FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-2

BUDGET ACTIVITY: 3 PROGRAM ELEMENT: 0603114N
PROGRAM ELEMENT TITLE: Power Projection Advanced Technology

COST: (Dollars in Thousands)

PROJECT NUMBER/ TITLE	FY 2002 ACTUAL	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	FY 2006 ESTIMATE	FY 2007 ESTIMATE	FY 2008 ESTIMATE	FY 2009 ESTIMATE
R2487 Aircraft Affordability Project DP-2	5,380	4,890						
R2721 Vectored Thrust Ducted Propeller (VDTP)	3,273	3,423						
R2821 Integrated Hypersonic Aeromechanics Tool Program (IHAT)	2,613	3,657						
R2823 Precision Strike Navigator	1,738	977						
R2911 Power Projection Advanced Technology	79,235	76,521	177,006	190,411	104,445	67,529	48,809	49,691
R3006 Affordable Weapons	6,724	5,867						
R9008 HEL-Low Aspect Target Tracking	8,070	4,451						
R9009 Aircraft Lightening Protection Applique System	1,442							
R9010 Variable Deliverable Pump/Variable Engine Nozzle	1,442	1,467						
R9011 Thermobaric Warhead Development	2,017							
R9012 Magdalena Ridge Observatory	8,146	20,536						
R9013 Littoral Support Craft (LSC (X))	0	8,935						
R9133 Advanced Camouflage Coating Demonstration	0	7,066						
R9134 High Speed Anti-Radiation Missile Demonstration – Digital CAS	0	7,481						
R9135 High Speed Anti-Radiation Missile Demonstration – AARGM	0	6,161						
R9136 HYSWAC Lifting Body Development	0	5,886						
R9137 Littoral Support Craft (LSC (X)) – Lifting Body	0	9,873						

FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-2

BUDGET ACTIVITY: 3 PROGRAM ELEMENT: 0603114N
PROGRAM ELEMENT TITLE: Power Projection Advanced Technology

Total	120,080	167,191	177,006	190,411	104,445	67,529	48,809	49,691

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:
This program includes RDT&E,N funds to develop and demonstrate advanced technologies for naval weapon systems, including Directed Energy, and Electric Warship related efforts which provide enhanced lethality and enable new capabilities for locating, identifying and killing high-value, short-dwell military ground and undersea targets, and suppression of enemy defenses. These technologies will include those that minimize exposure of naval personnel to lethal fire (autonomous vehicles), and reduce the total ownership cost of systems. This Program Element includes elements of the following Future Naval Capabilities (FNCs): Time Critical Strike (TCS), Autonomous Operations (AO), and Total Ownership Cost (TOC). Within the Naval Transformation Roadmap, this investment will achieve one of four key transformational capabilities required by Sea Strike as well as technically enable elements of both Sea Shield and Force Net.

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

B. PROGRAM CHANGE SUMMARY:
PROGRAM CHANGE SUMMARY EXPLANATION:

	FY 2002	FY 2003	FY 2004	FY 2005
FY 2003 President's Budget Submission:	117,756	78,247	69,511	53,166
Adjustments from FY 2003 President’s Budget:				
Congressional Plus-Ups		92,715		
SBIR Reductions	-2,388			
Execution Adjustments	+5,284			
Cong. Rescissions/Adjustment/Undist. Reductions	-572	-1,956		
S&T Program Adjustments			+111,792	+141,490
NWCF Rate Adjustments			-75	-34
Efficiencies at NWCF Activities			-136	-105
Pay Raise/Inflation Adjustments		-1,815	-4,086	-4,106
FY 2004/2005 President’s Budget Submission:	120,080	167,191	177,006	190,411

Schedule: Not applicable
Technical: Not Applicable

FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-2a

BUDGET ACTIVITY: 3 PROGRAM ELEMENT: 0603114N Project Number: R2911
PROGRAM ELEMENT TITLE: Power Projection Advanced Technology Project Title: Power Projection Advanced Technology

COST: (Dollars in Thousands)

PROJECT NUMBER/ TITLE	FY 2002 ACTUAL	FY2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	FY 2006 ESTIMATE	FY 2007 ESTIMATE	FY 2008 ESTIMATE	FY 2009 ESTIMATE
R2911 Power Projection Advanced Technology	79,235	76,521	177,006	190,411	104,445	67,529	48,809	49,691

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:
This program includes RDT&E,N funds to develop and demonstrate advanced technologies for naval weapon systems, including Naval Unmanned Combat Air Vehicle (UCAV-N), Directed Energy, and Electric Warship related efforts which provide enhanced lethality and enable new capabilities for locating, identifying and killing high-value, short-dwell military ground and undersea targets, and suppression of enemy defenses. These technologies will include those that minimize exposure of naval personnel to lethal fire (autonomous vehicles) and reduce the total ownership cost of systems. This Project includes elements of the following Future Naval Capabilities (FNCs): Time Critical Strike (TCS), Autonomous Operations (AO), and Total Ownership Cost (TOC).

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 02	FY 03	FY 04	FY 05
TIME CRITICAL STRIKE***	45,193	34,191	67,944	76,586

In support of this overall mission the following specific areas are included:
The specific mission of Time Critical Strike (TCS) integrates surveillance, indications and warnings, target identification, targeting, fire order generation and dissemination, engagement and kill mechanisms, and damage assessment processes to address critical mobile targets, urban targets, short dwell targets and deeply buried targets. Time Critical Strike must address time sensitive targets in complex urban areas over crowded skies shared by civilian commercial and neutral country aircraft. High quality, timely sensor information, target identification, and course of action analysis is required to enable distributed collaborative planning and the generation of retargeting folders for strike platforms.

All TCS technologies reduce the time to conduct strike in all functional areas of the kill chain: detect, decide, engage, and battle damage assessment. Intelligence processing, execution speed, command decisions, and accuracy of

strike are in constant tension. Technologies in this functional area also include those associated with Littoral Support Craft (Experimental) and directed energy.

FY 2002 Accomplishments:

This activity is associated with the Future Naval Capability (FNC) of Time Critical Strike (TCS) as well as other Exploitation and Deployment efforts. The TCS FNC is focused on delivering capability enhancements across detect, decide, engage and assess sub-systems to acquisition programs for transition to Fleet systems. The TCS FNC accomplished:

- Real Time Execution Decision Support System (REDS): Initiated system level and detailed design of software methods for collaborative planning, options generation, and mission target folder generation.
- Low Cost Active Terminal Seeker development for Cruise Missile Real Time Retargeting (CMRTR). Risk reduction test included flight testing of V.2 sensor. Development of V.3 sensor included signal and image processing and weapon interface in accordance tactical TOMAHAWK performance requirements.
- Gathered target data sets and conducted image and video analysis (IVA) algorithm survey and develop methods for target exploitation in image and video streams.
- Developed chemical and mechanical processes for low cost Fiber Optic Gyroscope inertial measurement unit fabrication as part of Precision Strike Navigator (PSN).
- Conducted integrated studies of an advanced dual mode anti-radiation missile seeker incorporating novel seeker, aperture, guidance and control technologies for a ramjet-powered missile airframe. This program will lead to a flight test demonstration of seeker Anti-Radiation Missiles effectiveness at high-speed (HSARM).
- Hyper-spectral Imaging System (HSI): Initiated development of rugged, high through-put near and far Infra-Red Spectrometers, optical train analysis, select position/pointing system reference, and enhanced detect algorithms for real time processor
- Surveyed candidate designs and began scale tests to develop a targetable submunition warhead variant for Tomahawk while preserving unitary performance Mission Responsive Ordnance (MRO).

The Exploitation and Deployment efforts for the Time Critical Strike activity include advanced rocket motor technology for high-speed strike weapons, advanced weapons seeker and guidance programs, hypersonic dual-combustor laboratory testing for high-speed air-breathing strike weapon, and tactical targeting processors which will be demonstrated to quantify specific risks remaining to achieve accurate and lethal strike

missions. Focused efforts on evaluation/assessment of high-speed vessel for long range, stable, affordable weapon support of expeditionary operations were conducted.

FY 2003 Plans:

This effort continues with significant efforts associated with the Future Naval Capability (FNC) of Time Critical Strike (TCS) as well as other Exploitation and Deployment efforts. The TCS FNC efforts are:

- Initiate design concepts and scaled material testing for advanced gun projectile propulsion technology and associated Advanced Gun-Barrel Technology (AGT).
- Mission Responsive Ordnance (MRO) technology will develop targetable submunition warhead variant for Tomahawk while preserving unitary performance, focusing on kill vehicle definition and operation and support structure.
- Real Time Execution Decision Support System (REDS): Detailed design and code software for collaborative planning, options generation, and mission target folder generation.
- Complete test and evaluation of V.2 sensor, continue development of V.3 sensor, spec V.4 low cost terminal seeker for Cruise Missile Real Time Retargeting (CMRTR).
- Conduct image video analysis (IVA) algorithm survey and develop algorithms for target exploitation in image and video streams on data sets collected.
- Within the Precision Strike Navigator (PSN) effort, continue development of chemical and mechanical processes, accuracy and stability testing for low cost Fiber Optic Gyroscope inertial measurement unit.
- High-Speed Anti-Radiation Missiles (HSARM) effort: Continue integrated studies and initiate development of an advanced dual mode anti-radiation missile seeker incorporating novel seeker, aperture, guidance and control technologies for a ramjet-powered missile airframe.
- Hyper-spectral Imaging System (HSI): Develop and complete rugged, high through-put near and far Infra-Red Spectrometers, optical train analysis, select position/pointing system reference, and enhance detect algorithms for real time processor.

The Exploitation and Deployment efforts for the Time Critical Strike functional area include:

- For the HyFly effort, begin fabrication of prototype components (Formed intlet cowl, inlet housing, Gas generator housing, and combustor nozzle).

FY 2004 Plans:

This effort continues with significant efforts associated with the Future Naval Capability (FNC) of Time Critical Strike (TCS) as well as other Exploitation and Deployment efforts. The TCS FNC efforts are:

- Continue development and scaled testing of advanced gun projectile propulsion technology (AGT) and associated advanced Gun-Barrel Technology.
- Continue efforts on Mission Responsive Ordnance (MRO) technology to develop targetable submunition warhead variant for Tomahawk while preserving unitary performance, developing kill vehicle form, lethality, guidance and control, and design of the unitary support structure.
- Real Time Execution Decision Support System (REDS): Complete software implementation and system and unit level test for collaborative planning, options generation, and mission target folder generation.
- Continue development of V.3 and V.4 sensors for low cost terminal seeker for Cruise Missile Real Time Retargeting (CMRTR), testing subcomponents of V.3 sensor.
- Continue image video analysis (IVA) algorithm development and implementation for target exploitation in image and video streams. Begin automatic target recognition development, optimized for algorithms and the data sets chosen.
- Within the Precision Strike Navigator (PSN) effort, continue development of chemical and mechanical processes for low cost precision Fiber Optic Gyroscope inertial measurement unit, with low accuracy unit ready for evaluation.
- HSARM: Continue development and subsystem test of an advanced dual mode anti-radiation missile seeker incorporating novel seeker, aperture, guidance and control technologies for a ramjet-powered missile airframe.
- Hyper-spectral Imaging System (HSI): Integrate visible sub-system with near and far Infra-Red Spectrometers, optical train, select position/pointing system reference, and enhance detect algorithms for real time processor for functional flight testing and evaluation.

The Exploitation and Deployment efforts for the Time Critical Strike functional area include:

- Advanced Gun Systems for fire support will be investigated.
- In addition, lifting body technology associated with the Littoral Support Craft (Experimental) will be pursued in conjunction with Congressional Plus-up Project Number R9137 in this Program Element.
- For the HyFly effort, complete fabrication of prototype components (Formed inlet cowl, inlet housing, Gas generator housing, and combustor nozzle). Conduct sled test of booster test vehicle. Conduct flight

tests of separation test vehicle (STV), and Booster performance and submunition dispense. Complete wind tunnel tests of freejet engine. Complete assembly of first HyFly flight test vehicle and associated live energetic systems. Deliver test vehicle to test site. Complete assembly of vehicle engine and integrate with fuel tank.

- For the SSCM effort begin basic design efforts and trade studies for the Standoff High-speed Option for Counter proliferation (SHOC) task. Complete a closed design that can be carried forward into a successful flight demonstration. Complete system requirements definition. The SSCM Supersonic Turbine Demonstration (STD) task will begin studies to identify potential concepts that address performance of the first demonstration vehicle, and depict the evolution into weaponized configurations. Initiate engine preliminary design of the STD under cooperative effort with the NASA Revolutionary Turbine Accelerator project utilizing NASA Revolutionary Aero-Space Engine Research (RASER) program. Generate performance specifications. Complete preliminary flight demo vehicle design.

FY 2005 Plans:
This effort continues with significant efforts associated with the Future Naval Capability (FNC) of Time Critical Strike (TCS) as well as other Exploitation and Deployment efforts. The TCS FNC efforts are:

- Continue development and scaled testing of advanced gun projectile propulsion technology (AGT) and associated advanced Gun-Barrel Technology. Begin large scale gun prototyping with materials selected.
- Continue efforts on Mission Responsive Ordnance (MRO) technology to develop targetable submunition warhead variant for Tomahawk while preserving unitary performance, developing and rail testing scaled and full sized, semi functional kill vehicles to determine lethality, fusing, guidance and control mechanisms, and unitary support structure.
- Full system test of V.3 sensor, continue development of V.4 sensor for low cost terminal seeker for Cruise Missile Real Time Retargeting (CMRTR), integrating V.2, V.3 sensors with V.4 and performing V.4 subsystem tests.
- Complete image video analysis (IVA) algorithms and implementation for target exploitation in image and video streams on target system. Incorporate automatic target recognition software, optimized for algorithms and the data sets chosen on target system.
- Complete development of the Precision Strike Navigator (PSN) chemical and mechanical processes for low cost precision Fiber Optic Gyroscope inertial measurement unit, with high accuracy unit ready for evaluation.

- HSARM: Complete development, subsystem, and system level flight test demonstration of an advanced dual mode anti-radiation missile seeker incorporating novel seeker, aperture, guidance and control technologies for a ramjet-powered missile airframe. Complete HSARM system level effectiveness testing.

The Exploitation and Deployment efforts for the Time Critical Strike functional area include:

- Complete assembly and deliver 2nd and 3rd HyFly flight test vehicles to test site. Conduct free flight tests of all three flight test vehicles and submit a report for each flight test.
- For the SSCM SHOC effort begin propulsion and payload subsystem development and testing. Missile subsystem development and test will begin, to include propulsion, airframe, ordnance, and guidance & control subsystems. For the STD effort initiate inlet/engine/nozzle integration and testing. Begin engine ground testing. Begin installation of the first flight engine. Continue fabrication of flight vehicles.

	FY 02	FY 03	FY 04	FY 05
Naval-Unmanned Combat Air Vehicle(UCAV-N)	9,080	25,000	95,105	99,797

In partnership with the Defense Advanced Research Projects Agency (DARPA), Naval Unmanned combat air vehicles (UCAV-N) will be investigated to effectively and affordably prosecute strike and surveillance missions. The UCAV-N approach must be responsive in that it can reduce the strike timeline against time critical targets. An aggressive UCAV-N goal has been set to demonstrate the technical feasibility for a UCAV system to effectively and affordably prosecute persistent, sea-based Surveillance, Suppression of Enemy Air Defenses, and Strike missions within the FORCENET architecture. Multi-year funding in this project will provide for two robust flight demonstrations to encourage innovation, fully explore the potential, and develop options for reduced risk transition to acquisition. Collaboration with United States Air Force (USAF) UCAV development to investigate and demonstrate joint UCAV system potential is an integral part of the demonstration.

The technical challenges of UCAV-N include: (1) Suitability of an advanced low observable air vehicle for carrier based launch and recovery, (2) integrated man/unmanned air and deck operations, and (3) Associated mission control system (MCS) carrier integration. Two full flight demonstrations are planned to include simulation and surrogate buildups, carrier air operations, catapult launch and arrested landing, and deck operations.

FY 2002 Accomplishments:

- Completed initial operational system concept development trade studies, effectiveness analysis, System Maturation Plans and Preliminary Demonstration System Designs.

FY 2003 Plans:

- Conduct simulated carrier air traffic area and mission operations, perform subsystem demonstrations, and prepare for surrogate and demonstrator aircraft flight test. Explore joint Air Force/Navy UCAV system potential. Update operational system concept based on results.

FY 2004 Plans:

- Continue subsystem and deck operations demonstrations, continue air vehicle, surrogate, and Mission Control System (MCS) software development (H/W and S/W Critical Design Review (CDR) is planned), fabricate two flight demonstration systems, develop surveillance mission simulations.

FY-2005 Plans:

- Continue fabrication and checkout of two flight demonstration systems, continue air vehicle, surrogate, and MCS software development, conduct surveillance mission simulations and surrogate flight test, continue software and MCS development, prepare for shore-based catapult and arrested flight demonstrations

.

	FY 02	FY 03	FY 04	FY 05
Autonomous Operations (AO)	17,242	17,330	13,957	14,028

Autonomous Operations: The autonomous operations activity aims to enhance the mission capability and operational utility of Naval forces by developing technologies that will dramatically increase the autonomy, performance, and affordability of Naval organic unmanned vehicle systems. By defining and focusing risk reduction overarching Intelligent Autonomy Science and Technology principles, transitional products will be developed in four areas: Unmanned Ground Vehicles (UGV) which focuses on the increasing utility of UGV systems to Marine Corps units in all environments but specifically in urban and littoral terrain; Unmanned Air Vehicles (UAV) which includes intelligent reasoning for autonomy, technologies to enhance "see and avoid" capabilities, object identification, vehicle awareness, and vehicle and mission management; Unmanned Undersea Vehicles (UUV) which will demonstrate the technical feasibility for a UUV system to effectively search,

detect, track and trail undersea threats while maintaining a robust communications link to enable appropriate command, control and transmission of collected data; and UAV Propulsion which will develop innovative propulsion and power technologies unique to Naval UAVs operating from surface combatants. This activity is related to on-going efforts such as the Integrated High Performance Turbine Engine Technology and planned for the Versatile Affordable Advanced Turbine Engine (VAATE) efforts after FY-05.

FY 2002 Accomplishments:

This activity is associated with the Future Naval Capability (FNC) of Autonomous Operations as well as other efforts. Autonomous Operations FNC efforts include:

- UAV Technology: For Situational Awareness, developed sub-system self-awareness sensor software to enable adaptation and independent action for detection (threats & terrain), display, and decision.
- Intelligent Autonomy: Developed alternative designs and risk reduction assessments for intelligent vehicle self-management and fault tolerance targeting concepts.
- UAV Propulsion: Continued development of an advanced propulsion system for reliable UAV systems with enhanced operational capabilities and affordable readiness. Development will be in conjunction with the joint Government and Industry Integrated High Performance Turbine Engine Technology (IHPTET) Phase III Joint Expendable Turbine Engine Concepts (JETEC) and the Joint Technology Demonstrator Engine (JTDE) class development efforts.
- UGV: Initiated design and development of mobility Unmanned Ground Vehicle (UGV) testbed for platform, sensor, and command & control sub-systems.
- UUV: Developed and demonstrated undersea, autonomous operations for Undersea Search and Survey, and Communications/Navigation Aid utilizing a network of multiple, mobile nodes. Also, developed and demonstrated undersea, autonomous operations for Maritime Reconnaissance utilizing a submarine launch-capable vehicle.

The Exploitation and Deployment efforts for the Autonomous Vehicles effort completes the fabrication and demonstration of an advanced linear motor system intended for affordable recovery of air vehicles. It demonstrated single-sided portion of linear motor recovery with a simulated aircraft recovery loading.

FY 2003 Plans:

This effort continues with significant efforts associated with the Future Naval Capability (FNC) of Autonomous Operations. The Autonomous Operations FNC includes:

- UAV Technology: For Situational Awareness, continue development of self-awareness sensor software to enable adaptation and independent action for detection (threats, terrain), display, and decision development of sub-system self-awareness sensors to enable adaptation and independent action for detection (threats & terrain), display, and decision. For Communications and Networks, develop multi-modal interface for humans to control autonomous vehicles using combination of control inputs, including speech, and touch screens. Using mixed-initiative model of autonomous control, develop the ability for a single human to control multiple vehicles.
- Intelligent Autonomy: Continue development design definition and risk reduction for intelligent vehicle self-management and fault tolerance targeting concepts. Development of architecture for combining reactive and deliberative behaviors for autonomous vehicles. Development of architecture for dynamic autonomy, allowing autonomous system to adjust level of autonomy based on environment, vehicle state and Rules of Engagement (ROE). Design a planning system that allows for autonomous vehicle to re-plan in real time based on current environmental and conditions and vehicle state.
- UAV Propulsion: Continue development of naval-unique propulsion and power technologies for future UAV systems and integrate these technologies into an enhanced next-generation commercial core for test. Development will be in conjunction with the IHPTET Phase III JETEC and JTDE project efforts.
- UGV: Continue design and development of mobility UGV test bed for platform, sensor, and command & control sub-systems
- UUV: Continue development and demonstration of undersea, autonomous operations for Maritime Reconnaissance utilizing a submarine launched capable vehicle. Continue development and demonstration of undersea, autonomous operations for Undersea Search and Survey, and Communications/Navigation Aid utilizing a network of multiple, mobile nodes.

FY 2004 Plans:

- UAV Technology: For Situational Awareness, develop and perform simulation testing of self-awareness sensor software to enable adaptation and independent action for detection (threats, terrain), display, and decision development of sub-system self-awareness sensors to enable adaptation and independent action for detection (threats & terrain), display, and decision. For Communications & Networks, continue the

development of multi-modal interface for humans to control autonomous vehicles using combination of control inputs, including speech, and touch screens.

- Intelligent Autonomy: Using mixed-initiative model of autonomous control, continue the development of the ability for a single human to control multiple vehicles. Continue the design of a planning system that allows for autonomous vehicle to re-plan in real time based on current environmental conditions and vehicle state.
- UAV Propulsion: Continue the development of an advanced propulsion system for reliable UAV systems. Ground test the enhanced next-generation commercial core. Development will be in conjunction with the IHPTET Phase III JETEC and JTDE project efforts.
- UGV: Complete design and development of mobility UGV test bed for platform, sensor, and command & control sub-systems
- UUV: Continue development and demonstration of undersea, autonomous operations for Maritime Reconnaissance utilizing a submarine launched capable vehicle. Continue development and demonstration of undersea, autonomous operations for Undersea Search and Survey, and Communications/Navigation Aid utilizing a network of multiple, mobile nodes.

FY 2005 Plans:

- UAV Technology: For Situational Awareness, complete simulation testing of self-awareness sensor software to enable adaptation and independent action for detection (threats, terrain), display, and decision development of sub-system self-awareness sensors to enable adaptation and independent action for detection (threats & terrain), display, and decision. For Communications & Networks, continue the development of multi-modal interface for humans to control autonomous vehicles using combination of control inputs, including speech, and touch screens.
- Intelligent Autonomy: Using mixed-initiative model of autonomous control, continue development of the ability for a single human to control multiple vehicles. Complete design of a planning system that allows for autonomous vehicle to re-plan in real time based on current environmental conditions and vehicle state.
- UAV Propulsion: Ground test the XTE-67/A1 UAV demonstrator engine comprised of naval unique UAV propulsion technologies integrated with the enhanced next-generation commercial core. Achieve IHPTET phase III JETEC cost goals and contribute towards the JTDE Thrust/weight and cost goals. Provide the

foundation demonstrator engine for the VAATE program. Ground test a Mach 3.5 capable expendable turbine engine for missile applications and achieve IHPTET phase III JETEC Thrust/Air Flow and cost goals.

- UUV: Complete development and demonstration of undersea, autonomous operations for Maritime Reconnaissance utilizing a submarine launched capable vehicle. Continue development and demonstration of undersea, autonomous operations for Undersea Search and Survey, and Communications/Navigation Aid utilizing a network of multiple, mobile nodes.

	FY 02	FY 03	FY 04	FY 05
Total Ownership Costs	7,720	0	0	0

Total Ownership Costs: Specific technology efforts are associated with affordability and reduction of total ownership costs for power projection systems.

FY 2002 Accomplishments:

This effort is associated with the Future Naval Capability (FNC) of Total Ownership Cost as well as other activities.

- The Total Ownership Cost FNC completed the Reconfigurable Rotor Blade system requirements and concept trade studies. In addition subsystem development of shaped memory alloy ¼ scale actuator will continue, as well as plans for system design, development and demonstration of the cost effective actuator and blade assembly.
- This effort is terminated at the completion of FY-02 tasks due to other program priorities.

The Exploitation and Deployment efforts for the Total Ownership Cost effort continued development and flight demonstration of enhanced Vectoring ESTOL Control Tailless Operation Research (VECTOR) air platform.

C. OTHER PROGRAM FUNDING SUMMARY:

Navy RELATED RDT&E:

PE 0601153N Defense Research Sciences
PE 0602114N Power Projection Applied Research
PE 0602236N Warfighter Sustainment Applied Research
PE 0603123N Force Protection Advanced Technology
PE 0603782N Mine and Expeditionary Warfare Advanced Technology

PE 0603236N Warfighter Sustainment Advanced Technology
PE 0603790N NATO Research and Development
PE 0305204N Tactical Unmanned Aerial Vehicles
PE 0603502N Surface and Shallow Water Mine Countermeasures
PE 0603654N Joint Service Explosive Ordnance Development
PE 0602131M Marine Corps Landing Force Technology

NON-NAVY RELATED RDT&E: These PEs adhere to Defense S&T Reliance agreements with oversight provided by the JDL.

PE 0603285E ASP-01 Advanced Aerospace Systems
PE 0603709D Joint Robotics Program
PE 0604709D Joint Robotics Program - EMD
PE 0602203F Aerospace Propulsion
PE 0603202F Aerospace Propulsion Subsystems Integration
PE 0603216F Aerospace Propulsion and Power Technology
PE 0603205F Flight Vehicle Technology
PE 0603245F Flight Technology Integration

D. Acquisition Strategy: Not Applicable.

CONGRESSIONAL PLUS-UPS

R2487	FY 02	FY 03
Aircraft Affordability Project DP-2	5,380	4,890

Aircraft Affordability Project DP-2: Continued development and evaluation of the half scale DP2 vertical takeoff aircraft. The advantage of the concept is to provide the only jet powered vertical and short takeoff multi-passenger aircraft.

R2721	FY 02	FY 03
Vectored Thrust Ducted Propeller (VTDP)	3,273	3,423

Vectored Thrust Ducted Propeller (VTDP): The VTDP is a multi-functional component that replaces a conventional tail rotor system in a helicopter. The VTDP provides anti-torque/yaw control capability with propulsion and effort vectoring control. Continued design, analysis and engineering support of the aircraft systems. Continue aircraft modifications and drive system testing at the Helicopter Transmission Testing Facility (HTTF). The prime contractor for VTDP is Piasecki Aircraft Corporation, Essington, PA. Navy efforts are focused at Naval Air Systems Command, Patuxent River, MD.

R2821	FY 02	FY 03
Integrated Hypersonic Aeromechanics Tool Program (IHAT)	2,613	3,657

Integrated Hypersonic Aeromechanics Tool Program (IHAT): Developed a multi-disciplinary optimization analysis tool for Navy use in design and evaluation of a hypersonic weapon system. Complete design and validation of Build One. Define requirements of next incremental Build.

R2823	FY 02	FY 03
Precision Strike Navigator	1,738	977

Precision Strike Navigator (PSN): Initiated integration of the Integrated Fiber Optic gyro components from the semi-automated fabrication facility with the goal of building and evaluating a complete Inertial Measurement Unit (IMU).

R3006	FY 02	FY 03
Affordable Weapons	6,724	5,867

Affordable Weapons: Flight-tested the Affordable Weapon from a short rail launcher using a new more powerful engine. Conduct flight duration tests of up to 6 hours. Test the GPS targeting system and demo it on a target range.

R9008	FY 02	FY 03
HEL-Low Aspect Target Tracking	8,070	4,451

HEL-Low Aspect Target Tracking: Investigated tracking techniques for target acquisition, background discrimination, and aim-point maintenance using the laser and beam director at the High Energy Laser Systems Test Facility (HELSTF) in New Mexico. Initiate laser/beam director system upgrade development and conduct test/demonstration to resolve issues associated with beam control in the negation of air threats to Surface ships. While the specific laser system of choice for the HEL ship defense application may be the electrically driven Free Electron Laser (FEL) or the Solid State Laser (SSL), this technology effort will provide essential technical data for the next phase of laser beam control at weapon power levels so laser device development can proceed with confidence.

R9009	FY 02	FY 03
Aircraft Lightening Protection Applique System	1,442	N/A

Aircraft Lightening Protection Applique System: Applied composite protection technology to small air vehicles to enhance survivability/effectiveness. This is also applicable to surface and ground based composite structures.

R9010	FY 02	FY 03
Variable Deliverable Pump/Variable Engine Nozzle	1,442	1,467

Variable Deliverable Pump/Variable Engine Nozzle (VEN): Initiate design, fabrication and demonstration testing on a new pump concept, which can be transitioned to the F-18E/F. Current nozzle actuator fuel pumps, which provide high pressure fuel to control the VEN area on the F-14 engine, have a low degree of reliability. This new pump concept will demonstrate increased reliability and durability.

R9011	FY 02	FY 03
Thermobaric Warhead Development	2,017	N/A

Thermobaric Warhead Development: Configure and demonstrate an advanced high-energy insensitive thermobaric explosive composition that will provide enhanced internal blast pressures and thermal effects in confined environments. The program will characterize and model existing foreign technologies related to thermobaric formulations, optimize compositions for US man portable munitions and determine material safety requirements. Selected compositions will be demonstrated in a variety of man portable munitions to verify concept effectiveness for final system down-selection.

R9012	FY 02	FY 03
Magdalena Ridge Observatory	8,146	20,536

Magdalena Ridge Observatory: Using a Naval Research Laboratory and New Mexico Technologic University team developed an interferometric system for use in the Magdalena Ridge Observatory to be run by New Mexico Tech.

R9013	FY 02	FY 03
Littoral Support Craft-Experimental (LSC (X))	*	8,935

Littoral Support Craft – Experimental: Littoral Support Craft – Experimental: Design and build a high speed vessel for full scale testing of high speed hydrodynamics, lifting body, drag reduction and low speed stability technologies for a multi-hulled catamaran (estimated start date 14 FEB 03, estimated deliver date 6 AUG 04)
*Previous year funding and planning discussed under PE 0603123N Project R9013.

R9133	FY 02	FY 03
Advanced Camouflage Coating Demo	0	7,066

Manufacture camouflage materials and apply them to unmanned aerial vehicles for expanded flight test evaluation, assessment and qualification. Development of palettes of these materials requiring different schemes due to various operational environments. These materials have the potential of reducing costs due to repair and replacement of the coatings

R9134	FY 02	FY 03
High Speed Anti-Radiation Missile Demonstration - Digital CAS	0	7,481

This project will develop a producible Digital Control Actuator System (CAS) for the missile aft steering system of the High Speed Anti-Radiation Demonstration (HSAD) airframe. Military value derives from the increase in performance of next generation Anti-Radiation Missiles (ARM). This performance increase will permit engagement of a wider array of targets and will improve the effectiveness of the weapon against enemy countermeasures that have been used against current ARMs.

R9135	FY 02	FY 03
High Speed Anti-Radiation Missile Demonstration- AARGM	0	6,161

This funds the Advanced Anti-Radiation Guided Missile (AARGM) seeker modifications and additional seekers to support the High Speed Anti-radiation Demonstration (HSAD) at higher operational speeds and longer ranges than the existing AARGM. Military value derives from the increased speed, accuracy, lethality and flexibility of the next generation Anti-Radiation Missile (ARM). The next generation ARM will be used for both suppression of enemy air defenses (SEAD) and Destruction of Enemy Air Defenses (DEAD) missions.

R9136	FY 02	FY 03
HYSWAC Lifting Body Development	0	5,886

Design, develop and demonstrate a Hybrid Small Waterplane Area Catamaran (HYSWAC) by converting the Surface Effect Ship 200 (SES-200) and incorporating an advanced lifting body to improve dynamic lift, payload capacity and small craft seakeeping. The HYSWAC project started with an FY00 Congressional plus-up and continued to receive congressional support with FY01 and FY02 plus-ups. A complete marine survey was completed prior to the

SES-200 being towed to the conversion shipyard in Honolulu, Hawaii. Final design for conversion and initial concepts for the lifting body have been completed. The SES-200 conversion is nearing completion. Lifting body final design, construction and installation will be completed in FY03 enabling at-sea demonstration of the HYSWAC.

R9137	FY 02	FY 03
Littoral Support Craft (LSC (X)) – Lifting Body	0	9,873

Conduct underlying Science and Technology to support design and construction of a Lifting Body for the Littoral Support Craft - Experimental (a full scale vessel). Previous funding and plans for LSC (X) are discussed under PE 0603123N Project 9013.