

UNCLASSIFIED

FY 2003 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2002

BUDGET ACTIVITY: 3 PROGRAM ELEMENT: 0603123N
 PROGRAM ELEMENT TITLE: FORCE PROTECTION ADVANCED TECHNOLOGY

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 2001 ACTUAL	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	FY 2006 ESTIMATE	FY 2007 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R2706 Project M		2,775							2,775
R2711 Superconducting DC Motor		1,982							1,982
R2828 Advanced Water Jet AWJ-21		3,469							3,469
R2831 AC Synchronous Propulsion Motor		3,965							3,965
R2848 Hybrid Small Waterplane Area Catamaran (HYSWAC)		7,235							7,235
R2912 Force Protection Advanced Technology **		92,108	50,942	42,321	44,573	42,865	43,414	CONT.	CONT.
R3049 Emerging Threats		0	6,662	9,452	11,914	3,469	3,958	CONT.	CONT.
R9013 Littoral Support Craft - Experimental		16,057							16,057
R9014 Curved Plate Technology		2,478							2,478
R9015 SMARTLINK System		1,487							1,487
R9016 Real Time Fire and Smoke Prediction Tool		991							991
R9017 Wireless Sensors for Total Ship Monitoring		2,775							2,775
R9018 Knowledge Projection for Fleet Maintenance		2,478							2,478
R9019 Wave Powered Electric Power Generating System		1,982							1,982
Total	**	139,782	57,604	51,773	56,487	46,334	47,372	CONT.	CONT.
Defense Emergency Response Fund (DERF)			36,000						

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Budget Item Justification
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** The Science and Technology PEs were restructured in FY 2002. FY 2001 efforts were funded in PE(s) 0602111N, 0602121N, 0603238N, 0603508N, 0603217N and 0603747N.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Includes RDT&E funds to develop and demonstrate advanced technologies that support platform self-protection and theatre wide and missile defense of naval platforms and 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.

(U) SURFACE SHIP & SUBMARINE HULL, MECHANICAL & ELECTRICAL (HM&E) thrusts include: signature reduction, hull life assurance, hydromechanics, distributed intelligence for automated survivability and advanced electrical power 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 weapons effects to control structural damage and the improvement of structural materials. Hydromechanics addresses hydrodynamic technologies, including the signature aspects of the hull-propulsor interface. Distributed control for automated survivability addresses both the basic technology of automating damage control systems as well as distributed auxiliary control with self-healing capability. Advanced electrical power systems area addresses electrical and auxiliary system and component technology to provide improvement in system energy and power density improvement, system operating efficiency and recoverability from casualties.

(U) SENSORS & ASSOCIATED PROCESSING thrust develops complementary sensor and processing technologies for 21st century warfighting success and platform protection. Current small platforms (both surface and airborne) have little to no situational awareness (SA) or self-protection against air, surface, and asymmetric threats. The goal of this effort is to provide these platforms with effective self-protection. The technology areas specific to platform protection will develop individual or multispectral (Electro-Optic (EO), IR, Radio Frequency (RF), 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 multispectral detection and distribution of specific threat information.

(U) MISSILE DEFENSE (MD) thrust develops Littoral Theater Air and Missile Defense (TAMD) technology enhancements for transition to acquisition programs, which will interact efficiently, effectively, and in time to detect, control, and engage projected anti-ship cruise missiles, overland cruise missiles, aircraft and theater ballistic threats. The Missile Defense S&T projects directly provide elements of the capability required by the Joint Requirements Oversight Council (JROC) TAMD Capstone Requirements Document (CRD) (2001). This PE includes those MD elements that perform risk reduction for Force Protection Capability. In addition, emerging S&T requirements in the area of Directed Energy and Strike Technology are also included under Missile Defense. In the terminology of the TAMD CRD, Attack Operations

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(Strike) is a necessary element of Theater Air and Missile Defense in order to attack the air threat before they are launched.

(U) UNDERWATER (UW) PLATFORM SELF DEFENSE thrust develops technologies that will increase 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, high speed torpedoes, air dropped torpedoes, and salvos of torpedoes). The long-term goal of the UW Platform Self Defense effort is to develop technologies that will ultimately be placed on board ship. Technologies should be developed to minimize shipboard impact, allow automatic employment, and require no organizational maintenance. Specific technology includes two programs. 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 improved passive shipboard detection, classification, and localization (DCL) of incoming torpedoes and an ATT to engage the threat torpedoes.

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

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded within the ADVANCED TECHNOLOGY DEVELOPMENT Budget Activity because it encompasses design, development, simulation, or experimental testing of prototype hardware to validate technological feasibility and concept of operations and reduce technological risk prior to initiation of a new acquisition program or transition to an ongoing acquisition program.

B. (U) PROGRAM CHANGE FOR TOTAL PE:

Table with 4 columns: Description, FY 2001, FY 2002, FY 2003. Rows include: FY 2002 President's Budget, Adjustments from FY 2002 President's Budget, Congressional Plus-ups, Section 8123 Management Reform Initiative Reduction, Increase for Force Protection Efforts, FY 03 PRESBDG Submission.

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R2912 Force Protection Advanced Technology	**	92,108	50,942	42,321	44,573	42,865	43,414	CONT.	CONT.

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B. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 2001 ACCOMPLISHMENTS:

(U) (\$20,800) SURFACE SHIP & SUBMARINE HM&E

- (U) Signature Reduction:

Initiated:

(U) Submarine condenser/discharge flanking path investigation within Advanced Machinery Support System Program (AMSS). (Funded in PE 0603508N).

Completed:

(U) AMSS submarine machinery support shock truss demo. (Funded in 0603508N)

(U) Identification of critical technologies and tradeoff studies for surface ship near field de-amping system.

(Funded in PE 0603508N).

- (U) Hull Life Assurance:

Continued:

(U) Thermochemical combustion model for passive magazine protection. (Funded in PE 0602121N).

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Completed:

(U) Anti-fratricide shielding reaction tests for passive magazine protection. (Funded in PE 0603508N).

- (U) Distributed Intelligence for Automated Survivability:

Continued:

(U) Sensor development and intermediate scale demo development for automated casualty flooding control. (Funded in PE 0603508N).

(U) Demonstrated automation technology to provide 85% reduction in damage control manning. (Funded in PE 0603508N).

- (U) Advanced Electrical Power Systems:

Continued:

(U) Ship service fuel cell diesel fuel reformer analytical dynamic performance model development.

(U) Development of Aircraft Electrical Servicing Station (AESS) demonstration using programmable Power Electronic Building Block (PEBB) and Power Node Control Center technologies. (Funded in PE 0603508N).

Completed:

(U) Transition of PEBB technology to industry. (Funded in PE 0603508N).

- (U) Electric Warship:

Initiated:

(U) Planning for Electric Warship and Combat Vehicles thrust area, including studies of superconducting generators, podded propulsors, and electric weapons. (Funded in PE 0603508N).

(U) (\$4,974K) SENSORS & ASSOCIATED PROCESSING

- (U) Multifunction Infrared Distributed Aperture System:

Continued:

(U) For Naval aircraft, the Navy has undertaken an Advanced Technology Demonstration (ATD) for the Multifunction Infrared Distributed Aperture System (MIDAS). The goal of the MIDAS effort is the development of a seamless, real-time, Omni-directional situational awareness capability for Naval Aviation meeting the Joint Strike Fighter (JSF) transition criteria. In FY01, accomplishments included successful completion of the focal plane acceptance test and other required lab test meeting the program sensor and processor objectives. (Funded in PE 0603238N).

(U) (\$7,679) MISSILE DEFENSE

Initiated:

(U) As part of the Missile Defense Future Naval Capability: The Reactive Warhead project initiated design of a dynamic test of an optimal reactive material warhead and initiated lethality analysis for testing against targets representative of both theater ballistic and cruise missiles. (Funded in PE 0602111N).

Continued:

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(U) Development of preliminary algorithms for Composite Threat Evaluation/Weapon Assignment (TEWA) across the entire theater of operations. (Funded in PE 0602111N)

(U) Development of preliminary algorithms for Composite Combat Identification (CCID) to assess feasibility of building ID across a network. (Funded in PE 0603238N).

- (U) Total Ownership Costs:

Continued:

(U) Development and flight demonstration of Vectoring enhanced short takeoff and landing (ESTOL) Control Tailless Operation Research (VECTOR) air platform (Funded in PE 0603217N).

(U) (\$1,197) UNDERWATER PLATFORM SELF DEFENSE

Continued:

(U) Development of ATT and Tripwire Torpedo Defense System (TDS) technology. (Funded in PE 0603747N).

2. (U) FY 2002 PLANS:

(U) (\$67,395) SURFACE SHIP & SUBMARINE HM&E

- (U) Signature Reduction:

Initiate:

(U) Surface ship boundary element model development for near field de-amping.

(U) Physical model of surface ship for near field de-amping demonstration and model validation.

(U) Stable algorithm development of near field de-amping system.

Continue:

(U) Large scale truss element evaluation for AMSS.

Complete:

(U) AMSS condenser overboard discharge acoustic demo.

- (U) Hull Life Assurance:

Initiate:

(U) Ship test planning for passive magazine protection. (Transitions to Project R3049 in this PE in FY03)

Complete:

(U) Propellant characterization and thermochemical combustion model for passive magazine protection. Tools for predicting the total response of stowed ordnance in a magazine with and without protective elements of Anti-Fratricide Shielding and Explosive Load Reduction.

- (U) Distributed Intelligence for Automated Survivability:

Initiate:

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(U) Advanced Damage Countermeasures - investigation of water mist firefighting application for electronic spaces. (Transitions to Project R3049 in this PE in FY03)

(U) Development of an advanced volume sensor for fire and smoke detection. (Transitions to Project R3049 in this PE FY03)

- (U) Electric Warship:

Continue:

(U) Electric Warship planning and studies leading to new efforts in FY 03.

(U) Ship Service Fuel Cell Demonstration and Quiet Electric Drive/Submarine Secondary Propulsion Unit (SPU) projects.

Compete:

(U) Including completion of the Aircraft Electrical Servicing Station (AESS) Demonstration

- (U) Advanced Ship Concepts:

Initiate:

(U) Development of the Littoral Surface Craft (Experimental), LSC (X). Develop technologies for small, fast craft in the 500-1000 ton range for missions such as littoral ASW and mine countermeasures. Complete detailed design and begin construction of the LSC(X) prototype craft.

(U) (\$15,922) SENSORS & ASSOCIATED PROCESSING

- (U) Distributive Aperture System:

Initiate:

(U) For Surface Ships, the Navy will launch a technology program (FY02 through FY06) for a ship based Distributive Aperture System (DAS) Infrared Search and Track (IRST) for transition to DDX, CGX, and CVNX. The staring IRST system will enable a passive self-protection capability for U.S surface ships. The system will address the need for low radar cross-section sensor for surface naval ships. The system will provide 360-degree staring panoramic view and awareness at-sea and in port of the surface, air, and asymmetric target set. Each module of the staring system will consist of focal plane arrays, anamorphic optics, stabilization, and modularization techniques. The ship's combat center will control the DAS through a central computer high-speed processor. The DAS, consisting of eight modules for surface combatant ships will vary based on the size of ship. It will provide surface ships with a 360-degree panoramic staring view on the horizon to line of sight, and be able to detect, declare, and track air contacts and surface contacts within 2-3 seconds. The sensor modules will also be able to pan its view downward to view the surface from the ship to line of sight for in port counterterrorism awareness. DAS will address the surface naval ships needs for a passive fighting and in-port security ability. The Navy will demonstrate a three-module prototype with a high-speed central computer in FY06. It is critical to demonstrate the technique to seam stitch three sensors panoramic view.

Initiate:

(U) For Naval Aircraft - The Missile Warning System (MWS) project will perform technology demonstrations of missile warning system components that are effective in detecting and locating threat missiles with the fidelity required for current and future tactical aircraft. A key component of the system is the development of a two color sensor using a

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solid state mercury cadmium telluride (MCT) focal plane array (FPA) that will demonstrate a 99% focal plane array operability with an increase in operating temperature from 90° Kelvin to 140° Kelvin and a 100% improvement in the FPA cryogenic cooling efficiency. This FPA will be laboratory tested along with the high efficiency cooler system. (U) For Surface Ships - The Shipboard electro-optic (EO)/IR closed loop Self Protection project that develops and demonstrates an integrated threat detection and closed-loop laser jamming system to counter EO/IR/laser guided threats to Naval combatants started integration of hardware for both the closed loop Infrared Countermeasures (IRCM) and open loop Electro-optic Countermeasures (EOCM) laboratory testing. The system will ultimately be demonstrated to be effective against TV guided, laser designated, mid-wave IR and long-wave IR guided (both autonomous and man-in-the-loop) seekers from a land site over water.

(U) For Small Platforms - Work on the EO/IR self-protection for Small Surface Vehicles project is focusing on breadboard demonstration of optical waveguide assemblies and suitable missile warning receivers to provide an automatic response for small platform and local area protection against IR guided and laser designated missiles and munitions. This work will be continued within the Electronic Warfare Integrated System for Small Platforms (EWISSP) effort in PE 0603235N in FY03.

- (U) Multifunction Infrared Distributive Aperture System:
Completed:

(U) For Naval Aircraft, the MIDAS ATD effort will be completed. Efforts in FY02 include the delivery of an operational MIDAS system for flight-testing and demonstration of the airborne situational awareness capability and subsequent transition of the technology to the Joint Strike Fighter (JSF) program office.

(U) (\$7,605) MISSILE DEFENSE

Initiate:

(U) As part of the Missile Defense Future Naval Capability: The Affordable Ground Based Radar (AGBR) project design and development of a sub-scale two High Mobility Multi-Purpose Wheeled Vehicle (HMMWV) -mounted radar system for surveillance, air control, and fire control as risk reduction leading to the Multi-Role Radar System (MRRS). The Littoral Affordability (LA) project will develop affordable elements of multi-spectral sensor and combat systems for the purpose of early detection through engage functions over-the-horizon from firing ships. The Advanced Area Defense Interceptor (AADI) project will initiate planning effort for a Navy - Marine Corps air-directed surface-to-air missile (ADSAM) live firing demonstration in FY 2006. Furthermore, it will coordinate with numerous Navy program sponsors and offices to formalize requirements, establish funding strategy, and prepare demonstration.

Continue:

(U) As part of the Missile Defense Future Naval Capability: The Reactive Warhead project will continue development of a warhead for STANDARD Missile using reactive materials. Test planning will commence for dynamic sled testing at Holloman AFB in FY 2004.

- (U) Total Ownership Costs:

Continue:

(U) Development and flight demonstration of VECTOR air platform.

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(U) (\$1,186) UNDERWATER PLATFORM SELF DEFENSE

Continue:

(U) Development of ATT and Tripwire TDS technology

(U) Classified program.

3. (U) FY2003 PLANS:

(U) (\$14,942) SURFACE SHIP & SUBMARINE HM&E

• (U) Signature Reduction:

Continue:

(U) Stable algorithm development of near field de-amping system.

(U) Outfit and begin demonstration with physical model of surface ship for near field de-amping math model validation.

(U) Evaluation of large-scale truss elements for AMSS.

• (U) Electric Warship:

Initiate:

(U) New projects addressing critical technology needs such as advanced energy storage, high powered switching and distribution, superconducting generators, and electric weapons.

Continue:

(U) Ship Service Fuel Cell and Quiet Electric Drive projects.

(U) (\$5,000) SENSORS & ASSOCIATED PROCESSING

• (U) Distributive Aperture System:

Continue:

(U) For Surface Ships, development and packaging the prototype sensor module (in FY04).

(U) For Naval Aircraft, the Missile Warning System (MWS) project will conduct laboratory common jam code demonstrations and pointer/tracker functional demonstrations. Missile signature data will be collected during live fire tests of opportunity. This live fire data will be coupled with recorded urban signature clutter to determine statistically significant system performance improvements such as probability of declaration and false alarm rates. This data will be used by the MWS to correctly identify the threat, determine the time-to-go accuracy necessary to track and engage the threat seeker with an Infrared Countermeasures (IRCM) system using common jam codes to cause the seeker to breaklock.

(U) For Surface Ships, the Shipboard EO/IR closed loop self-protection project, designed to increase platform survivability by the detection, classification and jamming of EO/IR/Laser guided threats, will conduct a functional demonstration of its mid-IR laser; receive and evaluate a Deuterium Fluoride pulsed chemical laser; and prepare for closed loop IRCM system demonstration in FY04.

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(U) For the EO/IR Self Protection for Small Surface Vehicles project, work will continue on the fabrication of the off-axis laser detection system that provides wide area threat detection capability against laser-designated missiles and munitions. Fabrication and integration of the decoy subsystems will also continue using a lightguide capable of transmitting radiation from .04 um to 12 um from a mast height ranging from 3.5 to 8 meters.

(U) (\$27,000) MISSILE DEFENSE

Initiate:

(U) The Navy portion of the tri-Service National Aerospace Initiative will design and fabricate 'flight weight' engine and airframe components of a hypersonic missile based on dual combustion ramjet engine technology.

Continue:

(U) As part of the Missile Defense Future Naval Capability: The AGRB project will continue design and assembly of an Advanced Development Model (ADM) sub-scale array for risk reduction of MRRS. The Reactive Warhead project will continue in its development of a reactive material warhead for STANDARD Missile, will conduct safety certification of warhead design for the Weapon Safety Evaluation System Review Board, and prepare a physics-based damage prediction model. The Advanced Area Defense Interceptor (AADI) project will continue with planning and coordination for a Navy - Marine Corps ADSAM live firing demonstration in FY 2006.

(U) As part of the Time Critical Strike Future Naval Capability: The Cruise Missile Real Time Retargeting project was previously funded in PE 0603114N. The low cost seeker task of the Cruise Missile Real Time Retargeting (CMRTR) task will flight test the build 3 seeker to verify performance and eye safe capabilities, develop detailed design of the tactical seeker, and demonstrate and evaluate the performance of the Automatic Target Recognition (ATR) algorithm.

Complete:

(U) Total Ownership Cost

Complete:

(U) Development and flight demonstration of VECTOR air platform.

(U) Classified Program

(U) (\$4,000) UNDERWATER PLATFORM SELF DEFENSE

Continue:

(U) Development of ATT and Tripwire TDS technology.

C. (U) PROGRAM CHANGE SUMMARY EXPLANATION: See Program change total summary for PE.

Schedule: Not Applicable.

D. (U) OTHER PROGRAM FUNDING SUMMARY:

(U) NAVY RELATED RDT&E:

(U) PE 0601153N (Defense Research Sciences)

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- (U) PE 0602123N (Force Protection Applied Research)
- (U) PE 0602131M (Marine Corps Landing Force Technology)
- (U) PE 0602235N (Common Picture Applied Research)
- (U) PE 0602271N (RF Systems Applied Research)
- (U) PE 0603640M (Marine Corps Advanced Technology Demonstrations)
- (U) PE 0603235N (Common Picture Advanced Technology)
- (U) PE 0603271N (RF Systems Advanced Technology)
- (U) PE 0603502N (Surface and Shallow Water Mine Countermeasures)
- (U) PE 0603513N (Shipboard System Component Development)
- (U) PE 0603553N (Surface ASW)
- (U) PE 0603561N (Advanced Submarine Systems Development)
- (U) PE 0603563N (Ship Concept Advanced Design)
- (U) PE 0603564N (Ship Preliminary Design and Feasibility Studies)
- (U) PE 0603573N (Advanced Surface Machinery Systems)
- (U) PE 0603609N (Conventional Munitions)
- (U) PE 0603721N (Environmental Protection)
- (U) PE 0204152N (E-2 Squadrons)
- (U) PE 0205601N (HARM Improvement)
- (U) PE 0206313M (Marine Corps Communications Systems)
- (U) PE 0604307N (Surface Combatant Combat System Engineering)
- (U) PE 0604518N (Combat Information Center Conversion)
- (U) PE 0604558N (New Design SSN)
- (U) PE 0604561N (SSN-21 Developments)

(U) NON NAVY RELATED RDT&E:

(U) PE 0602270A (EW Technology)

(U) PE 0602204F (Aerospace Sensors)

E.(U) SCHEDULE PROFILE: Not Applicable.

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(U) COST: (Dollars in Thousands)

PROJECT

NUMBER & TITLE	FY 2001 ACTUALS	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	FY 2006 ESTIMATE	FY 2007 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
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B. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 2001 ACCOMPLISHMENTS: Not Applicable.

2. (U) FY 2002 PLANS: Not Applicable.

3. (U) FY 2003 PLANS:

(U) EMERGING THREATS (\$6,662)

• (U) Hull Life Assurance:

Initiate:

(U) Vertical Launch System passive magazine protection design.

Continue and complete

(U) Ship test preparation for passive magazine protection full-scale test.

Complete:

(U) Blast yield/propagation test for passive protection.

• (U) Distributed Intelligence for Automated Survivability:

Continue:

(U) Small scale testing of high efficiency water mist system for application to electronic spaces within advanced damage countermeasures program. Continue response strategy development and intermediate scale system development for casualty flooding control system.

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FY 2003 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2002

BUDGET ACTIVITY: 3

PROGRAM ELEMENT: 0603123N

PROGRAM ELEMENT TITLE: FORCE PROTECTION ADVANCED TECHNOLOGY

(U) Support 3 RHIB units in NUWC demonstration of Unmanned Surface Vehicles to provide force protection, ISR and potential weapons platform for naval harbor and port facilities.

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DATE: February 2002

BUDGET ACTIVITY: 3

PROGRAM ELEMENT: 0603123N

PROJECT NUMBER: R3049

PROGRAM ELEMENT TITLE: FORCE PROTECTION ADVANCED TECHNOLOGY

PROJECT TITLE: EMERGING THREATS

C. (U) PROGRAM CHANGE SUMMARY EXPLANATION: See Program change total summary for PE.

(U) Schedule: Not Applicable.

(U) Technical: Not Applicable.

D. (U) OTHER PROGRAM FUNDING SUMMARY:

(U) NAVY RELATED RDT&E:

(U) PE 0601153N (Defense Research Sciences)

(U) PE 0602235N (Common Picture Applied Research)

(U) PE 0602123N (Force Protection Applied Research)

(U) PE 0603235N (Common Picture Advanced Technology)

(U) PE 0603502N (Surface and Shallow Water Mine Countermeasures)

(U) PE 0603561N (Advanced Submarine Systems Development)

(U) PE 0603563N (Ship Concept Advanced Design)

(U) PE 0603564N (Ship Preliminary Design and Feasibility Studies)

(U) PE 0604558N (New Design SSN)

(U) PE 0604561N (SSN-21 Developments)

(U) NON NAVY RELATED RDT&E: Not Applicable

E. (U) SCHEDULE PROFILE: Not Applicable.

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DATE: February 2002

BUDGET ACTIVITY: 3 PROGRAM ELEMENT: 0603123N
PROGRAM ELEMENT TITLE: FORCE PROTECTION ADVANCED TECHNOLOGY

CONGRESSIONAL PLUS-UPS

This section describes the following Congressional Plus-Ups appropriated in FY 2001 or FY2002 whose efforts fall within the scope of this restructured program, or which were appropriated in this program element:

AC Synchronous High Temperature Superconductor Electric Motor
Advanced Water Jet (AWJ-21)
Composite Helo Hangar Door
Computational Engineering Design
Curved Plate Technology
DDG-51 Composite Twisted Rudder
Knowledge Projection For Fleet Maintenance
Littoral Support Craft-Experimental (LSC-X)
Modular Composite Hull
Non-Magnetic, Stainless Steel Advanced Double Hull
Project M
Real Time Fire And Smoke Prediction Tool
SES 2000 Modification Hydrofoil Small Waterplane Area Catamaran
Ship Service Fuel Cell Technology Verification & Training Program
Smartlink System
Superconducting DC Motor
Virtual Testbed For Reconfiguring Ships
Wave Powered Electric Power Generating System/Portable Hybrid Electric Systems
Wireless Sensors For Total Ship Monitoring

(U) FY 2001 Congressional Plus-Ups:

- (U) (\$3,383) AC Synchronous High Temperature Superconductor (HTS) Electric Motor: Complete conceptual design of a 25 MW/120 RPM motor and preliminary design of a 5MW/230 RPM subscale demonstration motor to be built and tested. Pursued component development for HTS field windings, cryogenic cooling, torque transfer, stator and tooling. (Funded in PE 0603508N)
- (U) (\$3,861) Advanced Waterjet-21 (AWJ-21): Demonstrate a large-scale unit of the advanced waterjet and subsequent technology on a scaled platform to lower acoustic cavitation signatures as well as to reduce other signatures associated with surface ship propulsion systems. (Funded in PE 0603508N)
- (U) (\$3,887) Composite Helo Hangar Door: Develop a composite helicopter hangar door for a DDG-51 Flight IIA ship. (Funded in PE 0603508N)
- (U) (\$3,862): Computational Engineering Design: Provide advanced technology support for a computation engineering design tool. (Funded in PE 0602633N)

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FY 2003 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2002

BUDGET ACTIVITY: 3

PROGRAM ELEMENT: 0603123N

PROGRAM ELEMENT TITLE: FORCE PROTECTION ADVANCED TECHNOLOGY

- (U) (\$4,852) Hybrid Small Waterplane Area Catamaran (HYSWAC): Demonstrate manufacturing technology to allow major structural modification of ships allowing application of new materials and enable life extension. Began modifying ship to serve as a test bed for advanced electric propulsion components. (Funded in PE 0603792N)
 - (U) (\$2,899) Modular Composite Hull: Investigate modular composite construction allowing for the use of more complex bow shapes and stern hull components that could improve hydrodynamic performance, as well as reduce magnetic ship signatures for Navy surface ships. (Funded in PE 0603508N)
 - (U) (\$3,887) Non-Magnetic, Stainless Steel Advanced Double Hull: Development of a stainless steel advanced double hull structure for Navy ships. Perform an assessment on the structural integrity of hybrid composite/stainless steel hull structures and explore the benefits gained through the combination of stainless steel advanced double hull technology with composite hull technology. (Funded in PE 0602121N)
 - (U) (\$2,423) Portable Hybrid Electric Power Systems: Demonstrate the viability of wave power as a source of electric power by designing a Wave Energy Conversion (WEC) Buoy that converts wave motion to hydraulic power, and then to electrical energy. (Funded in PE 0603508N)
 - (U) (\$2,897) Project M: Development of a closed-loop degaussing system to confirm derivatives of the control system for benefit of the Electric Drive program. Build a full-scale mount, including a closed-loop degaussing system for the mount, resolution of ship systems integration issues, and confirmation of the performance potential of control systems. (Funded in PE 0603508N)
 - (U) (\$1,931) Ship Service Fuel Cell: Examine fuel-reforming technologies for molten carbonate fuel cells. Fuel cells offer the potential to increase the fuel efficiency of electric power generation by a factor of two or better. (Funded in PE 0603508N)
 - (U) (\$7,249) Superconducting DC Motor: Complete sizing of 25MW motor, preliminary design of a 3.7 MW subscale motor, design of a subscale motor test stand and preliminary ship system studies. Pursue component development/testing of brushes, brush holders, magnetic modeling and high current joints. (Funded in PE 0603508N)
 - (U) (\$2,419) Virtual Testbed for Reconfiguring Ships: Develop distributed computing and advanced visualizations to provide a means to test new engineered systems even before all the parts of the system actually exist. (Funded in PE 0603508N)
- (U) FY 2002 Congressional Plus-Ups:
- (U) (\$3,965) AC Synchronous High Temperature Superconductor (HTS) Electric Motor: Begin construction of the HTS propulsion motor and power electronics, and design an HTS generator as part of an integrated system to be tested in 2004.
 - (U) (\$3,469) Advanced Waterjet-21 (AWJ-21): Test a 1/4 scale unit of the advanced waterjet and subsequent technology demonstration on a scaled platform. An engineering evaluation of the propulsive efficiency and signature characteristics of the advanced design would be accomplished.

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BUDGET ACTIVITY: 3

PROGRAM ELEMENT: 0603123N

PROGRAM ELEMENT TITLE: FORCE PROTECTION ADVANCED TECHNOLOGY

- (U) (\$2,478) Curved Plate Technology: Development of curved plate technology in the construction of double hull vessels using steel and alloy metals with low magnetic, anti-corrosive properties.
- (U) (\$2,478) Knowledge Projection for Fleet Maintenance: Provide advanced technology for better management of fleet maintenance.
- (U) (\$16,057) Littoral Support Craft-Experimental (LSC-X): Design and construction for a Littoral Surface Craft - Experimental (LSC(X)) which will be a small, fast, experimental ship designed to operate in the littorals. The ship will be designed to carry a variety of mission modules, and will serve as a testbed for new technologies and new operational concepts.
- (U) (\$2,775) Project M: Demonstrate 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.
- (U) (\$991) Real Time Fire and Smoke Prediction Tool: Develop advanced technology to better model fire and smoke spread in a shipboard environment.
- (U) (\$7,235) SES 2000 Modification Hydrofoil Small Waterplane Area Catamaran (HYSWAC): Support modification of SES platform to HYSWAC configuration. Support at-sea testing for evaluation of the HYSWAC concept.
- (U) (\$1,487) Smartlink System: Advanced technology application to a Smart link System.
- (U) (\$1,982) Superconducting DC Motor: Advanced technology supporting preliminary design and construction of a 3.7 MW subscale motor.
- (U) (\$1,982) Wave Powered Electric Power Generating System: Provide advanced technology support for the development of a power generating system driven by ocean wave motion.
- (U) (\$2,775) Wireless Sensors for Total Ship Monitoring: Develop wireless sensor technology for monitoring all shipboard systems and providing situational awareness.
- (U) (\$991) DDG-51 Composite Twisted Rudder: Develop a process for the manufacture of large Composite Twisted Rudders for the DDG-51 class ship, as well as those of other ships and other large ship components. Development of this process could enable the manufacture of affordable composite rudders and other large articles for DDG-51 and other vessels. (Funded in PE 0603508N)
- (U) (\$1,982) Ship Service Fuel Cell Technical Verification & Training Program: Develop a dynamic simulation and validation capability for a diesel fuel cell. (Funded in PE 0603508N)

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