	DT/OTIII	DTI/OTI 12/98				
	DDI		9/95					
	DTIIIE2 7/93		ADCAP					
	DDI		DT/OTIII 12/94					
	OTIIIB 9/93							
	RAIDS OT 6/93							
	OUTLAW BANDIT	DTIII3B 3/94	DTIIIC	OTIIIC				
	OTIIC 2/93	OTIIIA 9/94	8/95	1/96				
			OTIIB 5/95					
CONTRACT			AIEWS/OACM					
MILESTONES			AWARD 1/95					

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	10,062	9,060	15,785	10,155	10,382	19,050	18,383	CONT.
SUPPORT CONTRACT	2,939	2,162	2,275	1,769	1,620	1,600	1,400	CONT.
IN-HOUSE SUPPORT	17,462	15,010	9,898	6,682	5,657	9,233	9,229	CONT.
GFE/ OTHER	559	2,156	1,615	1,606	1,368	2,178	2,139	CONT.
TOTAL	31,022	28,388	29,573	20,212	19,027	32,061	31,151	CONT.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U0954
BUDGET ACTIVITY: 5

Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Shipboard EW Improvements Program major efforts are: Advanced Capability (ADCAP) Improves Active Countermeasure capability; AN/SLQ-32(V) Phase E - Improves threat detection capability; DECM/Decoy Integration (DDI) - Integration of MK36 Decoy Launching System with AN/SLQ-32(V) Shipboard Electronic Countermeasures System; Rapid ASM Integrated Defense System (RAIDS) - phased Rapid Development initiative to improve the ability of surface combatants to perform Anti Ship Missile Defense (ASMD). The Advanced Torch Decoys program develops Ship Launched Decoys capable of seduction and distraction of IR homing Anti-Ship Missiles. The MK186 MOD 2 Torch provides improved flame characteristics. OUTLAW BANDIT Ship Signature management includes development of Radar Cross Section (RCS) reduction treatments for FFG 7, DD 963, DDG 993, CG 47 class ships and also covers RCS and Infrared (IR) measurement and control techniques. Advanced Integrated Electronic Warfare System (AIEWS) provides development of an advanced EW System to operate as an integral component of ships combat system and provides increased ECM capability to support ship defense and introduces the next generation of EW technology. Offboard Active Countermeasure (OACM) - an active Decoy compatible with existing MK36 DLS.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: (Dollars in Thousands)

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($6,285) Phase E Full Scale Engineering Development (FSED) Program Decision Review (PDR).
- (U) ($3,686) ADCAP concluded FSED; conducted field testing.
- (U) ($1,400) Continued developmental testing of Torch/Flying IR Torch (FLIRT).
- (U) ($3,416) Continued Signature Management program, conducted OPEVAL on FFG-7 (OTIIC 22-25 FEB 93). Conducted DT on the CG 47 class and Production Acceptance Test and Evaluation (PAT&E) for the DD 963 class. Initiated Radar Cross Section Control (RCSC) design for DDG-993 class. Initiated IV&V effort and conducted modeling and simulation for FFG-7, DD 963, CG 47 and DDG 993 class EW effectiveness.
- (U) ($4,800) Achieved MS III for OUTLAW BANDIT
- (U) ($2,772) Conducted DDI DT-IIIE/OT-IIIB At-Sea Tests.
- (U) ($2,098) Completed RAIDS DT-IIA/OT-IIA - ARB 19 JUL 93.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense
PROJECT NUMBER: U0954
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($2,438) Achieved MS III decision for RAIDS.
- (U) ($2,412) Approved AIEWS Mission Needs Statement (MNS) and COEA proposal; COEA completed 1/94.
- (U) ($1,715) Fully funded final increment of AEWS contract.

2. (U) FY 1994 PLAN:

- (U) ($7,646) Perform Phase E CDR and Factory tests.
- (U) ($1,200) Conduct DDI follow-on evaluations.
- (U) ($1,733) Conduct ADCAP testing. Final DT/OT. ADCAP Production award.
- (U) ($5,500) Continue Signature Management Program. Complete RCSC design package for DDG 993, complete SPG 62 antenna reflectivity improvement. Complete COMOPTEVFOR I V&V efforts on EW effectiveness modeling and simulation.
- (U) ($3,909) AIEWS/OACM multiple Concept Exploration and Definition Studies.
- (U) ($4,470) AIEWS/OACM Evaluation Concepts; develop DEM/VAL RFP Package.
- (U) ($3,480) AIEWS/OACM Conduct Milestone (MS) I review.
- (U) ($450) Complete TORCH/FLIRT developmental testing.

3. (U) FY 1995 PLAN:

- (U) ($1,000) Conduct Phase E acceptance testing.
- (U) ($1,779) Complete ADCAP DT/OTIII Tests 1Q/95
- (U) ($500) Phase E Landbased DT.
- (U) ($2,935) Phase E Final DT/OTIII. Phase E MSIII.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense
PROJECT NUMBER: U0954
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($17,559) AIEWS/OACM DEM/VAL contract award.
- (U) ($5,800) Signature Measurement-Conduct FOT&E on CG 47 class. Conduct DTIIIC test on DDG 993.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NAVSURFWARCENDIV, Dahlgren, VA; NAVSURFWARCENDIV, Crane, IN; NCCOSC RDT&E,N, San Diego, CA; SPCC, Mechanicsburg, PA: COMOPTEVFOR, Norfolk, VA. CONTRACTORS: Raytheon Co., Goleta, CA; Rubatex Corp, Bedford, VA; UNISYS, Corp., Great Neck, NY.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not availaable for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) Phase E Test and Evaluation Master Plan (TEMP) III-IE in process.
- (U) DDI TEMP Rev 2. Approved May 92.
- (U) ADCAP TEMP in process. Completion expected 2Q/94.
- (U) AIEWS MNS approved Oct 92. AIEWS MS I documentation to be submitted for approval 3Q/94.
- (U) RAIDS RFP in process. RAIDS TEMP signed 1Q/91.
- (U) OACM-TOR 4Q/90; Operations Requirement Document in preparation.
- (U) OUTLAW BANDIT OR 3Q/87; TEMP REV 1 2Q/93; AP 3Q/91; IPS 4Q/92.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U0954
BUDGET ACTIVITY: 5

Date: 7 February 1994

G. (U) RELATED ACTIVITIES: Not applicable.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) SLQ-32(V) OPN Line (12TC)	89,021	0	50,606	36,638	20,708	15,827	15,591	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION:

- (U) DDI DTIIIE/OTIIIB 4Q/93.
- (U) ADCAP DDTIIB/OTII 3Q/94;ADCAP DTIIIB/OTIII 1Q/95
- (U) OUTLAW BANDIT DT 2Q/93.
- (U) OUTLAW BANDIT OTIIC 2Q/93.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

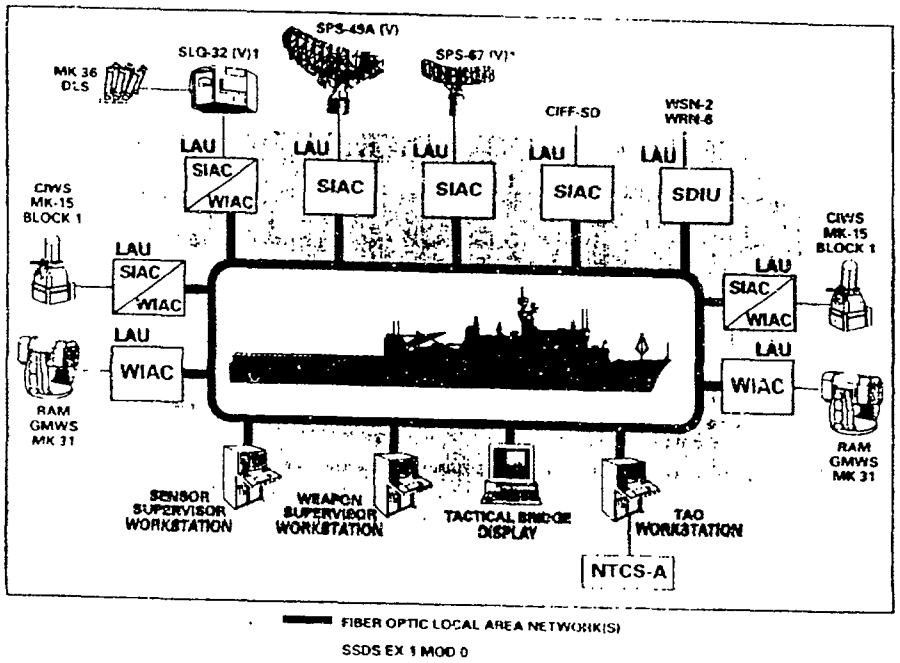
PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U2178
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: Quick Reaction Combat Capability (QRCC)

QRCC LSD-41 CLASS



POPULAR NAME: QRCC

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U2178
BUDGET ACTIVITY: 5

Date: 7 February 1994

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	RAIDS MSIII(8/93)	MK1 MSIV/II 7/94		MK 1 MS III 1/96				
ENGINEERING MILESTONES		CDR (MK 1) 7/94	MK 1 TRR 2/95					
T&E MILESTONES	SSDS MK 1 DEMO 06/93		LSD-41 DT/OT II 9/95		DD 963 FOT&E 7/97	LHD FOT&E 7/98	AOE-6 FOT&E 8/99 LHA FOT&E 2/99	FOT&E FOR CVN/LPD-17 FFG-7
CONTRACT MILESTONES		E&MD (MK1) 06/94		MK 1 PROC 03/96				

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	0	3,891	17,856	22,066	16,422	16,500	19,633	CONT.
SUPPORT CONTRACT	0	66	1,050	1,178	1,178	1,178	1,178	CONT.
IN-HOUSE SUPPORT	0	209	3,386	2,500	2,500	2,500	2,500	CONT.
GFE/ OTHER	0	125	5,103	5,000	4,800	4,700	4,900	CONT.
TOTAL	0	4,291	27,395	30,744	24,900	24,878	28,211	CONT.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense
PROJECT NUMBER: U2178
BUDGET ACTIVITY: 5
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The QRCC program provides the multi-sensor integration and hardkill/softkill coordination to improve current system performance with respect to short range anti-air ship self defense. It is intended to leverage recent critical experiments and RAIDS program efforts to upgrade existing short range anti-air warfare defenses by providing a quick reaction capability through flexible embedded doctrine that coordinates the detect-through-engage sequence for in-service equipment. In particular, QRCC applies multi-sensor integration to existing sensors, upgrades and integrates RAIDS for support of local command and control; integrates and coordinates weapon systems; and provides a first level of hardkill/softkill integration. QRCC architecture centers on the distributed processing concept and will be incrementally implemented via a MK 1 Ship Self Defense System (SSDS) focusing on integration of RAM, CIWS and the electronic countermeasures system, SLQ-32 followed by a Mark 1 system which integrates NSSMS, CIWS, RAM, SLQ-32 and the MK 23 TAS across a broad ship class spectrum. It integrates existing system elements via a fiber optic local area network and uses advanced display system currently under development for system operation, maintaining form, fit and function of the OJ-194 console. This project provides for full scale EMD of SSDS leading to production and installation.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: (Dollars in Thousands)

1. (U) FY 1993 ACCOMPLISHMENTS: Not applicable.

2. (U) FY 1994 PLAN:

- (U) ($3,091) Begin full scale development of SSDS MK 1 for the LSD 41 (Dock Landing Ship) class.
- (U) ($1,000) Conduct PDR and CDR of MK 1 System.
- (U) ($100) Initiate Design and engineering of modifications to the MK 1 system for installation aboard FFG 7 (Guided Missile Frigate), LHA (Amphibious Assault Ship), LHD, and DD 963 (Destroyer) classes.
- (U) ($100) Initiate Integrated Logistic Support and other programmatic efforts to prepare for fleet support requirements.

3. (U) FY 1995 PLAN:

- (U) ($17,856) Continue E&MD for SSDS MK 1 system for LSD 41 class ship.
- (U) ($2,400) Conduct Land Based Testing of MK 1 EDM.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

ROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U2178
BUDGET ACTIVITY: 5

Date: 7 February 1994

- (U) ($500) Begin MK 1 system adaptations for DD 963, LHD, LHA, AOE-6, CVN, and FFG 7 class ships.
- (U) ($5,103) Conduct DT/OT on LSD 41 Class Ship.
- (U) ($1,536) Develop programmatic documentation/requirements to support Milestone III production decision.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Dahlgren, VA; NAVSURFWARCENDIV, Port Hueneme, CA; NAVSURFWARCENDIV, Crane, IN. CONTRACTORS: To be determined, JHU/APL, Laurel, MD.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- (U) MNS: 8/92

G. (U) RELATED ACTIVITIES:

- (U) PE 0603755N (Ship Self Defense)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

ROGRAM ELEMENT: 0604755N
PROGRAM ELEMENT TITLE: Ship Self Defense

PROJECT NUMBER: U2178
BUDGET ACTIVITY: 5

Date: 7 February 1994

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
OPN Line 523400 Point Def. Sppt. EQ. (RAIDS)	12,104	573	0	0	0	0	0	0	12,677
(MK 1)	0	0	10,631	13,108	15,691	41,189	CONT.	CONT.	
OPN Line 231200 AN/SLQ-32 (RAIDS)	12,620	0	0	0	0	0	0	0	12,620
O&MN - WPN Maint. QRCC/SSDS (Line 14D70)	0	422	899	916	900	905	897	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION:

- (U) DT/OT for the MK 1 system is anticipated for FY97.
- (U) Systems to experience FOT&E as adaptations to additional ship classes occur.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604759N
PROGRAM ELEMENT TITLE: Major T&E Investment
PROJECT NUMBER: W2195
BUDGET ACTIVITY: 6
Date: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W2195 T&E Investment	36,281	51,862	51,966	55,068	50,618	52,535	54,457	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project has been established to improve visibility of Test and Evaluation (T&E) resources across the Services for major T&E investment funding. Following this direction, all improvement and modernization efforts funded under Program Element (PE) 0605864, projects W0541, W0653 and W0654 as well as the T&E Modernization, project W2125, have been transferred and consolidated under this line. This project provides support for the Naval Undersea Warfare Center Detachment Atlantic Undersea Test and Evaluation Center (NAVUNSEAWARCEN DET AUTEC), Andros Island, Bahamas; the Naval Air Warfare Center Weapons Division (NAVAIRWARCENWPNDIV), Point Mugu, CA and China Lake, CA; the Naval Air Warfare Center Aircraft Division (NAVAIRWARCENACDIV), Patuxent River, MD and Trenton, NJ. These funds correct major deficiencies, improve T&E capabilities and increase T&E support effectiveness.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,490) NAVUNSEAWARCEN DET AUTEC. Continued the installation of the Distributed Data Processing/Communication system. Initiated work on interface with remote ranges/facilities. Initiated work on countermeasure resistant tracking system.

- (U) ($12,116) NAVAIRWARCENWPNDIV. Continued instrumentation radar upgrades and increased the throughput of the data reduction system at the Radar Cross Section (RCS) measurement facility. Initiated procurement of Advanced Combat Direction System (ACDS) consoles. Provided compatibility with fleet ACDS equipped ships. Completed the underwater fiber optics link for San Nicolas Island. Initiated procurement of digital rangers for FPS-16 metric tracking radars. Continued improvement for telemetry (TM) sensor calibration capability. Completed acquisition of off-line data processing computer system, and initiated upgrade of the range timing system for the over land aircraft/Missile Ranges. Completed configuration management and real-time mass storage upgrades and initiated improvement of data reduction and analysis and communications systems for the Electronic Combat Range (ECR). Initiated TM antenna servo drive upgrade.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604759N
PROGRAM ELEMENT TITLE: Major T&E Investment
PROJECT NUMBER: W2195
BUDGET ACTIVITY: 6
Date: 7 February 1994

- (U) ($4,965) NAVAIRWARCENACDIV. Continued improvements to Flight Test Range tracking system, range computation and control system, and range Electronic Warfare (EW) system measurement capabilities. Continued improvements to Electromagnetic Environmental Effects (E3) data acquisition and test process automation systems. Continued procurement and installation of Maritime Multi-Mission Interoperability Center (MMIC) and Integrated Aircraft Weapon System (IAWS) test components. Continued a prudent System Rehabilitation and Modernization (SRAM) effort for existing T&E facilities and capabilities.

- (U) ($10,410) Global Positioning Systems (GPS). NAVAIRWARCENWPNDIV performed Low Rate Initial Production (LRIP) equipment T&E for the Range Application Joint Program Office (RAJPO) in conjunction with integrating these equipments into the Sea Test Range. Evaluated the LRIP system equipment for out year full production equipment integration into the North Range facility. NAVAIRWARCENACDIV attained a limited Initial Operating Capability (IOC) with equipment purchased this year. NAVUNSEAWARCEN DET AUTEC procured LRIP equipment for integration, test and evaluation.

- (U) ($6,300) Portable Tracking System (PTS). Developed a multichannel processor using a Digital Signal Processor integrated circuit. Designed, developed and built prototype in-line hydrophone unit. Conducted in-water prototype testing. Initiated software development (shallow track and deep track).

2. (U) FY 1994 PLAN:

- (U) ($4,955) NAVUNSEAWARCEN DET AUTEC. Complete the computer and display system part of the Distributed Data Processing and Communication system. Continue work on interface with remote range and facilities. Detail items for Down Range Site Reductions and initiate procurement of hardware. Continue work on counter measure resistant tracking system. Initiate system interface design work on an Advanced Weapon Noise Measurement System.

- (U) ($18,592) NAVAIRWARCENWPNDIV. Complete radar upgrades for the RCS measurement facility. Complete procurement of ACDS consoles. Initiate procurement of mobile frequency surveillance systems. Continue FPS-16 metric tracking radar upgrades. Initiate refurbishment and upgrade of ARSR-1 surveillance radar. Complete TM circuit design capability. Initiate replacement of unmaintainable threat radar dedicated computer and initiate upgrade to the threat radar instrumentation. Complete the calibration of the system capability. Continue instrumentation radar upgrades. Continue the modernization of range operation control rooms. Continue the replacement of the four maintenance cyber computers with a low cost distributed network of micro computers. Initiate maintenance upgrades to the Integrated Target Control System (ITCS).

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604759N
PROGRAM ELEMENT TITLE: Major T&E Investment
PROJECT NUMBER: W2195
BUDGET ACTIVITY: 6
Date: 7 February 1994

- (U) ($9,125) NAVAIRWARCENACDIV. Continue improvements to Flight Test Range tracking system, range computation and control systems and install Tri-Service production GPS equipment. Continue improvement and integration of EW emission simulation and range EW measurement capabilities. Procure and install increments of the NAVAIRWARCENACDIV fiber optic communication system. Continue upgrade of E3 capabilities. Continue equipment procurement and improvements to MMIC and IAWS. Continue a prudent SRAM effort for existing test equipments and capabilities. Initiate improvements to Electromagnetic Transient T&E Facility and Range Support Aircraft Instrumentation.

- (U) ($13,190) GPS. Continue to procure and integrate the Tri-Service RAJPO GPS system equipment.

- (U ($6,000) PTS. Begin request for procurement process and award contracts for the major hardware buys. Continue software development. Develop the technical specifications and the procurement packages for the major sub-systems. Test shallow and deep water prototypes.

3. (U) FY 1995 PLAN:

- (U) ($6,049) NAVUNSEAWARCEN DET AUTEC. Initiate the implementation of the capability to utilize the AUTEC Computer/Display System in support of GPS and remote ranges and facilities. Continue work in the system interface between AUTEC and remote ranges and facilities with emphasis on being compatible with new technology for in-water tracking. Continue work on implementing the cost saving Down Range Site Reduction. Continue work on Countermeasure Resistant Tracking and Advanced Noise Measurement System.

- (U) ($13,966) NAVAIRWARCENWPNDIV. Continue tracking mount replacement. Continue instrumentation radar upgrades. Begin metric video scoring replacement. Procure laser tracker kits. Begin RCS wideband data capability project. Continue replacement to threat radar computer and upgrade to threat radar instrumentation. Continue to secure communication and data processing capabilities. Continue maintenance upgrades to ITCS. Continue replacement of the CYBER computers with low cost distributed microcomputer network. Complete FPS-16 metric tracking radar upgrades. Procure new transmitter for 30 year old ARSR-1 surveillance radar. Initiate GPS integration into range data links and data processing. Continue improvements to TM antennas, receivers, Airborne TM spares and processor upgrades. Continue command and control and radio communication improvements.

UNCLASSIFIED

1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604759N
PROGRAM ELEMENT TITLE: Major T&E Investment

PROJECT NUMBER: W2195
BUDGET ACTIVITY: 6

Date: 7 February 1994

- (U) ($7,751) NAVAIRWARCENACDIV. Continue improvements to Range EW capabilities by improving dynamic and inflight Range Control System measurement capabilities. Continue upgrades to Range command, control, tracking and data computation systems. Continue improvements to T&E data processing. Continue E3, Electromagnetic Transient T&E Facility, and Range Support Aircraft Instrumentation improvements. Continue SRAM efforts on existing testequipments and capabilities.

- (U) ($17,600) GPS. Continue to procure and integrate the Tri-service RAJPO GPS system equipments.

- (U) ($6,600) PTS. Continue to monitor the procurement for the major hardware buys in support of PTS. Continue signal processor and software development.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCEN DET AUTEC, Andros Island, Bahamas; NAVAIRWARCENWPNDIV, Point Mugu and China Lake, CA; NAVAIRWPNSTA, Point Mugu and China Lake, CA; NAVAIRWARCENACDIV, Patuxent River, MD; and Trenton, NJ; NAVFACCHESDIV, Washington, DC. CONTRACTORS: Computer Sciences Corporation, Los Angeles, CA; UNISYS, New York, NY; and SRS Technology, Newport Beach, CA; Grumman Technical Services, Titusville, FL; Georgia Tech Research Institute, Atlanta, GA; H-6 Corporation, Nashua, NH; Logimetric, Plainview, NY; Cober Corporation, Stanford, CT; Veda Corporation, Lexington Park, MD.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Not applicable for this submission.

2. (U) Schedule changes: Not applicable for this submission.

3. (U) Cost Changes: Not applicable for this submission.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

UNCLASSIFIED

1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604759N
PROGRAM ELEMENT TITLE: Major T&E Investment

PROJECT NUMBER: W2195
BUDGET ACTIVITY: 6

Date: 7 February 1994

G. (U) RELATED ACTIVITIES:

- PE 0605864N, Test and Evaluation Support: This program provides institutional Maintenance and Operations support.
- PE 0604940D, Central Test and Evaluation Investment Program: Initiates development and implementation of a standard Radio Frequency data link; development of advanced design Anti-Radiation Missile targets; Metric Infrared Imaging System and Infrared Plume Measure Capability; development of a Common Airborne Instrumentation System; Improvement and Modernization of Air Combat Environment Test and Evaluation Facility components: Offensive Sensor Laboratory Threat Air Defense Laboratory; Operations and Control Center, Communications, Navigation and Identification Laboratory; Advanced Flight Simulator; Aircrew Systems Evaluation Facility.

H. (U) OTHER APPROPRIATION FUNDS: Not applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604761N
PROGRAM ELEMENT TITLE: Intelligence Engineering
BUDGET ACTIVITY: 4

DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Z0772 Foreign Material Exp/Acqu	3,252	341	0	0	0	0	0	0	5,607
R0809 Sensor Development	0	0	4,033	0	0	0	0	0	4,033
TOTAL	3,252	341	4,033	0	0	0	0	0	9,640

B. (U) BRIEF DESCRIPTION OF ELEMENT:

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604761N
PROGRAM ELEMENT TITLE: Intelligence Engineering
PROJECT NUMBER: R0809
BUDGET ACTIVITY: 4
DATE: 7 February 1994

C. (U) : JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R0809, EO Sensor Development.

(U) FY 1993 ACCOMPLISHMENTS: Not applicable.

(U) FY 1994 PLAN: Not applicable.

(U) FY 1995 PLAN:
• (u) ($4,033

(U) PROGRAM TO COMPLETION: Not applicable.

(U) WORK PERFORMED BY: IN-HOUSE: TBD. CONTRACTORS: TBD.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Covered by a U.S. Navy International Agreement of a higher classification. See project point of contact for further details.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604771N
PROGRAM ELEMENT TITLE: Medical Developments

PROJECT NUMBER: M0933
BUDGET ACTIVITY: 5

DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
M0933 Medical/Dental Equipment Development	3,915	3,985	1,686	3,265	3,711	4,228	4,337	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND PROJECT: This program element has only one project. The purpose is to develop biomedical equipment to reduce morbidity and mortality, to enhance the logistic feasibility of modern medical care for combat casualties, to speed return to duty, and to ensure that personnel are medically qualified for military duty using equipment which is standard and pertinent to military job requirements.
Each work unit undertaken in this project has a documented, authenticated military requirement. Efforts are justified based upon military payoff and cost benefit. There is strong potential for dual use, technology transfer and industrial participation in the project.

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($395) Initiated contract for development of low-cost, high-efficiency hearing protection based on Air Force patent.
- (U) ($3,120) Premarket Approval application for Resuscitation Fluids Production System submitted to the Federal Drug Administration. Major hardware and software upgrades accomplished.
- (U) ($400) Contracted with industry for production of liposome encapsulated hemoglobin (a blood substitute) in accordance with Good Manufacturing Practices. Product to be subject of safety and efficacy tests.

(U) FY 1994 PLAN:

- (U) ($1,315) Complete initial operational test and evaluation of Resuscitation Fluids Production System. Milestone III decision.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604771N
PROGRAM ELEMENT TITLE: Medical Developments
PROJECT NUMBER: M0933
BUDGET ACTIVITY: 5
DATE: 7 February 1994

- (U) ($1,005) Prepare and issue request for proposals for next generation frozen blood processing system and for clinical test apparatus for aviator spatial orientation based on Navy research results.
- (U) ($1,000) Continue contract with industry for production of liposome encapsulated hemoglobin. Safety and efficacy tests continue.
- (U) ($665) Continue development of hearing protection; test and evaluate colored-navigation light vision test.

(U) FY 1995 PLAN:
- (U) ($1,300) Continue contract for next generation frozen blood processing system.
- (U) ($110) Complete evaluation of Farnsworth Lantern color vision test equipment produced by Navy industrial contract.
- (U) ($276) Continue development of passive low-frequency hearing protection.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVRSCHLAB, Washington, DC; NCCOSC, San Diego, CA; NAVAEROMEDRSCHLAB, Pensacola, FL; NAVSUBMEDRSCHLAB, Groton, CT. CONTRACTORS: Sterimatics Inc., Framingham, MA; GeoCenters Inc., Boston, MA; Vestar Inc., San Dimas, CA; University of Texas, San Antonio, TX; Poesis Research, Pensacola, FL; Mold-Ex Inc., Milton, FL.

(U) RELATED ACTIVITIES:
- (U) PE 0601153N Defense Research Sciences: methods to measure incipient hearing loss.
- (U) PE 0602233N Mission Support Technology: immune reaction to liposome encapsulated hemoglobin.
- (U) PE 0603706N Medical Development: aviator spatial orientation and orientation illusions common to military aviators.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID System
BUDGET ACTIVITY: 5

DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0676* Improved ID Development	13,590	15,774	19,774	12,037	2,271	2,365	2,372	CONT.	CONT.
W1253* Combat ID System	0	7,180	8,172	8,575	8,994	9,420	9,360	CONT.	CONT.
F0253** Navigation and Electro-optical Support	3,252	5,009	7,466	6,828	3,978	3,639	2,929	CONT.	CONT.
X0921 NAVSTAR GPS Equipment	49,895	49,084	33,801	33,587	26,004	14,527	14,716	CONT.	CONT.
TOTAL	66,737	77,047	69,213	61,027	41,247	29,951	29,377	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: Reliable and secure Navigation and positive identification (ID) systems are essential elements of battle management in the naval environment. NAVSTAR Global Positioning System (GPS) is a space-based radio positioning and navigation system that provides users with worldwide, all weather, three dimensional position, velocity and precise time data based on a constellation of 21 or more satellites. In addition to distinguishing friend from foe for weapons employment, the Navy requires secure, jam resistant Identification Friend or Foe (IFF) systems for battle group air defense management and air traffic control. Identification is multifaceted and includes information received from several sensors (both cooperative and non-cooperative systems). The Combat Identification System (CIS) project (W1253) covers the Navy development aspects of a Cooperative Aircraft Identification (CAI) system which is the next generation replacement for the aging MK XII IFF and canceled Air Force MK XV IFF. CAI was directed to perform additional COEA studies before the Milestone I DAB in FY 1994. The Improved Identification Developments project (W0676) develops Non-Cooperative Target

* Previously funded under PE 0604211N
** Previously funded under PE 0604514N

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID System
BUDGET ACTIVITY: 5

DATE: 7 February 1994

Recognition (NCTR) and integration techniques. This project was restructured to allow rapid fielding of prototypes called Shipboard Advanced Radar target ID System (SARTIS), and NCTR system, on selected ships. AUTO-ID, a prototype sensor kinematics/doctrine display system, for aircraft carriers and selected Air-to-Air Warfare (AAW) ships is being integrated into formal full-scale development of systems beginning in FY 1992; the restructured Centralized IFF (CIFF) project will provide the vehicle to integrate both cooperative and non-cooperative ID systems. In August 1993, the CIFF/Auto-ID program began realignment to rearrange ship-class priorities. This program element also includes development of a new Photonics Mast under Navigation & Electronic Support project (F0253). The Photonics Mast project is a non-hull penetrating replacement for existing optical periscopes. The Photonics Mast exploits a wide portion of the electro-magnetic spectrum utilizing advanced electro-optical and thermal imaging.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID Systems

PROJECT NUMBER: W0676
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: Improved ID Development

POPULAR NAME: SARTIS, SLQ-20B, CIFF

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID Systems

PROJECT NUMBER: W0676
BUDGET ACTIVITY: 5

Date: 7 February 1994

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	MSII (SLQ-20) 9/93		MSIII (SARTIS) 1/95	MSIII (SLQ-20) 3/96	MSIII (CIFF) 2/97		MSIV (SARTIS) 7/99	CONT.
ENGINEERING MILESTONES	SDR/PDR (CIFF)	PDR (SLQ-20)	CDR (SLQ-20/CIFF)					CONT.
T&E MILESTONES		DT/OT (SARTIS)	DT (SLQ-20)	OT (SLQ-20) DT (CIFF)	OT (CIFF)			CONT.
CONTRACT MILESTONES		E&MD (SLQ-20) 10/93	PROD (SARTIS) 3/95	PROD (SLQ-20) 4/96	PROD (CIFF) 3/97			CONT.

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	8,350	11,500	15,500	8,000	700	0	0	CONT.
SUPPORT CONTRACT	225	1,330	1,150	900	50	50	50	CONT.
IN-HOUSE SUPPORT	4,915	2,794	2,824	2,937	1,471	2,265	2,272	CONT.
GFE/ OTHER	100	150	300	200	50	50	50	CONT.
TOTAL	13,590	15,774	19,774	12,037	2,271	2,365	2,372	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This provides for the development and integration of NCTR techniques and multi-sensor information integration systems for improved identification (ID). The current major effort is rapid prototype deployment of the SARTIS, an NCTR device. A secondary effort involves deployed AUTO-ID prototypes which take IFF track, link data, and kinematics/doctrine information to better ID/display targets; these features/displays are being integrated into a restructured CIFF development. Project will also develop an up[illegible] AN/SLQ-20 for future integration into the CIFF multi-sensor system. Participation is also maintained in Joint-Service [illegible]forts.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID Systems
PROJECT NUMBER: W0676
BUDGET ACTIVITY: 5
Date: 7 February 1994

C. (u) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (u) FY 1993 ACCOMPLISHMENTS:

- (u) ($2,800)

- (U) ($10,290) Completed CIFF SDR 12/92 and PDR to continue E&MD of CIFF system; completed combined Milestone I/II of AN/SLQ-20 Upgrade in fourth quarter and awarded contract.

- (U) ($500) Continued Joint-Service NCTR activities; initiated phase down. Turned over chairmanship of Joint Service Working Group to U.S. Army.

u

2. (u) FY 1994 PLAN

- (u) ($2,600)

- (U) ($13,174) Realign CIFF to rearrange ship class priorities via contract mod; complete PDR and prepare for CDR of the AN/SLQ-20 Upgrade processor.

3. (u) FY 1995 PLAN:

- (u) ($500)

- (U) ($19,274) Complete CDR and prepare for developmental testing of the CIFF system; complete CDR and initiate developmental testing of the AN/SLQ-20 Upgrade system.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NRL Washington, DC; NCCOSC RDTE DIV, San Diego, CA; NAVAIRWARCENACDIV, Warminster, PA; NESEA, St. Inigoes, MD. CONTRACTORS: Allied-Signal/Bendix Communications, Towson, MD; Scope, Inc., Reston, VA; Paramax, Great Neck, NY; The Johns Hopkins University Applied Physics Laboratory, Laurel, MD; Others, TBD.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID Systems

PROJECT NUMBER: W0676
BUDGET ACTIVITY: 5

Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.
2. (U) Schedule changes: Data in previous budget not available for comparison.
3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

- SARTIS: OR (NCTR) 2/86; RDC (SARTIS) 1/90; MNS 4/92; ORD, AP, and TEMP drafted.
- CIFF/AUTO-ID integration: OR 2/86; program restructured 1/90; AP 4/91; TEMP 3/92; contract awarded 6/92; realignment of ship class priorities 8/93.
- AN/SLQ-20 Upgrade: OR 2/86; PCAD 5/91; AP 1/92 rev 8/93; MNS 4/92; COEA 11/92; ORD 6/93; TEMP 9/93; MS I-II ADM 9/93.

G. (U) RELATED ACTIVITIES:

- (U) PE 0603742F, Combat ID Systems.
- (U) PE 063772A, Advanced Tactical Comp. Science Sensors.
- (U) PE 062120A. Electronic Surveillance & Fusing Technologies.
- (U) PE 064817A, Combat Identification.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) OPN Line	0	0	5,642	9,339	22,694	17,666	15,170	CONT.	CONT.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION: FY 1994 SARTIS TECHEVAL (10/93) and OPEVAL (3Q). FY 1996 SLQ-20 upgrade TECHEVAL (1Q) and OPEVAL (2Q).

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID Systems

PROJECT NUMBER: W1253
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: Combat ID System

PICTURE NOT AVAILABLE

POPULAR NAME: CAI

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID Systems
PROJECT NUMBER: W1253
BUDGET ACTIVITY: 5
Date: 7 February 1994

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		DAB I 8/94						CONT.
ENGINEERING MILESTONES								
T&E MILESTONES			Note: Milestones beyond DAB I TBD. Phase 0 COEA underway.					
CONTRACT MILESTONES								

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	0	1,900	2,000	2,000	2,000	2,000	2,000	CONT.
SUPPORT CONTRACT	0	2,050	2,500	1,500	1,500	1,500	1,500	CONT.
IN-HOUSE SUPPORT	0	2,110	2,572	2,875	2,994	3,320	3,160	CONT.
GFE/ OTHER	0	1,120	1,100	2,200	2,500	2,600	2,700	CONT.
TOTAL	0	7,180	6,172	8,575	8,994	9,420	9,360	CONT.

Note: Funding subject to change after Milestone Decisions (TBD).

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: USN has the requirement for a Cooperative Aircraft Identification (CAI) system that would replace aging Identification, Friend of Foe equipments. The Joint Chiefs of Staff/Joint Requirements Oversight Council Mission Needs Statement (JCS/JROC MNS) for Combat Identification was validated 4/92 by the Commanders in Chief (CINCs). OSD had a Milestone/Defense Acquisition Board (DAB) 0 in Aug 92 which directed "Combat ID to enter into Phase 0 for Joint Concept Exploration and Definition studies on Battlefield ID (Army lead) and CAI (Navy) with Navy as overall lead for coordination of both Phase 0 efforts." A Cost and Operational Effectiveness Analysis (COEA) is underway to investigate options to be presented at DAB I. The Naval Research Lab (NRL) is directing COEA studies.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID Systems
PROJECT NUMBER: W1253
BUDGET ACTIVITY: 5
Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS: Not applicable.

2. (U) FY 1994 PLAN:

- (U) ($5,428) Complete DAB I.
- (U) ($1,752) Initiate Phase I efforts and prepare for possible condensed Phase I, leading to early DAB II, yet to be determined.

3. (U) FY 1995 PLAN:

- (U) ($6,122) Continue with Phase I.
- (U) ($2,050) Prepare for DAB II.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, DC; NAVAIRWARCENACDIV, Patuxent River, MD; NCCOSC RDTE DIV, San Diego, CA; DOD ECAC, Annapolis, MD; NESEA, St. Inigoes, MD; NAVAIRWARCENACDIV, Indianapolis, IN; Air Force; Army; Marine Corps; TBD. CONTRACTORS: TBD.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: DOD AIMS STANAG 4193; JCS MROC 20-83 and NIS STANAG 4162; JCS/JROC MNS 4/92; ADM 8/92.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID Systems

PROJECT NUMBER: W1253
BUDGET ACTIVITY: 5

Date: 7 February 1994

G. (U) RELATED ACTIVITIES:

- (U) PE 063772A, Advance Tactical Comp. Science Sensors.
- (U) PE 062120A, Electronic Surveillance & Fusing Technologies.
- (U) PE 063742F, Combat ID Systems.
- (U) PE 064817A, Combat Identification.

H. (U) OTHER APPROPRIATION FUNDS: Not applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: MK XV MOAs still valid.

J. (U) TEST AND EVALUATION: Not applicable.

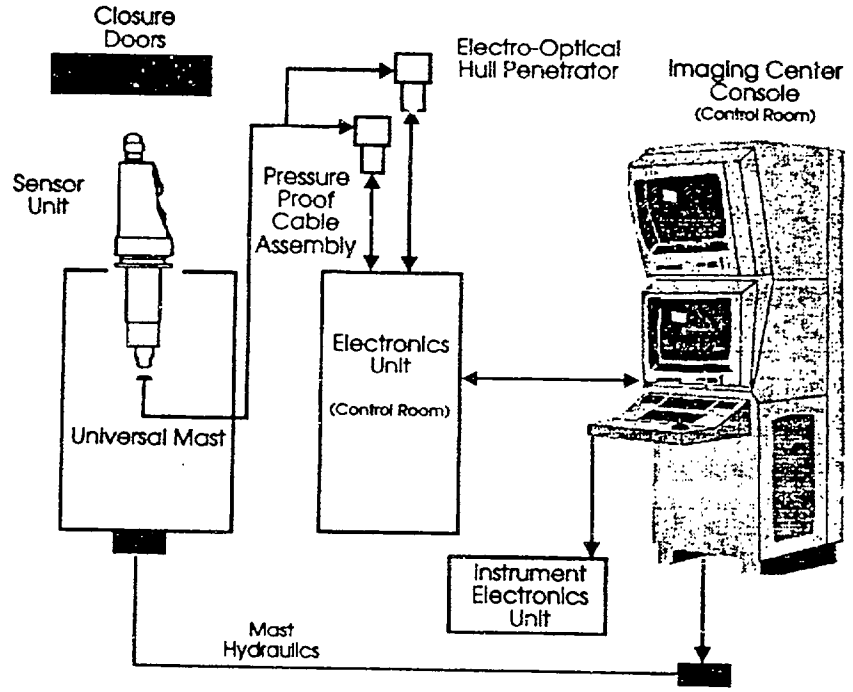
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID System

PROJECT NUMBER: F0253
BUDGET ACTIVITY: 5

DATE: 7 February 1994

PROJECT TITLE: Navigation & Elecro-Optical Support



PHOTONICS MAST SYSTEM

POPULAR NAME: PHOTONICS MAST

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID System
PROJECT NUMBER: F0253
BUDGET ACTIVITY: 5
DATE: 7 February 1994

A. (u) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES								
Photonics Mast Program		5/94-MSII				6/98-MSIII		CONT.
ENGINEERING MILESTONES			3/95-SDR					
Photonics Mast Program				10/95-PDR 3/96-CDR				
					12/96-EDM			CONT.
T&E MILESTONES								
Photonics Mast Program		3/94-TEMP Approval				12/97-DTII 6/98-OTII		CONT.
CONTRACT MILESTONES	1/93-CD Award							
Photonics Program	7/93-CD Results		11/94-EMD Awarded					CONT.

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	2,064	3,360	5,140	4,011	961	534	318	CONT.
SUPPORT CONTRACT	600	574	650	650	650	650	650	CONT.
IN-HOUSE SUPPORT	588	1,075	1,676	2,167	2,367	2,455	1,961	CONT.
GFE/ OTHER	0	0	0	0	0	0	0	CONT.
TOTAL	3,252 *	5,009	7,466	6,828	3,978	3,639	2,929	CONT.

* Budget submitted under Program Element 0604514N.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID System
PROJECT NUMBER: F0253
BUDGET ACTIVITY: 5
DATE: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Photonics Mast will replace existing penetrating periscopes and exploit a wide portion of the electro-magnetic spectrum through advanced electro-optical and thermal imaging. It will provide major improvements in submarine stealth and infrared imaging capabilities and make extensive use of image enhancement techniques for target identification and classification. The non-hull penetrating design provides freedom in ship construction design as well as space savings for future design submarines. The system will be designed to satisfy Operational Requirement #168-02-88. The Photonics Mast is planned for installation on the New Attack Submarine, SSN-688 and SEAWOLF class submarines.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($1,903) Awarded Photonics Mast Concept Definition contracts.
- (U) ($520) Evaluated Concept Definition designs for Photonics.
- (U) ($200) Completed Photonics Cost and Operational Effectiveness Analysis (COEA).
- (U) ($220) Conducted additional Atmospheric Propagation Analysis field tests for Photonics.
- (U) ($132) Prepared for underwater explosion tests of selected Photonics components.
- (U) ($90) Prepared for Photonics Logistics Readiness Review.
- (U) ($187) Conducted additional at-sea Non-Penetrating Periscope (NPP) testing on USS Memphis.

2. (U) FY 1994 PLAN:

- (U) ($694) Issue Photonics Mast Engineering and Manufacturing Development (EMD) Request for Proposals.
- (U) ($850) Obtain Photonics Mast Milestone II approval.
- (U) ($150) Conduct explosive snock and radar cross section and Infra-Red tests.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N PROJECT NUMBER: F0253 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: Navigation/ID System BUDGET ACTIVITY: 5

- (U) ($50) Install NPP in land-based test site.
- (U) ($3,265) Award Photonics Mast EMD contract.

3. (U) FY 1995 PLAN:

- (U) ($7,266) Continue Photonics Mast EMD phase.
- (U) ($100) Perform Photonics Mast System Requirements Review.
- (U) ($100) Perform Photonics Mast System Design Review.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCEN DET, New London, CT; NCCOSC RDTE DIV, San Diego, CA; NAVSURFWARCEN SHIPSYSENGSTA, Philadelphia, PA; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; CONTRACTORS: Kollmorgen, Northhampton, MA; Rockwell International, Anaheim, CA; Sperry Marine, Charlottesville, VA; Martin Marietta, Syracuse, NY.

E. (U) COMPARISON WITH AMENDED FY 1994 AMENDED PRESIDENT'S BUDGET:

1. Technology changes: Data in previous budget not available for comparison.
2. Schedule changes: Data in previous budget not available for comparison.
3. Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

Operational Requirement	7/87
Acquisition Strategy Report	1/94
Acquisition Plan	2/94
COEA Report	2/94
Test and Evaluation Master Plan	3/94
Operational Requirement Document	3/94
Integrated Program Summary	4/94
Acquisition Program Baseline	4/94

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N PROJECT NUMBER: F0253 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: Navigation/ID System BUDGET ACTIVITY: 5

G. (U) RELATED ACTIVITIES:

- (U) PE 0603226E (Experimental Evaluation of Innovative Technology) - Non-penetrating periscope developed by Kollmorgen for Defense Advanced Research Projects Agency.

H. (U) OTHER APPROPRIATION FUNDS: Not applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION: Photonics Mast development and operational DT/OT IIB at-sea testing is scheduled for FY 98.

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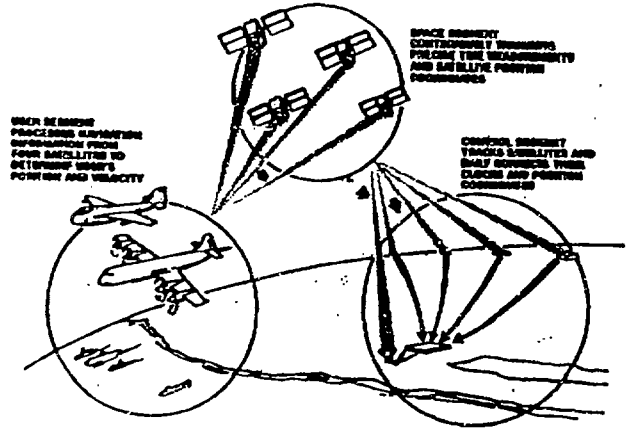
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID System
PROJECT NUMBER: X0921
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: NAVSTAR GPS Equipment

NAVSTAR GPS PROGRAM SEGMENTS



POPULAR NAME: NAVSTAR GPS

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID System
PROJECT NUMBER: X0921
BUDGET ACTIVITY: 5
Date: 7 February 1994

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES	MAGR MSIII	NAVSSI/ MSII/ III/GPS	EMBEDDED					CONT.
ENGINEERING MILESTONES	3/93	10/93						CONT.
T&E MILESTONES		DT 3/94 OT 3/94						CONT.
CONTRACT MILESTONES								CONT.

BUDGET	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	22,187	23,729	5,219	1,625	1,253	698	703	CONT.
SUPPORT CONTRACT	471	482	504	365	282	157	147	CONT.
IN-HOUSE SUPPORT	24,598	20,782	23,543	25,197	19,533	10,925	11,095	CONT.
GFE/ OTHER	2,639	4,091	4,535	6,400	4,936	2,747	2,771	CONT.
TOTAL	49,895	49,084	33,801	33,587	26,004	14,527	14,716	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The NAVSTAR Global Positioning System (GPS) is a space-based radio positioning and navigation system that provides users with worldwide, all-weather, three-dimensional position, velocity and precise time data based on a constellation of 21 or more satellites. Navy's portion of the GPS program develops user equipment and provides new/increased capability to each type platform through the integration and testing of this equipment. GPS increases the "performance envelope" of each testing of this aircraft by enhancing the aircraft's mission capability. GPS integrations involve development of ancillary hardware and software and testing of prototype avionics suites to validate enhancement of mission systems, emulation of Tactical Air Navigation (TACAN) in aircraft and system performance characteristics suitable for operational testing.

UNCLASSIFIED

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID System

PROJECT NUMBER: X0921
BUDGET ACTIVITY: 5

Date: 7 February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($38,348) Continued integration engineering on E-2C(UD), F-14D, S-3B, SH-60B(UD), UH-3H, E-6A(UD). T-45, A-6, ES-3A, H/KC-130, C-2A, CH-46, UH-1N, F/A-18, MH-53, VH-3D, EA-6B, CH-53E, VH-60D, A-6E, AV-8B (day attack), AH-1W, SH-2G, SH-60[illegible] and P-3C(UD) III aircraft.
- (U) ($510) Completed Miniaturized Airborne GPS Receiver (MAGR) test and evaluation a[illegible]achieved MSIII.
- (U) ($360) Continued GPS integration with shipboard command and control systems.
- (U) ($205) Continued systems integration in the Electrostatically Suspended Gyro Navigator (ESGN).
- (U) ($1,317) Continued development of Tactical Airborne Mission Planning System (TAMPS) software.
- (U) ($3,114) Continued efforts in the areas of integration design support, data reduction, platform test support, deficiency resolution and user equipment design analysis.
- (U) ($2,040) Navigation Sensor System Interface (NAVSSI) software design and integration engineering with shipboard command and control.
- (U) ($4,101) Develop/Design GPS/Inertial Navigation Assembly (GINA).

2. (U) FY 1994 PLAN:

- (U) ($39,973) Continue integration engineering on AH-1W, AV-8(day attack), AV-8(Radar), T-44, S-3B, E-2C(UD), E-6A(UD), ES-3A, SH-60B(UD), A-6E, UH-3H, T-45, F-14D, C-2A, F/A-18, CH-46, MH-53E, UH-1N, VH-3D, and H/KC-130 aircraft.
- (U) ($75) Complete systems integration in the ESGN.
- (U) ($115) Complete development of TAMPS software.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID System
PROJECT NUMBER: X0921
BUDGET ACTIVITY: 5
Date: 15 October 1993

- (U) ($251) Continue integration with shipboard command control systems.
- (U) ($2,049) Continue effort in the areas of integration design support, data reduction, platform test support, deficiency resolution and suer equipment design analysis.
- (U) ($4,515) Complete design and testing of GINA.
- (U) ($2,106) Continue NAVSSI software design and integration engineering with shipboard command and control.

3. (U) FY 1995 PLAN:

- (U) ($24,496) Continue integration engineering on C-9B, UC-12,TH-57,E-2C(UD), T-44, AV-8B(day attack), E-2C, F/A-18, AH-1W, CH-53E, H/KC-130, RP-3, T-2C, T-39D, AV-8B(radar), EA-6B, ES-3A, F-14D, UH-3H, E-6A and S-3B aircraft.
- (U) ($50) Complete systems integration in the ESGN.
- (U) ($1,471) NAVSSI integration engineering with shipboard command and control.
- (U) ($7,784) Continue effort in areas of integration design support, data reduction, platform test support, deficiency resolution and user equipment design analysis.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Air Force Systems Command (Space Systems Division), Joint Program Office, Los Angeles, CA; NCCOSC RDTE DIV DET, Warminster, PA; NAVAIRWARCENACDIV, Indianapolis, IN; NAVAIRWARCENACDIV, Patuxent River, MD; NAVAIRWARCENWPNDIV, China Lake, CA; NAVAVNDEP, Pensacola, FL, San Diego, CA. CONTRACTORS: Grumman Aerospace Corp., Long Island, NY; Boeing Company, Seattle, WA; McDonnell Douglas, St. Louis, MO.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID System
PROJECT NUMBER: X0921
BUDGET ACTIVITY: 5
Date: 7 February 1994

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

nt Acquisition Plan	Dec 1989
Multi-Service TEMP	Dec 1991
Joint ILS Plan	Jul 1991
Navy Training Plan	Oct 1991
DCP/IPS	Dec 1991

G. (U) RELATED ACTIVITIES:

- (U) PE 0603203F Advance Avionics of Aircraft
- (U) PE 0603601F Conventional Weapons Technology
- (U) PE 0305164F NAVSTAR GPS User Equipment
- (U) These are Air Force program elements that contribute to the development and test of GPS receivers and associated peripheral equipment.

H. (U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) OPN Line #26570	8,888	4,909	18,108	1,611	5,075	5,888	5,034	CONT.	CONT.
(U) APN BA5 (P-1 LI #52)	12,074	30,163	39,424	45,142	44,137	41,642	27,227	CONT.	CONT.
(U) SCN*									
APN BA 1*									

* In-line production funding. Procurement of GPS hardware not available at this level of detail. Composed of multiple P-1 Line Items.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID System
PROJECT NUMBER: X0921
BUDGET ACTIVITY: 5
Date: 7 February 1994

J. (U) TEST AND EVALUATION:

- (U) Standard GPS User Equipment
- (U) OT III Complete FY 04

Remarks: Exceeded reliability requirements by a factor of four. Five-channel user equipment found operationally suitable and effective; OPTEVFOR has recommended for fleet use. FOT&E to extend applications to 44 aircraft types has begun and will continue through FY 04.

EMBEDDED GPS	NAVSSI
DT/OT MAR-OCT 94	DT IIB MAY-JUN 92
	OT IIA AUG-SEP 92

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604784N
PROGRAM ELEMENT TITLE: Distributed Surveillance Systems
BUDGET ACTIVITY: 5

DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X1312 Fixed Distribution System (FDS)	145,074	100,878	81,866	79,159	2,078	4,363	4,371	17,500	1,261,689
X1300 Advanced Deployable Systems (ADS)	13,269	22,888	32,440	42,114	42,586	42,207	41,983	120,425	377,912
TOTAL	158,343	123,766	114,306	121,273	44,664	46,570	46,354	137,925	1,639,601

B. (U) BRIEF DESCRIPTION OF ELEMENT: Distributed Systems is part of the Integrated Undersea Surveillance System (IUSS). IUSS provides the majority of the U.S. Navy's open ocean detection capability against quiet submarines, including third world diesels. The Distributed Systems program element (PE) 0604784N consists of two projects, X1312 FDS and X1300 ADS, designed to improve the effectiveness and flexibility of Undersea Surveillance.

(U) FDS is a passive acoustic surveillance system for detecting modern quiet submarines using hydrophones ; FDS will vital to their mission success as well as long term strategic indications and warning for fleet and national command authorities. FDS represents the nation's sole source of bottom mounted undersea hardware, is modular and can be used FDS can be rapidly deployed in support of regional conflicts or deployed as large 24-year lifetime installations in areas requiring long term coverage. Increasing emphasis is being placed on the deployable, relocatable mission which would allow the U.S. the capability to set up, on short notice, surveillance coverage in regional conflict scenarios. FDS provides the primary intermediate and shallow water capability for a flexible mobile undersea surveillance force. Because of this emphasis, the Navy is developing a rapidly deployable demonstration of the FDS hardware, FDS-Deployable (FDS-D), to prove the capability to be able to respond to regional conflict scenarios in a short time period.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604784N
PROGRAM ELEMENT TITLE: Distributed Surveillance Systems
BUDGET ACTIVITY: 5

DATE: 7 February 1994

(U) ADS, will build on the FDS-D demonstration as well as the FDS developed underwater hardware and processing technologies and other programs. ADS will incorporate advanced sensors from other technology programs into a family of rapidly deployable systems. This family of systems will be significantly more rapidly deployable and able to be modularly adapt to specific geographic areas in response to regional conflicts involving submarine threats. This project was Congressionally directed in FY92 although funding for this project was not broken out separately until FY93. In FY92, $20.0M was allocated to ADS under project X1312.

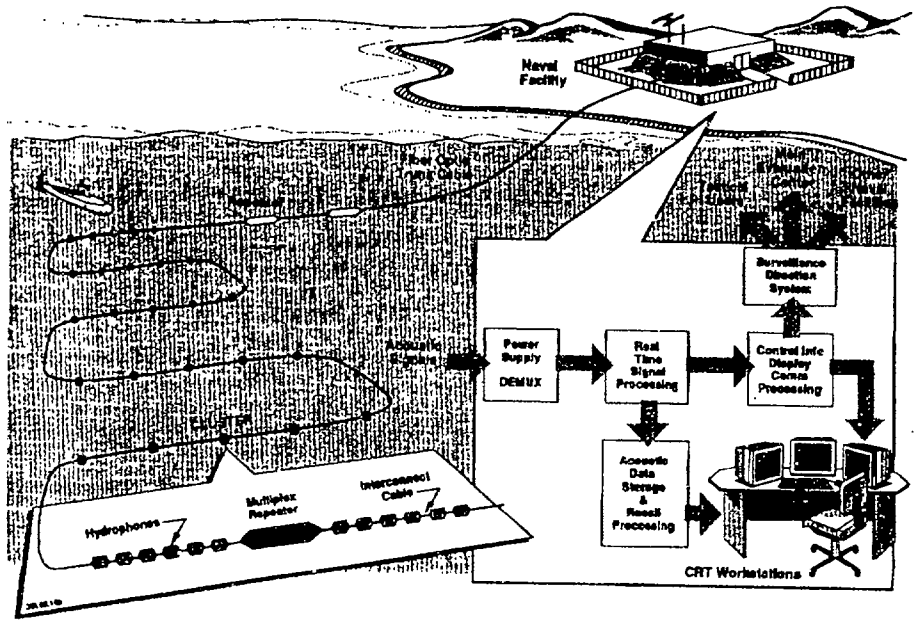
FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604784N
PROGRAM ELEMENT TITLE: Distributed Surveillance Systems

PROJECT NUMBER: X1312
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: Fixed Distribution System (FDS)



POPULAR NAME: FDS

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604784N
PROGRAM ELEMENT TITLE: Distributed Surveillance Systems
PROJECT NUMBER: X1312
BUDGET ACTIVITY: 5
Date: 7 February 1994

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES				MS-III				
ENGINEERING MILESTONES		CDR (Shore Segment) 9/93	Install FDS-D	Deploy Field One	Deploy Field Two			CONT.
T&E MILESTONES			DT-IID FDS-D Demo	DT-IIE	FDS OPEVAL	DT-IIF		CONT.
CONTRACT MILESTONES			Shore Segment Factory Acceptance Test 9/94					CONT.

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TOTAL BUDGET (TO COMPLETE)
MAJOR CONTRACT	655,400	115,000	73,258	49,007	69,677	1,487	3,345	3,355	983,954 (13,425)
SUPPORT CONTRACT	76,800	13,470	11,228	9,164	200	200	568	566	114,121 (1,925)
IN-HOUSE SUPPORT	94,197	16,604	16,392	23,695	9,282	391	450	450	163,614 (2,153)
GFE/ OTHER									
TOTAL	826,400	145,074	100,878	81,866	79,159	2,078	4,363	4,371	1,261,689 (17,500)

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604784N
PROGRAM ELEMENT TITLE: Distributed Surveillance Systems
PROJECT NUMBER: X1312
BUDGET ACTIVITY: 5
Date: 7 February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The FDS is part of the Integrated Undersea Surveillance System (IUSS). IUSS provides the majority of the U.S. Navy's open ocean detection capability against quiet submarines, including third world diesels. FDS is a passive acoustic surveillance system for detecting these quieter submarines using hydrophones. FDS will be vital to their mission success as well as long term strategic indications and warning for fleet and national command authorities. FDS represents the nation's sole source for the manufacturing of bottom mounted undersea hardware; is modular and can be rapidly deployed in support of regional conflicts or permanently installed in areas requiring long term coverage (estimated 24 year life). FDS can be rapidly deployed in support of regional conflicts or permanently installed in areas requiring long term coverage (estimated 24 year life). Increasing emphasis is being placed on the deployable, relocatable mission which would allow the U.S. the capability to set up, on short notice, surveillance coverage in regional conflict scenarios. FDS will provide the primary intermediate and shallow water capability for a flexible mobile undersea surveillance force. Because of this emphasis, the Navy is developing a rapidly deployable demonstration of the FDS hardware, FDS-Deployable (FDS-D), to prove the capability to be able to respond to regional conflict scenarios in a short time period. The FDS underwater system builds on commercial fiber-optic technology to achieve high data capacities, long trunk cable lengths and extremely high reliability. FDS is designed to be

Shore processing is workstation based using Non-Development Item (NDI) hardware throughout. This FDS processing system forms the framework and architecture for all IUSS processing requirements to be procured in the future.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($7,156) Conducted incremental software testing and evaluation Shore Signal Information Processing Segment (SSIPS).
- (U) ($14,776) Began integration of hardware and software of SSIPS.
- (U) ($98,437)
- (U) ($2,313)
- (U) ($5,174)
- (U) ($2,650)
- (U) ($6,738) Continued shore segment software development.
- (U) ($6,510) Continued engineering development of FDS-D.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604784N
PROGRAM ELEMENT TITLE: Distributed Surveillance Systems
PROJECT NUMBER: X1312
BUDGET ACTIVITY: 5
Date: 7 February 1994

- (U) ($1,320) Conducted sea trial of array laydown capability.

2. (U) FY 1994 PLAN:

- (U) ($39,893) Continue manufacturing and assembly of underwater components.
- (U) ($26,321) Continue integration efforts of underwater components into final configuration items.
- (U) ($13,220) Complete preparation for and conduct FDS-D demonstration (DT-IID).
- (u) ($4,414)
- (u) ($17,030) Complete integration of shore processing system.

3. (u) FY 1995 PLAN:

- (U) ($21,434) Continue underwater component manufacture and assembly for FDS.
- (u) ($5,018)
- (U) ($35,685) Complete shore processing system development and conduct shore processing system Factory Acceptance Test (FAT).
- (U) ($15,247) Install shore processing system at site and conduct Site Acceptance Test (DT-IIE).
- (u) ($0)
- (u) ($4,482)

4. (u) PROGRAM TO COMPLETION:

- (U) Complete underwater component manufacture and assembly for FDS-1 (FY96).
- (U) Conduct TECHEVAL (DT IIF) (FY97).
- (u):
- (U) Conduct OPEVAL (OT II; (FY96).
- (U) Complete Milestone III (FY96). No production is planned.
- (U) Conduct FOT&E (FY97).

D. (U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDTE DIV, San Diego, CA; NCEL, Port Hueneme, CA; NRL, Washington, DC.; NAVUNSEAWARCENDIV, Newport, RI. CONTRACTORS: AT&T Technologies, Inc., Greensboro, NC; AT&T/Bell Laboratories, Whippany, NJ; IBM Corporation, Manassas, VA; TRW, Inc., McLean, VA; AMRON, Inc., Arlington, VA; Simplex Wire and Cable Company, Portsmouth, NH; STC Submarine Systems, Inc, Portland, OR; Harris Corp., Melbourne, FL; CACI, Arlington, VA; Applied Research Lab/UT; Austin, TX; Applied Physics Lab/UW, Seattle, WA.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604784N
PROGRAM ELEMENT TITLE: Distributed Surveillance Systems
PROJECT NUMBER: X1312
BUDGET ACTIVITY: 5
Date: 7 February 1994

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION:

• (U) Decision Coordination Paper (DCP)	10 May 1989
• (U) Milestone II Decision/Acquisition Program	22 Sep 1989
• (U) ILSP Revised	30 Apr 1992
• (U) Acquisition Plan #91-18, FDS	14 Aug 1991
• (U) TEMP Revised/Approved	30 Sep 1991
• (U) Baseline Revised	29 Jan 1992

G. (U) RELATED ACTIVITIES: PE 0204311N, Integrated Surveillance System.

H. (U) OTHER APPROPRIATION FUNDS: Not applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION:
- (u) DT-IID
- (u) FDS-D Demo
- (u) DT-IIE
- (u) FDS OPEVAL
- (u) DT-IIF
- (u) FOT&E

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604784N
PROGRAM ELEMENT TITLE: Distributed Surveillance Systems

PROJECT NUMBER: X1300
BUDGET ACTIVITY: 5

Date: 7 February 1994

PROJECT TITLE: Advanced Deployable Systems (ADS)

A Family of Rapidly-Deployable IUSS Assets for Undersea Surveillance in Littoral Areas

- Rapid Response
- Flexible
- Reliable Maritime Picture
- World Wide
- Joint Mission

POPULAR NAME: ADS

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604784N
PROGRAM ELEMENT TITLE: Distributed Surveillance Systems
PROJECT NUMBER: X1300
BUDGET ACTIVITY: 5
Date: 7 February 1994

A. (U) SCHEDULE/BUDGET INFORMATION: (Dollars in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPLETE
PROGRAM MILESTONES		MS-I 6/94						CONT.
ENGINEERING MILESTONES		SDR 10/93	PDR 11/94					CONT.
T&E MILESTONES		Sensor Tests as available with fleet						CONT.
CONTRACT MILESTONES		DEMVAL 3/94						CONT.

BUDGET	FY 1992 AND PRIOR	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	TOTAL BUDGET FY 1999	(TO COMPLETE)
MAJOR CONTRACT	9,199	800	5,626	18,928	26,176	26,942	30,451	31,4	215,705 (66,179)
SUPPORT CONTRACT	7,415	2,630	4,412	3,141	4,195	4,056	3,505	3,328	67,108 (34,425)
IN HOUSE SUPPORT	2,966	4,755	8,338	6,527	7,451	7,200	4,077	3,365	56,629 (12,000)
GFE/ OTHER	420	5,084	4,512	3,844	4 292	4,388	4,174	3,886	38,420 (7,820)
TOTAL	20,000	13,269	22,888	32,440	42,114	42,586	42,207	41,983	377,912 (120,425)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Advanced Deployable System (ADS) program provides for the concept study, prototyping, test, design, development, installation, and maintenance of ADS. It will provide a rapidly deployable and a covertly deployable surveillance capability to operational forces in a timely response to tactical and strategic requirements. The systems will include sensors, transmission, processing and interface to the Surveillance Direction System (SDS) and applicable tactical assets as an evolving component of the Integrated Undersea Surveillance System (IUSS). The program uses and expands on technology developed under the Fixed Distributed System (FDS) program, the Advanced Deployable Array (AdDA) program, the Port Area Surveillance (PAS), Sonobuoy and ONR programs and the ARIADNE Program.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604784N
PROGRAM ELEMENT TITLE: Distributed Surveillance Systems

PROJECT NUMBER: X1300 Date: 7 February 1994
BUDGET ACTIVITY: 5

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($13,269) A Mission Needs Statement (MNS) was signed by Fleet and OPNAV representatives. A Milestone 0 Navy Program Decision Meeting (NPDM) was held on 24 November and resulted in FY 92 funds being released to ADS for award of system concept studies. The Defense Appropriations Bill and the Defense Authorization Act for FY 93 transferred funds from the program element for undersea Superiority Technology Demonstrations (P.E. 0603555N) to the Advanced Deployable System project under the program element for Distributed Surveillance Systems. Congress directed the Navy to proceed in parallel development of both rapid and unobserved deployment versions of ADS. Milestone I documentation requirements were defined and preparation of the documents commenced. A sea test was planned and executed for collection of shallow water diesel submarine data with sensors suitable for application in ADS. Concept studies efforts continued on schedule.

2. (U) FY 1994 PLAN:

- (U) ($6,822) Complete concept studies of the ADS system that incorporated both acoustic and non-acoustic sensors, that is small enough for deployment by aircraft or unmanned underwater vehicles (UUV), and is capable of being reconfigured depending on the mission, but optimized for shallow water ASW against quiet diesel submarines.
- (U) ($361) Provide results of concept studies to support independent Cost and Operational Effectiveness Analysis (COEA) study. Evaluate time sensitivity of various deployment options.
- (U) ($5,227) Provide documentation to support Milestone I decision.
- (U) ($5,050) Begin prototyping of most promising concept(s) indicated by concept studies and COEA results.
- (U) ($5,428) Plan and execute sea test, and analyze sea test data from sensors appropriate for ADS application and incorporate results into prototype developments.

3. (U) FY 1995 PLAN:

- (U) ($28,267) Design and begin assembly of two prototype ADS systems. One will be configured for rapid deployment and one for unobserved deployment.
- (U) ($4,173) Plan and execute sea test to demonstrate suitability of sensors used in ADS prototypes systems.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0604784N
PROGRAM ELEMENT TITLE: Distributed Surveillance Systems
PROJECT NUMBER: X1300 Date: 7 February 1994
BUDGET ACTIVITY: 5

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NCCOSC RDT&E DIV, San Diego, CA; NAVAIRWARCENACDIV, Warminster, PA; NAVUNSEAWARCENDIV, Newport, RI; NAVSEAWARCEN, Dahlgren Division. White Oak Detachment, Silver Spring, MD; NCEL, Port Hueneme, CA; NRL, Washington, DC. CONTRACTORS: AT&T Technologies, Whippany, NJ; Westinghouse Electric Company, Annapolis, MD; Presearch Incorporated, Fairfax, VA; IBM Corporation, Manassas, VA; BBN Systems & Technologies, Cambridge, MA;BBN Systems & Technologies, Arlington, VA; BBN Systems & Technologies, San Diego, CA; Alliant TechSystems Inc., Mukilteo, WA; Alliant TechSystems Inc., Arlington, VA; E-Systems, Garland Division, Garland, TX: Lockheed Missiles and Space Company,Inc., Sunnyvale, CA; Lockheed Sanders, Inc., Nashua, NH; Lockheed Aeronautical Systems Company, Marietta, GA; Planning Systems Inc., Mclean, VA; Sparton Corporation, Jackson, MI; Texas Instruments, McKinney, TX; McDonnell Douglas Aerospace-D&ES, Santa Anna, CA; McDonnell Douglas Aerospace, Arlington, VA; Hughes Aircraft Company, Fullerton, CA; Magnavox, Fort Wayne, IN; ORINCON, San Diego, CA; ORINCON, Arlington, VA; Western Instrument, Ventura, CA; Applied Remote Technology, San Diego, CA; Applied Research Lab/University of Texas (ARL/UT), Austin, TX; Johns Hopkins University/Applied Physics Lab (JHU/APL), Laurel, MD; AMRON, Inc. Arlington, VA; TRW, Inc., McLean, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: MNS signed by OPNAV NS 3/93.

G. (U) RELATED ACTIVITIES: Not applicable

H. (U) OTHER APPROPRIATION FUNDS: Not applicable

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

J. (U) TEST AND EVALUATION: Sensor level testing FY 93 through FY 96 with emphasis on detection exercises involving quiet diesel submarines.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605152N
PROGRAM ELEMENT TITLE: Studies and Analysis Support, Navy
BUDGET ACTIVITY: 6

DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
M0106 Naval Medical Support Capability	115	109	114	116	118	121	124	CONT.	CONT.
R0132 CNO Program Analysis and Evaluation	725	305	365	296	305	313	324	CONT.	CONT.
R0133 National Academy of Sciences/Naval Studies Board/ASN Studies	827	471	568	507	520	535	549	CONT.	CONT.
R0147 Operational Strategy and Tactical Effectiveness Analysis	215	460	561	456	466	481	495	CONT.	CONT.
R2040 Foreign Ship and Submarine Vulnerability Program	523	855	1,025	1,009	1,045	1,071	1,104	CONT.	CONT.
W2092 Naval Aviation Studies	823	1,138	1,089	1,098	1,086	1,125	1,169	CONT.	CONT.
L2097 Manpower, Personnel and Training Studies Support*	159	313	319	300	296	300	306	CONT.	CONT.
S2233 Naval Surface Warfare Studies	0	0	2,017	2,024	2,035	2,044	2,056	CONT.	CONT.
TOTAL	3,387	3,651	6,058	5,806	5,871	5,990	6,127	CONT.	CONT.

* Project funded as R2097 in FY 1993

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program provides analytical support to the Secretary of the Navy and the Chief of Naval Operations as a basis for major policy, planning, and acquisition program execution decisions. It supports research and development strategy development and planning. It supports studies in the areas of manpower,

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605152N
PROGRAM ELEMENT TITLE: Studies and Analysis Support, Navy
BUDGET ACTIVITY: 6

DATE: 7 February 1994

personnel and training, and aviation. It develops analytical tools for evaluating effectiveness of U.S. weapons against potential foreign threat ships and submarines.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605152N
PROGRAM ELEMENT TITLE: Studies and Analysis Support, Navy
PROJECT NUMBER: MC106
BUDGET ACTIVITY: 6
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: M0106, Naval Medical Support Capability. This project provides an essential management tool to examine and investigate biomedical operations, functions, allocation of resources, personnel training, detailing, and other problems that may affect the relevancy, effectiveness, and efficiency of medical support of the Navy and Marine Corps.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($115) Completed analyses of active duty medical personnel survey and reported findings to the Surgeon General.

(U) FY 1994 PLAN:
- (U) ($109) Determine the incidence and correlates of spontaneous abortion among U.S. Navy women.

(U) FY 1995 PLAN:
- (U) ($114) Determine health risks for women aboard ship; identify medical evacuation patterns, potential reproductive hazards, and issues of health care delivery for female patients.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: Naval Health Research Center, San Diego, CA. CONTRACTORS: San Diego State University Foundation, San Diego, CA.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605152N
PROGRAM ELEMENT TITLE: Studies and Analysis Support, Navy
PROJECT NUMBER: R0132
BUDGET ACTIVITY: 6
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R0132, CNO Program Analysis and Evaluation. This project provides analytical support to the Chief of Naval Operations and the Secretary of the Navy in evaluation of overall balance within total Navy programs. Includes such tasks as (a) evaluation of force capabilities and requirements, (b) analysis of effectiveness of systems under development, and (c) Secretary of Defense directed independent cost and effectiveness analyses of major Navy programs, and (d) items of Congressional interest as they relate to Navy programs. Deliverables consist of formal, structured documents containing or leading to conclusions and/or recommendations as well as the development and maintenance of databases and models. The use of databases and models is driven by the need to objectively and continually assess the impact of reduced funding and/or force drawdown upon Navy programs. They provide Navy planners and decision makers with objective, empirical data with which to make determinations regarding program planning and evaluation issues. The models funded by this account are the primary tools used to formulate program balance in the assessment process (particularly the Readiness, Support and Infrastructure Assessment and the Investment Balance Review). The analyses based on these models formed the heart of the Investment Balance Review, allowing the Navy to formulate and cost-out alternative force structure, manpower, infrastructure and readiness programs.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($ 22) Conducted analyses over a broad range of issues.
- (U) ($370) Updated and maintained the Aviation Readiness model and the Ships Resource-to-Readiness model, both of which are an integral part of the Navy's Readiness Assessment.
- (U) ($333) Supported the Integrated Theater Engagement Model, a model developed jointly with the Defense Nuclear Agency for analyses of Navy, Air Force, Army, and Marine Corps systems and platforms.

(U) FY 1994 PLAN:
- (U) ($ 28) Continue developing models and databases for studies to improve decision making and enhance understanding of readiness, sustainability and other programmatic issues.
- (U) ($100) Continue the update and maintenance of the Aviation Readiness model and the Ships Resource-to-Readiness model.
- (U) ($177) Provide statistical support and conduct studies and analyses to support the Navy's Assessment models.

(U) FY 1995 PLAN:
- (U) ($ 65) Maintain the Aviation Readiness model and the Ships Resource-to-Readiness model.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605152N
PROGRAM ELEMENT TITLE: Studies and Analysis Support, Navy
PROJECT NUMBER: R0132
BUDGET ACTIVITY: 6
DATE: 7 February 1994

- (U) ($300) Continue conducting studies and analyses to support the Navy's Assessment process.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NPRDC, San Diego, CA. CONTRACTORS: MATHTECH, Inc., Falls Church, VA.

(U) RELATED ACTIVITIES:
- (U) PE 0605154N (Center for Naval Analysis)
- (U) PE 0605873M (Marine Corps Program Wide Manpower System)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605152N
PROGRAM ELEMENT TITLE: Studies and Analysis Support, Navy
PROJECT NUMBER: R0133
BUDGET ACTIVITY: 6
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R0133, National Academy of Sciences/Naval Studies Board/ASN Studies. This project supports the core program for the Naval Studies Board. As mutually agreed upon between the Chief of Naval Operations (CNO) and the President of the National Academy of Sciences and with appropriate attention to the influence of the domestic economy, national objectives, social imperatives and anticipated military requirement, the Naval Studies Board will conduct and report upon surveys and studies in the field of scientific research and development applicable to the operation and function of the Navy. Reports consist of a briefing to the Assistant Secretary of the Navy (Research, Development and Acquisition) (ASN(RDA)) and the CNO and staff, and written technical reports. This project supports Technology Initiative Games (TIG) at the Naval War College in FY 93 only.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($539) Continued Office of Naval Research (ONR) research opportunities studies, and supported C.H. Davis lecture, Weinblum Memorial Lecture Series, and International Conference on Numerical Ship Hydrodynamics.
- (U) ($288) Continued Advanced Technology Chair, conducted TIG, completed Mine Countermeasures study and completed additional studies in support of ASN(RDA) and CNO.

(U) FY 1994 PLAN:
- (U) ($471) Continue ONR research opportunities studies. Complete/conduct studies related to Littoral Warfare, Deterrence, Acoustic/Non-acoustic research and initiate emissionless ship research. Circulate Mine Countermeasure study for review and comment.

(U) FY 1995 PLAN:
- (U) ($568) Continue ONR research studies and studies in areas of interest to the Navy. Emphasize research on emissionless ships.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: Naval Postgraduate School, Monterey, CA; Naval War College, Newport, RI. CONTRACTORS: National Academy of Sciences, Washington, D.C.

(U) RELATED ACTIVITIES: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605152N
PROGRAM ELEMENT TITLE: Studies and Analysis Support, Navy
PROJECT NUMBER: R0133
BUDGET ACTIVITY: 6
DATE: 7 February 1994

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605152N
PROGRAM ELEMENT TITLE: Studies and Analysis Support, Navy
PROJECT NUMBER: R0147
BUDGET ACTIVITY: 6
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R0147, Operational Strategy and Tactical Effectiveness Analyses. This project provides the Chief of Naval Operations and the Secretary of the Navy direct analyses of Navy policy, strategy acquisition, and program planning in meeting the following objectives: (a) producing study results impacting upon important programs/issues, (b) identifying and evaluating policy and strategy alternatives and doctrine, and (c) evaluating the capabilities of programmed forces to accomplish missions assigned to the Navy. Deliverables consist of formal, structured documents containing or leading to conclusions and/or recommendations as well as the development and maintenance of databases and models. This project directly supports and is critical for conducting the Navy's joint mission assessments.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($ 12) Conducted studies and performed analysis evaluating concepts and strategies, defining requirements, assessing capabilities, reviewing program alternatives and analyzing program and planning issues.
- (U) ($203) Updated the Capabilities Resource Allocation Display (CAPRAD) Database and the Integrated Program Assessment System (IPAS).

(U) FY 1994 PLAN:
- (U) ($316) Continual reviews of the CAPRAD Database will be conducted and econometric/statistical analyses will be performed on the impact of changes, resulting in part from the restructuring of the Operation and Maintenance appropriations. Plans also include making changes and revalidating the IPAS and other readiness models in order to run these programs under the revised allocation display.
- (U) ($144) Conduct studies with and provide on-site training, analysis and enhancements to Integrated Theater Engagement Model (ITEM).

(U) FY 1995 PLAN:
- (U) ($356) Conduct studies and perform analysis evaluating concepts and strategies, defining requirements, assessing capabilities, reviewing program alternatives and analyzing program and planning issues.
- (U) ($205) Update the CAPRAD Database, IPAS, and ITEM.

(U) PROGRAM TO COMPLETION: This is a continuing program.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605152N
PROGRAM ELEMENT TITLE: Studies and Analysis Support, Navy
PROJECT NUMBER: R0147
BUDGET ACTIVITY: 6
DATE: 7 February 1994

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Patuxent River, MD. CONTRACTORS: MATHTECH, Inc., Princeton, NJ.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605152N
PROGRAM ELEMENT TITLE: Studies and Analysis Support, Navy
PROJECT NUMBER: R2040
BUDGET ACTIVITY: 6
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R2040, Foreign Ship & Submarine Vulnerability Program. This project assesses effectiveness of U.S. Navy weapons against potential foreign threat ships and submarines. It develops and upgrades analytical methods and models for evaluating weapon lethality against potential targets and for predicting threat ship/submarine vulnerability. It provides information needed for warhead design during acquisition processes, in-service weapon upgrades, weapon loadout requirements, and for tactical applications of weapons. The Foreign Ship and Submarine Vulnerability Program is a continuing program with specific pre-planned annual activities and goals.

(u) FY 1993 ACCOMPLISHMENTS:
- (u) ($273) Developed target descriptions (TDs);
- (u) ($250) Developed terminal weapon effectiveness assessments (TWEAs) for;

(u) FY 1994 PLAN:
- (u) ($210) Develop TDs for;
- (u) ($445) Develop TWEAs for
- (u) ($ 50) Update ASW Warhead Effectiveness Compendium.
- (U) ($150) Develop hit distributions for Harpoon/TASM/Penguin against surface ships and surfaced submarines.

(u) FY 1995 PLAN:
- (u) ($397) Develop TDs for
- (u) ($478) Develop TWEAs for
- (U) ($150) Continue to develop hit distributions for Harpoon/Penquin/Hellfire against selected surface ships and submarine targets.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, China Lake, CA; NAVSURFWARCENDIV, Dahlgren, VA; NAVSURFWARCEN WHITE OAK DET, Silver Spring, MD; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD. CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605152N
PROGRAM ELEMENT TITLE: Studies and Analysis Support, Navy
PROJECT NUMBER: R2040
BUDGET ACTIVITY: 6
DATE: 7 February 1994

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605152N
PROGRAM ELEMENT TITLE: Studies and Analysis Support, Navy
PROJECT NUMBER: W2092
BUDGET ACTIVITY: 6
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W2092, Naval Aviation Studies. This project supports studies over a wide range of naval aviation issues as a basis for recommendations to the Chief of Naval Operations concerning major policy, planning, and acquisition program decisions. This effort is a management initiative which will allow accounting and allocation of study resources in a timely manner according to priorities. This ongoing program will continue to leverage more detailed program specific analysis in order to gain insight into acquisition of various weapon systems and their impact on force structure, manning levels, operational readiness and carrier air wing (CVW) effectiveness. This program will also support various Cost and Operational Effectiveness Analysis studies.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($148) Continued study to quantify the benefits of enhanced situational awareness through aircraft-aircraft data transfer commencing with high fidelity simulation.
- (U) ($417) Initiated study of hypothetical future Tactical Aircraft (TACAIR) mix to identify critical mission systems and determine impact of weapons procurement decisions on future CVW operational readiness.
- (U) ($226) Initiated analysis of Strike Mission Planning options for the F/A-18 E/F and Strike F-14 TACAIR mix in a deployed Carrier Battle Group (CVBG).
- (U) ($ 32) Ensured ongoing joint aviation analyses considered CVW and CVBG employment.

(U) FY 1994 PLAN:
- (U) ($222) Continue CVW critical mission system analysis.
- (U) ($365) Initiate Battle Group (BG)/Maritime Action group (MAG) effectiveness for validity and timeliness of targeting data for TACAIR usage.
- (U) ($275) Define system requirements for naval aircraft in support of BG/MAG and CVBG operations.
- (U) ($276) Initiate analysis of strike aircraft in parametric threat environment leading to tradeoffs of tactics, electronic countermeasures, and signature control.

(U) FY 1995 PLAN:
- (U) ($728) Continue CVW mix requirement analysis based on new tactical and support aircraft procurement strategies and new world threat structure.
- (U) ($341) Continue and expand analysis of strike effectiveness in parametric threat environment with tradeoffs and sensitivities associated with tactics, electronic countermeasures and signature control.
- (U) ($20) Conduct general aviation studies and cost and operational effectiveness analyses studies.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605152N
PROGRAM ELEMENT TITLE: Studies and Analysis Support, Navy
PROJECT NUMBER: W2092
BUDGET ACTIVITY: 6
DATE: 7 February 1994

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA; NAVAIRWARCENACDIV, Patuxent River, MD; NAVAIRWARCENWPNDIV, China Lake, CA. CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605152N
PROGRAM ELEMENT TITLE: Studies and Analysis Support, Navy
PROJECT NUMBER: L2097
BUDGET ACTIVITY: 6
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: L2097, Manpower, Personnel, and Training Studies Support. The Chief of Naval Personnel has an ongoing need for direct analyses of Navy manpower, personnel, and training (MPT) policies and program planning. This project provides an essential management tool to: (a) assess the effectiveness of existing MPT policies and programs, (b) identify needs for new policies and programs, (c) determine required manpower and training mix relative to changing demographic, societal and legislative/regulatory trends, and to evolving strategic and geopolitical factors, (d) study the impact of MPT programs on Navy accession, retention, and performance, and (e) develop, validate and/or refine a broad range of MPT forecasting models. The program permits the Office of the Chief of Naval Operations to more effectively utilize MPT Research and Development expertise to respond to emerging MPT problems beyond Navy's control.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($ 20) Assessed utilization/cost of transferring pregnant women from ships.
- (U) ($ 24) Developed and evaluated Naval Reserve Recruiter Workload Model.
- (U) ($ 21) Developed and refined "Annualized Cost of Leaving" econometric model.
- (U) ($ 50) Examined impact of Naval Correctional Custody Unit closures.
- (U) ($ 44) Developed and evaluated Military Applicant Security Screening System

(U) FY 1994 PLAN:

- (U) ($ 70) Assess gender discrimination in the Navy.
- (U) ($ 50) Evaluate effects of drawdown programs on retention.
- (U) ($ 50) Examine minority personnel issues.
- (U) ($ 70) Study morale, welfare and recreation program contributions to gender-integrated Navy.
- (U) ($ 40) Determine costs and benefits of alternative graduate education programs.
- (U) ($ 33) Assess policies and procedures pertinent to manpower distribution and training.

(U) FY 1995 PLAN:

- (U) ($100) Study and analyze emerging issues associated with force downsizing and restructuring.
- (U) ($100) Evaluate policies associated with women on ships.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605152N
PROGRAM ELEMENT TITLE: Studies and Analysis Support, Navy
PROJECT NUMBER: L2097
BUDGET ACTIVITY: 6
DATE: 7 February 1994

- (U) ($ 50) Assess impact of moving/reducing civilian personnel on the MPT system.
- (U) ($ 69) Analyze the officer and enlisted distribution systems.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NTSC, Orlando, FL; NPRDC, San Diego, CA; NAVPGSCOL, Monterey, CA; USNA, Annapolis, MD; NCCOSC RDTE DIV, San Diego, CA; NRL, Washington, DC. CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES:
- (U) PE 0602234N (Materials, Electronics and Computer Technology)
- (U) PE 0603707N (Manpower, Personnel, and Training Advanced Technology Development)
- (U) PE 0604703N (Manpower, Personnel, Training, Simulation and Human Factors)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605152N
PROGRAM ELEMENT TITLE: Studies and Analysis Support, Navy
PROJECT NUMBER: S2233
BUDGET ACTIVITY: 6
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: S2233, Naval Surface Warfare Studies. This new start project provides for analysis of the warfighting capability of Naval forces by examining specific selected numbers and mixes of surface combatants and other forces that are subjected to representative operational situations in a joint littoral environment. The U.S. strategic emphasis has shifted from global containment and warfighting to a global stability strategy with regional focus. As part of an overall effort at addressing future Naval force levels and capabilities, the Navy must assess the warfighting effectiveness of different mixes of surface combatants in battle groups operating in a littoral warfare environment and develop an investment strategy that supports the capabilities required.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) Not applicable.

(U) FY 1994 PLAN:

- (U) Not applicable.

(U) FY 1995 PLAN:

- (U) ($2,017) Conduct campaign analyses to identify battle force capabilities considering various force mixes. These analyses will develop functional requirements of various task groups in a Joint littoral context. Warfare capabilities and Measures of Effectiveness will be obtained from scoping models and these results will be used in characterizing capabilities for battle space dominance (air, undersea, surface and land) and for power projection. Verify accuracy of results, review and modify campaign scenarios and operational situations to scope, focus and interpret the analyses. Apply results of these analyses to the 21st Century Surface Combatant Cost and Operational Effectiveness Analysis. Incorporate results into strategic planning and investment strategies for future Joint Littoral Warfare Naval Forces.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Dahlgren, VA. CONTRACTORS: John Hopkins University Applied Physics Laboratory, Laurel, MD.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605152N
PROGRAM ELEMENT TITLE: Studies and Analysis Support, Navy
PROJECT NUMBER: S2233
BUDGET ACTIVITY: 6
DATE: 7 February 1994

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605154N
PROGRAM ELEMENT TITLE: Center for Naval Analyses
BUDGET ACTIVITY: 6

DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0031	Marine Corps Operations Analysis Group, CNA								
	4,514	4,607	4,583	4,678	4,788	4,910	5,037	CONT.	CONT.
R0148	Center for Naval Analyses, Navy								
	38,657	38,653	40,811	42,111	43,310	44,519	45,769	CONT.	CONT.
TOTAL	43,171	43,260	45,394	46,789	48,098	49,429	50,806	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Center for Naval Analyses (CNA) is the Department of the Navy's only Federally Funded Research and Development Center (FFRDC). CNA provides independent, objective, and expert analyses based on its unique access to sensitive data and hands-on exposure to fleet operations gained through its world-wide field program. CNA's continuing program of research is primarily concentrated along 14 categories of study called product areas. These product areas are structured to enhance CNA's focus of applied research and analysis upon the major present and future needs and issues of the Navy and the Marine Corps. Because of rapid advances in technology, changes in the fleet, the increasing complexity of weapon systems, and future reductions in manpower, force structure, and budgets, the Navy and Marine Corps have a greater need for analyses that are both sophisticated and timely, and can only be effectively produced by the DON's FFRDC. CNA is uniquely qualified to meet that need.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605154N
PROGRAM ELEMENT TITLE: Center for Naval Analyses
PROJECT NUMBER: C0031
BUDGET ACTIVITY: 6
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C0031, Marine Corps Operations Analysis Group. This program supports the Marine Corps' portion of the Center for Naval Analyses (CNA) Research Program under the auspices of the Department of the Navy (DON) Annual Study and Analysis Plan for CNA. It is managed as an element of the Marine Corps Studies System. This program provides independent research and analysis, those appropriate for a Federally Funded Research and Development Center, in the areas of cost and operational effectiveness analysis, manpower utilization, training, force structure, weapons systems analysis, operational tests, and field exercise support. This program also provides CNA field representative and scientific analyst support at major Marine Corps commands.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($2,027) Executed the approved portion of the DON's FY 1993 Study and Analysis Plan for CNA including "Emerging" and "Quick Response" study and analysis requirements.
- (U) ($1,403) Staffed 6 Field Representatives and 7 Scientific Analysts.
- (U) ($1,084) Continued 7 FY 1992 study and analysis projects.

(U) FY 1994 PLAN:
- (U) ($1,197) Execute the approved portion of the DON's FY 1994 Study and Analysis Plan for CNA including "Emerging" and "Quick Response" study and analysis requirements.
- (U) ($1,465) Staffing of 6 Field Representatives and 7 Scientific Analysts.
- (U) ($1,945) Continuation of 10 FY 1993 study and analysis projects.

(U) FY 1995 PLAN:
- (U) ($1,825) Execute the approved portion of the DON's FY 1995 Study and Analysis Plan for CNA including "Emerging" and "Quick Response" study and analysis requirements.
- (U) ($1,558) Staffing of 6 Field Representatives and 7 Scientific Analysts.
- (U) ($1,200) Continuation of 11 FY 1994 study and analysis projects.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: Not applicable. CONTRACTORS: The Center for Naval Analyses, Alexandria, VA.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605154N
PROGRAM ELEMENT TITLE: Center for Naval Analyses

PROJECT NUMBER: C0031
BUDGET ACTIVITY: 6

DATE: 7 February 1994

(U) RELATED ACTIVITIES:
- (U) PE 0605873M (Marine Corps Program Wide Manpower System)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605154N
PROGRAM ELEMENT TITLE: Center for Naval Analyses
PROJECT NUMBER: R0148
BUDGET ACTIVITY: 6
DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0148 Center for Naval Analyses, Navy	38,657	38,653	40,811	42,111	43,310	44,519	45,769	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project supports the Navy's portion of the Center for Naval Analyses (CNA) research program. CNA conducts a wide range of projects that provide two fundamental services to the Navy: (1) on-site analyses for unified, specified, or fleet commanders to improve tactics and readiness of existing forces, and (2) analyses for Navy headquarters decision-makers with responsibility for systems acquisition, program planning and budgeting, and manpower management. CNA's study and analysis capabilities cover 14 categories, or product areas, of research, including: (a) geopolitical security environment; (b) roles, missions, and concepts of operations; (c) force planning and evaluation; (d) fleet tactics and capabilities; (e) joint Space and Electronic Warfare/Command, Control, Communications, Computers, Intelligence and Information; (f) cost and operational effectiveness analysis (COEA); (g) research and development and acquisition; (h) infrastructure; (i) manpower and personnel; (j) medical; (k) training; (l) readiness, maintenance, and logistics; (m) system requirements; and, (n) modeling and simulation. CNA's analyses have resulted in substantial improvements in force structure, fleet effectiveness, and significant cost avoidance.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($38,657) Addressed issues of major importance to the Navy's leadership in the research areas noted above. CNA's research program has been planned in a broad outline form on an annual basis, and has been continually updated to identify specific, "emerging" and "quick-response" study requirements to be conducted during the year. The frequent review of CNA's program ensures that it is coordinated with other Navy research and that it addresses critical, high-priority issues requiring CNA's innovative and objective approach. In the current and future budgetary climate the Navy must rely even more on CNA in its effort to maximize effectiveness from available resources.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605154N PROJECT NUMBER: R0148 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: Center for Naval Analyses BUDGET ACTIVITY: 6

2. (U) FY 1994 PLAN:

- (U) ($38,653) CNA's research program will be continually updated to ensure CNA's research and studies support the Navy efficiently and effectively. CNA's analytical support will be critical to Navy's transition to smaller budgets in a shifting national security environment. CNA's program will place greater emphasis on COEA's; tactical training; naval environmental issues; infrastructure; contributions to joint and multinational operations; roles and missions of the Navy; the role of the Naval Reserve; littoral warfare; efficiencies in readiness, logistics, and manpower and personnel; and, modeling and simulation validation.

3. (U) FY 1995 PLAN:

- (U) ($40,811) CNA's research program will be continually updated to ensure CNA's research and studies support the Navy efficiently and effectively. CNA's analytical support will be critical to Navy's transition to smaller budgets in a shifting national security environment. CNA's program will place greater emphasis on COEA's; tactical training; naval environmental issues; infrastructure; contributions to joint and multinational operations; roles and missions of the Navy; the role of the Naval Reserve; littoral warfare; efficiencies in readiness, logistics, and manpower and personnel; and, modeling and simulation validation.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: Not applicable. CONTRACTORS: The Center for Naval Analyses, Alexandria, VA.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

Y 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605154N
PROGRAM ELEMENT TITLE: Center for Naval Analyses

PROJECT NUMBER: R0148
BUDGET ACTIVITY: 6

DATE: 7 February 1994

G. (U) RELATED ACTIVITIES: Not applicable.

H. (U) OTHER APPROPRIATION FUNDS: Not applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605155N
PROGRAM ELEMENT TITLE: Fleet Tactical Dev & Eval Prog
PROJECT NUMBER: R0151
BUDGET ACTIVITY: 6
DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0151 Intertype Tactical Development and Evaluation	3,337	4,346	4,570	3,651	4,348	4,444	4,616	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND PROJECT: This program element supports all naval warfare task areas and provides technical and analytical support to the fleet operating forces to develop and evaluate tactics for newly evolving force structures, new and existing weapon system employment, and changing threat scenarios to improve and measure force readiness.

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS: Developed new and/or advanced tactics which included the following:

- (U) ($371) Developed new and advanced strike/anti-surface warfare (ASW) tactics.
- (U) ($504) Developed new and advanced anti-submarine warfare tactics against non-nuclear and nuclear submarines.
- (U) ($360) Began development of new and advanced mine countermeasure tactics.
- (U) ($369) Developed and evaluated new/advanced anti-air warfare tactics.
- (U) ($380) Developed and evaluated new/advanced battle group (BG) and battle force (BF) coordinated/joint procedures.
- (U) ($900) Developed and evaluated new/advanced air platform counter tactics against foreign weaponry.
- (U) ($398) Upgraded and provided support for the Navy Lessons Learned System (NLLS).
- (U) ($ 55) Developed and published an annual report for the Steering Committee and Quarterly Status Reports.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605155N
PROGRAM ELEMENT TITLE: Fleet Tactical Dev & Eval Prog
PROJECT NUMBER: R0151
BUDGET ACTIVITY: 6
DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($250) Continue development of mine countermeasures tactics.
- (U) ($200) Develop surface-to-air missile (SAM) counter-tactics including SAM versus TACAIR.
- (U) ($395) Develop EA-6B/jamming tactics including joint operations.
- (U) ($712) Develop strike warfare/joint procedures.
- (U) ($320) Develop enhanced anti-surface underwater warfare procedures emphasizing the littoral environment.
- (U) ($135) Develop night close air support (CAS)/joint CAS procedures.
- (U) ($260) Develop SAM tactical effectiveness utilizing results from USN/FGN Mayfly Exercise.
- (U) ($339) Develop ASW procedures emphasizing the non-nuclear threat/littoral environment.
- (U) ($810) Develop BG/BF joint procedures, emphasizing amphibious ship placement in a multi-threat environment; operational deception tactics in third world littorals; and, airborne warning control system joint operations.
- (U) ($130) Develop ship defense tactics versus anti-ship missile salvos.
- (U) ($260) Develop/evaluate helicoper self protection tactics.
- (U) ($480) Upgrade and provide support for NLLS.
- (U) ($ 55) Develop and publish annual report for Steering Committee and Quarterly Status Reports.

(U) FY 1995 PLAN:

- (U) ($440) Develop theatre ballistic defense tactics.
- (U) ($795) Develop and evaluate Naval expeditionary warfare tactics.
- (U) ($775) Develop and evaluate littoral warfare tactics.
- (U) ($250) Develop offensive mine clearance tactics and documentation.
- (U) ($900) Develop and evaluate expeditionary force C4I procedures.
- (U) ($575) Develop armed helicopter attack tactics.
- (U) ($300) Develop and evaluate mine counter-tactics.
- (U) ($480) Upgrade and provide support for NLLS.
- (U) ($ 55) Develop and publish annual report for Steering Committee and Quarterly Status Reports.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605155N
PROGRAM ELEMENT TITLE: Fleet Tactical Dev & Eval Prog
PROJECT NUMBER: R0151
BUDGET ACTIVITY: 6
DATE: 7 February 1994

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVTACSUPPACT, Washington, DC; COMOPTEVFOR, Norfolk, VA; NAVAIRWARCEN, Warminister, PA./China Lake, CA,; NCCOSC, San Diego, CA; NAVSURFWARCEN, Dahlgren, VA/Panama City, Fl.; NRL, Washington, DC/Stennis Space Center, MS; NAVUNSEAWARCEN, Newport, RI. CONTRACTORS: JHU/APL, Laurel, MD.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605804N
PROGRAM ELEMENT TITLE: Technical Information Services
PROJECT NUMBER: R0835
BUDGET ACTIVITY: 6
DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0835 Technical Information Services	14,260	14,113	1,776	1,486	1,450	1,423	1,424	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND PROJECT: This program provides for controlled access to, and exchange of, technical information by Navy/DoD components and present/potential contractors; supports Navy research and development initiatives by providing readily accessible technological information to all potential users electronically and aids in the appropriate structuring of the Joint Mission Areas (JMAs) and ONR goals; consolidated Navy funding to support the Defense Technical Information Center (DTIC) and Information Analysis Centers (IACs); funds the Navy Acquisition Research and Development Center (NARDIC); and supports transfer of Navy technology to business and local governments for civil use (Public Law 96-480, Federal Technology Transfer Act of 1986) through Navy technology publications, Offices of Research and Technology Applications (ORTAs), and promotion of Cooperative Research and Development Agreements (CRADAs).

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($8,170) Provided Navy funding for DTIC/IAC.
- (U) ($3,180) Initiated demonstration technology transfer marketing projects; developed and published second edition of CRADA handbook; funded major laboratory ORTA activities; set up technology transfer gateway systems; established electronic bulletin board; initiated technology transfer training; expanded input to DTIC and NARDIC; promoted use of the expanded DTIC and NARDIC inputs in Independent Research and Development (IR&D) program formulation; and supported IR&D plan distribution on CD-ROM.
- (U) ($2,910) Provided start-up funding for the Advanced Technical Information Support System.

(U) FY 1994 PLAN:
- (U) ($400) Coordinate IR&D technical information exchange between the Naval Research Laboratory/Warfare Centers and industry; support production/distribute IR&D plans/projects on CD-ROMs to Naval Research Laboratory/Warfare Centers; promote use of IR&D information in Navy program formulation.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605804N
PROGRAM ELEMENT TITLE: Technical Information Services
PROJECT NUMBER: R0835
BUDGET ACTIVITY: 6
DATE: 7 February 1994

- (U) ($2,313) Increase joint efforts with other agencies for regional/national technology transfer; coordinate technology transfer training for various levels in-house and publicize to industry; publicize NARDIC; solicit Navy requirements documents and technical reports to NARDIC and DTIC; expand FACT SHEET content and readership; and oversee Navy funding for Federal Laboratory Consortium.
- (U) ($4,000) Fund the Advanced Technical Information Support System.
- (U) ($7,400) Oversee and fund Navy share of DTIC/IAC services.

(U) FY 1995 PLAN:

- (U) ($850) Coordinate IR&D technical information exchange between the Naval Research Laboratory/Warfare Centers and industry, and manage Navy participation; organize video teleconferencing for technical information exchange; apply advanced data gathering/dissemination techniques for Industry IR&D.
- (U) ($926) Support technology transfer efforts by the Navy Warfare Centers, the Naval Research Laboratory, and the Naval Medical Research and Development Command.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Washington, D.C.; NAVAIRWARCENWPNDIV, China Lake, CA; NAVSURFWARCENDIV, Dahlgren, VA; NAVUNSEAWARCEN DET, New London, CT. CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605853N
PROGRAM ELEMENT TITLE: Management, Technical and International Support
BUDGET ACTIVITY: 6

DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0115	Supreme Allied Commander Atlantic ASW Research Center (SACLANTCEN)								
	320*	304	297	302	325	346	358	CONT.	CONT.
R0149	International Cooperative RDT&E								
	990*	796	1,325	1,239	1,267	1,298	1,332	CONT.	CONT.
R0231	ASW System Support								
	2,656	1,899	1,908	1,791	1,514	1,547	1,576	CONT.	CONT.
R0905	Naval Warfare Tactical Analysis								
	2,560	1,651	2,888	2,506	2,476	2,534	2,354	CONT.	CONT.
R1767	NWC Center for Naval Warfare Studies								
	1,459	1,254	1,298	1,273	1,288	1,316	1,345	CONT.	CONT.
R2146	Scientist/Engineer Exchange Program (SEEP)								
	0**	0	688	704	709	713	731	CONT.	CONT.
X1795	C3CM Decision Aid System								
	2,278	1,883	1,862	1,903	1,912	1,963	2,018	CONT.	CONT.
TOTAL	10,263	7,787	10,266	9,718	9,491	9,717	9,714	CONT.	CONT.

* R0115, R0149 and R2146 Restructured from PE 0605857N
** Funded in R0149

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program provides management and technical support for several national and international projects. Projects R0231, R0905, and X1795 provide analytical and management support to the Planning and Programming segments of the Planning, Programming and Budgeting System (PPBS). These projects support the development of annual joint mission area assessments which provide the analytical underpinnings and basis for programmatic decisions made by the Navy's top leadership during the Planning and Programming phases of the PPBS process.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605853N
PROGRAM ELEMENT TITLE: Management, Technical and International Support
BUDGET ACTIVITY: 6

DATE: 7 February 1994

(U) Project R0115 provides for the salaries and administrative cost to maintain the U.S. scientific staff assigned to the Supreme Allied Commander Atlantic, Undersea Research Center (SACLANTCEN), La Spezia, Italy. Additionally, R0115 supports collaboration between U.S./SACLANTCEN scientists, the lease/loan of equipment, and the purchase of expendables to support the Center's scientific program.

(U) Project R0149 provides program management, execution, and support to implement a broad range of cooperative naval research and development initiatives with allied and friendly nations. Potential cooperative programs are pursued to fulfill established operational requirements, enhance U.S./allied interoperability and standardization, obtain unique foreign technologies, and reduce U.S. developmental and production costs. Such efforts result in:

- (U) Development and negotiation of approximately 25 international RDT&E Memoranda of Understanding with allied and friendly nations.
- (U) Management of over 300 information exchange agreements.
- (U) Participation in armaments cooperation fora including the Conference of NATO Armaments Directors groups (e.g., the NATO Naval Armaments Group), Senior National Representative consultation, and the Technical Cooperation Program.

(U) Project R1767 supports the Naval War College (NWC) in formulating and developing strategy and campaign alternatives. Under this project, the NWC provides continuing support to the Chief of Naval Operations Strategic Studies Group, the Center for Naval Warfare Studies, and other CNO, UNIFIED, and Fleet CINC projects in the area of multinational cooperation and command, control, communications and intelligence.

(U) Project R2146 supports DoN scientists and engineers during their assignments at various allied research facilities under the Scientist/Engineer Exchange Program which involves approximately 30 U.S. and allied naval personnel.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605853N
PROGRAM ELEMENT TITLE: Management, Technical and International Support

PROJECT NUMBER: R0115
BUDGET ACTIVITY: 6

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R0115, SACLANTCEN. This project provides for salary and administrative costs for U.S. Navy scientists at the NATO Supreme Allied Commander Atlantic, Undersea Research Center (SACLANTCEN), La Spezia, Italy. It also provides for all U.S. direct support to SACLANTCEN for administering requests for equipment, other assets, services, and to foster scientific collaboration between U.S. and SACLANTCEN. The Centre s unique research facilities and reservoir of oceanographic/acoustic data bases and knowledge are used to augment and complement United States Navy Anti-Submarine Warfare (ASW) related research.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($ 20) Leased hydrophones for use in joint U.S./SACLANTCEN at-sea measurements.
- (U) ($ 11) Supported joint U.S./SACLANTCEN development of apparatus for in situ measurement of shear velocity in marine sediments. This work is being continued in FY-94 with the Centre and will lead to an in situ capability to predict probability of buried mines in shallow water.
- (U) ($100) Participated in an at-sea acoustic experiment with SACLANTCEN to measure bottom effects in shallow water, including slopes.
- (U) ($ 20) Participated in a joint experiment to determine primary physical mechanisms for volume reverberation for Low Frequency Active Systems. This multinational effort involved Germany, SACLANTCEN, and the U.S. Provided a final report on this work.
- (U) ($ 50) Accounted for fluctuations of reverberation in shallow water. Identified statistics of the reverberation as a function of measurable environmental parameters, such as sediment type, and shear. The first part of this effort was, in collaboration with SACLANTCEN, to exercise a SACLANTCEN research model that predicts this quantity against SACLANTCEN at-sea data. The second part of this work is being funded in FY-94 by ONR (AEAS). The U.S. was able to accomplish this without an at-sea experiment by leveraging SACLANTCEN data.
- (U) ($ 37) Developed a comprehensive MCM model by using the 'best' model from the NATO nations.
- (U) ($ 25) Collaborated with SACLANTCEN and Scripps Institute of Oceanography for the development of new acoustic inversion techniques.
- (U) ($ 20) There has been much interaction between the U.S. scientific community and SACLANTCEN. These funds provided for a comprehensive report describing these interactions.
- (U) ($ 20) Provided support for the U.S. Scientific Committee National Representative (SCNR), his alternate, and the U.S. National Liaison Officer to attend biannual SCNR meetings.
- (U) ($ 16) Supported two U.S. students in the annual SACLANTCEN Summer Research program.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605853N
PROGRAM ELEMENT TITLE: Management, Technical and International Support
PROJECT NUMBER: R0115
BUDGET ACTIVITY: 6
DATE: 7 February 1994

- (U) ($ 1) Provided measurement equipment and lab equipment.

(U) FY 1994 PLAN:
- (U) ($130) Support joint U.S./SACLANTCEN development of a device to measure shear strength of marine sediments in shallow water. Apply to mine burial predictions. This is the second part of the FY-93 work to develop an in situ capability to predict mine burial probability.
- (U) ($ 40) Collaboration between the U.S. and SACLANTCEN to complete the evaluation of MCM models from the various NATO nations.
- (U) ($ 25) Collaborate with SACLANTCEN to complete data analysis of SACLANTCEN oceanographic data, in particular surface drifter data.
- (U) ($ 40) Collaborate between the U.S. and SACLANTCEN in shallow water reverberation modeling.
- (U) ($ 20) Lease hydrophones for use in joint U.S./SACLANTCEN experiments.
- (U) ($ 13) Provide support for U.S. participants in the annual SACLANTCEN Summer Research Assistants program.
- (U) ($ 35) Provide support for the U.S. SCNR representative, his alternate and the U.S. National Liaison Officer to attend biannual SCNR meetings. Also includes funds for ONR scientists to visit the Centre to augment U.S. programs.
- (U) ($ 1) Provide measurement equipment and lab equipment.

(U) FY 1995 PLAN:
- (U) ($ 85) Collaborate with SACLANTCEN and NATO nations in support of Littoral Warfare.
- (U) ($ 22) Lease hydrophones for joint experiments with SACLANTCEN.
- (U) ($ 30) Provide support for the U.S. representative, his alternate and the U.S. National Liaison Officer to attend biannual SCNR meetings.
- (U) ($ 18) Provide support for U.S. participation in the annual SACLANTCEN Summer Research Assistants program.
- (U) ($ 72) Collaborate with SACLANTCEN to develop rapid assessment for shallow water areas.
- (U) ($ 70) Collaborate with SACLANTCEN in the development of shallow water mine countermeasure predictions.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NRL, Stennis Space Center, MS; NRL, Washington, D.C.; NAVUNSEAWARCEN DET, New London, CT; SACLANTCEN, La Spezia, Italy; NAVSURFWARCENCOASTSYSTA, Panama City, FL. CONTRACTORS: Pennsylvania

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605853N
PROGRAM ELEMENT TITLE: Management, Technical and International Support

PROJECT NUMBER: R0115
BUDGET ACTIVITY: 6

DATE: 7 February 1994

State University/APL, State College, PA; Lamont-Doherty Geological Observatory, Palisades, NY.

(U) RELATED ACTIVITIES:
- (U) PE 0601153N (Defense Research Sciences)
- (U) PE 0602314N (Undersea Surveillance & Weapons Technology)
- (U) PE 0603207N (Air/Ocean Tactical Application)
- (U) PE 0603785N (Combat Systems Oceanographic Performance Assessments)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: NATO SACLANT ASW Research Centre Charter 31 Oct 1962

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605853N
PROGRAM ELEMENT TITLE: Management, Technical and International Support
PROJECT NUMBER: R0149
BUDGET ACTIVITY: 6
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R0149, International Cooperative RDT&E. International RDT&E project efforts include: development/negotiation of international Memoranda of Understanding (MOUs) required to implement cooperative research and development projects, management of information exchange programs, and participation in DoD directed armaments cooperation groups such as Conference of NATO Armaments Directors and the Technical Cooperation Program.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($ 47) Supported DoN participation at Senior National Representatives (SNR) conferences with allies to harmonize operational requirements and identify candidate projects for collaboration.
- (U) ($306) Continued to support DoN participation in U.S./allied data exchange conferences as well as an on-going review of all information exchange agreements in order to ensure data exchange agreements (DEAs).
- (U) ($177) Funded the foreign assignments of three DoN engineers under the Scientist/Engineer Exchange Program.
- (U) ($420) Continued to update and maintain the DoN data bases for drafting, negotiating, managing and tracking of proposed International Agreements (IAs) for "high leverage/high payoff" research and development (R&D) technology base cooperative projects with key allies and friendly nations that focus on projects in Command, Control and Communications, naval mine warfare, and electronic warfare.
- (U) ($ 40) Negotiated cooperative IAs with the assistance of NAVSEA and NAVSURFWARCEN CARDERCCKDIV.

(U) FY 1994 PLAN:

- (U) ($ 80) Continue to support DoN participation at SNR Conferences with allies for harmonization of requirements and identification of potential collaborative R&D projects.
- (U) ($293) Continue to support DoN participation in U.S./allied data exchange conferences to identify foreign technologies and R&D projects in which the Navy may desire to collaborate as well as the on-going review to initiate/revise/terminate DEAs to target new technologies and expand, where appropriate, to include exchanges with former Eastern Block Countries and the Commonwealth of Independent States (CIS).
- (U) ($300) Continue to update and maintain the DoN data bases for drafting, negotiating, managing and tracking of proposed IAs for "high leverage/high payoff" R&D technology base cooperative projects with key allies and friendly nations.
- (U) ($ 25) Provide support to the Tri-Service Project Alliance Ad Hoc International Programs Working Group in identifying and pursuing cooperative opportunities with our allies in critical technology areas.
- (U) ($ 27) Maintain engineers/scientists who are assigned to the Scientist/Engineer Exchange Program that

are working in foreign research facilities that possess critical technologies.
- (U) ($ 71) Continue to fund the efforts of SYSCOMS and laboratories in researching and negotiating international cooperative projects.

(U) FY 1995 PLAN:
- (U) ($100) Continue to support DoN participation at SNR Conferences with allies for harmonization of requirements and identification of potential collaborative R&D projects.
- (U) ($350) Continue to support DoN participation in U.S./allied data exchange conferences to identify foreign technologies and R&D projects in which the Navy may desire to collaborate as well as the on-going review to initiate/revise/terminate DEAs to target new technologies and expand, where appropriate, to include exchanges with former Eastern Block Countries and CIS.
- (U) ($525) Continue to update and maintain the DoN data bases for drafting, negotiating, managing and tracking of proposed IAs for "high leverage/high payoff" R&D technology base cooperative projects with key allies and friendly nations.
- (U) ($150) Provide support to the Tri-Service Project Alliance Ad Hoc International Programs Working Group in identifying and pursuing cooperative opportunities with our allies in critical technology areas.
- (U) ($200) Continue to fund the efforts of SYSCOMS and laboratories in researching and negotiating international cooperative projects.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD. CONTRACTORS: JIL Systems, Arlington, VA; Booz Allen, Arlington, VA.

(U) RELATED ACTIVITIES:
- (U) PE 0603790D (Nunn Armaments Cooperation)
- (U) PE 0605130D (Foreign Comparative Testing)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Effort includes development/negotiation of all DoN R&D international MOUs required to implement cooperative R&D projects. Funding is not project specific.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605853N
PROGRAM ELEMENT TITLE: Management, Technical and International Support

PROJECT NUMBER: R0231
BUDGET ACTIVITY: 6

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R0231, Anti-Submarine Warfare (ASW) System Support. This project develops, validates and reviews the Navy's Investment Strategy through the Joint Mission Area Assessment process. Conducts analyses to define requirements, assess programs and performance, and make cost/performance tradeoffs across Joint Mission/Support Areas. Supports development of ASW architectures and development, and maintenance of ASW models.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($1,679) Examined Force Structure versus Cost Effectiveness for all Joint Mission Areas in specific scenarios.
- (U) ($ 45) Supported faculty research at U.S. Naval Postgraduate School in areas related to ASW modeling and signal processing.
- (U) ($ 300) Held seminar war games for Joint Littoral and Strategic Deterrence as part of the FY-94 and FY-95 assessment/POM process for "rightsizing".
- (U) ($ 132) Formulated Battlespace Dominance and Power Projection assessments.
- (U) ($ 413) Examined ASW Force Structure versus Cost Effectiveness in specific scenarios.
- (U) ($ 37) Continued the ASW model maintenance and development initiative.
- (U) ($ 50) Studied AEGIS, Amphibious, Marine Air Ground Task Force Lateral Command, Control, Communications, Computers and Intelligence connectivity.

(U) FY 1994 PLAN:
- (U) ($1,614) Continue examining Force Structure versus Cost Effectiveness in specific scenarios across Joint Mission/Support Areas.
- (U) ($ 200) Develop database analysis tool for programmatic and financial information.
- (U) ($ 45) Continue support to Naval Post Graduate School.
- (U) ($ 40) Continue the ASW model maintenance and development initiative.

(U) FY 1995 PLAN:
- (U) ($1,823) Continue effort in determining most cost effective forces required across all Joint Mission and Support Areas. Major emphasis is placed on trade-off analysis with consideration to all warfare tasks ing ASW, Strike Warfare, Anti-Surface Warfare, Mine Warfare, Amphibious Warfare, Anti-Air Warfare, Special Warfare, Logistics, Space and Electronic Warfare and Intelligence, Manpower, Personnel and ing, Readiness and Sustainability, Overseas Presence, and Surveillance how they impact Battle Space

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605853N
PROGRAM ELEMENT TITLE: Management, Technical and International Support

PROJECT NUMBER: R0231
BUDGET ACTIVITY: 6

DATE: 7 February 1994

Dominance, Power Projection, Force Sustainment, and Command/Control and Surveillance. This effort has direct input into all Joint Mission Area and Support Area Assessment analyses and therefore impacts the Investment Balance Review upon which the Navy bases its Investment Strategy.

- (U) ($ 45) Continue to support Naval Post Graduate School in its efforts in ASW research and advanced studies.
- (U) ($ 40) Continue ASW model maintenance and development initiative.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVUNSEAWARCENDIV, Newport, RI; NAVUNSEAWARCEN DET, New London, CT. CONTRACTORS: CNA, Alexandria, VA; Johns Hopkins University/APL, Laurel, MD; Systems, Planning and Analysis, Inc., Alexandria, VA; Presearch, Inc., Arlington, VA; MITRE Corp., Fairfax, VA; IDA, Alexandria, VA.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605853N
PROGRAM ELEMENT TITLE: Management, Technical and International Support

PROJECT NUMBER: R0905
BUDGET ACTIVITY: 6

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R0905, Naval Warfare/Tactical Analyses. This project provides analytical and management support to the Deputy Chief of Naval Operations for Resources, Warfare Requirements, and Assessments within all Joint Mission and Support Areas, including Littoral, Space and Electronic Warfare, Strike, Surveillance, Strategic Deterrence, Readiness and Sustainability, Sealift, and Manpower, Personnel and Training. Funds are used to conduct continuing analyses of Navy's capabilities and limitations in execution of these missions.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($1,733) Developed Joint Mission and Support Areas as listed above.
- (U) ($ 827) Continued to support OSPREY REINDEER.

(U) FY 1994 PLAN:
- (U) ($1,039) Continue to support Joint Mission and Support Area assessments as listed above.
- (U) ($ 612) Continue to support OSPREY REINDEER.

(U) FY 1995 PLAN:
- (U) ($2,061) Continue to support Joint Mission and Support Area assessments as listed above.
- (U) ($ 827) Continue to support OSPREY REINDEER.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENCOASTSYSTA, Panama City, FL; NRL, Washington, DC; NRL, Orlando, FL; NAVSURFWARCEN CARDEROCK DIV, Bethesda, MD; COMINEWARCOM, Charleston, SC; NAVAIRWARCENWPNDIV, China Lake, CA. CONTRACTORS: Booz-Allen-Hamilton, Arlington, VA; The Aerospace Corporation, El Segundo, CA; Johns Hopkins/APL, Laurel, MD; Global Associates, Arlington, VA.

(U) RELATED ACTIVITIES: Supports all Naval Warfare Areas.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605853N
PROGRAM ELEMENT TITLE: Management, Technical and International Support

PROJECT NUMBER: R1767
BUDGET ACTIVITY: 6

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R1767, Naval War College (NWC) Center for Naval Warfare Studies. NWC research activities serve as a focal point, stimulus, and major source of strategic and campaign thought within the Navy. These efforts generate strategy and campaign alternatives, provide for evaluation through wargaming methodologies, and provide recommendations to the Chief of Naval Operations (CNO) and fleet commanders regarding the formulation and execution of strategy.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($560) Conducted strategic studies in response to SECNAV, CNO, UNIFIED, and Fleet CINC taskings in such areas as multi-national cooperation options and joint command, control, and communication issues.
- (U) ($849) Conducted over 40 major wargames culminating in Global War Game '93 involving some 1,500 participants from over 40 different organizations to assess the global security environment.
- (U) ($ 50) Provided for selected NWC students to conduct advanced research projects.

(U) FY 1994 PLAN:
- (U) ($540) Conduct strategic studies in response to SECNAV, CNO, UNIFIED and Fleet CINC taskings in such areas as nuclear arms proliferation and multi-national cooperation options, and commence emergent FY 1995 taskings.
- (U) ($664) Conduct major wargames culminating in Global War Game '94.
- (U) ($ 50) Provided for selected NWC students to conduct advanced research projects.

(U) FY 1995 PLAN:
- (U) ($550) Conduct strategic studies in response to SECNAV, CNO, UNIFIED, and Fleet CINC taskings in such areas as nuclear arms proliferation and multi-national cooperation options and commence emergent FY 1995 taskings.
- (U) ($698) Conduct major wargames culminating in Global War Game '95.'
- (U) ($ 50) Provide for selected NWC students to conduct advanced research projects

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: Naval War College, Newport, RI. CONTRACTORS: Sonalysts, Inc., Waterford, CT.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605853N
PROGRAM ELEMENT TITLE: Management, Technical and International Support

PROJECT NUMBER: R1767
BUDGET ACTIVITY: 6

DATE: 7 February 1994

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605853N
PROGRAM ELEMENT TITLE: Management, Technical and International Support

PROJECT NUMBER: R2146
BUDGET ACTIVITY: 6

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R2146, Scientist/Engineer Exchange Program (SEEP). SEEP is a DoD program for the exchange of selected U.S. and foreign scientists and engineers in which the Navy participates. SEEP is designed to develop close technical relationships with allies and friendly nations. This program provides on-site working assignments for qualified DoN military and civilian personnel in allied defense laboratories and for the reciprocal assignment of allied personnel to DoN facilities. The SEEP participants are to determine the availability of foreign technologies to meet DoN requirements or to serve as a basis for cooperative projects as well as provide USN scientists and engineers exposure to different cultural views and processes toward research and development.

(U) FY 1993 ACCOMPLISHMENTS: Not applicable.

(U) FY 1994 PLAN: Not applicable.

(U) FY 1995 PLAN:
- (U) ($688) Increase the level of Navy participation in SEEP to approximately 7 engineers/scientists. Apply lessons learned from analysis of FY 1993 assignments to matching engineers and scientists in future assignments. Continue to conduct post-assignment analysis and targeting of emerging technologies and foreign research establishments research programs.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVSEA, Washington, DC; NAVAIRWARCENACDIV, Warminster, PA; NCCOSC RDT&E DIV, San Diego, CA; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NAVSURFWARCENDIV, Port Hueneme, CA. CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES:
- (U) PE 0603790D (Nunn Armaments Cooperation)
- (U) PE 0605130D (Foreign Comparative Testing)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605853N
PROGRAM ELEMENT TITLE: Management, Technical and International Support
PROJECT NUMBER: X1795
BUDGET ACTIVITY: 6
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X1795, Command, Control, and Communications Countermeasure (C^3CM) Decision Aid System. The C^3CM Decision Aid project provides all source C^3CM simulation and analysis systems that simulate, in fine detail, analytical cases ranging from one-on-one to global operational situations. It supports development of warfare system architectures and Space and Electronic Warfare (SEW) systems through effectiveness trade-off analyses. A key element of the C^3CM Decision Aid System is the SEW Simulator (SEWSIM), which is an operations analysis tool designed for use in assessing the projected effectiveness of current and future SEW systems under realistically simulated operating conditions in a variety of threat scenario environments. These simulation systems are used to compute specific SEW related measures of effectiveness. Applications include Joint Mission Assessments, Investment Balance Reviews (IBR), Cost and Operational Effectiveness Analyses, and other SEW assessments.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($1,078) Assessed effectiveness of SEW systems in Defense Planning Guidance/Joint Chief of Staff (DPG/JCS) Concurrent Scenario to support POM-96 appraisal and multi-warfare analysis.
- (U) ($ 100) Purchased hardware components for SEWSIM computer upgrade to achieve increased processing capability.
- (U) ($ 600) Performed software and database threat enhancements, and initiated conditional logic research.
- (U) ($ 500) Completed SEWSIM accreditation process.

(U) FY 1994 PLAN:
- (U) ($1,383) Assess effectiveness of SEW systems in JCS approved scenarios in support of IBRs and Joint Mission Area Assessments. Include the concept of COPERNICUS and alternative implementation approaches.
- (U) ($ 78) Expand post-processing analysis capabilities.
- (U) ($ 324) Use algorithms in SEWSIM to support the implementation of the Navy Modeling and Simulation Corporate Strategy.
- (U) ($ 98) Perform software and database enhancements to enable SEWSIM to maintain pace with platform and system updates and threat enhancements, including the characterization and fusion at each Command and Control node.

(U) FY 1995 PLAN:
- (U) ($1,362) Assess effectiveness of SEW systems in DPG/JCS approved scenario in support of IBRs and Joint

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605853N
PROGRAM ELEMENT TITLE: Management, Technical and International Support

PROJECT NUMBER: X1795
BUDGET ACTIVITY: 6

DATE: 7 February 1994

Mission Area Assessments.

- (U) ($ 100) Continue SEWSIM upgrades for increased processing capability.
- (U) ($ 300) Continue C^3CM Support and Implementation of the Navy Modeling and Simulation Corporate Strategy.
- (U) ($ 100) Continue Data Base Enhancements and Research to improve SEW modeling capabilities.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NCCOSC, San Diego, CA; NRL, Washington, DC; NAVSURFWARCENDIV, Dahlgren, VA. CONTRACTORS: TBD.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605856N
PROGRAM ELEMENT TITLE: Strategic Technical Support
BUDGET ACTIVITY: 6

DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
M0100 Biomedical Support for Submarine Systems	1,358	1,141	566	843	868	891	917	CONT.	CONT.
R0128 Management and Technical Support, Strategic	1,467	1,261	985	1,204	1,356	1,414	1,414	CONT.	CONT.
Z1038 Acoustic and Non-Acoustic Analysis Support	1,307	1,200	994	1,004	1,054	1,088	1,129	CONT.	CONT.
TOTAL	4,132	3,602	2,545	3,051	3,278	3,393	3,460	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT:

1. (U) M0100 Biomedical Support for Submarine Systems - Provides biomedical knowledge necessary to increase effectiveness and enhance operator performance with visual and auditory sonar techniques to improve the operator's ability to detect, track and classify multiple targets. The more acoustically cluttered littoral environment makes the operator's role more critical since automated systems were optimized for isolated deep water combat.

2. (U) R0128 Management and Technical Support, Strategic - Develops strategic and theater nuclear concepts, determines technology requirements, defines systems and options for strategic deterrence requirements for strategic force survivability, examines reentry system requirements in support of sea-based strategic (nuclear and conventional) deterrent systems, and establishes Navy Deterrent Command, Control and Communications requirements. It includes assessment of future strategic deterrent forces and capabilities, the implications of that deterrence on national security policy, and consequential force requirements and employment policies for deterrent forces. Develops policy recommendations concerning arms control and its effect on Naval forces, both nuclear and conventional. This project provides unique support necessary to produce optimum future naval contributions to conventional and nuclear forces to provide strategic deterrence.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605856N
PROGRAM ELEMENT TITLE: Strategic Technical Support
BUDGET ACTIVITY: 6

DATE: 7 February 1994

3. (U) Z1038 Acoustic and Non-Acoustic Analysis Support - Provides for research and development of new data collection and analysis techniques in support of sensor and weapons system development; provides for responsive support to sensor and weapons system development for enhanced signal exploitation and threat vulnerability characterization through technical analysis; develops exploitation techniques to determine the acoustic and non-acoustic vulnerabilities of diesel submarines in shallow water for regional conflict engagement planning.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605856N PROJECT NUMBER: M0100 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: Strategic Technical Support BUDGET ACTIVITY: 6

C. (U) JUSTIFICATION FOR PROJECTS:

(U) PROJECT NUMBER AND TITLE: M0100, Biological Support for Submarine Systems. Provides biomedical knowledge necessary to increase effectiveness and enhance performance of critical submarine tasks with particular emphasis on development and assessment of improved visual and auditory sonar techniques to improve the operator's ability to detect, track and classify multiple targets. Additionally, operator-machine interface issues are investigated.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($677) Audio: Reported detection performance with analysis and synthesis by rule. Conducted at sea test of shaping technique, and at sea test of active-noise canceling headsets. Made recommendations for Acoustic Intercept (ACINT) sonar riders.
- (U) ($193) Visual: Developed algorithms for filtering spatial frequency components of displayed images to enhance detection of weak signals. Recommended color display parameters for Advanced Mine Detection Systems (AMDS). Reported on non-uniform data scaling techniques to enhance target detection of 256 gray shade displays.
- (U) ($488) Digital Audio: Reported on trade-offs of digital sample rate and bit quantification on target detection and discrimination.

(U) FY 1994 PLANS:

- (U) ($600) Recommend specifications for active noise canceling sonar headsets for SSNs. Deliver to NAVSEA report on sonar shack surveys. Provide signal-filtering techniques that enhance aural detection, classification, and tracking for generic sonar signals and noise backgrounds. Develop algorithms and performance assessments of temporal signal processing techniques to enhance aural classification.
- (U) ($360) Visual: Develop algorithm for filtering and colonizing Low Frequency Analysis Recording (LOFAR) data to include narrow medium, and broadbrand contacts in one image. Optimize display parameters for human performance and complete comparative studies with traditional displays.
- (U) ($181) Digital Audio: Report on audibility of temporally reversed signals.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605856N
PROGRAM ELEMENT TITLE: Strategic Technical Support
PROJECT NUMBER: M0100
BUDGET ACTIVITY: 6
DATE: 7 February 1994

(U) FY 1995 PLANS:

- (U) ($200) Audio: Report to NAVSEA degradations in audio circuitry of SQQ-5 sonar, with recommendations for improvements. Report virtual auditory display that facilitate increased auditory workload. Identify audio signal enhancement methods to optimize target identification.
- (U) ($218) Visual: Develop recommendations for color coding the broadband bearing time displays using the predominant frequency emitted by the contact.
- (U) ($148) Digital Audio: Develop target-based spectral enhancement for aural analysis and target tracking and management.

(U) PROGRAM TO COMPLETION: This is a continuing program.
(U) WORK PERFORMED BY: IN-HOUSE: NAVSUBMEDRSCHLAB, New London, CT. CONTRACTORS: Not applicable.
(U) RELATED ACTIVITIES: PE 0603792N, Advanced Technology Transition.
(U) OTHER APPROPRIATION FUNDS: Not applicable.
(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605856N
PROGRAM ELEMENT TITLE: Strategic Technical Support
PROJECT NUMBER: R0128
BUDGET ACTIVITY: 6
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECTS:

(U) PROJECT NUMBER AND TITLE: R0128, Management and Technical Support, Strategic. Provide Strategic Force Structure analysis to aid CNO, SECNAV, JCS, and OSD in support of the National Military Strategy. Evaluate strategic force balance, capabilities, and survivability. Assess future needs and develop plans and testing requirements for future systems to meet those needs. Continually improve Strategic Forces to support national policy. Assess the strategic deterrence (conventional and nuclear) forces and capabilities in the Navy.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($125) Completed the Future Deterrence Study that provides a strategic vision of the Navy's role in deterrence during the 21st century.
- (U) ($100) Assessed the strategic deterrence (conventional and nuclear) force structure and capability in the Navy.
- (U) ($847) Supported the analyses of programs which enhance strategic deterrence. Developed methodology for measuring deterrence capability of weapons and platforms.
- (U) ($145) Commenced Trident SSBN employment alternatives study.
- (U) ($250) Assessed the impact of Arms Control negotiations and proposed a Navy policy that supports a win-win agreement for the Arms Control process.

(U) FY 1994 PLANS:
- (U) ($250) Continually evaluate and improve Strategic Force Structure, survivability, targeting, C3 networking, and SSBN deployments.
- (U) ($731) Analyze Force Structure to balance present and future strategic deterrence requirements and analyze regional threats.
- (U) ($70) Conduct a comprehensive review of nuclear posture.
- (U) ($70) Analyze U.S. Military and Naval roles in counterproliferation.
- (U) ($60) Continue study of follow-on questions for the Future Deterrence Study to provide a strategic vision of the Navy's role in deterrence during the 21st century.
- (U) ($40) Analyze strategic requirements to establish a floor for the number of required warheads.
- (U) ($40) Analyze means to deter third world actors.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605856N
PROGRAM ELEMENT TITLE: Strategic Technical Support
PROJECT NUMBER: R0128
BUDGET ACTIVITY: 6
DATE: 7 February 1994

(U) FY 1995 PLANS:

- (U) ($250) Continue to assess the strategic deterrence (conventional and nuclear) force structure and capability in the Navy.
- (U) ($525) Prioritize systems that contribute to deterrence. Continue development and application of methodology for measuring nuclear and conventional deterrence capability of weapons systems and platforms. Investigate the synergy between information warfare, surveillance and strategic deterrence.
- (U) ($60) Review the Trident Manning Alternatives Study recommendations.
- (U) ($80) Assess the impact of Arms Control negotiations on SSBN force structure. Balance Force Structure to provide strategic deterrence to present and expected regional threats through 2010.
- (U) ($70) Continue to analyze U.S. Military and Naval roles in counterproliferation.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Dahlgren, VA. CONTRACTORS: Science Applications International Corporation, San Diego, CA; MITRE Corporation, McLean, VA; and Johns Hopkins University/Applied Physics Laboratory, Laurel, MD.

(U) RELATED ACTIVITIES:

- PE 0603311F Advanced Strategic Missile Systems
- PE 0101221N Strategic Submarine and Weapons System Support
- PE 0605864F Test and Evaluation.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605856N
PROGRAM ELEMENT TITLE: Strategic Technical Support
PROJECT NUMBER: Z1038
BUDGET ACTIVITY: 6
DATE: 7 February 1994

C. (u) JUSTIFICATION FOR PROJECTS:

(u) PROJECT NUMBER AND TITLE: Z1038, Acoustic and Non-Acoustic Analysis Support. Research and development of new data collection and analysis techniques in support of sensor and weapons system development; supports development of effective ASW tactics and identification of target characteristics and vulnerabilities through technical analysis; provides unique hardware and software development at the Office of Naval Intelligence (ONI).

(u) FY 1993 ACCOMPLISHMENTS:
- (u) ($500) Completed Phase I [ ] processing system.
- (u) ($25) Updated [ ] intercept system for new sonar frequencies.
- (u) ($250) Developed new modeling for "Rest of World" diesel [ ] and non-traditional acoustic signature research.
- (u) ($250) Developed additional capabilities to track [ ] in shallow water.
- (u) ($25) Developed processing capabilities for [ ] collection systems.
- (u) ($100) Continued additional development of shallow water [ ]
- (u) ($132) Continued support to overseas collection sites.
- (u) ($25) Developed new Fixed Distributed System (FDS) data

(u) FY 1994 PLANS:
- (u) ($150) Develop database systems for customer on-demand access.
- (u) ($350) Add processing tools for exploitation of diesel [ ]
- (u) ($100) Refine [ ] models, with emphasis on diesels.
- (u) ($100) Research new [ ] characterization methods.
- (u) ($250) Expand shallow water environmental database and models.
- (u) ($50) Refine [ ] systems.
- (u) ($25) Incorporate exploitation from [ ] collection systems.
- (u) ($25) Enhance [ ]
- (u) ($150) Continue support to overseas [ ] sites.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605856N PROJECT NUMBER: Z1038 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: Strategic Technical Support BUDGET ACTIVITY: 6

(u) FY 1995 PLANS:

- (u) ($105) Continue development of computer aids to support on-demand, on-line access to the Database by Navy DOD and national consumers. Subject matter contained will be expanded.
- (u) ($322) Continue development and production of processing tools for the exploitation of with emphasis on the shallow water of submerged patrolling diesel submarines.
- (u) ($200) Refine the sonar target strength characterizations and assessments through continued research and development, and modeling.
- (u) ($200) Continue expansion of shallow water propagation databases and their utility for supporting the for research, development, test and evaluation.
- (u) ($67) Develop signal exploitation processing for of interest to maritime intelligence.
- (u) ($100) Continue support to overseas sites.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: ONI, Suitland, MD; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NCCOSC RDTE DIV, San Diego, CA; and NAVUNSEAWARCEN DET, New London, CT. CONTRACTORS: Applied Physics Laboratory/University of Washington; and Planning Systems Inc., Sunnyvale, CA.

(U) RELATED ACTIVITIES:

- PE 0604784N Distributed Surveillance Systems
- PE 0204311N Integrated Surveillance System

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605861N
PROGRAM ELEMENT TITLE: RDT&E,N Science and Technology Management
BUDGET ACTIVITY: 6

DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
M0104 NAVMED Management Support	7,685	7,913	7,476	7,846	7,859	8,047	8,244	CONT.	CONT.
R0135 ONR Science and Technology Management0	52,891	51,307	53,496	52,735	51,832	51,143	50,427	CONT.	CONT.
X0832 Central Management Support	1,650	1,077	1,119	1,282	1,280	1,277	1,281	CONT.	CONT.
R1855 Science/Engineering Training Support	583	451	555	757	779	806	834	CONT.	CONT.
TOTAL	62,809	60,748	62,646	62,620	61,750	61,273	60,786	CONT.	CONT.

B. (U) BRIEF DESCPIPTION OF ELEMENT: This program supports the Office of Naval Research (ONR), small non-overhead distributing Navy R&D activities, and medical research laboratories. It pays salaries, rent, utilities, printing, supplies, materials, and other day-to-day costs that are necessary to support these Navy activities that administer and execute the Navy's R&D program. The vast majority of these costs are fixed costs which primarily support scientists and engineers working on the Navy Science and Technology Program. For overhead distributing activities, this program covers costs not chargeable to overhead or to customers.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605861N
PROGRAM ELEMENT TITLE: RDT&E,N Science and Technology Management
BUDGET ACTIVITY: 6

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project M0104 - NAVMED Management Support: This project supports certain program-wide management and operational costs at the Naval Medical Research and Development Command and specified Naval Medical Research Laboratories that do not distribute overhead. Funds are used for general administrative expenses including salaries of support personnel, centralized technical services, common support costs under host-tenant agreements, routine maintenance and repair of buildings and costs of laboratory support provided by other agencies/commands.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($7,685) Provided management support for operations at Naval Medical Research and Development Command Headquarters, three in-house laboratories and two detachments.

(U) FY 1994 PLANS:
- (U) ($7,913) Provide management support for operations at Naval Medical Research and Development Command Headquarters, three in-house laboratories and two detachments.

(U) FY 1995 PLANS:
- (U) ($7,476) Provide management support for operations at Naval Medical Research and Development Command Headquarters, three in-house laboratories and two detachments.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: COMNAVMEDDRSCHDEVCOM, Bethesda, MD; NAVDENRSCHINSTITUTE, Great Lakes, IL; NAVMEDRSCHU No. 2, Jakarta, ID; NAVMEDRSCHU No. 3, Cairo, EG; NAVMEDRSCHU No. 2 Datachment, Manila, RP; NAVMEDRSCHINSTITUTE Datachment, Lima, PE. CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES:
- Program Element 0605862N, RDT&E,N Instrumentation Modernization, funds investment items and general purpose equipment for activities supported by this program element.
- All Navy medical research and development programs receive central management support under this program element.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605861N PROJECT: M0104 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: RDT&E,N Science and Technology Management
BUDGET ACTIVITY: 6

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605861N
PROGRAM ELEMENT TITLE: RDT&E,N Science and Technology Management
BUDGET ACTIVITY: 6

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project R0135 - ONR Science and Technology Management - This project supports the Office of Naval Research (ONR) management and direction for the entire Navy Science and Technology program. ONR sponsors scientific advances which benefit all Joint Mission Areas, including Joint Strike and Joint Littoral Warfare, and supports the fleet's ability to operate from a position of technological superiority. Functions performed include: (1) scientific and technical direction of the nationwide Category 6.1 basic research program with colleges, universities, and Navy laboratories and warfare centers; (2) scientific and technical direction of the 6.2 exploratory development program through the Navy's R&D laboratories and warfare centers; (3) management and formulation of the Navy advanced technology development program (Category 6.3A); (4) management, resource formulation, program assessment, and contract negotiation/administration of the entire Navy basic research and exploratory development program; (5) program management and administrative support to selected research programs of Ballistic Missile Defense Organization (BMDO), Advanced Research Projects Agency (ARPA), and Chief of Naval Operations (CNO); and (6) coordination of the Navy's Technology Base program within the context of total DoD/Government (e.g., National Science Foundation, National Academy of Sciences) R&D initiatives in order to maximize scientific advances. This project also supports ONR management and direction for the following Navy-wide programs: Small Business Innovation Research (SBIR), Naval Research Advisory Committee, Navy Patent Program, Navy Manufacturing Technology Program, Navy Energy R&D efforts and the SSBN Survivability Program. In addition, this program supports ONR's Navy-wide responsibilities in the negotiation and establishment of indirect cost rates for DoD-assigned universities and performance of contract administration for all DoD contracts/grants at all colleges and universities. This project funds salaries, rent, utilities, supplies, and other fixed costs at ONR Headquarters and field offices.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($52,891) The project provided for basic costs of the ONR headquarters and its field activities in support of the entire Navy Science and Technology program. Specifically, it paid salaries of scientific and engineering personnel who direct the execution of the Navy's basic research (Category 6.1), exploratory development (Category 6.2), and advanced technology development (Category 6.3A) programs at the nation's universities/colleges, Navy laboratories and warfare centers, and private industry. In addition to its Navy Science and Technology mission, ONR provided important program management and administrative support to BMDO, ARPA,

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605861N PROJECT: R0135 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: RDT&E,N Science and Technology Management
BUDGET ACTIVITY: 6

and CNO. Almost all the funds in this project are fixed costs, such as salaries, building rent, communications, etc. The project provided support for the ONR headquarters, the ONR European Office (London), the ONR Asian Office (Tokyo), and field detachments.

(U) FY 1994 PLANS:

- (U) ($51,307) The project continues to provide for basic costs of the ONR headquarters and its field activities in support of the entire Navy Science and Technology program. Specifically, it pays the salaries of scientific and engineering personnel who direct the execution of the Navy's basic research (Category 6.1), exploratory development (Category 6.2), and advanced technology development (Category 6.3A) programs at the nation's universities/colleges, Navy laboratories and warfare centers, and private industry. In addition to its Navy Science and Technology mission, ONR provides important program management and administrative support to BMDO, ARPA, and CNO. Almost all the funds in this project are fixed costs, such as salaries, building rent, communications, etc. The project continues to provide support for the ONR headquarters, the ONR European Office (London), the ONR Asian Office (Tokyo), and field detachments.

(U) FY 1995 PLANS:

- (U) ($53,496) The project will continue to provide for basic costs of the ONR headquarters and its field activities in support of the entire Navy Science and Technology program. Specifically, it will pay the salaries of scientific and engineering personnel who direct the execution of the Navy's basic research (Category 6.1), exploratory development (Category 6.2), and advanced technology development (Category 6.3A) programs at the nation's universities/colleges, Navy laboratories and warfare centers, and private industry. In addition to its Navy Science and Technology mission, ONR will provide important program management and administrative support to BMDO, ARPA, and CNO. Almost all the funds in this project will be fixed costs, such as salaries, building rent, communications, etc. The project will continue to provide support for the ONR headquarters, the ONR European Office (London), the ONR Asian Office (Tokyo), and field detachments.

(U) PROGRAM TO COMPLETION: This is a continuing program.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605861N PROJECT: R0135 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: RDT&E,N Science and Technology Management
BUDGET ACTIVITY: 6

(U) WORK PERFORMED BY: IN-HOUSE: ONR, Arlington, VA; ONREUR, London, England; ONRASIA, Tokyo, Japan; ONR Resident Representative (RESREP)-Boston, MA; ONR RESREP-Atlanta, GA; ONR RESREP-Chicago, IL; ONR RESREP-San Diego, CA; ONR RESREP-Seattle, WA and ONRDET Bay St. Louis, MS.
CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES:
- All Navy Science and Technology P.E.s (Budget Categories 6.1, 6.2 and 6.3A) are managed by ONR and supported by this program element.
- Program Element 0605862N, RDT&E,N Instrumentation Modernization, which funds investment items for the activities covered in this program element.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605861N
PROGRAM ELEMENT TITLE: RDT&E,N Science and Technology Management
BUDGET ACTIVITY: 6

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project X0832 - Central Management Support: This project supports centrally managed inter-warfare center and corporate laboratory projects such as the Federation of Systems Analysis Directors (FOSAD), support for corporate video teleconferencing (VTC), joint planning, and other emerging issues which cut across the Navy Warfare Centers and Corporate Laboratory. This project is managed by the Navy Laboratory/Center Coordinating Group (NLCCG). Funds are used for the oversight and support of system evaluations and concept investigations, planning for cross warfare center/laboratory VTC, maintenance and expansion of corporate databases and historical archives, preparation and review of the Navy's annual RDT&E Management Briefs as well as other resource documentation, and reports on corporate issues involving capital investment planning, technical program structure and business plans.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($394) Coordinated ongoing development of VTC services among the Warfare Centers and Naval Research Laboratory.
- (U) ($200) Completed study on strategy for use of models and simulators.
- (U) ($169) Former Director of Navy Laboratories (DNL) databases and historical archives expanded to include all NLCCG organizations.
- (U) ($125) Corporate contractual vehicles for structural analyses secured and maintained.
- (U) ($200) Collected, reviewed, published and distributed the RDT&E Management Briefs and statistical and biographical data report.
- (U) ($365) Supported multiple user underwater explosive test site studies.
- (U) ($197) Provided oversight, support and reports for other corporate initiatives (e.g., long term travel guidance, science and technology corporate report, defense conversion/technical transfer studies).

(U) FY 1994 PLANS:
- (U) ($150) Provide oversight and support of system evaluations and concept investigations.
- (U) ($225) Plan and coordinate cross warfare center/laboratory VTC.
- (U) ($150) Maintain and expand corporate data bases and historical archives.
- (U) ($ 95) Maintain corporate contract vehicle for structural analyses.
- (U) ($241) Prepare and/or review recurring corporate reports (e.g., management briefs, statistical and biographical data document).

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605861N PROJECT: X0832 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: RDT&E,N Science and Technology Management
BUDGET ACTIVITY: 6

- (U) ($216) Provide oversight, support and reports for corporate issues involving capital investment planning, technical program structure and business plans (e.g., defense conversion, business divestitures, "Reliance" initiatives, preservation of core capabilities, and coordination with universities and industries).

(U) FY 1995 PLANS:
- (U) ($200) Provide oversight and support of system evaluations and concept investigations.
- (U) ($200) Plan and coordinate cross warfare center/laboratory VTC.
- (U) ($150) Maintain and expand corporate data bases and historical archives.
- (U) ($100) Maintain corporate contract vehicle for structural analyses.
- (U) ($250) Prepare and/or review recurring corporate reports (e.g., management briefs, statistical and biographical data document).
- (U) ($219) Provide oversight, support and reports for corporate issues involving capital investment planning, technical program structure and business plans (e.g., defense conversion, business divestitures, "Reliance" initiatives, preservation of core capabilities, and coordination with universities and industries).

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA; NAVAIRWARCENWPNDIV, China Lake, CA; NAVSURFWARCENDIV, Dahlgren, VA; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NAVSURFWARCENCOASTSYSTA, Panama City, FL; NAVUNSEAWARCENDIV, Newport, RI; NCCOSC RDTE DIV, San Diego, CA; and NRL, Washington, D.C. CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605861N
PROGRAM ELEMENT TITLE: RDT&E,N Science and Technology Management
BUDGET ACTIVITY: 6

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project R1855 - Science/Engineering Training Support: This project provides funds for long term (more than one semester) professional education and training for Navy civilian scientists and engineers to maintain and update essential skills and develop new expertise as needed.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($583) Provided long-term professional training and education for 60 persons.

(U) FY 1994 PLANS:
- (U) ($451) Provide long-term professional training and education for about 50 persons.

(U) FY 1995 PLANS:
- (U) ($555) Provide long-term professional training and education for about 55 persons.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: Not applicable.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605862N
PROGRAM ELEMENT TITLE: RDT&E,N Instrumentation Modernization
BUDGET ACTIVITY: 6

DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
M0105	NAVMED Instrumentation and Material Support								
	6,055	3,905	4,190	4,322	4,314	4,365	4,416	CONT.	CONT.
R0137	ONR Science & Technology Instrumentation Modernization								
	2,821	612	1,694	1,661	1,635	1,605	1,569	CONT.	CONT.
S0353	NAVSEA Instrumentation and Material Support								
	1,244	892	796	749	747	738	714	CONT.	CONT.
W0566	NAVAIR Instrumentation and Material Support								
	2,630	1,269	1,470	1,591	1,407	1,388	1,347	CONT.	CONT.
X0799	SPAWAR Material Support								
	1	236	0	0	0	0	0	0	1,209
X0833	Instrumentation & Material Support								
	985	0	0	0	0	0	0	0	17,953
S1957	Large Cavitation Channel								
	5,727	31,826	0	0	0	0	0	0	120,000
L2149	NPRDC Instrumentation Modernization								
	731	602	607	561	560	562	546	CONT.	CONT.
TOTAL	20,194	39,342	8,757	8,884	8,663	8,658	8,592	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element funds investment costs at certain Navy research, development, test, and evaluation laboratories and facilities. These laboratories and other facilities are involved in diverse activities such as: medical research including research of new methods of combat casualty care; energy conservation; weapons testing; personnel related research and development; and a number of other programs. This program provides for research equipment in support of multiple program requirements at the Medical Research laboratories and supports the Office of Naval Research (ONR) headquarters and field offices/detachments.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605862N
PROGRAM ELEMENT TITLE: RDT&E,N Instrumentation Modernization
BUDGET ACTIVITY: 6

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project M0105 - NAVMED Instrumentation and Material Support: This project funds the procurement of new and replacement general purpose analytical and research support equipment, minor construction, alterations, equipment installation, and first destination transportation cost of newly purchased equipment for the Naval Medical Research and Development Command Headquarters, eight Medical Research laboratories and three detachments.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($6,055) Provided support for repairs of laboratory spaces and improvements to aging facilities. Made progress toward DDR&E directed goal in meeting American Association for Accreditation of Laboratory Animal Care standards. Provided new technology analytical instrumentation and replacement of obsolete research equipment.

(U) FY 1994 PLANS:
- (U) ($1,600) Provide support for repairs of laboratory spaces and improvements to aging facilities.
- (U) ($2,305) Provide new technology analytical instrumentation and replacement of obsolete research equipment.

(U) FY 1995 PLANS:
- (U) ($2,260) Provide support for repairs of laboratory spaces and improvements to aging facilities.
- (U) ($1,930) Provide new technology analytical instrumentation and replacement of obsolete research equipment.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVMEDRSCHDEVCOM, Bethesda, MD; NAVAEROMEDRSCHLAB, Pensacola, FL; NAVBIODYNLAB New Orleans, LA; NAVDENRSCHINSTITUTE Great Lakes, IL; NAVHLTHRSCHCEN San Diego, CA; NAVMEDRSCHINSTITUTE Bethesda, MD; NAVSUBMEDRSCHLAB New London, CT; NAVMEDRSCHU TWO, Jakarta, ID; NAVMEDRSCHU THREE, Cairo, EG; NAVMEDRSCHU TWO DET, Manila, RP; NAVMEDRSCHINSTITUTE DET, Lima PE; NAVMEDRSCHINSTITUTE TOX DET WPAFB, CH. CONTRACTORS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605862N PROJECT: M0105 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: RDT&E,N Instrumentation Modernization
BUDGET ACTIVITY: 6

(U) RELATED ACTIVITIES:
- Program Element 0605861N, RDT&E,N Science and Technology Management.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605862N
PROGRAM ELEMENT TITLE: RDT&E,N Instrumentation Modernization
BUDGET ACTIVITY: 6

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project R0137 - ONR Science & Technology Instrumentation Modernization: This project purchases ADP and general support equipment for the Office of Naval Research (ONR) headquarters and field offices/ detachments.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($2,821) Purchased ADP and general support equipment for ONR headquarters and field\ offices/detachments.

(U) FY 1994 PLANS:
- (U) ($612) Purchase ADP and general support equipment for ONR headquarters and field offices/detachments.

(U) FY 1995 PLANS:
- (U) ($1,694) Will purchase ADP and general support equipment for ONR headquarters and field offices/detachments.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NRLSSC, Stennis Space Center, MS and Monterey, CA. CONTRACTORS: TBD.

(U) RELATED ACTIVITIES:
- PE 0605861N (RDT&E,N Science and Technology Management), and Navy R&D science and technology programs.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605862N
PROGRAM ELEMENT TITLE: RDT&E,N Instrumentation Modernization
BUDGET ACTIVITY: 6

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project S0353 - NAVSEA Instrumentation and Material Support: Funding in this project is used for procurement of needed safety and station equipment; first destination transportation; and the hulk program, providing storage, basic configuration, and maintenance of RDT&E target ships.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($1,244) Procured and upgraded safety and station equipment; funded first destination transportation; continued to provide technical, maintenance, and storage management services for T&E hulk pool targets in support of weapons systems testing programs.

(U) FY 1994 PLANS:
- (U) ($892) Procure and upgrade safety and station equipment; fund first destination transportation; continue to provide technical, maintenance and storage management services for T&E hulk pool targets in support of weapons systems testing programs.

(U) FY 1995 PLANS:
- (U) ($796) Procure and upgrade safety and station equipment; fund first destination transportation; continue to provide technical, maintenance and storage management services for T&E hulk pool targets in support of weapons systems testing programs.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, Pt. Mugu, CA

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605862N
PROGRAM ELEMENT TITLE: RDT&E,N Instrumentation Modernization
BUDGET ACTIVITY: 6

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project W0566 - NAVAIR Instrumentation and Material Support: This is a continuing project that supports energy conservation and environmental compliance and pollution prevention related projects at the Naval Air Warfare Center and the Naval Undersea Warfare Center Detachment AUTEC, Andros Island, Bahamas.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,630) Provided funding to the Naval Air Warfare Center Aircraft Division, Patuxent River and Trenton and the Naval Air Warfare Center Weapons Division, Point Mugu and China Lake for environmental protection and energy conservation projects. Continued project requirements including compliant storage equipment and facilities for hazardous waste, repair/replacement of Polychlorinated Bi-Phenol (PCB) transformers, and removal/replacement of leaky underground storage tanks. Projects included removal of deteriorated asbestos in locations such as boilers (deteriorated insulation), refrigeration systems, piping and heating exchangers. Completed support of NAVAIRWARCENWPNDIV DET aircraft instrumentation requirements for transfer to China Lake.

(U) FY 1994 PLANS:

- (U) ($1,269) Continue to provide funds to the Naval Air Warfare Center facilities for environmental protection and energy conservation projects. Projects will include ongoing efforts geared at complying with Federal, State, and local environmental requirements, including removal of asbestos from Navy heating/air conditioning/venting, refrigerant and piping systems located throughout Navy owned and operated RDT&E facilities.

(U) FY 1995 PLANS:

- (U) ($1,470) Continue asbestos removal and isolation efforts in various buildings throughout Navy owned and operated RDT&E facilities. Continue PCB repair and replacement efforts. Remove and replace aging and deteriorating underground fuel storage tanks. Undertake assessment of fuel and hazardous material storage and containment requirements.

(U) PROGRAM TO COMPLETION: This is a continuing program.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605862N PROJECT: W0566 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: RDT&E,N Instrumentation Modernization
BUDGET ACTIVITY: 6

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV DET, Albuquerque, NM; NAVUNSEAWARCEN DET AUTEC, Andros Island, Bahamas; NAVAIRWARCENACDIV, Patuxent River, MD and Trenton, NJ; NAVAIRWARCENWPNDIV, Point Mugu, CA and China Lake, CA. CONTRACTORS: Various small contracts for instrumentation equipment, and environmental/energyprojects and equipment.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605862N
PROGRAM ELEMENT TITLE: RDT&E,N Instrumentation Modernization
BUDGET ACTIVITY: 6

DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) Project L2149 - NPRDC Instrumentation Modernization: Project provides for acquisition and installation of essential general research equipment, minor construction and minor repairs at the Navy Personnel Research and Development Center (NPRDC). Advances in manpower, personnel and training (MPT) technologies require continual upgrades to supporting hardware, laboratory equipment and facilities.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($383) Upgraded computer processing software and network systems.
- (U) ($ 67) Upgraded technical library's storage and retrieval capabilities.
- (U) ($ 31) Integrated visual information processing components.
- (U) ($250) Completed minor repairs and upgrades to meet habitability and safety requirements.

(U) FY 1994 PLANS:
- (U) ($ 45) Complete upgrade of network systems.
- (U) ($190) Purchase equipment to create distributed processing systems.
- (U) ($161) Purchase equipment to meet emerging requirements in research.
- (U) ($ 56) Initiate development of a "virtual reality" research lab.
- (U) ($150) Rehabilitate and repair facilities to maintain structural integrity and meet safety, health and efficiency requirements.

(U) FY 1995 PLANS:
- (U) ($207) Integrate mainframes with distributed processing systems and couple operating environments.
- (U) ($200) Purchase multimedia equipment to meet emerging research requirements in biopsychometric testing and virtual reality based training systems.
- (U) ($140) Maintain structural integrity of facilities, remedy deficiencies and support technological change.
- (U) ($ 60) Complete development of "virtual reality" research laboratory.

(U) PROGRAM TO COMPLETION: This is a continuing program.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605862N PROJECT: L2149 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: RDT&E,N Instrumentation Modernization
BUDGET ACTIVITY: 6

(U) WORK PERFORMED BY: IN-HOUSE: NPRDC, San Diego, CA.; NCCOSC, San Diego, CA; Public Works Center (PWC), San Diego, CA.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605863N
PROGRAM ELEMENT TITLE: RDT&E,N Ship and Aircraft Support
BUDGET ACTIVITY: 6

DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R1999 Ocean Research Ship Support	4,331	0	0	0	0	0	0	0	49,448
S0354 RDT&E Ships Support	21,777	16,667	15,306	13,473	13,815	14,159	14,535	CONT.	CONT.
W0568 RDT&E Aircraft Flight Hours	11,738	10,362	11,361	11,264	11,576	11,882	12,123	CONT.	CONT.
W0569 RDT&E Aircraft Support	57,480	47,695	54,695	51,447	52,582	53,879	55,437	CONT.	CONT.
TOTAL	95,326	74,724	81,362	76,184	77,973	79,920	82,095	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This continuing program provides support for ships and platforms required to accommodate Research, Development, Test and Evaluation (RDT&E) of new systems. The RDT&E ships and aircraft inventory is required to adequately test new and improved weapon systems, stay current with the threat, and increase warfighting capability of the fleet. The program provides integrated logistics support of aircraft at selected field activities; provides depot level rework of aircraft, engines, components for the Navy inventory of RDT&E aircraft; and provides support ships and aircraft bailed to contractors for Navy RDT&E projects. Costs covered under this element include aircrew training/proficiency, fuel, supplies, equipment, modification, repair, Aviation Depot Level Repairables, Special Flight Test Instrumentation Pool equipment, overhaul of ships and aircraft, as well as Organizational, Intermediate, and Depot maintenance of ships and aircraft in the Navy RDT&E inventory.

(U) This program element also supports oceanographic research ships which provide services to Navy laboratories, systems commands and Navy funded laboratories for basic research, detailed site and weapon specific investigation and fleet support.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605863N
PROGRAM ELEMENT TITLE: RDT&E,N Ship and Aircraft Support
PROJECT NUMBER: S0354
BUDGET ACTIVITY: 6
Date: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: S0354, RDT&E Ships Support. This project provides for operation and maintenance of platforms used as Sea Based Test Sites in support of the Navy Research, Development, Test and Evaluation (RDT&E) program. These are USS DOLPHIN (AGSS-555), the Floating Instrumentation Platform (FLIP) and the Oceanographic Research Buoy (ORB). EX-USS DECATUR (DDG-31) is being supported by this line as the Self-Defense Test Ship (SDTS). Testing aboard these platforms reduces the number of fleet units required to support RDT&E efforts. In the case of the SDTS, it provides the capability of testing self defense weapons systems to within their minimum ranges. A major cost of this project is regularly scheduled ship overhauls. The USS DOLPHIN (AGSS-555) is undergoing a regular overhaul during FY 92-94. The remainder of the funds are used for purchase of supplies and equipment, fuel and petroleum products, repairs and supporting modifications. Most costs are fixed and are associated with simply having these platforms in the inventory. A lesser portion varies with the tempo and type of ship operations and provides for system improvements and replacement planning. The nature of the operation is determined by the overall Navy/DOD R&D testing program.

(U) The Montreal Protocol 1989 and the Clean Air Act of 1990 require cessation of chlorofluorocarbons/hydrochlorofluorocarbons venting in 1992 and cessation of production in 1997. USS DOLPHIN, with it's unique Thermoelectric Air Conditioning (TEAC) plant, is actively involved in NAVSEA's efforts to comply with these laws. USS DOLPHIN's TEAC system is being evaluated for use on Navy submarines and surface ships and will act as a test bed for future designs.

(U) The current and projected Anti-Ship Cruise Missile threat requires self-defense weapons systems capable of adequately countering the ASCM's into the year 2000. The National Defense Authorization Act for FY 87, section 910, "Testing of Certain Weapons System and Munitions," requires live-fire lethality testing of major weapons systems. Operational and safety constraints limit realistic live-fire lethality testing with manned U.S. Navy ships and thus drive the requirement for having an afloat, unmanned, remotely controlled SDTS. Ex-USS DECATUR will be converted to the SDTS. The SDTS plans call for testing Close-In-Weapons System (CIWS), NATO Sea Sparrow Missile System (NSSMS), Ship Self-Defense System, Rolling Airframe Missile (RAM), SLQ-32(V3), and future short range Anti-Air Warfare systems against realistic threat presentation in an at-sea environment.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605863N
PROGRAM ELEMENT TITLE: RDT&E,N Ship and Aircraft Support
PROJECT NUMBER: S0354
BUDGET ACTIVITY: 6
Date: 7 February 1994

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($18,898) USS DOLPHIN was in a regular overhaul at Naval Shipyard Mare Island (NAVSHIPYD, Mare Island). The overhaul completes in early FY 94. The scope of work planned for the overhaul is the minimum required to maintain Submarine Safety (SUBSAFE) certification and support safe platform operations. No platform enhancements are planned. Planning for FY 94 and future RDT&E operation continues. Commander in Chief, Pacific Fleet (CINCPACFLT) personnel assist in the USS DOLPHIN overhaul work, within their capability, to minimize the impact of higher shipyard labor rates.

- (U) ($969) FLIP/ORB continued to conduct research in underwater acoustic and non-acoustic phenomena to support ASW surveillance and weapons (OT3A) needs, ocean technology development, and participate in the Office of Naval Research (ONR) Accelerated Research Initiative marine boundary layer experiment. Developed initial specifications/drawings package for future FLIP overhaul. Conducted drydock inspection of FLIP and repaired hull as needed.

- (U) ($1,910) Ex-USS DECATUR/SDTS completed Phase II conversion to SDTS at NAVSHIPYD Puget Sound. A helicopter flight deck, SLQ32(V3) Electronic Warfare System and 400 Mz electronic power systems were installed. The SDTS was towed to its home port of Port Hueneme, CA to complete post shipyard conversion including operational checkout of installed combat systems, installation of ship and combat system remote controls, and outfitting.

(U) FY 1994 PLAN:

- (U) ($14,363) USS DOLPHIN completes its regular overhaul at NAVSHIPYD, Mare Island in first quarter. USS DOLPHIN enters a post overhaul availability at its home port in San Diego, CA to install special scientific sensors and equipment during second and third quarter. USS DOLPHIN commences normal operations in third quarter with MK 50 Torpedo Program testing, Wide Area Undersea Surveillance Program and SEAWOLF/Attack Submarine material evaluations will be supported. Testing of sea floor bottom mapping for Advanced Research Projects Agency will be conducted and coordinated with Navy Oceanographic Office. Testing starts in the fourth quarter for lightweight, broad-band variable depth sonar. Planning will begin for testing an advanced Sea/Land Team delivery system. USS DOLPHIN continues to support near ocean bottom operations an other RDT&E programs, modeling sonar propagation, testing Unmanned Underwater Vehicles (UUVs), testing sensors, TEAC systems, and communication systems.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605863N
PROGRAM ELEMENT TITLE: RDT&E,N Ship and Aircraft Support
PROJECT NUMBER: S0354
BUDGET ACTIVITY: 6
Date: 7 February 1994

- (U) ($504) FLIP/ORB continues to conduct research in underwater acoustic and non-acoustic phenomena to support ASW surveillance and weapons (OT3A) needs and ocean technology development. Continue participation in ARI marine boundary layer experiment. Support shallow water vertical array acoustics experiment. The previously planned FLIP overhaul was canceled due to budget constraints. Drydock inspection is conducted on FLIP and repairs as needed.

- (U) ($1,800) Ex-USS DECATUR/SDTS completes outfitting and checkout of installed combat systems and associated remote controls. Installation of CIWS, fire prevention system, ship wide alarm system, and conversion/certification of missile magazine are accomplished. Sea trials are conducted to test ship and combat systems at Naval Air Warfare Center Weapons Division (NAVAIRWARCENWPNDIV) Pt Mugu, CA following conversion. Final approval of all applicable operational safety, and maintenance documentation is given by NAVAIRWARCENWPNDIV and the SDTS is certified for and conducts live fire operations to support RAM, CIWS, NSSMS, and other self defense systems as may be required. Naval Surface Warfare Center Division (NAVSURFWARCENDIV), Port Hueneme, CA is responsible for the operation and maintenance of the SDTS.

(U) FY 1995 PLAN:

- (U) ($10,506) USS DOLPHIN continues to support MK 50 Program testing and SEAWOLF/Attack Submarine material evaluations. Sixty (60) days of at-sea testing and environmental surveys for NOAA's National Undersea's Research Program are scheduled. USS DOLPHIN continues to support ocean bottom operations and other RDT&E programs, modeling sonar propagation, testing UUVs, testing sensors, TEAC systems, and communications systems. USS DOLPHIN conducts periodic phased maintenance to maintain certification and procures material to support continued operations.

- (U) ($2,901) FLIP/ORB continues to conduct research in underwater acoustic and non-acoustic phenomena to support ASW surveillance and weapons (OT3A) needs and ocean technology development. Drydock inspection scheduled for FLIP. Structural repairs and safety and environmental modifications to meet the requirements of the Code of Federal Regulations will be accomplished.

- (U) ($1,899) Ex-USS DECATUR/SDTS conducts live fire operations at NAVAIRWARCENWPNDIV, Pt Mugu, CA as required to support RAM, CIWS, NSSMS, and other self defense systems as may be required. NAVSURFWARCENDIV, Port Hueneme, CA plans, schedules and performs combat systems operations and maintenance on board the SDTS. The NSSMS (RIM 7R) Follow on Test and Evaluation (FOT&E) is conducted on SDTS.

(U) PROGRAM TO COMPLETION: This is a continuing program.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605863N
PROGRAM ELEMENT TITLE: RDT&E,N Ship and Aircraft Support
PROJECT NUMBER: S0354
BUDGET ACTIVITY: 6
Date: 7 February 1994

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Port Hueneme, CA; NAVAIRWARCENWPNDIV, Pt. Mugu, CA; SUPSHIP, Seattle, WA; SUPSHIP, San Diego; NAVSHIPYD, Mare Island, Vallejo, CA; Puget Sound Naval Shipyard, Bremerton, WA, NAVAL WARFARE ASSESSMENT CENTER, Corona, CA; NAVOCEANSYSCEN, San Diego, CA; NAVSURFWARCEN, Carderock Div, Bethesda, MD/DET, Annapolis, MD; NRL, Washington, DC. CONTRACTORS: Applied Research Laboratories, Austin, TX; Charles Stark Draper Laboratories, Cambridge, MA; University of California, San Diego, CA; Johns Hopkins University Applied Physics Laboratory, Laurel, MD.

(U) RELATED ACTIVITIES:

- (U) PE 0604755N: 5in Rolling Airframe Missile (Ex-Decatur)
- (U) PE 0604755N: NATO Sea Sparrow and CIWS (Phalanx)
- (U) PE 0602314N: Undersea Surveillance and Weapons Technology (FLIP)
- (U) PE 0602435N: Oceanographic and Atmospheric Technology (RL3B, OT3B)
- (U) PE 0602111N: Surface/Aerospace Surveillance and Weapons Technology (OR1A)
- (U) PE 0603226E: Unmanned Underwater Vehicles (USS Dolphin)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605863N
PROGRAM ELEMENT TITLE: RDT&E,N Ship and Aircraft Support
PROJECT NUMBER: W0568
BUDGET ACTIVITY: 6
Date: 7 February 1994

C (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W0568, RDT&E Aircraft Flight Hours. This non-acquisition proje provides aircraft flight hours/operating support for Research, Development, Test & Evaluation (RDT&E) programs at six Naval Air Systems Command/Office of Naval Research (NAVAIR/ONR) activities. Support includes aircrew training, pilot Naval Air Training and Operating Procedures Standardization (NATOPS) proficiency/currency requirements, annual simulator training, transition to new aircraft types, organizational and intermediate level maintenance, and associated consumables, including petroleum, fuel, and lubricants.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($11,738) Flew 9,600 flight hours in FY 1993. The increase in flight hours reflected significant aircraft inventory transitions to newer, more sophisticated airframes that require more flight hour training for initial qualifications and proficiency maintenance. As older aircraft leave the inventory (e.g., A-7) as part of the process of RDT&E infrastructure reduction, more effort and expense was required to retrain pilots and aircrew on the newer aircraft (ES-3A, E-6A, T-45, F-14D, AH-1W, V-22) and their respective simulators. Transitioning of the aircraft, proficiency flying, and maintenance effort of Naval Weapons Evaluation Facility (NAVWPNEVALFAC), Albuquerque, NM, to Naval Air Warfare Center Weapons Division (NAVAIRWARCENWPNDIV), China Lake, CA, commenced. Continued providing the maintenance and support for aircraft required by RDT&E projects. Updated aircraft replacements continued (F/A-18D, T-45, E-6A, ES-3A).

(U) FY 1994 PLAN:

- (U) ($10,362) Plan to fly 9,000 flight hours in FY 1994. The aircraft transition and reduction will still be a main driver for this period. The more sophisticated aircraft transitions in the RDT&E inventory (e.g., F-14D, F/A-18D, T-45, ES-3A, E-6A) and support for new test aircraft (e.g., V-22) will increase the flight hours needed for qualifications and proficiency to support the RDT&E programs, as well as increase the costs/hours of aircraft operation. Aircraft and pilot/aircrew transition of work from NAVWPNEVALFAC to NAVAIRWARCENWPNDIV, will be completed this fiscal year. Transition and integration of aircraft and pilots/aircrew of Naval Air Warfare Center Aircraft Division (NAVAIRWARCENACDIV), Warminster, PA, to NAVAIRWARCENACDIV, Patuxent River, MD, commences. Continue providing the maintenance and support for aircraft required by RDT&E projects. Updated aircraft replacement to continue (F/A-18D, P-3B/C, T-45, ES-3A, E-6A).

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605863N
PROGRAM ELEMENT TITLE: RDT&E,N Ship and Aircraft Support
PROJECT NUMBER: W0568
BUDGET ACTIVITY: 6
Date: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($11,361) Plan to fly 9,200 flight hours in FY 1995. The aircraft transition and reduction will still be in progress and support for new test aircraft (V-22, F/A-18 E/F, T-45) will be increasing. Continued support of the proficiency and qualifications flight hours will be critical to the support of these RDT&E aviation programs during this phase of development and acquisition. Transition and integration of aircraft and pilots/aircrew of the NAVAIRWARCENACDIV, Warminster, PA, to NAVAIRWARCENACDIV, Patuxent River, MD will be completed. Continue providing the maintenance and support for aircraft required by RDT&F projects. Updated aircraft replacement to continue.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Warminster, PA; NAVSURFWARCEN COASTSYSTA, Panama City, FL; NAVAIRWARCENWPNDIV (non-range), Point Mugu, CA; NRL, Washington, DC; and NAVTRASYSCEN, Orlando, FL. CONTRACTORS: Dyncorp, Dallas, TX; Sikorsky, Stratford, CT; and Kay and Associates, Chicago, IL.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605863N PROJECT NUMBER: W0569
PROGRAM ELEMENT TITLE: RDT&E,N Ship and Aircraft Support BUDGET ACTIVITY: 6

Date: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W0569, RDT&E Aircraft Support. This continuing project provides for the Standard Depot Level Maintenance (SDLM), modification and rework of over 180 Navy Research, Development, Test & Evaluation (RDT&E) fixed and rotary wing aircraft required to accommodate test and evaluation of weapon systems in development. It also supports engines, aircraft material condition and field inspections, and emergency repair. In addition, it provides for Individual Material Readiness List (IMRL) tools and support equipment needed to perform aircraft maintenance; modification of inservice aircraft and other systems for application to and compatibility with RDT&E requirements; provides Special Flight Test Instrumentation Pool (SFTIP) equipment, shared/reused by programs to reduce/eliminate procurement lead times and save money when provided as Government Furnished Equipment (GFE); Aviation Depot Level Repairables (AVDLRs), which are spare/replacement installed aircraft parts and components; and support of aircraft bailed to contractor facilities. The project is funding the RDT&E modification of two Naval Research Lab (NRL) replacement P-3 aircraft; and engine, landing gear, and avionics upgrades for ten P-3A aircraft.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($57,480) The program supported the following: SDLM, IMRL, engine support for 59 type/model/series, SFTIP and AVDLRs for 180 aircraft in the RDT&E inventory, and contractor bailed aircraft (41 aircraft) support including consumables. The cost of rework and maintenance support steadily rose, and was higher on average for newer individual aircraft types entering the RDT&E inventory mix. Additional aircraft inventory included ES-3A, E-6A, and T-45. The RDT&E conversion of the first replacement NRL P-3 aircraft was completed during the fourth quarter FY 1993. Upgraded engines and avionics for the RDT&E P-3A inventory began second quarter FY 1993. Navy Aviation Logistics Command Management Information System (NALCOMIS) implementation continued, and the Maintenance Training Improvement Program (MTIP) was implemented at Naval Air Warfare Center Weapon Division (NAVAIRWARCENWPNDIV), Pt Mugu, CA. Naval Weapons Evaluation Facility (NAVWPNEVALFAC), Albuquerque, NM, commenced transition of its RDT&E aircraft, test flight and maintenance requirements to NAVAIRWARCENWPNDIV, China Lake, CA, this year.

(U) FY 1994 PLAN:

- (U) ($47,695) The following programs are included: SDLM, IMRL, engine support for 61 type/model/series, SFTIP and AVDLRs for 170 aircraft in the RDT&E inventory, and contractor bailed aircraft (41 aircraft) support including consumables. An estimated nineteen aircraft will require SDLM rework. Avionics and engine upgrades of the RDT&E P-3A inventory will be ongoing. RDT&E conversion of the second NRL P-3 aircraft will commence. Transition of NWEF aircraft and maintenance requirements to NAVAIRWARCENWPNDIV, China Lake, CA will be completed. Transition of Naval

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605863N PROJECT NUMBER: W0569 Date: 7 February 1994
PROGRAM ELEMENT TITLE: RDT&E,N Ship and Aircraft Support BUDGET ACTIVITY: 6

Air Warfare Center Aircraft Division (NAVAIRWARCENACDIV), Warminster, PA, aircraft and maintenance requirements to NAVAIRWARCENACDIV, Patuxent River, MD, will commence. NALCOMIS and MTIP will continue to operate at NAVAIRWARCENACDIV, Patuxent River, MD and NAVAIRWARCENWPNDIV, Pt Mugu, CA, and will commence implementation at NAVAIRWARCENWPNDIV, China Lake, CA. Commence implementation of the Uniform Automated Data Processing System (UADPS) at NAVAIRWARCENWPNDIV, China Lake, CA.

(U) FY 1995 PLAN:

- (U) ($54,695) The following programs are included: SDLM, IMRL, engine support for 61 type/model/services, SFTIP and AVDLRs for 160 aircraft in the RDT&E inventory, and contractor bailed aircraft (41 aircraft) support including consumables. An estimated eighteen aircraft will require SDLM rework, including one DC-130A (former FEWSG asset). Avionics upgrades of the RDT&E P-3A inventory will be ongoing. Transition of NAVAIRWARCENACDIV, Warminster, PA aircraft and maintenance requirements to NAVAIRWARCENACDIV, Patuxent River, MD will be completed. NALCOMIS and MTIP will continue to operate at NAVAIRWARCENACDIV, Patuxent River, MD and NAVAIRWARCENWPNDIV, Pt Mugu, CA and implementation will be completed at NAVAIRWARCENWPNDIV, China Lake, CA. Complete implementation of UADPS at NAVAIRWARCENWPNDIV, China Lake, CA.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Patuxent River, MD and Warminster, PA; NAVSURFWARCENCOASTSYSTA, Panama City, FL; NAVAIRWARCENWPNDIV, Pt Mugu and China Lake, CA; NRL, Washington, DC;NAVWPNEVALFAC, Albuquerque, NM; NAVUNSEAWARCEN DET AUTEC, Andros Island, Bahamas; NAVAVNDEPOT, Norfolk, VA,North Island, VA, Pensacola, FL, Cherry Point, NC, Jacksonville, FL, and Alameda, CA; DPRO, Stratford, CT, Bethpage, NY, and Ft Worth, TX; NAVAVNMAINTOFF, Patuxent River, MD. CONTRACTORS: Dyncorp, Dallas, TX;Beech Air Services, Inc., Madison, MS; Grumman, Bethpage, NY; Grumman Technical Services Inc., Orlando, FL;and Kay and Associates, Chicago, IL.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605864N
PROGRAM ELEMENT TITLE: Test and Evaluation Support
BUDGET ACTIVITY: 6

Date: 7 Februar, 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
W0541 Atlantic Undersea Test and Evaluation Center	50,124	46,272	51,126	51,592	47,066	48,559	50,240	CONT.	CONT.
W0653 Naval Air Warfare Center Weapons Division	155,411	141,167	145,783	150,622	138,781	143,022	148,505	CONT.	CONT.
W0654 Naval Air Warfare Center Aircraft Division	103,021	92,276	96,700	93,929	87,506	90,406	93,567	CONT.	CONT.
TOTAL	308,556	279,715	293,609	296,143	273,353	281,987	292,312	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program provides institutional maintenance and operations support for: the Naval Undersea Warfare Center Detachment Atlantic Undersea Test and Evaluation Center (NAVUNSEAWARCEN DET AUTEC), Andros Island, Bahamas; the Naval Air Warfare Center Weapons Division (NAVAIRWARCENWPNDIV), Point Mugu and China Lake, CA; the Naval Air Warfare Center Aircraft Division (NAVAIRWARCENACDIV), Patuxent River, MD and Trenton, NJ. These Test and Evaluation (T&E) activities makes up the Navy portion of the Department of Defense's Major Range and Test Facility Bases. These activities are chartered to develop, refine and maintain the capability and capacity to perform the full spectrum of development and acquisition of technologically advanced weapons systems. Adequate state-of-the-art and realistic T&E is paramount in providing the operational forces with effective weapon systems to counter a dynamic threat environment. Project W0653 also supports three DC-130A multiple-target-launch-capable aircraft. Effective FY 1994, the T&E Modernization Project W2125 and the individual facility Improvement and Modernization efforts have been consolidated and transferred to a new PE 0604759N, Major Test and Evaluation Investment Program, Project W2195.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605864N
PROGRAM ELEMENT TITLE: Test and Evaluation Support
PROJECT NUMBER: W0541
BUDGET ACTIVITY: 6
Date: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W0541, Atlantic Undersea Test and Evaluation Center (AUTEC). The Atlantic Undersea Test and Evaluation Center (AUTEC) provides a deep water Test and Evaluation (T&E) facility for making selected underwater, surface and air tracking data on test participants. The Naval Undersea Warfare Center Detachment AUTEC (NAVUNSEAWARCEN DET AUTEC), Andros Island, Bahamas, includes the Weapons Range, Fleet Operational Readiness Accuracy Check Site, Weapons Acoustic Measurement Capabilities and an Ocean Haul Down Facility for large buoyant bodies. The Weapons Range provides three dimensional (undersea, surface, air) precision tracking capability in support of Anti-Submarine Warfare Development T&E and Operational T&E. Major training operations including Fleet readiness exercises and tactical development trials are also conducted on the Weapons Range. The Fleet Operational Readiness Accuracy Check Site provides the capability to accurately calibrate and align electronic optical, acoustic, and navigational systems installed on submarines, surface ships and helicopter. The NAVUNSEAWARCEN DET AUTEC at West Palm Beach, Florida, provides technical expertise in tracking systems, liaison and test planning with range users, test scheduling, and logistic support. Effective FY 1994 all improvement and modernization efforts have been consolidated and transferred to a new PE 0604759N, Major Test and Evaluation (T&E) Investment, Project W2195.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($27,871) Continued to operate and maintain the physical plant; maintain technical test support instrumentation, marine craft, and spare parts inventory; perform repair efforts to reduce the Backlog of Maintenance and Repair (BMAR) items; and perform contract administration support.
- (U) ($11,445) Continued rental payments to Bahamian government and lease payments for facilities at West Palm Beach.
- (U) ($7,405) Continued civilian pay, travel, utility, fuel, supply and general and administrative efforts required to maintain and operate the facility.
- (U) ($913) Real Property Maintenance Activities (RPMA).
- (U) ($2,490) Improvement and modernization efforts transferred and consolidated under PE 0604759N, Major T&E Investment.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605864N
PROGRAM ELEMENT TITLE: Test and Evaluation Support

PROJECT NUMBER: W0541
BUDGET ACTIVITY: 6

Date: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($26,933) Continue to operate and maintain the physical plant; maintain technical test support instrumentation, marine craft, and spares inventory; perform repair efforts to reduce the BMAR items; and perform contract administration support.
- (U) ($11,500) Continue rental payments to Bahamian government and lease payments for facilities at West Palm Beach.
- (U) ($7,839) Continue civilian pay, travel, utility, POL, supply and general and administrative efforts required to maintain and operate the facility.

(U) FY 1995 PLAN:

- (U) ($31,626) Continue to operate and maintain the physical plant; maintain technical test support instrumentation, marine craft, and spares inventory; perform repair efforts to reduce the BMAR items; and perform contract administration support.
- (U) ($11,600) Continue rental payments to Bahamian government and lease payments for facilities at West Palm Beach.
- (U) ($7,900) Continue civilian pay, travel, utility, POL, supply and general and administrative efforts required to maintain and operate the facility.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: Technical services are performed by the NAVUNSEAWARCENDIV, Newport, RI; COMNAVOCEANCOM, Bay St. Louis, Stennis Space Center, MS. CONTRACTORS: AUTEC RANGE SERVICES, West Palm Beach, FL.

(U) RELATED ACTIVITIES:

- (U) PE 0604759N, Major T&E Investment

(U) OTHER APPROPRIATION FUNDS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605864N
PROGRAM ELEMENT TITLE: Test and Evaluation Support

PROJECT NUMBER: WO541
BUDGET ACTIVITY: 6

Date: 7 February 1994

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: The United States Government has an agreement with the Commonwealth of the Bahamas concerning the provision of sites for United States Defense purposes. An agreement was signed 6 February 1992 for a five year extension ending in January 1998. Each year agreements are made with U.S. Foreign Military Sales Office and international customers to use the range for testing various weapon systems.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605864N
PROGRAM ELEMENT TITLE: Test and Evaluation Support
PROJECT NUMBER: W0653
BUDGET ACTIVITY: 6
Date: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W0653, Naval Air Warfare Center Weapons Division. The Pacific Missile Test Center and the Naval Weapons Center have been consolidated under the new Naval Air Warfare Center. These two Major Range and Test Facility Base (MRTFB) activities are now called the Naval Air Warfare Center Weapons Division (NAVAIRWARCENWPNDIV) Point Mugu and China Lake. Project W0653 provides over land and over sea ranges to the Department of Defense and other government agencies for launching, tracking and collecting data in support of: Test and Evaluation (T&E) of airborne weapon systems; aircraft and weapon integration; personnel parachutes; recovery systems; guided and ballistic missiles; satellite and space vehicle research;and various development and fleet raining programs. Range support includes: metric tracking of test objects; command, control, and destruct for range safety purposes; communications; frequency interference control and analysis; collection processing and display of telemetered data. This project also funds DC-130 aircraft supporting a multiple target launch capability. Other test capabilities include: rocket motor, warhead and other missile component test facilities; the Electronic Combat Range, formerly called the Electronic Warfare Threat Environment simulation; static Radar Cross Section (RCS) measurement facility and parachute/weapon recovery system test facilities. This project funds facility costs not chargeable to the user. Effective FY 1994 all improvement and modernization efforts have been consolidated and transferred to a new PE 0604759N, Major T&E Investment, Project W2195.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($66,321) Continued indirect civilian pay and contractor costs required to manage, operate and maintain the Sea and Land Ranges, target systems, aircraft maintenance, weapons handling and storage, air operations and engineering development.
- (U) ($6,612) Continued support for sustaining maintenance materials, supplies, technical equipment and spare parts for range and target instrumentation and equipment to ensure reliability.
- (U) ($2,841) Continued travel, transportation, printing, communications and training necessary to manage and sustain MRTFB operations.
- (U) ($8,380) Continued the maintenance and repair of MRTFB facilities to reduce the BMAR and to perform RPMA. Started the procurement phase of the Uninterruptable Power Source (UPS) program to ensure power reliability for range operations and safety requirements.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605864N
PROGRAM ELEMENT TITLE: Test and Evaluation Support
PROJECT NUMBER: W0653
BUDGET ACTIVITY: 6
Date: 7 February 1994

- (U) ($230) Continued annual leases for off shore islands and remote location instrumentation sites and other Host Tenant Agreement costs with other commands.
- (U) ($1,500) Complete support for NAVSURFWARCEN open ocean RCS facility located at Santa Cruz island.
- (U) ($1,086) RPMA.
- (U) ($58,418) Continued annual utility costs, facility service contracts, payment of workmen's compensation costs for MRTFB employees and contribution to the command's general and administrative (G&A) expenses.
- (U) ($5,760) Continued flight hour costs to maintain pilot proficiency in aircraft used to support the MRTFB mission.
- (U) ($1,800) Initiated the DC-130 target air launch capability maintenance contract and other overhead costs.
- (U) ($2,463) Continued support for maintaining the R-2508 Air Space Control System.

(U) FY 1994 PLAN:

- (U) ($61,124) Continue indirect civilian pay and contractor costs required to manage, operate, and maintain the MRTFB's Sea Range, Air and Ground Range, Electronic Combat Range, Junction Ranch's RCS Range, the Propulsion, Warhead, and Environmental test facilities, parachute system testing, and the operational target vehicle and launch functions. Supports the Naval Air Weapons Station overhead MRTFB functions. Support required to maintain and operate the new threat systems at the Electronic Combat Range.
- (U) ($7,497) Continue support for sustaining equipment maintenance, materials, supplies, technical equipment and spare parts for the ranges and target instrumentation and equipment systems. Newly acquired threat systems at the Electronic Combat range requires critical spare parts and other operational support.
- (U) ($2,393) Continue travel, transportation, printing, communications, and training necessary to manage and sustain MRTFB operations.
- (U) ($245) Continue annual leases for off shore island and remote location instrumentation sites, and Host Tenant Agreement Costs with other Commands.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605864N
PROGRAM ELEMENT TITLE: Test and Evaluation Support
PROJECT NUMBER: W0653
BUDGET ACTIVITY: 6
Date: 7 February 1994

- (U) ($7,268) Continue funding MRTFB RPMA including emergency call services, extensive road maintenance, periodic system maintenance and major facility projects to reduce the backlog of maintenance and repair to meet new mission and customer requirements. Fund public works transportation and engineering support and hazardous waste control. Complete the procurement of UPS systems for critical range operations and safety systems.

- (U) ($2,463) Continue support for maintaining the R-2508 Air Space Control system. Additional R-2508 enhancements and maintenance are required to complete the rehosting of the Mosaic Direct Access Radar channel.

- (U) ($53,277) Continue annual utility costs, facility service contracts, payment of workmen's compensation costs for MRTFB employees and contribution to the Command's G&A expenses.

- (U) ($5,200) Continue flight hour costs to maintain pilot proficiency in aircraft used to support the MRTFB mission.

- (U) ($1,700) Continue the DC-130 target air launch capability maintenance contract and other overhead costs.

(U) FY 1995 PLAN:

- (U) ($62,451) Continue indirect civilian pay and contractor costs required to manage, operate and maintain the MRTFB's Sea Range, Air and Ground Range, Electronic Combat Range, Junction Ranch's RCS Range, the Propulsion, Warhead, and Environmental test facilities, parachute system testing, and the operational target vehicle and launch functions. Supports Naval Air Weapons Station, Point Mugu and China Lake's aircraft maintenance, air operations and weapons storage overhead MRTFB functions. Support required to maintain and operate new threat systems at the Electronic Combat Range.

- (U) ($7,900) Continue sustaining equipment maintenance, technical material and spare parts for the ranges and target instrumentation and equipment systems. Technical spares, material and contract support are required to ensure the continued reliability of the existing T&E systems. Threat systems at the Electronic Combat Range require critical spare parts.

- (U) ($9,197) Continue funding MRTFB RPMA including emergency call services, extensive road maintenance, periodic system maintenance and major facility projects to reduce the backlog of maintenance and repair to meet new mission and customer requirements. Fund public works transportation and engineering support and hazardous waste control. Facility support required for road maintenance, facility service calls and periodic maintenance.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605864N
PROGRAM ELEMENT TITLE: Test and Evaluation Support

PROJECT NUMBER: W0653
BUDGET ACTIVITY: 6

Date: 7 February 1994

- (U) ($2,500) Continue travel, transportation, printing, communications, and training necessary to manage and sustain MRTFB operations.
- (U) ($275) Continue annual lease for off shore and remote location instrumentation sites and Host Tenant Agreement costs with other Commands.
- (U) ($2,800) Continue support for maintaining the R-2508 Air Space Control System.
- (U) ($53,300) Continue annual utility costs, facility service contracts, payment of workmen's compensation costs for MRTFB employees and contribution to the Command's G&A expenses.
- (U) ($5,360) Continue flight hour costs to maintain pilot proficiency in aircraft used to support the MRTFB mission.
- (U) ($2,000) Continue the DC-130A target air launch capability maintenance contract and other overhead costs.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, Point Mugu and China Lake, CA; NAVAIRWPNSTA, Point Mugu and China Lake, CA., (including outlying field, San Nicolas Island). CONTRACTORS:Computer Sciences Corporation, Los Angeles, CA; UNISYS, New York, NY; SRS Technology, Newport Beach, CA; Grumman Technical Services, Titusville, FL; Control Data Corporation, Minneapolis, MN; ERAI, Ridgecrest, CA; COMARCO, Ridgecrest, CA; Boeing Computer Support Services, Ridgecrest, CA; LORAL Electronic Systems, Ridgecrest CA; Research Development Lab, Ridgecrest, CA.

(U) RELATED ACTIVITIES: PE 0604759N, Major Test and Evaluation Investment

(U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) MILCON, Projects 428, 469, 014, 346, 061, 031, 090, 773, 289, 032	0	18,570	5,800	0	12,600	12,500		CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605864N
PROGRAM ELEMENT TITLE: Test and Evaluation Support
PROJECT NUMBER: W0654
BUDGET ACTIVITY: 6
Date: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: W0654, Naval Air Warfare Center Aircraft Division. The Naval Air Test Center and the Naval Air Propulsion Center have been consolidated under the new Naval Air Warfare Center. These two Major Range and Test Facility Base (MRTFB) activities are now called the Naval Air Warfare Center Aircraft Division (NAVAIRWARCENACDIV) Patuxent River, and Trenton, NJ. This project provides funds for full-spectrum research, development, test and evaluation (RDT&E), engineering, and fleet support for air platforms. The product areas include aircraft systems technology, propulsion RDT&E, flight test and engineering, avionics design and production, and aircraft-platform interface. Flight Test and Engineering Group (FTEG) Patuxent River, performs development, and test and evaluation of manned and unmanned air vehicle systems, including mission systems, equipment, subsystems, components, and support systems. NAVAIRWARCENACDIV has extensive airfield, flight test range, aircraft systems test facilities and simulation laboratories. This project also provides complete technical and engineering support and associated RDT&E plant and facilities for air-breathing propulsion systems; this includes accessories and components, fuels, and lubricants. NAVAIRWARCENACDIV has extensive facilities for conducting both installed and uninstalled aircraft engine Development, Test and Evaluation (DT&E). This project funds facility costs not chargeable to the user. Effective FY 1994 all Improvement and Modernization efforts have been consolidated and transferred to a new PE 0604759N, Major Test and Evaluation Investment, project W2195. Effective FY 1995, NAVAIRWARCENACDIV funding has been realigned to reflect a more appropriate charging practice between MRTFB and DBOF efforts. This change makes NAVAIRWARCENACDIV charging practices consistent with NAVAIRWARCENWPNDIV.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($47,456) Continued funding civilian labor required to manage, operate and maintain the MRTFB.
- (U) ($10,952) Continued travel, transportation, collateral equipment, supplies, and other expenses.
- (U) ($9,645) Continued communications, purchased equipment maintenance, printing and reproduction, and purchased services contracts.
- (U) ($14,455) Continued maintenance and repair program.
- (U) ($5,424) Continued minor construction and major repair program to reduce BMAR. Projects included runway repairs, a hangar roof replacement, and widening the Electromagnetic Pulse (EMP) facility tow-way.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605864N
PROGRAM ELEMENT TITLE: Test and Evaluation Support
PROJECT NUMBER: W0654
BUDGET ACTIVITY: 6
Date: 7 February 1994

- (U) ($6,859) Continued flight hour costs to maintain pilot proficiency in aircraft used to support the MRTFB mission.
- (U) ($449) Continued equipment and building rentals.
- (U) ($3,614) Continued annual utility costs.
- (U) ($1,187) Continued payment of workmen's compensation costs for MRTFB employees.
- (U) ($2,161) Real Property Maintenance Activities.
- (U) ($819) Improvement and Modernization efforts transferred and consolidated under PE 0604759N, Major T&E Investment.

(U) FY 1994 PLAN:

- (U) ($42,818) Continue civilian labor required to manage, operate, and maintain the MRTFB.
- (U) ($8,940) Continue travel, transportation, collateral equipment, supplies, and other expenses.
- (U) ($7,659) Continue communications, purchased equipment maintenance, printing and reproduction, and purchased services contracts.
- (U) ($14,112) Continue maintenance and repair program.
- (U) ($5,650) Continue minor construction and major repair program to reduce BMAR.
- (U) ($7,114) Continue flight hour costs to maintain pilot proficiency in aircraft used to support the MRTFB mission.
- (U) ($1,204) Continue equipment and building rentals.
- (U) ($3,393) Continue annual utility costs.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605864N
PROGRAM ELEMENT TITLE: Test and Evaluation Support
PROJECT NUMBER: W0654
BUDGET ACTIVITY: 6
Date: 7 February 1994

- (U) ($1,386) Continue payment of workmen's compensation cost for MRTFB employees.

(U) FY 1995 PLAN:

- (U) ($47,050) Continue civilian labor required to manage, operate, and maintain the MRTFB.
- (U) ($6,372) Continue travel, transportation, collateral equipment, supplies, and other expenses.
- (U) ($19,546) Continue communications, purchased equipment maintenance, printing and reproduction, and purchased services contracts.
- (U) ($4,899) Continue maintenance and repair program.
- (U) ($6,342) Continue minor construction and major repair program to reduce BMAR.
- (U) ($8,888) Continue flight hour costs to maintain pilot proficiency in aircraft used to support the MRTFB mission.
- (U) ($1,215) Continue equipment and building rentals.
- (U) ($2,038) Continue annual utility costs.
- (U) ($350) Continue payment of workmen's compensation cost for MRTFB employees.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV FTEG, Patuxent River, MD and Trenton, NJ; CHESNAVFACENGCOM, Washington, DC. CONTRACTORS: Southern Maryland Electric, Hughesville, MD; Dyncorp, Reston, VA; Universal Fuel, Lexington Park, MD; Holmes and Narver, Inc., Orange County,CA; USA Asbestos Removal Company, Clifton, NJ; TUCS Cleaning Services, Inc., West Orange, NJ; Interstate Waste Removal Company, Trenton, NJ; KEI Industrial Services, Inc., Levittown, PA; York International, Malvern, PA.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605864N
PROGRAM ELEMENT TITLE: Test and Evaluation Support

PROJECT NUMBER: W0654
BUDGET ACTIVITY: 6

Date: 7 February 1994

(U) RELATED ACTIVITIES:

- (U) PE 0604759N, Major Test and Evaluation Investment

(U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) MILCON Proj 505, 426, 493	0	1,000	3,400	0	0	6,270	CONT.	CONT.	

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605865N
PROGRAM ELEMENT TITLE: Operational Test and Evaluation Capability
PROJECT NUMBER: R0831
BUDGET ACTIVITY: 6
DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0831 Operational Test and Evaluation Force Support	8,732	8,190	8,637	8,518	8,697	8,864	9,036	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND PROJECT: This program element provides Commander, Operational Test and Evaluation Force (COMOPTEVFOR) general support funding for the planning, conducting, analysis, and reporting of operational test and evaluation of Navy weapon systems acquisition projects, and the validation of tactics as required by directives of the Secretary of Defense and by Public Law.

C. U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($8,732) Issued operational test and evaluation reports to the Chief of Naval Operations (CNO) and the Secretary of the Navy (SECNAV) in support of production decisions and fleet introduction decisions for new weapon systems. Continued operational testing and reporting of non-tactical automated information systems (AIS).

(U) FY 1994 PLAN:
- (U) ($6,142) Operationally test and evaluate CNO projects commensurate with authorized funding level.
- (U) ($2,048) Maintain level of effort associated with the DOD 5000 acquisition guidance which requires increased COMOPTEVFOR involvement in early operational assessments, developmental testing, and the Cost and Operational Effectiveness Analysis.

(U) FY 1995 PLAN:
- (U) ($6,478) Operationally test and evaluate CNO projects commensurate with authorized funding level.
- (U) ($2,159) Maintain level of effort associated with the DOD 5000 acquisition guidance which requires COMOPTEVFOR involvement in early operational assessments, developmental testing, and the Cost and Operational Effectiveness Analysis.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605865N
PROGRAM ELEMENT TITLE: Operational Test and Evaluation Capability
PROJECT NUMBER: R0831
BUDGET ACTIVITY: 6
DATE: 7 February 1994

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: COMOPTEVFOR, Norfolk, VA; NAVAIRWARCENWPNDIV, China Lake, CA; NAVUNSEAWARCENDIV, Keyport, WA; NAVAIRWARCENWPNDIV, Point Mugu, CA; NAVSURFWARCENDIV, Dahlgren, VA; and NAVSURFWARCENDIV, Port Hueneme, CA. CONTRACTORS: PRC, Norfolk, VA.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) MILCON P-141	0	8,200	0	0	0	0	0	0	8,200
• (U) OPN Line 42	0	0	72	0	0	0	0	0	72

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605866N
PROGRAM ELEMENT TITLE: Navy Space and Electronic Warfare Support
BUDGET ACTIVITY: 6

DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R0739 Navy C4I Top Level Requirements	2,481	2,099	1,850	2,523	1,823	2,231	2,022	CONT.	CONT.
X0706 EMI Reduction and Radio Frequency Management*	3,513	1,907	1,669	2,209	2,355	2,324	3,235	CONT.	CONT.
TOTAL	5,994	4,006	3,519	4,732	4,178	4,555	5,257	CONT.	CONT.

*Funded in Program Element 0605803N in FY 1993.

B. (U) BRIEF DESCRIPTION OF ELEMENT: Project R0739 Navy C4I Top Level Requirements - Analyzes fleet requirements and research and development technology to develop top level plans for operating Navy Communications, Command and Control, Computers, and Intelligence (C4I) and space systems in the Space and Electronic Warfare (SEW) mission area. Project X0706 Electro Magnetic Interference (EMI) Reduction and Radio Frequency (RF) Management - develops advanced technology to identify and reduce electromagnetic interference sources from Navy systems and platforms.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605866N
PROGRAM ELEMENT TITLE: Navy Space and Electronic Warfare Support (SEW)
PROJECT: R0739
BUDGET ACTIVITY: 6
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECTS:

(U) PROJECT NUMBER AND TITLE: R0739, Navy C^4I Top Level Requirements. Provides analysis of fleet requirements and research and development technology to develop top level plans for operating Navy Communications, Command, Control, Computers, and Intelligence (C^4I) and space systems in the Space and Electronic Warfare (SEW) mission area.

(U) FY 1993 ACCOMPLISHMENTS:
- (U) ($2,481) Identified programs and actions needed to increase efficiency of C4 links by implementing C4 architectures to provide user pull, vice provider push, of information.

(U) FY 1994 PLANS:
- (U) ($1,724) Identify programs and actions needed to develop a common tactical pic for command and control applications, e.g., enhanced: 1) data fusion, 2) multimedia communications, 3) Global Positioning System (GPS) accuracy, 4) amphibious C4I, 5) multiband antennas, and 6) combat identification.
- (U) ($375) Relate the effects of changing surface ship force structure to Navy Command and Control System Ashore and Afloat requirements.

(U) FY 1995 PLANS:
- (U) ($925) Identify programs and actions needed to provide networking of communication, command and control, computers, and intelligence (C^4I) systems, e.g., enhanced: 1) multilevel security, and 2) mine warfare C4I.
- (U) ($925) Identify programs and actions needed to provide joint capabilities for C^4I architecture, e.g., enhanced: 1) near real time targeting, 2) real time Joint planning/coordination, 3) early intelligence preparation of battle space, and 4) hardkill/softkill weapons.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENWPNDIV, China Lake, CA; NRL, Washington, D.C.; NCCOSC WC ISE DIV, San Diego, CA; NAVPGSCOL, Monterey, CA. CONTRACTORS: Johns Hopkins University/Applied Physics Laboratory, Laurel, MD.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605866N
PROGRAM ELEMENT TITLE: Navy Space and Electronic Warfare Support (SEW)

PROJECT: R0739
BUDGET ACTIVITY: 6

DATE: 7 February 1994

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605866N
PROGRAM ELEMENT TITLE: Navy Space and Electronic Warfare Support (SEW)
PROJECT NUMBER: X0706
BUDGET ACTIVITY: 6
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: X0706, Electromagnetic Interference (EMI) Reduction and Radio Frequency (RF) Management. This project develops advanced technology to identify and reduce EMI sources from Navy systems and platforms.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($725) Automated Spectrum Planning, Engineering, Coordination and Tracking System (ASPECTS): Tailored ASPECTS for USMC. Began developing a High Frequency (HF) analysis capability, incorporating engineering checks into the Allocation Application Package, tailoring fleet system software for Navy Electromagnetic Spectrum Center (NAVEMSCEN)/Navy Systems Commands (SYSCOMs) and developing database transfer enhancements. Began expanding Electromagnetic Compatibility (EMC) Analysis Program (EMCAP) to include 100 platforms.
- (U) ($1,455) Battle Force (BF) EMI Evaluation System (BEES): Began integrating the BEES analysis criteria into the BEES Analyst Terminal (BAT) to develop a post BF exercise EMI analysis capability. Developed Detection-to-Engagement (DTE) module for BEES to assess the EMI degradation of the performance of Anti-Air Warfare (AAW) Combat System.
- (U) ($100) Waveform Recording and Playback System (WRaPS): Developed WRaPS as authentic signal match of BF EMI.
- (U) ($250) Evaluated promising fiber optic technology applications. Developed new test procedures for evaluating shielding effectiveness of composite materials.
- (U) ($983) Developed new Navy criteria and test procedures for inclusion in MIL-STD-461D/462D and MIL-HDBK-235.

(U) FY 1994 PLAN:

- (U) ($304) ASPECTS: Incorporate Navy user feedback into ASPECTS development. Complete HF analysis capability, incorporating engineering checks into the Allocation Application Package and tailoring software for NAVEMSCEN and SYSCOMs. Begin development of Terrain Analysis Capability and continue to develop and incorporate database transfer enhancements. Add algorithms to EMCAP to include Identification, Friend or Foe (IFF) and Electronic Warfare (EW) systems.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605866N
PROGRAM ELEMENT TITLE: Navy Space and Electronic Warfare Support (SEW)
PROJECT NUMBER: X0706
BUDGET ACTIVITY: 6
DATE: 7 February 1994

- (U) ($1,141) Integrate BEES analysis criteria into BAT to develop a post exercise EMI analysis capability at platform system levels. Integrate automated combat system EMC analysis tool into BEES.
- (U) ($80) Begin to develop WRaPS test and evaluation applications for use in avoiding EMI in the procurement of Navy Systems.
- (U) ($382) Develop new Navy criteria and test procedures to validate conversion of industry standards to military standards.

(U) FY 1995 PLAN:

- (U) ($367) ASPECTS: Complete development of ASPECTS Terrain Analysis Capability. Continue to develop and incorporate database transfer enhancements. Continue to incorporate IFF and EW system algorithms into EMCAP. Integrate ASPECTS into the Navy Tactical Command System-Afloat (NTCS-A).
- (U) ($757) BEES: Incorporate EMCAP into BEES to provide accurate measured radar range, power, frequency, and geometry data needed to analyze Electromagnetic Environmental Effects. Integrate BEES into the NTCA-A.
- (U) ($60) Supplement WRaPS with the capability to measure the Electromagnetic Environment of the BF for use in EMCAP and BEES, to determine compliance with the Frequency Management Plans and detect unauthorized users of the frequency spectrum and the presence of hostile emitters.
- (U) ($485) Develop test procedures for electromagnetic vulnerability and susceptibility evaluation of Non-developmental and Commercial off-the-shelf procured Navy communications-electronic equipment.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NAVSURFWARCENDIV, Dahlgren, VA; NCCOSC WC ISE DIV, San Diego, CA; NRL, Washington, D.C.; Electromagnetic Compatability Analysis Center, Annapolis, MD. CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605867N
PROGRAM ELEMENT TITLE: SEW Surveillance/Recon Spt
BUDGET ACTIVITY: 6

DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Z1034 Tac Sat Recon Office	9,281	10,616	13,611	13,723	14,564	13,938	15,962	CONT.	CONT.
R2007 Space Mgmt Support	1,023	912	954	959	964	995	1,025	CONT.	CONT.
X1368 Nav Space Act LA	204								
TOTAL	10,508	11,528	14,565	14,682	15,528	14,933	16,987	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT: SEW Surveillance/Reconnaissance Support.

(U) Z1034: Established to exploit all National and Service sensor systems to improve tactical support to fleet operational commanders. Project also supports fleet exercises, which provide the venue for testing modifications to existing programs and being made aware of new requirements.

(U) R2007: This project provides resources to the Naval Space Command for the conduct of its support testing.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605867N
PROGRAM ELEMENT TITLE: SEW Surveillance/Recon Spt
PROJECT NUMBER: R2007
BUDGET ACTIVITY: 6
Date: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: R2007, Space Management Support. This project provides resources to the Naval Space Command for the conduct of its support testing.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($215) Conducted assessments of identified C2 and data distribution architecture options for space-derived support to the fleet.
- (U) ($808) Completed prototyping and commenced test and demonstration of system for tactical integration of space-derived information.

(U) FY 1994 PLAN:

- (U) ($180) Commence prototyping of equipment to provide most cost effective C2 and data distribution architecture for space support to the fleet.
- (U) ($370) Complete test and demonstration of system for tactical integration of space-derived information.
- (U) ($152) Commence technology supplement for support of the evolution of the SEW concept as part of revision to Naval Space Technology plan.
- (U) ($210) Complete prototyping and commence test and demonstration of system for tactical integration of space-derived information.

(U) FY 1995 PLAN:

- (U) ($210) Complete prototyping and commence test and demonstration of system for tactical space support to the fleet.
- (U) ($694) Evaluate advanced technology options for space support to the fleet.
- (U) ($50) Complete technology supplement for support of the evolution of the SEW concept as part of revision to Naval Space Technology Plan.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: In house: Naval Surface Warfare Center, Dahlgren Division (NSWCDD), Dahlgren, VA.; Naval Research Laboratory (NRL), Washington, D.C. Contractor: TBD.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605867N
PROGRAM ELEMENT TITLE: SEW Surveillance/Recon Spt

PROJECT NUMBER: R2007
BUDGET ACTIVITY: 6

Date: 7 February 1994

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605867N
PROGRAM ELEMENT TITLE: SEW Surveillance/Recon Spt
PROJECT NUMBER: Z1034
BUDGET ACTIVITY: 6
Date: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Z1034 TAC SAT RECON OFFICE	9,281	10,616	13,611	13,723	14,564	13,938	15,962	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Established to exploit all National and Service sensor systems to improve tactical support to fleet operational commanders. Project also supports fleet exercises, which provide the venue for testing modifications to existing programs and being made aware of new requirements. Additional detailed information is available at a higher level of classification.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,024) Joint/Navy Tactical Support
- (U) ($1,377) Surveillance of Non-cooperative Targets
- (U) ($4,510) Timely Dissemination of Tactically Significant Data
- (U) ($1,370) Emerging R&D Opportunities

2. (U) FY 1994 PLAN:

- (U) ($2,008) Joint/Navy Tactical Support
- (U) ($1,963) Surveillance of Non-cooperative Targets
- (U) ($4,133) Timely Dissemination of Tactically Significant Data
- (U) ($2,512) Emerging R&D Opportunities

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605867N
PROGRAM ELEMENT TITLE: SEW Surveillance/Recon Spt

PROJECT NUMBER: Z1034
BUDGET ACTIVITY: 6

Date: 7 February 1994

3. (U) FY 1995 PLAN:

- (U) ($5,267) Joint/Navy Tactical Support
- (U) ($2,950) Surveillance of Non-cooperative Targets
- (U) ($2,890) Timely Dissemination of Tactically Significant Data
- (U) ($2,504) Emerging R&D Opportunities

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: Under compartmented contracts.

E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparisen.

3. (U) Cost Changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES: PE 0603451N Tactical Space Operations

H. (U) OTHER APPROPRIATION FUNDS: Not applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605871M
PROGRAM ELEMENT TITLE: Marine Corps Tactical Exploitation of National Capabilities
PROJECT NUMBER: C1424
BUDGET ACTIVITY: 6
DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C1424 Tactical Exploitation of National Capabilities (TENCAP)	1,179	4,241	1,019	1,056	1,079	1,109	1,139	CONT.	CONT.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND PROJECT: This program is designed to enhance the ability of tactical Marine Corps forces to exploit the capabilities of national intelligence-gathering systems. Congressionally directed, it requires close liaison with the intelligence community and involves complex and highly-sensitive activities.

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($287) Provided Federal Information Processing resources to upgrade the Geographical Information System (GIS) to support the intelligence requirements of the Marine Corps through the use of open source satellite data. The Commander's Tactical Terminal Cost and Operational Effectiveness Analysis explored the best follow-on capability to receive near real-time information from national systems.
- (U) ($110) Demonstrated alternate communication/dissemination paths to include: Chariot, an advanced tactical extra high frequency (S-band) satellite communications transceiver; Satellite Launch Dispenser Communication; and GIS.
- (U) ($218) Participated in TENCAP system demonstrations/exercises at the Fleet Marine Force (FMF) and supporting establishments including: Joint Chiefs of Staff directed Special Project EIDOLON LANCE-93, whose objectives highlighted intelligence dissemination to the Joint Task Force (JTF) and included an imagery "pull" architecture from a servicing Joint Intelligence Center to the JTF; Combined Arms exercise, which included ground and air elements in a Marine Corps live-fire exercise; and Weapons and Tactics Instructor course.
- (U) ($564) Completed Marine Corps TENCAP-related support projects, including update of Marine Corps Intelligence Planning System (MIPS). Participated in National Intelligence Systems Development (NISD) and explored emerging technology with the Defense Support Project Office and other Services. Assisted in the update of the Joint Service Tactical Exploitation of National Systems Manual.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605871M
PROGRAM ELEMENT TITLE: Marine Corps Tactical Exploitation of National Capabilities
PROJECT NUMBER: C1424
BUDGET ACTIVITY: 6
DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($1,500) Develop S-Band architecture. Develop M-22 Tactical Network with primary objective of developing Marine Corps-wide national secondary imagery dissemination capability.
- (U) ($1,300) NISD participation in the following areas: prototype development and testing of RADIANT HAIL, a man-portable, multi-source tactical information receiver and processor. Explore concept of secondary imagery to lower echelon Marine units utilizing RADIANT TIN imagery processing using mathematical description techniques. RADIANT TIN is a joint Navy/Marine Corps TENCAP project to prove the operational utility of a new imagery software program. Evaluate three candidate proposals for Marine Corps submissions to the Military Exploitation of Reconnaissance and Intelligence Technology board.
- (U) ($1,241) Complete Marine Corps TENCAP-related support projects, including the updated MIPS, and prepare Tactical Impact Statements (TIS) on National Intelligence Systems as required by Congress. Demonstrate TENCAP system capabilities with the FMF. Coordinate TENCAP training/exercise support for Marine Corps units.
- (U) ($200) Develop "Centers of Excellence", a Marine Corps TENCAP initiative to create permanent capabilities for accessing, using and disseminating advanced products from National Systems, at Marine Aviation Weapons Training Squadron (MAWTS) and Marine Corps Air and Ground Combat Center (MCAGCC) to test/evaluate methods/techniques for dissemination of national-level information to Marine units.

(U) FY 1995 PLAN:

- (U) ($338) Participate in NISD development, technology assessments, utility evaluations and submit TIS as required by Congress. This will ensure Marine Corps requirements are addressed in basic system design and prevent the need for costly retrofits to build systems.
- (U) ($436) Participate in Marine Corps TENCAP-related support projects including TENCAP concept development and feasibility demonstrations. This will enhance national level support that operational forces receive from existing national intelligence systems.
- (U) ($245) Coordinate and fund TENCAP training/exercise support. This will enhance operational forces' understanding of national intelligence support and improve use of national data.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605871M
PROGRAM ELEMENT TITLE: Marine Corps Tactical Exploitation of National Capabilities
PROJECT NUMBER: C1424
BUDGET ACTIVITY: 6
DATE: 7 February 1994

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: SPAWARSYSCOM, Washington, DC; NAVSYSMGMTACT, Washington, DC; MCAGCC, Twentynine Palms, CA; MAWTS, Yuma, AZ. CONTRACTORS: Not applicable.

(U) RELATED ACTIVITIES:

- (U) PE 0603730A (Army TENCAP), Project D560
- (U) PE 0603766A (Army TENCAP), Project D907
- (U) PE 0604740A (OSD TENCAP), Project D662
- (U) PE 0902398M (United States Special Operations Command), Chariot Program
- (U) PE 0605867N (SEW Surveillance/Reconnaissance Support), Project Z1034

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605873M
PROGRAM ELEMENT TITLE: Marine Corps Program Wide Support
BUDGET ACTIVITY: 6

DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
C0030 Marine Corps Studies and Analysis[1]	1,069	3,436	2,288	2,160	3,895	2,970	5,339	CONT.	CONT.
C0033 Operational Test and Evaluation Support[2]	4,228	2,074	1,916	1,219	1,088	1,106	1,028	CONT.	CONT.
C0073 Human Resources Management and Forecasting[3]	3,399	2,535	2,112	1,726	1,701	1,749	1,796	CONT.	CONT.
TOTAL	8,696	8,045	6,316	5,105	6,684	5,825	8,163	CONT.	CONT.

1 FY 1993 funding was moved from Program Element (PE) 0605151M due to the Congressional PE Restructure.
2 FY 1993 funding was moved from PE 0605156M due to the Congressional PE Restructure.
3 FY 1993 funding was moved from PE 0603732M due to the Congressional PE Restructure.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This PE provides the analytical foundation for the Marine Corps Studies System (MCSS), including mandated Mission Area Analyses and Cost and Operational Effectiveness Analyses. The MCSS is the front end of the Marine Corps' acquisition system and supports the Concepts Based Requirements System. In addition, the PE supports Marine Corps Operational Test and Evaluation (OT&E) Activity representatives for Marine Corps OT&E and OT&E performed by Fleet Marine Force Commanders and Technical Support Activities. The PE also funds the advanced development of systems and equipment to improve the manpower readiness of the Fleet Marine Force.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605873M
PROGRAM ELEMENT TITLE: Marine Corps Program Wide Support
PROJECT NUMBER: C0030
BUDGET ACTIVITY: 6
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C0030 Marine Corps Studies and Analysis. This program provides the analytical foundation for the Marine Corps Studies System (MCSS). The MCSS is the front end of the Marine Corps' acquisition system and supports the Concepts Based Requirements System. This program funds a variety of studies to include: mandated Mission Area Analysis (MAA); technology assessments; force structure analysis; weapons systems analysis; concept development and analysis studies; cost benefit analysis; training assessments; feasibility analysis; scenario development; and system threat analysis. The MCSS also is required to fund the execution of Milestone I Cost and Operational Effectiveness Analysis (COEA) studies in support of Program Objective Memorandum initiatives. This program provides quantitative information to decision makers on which to base improvements to doctrine, training and education, force structure and procurement. The MCSS also provides analytical support for decisions related to the resolution of current problems identified by the operating forces.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) Funded the continuation of 9 continuing FY 1992 study initiatives including:
- (U) ($245) 2 MAAs (Transportation and Health Services);
- (U) ($191) 3 COEAs (Tactical Combat Operations, Light Armored Vehicle - Day/Night Sight and the Tactical Control and Analysis Center);
- (U) ($633) 4 general studies (Measures of Effectiveness for Readiness and Sustainability, Manning and Equipping Combat Engineering and Support Battalions, Combat Service Support Element Task Organization Criteria, and the Joint Intelligence Center Intelligence Tactical Training Situation Scenario).

(U) FY 1994 PLAN:

- (U) ($2,237) Execute 42% of the studies approved in the FY 1994 Marine Corps Studies Master Plan (MCSMP) to include 9 mandated MAAs and 25 COEAs.
- (U) ($1,199) Fund the continuation of an estimated 12 continuing FY 1993 study initiatives.

(U) FY 1995 PLAN:

- (U) ($1,302) Execute an estimated 40% of the approved FY 1995 MCSMP. The MCSMP will include 9.5 mandated MAAs and 25 COEAs.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605373M
PROGRAM ELEMENT TITLE: Marine Corps Program Wide Support

PROJECT NUMBER: C0030
BUDGET ACTIVITY: 6

DATE: 7 February 1994

- (U) ($986) Fund the continuation of an estimated nine continuing FY 1994 study initiatives.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: MARCORSYSCOM Working Groups, Quantico, VA and DoD Top Level Schools (Naval Post Graduate School, Monterey, CA; Naval War College, Newport, RI; Marine Corps University, Quantico, VA; ARL, at PENN State, University Park, PA). CONTRACTORS: PRC Incorporated, Woodbridge, VA; Analytical Systems Engineering Corporation, Dumfries, VA; Potomac Systems Engineering, Incorporated, Annandale, VA; Management Systems Applications, Incorporated, Chesapeake, VA.

(U) RELATED ACTIVITIES:

- (U) PE 0605154N (Center for Naval Analyses (CNA)), Project C0031, Marine Corps Operations Analysis Group.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605873M
PROGRAM ELEMENT TITLE: Marine Corps Program Wide Support
PROJECT NUMBER: C0033
BUDGET ACTIVITY: 6
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C0033 Operational Test & Evaluation Support. This program supports the Marine Corps Operational Test and Evaluation (OT&E) Activity (MCOTEA) representatives for Marine Corps OT&Es and OT&Es performed by Fleet Marine Force Commanders and Technical Support Activities. This program also provides for OT&E of systems prior to procurement by the Marine Corps to include test planning, operational testing, and Independent Evaluation Report (IER) preparation. Funding for this project changed from Program Element 0605156M, at the end of FY 1993.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($963) MCOTEA In-House Support, salaries and utilities.
- (U) ($6) Unmanned Aerial Vehicle Short Range (UAV-SR) - wrote test plans, participated in multi-service Early Operational Assessment (EOA), published EOA reports.
- (U) ($15) Light Strike Vehicle - wrote test plans, participated in EOA, and published EOA report.
- (U) ($4) Anti-personnel Obstacle Breaching System - wrote test plans, conducted Initial Operational Test and Evaluation (IOT&E) and published independent Evaluation Report (IER).
- (U) ($266) Advanced Tactical Air Command Central - wrote test plans, conducted IOT&E and published IER.
- (U) ($3) Tray Ration Heating System (TRHS) - wrote test plans, conducted IOT&E and published IER.
- (U) ($62) Advanced Anti-Tank Weapon System - Medium (JAVELIN) - participated in multi-service IOT&E.
- (U) ($173) C-17 aircraft loading - participated in multi-service IOT&E.
- (U) ($5) AN/GRC-171 (HAVE QUICK) - participated in the Follow-on Test and Evaluation (FOT&E) and wrote an IER.
- (U) ($2,731) Light Armored Vehicle - Air defense (LAV-AD), conducted IOT&E.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605873M
PROGRAM ELEMENT TITLE: Marine Corps Program Wide Support

PROJECT NUMBER: C0033
BUDGET ACTIVITY: 6

DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($851) MCOTEA In-House Support, salaries and utilities.
- (U) ($185) C-17 aircraft - participate in multi-service IOT&E.
- (U) ($189) Light Armored Vehicle - Air Defense (LAV-AD) - complete IOT&E and publish an IER.
- (U) ($208) JAVELIN - complete multi-service IOT&E, and publish an IER.
- (U) ($204) Light Armored Vehicle - Day/Night Sight - write test plans, conduct IOT&E and publish an IER.
- (U) ($45) Improved Rigid Raider Craft - write test plans, conduct IOT&E, and publish IER.
- (U) ($60) Marine Expeditionary Force, Intelligence Analysis System - write test plans, conduct IOT&E and publish IER.
- (U) ($50) Mobile Electronic Warfare Support System Product Improvement Program - write test plans, conduct IOT&E, and publish IER.
- (U) ($60) Technical Control and Analysis Center - write test plans, conduct IOT&E, and publish IER.
- (U) ($50) Tactical Combat Operations System - write test plans, conduct IOT&E, and publish IER.
- (U) ($2) TRHS - complete IOT&E and publish IER.
- (U) ($70) Dual Mount - conduct MOT&E and publish IER.
- (U) ($40) Meterological Measuring SET (MMS) - conduct MOT&E, and publish IER.
- (U) ($30) Field Clinical X-Ray System - conduct MOT&E and publish IER.
- (U) ($30) Field Medical Clinical Laboratory System - conduct IOT&E and publish IER.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605873M
PROGRAM ELEMENT TITLE: Marine Corps Program Wide Support
PROJECT NUMBER: C0033
BUDGET ACTIVITY: 6
DATE: 7 February 1994

(U) FY 1995 PLAN:

- (U) ($933) MCOTEA In-House Support salaries and utilities.
- (U) ($152) Joint Service Imagery Processing System - write test plans, participate in multi-service IOT&E, and publish IER.
- (U) ($50) MANPACK Ultra High Frequency Satellite Communications Terminal (AN/PSC-5) - write test plans, conduct IOT&E, and publish IER.
- (U) ($66) Unmanned Aerial Vehicles - Short Range (UAV-SR) - write test plans, conduct IOT&E, and publish IER.
- (U) ($30) Unmanned Ground Vehicle - write test plans, conduct EOA, and publish IER.
- (U) ($50) Down Sized Master Station (Position Location Reporting System) (PLRS) - write test plans, conduct IOT&E, and publish IER.
- (U) ($20) Medium Tactical Vehicle Replacement Program - write test plans, conduct IOT&E, and publish IER.
- (U) ($40) Military Strategic and Tactical Relay Satellite System - write test plans, participate in multi-service IOT&E, and publish IER.
- (U) ($61) C-17 - participation in multi-service IOT&E and publish IER.
- (U) ($20) Global Position System Interface Unit - conduct IOT&E and publish IER.
- (U) ($50) Improved Direct Air Support Central - Conduct IOT&E and publish IER.
- (U) ($20) NBC Hazardous Warning System - conduct IOT&E and publish IER.
- (U) ($50) PLRS Communications Enhancement - conduct IOT&E and publish IER.
- (U) ($21) Tactical Communications Center - conduct IOT&E and publish IER.
- (U) ($55) Tactical Electronic Reconnaissance Processing and Simulation System (TERPES IV) - conduct IOT&E and publish IER.
- (U) ($20) TROJAN SPIRIT II - conduct MOT&E and publish IER.
- (U) ($25) Mobile Electronic Warfare Support System - PIP - participate in MOT&E and write IER.
- (U) ($50) Marine Expeditionary Force Intelligence Analysis System - conduct IOT&E and write IER.
- (U) ($25) Tactical Air Operations Module Block Upgrade - conduct IOT&E and write IER.
- (U) ($50) Technical Control and Analysis Center - conduct IOT&E and publish IER.
- (U) ($103) Commander's Tactical Terminal - conduct IOT&E and publish IER.
- (U) ($25) Intelligence Analyses System Workstation - conduct IOT&E and publish IER.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605873M
PROGRAM ELEMENT TITLE: Marine Corps Program Wide Support
PROJECT NUMBER: C0033
BUDGET ACTIVITY: 6
DATE: 7 February 1994

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: MCOTEA and MARCORSYSCOM, Quantico, VA; NAVAIRWARCENWPNDIV, China Lake, CA; NWS, Seal Beach, CA; Aberdeen Proving Ground, Aberdeen, MD; Dugway Proving Ground, Dugway, UT; Marine Corps Tactical Systems Support Activity, Camp Pendleton, CA. CONTRACTORS: COMARCO, China Lake, CA.

(U) RELATED ACTIVITIES: Not applicable.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605873M
PROGRAM ELEMENT TITLE: Marine Corps Program Wide Support
PROJECT NUMBER: C0073
BUDGET ACTIVITY: 6
DATE: 7 February 1994

C. (U) JUSTIFICATION FOR PROJECT:

(U) PROJECT NUMBER AND TITLE: C0073 Human Resources Management and Forecasting. This program funds the advanced development of systems and equipment to improve the manpower readiness of the Fleet Marine Force and develops techniques and methods that advance enlisted and officer occupational assignment, promotions and career track planning in the Marine Corps while end strength is reduced and force structure is changed. Funding for this program transitions from PE 0603732M, Marine Corps Advanced Manpower Training Systems, at the end of FY 1993.

(U) FY 1993 ACCOMPLISHMENTS:

- (U) ($2,424) Developed Optical Digital Imaging (ODI) prototype for Fitness Report Processing to test and evaluate functionality and applicability of digital imaging for storage, control and management of fitness reports.
- (U) ($475) Completed Enlisted Planning System (EPS) user interface and Enlisted Bonus Module.
- (U) ($467) Developed a prototype of a system based on a historical relational database, allowing users easy access to the data needed to perform their jobs. The prototype will be the basis for future development of Total Force Decision Support System (TFDSS) which will improve our manpower management capabilities, especially in areas requiring predictions of future behavior.
- (U) ($33) Began Manpower Process Modernization (MPM) sub-project by testing existing software and developing prototypes to convert and transition large mathematical optimization problems from mainframe to personal computer hardware.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605873M
PROGRAM ELEMENT TITLE: Marine Corps Program Wide Support
PROJECT NUMBER: C0073
BUDGET ACTIVITY: 6
DATE: 7 February 1994

(U) FY 1994 PLAN:

- (U) ($244) Complete EPS Promotion Planning Module.
- (U) ($921) Continue TFDSS development by designing applications for Manpower Plans and Policy Division and developing an additional prototype to automate the Monitor Assignment process.
- (U) ($375) Continue the MPM optimization development and testing. Complete conversion of Enlisted Staffing Goal Model and Recruit Distribution Model. Begin conversion of Enlisted Assignment Model (EAM). Begin research toward linking manpower optimization with standard modeling and query languages.
- (U) ($995) Develop the design of an ODI records management system and a Promotion Board prototype.

(U) FY 1995 PLAN:

- (U) ($400) Complete the ODI Records Management System Design.
- (U) ($870) Continue development of TFDSS by building Manpower Analysis, applications, expanding capabilities of the existing TFDSS data bases, and refining user interface to allow for new complex queries. Expand Research and Development into minority population analysis.
- (U) ($842) Complete conversion of the EAM under MPM.

(U) PROGRAM TO COMPLETION: This is a continuing program.

(U) WORK PERFORMED BY: IN-HOUSE: NPRDC, San Diego, CA; NPGS, Monterey, CA. CONTRACTORS: Dynamic Concepts, Incorporated, Washington, DC; Department of Transportation, Boston, MA; Computer Sciences Corporation, Falls Church, VA; PRC Incorporated, Reston, VA.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605873M
PROGRAM ELEMENT TITLE: Marine Corps Program Wide Support

PROJECT NUMBER: C0073
BUDGET ACTIVITY: 6

DATE: 7 February 1994

(U) RELATED ACTIVITIES:

- (U) PE 0603007A (Human Factors, Personnel and Training Advanced Technology Development)
- (U) PE 0603227F (Personnel, Training, and Simulation Technology)
- (U) PE 0603707N (Manpower, Personnel and Training Advanced Technology Development)
- (U) This program adheres to Tri-Service Reliance Agreements on Manpower and Personnel, with oversight and coordination provided by the Joint Directors of Laboratories.

(U) OTHER APPROPRIATION FUNDS: (Dollars in Thousands)

	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
• (U) O&M,MC Line 90A0	0	0	0	22	27	37	42	CONT.	CONT.
• (U) PMC Line 65 (BLI #494200) ADP Equipment (TFDSS and MPM portion only)	0	268	200	220	180	170	180	CONT.	CONT.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0605896N
PROGRAM ELEMENT TITLE: Base Operations R&D
PROJECT NUMBER: R2238
BUDGET ACTIVITY: 6
DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R2238 Base Operations R&D	0	0	32,100	0	0	0	0	0	32,100

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element funds joint logistic requirements for various Navy Research and Development (R&D) activities.

C. (U) JUSTIFICATION FOR PROJECT:

(U) FY 1993 ACCOMPLISHMENTS: Not applicable.

(U) FY 1994 PLAN: Not applicable.

(U) FY 1995 PLAN: ($32,100) Fund joint logistic requirements for Navy R&D activities.

(U) PROGRAM TO COMPLETION: Not applicable.

(U) WORK PERFORMED BY: IN-HOUSE: Various. CONTRACTORS: None.

(U) RELATED ACTIVITIES: Various.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0708011N
PROGRAM ELEMENT TITLE: Manufacturing Technology
PROJECT NUMBER: R1050
BUDGET ACTIVITY: 7
DATE: 7 February 1994

A. (U) RESOURCES: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1993 ACTUAL	FY 1994 ESTIMATE	FY 1995 ESTIMATE	FY 1996 ESTIMATE	FY 1997 ESTIMATE	FY 1998 ESTIMATE	FY 1999 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R1050 Manufacturing Technology	99,485	140,629	20,164*	30,492	20,449	15,424	10,341	CONT.	CONT.

* Service Manufacturing Technology funding for FY 1995 and out, except for the National Center of Excellence for Metalworking Technology, has been centralized under OSD Program Element 0603705D.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Navy Manufacturing Technology (MANTECH) Program is intended to improve the productivity and responsivenecs of the U.S. defense industrial base by funding the development of manufacturing technologies. The Navy program, by providing seed funding for the development of moderate to high risk process and equipment technology, permits contractors to upgrade their manufacturing capabilities. Ultimately, the program aims to produce high-quality weapon systems with shorter lead times and reduced acquisition costs. Major areas of endeavor both underway and planned include: advanced manufacturing technology for electronics assembly, laser metalworking, flexible computer manufacturing, composites, metalworking and welding technology. The MANTECH program is being integrated into the Joint Mission Area/Support Area and Joint Warfare Operational Capability process and will utilize the results of these initiatives as appropriate in the program planning process.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 ACCOMPLISHMENTS:
   - (U) ($20,000) National Center of Excellence for Composites Manufacturing Technology: Established the Composites Technology Teaching Factory; Field Repair and Non-Destructive Evaluation of Low Observable Structures; Low Observable Core Manufacturing Process Improvements; commenced Tooling for Composites Program with literature search initiated; completed design and analysis for a composite electronics housing for the AN/AYK-14 Navy Standard Mission Computer; submitted program plan to the Navy for Composite Marine Control Surface Program; completed Phase I of the Infrared Spectroscopy; established two satellite Composite Technology Centers; produced two iterations of a draft program concept document with the voluntary assistance of representatives of all major aircraft fabricators for the Fit-Up and Assembly Program.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0708011N
PROGRAM ELEMENT TITLE: Manufacturing Technology

PROJECT NUMBER: R1050
BUDGET ACTIVITY: 7

DATE: 7 February 1994

- (U) ($3,000) Advanced Telecommunications Institute: Initiated action for contract award for the Advanced Telecommunications Institute to develop and coordinate advanced educational programs and laboratories in telecommunications, multi-media systems and computing technology applications for dual use in government and defense industries along with private sector industry evolving requirements.
- (U) ($24,000) National Center for Metalworking Technology: Continued development of advanced metalworking technology in semi-solid forming; deformation processing initiative; intelligent processing (casting); residual stress measurements on landing gears; metal composites (bond strength) characterization; remote information systems; laser ultrasonics; evaluation of process impacting machine hole quality and stress corrosion cracking data on selected alloys. Also continued efforts in atlas of formability; tungsten alloy penetrators; powder injection molding; and casting technology.
- (U) ($1,500) Electroslag Surfacing: Began experimental work to evaluate the compatibility of Electroslag Surfacing applied Alloy 625 with continuation by Gas Metal Arc Welding (GMAW). Completed all mechanical testing related to the Electroslag Surfacing and Submerged Arc Surfacing application of Alloy 625 to Class 1, 2 and 5 shafting steel, with the exception of the round (rotating-being) fatigue testing in progress. Continued preparations of scripts for the Engineering and Training module videos.
- (U) ($2,500) National Shipbuilding Research Program: Developed a portable pipe laser beam cutting/welding system. Developed a comprehensive, cost effective weld-thru planner. Developed a generic build strategy and investigated methods for improving production throughput in a shipyard.
- (U) ($6,000) Automated Manufacturing Research Facility: Continued development of intelligent manufacturing technology. Developed improvements in manufacturing technologies for machining and grinding of advanced materials such as ceramics and silicon carbide. Produced a commercially viable, low cost, machine tool controller which conforms to the emerging Next Generation Controller specification. Completed development and commercialization of manufacturing system "smart module" for automatic generation of manufacturing planning, simulation systems for automated factories, dynamic scheduling and automated design for assembly.
- (U) ($5,000) Multi-Function Self Aligned Gate: Completed Phase I including delivery of a detailed Technical Plan and Milestone Schedule. Significant technology from the Air Force X-Band T/R Module MANTECH was analyzed and selected for transition and insertion into the Navy C-Band MANTECH. Phase II start-up; a major contract was awarded under authority and project management of Naval Command, Control and Ocean Surveillance Center at San Diego. The Space and Naval Warfare Systems Command Federal Labs contract with JHU/APL was successfully employed for this work. All technical, schedule and budgetary objectives were successfully met.
- (U) ($5,000) Center of Excellence in Ship Hull Designs and Electrical Systems: Initiated action to award sole source contract to University of New Orleans and LaMar University.

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FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0708011N PROJECT NUMBER: R1050 DATE: 7 February 1994
PROGRAM ELEMENT TITLE: Manufacturing Technology BUDGET ACTIVITY: 7

- (U) ($7,200) EA-6B Prowler Upgrade: Awarded contract to Litton Amecom to commence Production Technology Improvement Program, Phase I, and related support to develop and demonstrate improved industrial productivity and responsiveness, and to demonstrate insertion of already developed new technologies for improved performance and packaging on the Receiver Processor Group.
- (U) ($3,585) Purchased Nd:YAG Laser for Philadelphia Naval Shipyard; continued Manufacturing Technology Strategic Planning Initiative; continued Design and Manufacturing Education Program and completed Design and Manufacturing college curriculum; monitored technical achievements of all manufacturing technology projects by technical advisory boards, executive advisory boards, contracting officers technical representatives and site reviews.
- (U) ($15,000) Cast Projectiles: Continued work on modeling, analysis, casting, and testing of the various projectiles covered under the current contract. The work covered various phases on the individual projectile types, ranging from modeling to live firing test. All 5"/54 configurations have reached various stages of completion and the 76mm configurations are entering into phase one modeling studies.
- (U) ($1,700) Laser Assisted Metalworking: Demonstrated process parameters for portable 1.8 kilowatt portable laser; processed development and demonstration for 2.4 kilowatt portable laser.
- (U) ($5,000) Established the National Center for Advanced Gear Manufacturing Technology to develop gear measurement standards and begin developing training and education materials for the gear manufacturers to advance themselves in gear manufacturing.

2. (U) FY 1994 PLAN:

- (U) ($7,000) Multi-Function Self-Aligned Gate: Begin pre-production run of 100 modules and production validation run of 1200 modules to be implemented in the Cooperative Engagement Capability Program for Airborne and Shipboard testing of active aperture communication arrays. Complete the transition and insertion of selected Air Force contractors technology into ITT production facility. Continue with semi-annual government/industry briefings to effect real-time technology distribution.
- (U) ($40,000) National Center for Metalworking Technology: Continue development of advanced metalworking technology in squeeze casting; weld optimization for accelerate cooling/direct quench (AC/DQ) steels; advanced consumables for AC/DQ steels; joining of high strength, high toughness alloys for submarine hull applications; improved performance of sliding gold plated electrical conductors; and ion implantation process for surfacing.
- (U) ($1,500) Electroslag Surfacing: Conduct trial runs at Long Beach Naval Shipyard; conduct shipyard/manufacturer demonstrations; continue evaluations of repairability of Electroslag cladding by GMAW; continue optimization of the Electroslag process for 70Cu-30Ni cladding; and continue the development of written and video training materials.

FY 1995 RDT&E, NAVY DESCRIPTIVE SUMMARY

PROGRAM ELEMENT: 0708011N
PROGRAM ELEMENT TITLE: Manufacturing Technology
PROJECT NUMBER: R1050
BUDGET ACTIVITY: 7
DATE: 7 February 1994

- (U) ($13,500) Laser Surface Engineering: The material categories that are to be addressed by the Center include electronic and opto-electronic materials, polymers, metals, ceramics and diamond films. Films, coatings and surface treatments will be developed to achieve wear, corrosion and thermal resistance for mechanical systems such as machine elements, tools, engine components, thermal systems and control surfaces. Research and technology development in manufacturing of diamond and related coatings, nano devices, ion implantation systems, surface modification of composite constituents, physical vapor deposition, chemical vapor deposition, plasma deposition and spray metal forming will be addressed.
- (U) ($11,000) Electronics Manufacturing Productivity Facility: Cleanliness testing at 12 mil pitch surface mount devices; fluxless soldering demonstration and deployment; process hardening of conformal with low volatile organic compounds materials; conformal coating dye tag standard development; process development for rework and repair at 12 mil pitch; and reflow/curing at 12 mil pitch.
- (U) ($6,975) National Center of Excellence for Composites Manufacturing Technology: Complete survey of existing repair procedures and existing Non-Destructive Item procedures for the Field Repair and Non-Destructive Evaluation of Low Observable Structures; complete Low Observable Core Manufacturing Process with implementation and testing; complete the design and analysis of a composite Mine Countermeasures ship rudder for the Composite Marine Control Surface Program and complete all material testing; continue efforts on the Infrared Spectroscopy project; perform a cooperative "Senior Project", to construct a solar-powered boat with students from Marquette University under the Composites Technology Center initiative; complete and present the program concept plan/roadmap to the Naval Air Systems Command for review and comment on the Fit-Up and Assembly project.
- (U) ($6,000) Automated Manufacturing Research Facility: The Research Facility will concentrate efforts in three major areas: 1.) Manufacturing Systems - continue activities in factory engineering, particularly with respect to establishing integrated engineering systems for process, factory, and enterprise design and in the development of tools for evaluating the producibility of mechanical parts utilizing feature-based design inputs; 2.; Precision Machining - continue the on-going Enhanced Machine Controller project which will develop open architecture machine controllers; and 3.) Pilot Demonstrations - aimed at transitioning advanced technology from the research facility program to commercial manufacturers including precision machining, reverse engineering cells, and an integrated workstation for computer-aided manufacturing systems engineering.
- (U) ($3,500) Lifecycle Improvement by Networking Critical Technologies: Further development and implementation of the technology resource network for the shipyards and depots. Environmental state of practice reports will be issued and follow-on recommended prioritized environmental compliance programs will be initiated. Commercialization as a dual-use electrical interconnect screening system with potential application throughout DOD and private industry.

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- (U) ($8,000) National Center for Advanced Gear Manufacturing Technology: Continue cooperative effort with National Institute of Standards and Technology and the Department of Energy, Oak Ridge Facilities, to facilitate a collaborative total quality measurement capability which optimizes domestic, quality assured, precision gear metrology and manufacturing services to industrial, academic and government participants. Develop a calibration service for gear artifacts and master gears; advance gear measurement techniques and mechanisms for achieving traceability of measurements; training and education of the gear industry in proper integration of metrology in gear manufacture, as well as in specific measurement techniques; development and advancement of gear standards for gear metrology; and the development of a formal laboratory accreditation program for gear-related measurement.
- (U) ($750) Electro-Optics Manufacturing: Develop a technology thrust in electro-optics manufacturing, with emphasis on dual-use technology deployment. Develop a strategic plan to execute this thrust.
- (U) ($1,000) Laser Metalworking: Implementation of the mature developed laser processes to Navy facilities including Mare Island Naval Shipyard and Puget Sound Naval Shipyard. Additionally, process development and qualification efforts will continue in the area of laser based repair and refurbishment of nickel aluminum bronze structures, lightweight structures, and cladding, while at the same time begin development of procedures for laser based coating/paint removal and the development of cladding alloys/procedures for environmentally compliant coatings.
- (U) ($2,500) Spray Metal Forming: Produce prototype components for test and evaluation; solicit additional applications from other services; evaluate production costs; and begin test and evaluation of components.
- (U) ($4,000) Center of Excellence in Ship Hull Designs and Electrical Systems: Support the design and manufacturing of power transmission systems to include gears, transmissions and cargo winches; shiphulls to include coastal shipping hulls; and electrical systems to include generators, power distribution networks and fiber optic transmission. This will include direct support to ship owners/operators, shipyards, component manufacturers, design agents and academic institutions.
- (U) ($6,000) EA-6B Prowler Upgrade: Continue Production Technology Improvement Program and related support. Commence Phase I of Improvement Program.
- (U) ($12,000) Cast Ductile Projectiles: Start transition Phase I (Definition) for the MK 64 type cast projectiles and update technical data package; complete feasibility Demonstration Phase IV (environmental testing) for HiFrag type projectiles; complete feasibility Demonstration Phase II (design pattern and core and six consecutive castings) for the MK 64 High Explosive projectile and start Phase III to finalize pattern and core and produce 100 castings; complete Phase I Feasibility Demonstration (stress and thermal analysis and modeling) of the MK 201 76mm projectile; complete Phase I Feasibility Demonstration (stress and thermal analysis) of the MK 200 76mm projectile; continue efforts in the MK 82 Bomb Program to certify

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cast ductile iron as an acceptable material for use in bomb fabrication and further develop cast ductile iron technology.

- (U) ($5,000) Manufacturing Producibility Center: Establish the Manufacturing Producibility Center to evaluate and refine industrial manufacturing processes, designs and patents developed by the Navy Research Laboratories and Centers of Excellence; transfer proven technologies to private industry; assess the feasibility of enhancing or improving developed patents, processes and designs; and develop improvements to selected technologies to make them commercially viable.
- (U) ($1,000) National Center for Best Manufacturing Practices: Commence the set-up of the Center of Excellence to promote technology transfer and solve common problems faced by U.S. firms, both commercial and defense. Continue upgrade and maintenance of the Program Manager's Workstation, training and deployment, seminars and workshops, research and customer service and users groups management and development.
- (U) ($1,500) National Center for Energetics Materials: The Center will concentrate efforts in two major areas: 1.) Process Technology and 2.) Environment Technology. Process Technology will include: Process Controls for improving methods for process analysis and data collection with the goal of decreased product variability and increased production yields; manufacturing techniques for developing new methods of manufacturing energetic materials with an emphasis on continuous processing techniques in manufacture of energetic materials; and Process Analysis for reducing cycle times, improving quality and minimizing variability. Environmental Technology will focus on Pollution Prevention, Environmental Compliance and Reclamation/Recycle efforts.
- (U) ($2,200) Advanced Telecommunications Institute: Continuation of the education programs in telecommunications, multimedia systems, and computing technology.
- (U) ($3,300) Joint Logistics Support Center Rapid Acquisition of Manufactured Parts: The funds provided for the Rapid Acquisition of Manufactured Parts are to permit continued research to improve manufacturing processes in depots and industrial facilities.
- (U) ($404) Support: Continue project management at the field activities, laboratories and Naval Industrial Resources Support Activity to participate on Technical Advisory Boards, Executive Advisory Boards and proposal evaluations of all Manufacturing Technology projects. Develop presentations on Manufacturing Technology, Technology Investment Project, Joint Directors Laboratory Reliance Panel on Manufacturing, Science and Technology; and continue the Navy strategic planning process to identify manufacturing gaps in weapons systems.
- (U) ($500) Taconite Process Technology: The combined efforts of academia, industry and government to develop a process to economically extract commercially usable iror ore from taconite.

- (U) ($3,0C) Fiber-Optic Acoustic Sensors: Fiber-Optic Acoustic Sensor Technology includes a Hydrophone Winding Station, a Hydrophone Optical Assembly Station and a Towed Array Station. The development of this technology has application beyond the defense establishment and includes oceanography and marine biology. It is planned to produce advanced fiber-optic acoustic stations.

3. (U) FY 1995 PLAN:
   - (U) Service Manufacturing Technology funding for FY 1995 and out, except for the National Center of Excellence for Metalworking Technology, has been centralized under OSD Program Element 0603705D.
   - (U) ($20,164) National Center of Excellence for Metalworking Technology: Continue work in: Advance Surface Treatment and Component Wear; Technology Training and Education Services; Ceramics Technology; Cutting and Machining Technology; Advanced Intelligent Processing of Materials Applications; Thermomechanical Processing Extensions and Applications such as advanced gun barrel technology and metalworking database development. Planned achievements: Development of materials and processes for advanced gun barrel manufacturing to extend weapons life working with the Joint Service Medium Caliber Automatic Gun Technology Group; work with the Naval Research Laboratory in the development of manufacturing processes for high temperature superconducting materials for use in weapon systems applications, e.g., submarine motor-generators and minesweeping, as well as commercial applications; develop solutions to specific wear problems such as aircraft hookpoints through surface treatment technology developments; completion of powder metallurgy materials database and standards for use by designers in specifying lower cost, powder metallurgy parts and components; extension of the weldment optimization technology and capabilities to other weldments, materials and applications.

4. (U) PROGRAM TO COMPLETION: This is a continuing program.

D. (U) WORK PERFORMED BY: IN-HOUSE: NAVAIRWARCENACDIV, Indianapolis, IN; NCCOSC RDTE DIV, San Diego, CA; NAVSURFWARCENDIV, Dahlgren, VA; NAVSURFWARCEN CARDEROCKDIV, Bethesda, MD; NAVSURFWARCENDIV, Crane, IN; NRL, Washington, DC; NAVAIRWARCENWPNDIV, China Lake, CA; NAVAIRWARCENACDIV, Lakehurst, NJ. CONTRACTORS: Applied Research Laboratory, Pennsylvania State University, State College, PA; McDonnell Douglas Aircraft Corporation, St. Louis, MO; Concurrent Technology Corporation, Johnstown, PA; Great Lakes Composites Consortium, Kenosha, WI; Edison Welding Institute, Columbus, OH; Lufkin Industries, Lufkin, TX; ITT, Roanoke, VA; Litton Amecom, College Park, MD.

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E. (U) COMPARISON WITH FY 1994 AMENDED PRESIDENT'S BUDGET:

1. (U) Technology changes: Data in previous budget not available for comparison.

2. (U) Schedule changes: Data in previous budget not available for comparison.

3. (U) Cost changes: Data in previous budget not available for comparison.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES:
- (U) PE 0603705D (Manufacturing Science and Technology)
- (U) The Navy keeps constant communication with the 6.1, 6.2 and 6.3A programs.

H. (U) OTHER APPROPRIATION FUNDS: Not applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Not applicable.

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