

UNCLASSIFIED

FY 2008/2009 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2

DATE: February 2007

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603123N
PROGRAM ELEMENT TITLE: FORCE PROTECTION ADVANCED TECHNOLOGY

COST: (Dollars in Thousands)

Project Number & Title	FY 2006 Actual	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
Total PE	175,943	147,111	70,850	58,615	50,355	45,108	46,351	47,297
2912 FORCE PROTECTION ADVANCED TECHNOLOGY	71,620	58,599	68,740	56,377	47,971	42,578	43,774	44,673
3049 FORCE PROTECTION	5,600	2,640	2,110	2,238	2,384	2,530	2,577	2,624
9999 CONGRESSIONAL PLUS-UPS	98,723	85,872	0	0	0	0	0	0

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This Program Element (PE) addresses advanced technology development associated with providing the capability of Platform and Force Protection for the U.S. Navy. This program supports the development of technologies associated with all naval platforms (surface, subsurface, terrestrial and air) and the protection of those platforms. This PE supports the Future Naval Capabilities (FNC) in the areas of Sea Shield and Cross Pillar Enablers. The goal of this program 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. Surface Ship & Submarine, Hull, Mechanical & Electrical (HM&E), Missile Defense, Fleet Force Protection and Defense against Undersea Threats, and Emerging Threats activities all support FNC efforts.

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

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B. PROGRAM CHANGE SUMMARY:

	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
FY 2007 President's Budget Submission	165,611	61,504	49,709	49,962
Congressional Action	0	86,200	0	0
Congressional Realignment	7,351	0	0	0
Congressional Undistributed Reductions/Rescissions	-1,363	-593	0	0
Execution Adjustments	8,561	0	0	0
Non-Pay Inflation Adjustments	0	0	-118	108
Program Adjustments	0	0	22,071	5,769
Program Realignment	0	0	-840	2,689
Rate Adjustments	0	0	28	87
SBIR Assessment	-4,217	0	0	0
FY 2008/FY 2009 President's Budget Submission	175,943	147,111	70,850	58,615

PROGRAM CHANGE SUMMARY EXPLANATION:

Technical: Not applicable.

Schedule: Not applicable.

C. OTHER PROGRAM FUNDING SUMMARY:

Not applicable.

D. ACQUISITION STRATEGY:

Not applicable.

E. PERFORMANCE METRICS:

The overall goals of this advanced technology program are the development of technologies which focus on the

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warfighter and providing 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. Overall metric goals are to transition the advanced technology projects into acquisition programs. Each Activity within this PE has unique goals and metrics, some of which include classified quantitative measurements.

Specific examples of metrics under this PE include:

- Improve performance of high speed craft to allow 4000 NM range in a craft capable of 50 kts maximum speed by FY 2007.
- Demonstrate improved performance of main propulsion electric motors and controllers (50% reduced weight and volume) by FY 2011.
- In-water successful demonstration of warhead lethality against specified threat at required Closest Point of Approach (CPA).
- Items included within the Missile Defense Activity description.

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Project Number & Title	FY 2006 Actual	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
2912 FORCE PROTECTION ADVANCED TECHNOLOGY	71,620	58,599	68,740	56,377	47,971	42,578	43,774	44,673

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project addresses advanced technology development 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 Sea Shield and Cross Pillar Enablers -- Future Naval Capabilities (FNCs). The goals of this project are 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.

The funding profile from FY 2006 to FY 2007 reflects the reorganization of FNC Program investments into Enabling Capabilities (ECs). As a result of this reorganization, the funding for each EC has been aligned to a Budget Activity 2 and Budget Activity 3 PE as appropriate. This Project reflects the alignment of investments for the following ECs: Total Ship Survivability Damage Tolerance and Recoverability; Over-the-Horizon Missile Defense; Two-Torpedo Salvo Defense; Defense of Harbor and Near-Shore Naval Infrastructure Against Asymmetric Threats; Sea Based Missile Defense of Ships & Littoral Installations; Aircraft Integrated Self-Protection Suites; Hostile Fire Detection and Response Spirals 1 and 2; Shipboard Force Protection in Port and Restricted Waters - Detection and Classification; and Underwater Total Ship Survivability.

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2006	FY 2007	FY 2008	FY 2009
SURFACE SHIP & SUBMARINE HULL MECHANICAL & ELECTRICAL (HM&E)	31,875	18,609	10,339	13,712

Activity includes: Signature Reduction, Hull Life Assurance, and Advanced Capability Electric Systems.

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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. Advanced Capability Electric Systems area addresses electrical and auxiliary systems and component technology to provide improvements in system energy and power density, system operating efficiency, and recoverability from casualties. Advanced Damage Control Countermeasures addresses fire, smoke, and flooding detection using a volume sensor and the use of a hybrid water-mist for electronic space protection. This activity includes support to the Sea Strike and Cross Pillar Enablers FNC programs.

Funding decrease from FY 2006 through FY 2008 is due to completion of construction of the 36.5 MW Superconducting Motor and completion of Total Ownership Cost efforts. The increase of funding in FY 2009 is due to the initiation of Control Surface Actuator efforts and new FNC topics for the enterprise platform enabler.

FY 2006 Accomplishments:

- Continued development of diesel fuel reforming technology for molten carbonate and proton exchange membrane fuel cells.
- Continued development of advanced superconducting homopolar main propulsion motor with General Atomics.
- Continued development of on-board vehicle power system technologies for future Marine Corps Battlefield Power System (Transferred to PE 0603236N in FY 2007).
- Completed development of electromagnetic gun technology, including focus on rail wear issues, energy storage, and pulsed power switching (transitioned to PE 0602114N).
- Completed technology efforts for reduced total ownership cost.
- Completed design and construction of a 36.5 MW superconducting synchronous main propulsion prototype motor with American Superconductor.
- Completed construction of Advanced Electric Ship Demonstrator (AESD).
- Completed and transitioned quiet electric drive technology to NAVSEA 08 and PMS 350.
- Initiated development of autonomous recovery system for Unmanned Sea Surface Vehicles from a host ship.

FY 2007 Plans:

- Continue all efforts of FY 2006, less those noted as completed above.
- Complete testing of superconducting synchronous main propulsion motor with American Superconductor.

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- Initiate development of Integrated Damage Control Systems which includes Integrated Damage Control Communications and Advanced Magazine Protection System.

FY 2008 Plans:

- Continue all efforts of FY 2007, less those noted as completed above.
- Initiate Total Ship Survivability Damage Tolerance and Recoverability efforts which include integrated damage control situation awareness technologies.

FY 2009 Plans:

- Continue all efforts of FY 2008.
- Initiate Control Surface Actuator efforts.
- Initiate new FNC topics for enterprise platform enabler.

	FY 2006	FY 2007	FY 2008	FY 2009
FLEET FORCE PROTECTION AND DEFENSE AGAINST UNDERSEA THREATS	23,555	27,001	22,230	20,100

Fleet Force Protection and Defense against Undersea Threats addresses efforts that include applied research for complementary sensor and processing technologies for platform protection and shipboard technologies to increase the survivability of surface ship and submarine platforms against torpedo threats.

The first major goal of this activity is to develop 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. This activity will provide tactical aircraft (TACAIR) and other platforms with effective threat warning and self-protection. The technology areas specific to platform protection will develop individual or multi-spectral [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 multi-spectral detection and distribution of specific threat information.

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The Fleet Force Protection portion of this activity includes support to the FNC Enabling Capabilities for: Aircraft Integrated Self-protection Suites; Intent Determination - EO/IR Enhancements; Proof-of-Concept for Non-lethal Approach; Advanced Electronic Sensor Systems for Missile Defense; Hostile Fire Detection and Response Spirals 1 and 2; Defense of Harbor and Near-Shore Naval Infrastructure Against Asymmetric Threats; and Shipboard Force Protection in Port and Restricted Waters - Detection and Classification.

The second major goal of this activity is to develop 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 salvos of torpedoes). Technologies developed will minimize shipboard impact and require no shipboard organizational maintenance. Two major efforts are ongoing: 1) The Next Generation Countermeasure (NGCM) is a mobile adaptive acoustic countermeasure (CM) for defeating threat torpedoes; NGCM capabilities will include acoustic communication links to enable connectivity from each CM to other CMs (in the group) and to the host platform; and 2) The Anti-Torpedo Torpedo (ATT)/Tripwire provides technologies that enable an ATT to engage threat torpedoes detected by a surface ship towed sensor system. The ultimate goal is to develop technologies to enable a torpedo defense capability, including ship self-defense against salvo torpedo attacks, to fill the FNC Sea Shield Warfighting Capability Gap/Enabling Capability: Platform Defense against Undersea Threats. This will be accomplished by providing a capability to prevent a single salvo of two threat torpedoes fired at high value Naval platforms from hitting those platforms. Ultimately the efforts should deliver a netted set of decoys and an anti-torpedo-torpedo for use in defeating a 2-torpedo salvo attack against a surface or subsurface platform.

The funding increase from FY 2006 to FY 2007 is due to the transfer of Intelligent Video Surveillance efforts from PE 0602131M. The decrease from FY 2007 to FY 2008 reflects completion of demonstration activity.

FY 2006 Accomplishments:

Sensors & Associated Processing -

- Continued laboratory demonstration of a coated carbon fiber cable that survives 27 times longer than Zylon under direct flame at temperatures >1800 degrees Fahrenheit. Integrated Defensive Electronic Countermeasures Pre-Planned Product Improvement (IDECM P3I).
- Continued laboratory demonstration of the upgraded multiband laser towards a goal of 5W in all bands for EO/IR Jammer for TACAIR.

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- Continued the End User Terminal (EUT) effort by conducting a side-by-side laboratory demonstration of the Dismounted-Digital Automated Computing Terminal (D-DACT) including the integrated 256 color Organic Light Emitting Diode (OLED) display with a Liquid Crystal Display D-DACT.
- Continued the Shipboard EO/IR Closed Loop Self-Protection effort by demonstrating a pulse-gated visible receiver operating at 10kHz frame rate.
- Completed land based testing of optical design and data processing systems for DAS.
- Completed international effort to develop new and improved algorithms for DAS IRSTs to cope with at-sea environmental effects.
- Completed the Laser Detection and Ranging (LADAR) piece of the Distributed Aperture System (DAS) for target imagery and identification and DAS IRST testing. The LADAR build will be a low power breadboard model.
- Initiated the integration of the Gallium Arsenide (GaAs) transmitter with an ALE-55 sized Fiber-Optic Towed Decoy (FOTD) and onboard power supply for the Integrated Defensive Electronic Countermeasures Pre-Planned Product Improvement (IDECM P3I) effort.
- Initiated and completed development work on improving imaging technologies (IIT) to support the Integrated Radar Optical Sighting & Surveillance (IROSS) Shipboard Protection System (SPS) Spiral for IROSS and Antiterrorist Force protection (ATFP) surveillance and identification for surface ships.
- Initiated the integration of a noncryogenic solid-state Mid-wave Infrared (MWIR) multiband laser into a prototype Tactical Aircraft Directed IR Countermeasures (TADIRCM) pod that will undergo an Early Operational Assessment (EOA) in FY06 (EO/IR Laser Jammer for TACAIR).
- Initiated the Integrated EO/IR Self Protection Suite for Rotary Wing Aircraft effort by evaluating and demonstrating an uncooled missile warning system (MWS) sensor operating in the visible/near-infrared (500-1100 nanometer) spectral band.
- Initiated the integration and laboratory testing of the multiband laser jammer, stabilized pointer, and closed-loop EO/IR receivers for the Shipboard EO/IR Closed-Loop Self Protection effort.
- Initiated preparations for the completion of the EUT effort by planning a field demonstration of the full capabilities of the integrated personal communications, situational awareness, and gunfire detection system including the Monocular Display with a super video graphics adapter (SVGA) resolution of 800x600 pixels.

Underwater Platform Self-Defense -

- Continued open loop in-water data collection experiments to collect ATT one-on-one (1x1) sensor data for improving operations in the wake.
- Continued in-water tests evaluating the ability of ATTs to transmit and receive acoustic communication between vehicles.

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- Continued open loop in-water experiments to evaluate ATT salvo four-on-four (4x4) engagement technologies.
- Completed open loop in-water data collection efforts to evaluate the ATT two-on-two (2x2) salvo sonar technologies for emulated salvo threat during relevant engagement geometries.
- Initiated closed loop in-water data collection experiments to collect ATT one-on-one (1x1) sensor data for improving operations in the wake.
- Initiated in-water demonstration of free swimming NGCM.
- Initiated in-water demonstration of NGCM controlled mobility.
- Initiated closed loop data collections to evaluate ATT two-on-two (2x2) salvo technologies for improving operations outside the wake.
- Initiated development of technologies to support the Underwater Threat Neutralization project which include a scalable low frequency continuous wave acoustic weapon for use against underwater asymmetric threats.

FY 2007 Plans:

Sensors & Associated Processing -

- Continue all efforts of FY 2006, less those noted as complete above.
- Continue developing technologies to support the Intelligent Video Surveillance project which includes integration of object recognition and tracking algorithms, machine vision, and multiple networked video streams into different classes of EO/IR sensors. (Transferred from PE 0602131M in FY 2007.)
- Continue performance evaluation of a Counter Torpedo Detection, Classification and Localization (CTDCL) prototype torpedo protection system capable of countering two torpedoes launched in rapid succession. Transferred from PE 0603747N.
- Transfer the Shipboard EO/IR Closed Loop Self-Protection effort to PE 0603271N.
- Transfer development work on improving imaging technologies (EO/IR/Laser) supporting Integrated Radar Optical Sighting & Surveillance (IROSS) Shipboard Protection System (SPS) Spiral for IROSS to PE 0602131M.
- Complete laboratory demonstration of the common jam code countermeasure jamming capability by demonstrating a 95% jamming effectiveness for all Tier 1 and 2 IR threats (EO/IR Laser Jammer for TACAIR).
- Complete flight tests against single and multiple, simultaneous threats employing the complete system capabilities, including new towline capable of continuous operation at temperatures exceeding 1800 degrees Fahrenheit, 80W output continuous wave RF decoy, and Electronic Countermeasure (ECM) techniques (IDECM P3I effort).

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Underwater Platform Self-Defense -

- Continue all efforts of FY 2006, less those noted as complete above.
- Complete closed loop in-water data collection experiments to collect ATT one-on-one (1x1) sensor data for improving operations in the wake.
- Complete closed loop in-water data collection efforts to evaluate the ATT two-on-two (2x2) salvo sonar technologies for improving operations outside the wake.
- Complete evaluation of NGCM mobility capabilities by in-tank tests.
- Complete open loop in-water demonstration of ATT one-on-one (1x1) engagement in the wake.
- Complete in-water demonstration of free swimming NGCM.
- Complete open loop in-water experiments to evaluate ATT salvo four-on-four (4x4) engagement technologies.
- Initiate and complete demonstration of NGCM acoustic communication technologies and transition them to PMS415.
- Initiate and complete conduct of in-water demonstration of full duplex adaptive signal generation capability for NGCM.
- Initiate in-tank experiments at Naval Undersea Warfare Center, Division Newport to evaluate NGCM group behavior technology.

FY 2008 Plans:

Sensors & Associated Processing -

- Continue all efforts of FY 2007, less those noted as completed above.
- Complete the Integrated EO/IR Self Protect Suite for Rotary Wing Aircraft by conducting a field demonstration of the integrated Missile Warning Sensor (MWS) and multi-band fiber coupled laser jammer.
- Complete the Intelligent Video Surveillance project including integration of object recognition and tracking algorithms, machine vision, and multiple networked video streams into different classes of EO/IR sensors.
- Complete performance evaluation of a CTDCI prototype torpedo protection system capable of countering two torpedoes launched in rapid succession.
- Initiate new FNC Enabling Capability (EC) SHD-FY08-03 Shipboard Force Protection in Port and Restricted Waters - Detection and Classification. This project will develop mission specific electro-optic/infrared sensors to detect, classify, and determine the intent of potential terrorist and special operations force threats to ships and craft in port and transiting restricted waters.

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Underwater Platform Self-Defense -

- Continue all efforts of FY 2007, less those noted as completed above.
- Complete the Underwater Threat Neutralization project including demonstration of a scalable low frequency continuous wave acoustic system for use against underwater asymmetric threats in port.
- Initiate development of low-cost, light-weight swimmer detection and localization technologies.

FY 2009 Plans:

Sensors & Associated Processing -

- Continue all efforts of FY 2008, less those noted as completed above.

Underwater Platform Self-Defense -

- Continue all efforts of FY 2008, less those noted as completed above.

	FY 2006	FY 2007	FY 2008	FY 2009
MISSILE DEFENSE (MD)	8,900	10,028	36,171	22,565

This activity describes Missile Defense Science and Technology (S&T) projects of the Over-the-Horizon Missile Defense and the Sea Based Missile Defense of Ships & Littoral Installations ECs within the Sea Shield Future Naval Capability (FNC) program including:

- Advanced Area Defense Interceptor (AADI) S&T planning and data analysis effort for Navy-Marine Corps Air-Directed Surface-to-Air Missile (ADSAM) live firing demonstration at White Sands Missile Range in FY 2008. The metric for AADI is execution of an ADSAM demonstration by the Navy and Marine Corps that establishes the basis for further development of an operational Naval Integrated Fire Control/Counter-Air (NIFC-CA) capability.
- Distributed Weapons Coordination (DWC) open architecture combat system algorithms for Theater Air and Missile Defense (TAMD) Automated Battle Management Aids (ABMA), including Common Threat Evaluation (CTE) and Preferred Shooter Recommendation (PSR) functions that will enable fleet units to defend against air and missile attacks with increased effectiveness and efficiency. Metrics for DWC include (a) increased effectiveness of combat resources through a theater-wide threat evaluation process; (b) increased efficiency of weapons resources through weapon assignment and preferred shooter recommendations considering Theater Ballistic Missile Defense (TBMD) and Area/Ship Defense capability operating simultaneously; and (c) reduced "free riders" (threats not fired at) due to ineffective use of resources (unengaged targets) by 50% (threshold) 80% (objective). Transition to acquisition in FY 2008.

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- Distributed Sensor Coordination (DSC) algorithms for airborne sensor management in ADSAM and multi-threat air defense engagements. The metric for DSC is effective coordination of airborne sensor resources to support NIFC-CA capability, evaluated using laboratory Monte Carlo simulations within simulated stressing air defense environments. Transition to acquisition in FY 2008.
- Littoral Affordability (classified program). Metrics for this project are classified. Transitioned to acquisition at the end of FY 2006.
- Naval Interceptor Improvements (NII) technology upgrades for STANDARD Missile (SM) future TAMD missile. Metrics will be to achieve SM performance requirements in specified tactical rain environments and all specified electronic countermeasures environments. Transition anticipated in FY 2011.
- Extended Distributed Weapons Coordination (EDWC) algorithms to extend DWC ABMA functionality to include coordination of passive defense measures (emission control, use of decoys, maneuvering). Metrics will be defined in a transition agreement to be signed with the Navy acquisition customer upon project initiation in FY 2008. Transition anticipated in FY 2011.
- Positive Control of Naval Weapons (PCNW) equipment and computer programs for an advanced multi-band weapon system/interceptor link to enable forward pass engagements and enhance link security in hostile environments. Metrics will be defined in a transition agreement to be signed with the Navy acquisition customer upon project initiation in FY 2008. Transition anticipated in FY 2011.
- Advanced technologies that support delivery of Technology Oversight Group (TOG)-approved FNC enabling capabilities (EC) structured to close operational capability gaps in missile defense.
- Joint Integrated Fire Control (JIFC) S&T planning and preparations, non-FNC expansion of the AADI ADSAM demonstration, to support participation of Army, Air Force and coalition sensor and weapon test assets. The metric for this expanded participation is a series of demonstrations in FY08-09 that show a technology basis for effective interoperability with Navy and Marine Corps participating systems. These additional demonstrations are designed to show the viability of a multi-Service/coalition JIFC capability to defend expeditionary forces from air and missile attacks.

Funding increase in FY 2007 is caused by the addition of the NII project and USMC participation in ADSAM demonstration supported by AADI planning effort. Funding increase in FY 2008 results from JIFC demonstration S&T efforts and initiation of EDWC and PCNW projects. Funding decrease in FY 2009 reflects completion of DWC and DSC efforts associated with Over-the-Horizon Missile Defense EC.

FY 2006 Accomplishments:

- Continued AADI ADSAM demonstration planning and coordination efforts.

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- Continued development of DSC algorithms and operational concept for TAMD sensor management.
- Continued testing and demonstration of DWC combat system algorithms developed under PE 0602123N.
- Completed Littoral Affordability effort (classified program).

FY 2007 Plans:

- Continue all efforts of FY 2006, less those noted as completed above.
- Continue AADI planning and coordination for FY 2008 Navy ADSAM live-fire demonstration.

FY 2008 Plans:

- Continue all efforts of FY 2007.
- Complete testing and demonstration of DWC and DSC algorithms.
- Initiate EDWC, NII and PCNW project efforts.
- Initiate JIFC demonstration S&T planning and preparations.

FY 2009 Plans:

- Continue all efforts of FY 2008, less those noted as completed above.
- Complete AADI project and JIFC effort.
- Initiate TOG-approved FNC Missile Defense EC project(s).

	FY 2006	FY 2007	FY 2008	FY 2009
HIGH SPEED CRAFT TECHNOLOGY	7,290	2,961	0	0

X-Craft is envisioned as an S&T platform designed for Littoral Combat Ship (LCS) risk reduction and mission module demonstration. 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.

Decrease of funding from FY 2006 to FY 2008 is due to the completion of the X-Craft.

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FY 2006 Accomplishments:

- Continued efforts to install lifting body and drag reduction systems on alternative high speed platforms.
- Completed sea trials and produced report on technology developments.
- Initiated further development of drag reduction and lifting body technology on additional alternative platforms. Support demonstration and evaluation of lifting body hull forms.

FY 2007 Plans:

- Complete development of drag reduction and lifting body technology and lifting body hull forms.

C. OTHER PROGRAM FUNDING SUMMARY:

RELATED RDT&E:

NAVY RELATED RDT&E:

PE 0204152N (E-2 Squadrons)
PE 0205601N (HARM Improvement)
PE 0206313M (Marine Corps 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 Systems 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 0603609N (Conventional Munitions)
PE 0603640M (USMC Advanced Technology Demonstration (ATD))

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PROGRAM ELEMENT TITLE: FORCE PROTECTION ADVANCED TECHNOLOGY

PROJECT NUMBER: 2912

PROJECT TITLE: FORCE PROTECTION ADVANCED TECHNOLOGY

PE 0604307N (Surface Combatant Combat System Engineering)

PE 0604518N (Combat Information Center Conversion)

PE 0604558N (New Design SSN)

NON NAVY RELATED RDT&E: Not applicable.

D. ACQUISITION STRATEGY:

Not applicable.

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PROGRAM ELEMENT: 0603123N

PROGRAM ELEMENT TITLE: FORCE PROTECTION ADVANCED TECHNOLOGY

PROJECT NUMBER: 3049

PROJECT TITLE: FORCE PROTECTION

Project Number & Title	FY 2006 Actual	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
3049 FORCE PROTECTION	5,600	2,640	2,110	2,238	2,384	2,530	2,577	2,624

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The efforts in this project shifted focus to protection of Naval Installations starting in FY 2006. Other efforts (water-mist and volume sensor work) moved to Project 2912 in FY 2006. Advanced technologies developed, critical to protecting naval installations, will provide seamless full spectrum protection against asymmetric terrorist attack by improving the ability to: sense developing and immediate threats; shape our responses through improved situational awareness and decision making; shield personnel, mission critical facilities, infrastructure, and operating fleet assets; maintain essential functions; and sustain and restore critical services in the aftermath of an incident. Technologies developed will also seek to reduce the required manpower and skill levels devoted to the force protection mission.

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2006	FY 2007	FY 2008	FY 2009
EMERGING THREATS	5,600	2,640	2,110	2,238

This activity includes: Advanced technologies developed, critical to protecting naval installations, will provide seamless full spectrum protection against asymmetric terrorist attack by improving the ability to: sense developing and immediate threats; shape our responses through improved situational awareness and decision making; shield personnel, mission critical facilities, infrastructure, and operating fleet assets; maintain essential functions; and sustain and restore critical services in the aftermath of an incident. Technologies developed will also seek to reduce the required manpower and skill levels devoted to the force protection mission.

Decrease in funding from FY 2006 to FY 2007 is due to Shipboard EO/IR Closed Loop Self Protection efforts transferring into PEs 0602271N and 0603271N.

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PROJECT NUMBER: 3049

PROGRAM ELEMENT TITLE: FORCE PROTECTION ADVANCED TECHNOLOGY

PROJECT TITLE: FORCE PROTECTION

FY 2006 Accomplishments:

- Continued development of lower cost/higher performance Force Protection sensors and automated detection algorithms, and decision support tools.
- Completed Shipboard EO/IR Closed Loop Self Protection efforts.

FY 2007 Plans:

- Continue all efforts of FY 2006, less those noted as completed above.
- Initiate interim demonstration of prototype Force Protection sensors.
- Initiate development of intrusion/incident response countermeasures for Force Protection.

FY 2008 Plans:

- Continue all efforts of FY 2007.
- Initiate full scale demo of swimmer defense system including sensors and response countermeasures.
- Initiate interim demonstration of force protection detection and response system with automated detection and self learning algorithms.

FY 2009 Plans:

- Continue all efforts of FY 2008.

C. OTHER PROGRAM FUNDING SUMMARY:

NAVY 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)

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PROJECT NUMBER: 3049

PROJECT TITLE: FORCE PROTECTION

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.

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PROGRAM ELEMENT TITLE: FORCE PROTECTION ADVANCED TECHNOLOGY

PROJECT TITLE: Congressional Plus-Ups

CONGRESSIONAL PLUS-UPS:

	FY 2006	FY 2007
ACCELERATED DEVELOPMENT OF MOBILE ACOUSTIC COUNTERMEASURE FOR FORCE PROTECTION FNC	0	996

Initiate Mobile Acoustic Countermeasure efforts.

	FY 2006	FY 2007
AFFORDABLE DISTRIBUTED APERTURE IRCM FOR HELICOPTERS AND REGIONAL JETS	0	3,985

Initiate the qualification of intermediate modulus carbon fibers for use in polymer reinforced composite components for applications in JSF and Global Hawk, JUCAV and the F18.

	FY 2006	FY 2007
AGILE PORT AND HIGH SPEED SHIP TECHNOLOGY	4,319	2,391

FY 2006: Continued the work to characterize and define the elements required to support an agile port concept concentrating on the inland port concept and enabling ship technologies including high power waterjets.

FY 2007: Continue efforts to support an agile port concept concentrating on the inland port concept and enabling ship technologies including high power waterjets.

	FY 2006	FY 2007
AT-SEA DECONTAMINATION PLATFORM DEVELOPMENT AND CONCEPTUAL DESIGN	961	0

Continued a feasibility assessment of potential advanced ship decontamination system designs that could be used while at-sea including the predicted decontamination success rates for various Chemical/Biological/Radiological Warfare constituents, anticipated costs for forward fit and backfit onto Navy ships, and development of an optimum system design for Navy ships.

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PROJECT TITLE: Congressional Plus-Ups

	FY 2006	FY 2007
AUTONOMOUS TECHNOLOGIES IN SUPPORT OF SEA POWER 21	1,638	0

Developed innovative approaches in intelligent autonomy and advanced control. These autonomous technologies will be critical in realizing the objectives of the Navy's Sea Power 21 doctrine, requiring advances in dynamic control, obstacle detection and management, group behavior and planning of multiple vehicles, control in rough conditions, and supervisory control.

	FY 2006	FY 2007
AVIATION GROUND ADVANCED TECHNOLOGY	1,246	2,192

FY 2006: Developed an integrated approach to planning and monitoring airside assets through the Aviation Ground Navigation System (AGNAS). Specific efforts included the continued development & testing of a full-scale autonomous aircraft tug as an integrated AGNAS subsystem, as well as development of an AGNAS communication subsystem. If successful, AGNAS will provide an extremely precise depiction of airside personnel and ground support equipment locations, their movements, and a prediction of their future position.

FY 2007: Continue development of an integrated approach to planning and monitoring airside assets through the Aviation Ground Navigation System (AGNAS).

	FY 2006	FY 2007
CENTER FOR APPLIED RESEARCH FOR AUTONOMOUS SYSTEMS	0	1,445

Develop innovative approaches in intelligent autonomy and advanced control. These autonomous technologies will develop advances in dynamic control, obstacle detection and management, group behavior and planning of multiple vehicles, control in rough conditions, and supervisory control.

	FY 2006	FY 2007
COMPLETION OF ADVANCED SHIP SERVICE FUEL CELL POWER PLANT	959	996

FY 2006: Conducted factory testing and additional performance characterization for the 625 kilowatt Molten

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PROJECT TITLE: Congressional Plus-Ups

Carbonate Fuel Cell system at the manufacturer's test site and developed an advanced DC/DC converter that can be used in a fuel cell system.

FY 2007: Complete factory testing and additional performance characterization for the 625 kilowatt Molten Carbonate Fuel Cell system at the manufacturer's test site and continue development of an advanced DC/DC converter that can be used in a fuel cell system.

	FY 2006	FY 2007
COPPER-CERAMIC SOLID OXIDE FUEL CELL TECHNOLOGY	959	0

Developed sulfur tolerant copper-ceramic based solid oxide fuel cell technology that will operate on hydrocarbon logistics fuel without the need for fuel reformation. Conducted operation on Naval logistics fuel and provided a detailed report.

	FY 2006	FY 2007
DAMAGE CONTROL WIRELESS COMMUNICATIONS AND EXPERIMENTATION (DCWC&E)	0	2,192

Initiate efforts for wireless communications and experimentation.

	FY 2006	FY 2007
DETECTING IEDS	0	996

Initiate technology effort to detect IEDs.

	FY 2006	FY 2007
DEVELOPMENT OF HIGH PERFORMANCE SANDWICH PANEL CONSTRUCTION	1,198	1,793

FY 2006 - Continued to advance the design, development, testing and qualification of low cost, lightweight steel sandwich structures for surface ship applications. This effort developed a manufacturing capability for material systems that may be used to reduce the weight and improve ballistic performance pertinent to select applications of CVN-21. FY 2007 - Continue testing and qualification of low cost, lightweight steel sandwich

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structures for surface ship applications.

	FY 2006	FY 2007
ELECTROMAGNETIC RAIL GUN TEST MUNITION	1,053	0

Completed a test site survey and the design, fabrication and delivery of an Instrumented Long Range Test Projectile (ILRTP). The ILRTP consists of the Non-Instrumented Pusher Assembly (NIPA), an instrumented projectile and a sabot. This instrumentation will provide in-bore and short range in-flight data for the hypersonic projectile for Electromagnetic (EM) gun.

	FY 2006	FY 2007
ENABLING MATERIALS FOR MEMS FABRICATION AND PACKAGING	4,310	0

Developed advanced manufacturing processes for packaging the Micro-Electro-Mechanical System (MEMS) Inertial Measurement Unit (IMU) and to assess the feasibility of developing, packaging and manufacturing of MEMS integrated micro-sensor/actuator systems.

	FY 2006	FY 2007
FORCE PROTECTION DIGITAL DIRECTION FINDER	2,011	0

Continued to develop and demonstrate all digital interferometric signal detection and direction finder system.

	FY 2006	FY 2007
FOURTH GENERATION NAVAL PROPULSION PERMANENT MAGNET MOTOR	1,441	0

Developed technical solutions to the thermal management and insulation issues associated with current power dense permanent magnet motor. Solutions to these technical issues could enable the preliminary design of more torque dense, lighter weight motors for advanced submarine and surface ship electric drive systems.

	FY 2006	FY 2007
FUEL CELL FAST-START BATTERY FOR SHIP PROPULSION	0	3,288

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Develop lithium ion battery technology for use with shipboard fuel cell systems.

	FY 2006	FY 2007
HIGH POWER DENSITY MOTOR DRIVE	0	1,345

Initiate efforts for a high power density motor drive.

	FY 2006	FY 2007
HIGH SPEED POWER NODE SWITCHING CENTER	0	2,391

Initiate high speed power node switching center efforts.

	FY 2006	FY 2007
HIGH TEMPERATURE SUPERCONDUCTING (HTS) GENERATOR	3,993	2,241

FY 2006 - Initiated efforts to develop a conceptual design for a 5 Megawatt High Temperature Superconducting (HTS) Generator and to perform risk assessments and develop mitigation plans for seven key components for 36.5 Megawatt Class HTS Generator technology. Each of these major efforts are broken down into specific tasks to accomplish the major efforts including conceptual designs and tradeoff studies, system transient studies, thermal design analysis, system integration considerations, component assessment and design risk factors, and potential risk mitigation actions.

FY 2007 - Continue conceptual design of 5 Megawatt High Temperature Superconducting (HTS) Generator, risk assessments, and mitigation plans for seven key components for 36.5 Megawatt Class HTS Generator technology.

	FY 2006	FY 2007
HTS AC SYNCHRONOUS NAVY PROPULSION MOTOR	3,360	2,989

The superconducting synchronous main propulsion motor is under construction by American Superconductor at the Philadelphia Naval Business District, Building 60. IEEE testing of the motor is expected to be completed in 2nd Quarter FY07 and delivered in 4th Quarter FY07 to NSWCPHIL for full power testing.

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	FY 2006	FY 2007
INTEGRATED ADVANCED COMMUNICATIONS TERMINAL	958	0

Continued efforts to develop the design and interface methodology to enable advanced integration of a variety of communications terminal architectures. This alleviates the necessity for duplicative common communication terminal components.

	FY 2006	FY 2007
LARGE UNMANNED UNDERSEA VEHICLE (LUUV) TEST BED	4,023	1,295

Continue design modifications to the existing Large Unmanned Undersea Vehicle (UUV) Test Bed that will facilitate advanced UUV systems and scaled advanced submarine propulsion systems demonstrations. Construction of the LUUV is expected to be complete in FY07.

	FY 2006	FY 2007
LIFE CYCLE PROGRAM SUPPORT FOR UNMANNED SYSTEMS	3,256	0

Initiated development of a life cycle supportable program with infrastructure to establish a centralized configuration, training and logistics support center for unmanned ground vehicles. Facilitated the formulation of an interim sustainment mechanism to insure the readiness of deployed unmanned system technologies until formal acquisition of successful technologies can be accomplished to meet user identified operational needs.

	FY 2006	FY 2007
LIGHT STRIKE MEDICAL EVACUATION VEHICLE PILOT	1,628	0

Developed and demonstrated variable load suspension system with semi-active damping technology for potential application to future military wheeled vehicles.

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PROJECT TITLE: Congressional Plus-Ups

	FY 2006	FY 2007
LIGHTWEIGHT, RUGGEDIZED RECONNAISSANCE ROBOT	0	996

Initiate efforts to produce a lightweight rugged reconnaissance robot.

	FY 2006	FY 2007
LOW SPEED AIRSPEED SYSTEM	3,351	0

Initiated development of technology to be used in the Land Safe Aircraft Survivability System (LSASS). This system will provide an interim brown-out solution for the Marine helicopters operating in austere landing zones. This effort will also produce an airworthiness certified prototype demonstrator system to be installed in a CH-53E helicopter for flight test.

	FY 2006	FY 2007
M-65 BISMALIMIDE CARBON FIBER PREPREG RESIN SYSTEM QUALIFICATION FOR USE WITH AUTOMATED PLACEMENT MACHINES	2,596	0

Initiated qualification of the M-65 Bismaleimide Carbon Fiber Prepreg (BMI/CFP) resin system for automated carbon fiber placement machines associated with Navy aircraft procurement programs. Provided initial population of the manufacturing process, resin properties and composite coupon mechanical properties databases which are part of the qualification program.

	FY 2006	FY 2007
MISSILE WARNING SENSOR	2,874	2,789

FY 2006 - Developed a prototype two-color IR missile warning sensors that incorporate miniature pointing devices to direct laser jammer energy at the threat seeker. The laser energy will be transmitted to the sensor via an IR transmitting fiber.

FY 2007 - Continue efforts to develop a two-color IR missile warning sensor.

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	FY 2006	FY 2007
MOBILE MANUFACTURING AND REPAIR CELL	3,355	3,238

FY 2006: Developed a manufacturing and repair unit that is capable of fabricating replacement parts on-demand and repairing broken parts as needed. Such a manufacturing unit could be deployed in the field or at a remote location. Both friction stir processing for repair and direct deposition of metal processes will be applied in the development of the cell.

FY 2007: In phase two, the fabrication of new and replacement parts and components will be demonstrated. In addition, the direct metal deposition and friction stir processing technologies will be integrated into a manufacturing system, whose ability for field deployment will be evaluated and assessed.

	FY 2006	FY 2007
MULTI-FUEL PORTABLE FUEL CELL POWER PROJECT	960	0

Initiated development and demonstration of an integrated reformer configuration to generate 2 kilowatts electrical equivalent reformat from ethylene glycol-based antifreeze. The initial feasibility testing and modeling of this new integrated reactor system will be used to develop a final design that will meet anticipated field and performance needs. Additionally, an initial assessment of the new system's manufacturability, robustness and safety impact will be conducted.

	FY 2006	FY 2007
MULTIPOLAR MOTOR	963	1,096

FY 2006: Validated the feasibility studies and very small scale prototypes for an innovative permanent magnet multipolar motor, and developed a detail design for a 1,000 to 5,000 horsepower prototype motor.

FY 2007: Continue very small scale prototypes for an innovative permanent magnet multipolar motor, and develop a detail design for a 1,000 to 5,000 horsepower prototype motor.

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	FY 2006	FY 2007
NCDR - LIGHTWEIGHT, RUGGEDIZED RECONNAISSANCE ROBOT	1,244	0

Continued to develop, in conjunction with the National Center for Defense Robotics (NCDR), technology collaborative, technology enhancements for a lightweight, ruggedized reconnaissance robot ground vehicle for the Marine Corps. These enhancements include increased range, an extended life power source, lower speed operations and a zoom camera payload.

	FY 2006	FY 2007
PHASE II VIRENT-NASEA ANTIFREEZE HYDROGEN PROJECT	0	996

Develop fuel cell systems and reforming technologies focused on using waste ethylene glycol and other novel fuels that are part of the existing logistics chain.

	FY 2006	FY 2007
PLANAR SOLID OXIDE FUEL CELL CLUSTER DEMONSTRATION	4,888	0

Initiated the design, construction, installation, and demonstration of a 100 kilowatt planar Solid Oxide Fuel Cell cluster. The cluster will consist of four discrete and clustered 25 kilowatt fuel cell modules that will initially run on natural gas and then on DoD logistics fuel.

	FY 2006	FY 2007
POROUS SILICON-BASED DIRECT METHANOL FUEL CELL	1,681	1,345

FY 2006 - Developed and demonstrated an air-independent porous silicon fuel cell with the BA-5590 form factor.

FY 2007 - Continue demonstration of an air-independent porous silicon fuel cell.

	FY 2006	FY 2007
PROJECT M	958	0

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Developed look-ahead detection technology for observing the approaching ocean surface and enable shock-compensation technology to mitigate shock impact.

	FY 2006	FY 2007
PURE HYDROGEN SUPPLY FROM LOGISTIC FUEL	2,394	1,195

FY 2006 - Initiated development of an innovative palladium-copper alloy membrane for use in the extraction of ultra-high purity hydrogen from sulfur laden Navy logistics fuels. The sulfur contaminant in these fuels is detrimental to the effective and efficient operation of fuel cells. This effort was focused on the design, construction and demonstration of a large-scale, innovative hydrogen membrane separator system that is sulfur tolerant to concentrations greater than 100 parts per million.

FY 2007 - Continue development of pure hydrogen supply extraction system.

	FY 2006	FY 2007
REDUCED SHIP CREW BY VIRTUAL PRESENCE	961	0

Initiated investigation of emerging sensors and develop wireless sensor network technologies for advancing shipboard automation architectures. This effort focused on the use of COTS sensors and sensor communications through low power, emerging networking protocols to provide distributed, multi-functional monitoring of shipboard environmental and machinery systems.

	FY 2006	FY 2007
REMOTE CONTINUOUS ENERGETIC MATERIAL MANUFACTURING FOR PYROTECHNIC IR DECOYS	1,254	1,096

FY 2006 - Initiated development of improved processing technologies for remote energetic material used in pyrotechnic systems.

FY 2007 - Continue to develop improved processing technologies for remote energetic material used in pyrotechnic systems.

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	FY 2006	FY 2007
SEA FIGHTER	0	14,943

Develop a ship alteration package to improve SEA FIGHTER capabilities. These modifications will include necessary improvements to aviation equipment, damage control, crew facilities, communications and topside survivability improvements.

	FY 2006	FY 2007
SECURE INFRASTRUCTURE TECHNOLOGY LABORATORY (SINTEL)	0	6,376

Initiate efforts for a secure infrastructure technology laboratory (SINTEL).

	FY 2006	FY 2007
SHIP SERVICE FUEL CELL	2,914	0

Initiated efforts to transfer the 625 kilowatt Molten Carbonate Fuel Cell system from the manufacturer's test site to the Navy's Land Based Engineering Site (LBES) to conduct follow-on performance characterization testing including endurance and latent defect testing for at least 1,000 hours. The goal is to demonstrate the compatibility of the fuel cell system with the Navy's Integrated Power System (IPS) power architecture. Operational test data obtained will be used to develop and validate advanced shipboard fuel cell ship service power plant designs.

	FY 2006	FY 2007
SMART MICRO-SENSOR ARRAYS	0	996

Initiate efforts for smart micro-sensor arrays.

	FY 2006	FY 2007
SOLID OXIDE FUEL CELLS (SOFCs)	0	996

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Initiate solid oxide fuel cells efforts.

	FY 2006	FY 2007
SOLID STATE DC PROTECTION SYSTEM	0	996

Initiate efforts for a solid state DC protection system.

	FY 2006	FY 2007
STABILIZED LASER DESIGNATION CAPABILITY	0	996

Initiate stabilized laser designation capability efforts.

	FY 2006	FY 2007
STRATEGIC MOBILITY 21 DEPLOYMENT TECHNOLOGY	2,489	2,789

FY 2006 - Continued projects that deal with the application of transportation technologies for Joint Force deployment and sustainment support through the development of a prototype Agile Port System (APS) that can be duplicated, adapted and integrated on a national basis and deployed intra-theater to include future Sea Basing operational requirements.

FY 2007 - Continue mobility projects for Joint Force deployment and sustainment through APS efforts.

	FY 2006	FY 2007
SUPERCONDUCTING DC HOMOPOLAR MOTOR FOR ELECTRIC DRIVE SHIPS	1,150	2,590

FY 2006 - Constructed the Superconducting synchronous main propulsion motor by American Superconductor and is expected to be delivered in FY 2007 to Naval Surface Warfare Center, Philadelphia for full power testing.

FY 2007 - Continue superconducting DC homopolar main propulsion motor efforts. The superconducting DC homopolar main propulsion motor is currently in the detailed design phase by General Atomics and is expected to be delivered to the Navy in FY11.

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	FY 2006	FY 2007
TRANSPARENT ARMOR	0	498

Establish a research and development program to explore new materials and strategies for fabrication of transparent materials with the mechanical properties needed for providing armor protection.

	FY 2006	FY 2007
UNIVERSAL SOLID STATE BREAKER	961	0

Developed a universal solid-state circuit breaker (USSB) for medium voltage Navy power distribution systems. This effort will specifically focus on developing programmable thresholds for electrical fault trip points with increased interruption speed within a hybrid USSB that is designed to operate in Navy medium voltage applications.

	FY 2006	FY 2007
UNMANNED FORCE AUGMENTATION SYSTEM	2,892	0

Continued development and flight testing of advanced concept hardware and software to deploy autonomous fixed wing unmanned aerial systems for surface, littoral, force protection, and land attack combat operations. An important increase in capability for the Navy over similar systems currently in the fleet is the capability for the system to autonomously and precisely perform ship auto-landings with little-to-no operator input required during execution.

	FY 2006	FY 2007
UNMANNED SYSTEMS TECHNOLOGIES FOR EXPLOSIVE ORDNANCE DISPOSAL	1,254	996

FY 2006 - Continued development of S&T tools and capabilities necessary for the military and law enforcement Explosive Ordnance Disposal (EOD) technicians to meet the various EOD, Improvised Explosive Device (IED), and Unexploded Ordnance (UXO) challenges and reduce the risk to the personnel by developing unmanned ground systems technologies to perform these dangerous and critical missions.

FY 2007 - Continue developing unmanned ground system technologies for explosive ordnance disposal.

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	FY 2006	FY 2007
WAVE POWER ELECTRIC POWER GENERATING SYSTEM FOR HAWAII NAVAL BASE	1,447	996

FY 2006 - Continued development of the Wave Energy Conversion (WEC) ocean test system and analysis of collected data.

FY 2007 - Initiate analysis of performance data for the three direct drive power conversion methods (hydraulic, rack and pinion, and permanent magnet systems).

	FY 2006	FY 2007
WIDE-AREA SENSOR FOR FORCE PROTECTION TARGETING	0	2,590

Initiate wide-area sensor for force protection targeting efforts.

	FY 2006	FY 2007
WIDE-BAND GAP SEMICONDUCTOR MATERIALS RESEARCH	5,389	5,180

FY 2006 - Continued development of semiconductor materials capable of higher power levels and greater temperature ranges than currently employed silicon-based materials.

FY 2007 - Continue wide-band gap semiconductor materials research.

	FY 2006	FY 2007
WIRELESS CONDITION-BASED MAINTENANCE MONITORING FOR NAVAL SHIPYARD EQUIPMENT AND FACILITIES	3,079	1,644

FY 2006 - Initiated efforts to improve the operational time and to reduce the maintenance costs of critical shipyard equipment, focusing on such equipment as mobile and overhead cranes, drydock pumps, compressors and other equipment that paces ship production and repair.

FY 2007 - Continue wireless condition-based maintenance monitoring of naval shipyard equipment and facilities

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for efforts to reduce maintenance costs and operational time.

	FY 2006	FY 2007
WIRELESS SENSOR SYSTEM	1,343	0

Initiated development of wireless sensor technologies to support a number of intelligent component health monitoring of shipboard equipment and machinery. This effort would provide the navy with a Wireless Sensor System (WSS) to reduce workloads for newly delivered ships.

	FY 2006	FY 2007
X - CRAFT	10,055	0

Completed installation of various "fleet ready" upgrades of X-CRAFT to allow use of vessel in fleet exercises in support of LCS risk reduction. Upgrades included damage control systems, C4I and shock-mitigating seats. Operated vessel in support of LCS risk reduction.

	FY 2006	FY 2007
ZEUS LIGHT STRIKE VEHICLE HYBRID ELECTRIC PILOT	958	0

Initiated efforts to develop and demonstrate a system of propulsion & accessory technologies to quantify realistic fuel efficiency gains for military vehicles for the ZEUS Light Strike Vehicle Hybrid Electric Pilot.