FY 2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 2004
Exhibit R-2

BA: 03 PROGRAM ELEMENT: 0603123N
PROGRAM ELEMENT TITLE: Force Protection Advanced Technology

COST: (Dollars in Thousands)

Project Number & Title	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
R2706 Project M	2,024	4,945	0	0	0	0	0
R2711 Superconducting DC Homopolar Motor	2,666	5,537	0	0	0	0	0
R2826 Ship Service Fuel Cell	2,857	0	0	0	0	0	0
R2828 Advanced Water Jet 21 (AWJ-21)	0	1,978	0	0	0	0	0
R2831 High Temperature Superconducting AC Synchronous Propulsion Motor and Generator	4,763	5,933	0	0	0	0	0
R2912 Force Protection Adv Tech	55,940	50,038	73,524	52,740	53,768	59,089	59,919
R3049 Force Protection	3,972	5,102	8,606	3,104	3,534	3,606	3,683
R9013 Littoral Support Craft-Experimental	0	13,844	0	0	0	0	0
R9014 Precision Fabrication of Large Curved Steel Ship Structures	0	2,472	0	0	0	0	0
R9015 Deployable Smart Link Communications Upgrade	1,429	0	0	0	0	0	0
R9017 Wireless Sensor Network	0	989	0	0	0	0	0
R9019 Wave Power Demonstration Project	1,905	3,362	0	0	0	0	0
R9120 High Speed Cargo Craft	715	0	0	0	0	0	0

FY 2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 2004
Exhibit R-2

BA: 03 PROGRAM ELEMENT: 0603123N
PROGRAM ELEMENT TITLE: Force Protection Advanced Technology

Project Number & Title	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
R9138 Center for Maritime Systems	1,335	0	0	0	0	0	0
R9139 Graphite Fiber Sandwich Composite for Adv Warship Design	952	0	0	0	0	0	0
R9140 High Performance Lightweight Generator	3,334	3,560	0	0	0	0	0
R9141 Marine Direct Ship Service Fuel Cell Technology Validation Trainer	1,141	0	0	0	0	0	0
R9142 Smart Microsensor Arrays For Shipboard Damage Control	5,048	0	0	0	0	0	0
R9143 Smart Sensor Web	1,004	0	0	0	0	0	0
R9303 Agile Port and High Speed Ship Technology	0	4,945	0	0	0	0	0
R9304 Aviation Ground Navigation Systems (AGNAS)	0	1,682	0	0	0	0	0
R9305 Composite Special Operations Craft	0	989	0	0	0	0	0
R9306 DockShock	0	989	0	0	0	0	0
R9307 E-2C Infrared Search and Track (IRST) Technology Experimentation	0	1,359	0	0	0	0	0
R9308 Global Personal Locator Beacon (PLB)	0	1,730	0	0	0	0	0
R9309 Large Unmanned Undersea Vehicle (LUUV) Test Bed	0	1,187	0	0	0	0	0
R9310 Laser Welding and Cutting	0	3,461	0	0	0	0	0

FY 2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 2004
Exhibit R-2

BA: 03 PROGRAM ELEMENT: 0603123N
PROGRAM ELEMENT TITLE: Force Protection Advanced Technology

Project Number & Title	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
R9311 Quad Hull Security Caisson Technical Demonstration	0	2,472	0	0	0	0	0
R9312 Remote Continuous Energetic Material Manufacturing Pyrotechnic IR Decoys	0	1,187	0	0	0	0	0
R9313 Technologies for Future Naval Capabilities (FNC)	0	1,088	0	0	0	0	0
R9314 Wireless Programmable Logic Controllers	0	989	0	0	0	0	0
Totals	89,085	119,838	82,130	55,844	57,302	62,695	63,602

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Includes funds to develop and demonstrate advanced technologies that support naval platform self-protection and theatre wide missile defense of naval forces. The new capabilities include the areas of all-weather, day/night protection of naval platforms and forces against all weapon threats, counter-stealth and countermeasures. These new capabilities also include affordable technologies for platform structural systems as well as platform systems, sub-systems and components and aircraft vectoring technologies. Demonstrated capabilities support the ability to prevent or control platform damage while preserving operational capability. Within the Naval Transformational Roadmap, this investment directly supports the Theater Air and Missile Defense transformational capability required by Sea Shield and the Ship to Objective Maneuver key transformational capability within Sea Strike by virtue of improvements in platform offensive performance, stealth and self defense. Program supports the Fleet Force and Platform Protection, Advanced Capability Electric Systems, Total Ownership Cost and Missile Defense Future Naval Capabilities (FNCs).

Due to the number of efforts in this PE, the programs described herein are representative of the work included in this PE.

BA: 03 PROGRAM ELEMENT: 0603123N
PROGRAM ELEMENT TITLE: Force Protection Advanced Technology

PROGRAM CHANGE SUMMARY:

	FY 2003	FY 2004	FY 2005
FY 2004-2005 President's Budget Submission	86,270	55,780	82,554
Cong. Rescissions/Adjustments/Undist.Reductions	0	-1,365	0
Congressional Actions	0	65,425	0
Execution Adjustments	3,616	0	0
FY03 Fed Tech Transfer	-27	0	0
Inflation Savings	0	0	-266
Rate Adjustments	0	-2	-113
SBIR Assessment	-774	0	0
Technical Adjustments	0	0	-45
FY 2005 President's Budget Submission	89,085	119,838	82,130

PROGRAM CHANGE SUMMARY EXPLANATION:
Technical: Not applicable.

Schedule: Not applicable.

FY 2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 2004
Exhibit R-2a

BA: 03 PROGRAM ELEMENT: 0603123N PROGRAM ELEMENT TITLE: Force Protection Advanced Technology
PROJECT NUMBER: R2912 PROJECT TITLE: Force Protection Adv Tech

COST: (Dollars in Thousands)

Project Number & Title	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
R2912 Force Protection Adv Tech	55,940	50,038	73,524	52,740	53,768	59,089	59,919

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project addresses applied research associated with providing the capability of Platform and Force Protection for the U.S. Navy. This project supports the development of technologies associated with all naval platforms (surface, subsurface, terrestrial and air) and the protection of those platforms. It supports the Fleet Force and Platform Protection, Electric Warship, Total Ownership Cost and Missile Defense Future Naval Capabilities (FNCs). The goal of this project is to provide the ability to win or avoid engagements with other platforms or weapons and, in the event of engagement, to resist and control damage while preserving operational capability.

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2003	FY 2004	FY 2005
Surface Ship & Submarine Hull Mechanical & Electrical (HM&E)	33,468	26,831	42,737

Activity includes: Signature Reduction, Hull Life Assurance, Distributed Intelligence for Automated Survivability and Advanced Capability Electric Systems. Signature Reduction addresses Electromagnetic (EM), infrared (IR) and acoustic signature tailoring, both topside and underwater. Hull Life Assurance addresses development of new structural system approaches for surface ships and submarines, including the management of weapon effects to control structural damage and the improvement of structural materials. Distributed Intelligence for Automated Survivability addresses both the basic technology of automating damage control systems, as well as, distributed auxiliary control with self-healing capability. Advanced Capability Electric Systems area addresses electrical and auxiliary system and component technology to provide improvement in system energy and power density, system operating efficiency and recoverability from casualties. Additional funding was added in FY 05 by OSD Program Decision Memorandum II (PDM II). This funding will be invested in development of electromagnetic gun technology.

FY 2003 Accomplishments:

- Suspended work on surface ship near field de-amping boundary element and physical model development (includes stable algorithm).
- Suspended work on large-scale truss development for Advanced Machinery Support System (AMSS).
- Performed proving ground testing of Reconnaissance, Surveillance, Targeting Vehicle (RSTV).
- Developed design for advanced main propulsion superconducting motor.
- Developed advanced power electronics for Electromagnetic Aircraft Launch System (EMALS) and ship main propulsion systems.
- Continue development of Ship Service Fuel Cell (625kW) including diesel fuel reforming technology for molten carbonate and proton exchange membrane (PEM) fuel cells.
- Began development of Quiet Electric Drive (QED)/secondary propulsion unit (SPU).

FY 2004 Plans:

- Complete fabrication and test of Proton Exchange Membrane (PEM) diesel fuel cell reformer.
- Continue all efforts of FY03 less those noted as completed above.
- Continue development of advanced main propulsion superconducting motor. Begin design and construction of 36.5 MW prototype motor.
- Initiate development of electromagnetic gun technology, including focus on rail wear issues, energy storage, and pulsed power switching.
- Initiate development of technologies for future Marine Corps Battlefield Power System.

FY 2005 Plans:

- Complete Quiet Electric Drive/submarine secondary propulsion unit (SPU).
- Complete laboratory evaluation of 625kW molten carbonate fuel cell and reformer.
- Continue all efforts of FY04 less those noted as completed above.
- Funding from PDM II will be applied to further development of electromagnetic gun technology, including focus on rail wear issues, energy storage, and pulsed power switching.
- Initiate development of advanced energy storage technology.

	FY 2003	FY 2004	FY 2005
Advanced Energetics	0	2,706	0

Advanced Energetics efforts address technology development to provide substantial improvements in energetic

material systems and subsystems, primarily in terms of performance, but also addressing safety, reliability, and affordability. This work includes the development of advanced energetic materials for thermobaric applications. Efforts include development and evaluation of new explosive formulations, reliable simulation tools and diagnostics to develop and design superior performance systems tailored to specific warfighter missions.

FY 2003 Accomplishments:

• Completed applied research (BA 2) portion of Advanced Energetics effort in Thermobaric Weapon Advanced Concept Technology Demonstration (ACTD) in PE 0602123N. PE 0602123N took the effort through subscale payload testing. Follow-on work was picked up in Advanced Energetics under PE 0603123N in FY04.

FY 2004 Plans:

• Advanced energetics effort will complete the payload development of the Thermobaric Weapon ACTD with explosive fill optimization, scale up, full scale performance validation, and qualification.

FY 2005 Plans:

No effort planned in this PE in FY05.

	FY 2003	FY 2004	FY 2005
Sensors & Associated (S&A) Processing	7,064	8,187	6,495

Activity develops complementary sensor and processing technologies for 21st century warfighting success and platform protection. Current small platforms (both surface and airborne) have little or no situational awareness (SA) or self-protection against air, surface, and asymmetric threats. The goal of this activity is to provide tactical aircraft (TACAIR) and these platforms with effective threat warning and self-protection. The technology areas specific to platform protection will develop individual or multi-spectral [Electro-Optic (EO), Infra-Red (IR), Radio Frequency (RF), Electromagnetic (EM), visual and acoustic] sensors and associated processing. To defend platforms from current and advanced threats in at-sea littoral environments and in port, these technologies must improve multi-spectral detection and distribution of specific threat information. Major efforts are summarized below:

For Aircraft -

• The Integrated Defensive Electronic Countermeasures (IDECM) Pre-planned Product Improvement (P3I) effort

provides the F/A-18E/F aircraft with increased self protection capability.
• The Missile Warning System (MWS) effort is designed to develop and demonstrate two-color infrared (IR) missile warning enabling technology that is compatible with the Tactical Aircraft Directed IR Countermeasures (TADIRCM).
• The EO/IR Laser Jammer for TACAIR effort develops and demonstrates advanced laser jammer enabling technology that is compatible with tactical air (TACAIR) signature, radar cross section (RCS), and drag requirements and is effective against surface-to-air missiles (SAM), air-to-air missiles (AAM), and advanced imaging threats.

For Surface Ships –
• Distributed Aperture System (DAS) development: Develops the data processor and optical augmentation software algorithms for threat classification. This is an international effort. Examines and integrates sensor modules into a single system design to support shipboard combat operations.
• The Shipboard EO/IR Closed Loop Self-protection effort is designed to increase surface ship survivability by the detection, classification and jamming of EO/IR guided anti-ship missile threats.

For Marine Corps –
• The End User Terminal (EUT) effort develops improved personal communications, situational awareness and sniper detection for ground troops.

FY 2003 Accomplishments:

• The Missile Warning System (MWS) and EO/IR Laser Jammer for TACAIR efforts conducted laboratory common jam code demonstrations and pointer/tracker functional demonstrations. Missile signature data was collected during live fire tests of opportunity. The jam head for the pointer-tracker has been assembled and has begun testing.
• DAS - Developed and packaged prototype sensor module for the Infrared Search and Track (IRST) Program.
• Shipboard EO/IR Closed Loop Self-protection: Conducted a functional demonstration of a multi-band mid-wave IR solid-state countermeasure laser. Closed-loop Infrared Countermeasures (IRCM) system demonstrations using hardware-in-the-loop techniques were conducted in the laboratory and will continue in FY04.
• EUT: Completed demonstration of the “ruggedized” 6-inch Organic Light Emitting Diode (OLED) display and proceeded with the design of an integrated antenna for the Dismounted Digital Automated Computing Terminal (D-DACT). Completed testing of the 3.5" Single Board computer with Xscale processor.

FY 2004 Plans:

- Continue all efforts of FY03 less those noted as completed above.
- IDECM Pre-planned Product Improvement (P3I) will perform tests on a short sample of a new high temperature towline required to operate throughout the entire F/A-18 E/F flight envelope including maximum afterburner.
- DAS: Efforts are focused on design, development and testing of systems, subsystems, and components for integration of sensor modules and components into a DAS capability demonstration model.

FY 2005 Plans:

- Continue all efforts described in FY04.

	FY 2003	FY 2004	FY 2005
Missile Defense (MD)	6,010	5,484	7,189

This activity describes S&T projects of the Missile Defense Future Naval Capabilities (FNC) program. Budget Activity 3 missile defense efforts are co-funded by PE 0603271N. Focus areas include:
- Advanced Area Defense Interceptor (AADI)
- Distributed Weapons Coordination (DWC)
- Littoral Affordability (classified program)
- Reactive Warhead

FY 2003 Accomplishments:

- Completed Reactive Warhead efforts on the physics-based damage prediction model and effectiveness analyses of a mass-focused reactive material warhead for STANDARD Missile.
- Completed development and flight demonstration of Vertical Extremely Short Take Off and Landing (ESTOL) Control Tailless Operation Research (VECTOR) air platform. (Not a Missile Defense FNC effort)
- Continued the Advanced Area Defense Interceptor (AADI) planning and coordination effort for a Navy - Marine Corps Air-Directed Surface-to-Air Missile (ADSAM) live firing demonstration in FY 2007.

FY 2004 Plans:

- Initiated BA 3 aspects of the Littoral Affordability effort begun in FY2002 in PE0602123N (classified program)

• Continued the Advanced Area Defense Interceptor (AADI) planning and coordination effort for a Navy - Marine Corps Air-Directed Surface-to-Air Missile (ADSAM) live firing demonstration in FY 2007.

FY 2005 Plans:

• Continue Littoral Affordability (classified program).
• Continue the AADI planning and coordination effort for an ADSAM demonstration in FY2007.
• Initiate advanced combat system integration of Distributed Weapons Coordination (DWC) algorithms for Common Threat Evaluation (CTE), and Preferred Shooter Recommendation (PSR), developed under PE 0602123N, into a distributed computing environment for transition to Naval Open Architecture combat systems.

	FY 2003	FY 2004	FY 2005
Underwater (UW) Platform Self Defense	2,395	2,320	6,859

This activity develops enabling technologies that will increase the survivability of surface ship and submarine platforms against torpedo threats. Proposed technologies focus on defeating high priority threats including torpedoes (i.e. straight running, wake homing, acoustic homing, air dropped torpedoes, and salvoes of torpedoes). The long-term goal of the UW Platform Self Defense activity is to develop technologies that will ultimately be placed onboard ship. Technologies should be developed to minimize shipboard impact, and require no organizational maintenance. Two major efforts are: The Next Generation Countermeasure (NGCM): A mobile adaptive acoustic countermeasure with acoustic communication links to enable countermeasure connectivity and group behavior to defeat threat torpedoes. The Anti-Torpedo Torpedo (ATT)/Tripwire Demonstration: Technologies that improve passive shipboard detection, classification, and localization (DCL) of incoming torpedoes and an ATT to engage the threat torpedoes.

FY 2003 Accomplishments:

• Completed design and development of the hardware necessary to support the 1Q FY04 in-water test series; expect completion in time to ship to NUWC/Keyport for the October 2003 HF/LF Shallow Wake Operations test.
• Developed a finite element model of the engine condenser shell under bending load, analyzed the condenser shell prior to final design and fabrication of the low-cost boilers.
• Modified the advanced engine transient boiler Computerized Fluid Dynamic (CFD) Model and developed pilot-scale alternate start charge concepts involving the use of Teflon.
• Continued transition of counter-torpedo technologies to Naval Sea Systems Command (NAVSEA) Tripwire Torpedo Defense System (AN/WSQ-11).

• **FY 2004 Plans:**

• Complete acoustic tank testing of compact, high power, broadband single crystal transducer for Next Generation Countermeasure.
• Integrate transducer into the Countermeasure.
• Continue in-water data collection to evaluate technologies for a 2 on 2 salvo engagement with test vehicles in open loop mode.
• Initiate in-water testing with of sonar channels for Anti-Torpedo Torpedo terminal homing in wake at shallow depth.

FY 2005 Plans:

• Finalize in-water demonstration and transition to AN/WSQ-11 of guidance and control for terminal homing of Anti-Torpedo Torpedo (ATT) for one on-one engagements in wake environments at shallow depths.
• Complete in-water data collection to evaluate technologies for a 4 on 4 salvo engagement with test vehicles in open loop mode.
• Demonstrate full-duplex transmit/receive capability for Next Generation Countermeasure (NGCM) with towed array fixture.

	FY 2003	FY 2004	FY 2005
Littoral Surface Craft – Experimental (LSC(X))	7,003	4,510	10,244

X-Craft is envisioned as an S&T platform designed for experimentation with lifting bodies, drag reduction and mission modularity. A high-speed, all-aluminum catamaran, it displaces 1400 tons at full load. Performance requirements are 50 knots at combat load (about 1200 tons), 40 knots in sea state 4, and a 4000 nautical miles range without replenishment. It will be capable of landing two helicopters up to the size of SH-60R, transporting and operating autonomous vehicles, and carrying several reconfigurable mission modules in standard Twenty-foot Equivalent Unit (TEU) boxes. The crew will be minimal and the vessel will be built to commercial American Bureau of Shipping (ABS) standards.

FY 2003 Accomplishments:

• Completed concept level design of LSC(X).
• Contracted for detail design and construction.
• Keel laid June 2003.

FY 2004 Plans:

- Complete detail design of the LSC(X) prototype craft.
- Continue design and development of lifting body and drag reduction systems.
- Continue development of technologies for small, fast craft in the 500-1000 ton range. These technologies enable a craft for missions such as littoral anti-submarine warfare (ASW) and mine countermeasures.

FY 2005 Plans:

- Complete construction of the LSC(X).
- Conduct hydrodynamic testing of the X-craft.
- Continue design and development of lifting body and drag reduction system.

C. OTHER PROGRAM FUNDING SUMMARY:

RELATED RDT&E:

NAVY RELATED RDT&E:
PE 0204152N (E-2 Squadrons)
PE 0205601N (HARM Improvement)
PE 0206313M (Marine Air Communications Systems)
PE 0601153N (Defense Research Sciences)
PE 0602123N (Force Protection Applied Research)
PE 0602131M (Marine Corps Landing Force Technology)
PE 0602235N (Common Picture Applied Research)
PE 0602271N (RF System Applied Research)
PE 0603235N (Common Picture Advanced Technology)
PE 0603271N (RF Systems Advanced Technology)
PE 0603502N (Surface and Shallow Water Mine Countermeasures)
PE 0603561N (Advanced Submarine System Development)
PE 0603563N (Ship Concept Advanced Design)
PE 0603564N (Ship Preliminary Design and Feasibility Studies)
PE 0604307N (Surface Combatant Combat System Engineering)
PE 0603609N (Conventional Munitions)
PE 0603640M (USMC Advanced Technology Demonstration (ATD))

PE 0604518N (Combat Information Center Conversion)
PE 0604558N (New Design SSN)

NON NAVY RELATED RDT&E: Not Applicable.

D. ACQUISITION STRATEGY:
Not Applicable.

FY 2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 2004

Exhibit R-2a

BA: 03 PROGRAM ELEMENT: 0603123N PROGRAM ELEMENT TITLE: Force Protection Advanced Technology

PROJECT NUMBER: R3049 PROJECT TITLE: Force Protection

Project Number & Title	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
R3049 Force Protection	3,972	5,102	8,606	3,104	3,534	3,606	3,683

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Includes funds to develop and demonstrate advanced technologies that support platform self-protection. The new capabilities include the areas of all-weather, day/night protection of naval platforms and forces against all weapon threats, counter-stealth and countermeasures. Demonstrated capabilities support the ability to prevent or control platform damage while preserving operational capability. Hull life assurance addresses: development of new structural system approaches for surface ships and submarines, management of weapons effects to control structural damage, and improvement of structural materials. Distributed intelligence for automated survivability addresses both the basic technology of automating damage control systems as well as distributed auxiliary control with self-healing capability.

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2003	FY 2004	FY 2005
Emerging Threats	3,972	5,102	8,606

This activity includes: Efforts in hull life assurance and distributed intelligence for automated survivability. Addresses the management of weapon effects to control structural damage and the improvement of structural materials. All efforts were previously funded in the Hull Mechanical and Electrical Activity of Project R2912.

FY 2003 Accomplishments:

- All passive protection efforts were suspended to pursue higher priority Fleet and Force Protection FNC areas. This includes:
  - Ship test planning for passive ship protection full-scale tests.
  - Passive ship protection system design.
  - Blast yield/propagation test for passive protection.
- Continued small-scale testing of high efficiency water-mist system for application to electronic spaces within advanced damage countermeasures program.

- Continued data collection and field test of optical sensor prototype for volume sensor.
- Initiated development of prototype optical sensor for volume sensing (fire & smoke detection) application. This effort was a small-scale test.

FY 2004 Plans:

- Complete small-scale tests of prototype optical sensor for volume sensing (fire and smoke detection).
- Complete small-scale testing of high efficiency water-mist system.
- Initiate testing of hybrid water-mist at an intermediate scale.
- Initiate development to increase the capability of previous volume sensor by extending capabilities to allow real-time response.
- Initiate collection of field data on real-time volume sensor.

FY 2005 Plans:

- Complete development of real-time volume sensor.
- Completed concept level design of LSC(X).
- Complete intermediate-scale testing of hybrid water-mist system.
- Continue data collection and field test of volume sensor.
- Initiate full-scale ship tests on ex-USS Shadwell to validate performance of the real-time volume sensor.
- Initiate full-scale ship trials of hybrid water-mist system on ex-USS Shadwell to validate performance.

C. OTHER PROGRAM FUNDING SUMMARY:
RELATED RDT&E:

PE 0601153N (Defense Research Sciences)
PE 0602123N (Force Protection Applied Research)
PE 0602235N (Common Picture Applied Research)
PE 0603235N (Common Picture Advanced Technology)
PE 0603502N (Surface and Shallow Water Mine Countermeasures)
PE 0603561N (Advanced Submarine System Development)
PE 0603563N (Ship Concept Advanced Design)
PE 0603564N (Ship Preliminary Design and Feasibility Studies)
PE 0604558N (New Design SSN)
PE 0604561N (SSN-21 Developments)

NON NAVY RELATED RDT&E: Not Applicable.

D. ACQUISITION STRATEGY:
Not Applicable.

CONGRESSIONAL PLUS-UPS:

R2706	FY 2003	FY 2004
PROJECT M	2,024	4,945

FY03: Demonstrated derivatives of Project M active control technology for active degaussing (reduction of electromagnetic signatures) of naval motors and for mitigation of shock on small naval craft. FY04: Build Advanced Development Model (ADM) and conduct laboratory tests, as well as sea-trials on MKV boats. The final seat will also include Look Ahead Detection System (LADS).

R2711	FY 2003	FY 2004
SUPERCONDUCTING DC HOMOPOLAR MOTOR	2,666	5,537

FY03: Completed test stand motor testing and design of a 3.7 MW subscale motor. Completed a conceptual design of full scale main propulsion motor. Motor design addresses development of an advanced acyclic motor with superconducting windings. The design effort addresses the complete machine design, including issues such as high reaction forces resulting from high magnetic fields, mechanical and cooling issues. FY04: Plans are to complete construction, test the 3.7MW sub-scale motor, perform brush risk reduction, and preliminary design of full scale propulsion motor.

R2826	FY 2003	FY 2004
SHIP SERVICE FUEL CELL	2,857	0

Developed a dynamic simulation and validation capability for a diesel fuel cell. Developed a 625 kW molten carbonate fuel cell and reformer system for land based testing. Collected data to model the reliability and maintenance characteristics of such fuel cells. The system can be used as a training platform.

R2828	FY 2003	FY 2004
ADVANCED WATERJET-21 (AWJ-21)	0	1,978

Develop large scale demonstrator platform for signature, propulsion efficiency, and mechanical design interface evaluation.

R2831	FY 2003	FY 2004
HIGH TEMPERATURE SUPERCONDUCTING AC SYNCHRONOUS SHIP PROPULSION MOTOR & GENERATOR	4,763	5,933

FY03: Provided design tradeoffs and preliminary design for a 36.5MW HTS high power density propulsion motor. Tradeoff and preliminary design addresses all aspects of electromagnetic and mechanical design, including addressing the aspects of high field levels in superconducting windings and the influence of subsequent high forces on the mechanical design of the machine. Began construction of key prototype HTS propulsion motor and power electronic components. FY04: This effort will continue with final design of 36.5 MW propulsion motor and motor drive, long lead item procurement and the initiation of manufacture.

R9013	FY 2003	FY 2004
LITTORAL SUPPORT CRAFT-EXPERIMENTAL (LSC-X)	0	13,844

Continue the construction of the X-Craft. Expected to be delivered early in FY05, X-Craft will be built to evaluate the hydrodynamic performance, structural behavior, and propulsion system efficiency of high speed hull form technologies. The 79-meter all-aluminum craft will also be used to evaluate mission modularity through a large open mission bay and will eventually serve as a platform for testing lifting body and drag reduction technology.

R9014	FY 2003	FY 2004
PRECISION FABRICATION OF LARGE CURVED STEEL SHIP STRUCTURES	0	2,472

Development of curved plate technology in the construction of double hull vessels using steel and alloy metals with low magnetic, anti-corrosive properties. Demonstrating this application addresses welding technology for stainless steel that is different from conventional carbon steel approaches. The demonstration builds full-scale hull sections that may be used for air-blast and underwater explosion resistance testing.

R9015	FY 2003	FY 2004
DEPLOYABLE SMART LINK COMMUNICATIONS UPGRADE	1,429	0

The effort provided advanced technology application for a Smart Link System. The prototype communication system has demonstrated an order of magnitude improvement in bandwidth. Provided improved primary

communication capabilities during operational deployment.

R9017	FY 2003	FY 2004
WIRELESS SENSOR NETWORK	0	989

Develop wireless sensor technology for monitoring all shipboard systems and provide situational awareness.

R9019	FY 2003	FY 2004
WAVE POWER DEMONSTRATION PROJECT	1,905	3,362

FY03: (Previusly titled: Wave Powered Electric Power Generating System For Remote Naval Sites.) Provided advanced technology support for the development of a power generating system driven by ocean wave motion. Provided testing, extended the hydrodynamic modeling of a buoy system and validated those models. Addressed environmental issues, means to improve reliability and increase energy efficiency, and issues associated with operation of a multi-buoy system. FY04: The system will be installed and tested.

R9120	FY 2003	FY 2004
HIGH SPEED CARGO CRAFT	715	0

Designed, constructed and tested a small prototype High Speed Cargo Craft. The prototype craft demonstrated an advanced hull form incorporating a combination of catamaran and surface effect technologies with the goal of evaluating the craft’s suitability as a high-speed cargo craft.

R9138	FY 2003	FY 2004
CENTER FOR MARITIME SYSTEMS	1,335	0

Developed an integrated system of observing networks and forecasting models to provide real-time information on oceanographic and atmospheric conditions affecting Navy sensors and operations. Provided real time data/model uncertainty analysis and a display suitable for decision making. Provided high resolution surveillance of ship traffic oceanic and atmospheric conditions within a specified geographic region. Provided means of rapidly addressing security concerns at USN ship berths at any location in the world.

R9139	FY 2003	FY 2004
GRAPHITE FIBER SANDWICH COMPOSITES FOR ADVANCED WARSHIP DESIGN	952	0

Investigated the use of carbon sandwich materials for surface ship hull structure. Combined analytical and experimental investigations to address design, survivability and fatigue issues associated with the implementation of these materials for future Navy platforms.

R9140	FY 2003	FY 2004
HIGH PERFORMANCE LIGHTWEIGHT GENERATOR	3,334	3,560

FY03: (Previously titled: High Speed Permanent Magnet Generator.) Funds used to develop a high speed permanent magnet generator. Evaluate heat removal techniques with the preliminary design of the generator. Generator design issues were addressed to establish the best approach for the electromagnetic and mechanical design, including thermal design issues. Effort provided assessment of the machines potential efficiency and other performance characteristics. FY04: Funds will construct an approximately 3MW prototype machine.

R9141	FY 2003	FY 2004
MARINE DIRECT SHIP SERVICE FUEL CELL TECHNOLOGY VALIDATION TRAINER	1,141	0

Began development of a fuel cell training program for both fuel cell operators and engineers. Developed detail plan for test and evaluation on Molten Carbonate Fuel Cell Systems.

R9142	FY 2003	FY 2004
SMART MICROSENSOR ARRAYS FOR SHIPBOARD DAMAGE CONTROL	5,048	0

Developed a high temperature cermet (ceramic-metallic) prototype smart microsensor array system for Navy damage control applications. The chemical microsensor array system offered a small size, light weight, and low cost alternative to conventional sensors and the potential for fabrication of smart sensor arrays with on-chip logic integration. The arrays were networked using E-Smart (Environmental Systems Management, Analysis and Reporting network) system. Developed flexible readout circuitry using standard Si and then SOI microelectronics offering high operating temperature control and logic circuitry applicable to shipboard damage control environments.

R9143	FY 2003	FY 2004
SMART SENSOR WEB	1,004	0

Developed a network of smart, ground based sensors that operate in an urban environment. The sensors communicate via power lines or in a wireless mode in the absence of power lines. This technology is applicable to a variety of operational environments including chemical and biological warfare. It is also applicable to Military Operations Other Than War (MOOTW).

R9303	FY 2003	FY 2004
AGILE PORT AND HIGH SPEED SHIP TECHNOLOGY	0	4,945

Develop and demonstrate advanced maritime technologies with commercial and military applications. Includes scale model and full-scale demonstration of advanced hull forms, and supporting technologies in the areas of hydromechanics and lightweight structures.

R9304	FY 2003	FY 2004
AVIATION GROUND NAVIGATION SYSTEMS (AGNAS)	0	1,682

Effort will support Aviation Ground Navigation Systems (AGNAS).

R9305	FY 2003	FY 2004
COMPOSITE SPECIAL OPERATIONS CRAFT	0	989

Develop a replacement design for special operations craft that will incorporate composite hull construction technology and reduce slamming loads.

R9306	FY 2003	FY 2004
DOCKSHOCK	0	989

Develop and complete system design studies for an advanced ship/platform shock test technology utilizing DARPA developed electrochemical explosive devices.

R9307	FY 2003	FY 2004
E-2C INFRARED SEARCH AND TRACK (IRST) TECHNOLOGY EXPERIMENTATION	0	1,359

The program will demonstrate staring infrared (IR) sensors on the E-2C aircraft for detection and tracking of Theater Ballistic Missiles (TBMs), as well as for aircraft and anti-aircraft missiles.

R9308	FY 2003	FY 2004
GLOBAL PERSONAL LOCATOR BEACON (PLB)	0	1,730

Development of Global Personal Location Beacon (PLB) Smart Sensor Web. This effort will enhance the current Emergency Positions Indicating Radio Beacons (EPIRBs) international constellation of satellites to relay an alerting distress message to a regional rescue coordination center (RCC) with critical situational data such as the nature of the emergency, what type of rescue will be required, number of people in the party, location, condition of victims, and who should be alerted.

R9309	FY 2003	FY 2004
LARGE UNMANNED UNDERSEA VEHICLE (LUUV) TEST BED	0	1,187

Produce an integrated vehicle and guidance design for a Large Unmanned Undersea Vehicle (LUUV) Test Bed including the design of a water tunnel modification and test fixture for evaluating and validating distributed electrical propulsion concepts.

R9310	FY 2003	FY 2004
LASER WELDING AND CUTTING	0	3,461

Funding will be dedicated to testing and qualification of the fabricated shapes, automating the laser process controls, and automating material handling for transition to the carrier programs.

R9311	FY 2003	FY 2004
QUAD HULL SECURITY CAISSON TECHNICAL DEMONSTRATION	0	2,472

Construct and evaluate a quad hull security caisson constructed from segmented curved plates (a proprietary structural design and manufacturing technology). The technology may offer a robust and economical means of

protecting shore facilities and ships from sea based terrorist attack.

R9312	FY 2003	FY 2004
REMOTE CONTINUOUS ENERGETIC MATERIAL MANUFACTURING PYROTECHNIC IR DECOYS	0	1,187

Utilizing twin-screw extrusion technology, a remote-operation manufacturing capability could be installed at the Louisiana Army Ammunition Plant. In about one year, a production line could be operational with scale-up to full production capability within 2 years. This would provide a secure domestic source for infrared (IR) decoys, with benefits in term of safety, cost and environmental impact as well as capability for de-mining torches.

R9313	FY 2003	FY 2004
TECHNOLOGIES FOR FUTURE NAVAL CAPABILITIES (FNC)	0	1,088

Develop a test-bed model of an unmanned surface vehicle to be employed in the development of control and monitoring algorithm. Systems integrations will be performed to ensure the viability of the models, simulations and signal processing.

R9314	FY 2003	FY 2004
WIRELESS PROGRAMMABLE LOGIC CONTROLLERS	0	989

Effort supports Wireless Programmable Logic Controllers.