

UNCLASSIFIED
EXHIBIT R-2, FY 2000 BUDGET PROJECT JUSTIFICATION SHEET

DATE: February 1999

BUDGET ACTIVITY: 5

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID Systems

(U) COST: (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1998 ACTUAL	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
F0253 Navigation and Electro-optical Support	6,764	9,586	4,062	1,578	2,300	3,131	1,690	1,725	CONT.	CONT.
W1253 Combat ID System	352	0	0	0	0	0	0	0	0	98,786
W2212 All Service Combat Identification Evaluation Test (ASCIET)	4,486	3,558	2,469	4,042	4,113	4,168	4,258	4,349	CONT.	CONT.
X0921 NAVSTAR GPS Equipment	23,167	25,855	9,960	9,819	10,145	20,032	21,460	18,132	CONT.	CONT.
X2303 Combat Survivor Evader Locator (CSEL)	447	0	0	0	0	0	0	0	0	1,286
X2313 Situational Awareness Beacon with Reply (SABER)	4,610	6,993	3,317	1,147	1,130	1,161	1,189	1,217	CONT.	CONT.
TOTAL	37,732	45,992	19,808	16,586	17,688	28,492	28,597	25,423	CONT.	CONT.

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Reliable and secure Navigation and positive identification (ID) systems are essential elements of battle management in the naval environment. NAVSTAR Global Positioning System (GPS), project (X0921) 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 24 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 lead of a MK XII Waveform definition for future Aircraft IFF (AIFF) and NATO interoperability. AIFF supersedes Cooperative Aircraft Identification (CAI) per June 95 direction. The All Service Combat Identification Evaluation Team (ASCIET) project (W2212) covers the Navy portion of a new joint service sponsored test and evaluation team effort, formerly the OSD sponsored Joint Air Defense Organization-Joint Engagement Zone (JADO-JEZ) program. The program is designed to evaluate cooperative and non-cooperative combat identification systems and tactics, as well as

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serve as a conduit for evaluating research and development in promising combat identification technologies. Per OSD direction, NATO participation is encouraged and performance data is exchanged to ensure the opportunity for interoperability with allied identification systems is maximized. The Photonics Mast (F0253) 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-Optic/thermal imaging and communications reception/Electronic Warfare Support Measures (ESM). The Combat Survivor Evader locator (CSEL), project (X2303), covers the Navy portion of a joint service program to develop and procure an improved Combat Search And Rescue (CSAR) radio. The Situational Awareness Beacon with Reply (SABER) system, project (X2313), provides critical battlefield/operating area situational awareness and friendly ID capabilities by uniting GPS and UHF/SATCOM technologies. The SABER system consists of a GPS receiver and two-way radio capable of Over-The-Horizon (OTH) and Line-Of-Sight (LOS) secure and non-secure communications, plus a Collection Of Broadcast from Remote Assets (COBRA) transmitter.

B. (U) PROGRAM CHANGE SUMMARY: See individual projects.

C. (U) OTHER PROGRAM FUNDING SUMMARY:

	FY 1998 ACTUAL	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY2004 ESTIMATE	FY2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0921										
(U) O&MN PE#: 0305164N	2,811	1,378	2,236	2,428	2,494	2,559	2,594	2,659	cont.	cont.
(U) OPN Line #26570	4,824	9,502	8,518	9,987	9,295	9,409	9,618	9,283	cont.	cont.
(U) APN-Common Avionics	54,234	29,338	9,259	17,867	14,108	24,162	13,417	13,414	cont.	cont.
(U) RELATED RDT&E: None										

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	FY 1998 ACTUAL	FY 1999 EST	FY 2000 EST	FY 2001 EST	FY 2002 EST	FY 2003 EST	FY2004 EST	FY2005 EST	TO COMP	TOTAL PROG
X2303:										
(U) O&MN PE# 0708017N	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	Cont	Cont
(U) OPN PE# 0708017N	2,713	13,741	18,369	18,483	7,424	7,103	6,878	5,866	Cont	Cont
(U) RELATED RDT&E: None										
x2313:										
(U) OPN #285100:	0	1,022	4,178	4,336	4,735	3,304	3,373	3,443	Cont	Cont
(U) O&MN #AG/SAG 1A4A: 908		970	1,966	3,578	3,923	6,555	6,723	6,898	Cont	Cont
F0253:										
(U) SCN Line 201300	20,000	16,000	0	15,900	16,200	0	17,300	35,000	Cont	Cont
(U) RELATED RDT&E:										
(U) PE 0603226E (Experimental Evaluation of Innovative Technology)										
(U) PE 0604558N (New Design SSN Development)										

D. (U) ACQUISITION STRATEGY: See individual projects.

E. (U) SCHEDULE PROFILE: See acquisition strategy paragraph in each individual project.

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Cost (\$ in Thousands)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete Cont	Total Cost Cont
Project Cost	6,764	9,586	4,062	1,578	2,300	3,131	1,690	1,725		
RDT&E Articles Qty		1								

A. (U) Mission Description and Budget Item Justification: The Photonics Mast will replace existing penetrating periscopes and exploit a wide portion of the electro-magnetic spectrum through advanced E-O/thermal imaging and Electronic Support Measures (ESM)/Communications reception. It will provide major improvements in submarine stealth and infrared imaging capabilities. The non-hull penetrating design provides freedom in ship design as well as space savings for future design submarines. The system has been designed to satisfy Operational Requirement #365-87-94. The Photonics system, mounted on the Universal Modular Mast, is designed for forward fit on the New Attack Submarine and for backfit on the earlier ship classes, SSN-688 and SEAWOLF

(U) Program Accomplishments and Plan:

1. (U) FY 1998 Accomplishments:

- (U) (\$6,565) Continued Photonics Program Engineering and Manufacturing Development Phase
- (U) (\$750) Performed Photonics Program Functional Configuration Audit (FCA) and Physical Configuration Audit (PCA)
- (U) (\$124) Performed Photonics Program/Universal Modular Mast DT IIA testing

2. (U) FY 1999 Plan:

- (U) (\$7,045) Deliver Engineering Development Model
- (U) (\$2,000) Commence On-Board Team Trainer Development
- (U) (\$419) Perform Photonics System/Universal Modular Mast DT IIB testing.
- (U) (\$122) Portion of extramural program is reserved for Small Business Innovation Research assessment in accordance with 15 USC 638

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3. (U) FY2000 Plan:

- (U) (\$2,068) Complete Engineering Development Model
- (U) (\$750) Continue On-Board Team Trainer Development
- (U) (\$1,244) System Engineering and OT11 support

B. (U) Other Program Funding Summary

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>To Complete</u>	<u>Total Cost</u>
(U)SCN Line 201300	20,000	16,000	0	15,900	16,200	0	17,300	35,300	Cont.	Cont.

Related RDT&E

- (U) PE 0603226E (Experimental Evaluation of Innovative Technology)
- (U) PE 0604558N (New Design SSN Development)

C. (U) Acquisition Strategy: Not applicable.

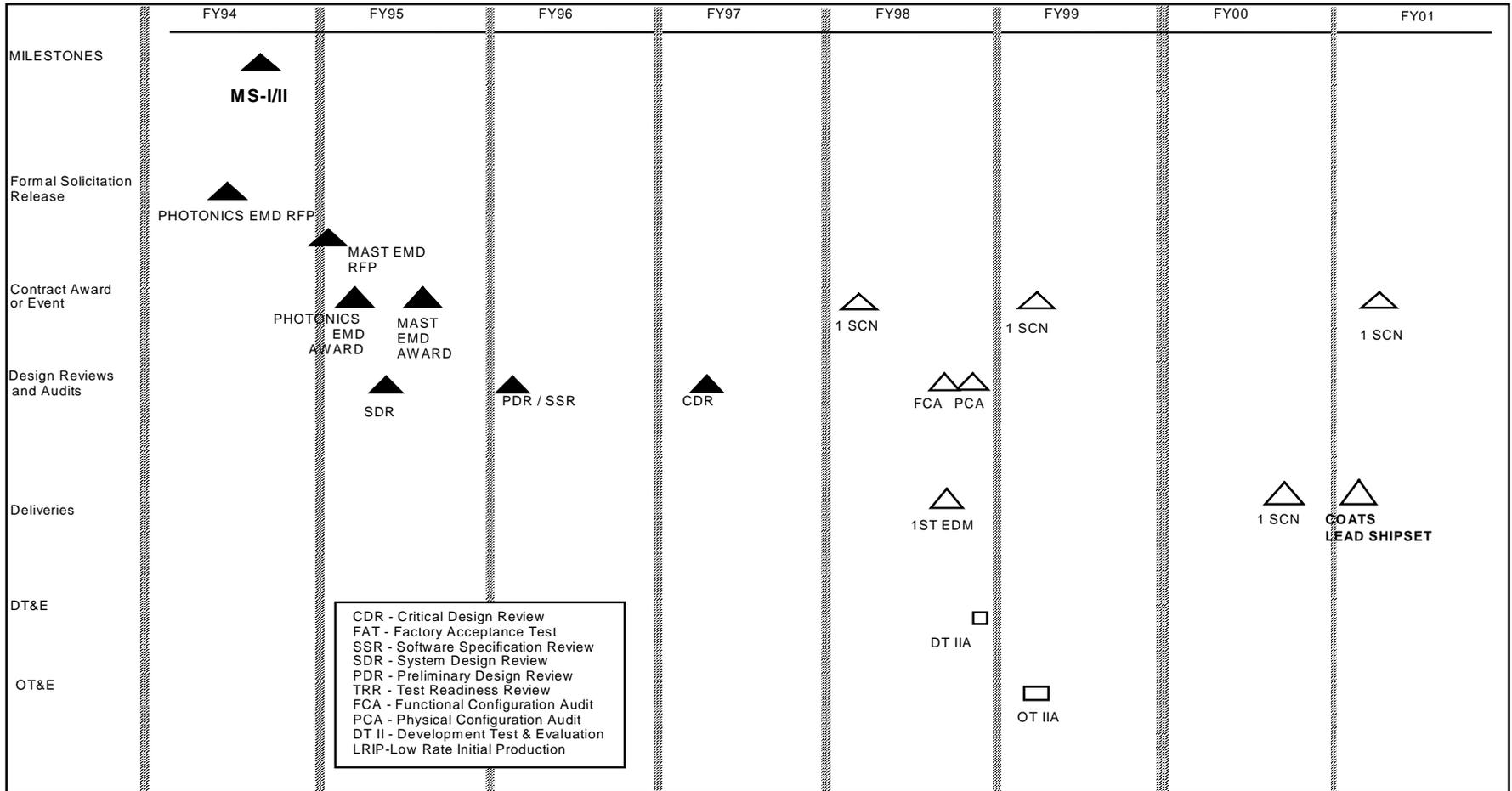
D. (U) Schedule Profile: See attached.

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Exhibit R-3, Cost Analysis										Date: February 1999		
APPROPRIATION/BUDGET ACTIVITY RDT&EN/5			Navigation/ID Systems/0604777N			Project Name and Number. Navigation and Electro-Optical Support/F0253						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total Pys Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date			Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	CPIF	Kollmorgen, Northampton MA	25,300	8,018	10/98	1,644	10/99			279	31,000	31,000
Ancillary Hardware Development												
Systems Engineering	Various	Various	1,000	1,000		1,800				Cont.	Cont.	
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			26,300	9,018		3,444				Cont.	Cont.	
Remarks:												
Development Support Equipment	Contract Method & Type	Performing Activity & Location	Total Pys Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date			Cost To Complete	Total Cost	Target Value of Contract
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Subtotal Support												
Remarks: Not Applicable												

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EXHIBIT R-3, FY 2000 RDT&E,N PROJECT COST ANALYSIS

DATE: February 1999

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PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID Systems

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total Pys Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date			Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation												
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E												
Remarks:												
Not Applicable												
Management Support Services & Engineering Technical Services	PD	SWL	2,000	230		230				Cont.	Cont.	
Miscellaneous	Various	Various	98	288		338				Cont.	Cont.	
Travel			266	50		50				Cont.	Cont.	
Subtotal Management			2,364	568		618				Cont.	Cont.	
Remarks:												
Total Cost			28,664	9,586		4,062				Cont.	Cont.	
Remarks:												

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(U) COST: (Dollars in Thousands)

<u>Project Number & Title</u>	<u>FY 1998 Budget Estimate</u>	<u>FY 1999 Estimate</u>	<u>FY 2000 Estimate</u>	<u>FY 2001 Estimate</u>	<u>FY 2002 Estimate</u>	<u>FY 2003 Estimate</u>	<u>FY 2004 Estimate</u>	<u>FY 2005 Estimate</u>	<u>To Complete</u>	<u>Total Program</u>
W2212 All Service Combat Identification Evaluation Test (ASCIET)	4,486	3,558	2,469	4,042	4,113	4,168	4,258	4,349	CONT.	CONT.
TOTAL	4,486	3,558	2,469	4,042	4,113	4,168	4,258	4,349	CONT.	CONT.

Quantity of RDT&E Articles: 0

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: ALL SERVICES COMBAT IDENTIFICATION EVALUATION TEAM (ASCIET) PROGRAM. (Formerly, the Office of the Secretary of Defense (OSD) sponsored Joint Air Defense Organization - Joint Engagement Zone (JADO-JEZ) testing.) This is a new joint service test program whose operations have been proportionally assumed by the four Services under the oversight of the General Officer Steering Committee for Combat Identification (GOSC-CI) and the Joint Combat Identification Office (JCIDO). The program is designed to conduct periodic joint exercises to evaluate and assess cooperative and non-cooperative, direct and indirect, passive and active combat identification systems, platforms, and tactics, as well as serving as the primary test bed for evaluating research and development in promising combat identification technologies in a joint, tactical environment. Per OSD direction, NATO participation is encouraged and performance data is exchanged to ensure the opportunity for interoperability with allied identification systems is maximized.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1998 ACCOMPLISHMENTS:

- (U) (\$4,486): Planned and prepared for 1999 test and evaluation of combat identification platforms and systems in the air-to-air and ground-to-air mission areas.

2. (U) FY 1999 PLAN:

- (U) (\$3,558) Conduct test and evaluation of combat identification platforms and systems in the air-to-air and ground-to-air mission areas.

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3. (U) FY 2000 PLAN:

- (U) (\$2,469) Conduct test and evaluation of combat identification platforms and systems in the air-to-air and ground-to-air mission areas.

(U) B. PROGRAM CHANGE SUMMARY	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>
(U) FY 1999 President's Budget:	1,507	3,968	4,019
(U) Appropriated Value:	1,552	3,968	
(U) Adjustments from Pres Budget:	+2934	-410	-1,550
(U) (U) FY 2000 Pres Budget Submit:	4,486	3,558	2,469

CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1998 net increase of \$2934 thousand resulted from a reprogramming of \$2843 thousand for additional planning required for the 1999 test and evaluation of combat identification platforms and systems in the air-to-air and ground mission areas, and an increase of \$38 thousand for other OSD adjustments; decreases of \$41 thousand for the Small Business Innovation Research assessment and \$12 thousand for other Navy priorities. FY 1999 net decrease of \$410 thousand resulted from a decrease of \$401 thousand based on inadequate expenditures, and a decrease of \$9 thousand for minor program adjustment. FY 2000 decrease of \$1,514 thousand based on inadequate expenditures, and \$36 thousand for a minor program adjustment.

(U) Schedule: N/A.

(U) Technical: N/A.

(U) C. OTHER PROGRAM FUNDING SUMMARY: N/A.
RELATED RDT&E: N/A.

(U) D. ACQUISITION STRATEGY: This is a non-ACAT program and requires no specific acquisition strategy.

(U) E. SCHEDULE PROFILE: N/A.

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<u>Cost Categories:</u>	<u>Contract Method & Type</u>	<u>Performing Activity & Location</u>	<u>Total Prior Yrs Cost</u>	<u>FY 1999 Cost</u>	<u>FY 1999 Award Date</u>	<u>FY 2000 Cost</u>	<u>FY 2000 Award Date</u>	<u>Cost to Complete</u>	<u>Total Cost</u>	<u>Target Value of Contract</u>
Subtotal Project Development			0	0		0		0	0	
Remarks:										
	<u>Method & Type</u>	<u>Activity & Location</u>	<u>Prior Yrs Cost</u>	<u>FY 1999 Cost</u>	<u>Award Date</u>	<u>FY 2000 Cost</u>	<u>Award Date</u>	<u>Cost to Complete</u>	<u>Total Cost</u>	<u>Value of Contract</u>
Subtotal Support			0	0		0		0	0	
Remarks:										
	VAR	Eglin AFB , FL	10,198	3,558	MISC.	2,469	MISC.	CONT.	CONT.	CONT.
Subtotal Test & Evaluation			10,198	3,558	MISC.	2,469	MISC.	CONT.	CONT.	CONT.
Remarks:										
Subtotal Management			0	0		0		0	0	
Remarks:										
Total Cost			10,198	3,558	MISC.	2,469	MISC.	CONT.	CONT.	CONT.

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(U) COST: (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1998 ACTUAL	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0921 NAVSTAR Global Positioning System (GPS) Equipment	23,167	25,855	9,960	9,819	10,145	20,032	21,460	18,132	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The mission is to provide supported, affordable, integrated, and interoperable navigation solutions to the warfighters. RDT&E funds are used to perform all the non-recurring Global Positioning System (GPS) Surface Ship, Submarine and Aircraft Integration efforts. The Aircraft integration efforts are required for 83 different configurations of Navy, Marine Corps and Coast Guard aircraft in response to the CNO GPS Integration Guidance (GIG), the Public Law 103-160 and the Secretary of Defense As Soon As Possible direction of April 1996 (ASAP program). The GIG directs GPS design functional characteristics for the aircraft and Public Law 103-160 directs the schedule for completion of all installations by 30 September 2000. The 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 24 satellites. PMW/PMA-187 is the central office responsible for funding all GPS aircraft integration RDT&E efforts performed by over 20 NAVAIR program offices, dozens of DoD/Navy field activities and laboratories, and dozens of contractors. The aircraft installation recurring efforts are funded separately by PMW/PMA-187 and the platform program offices with APN dollars. The primary tasks to be accomplished for each of the 83 aircraft configurations include: GPS integration design studies; acquisition of aircraft and lab RDT&E assets; development of test aircraft hardware and/or software designs; development of Integrated Logistics Support (ILS) elements to support test (operator and maintenance training, technical manuals); and Formal Navy Test and Evaluation (Development and Operational Test). Other tasks include the development of new hardware systems to meet GIG requirements when existing systems are unsuitable (GINA for the T-45A; EGI for the AH-1W and F/A-18; the Digital Data Set (DDS); the Control Display Navigation Unit (CDNU) and associated software for many different aircraft) and the development of and modifications to the GPS Mission Planning Module for the Tactical Automated Mission Planning System (TAMPS)/Joint Mission Planning System (JMPS). The Surface Ship and Submarine integration efforts include two vitally important navigation integration initiatives. The first program is the Navigation Sensor System Interface (NAVSSI) development. The NAVSSI is the surface ship system with operational requirement of integrating 179 systems on 161 surface ship platforms. This operational requirement for the NAVSSI has two distinct functions. The first is the integration and distribution of real time navigation and time sources, primarily GPS, to combat systems, combat support systems, air alignment systems and support systems. The second is as the primary surface ship navigators' electronic workstation required to perform fully integrated Electronic Chart Display Information System for the Navy (ECDIS-N) navigation. NAVSSI is an evolutionary acquisition development. The second surface ship development program is the replacement of the AN/WRN-6, which is out of production and approaching obsolescence, with low cost VME card technology

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(GPS VME Receiver Card (GVRC)) combined with Fiber Optic Antenna Link (FOAL) antenna capability. For NAVSSI ships, this integration will be done in conjunction with NAVSSI integrations. For non-NAVSSI surface ships, PMW/PMA 187 is developing a low cost system to replace the AN/WRN-6. For submarine systems, PMW/PMA 187 is supporting ongoing NAVSEA initiatives for the replacement of the AN/WRN-6 systems with the GVRC card technology. The Operational Requirements Document for Global Positioning System - Navigation Warfare, specifies that the military forces shall have a jam resistance capability to meet mission requirements in an electronically challenged environment. Given the current threat to GPS navigation from jamming, and the increasing use of GPS by potential adversaries, RDT&E funds are required to design, develop, and test equipment for use on naval platforms. Funds are also required to integrate GPS modernization capabilities into naval platforms. All of the above efforts are directed by, tasked by and funded by PMW/PMA-187.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1998 ACCOMPLISHMENTS:

- (U) (\$12,768) Continue integration engineering on RC-12M, RC-12F, RC-12B, UC-12M, UC-12B, F-14B, F-14D, VH-3D, VH-60N, EA-6B, F/A-18A/B, P-3, UP-3, VP-3, C-20D, C-20G, T-34, T-44, MH-53, CH-53D, CH-53E, CH-46E, E-2C, C-9, DC-9, TH-57C, SH-60R, HH-1N, KC-130, C-130, HC-130 aircraft.
- (U) (\$9,922) Continue NAVSSI upgrade, integration engineering, logistics element development and testing with shipboard combat, weapons, navigation, and command and control systems. Evolutionary upgrades include collection/distribution of precise navigation and time data from/to gun weapons systems (MK-160 and MK-86), the Joint Maritime Command Information System (via LAN), HAVEQUICK Radio (WSC-3), Ring Laser Gyro Navigator (RLGN), Combat DF, ATWCS, Battle Force Tactical Trainer (BFTT), Fiber Optic Digital Multiplexing System (DMS), Doppler Sonar Velocity Log (DSVL) and SQS-53 Sonar. Other efforts include calibration of all navigation positional data to Own Ship Reference Point, integration of a precise time distribution unit, completion of year 2000 initiatives, integration of GPS VME Receiver Card (GVRC)/Fiber Optic Antenna Link (FOAL) and continued support of the Coast Guard for our joint Command Display and Control (COMDAC) development and development of Computer Based Training Systems and integration of Electronic Technical Manuals. Starting efforts to be finished in subsequent fiscal years include transition NAVSSI hardware/software into an NT compliant environment, chart distribution technology, radar overlay of charting segment, integration of Theater Ballistic Missile Defense (TBMD) precise navigation output and bathymetric data logging. Continue RDT&E support of CVN-76, LHD-7 and LPD-17 Navigation integration efforts. Continue RDT&E support of the New Attack Submarine (NSSL) integration of GVRC. Continue development of NAVSSI Computer Based Trainer (CBT) to meet the standards of the current NAVSSI Block. Continue development of Interactive Electronic Technical Manual (IETM) to meet the standards of the current NAVSSI Block.
- (U) (\$477) Develop and update Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C4ISR) implementation guidance. Develop and update Naval C4ISR mission to incorporate an overarching operational, systems, technical and information architectures. Conduct associated C4ISR analyses and studies.

2. (U) FY 1999 PLAN:

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- (U) (\$9,823) Continue integration engineering on F-14B, F-14D, F/A-18A/B, EA-6B, EP-3E, SH-60R, F-5, MH-53E, P-3C, C-20D, T-39N, C-12, C-9, CT-39G and AH-1W.
- (U) (\$11,000) Continue NAVSSI upgrade, integration engineering and testing with shipboard combat, weapons, navigation, and command and control systems. Evolutionary upgrades include all integrations required for the support of Air Craft Carrier Platform Integrations, TBMD integration, radar overlay integration and Extended Range Guided Munitions (ERGM) integration. Testing of evolutionary upgrades include collection/distribution of precise navigation and time data from/to gun weapons systems (MK-160 and MK-86), the Joint Maritime Command Information System (via LAN), HAVEQUICK Radio (WSC-3), Ring Laser Gyro Navigator (RLGN), Combat DF, ATWCS, Battle Field Tactical Trainer (BFTT), Fiber Optic DMS, DSVL SQS-53 Sonar, calibration of all navigation positional data to Ship Own Ship Reference Point, integration of a precise time distribution unit, completion of year 2000 initiatives, integration of GPS VME Receiver Card (GVRC)/Fiber Optic Antenna Link (FOAL). Begin integration of Coast Guard COMDAC charting segment into NAVSSI. Develop prototype for transitioning NAVSSI hardware/software into an NT compliant environment. Continue RDT&E support of CVN-76, LHD-7 and LPD-17 Navigation integration efforts. Continue RDT&E support of NSSN integration of GVRC. Continue development of NAVSSI Computer Based Trainer (CBT) to meet the standards of the current NAVSSI Block. Continue development of Interactive Electronic Technical Manual (IETM) to meet the standards of the current NAVSSI Block.
- (U) (\$2,316) Initiate efforts to develop solutions to the GPS vulnerability problem and develop complimentary navigation prevention capabilities for incorporation on selected Naval air, surface, and subsurface platforms. This effort includes the Research, Development, Test and Evaluation (RDT&E) of anti-jam GPS user equipment and prevention equipment that is fully interoperable with all land, sea, and air combat applications. Anti-jam user equipment enhancements and prevention capabilities have been identified as a requirement in the Navigation Warfare Mission Need Statement which has been validated by the Joint Oversight Requirements Council. The military forces must meet the precise position, velocity, and time requirements defined in the Operational Requirements Document (ORD) for Global Positioning System - Navigation Warfare. Tasks to accomplish these requirements include: (1) perform modeling and simulation to identify specific platforms in need of a Navigation Warfare capability, (2) coordinate research with the platforms to develop specifications and integration documents suitable for hardware designs, and (3) develop and test equipment necessary to satisfy the

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Navigation Warfare mission requirements. These RDT&E steps are necessary to develop hardware solutions so acquisition funds may be applied to the purchase and integration of the developed solutions.

- (U) (\$2,716) Initiate efforts to modernize the navigation capability on Naval air, surface, and subsurface platforms. The Global Positioning System is managed by an Interagency GPS Executive Board (IGEB) which is comprised of members from the Department of Defense (DoD) and the Department of Transportation (DoT). A decision was made by the IGEB to modernize the GPS signals for enhanced civilian and military performance. The impacts of the various signal structure alternatives and the method to upgrade the user equipment must be identified. Funds for Research, Development, Test and Evaluation are needed to develop user equipment that will incorporate the National Air Space (NAS) Non-Precision Approach (NPA) sole/primary IFR navigation requirements into Naval aviation platforms. The NPA GPS requirement has been identified in the Federal Radionavigation Plan, chairman Joint Chiefs of Staff Master Navigation Plan, and CNO's Draft GPS Integration Guidance.

3. (U) FY 2000 PLAN:

- (U) (\$5,020) Continue NAVSSI upgrade, integration engineering and testing with shipboard combat, weapons, navigation, and command and control systems. Evolutionary upgrades include all integrations required for the support of Aircraft Carrier Platform Integrations, TBMD integration, radar overlay integration and ERGM integration. Testing of evolutionary upgrades include collection/distribution of precise navigation and time data from/to Aircraft Carrier Systems, TBMD, radar overlay, COMDAC Charting integration, and ERGM. Transition NAVSSI hardware/software into an NT compliant environment. Develop interface support for CVN-76, LHD-7 and LPD-17 Navigation integration efforts. Begin integrations with TESS, PLRS, weather tracking, IBS and TPX-42. Begin development of the low cost GPS replacement system. Begin development for integration into emerging combat, combat support and support systems. Continue RDT&E support of NSSN integration of GVRC. Continue development of NAVSSI Computer Based Trainer (CBT) to meet the standards of the current NAVSSI Block. Continue development of Interactive Electronic Technical Manual (IETM) to meet the standards of the current NAVSSI Block.
- (U) (\$2,315) Continue aircraft integration effort.
- (U) (\$2,010) Continue efforts to develop solutions to the GPS vulnerability problem and develop complimentary navigation prevention capabilities for incorporation on selected Naval air, surface, and subsurface platforms. This effort includes the Research, Development, Test and Evaluation (RDT&E) of anti-jam GPS user equipment and prevention equipment that is fully interoperable with all land, sea, and air combat applications. Anti-jam user equipment enhancements and prevention capabilities have been identified as a requirement in the Navigation Warfare Mission Need Statement which has been validated by the Joint Oversight Requirements Council. The military forces must meet the precise position, velocity, and time requirements defined in the Operational Requirements Document (ORD) for Global Positioning System - Navigation Warfare. Tasks to accomplish these requirements include: (1) perform modeling and simulation to identify specific platforms in need of a Navigation Warfare capability, (2) coordinate research with the platforms to develop specifications and integration documents suitable for hardware designs, and (3) develop and test equipment necessary to satisfy the Navigation Warfare mission requirements. These RDT&E steps are necessary to develop hardware solutions so acquisition funds may be applied to the purchase and integration of the developed solutions.
- (U) (\$615) Continue efforts to modernize the navigation capability on Naval air, surface, and subsurface platforms. The Global Positioning System is managed by an Interagency GPS Executive Board (IGEB) which is comprised of members from the Department of Defense (DoD) and the Department of Transportation (DoT). A

R-1 Shopping List -

UNCLASSIFIED
EXHIBIT R-2a, FY 2000 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1999

BUDGET ACTIVITY: 5

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID Systems

decision was made by the IGEB to modernize the GPS signals for enhanced civilian and military performance. The impacts of the various signal structure alternatives and the method to upgrade the user equipment must be identified. Funds for Research, Development, Test and Evaluation are needed to develop user equipment that will incorporate the National Air Space (NAS) Non-Precision Approach (NPA) sole/primary IFR navigation requirements into Naval aviation platforms. The NPA GPS requirement has been identified in the Federal Radionavigation Plan, chairman Joint Chiefs of Staff Master Navigation Plan, and CNO's Draft GPS Integration Guidance.

BUDGET ACTIVITY: 5

PROGRAM ELEMENT: 0604777N

B. (U) PROGRAM CHANGE SUMMARY

(U) FY 1998: Funding change of -\$179K for SBIR reduction; +\$250K for BTRs. FY 1999: Funding change of -\$60K for revised economic assumptions; -\$14K for civilian personnel under execution; -\$118 for CAAS. FY 2000: Funding change of =\$45K for NWCF rates; -\$131K for inflation adjustments.

(U) Schedule: None.

(U) Technical: None.

(U) COST: (Dollars in thousands)

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands)

	FY 1998 ACTUAL	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY2004 ESTIMATE	FY2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) O&MN PE#: 0305164N	2,811	1,378	2,236	2,428	2,494	2,559	2,594	2,659	cont.	cont.
(U) OPN Line #26570	4,824	9,502	8,518	9,987	9,295	9,409	9,618	9,283	cont.	cont.
(U) APN-Common Avionics	54,234	29,338	9,259	17,867	14,108	24,162	13,417	13,414	cont.	cont.

(U) RELATED RDT&E: None

D. (U) ACQUISITION STRATEGY: NOT APPLICABLE FOR PROJECT X0921, ALL MILESTONES AND SCHEDULES ARE COMPLETED

R-1 Shopping List -

BUDGET ACTIVITY: 5

PROGRAM ELEMENT: 0604777N

Exhibit R-3 Cost Analysis (page 1)								Date: February 1999				
APPROPRIATION/BUDGET ACTIVITY: 5				PROGRAM ELEMENT: 0604777N				PROJECT NAME AND NUMBER: X0921 NAVSTAR GPS Equipment				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total Pys Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date			Cost To Complete	Total Cost	Target Value of Contract
Product Dev (F-14B)	SS	Grumman Aero	9,466	2,000	12/98	0				0	11466	
Product Dev (F-18B)	SS	Boeing	12,814	3,096	12/98	0				0	15,910	
Product Dev (S-3B, F-14D, C12, etc)	Various	Other Contracts	233,240	2,173	Var	2,804	Var			Cont	Cont	
Product Dev (SSC-SD)	NA	SSC-SD	38,481	8,494	10/98	3,234	10/99			Cont	Cont	
Product Dev (Other Inhouse)	NA	Various Field Act	430,063	7,814	10/98	2,983	10/99			Cont	Cont	
Subtotal Product Development			724,064	23,577		9,020				Cont	Cont	
Remarks:												
Support	Various	Various	12,710			0				0	12,710	
Subtotal Support			12,710			0				0	12,710	
Remarks												

R-1 Shopping List -

BUDGET ACTIVITY: 5

PROGRAM ELEMENT: 0604777N

Exhibit R-3 Cost Analysis (page 2)								Date: February 1999				
APPROPRIATION/BUDGET ACTIVITY: 5				PROGRAM ELEMENT: 0604777N				PROJECT NAME AND NUMBER: X0921 NAVSTAR GPS Equipment				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date			Cost To Complete	Total Cost	Target Value of Contract
T&E (NAWC PAX)	NA	NAWC PAX	8,353	878	10/98	338	10/99			Cont	Cont	
Subtotal T&E			8,353	878		338				Cont	Cont	
Remarks												
Project Management Support	T&M	DCS Corp, San Diego	1,600	1,400		601				Cont	Cont	
Subtotal Management			1,600	1,400		601				Cont	Cont	
Remarks												
Total Cost			746,727	25,855		9,960				Cont	Cont	
Remarks												

R-1 Shopping List -

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DATE: February 1999

BUDGET ACTIVITY: 5

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID Systems

(U) COST: (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1998 ACTUAL	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X2303 Combat Survivor Evader Locator (CSEL)	447	0	0	0	0	0	0	0	0	1291

(U) A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: In response to a Joint Memorandum of 21 Sept 95 from the Secretary of Defense and the Director, Intelligence Community, CSEL is being developed as a joint service program with RDT&E funding provided by the Air Force as the lead service. The memorandum directed the development and procurement of an improved Combat Search And Rescue (CSAR) system to fulfill the CSEL Mission Needs Statement (MNS) as validated by the Joint Requirements Oversight Council (JROC), to include providing GPS precision positioning service, dual frequency (Y Code) capability to the survivor and rescuers. The CSEL system consists of three segments: 1) the user segment, which includes a new self-locating hand-held survival radio with GPS and OTH data burst capability; 2) the Over-The-Horizon (OTH) Communications relay segment comprised of satellite-based data relays; and 3) the Ground segment made up of a communications distribution and display network. The OTH segment will rely on the use of existing DoD and other Agency assets to meet threshold requirements. Future improvements will evaluate use of mobile satellite commercial services for meeting objective OTH data communication requirements. The Ground segment will include the Navy UHF Base Stations, a GCCS communications segment and Joint Service Rescue Center (JSRC) for receipt and display of survivor OTH data and OTH transmissions to the survivor. Rescue Response Cells include primary locations where rescue activities are planned and coordinated, such as Joint Rescue Coordination Centers, ships and Command and Control nodes. The Navy effort consists of: (1) lead development of the ground system communications architecture; (2) acquire and install communications distribution equipment at four UHF Base Stations in Hawaii, Diego Garcia, Norfolk, VA, and Siganello, IT; (3) develop Navy Joint Maritime Command Information System (JMCIS) segment; (4) test Air Force CSEL GCCS segment before submission to DISA; and (5) procure and plan support of Navy acquisition requirements.

(U) COST: (Dollars in thousands)

(U) PROGRAM PLANS:

2. (U) FY 1998 ACCOMPLISHMENTS:

- (U) (\$70) Conduct shipboard rescue center integration analysis.

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DATE: February 1999

BUDGET ACTIVITY: 5

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID Systems

- (U) (\$104) EMD System assessment.
- (U) (\$123) Support to command and control analysis.
- (U) (\$71) Complete training requirements.
- (U) (\$9) Develop & update Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C4ISR) implementation guidance. Develop & update Naval C4ISR mission to incorporate overarching operational, systems, technical and information architectures. Conduct associated C4ISR analyses and studies.
- (U) (\$70) User survey and analysis of in-service requirements

(U) B. (U) PROGRAM CHANGE SUMMARY:

CHANGE SUMMARY EXPLANATION:

(U) FY 1998: Funding change of -\$14K for Congressional undistributed general adjustments, -\$2K for BTR issue.

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands)

	FY 1998 ACTUAL	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY2004 ESTIMATE	FY2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) O&MN PE# 0708017N	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	Cont	Cont
(U) OPN PE# 0708017N	2,713	13,741	18,369	18,483	7,424	7,103	6,878	5,866	Cont	Cont

(U) RELATED RDT&E: None

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DATE: February 1999

BUDGET ACTIVITY: 5

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID Systems

D. (U) ACQUISITION STRATEGY: *

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
Program Milestones	4Q - MSIIIA	3Q - MSIII	3Q - MSIV	
Engineering Milestones				
T&E Milestones	4Q - OA		2Q - IOT&E	
Contract Milestones			3Q - Full Production	

*The CSEL program is a joint service program with the Air Force as lead. The Air Force provided funds to initiate the program and accomplish the milestones prior to FY98.

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DATE: February 1999

BUDGET ACTIVITY: 5

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID Systems

(U) COST: (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 1998 ACTUAL	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X2313 Situational Awareness Beacon with Reply (SABER)	4,610	6,993	3,317	1,147	1,130	1,161	1,189	1,217	cont.	cont. .

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The SABER system provides critical battlefield/operating area situational awareness and friendly ID capabilities by uniting GPS and communications technologies. The SABER system consists of a GPS receiver and two-way radio capable of Over-The-Horizon (OTH) and Line-Of-Sight (LOS) secure and non-secure communications, plus a Collection of Broadcast From Remote Assets (COBRA) transmitter. The GPS receiver provides an accurate position of the user which is broadcast over the various RF links for reception by other SABER beacons. When a correctly encoded interrogation signal is received by the SABER, it transmits a reply via the radio of the users identification, position, heading, and speed. The interrogating system can be any member of the user's command and control structure. Additionally, SABER-equipped units who are preparing to launch an attack will send an intent-to-shoot LOS transmission indicating the target position and a kill radius. All SABER units on the network will compare the area with their own position. If an overlap exists, a "Don't Shoot" reply is sent to prevent fratricide. Three basic configurations will be developed and produced: self-contained (for amphibious forces and ground forces); integrated with NAVSSI (for ships so equipped); integrated with CDNU (in aircraft so equipped).

(U) PROGRAM PLANS AND ACCOMPLISHMENTS:

1. (U) FY 1998 ACCOMPLISHMENTS

- (U) (\$542K) Conduct and support joint exercises utilizing ACTD systems.
- (U) (\$865K) Systems Engineering for studies for shipboard and aircraft integration.
- (U) (\$845K) Procure technical data.
- (U) (\$846K) System engineering analysis, modeling, and simulation of combat and friendly identification concepts.
- (U) (\$149K) Developmental testing of YEAR 2000 and encrypted waveform components.
- (U) (\$1,228K) Fabrication of upgraded ACTD models for exercises and demonstrations.
- (U) (\$135K) Develop and update Naval Command, Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C4ISR) implementation guidance. Develop and update Naval C4ISR mission to incorporate an overarching operational, systems, technical and information architectures. Conduct associated C4ISR analyses and studies.

2. (U) FY 1999 PLANS:

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DATE: February 1999

BUDGET ACTIVITY: 5

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID Systems

- (U) (\$5,975) Development, fabrication, test, and evaluation of Engineering Development Model(EDM)of SABER stand alone configuration.
- (U) (\$85) Systems Engineering for C4ISR integration.
- (U) (\$375) System engineering for transition of SABER from ACTD to a formal acquisition program in conformance with DODINST 5000 series.
- (U) (\$225) Prototype development and demonstration of integrated SABER/aircraft and shipboard configuration. System engineering analysis of SABER/NAVSSI integration.
- (U) (\$333) System engineering management of EDM development and operational testing.

3. (U) FY 2000 PLANS:

- (U) (\$289) System engineering analysis for C4ISR integration.
- (U) (\$1964) Developmental, qualification, and environmental test of SABER EDM systems.
- (U) (\$100) Conduct Operational Test and Evaluation of SABER systems.
- (U) (\$964) System engineering and developmental test of prototype integrated SABER/aircraft and shipboard configuration.

B. (U) PROGRAM CHANGE SUMMARY:

(U) FY 1998: Funding change of -\$1,131K for SBIR realignment: -\$567K for Congressional recession. FY 1999 Funding change of -\$25K for revised economic assumptions. FY 2000: Funding change of -\$36K for inflation adjustments.

(U) Schedule: FY 1998: Competition for Engineering Development Models and initial production deferred to FY 1999 releasing funds for exercises and demonstrations.

(U) Technical: None.

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EXHIBIT R-2a, FY 2000 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1999

BUDGET ACTIVITY: 5

PROGRAM ELEMENT: 0604777N
PROGRAM ELEMENT TITLE: Navigation/ID Systems

(U) COST: (Dollars in thousands)

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands)

	FY 1998 ACTUAL	FY 1999 ESTIMATE	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) OPN #285100:	0	1,022	4,178	4,336	4,735	3,304	3,373	3,443	CONT.	CONT.
(U) O&MN #AG/SAG 1A4A:	908	970	1,966	3,578	3,923	6,555	6,723	6,898	CONT.	CONT.

D. (U) SCHEDULE PROFILE:

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>
Program Milestones		2Q-Milestone II	3Q - Milestone III
Engineering Milestones		3Q - PDR	1Q - CDR
T&E Milestones			2Q - FAT 3Q - OPEVAL
Contract Milestones	*3Q-Acquisition Package Comp.	2Q-Contract Award (EMD)	1Q - Contract Award (LRIP)

- The SABER program is an ACTD program. The Navy has provided the funds for concept design, test, and milestone accomplishment prior to FY98 through reprogramming within Navy PE#: 0604777N, project X0921 in the amount of \$796K in FY96 and \$700K in FY97.

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EXHIBIT R-3, FY 2000 RDT&E,N COST ANALYSIS

DATE: February 1999

BUDGET ACTIVITY: 5

PROGRAM ELEMENT: 0604777N

PROJECT NUMBER: x2313

Exhibit R-3 Cost Analysis (page 1)								Date: February 1999				
FY 1999/ Budget Activity 5				PROGRAM ELEMENT : 0604777N				SABER Project Number:X2313				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total Pys Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date			Cost To Complete	Total Cost	Target Value of Contract
ACTD Hardware	CPFF	Southwest Research Inst.-San Antonio TX	1,228								1,795	
Engineering Development Model	CPI	Competitive		5,975	10/98	1,964	10/99			Cont	9,000	
System Engineering	WR	SPAWAR-SYS. CEN. San Diego	1,754	659	10/98	989	10/99			Cont	Cont	
Engineering Services	CPFF	ARINC INC./CSC San Diego	250	100	10/98	100	10/99			Cont	Cont	
Subtotal Product Development			3,232	6,734		3,053				Cont	Cont	
Remarks:												
ACTD Exercise Support	WR	SPAWAR -SYS. CEN. Charleston	700	100							800	
Subtotal Support			700	100							800	
Remarks												

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EXHIBIT R-3, FY 2000 RDT&E,N COST ANALYSIS

DATE: February 1999

BUDGET ACTIVITY: 5

PROGRAM ELEMENT: 0604777N

PROJECT NUMBER: x2313

Exhibit R-3 Cost Analysis (page 2)								Date: February 1999				
FY 1999 / Budget Activity 5				PROGRAM ELEMENT : 0604777N				SABER Project Number:X2313				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total Pys Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date			Cost To Complete	Total Cost	Target Value of Contract
TEMP Development	CPFF	ARINC INC. San Diego	418							Cont	Cont	
Operational Evaluation		OPTEVFOR				100	10/99				100	
Subtotal T&E			418			100				Cont	Cont	
Remarks												
Project Management Support	CPFF	DCS Corp San Diego	350	159	10/98	164	10/99			Cont	Cont	
Subtotal Management			350	159		164				Cont	Cont	
Remarks												
Total Cost			4,610	6,993		3,317				Cont	Cont	
Remarks												