FY 2003 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2002

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

(U) COST: (Dollars in Thousands)

PROJECT NUMBER/ TITLE	FY 2001 ACTUAL	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	FY 2006 ESTIMATE	FY 2007 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R2487 Aircraft Affordability Project DP-2	**	5,551	0	0	0	0	0	0	15,814
R2721 Vectored Thrust Ducted Propeller (VDTP)	**	3,370	0	0	0	0	0	0	12,167
R2821 Integrated Hypersonic Aeromechanics Tool Program (IHAT)	**	2,676	0	0	0	0	0	0	5,093
R2823 Precision Strike Navigator	**	1,784	0	0	0	0	0	0	6,139
R2911 Power Projection Advanced Technology		75,730	78,247	69,511	53,166	41,766	47,481	CONT.	CONT.
R3006 Affordable Weapons		6,938	0	0	0	0	0	0	6,938
R9008 HEL-Low Aspect Target Tracking		8,326	0	0	0	0	0	0	8,326
R9009 Aircraft Lightening Protection Applique System		1,487	0	0	0	0	0	0	1,487
R9010 Variable Deliverable Pump/Variable Engine Nozzle		1,487	0	0	0	0	0	0	1,487
R9011 Thermobaric Warhead Development		2,081	0	0	0	0	0	0	2,081
R9012 Magdalena Ridge Observatory		8,326	0	0	0	0	0	0	8,326
Total	**	117,756	78,247	69,511	53,166	41,766	47,481	CONT.	CONT.

**The Science and Technology Program Elements (PEs) were restructured in FY 2002. The work described in 2001 was funded in PEs 0602111N, 0603217N and 0603792N.

A. (U) 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), reduce the total ownership cost of systems, and provide responsive/cost effective high-speed sealift.

In support of this overall mission the following specific areas are included:
Time Critical Strike: The specific mission of Time Critical Strike 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 with 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. Unmanned combat air vehicles will be investigated to effectively and affordably prosecute strike and surveillance missions. The approach must be responsive in that it can reduce the strike timeline against time critical targets. The support required to accomplish this also requires high-speed sealift. The 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.

Autonomous Operations: The autonomous operations program aims to enhance the mission capability 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 propulsion and power technologies unique to Naval UAVs operating from surface combatants. The project is related to on-going projects such as the Integrated High Performance Turbine Engine Technology program.

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

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

FY 2003 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2002

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

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

C. (U) PROGRAM CHANGE SUMMARY:

	FY 2001	FY 2002	FY 2003
FY 2002 President's Submission:	**	76,410	
Adjustments from FY 2002 President's Budget:			
Congressional Plus-ups		+42,400	
Section 8123 Management Reform Initiative Reduction		-1,049	
FFRDC Reduction		-5	
FY 2003 President's Submission:	**	117,756	78,247

**The Science and Technology PEs were restructured in FY 2002. FY 2001 efforts were funded in PEs 0602111N, 0603271N and 0603792N.

FY 2003 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2002

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

(U) COST: (Dollars in Thousands)

PROJECT NUMBER/ TITLE	FY 2001 ACTUAL	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	FY 2006 ESTIMATE	FY 2007 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R2911 Power Projection Advanced Technology	**	75,730	78,247	69,511	53,166	41,766	47,481	CONT.	CONT.

**The Science and Technology Program Elements (PEs) were restructured in FY 2002. The work described in 2001 was funded in PEs 0602111N, 0603217N and 0603792N.

A. (U) 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), reduce the total ownership cost of systems, and provide responsive/cost effective high-speed sealift.

In support of this overall mission the following specific areas are included:
Time Critical Strike: 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 with 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. Unmanned combat air vehicles will be investigated to effectively and affordably prosecute strike and surveillance missions. The approach must be responsive in that it can reduce the strike timeline against time critical targets. The support required to accomplish this also requires high-speed sealift. The 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.

FY 2003 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2002

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

Autonomous Operations: The autonomous operations program aims to enhance the mission capability 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 propulsion and power technologies unique to Naval UAVs operating from surface combatants. The project is related to on-going projects such as the Integrated High Performance Turbine Engine Technology program.

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

B. (U) PROGRAM PLANS AND ACCOMPLISHMENTS:

1. (U) FY 2001 ACCOMPLISHMENTS:

- (U) ($14,200) Time Critical Strike: Conducted risk reduction in the areas of Surface Fire Support and real time retargeting for cruise missiles, as well as gun launched ordnance for the purpose of delivering ordnance to land targets. The Cruise Missile Real Time Retargeting (CMRTR) project successfully developed a Mercad Telluride detector for the advanced development seeker and determined that the 1.54 micron laser was too large and generated too much heat to be usable. This project initiated efforts with a 1.06 micron laser for planned advanced development. Various efforts in Naval Fire Support in 0602111N were focused on preliminary risk reduction in preparation for the advanced

  development TCS efforts. The Barrage Round project successfully completed projectile demonstrations, which proved the viability of an accurate, guided projectile in modern strike warfare. (FY-01 accomplishments were funded in PE 0602111N and PE 0603217N).

- (U) ($3,200) Autonomous Operations: The Advanced Linear Motor Technology project developed a prototype electromagnetic aircraft recovery system for carriers which has the ability to store energy. This has the potential of being used on current and future aircraft recovery systems, including those which would be used for UAV recovery. Component
- testing is completed and final testing of the prototype will be completed in FY-02. The Integrated High Performance Turbine Engine Technology (IHPTET) project, a phased approach to advanced turbine propulsion for UAVs and aircraft, demonstrated Phase II propulsion systems and initiated design and development of Phase III systems. (FY-01 accomplishments were funded in PE 0603217N and PE 0603792N).

- (U) ($4,100) Total Ownership Costs: This effort developed requirements for a cost effective reconfigurable rotor blade system, evaluated corrosion and durability of the thermal energy modules, and initiated development of a ¼ scale Shaped Memory Alloy actuator as well as initiation of integration efforts into a rotor blade system. In addition, a cost effective, enhanced air platform design and development of a Vectoring ESTOL Control Tailless Operation Research (VECTOR) project was initiated. (FY-01 accomplishments were funded in PE 0603217N).

2. (U) FY 2002 PLAN:

- (U) ($50,160) Time Critical Strike: This thrust continues with significant efforts associated with the Future Naval Capability (FNC) of Time Critical Strike(TCS) as well as other Discovery and Invention 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 will execute:
  - (U) Naval-Unmanned Combat Air Vehicle (UCAV-N) Phase II: Refine operational system concept development, System Maturation Plans and Preliminary Designs initially developed in Phase I 6.2 program. Conduct sub-system development and test in critical technology areas, leading to simulations and flight demonstrations.
  - (U) Real Time Execution Decision Support System (REDS): Develop software methods for collaborative planning, options generation, and mission target folder generation.
  - (U) Conduct analysis of seeker alternatives and mission need assessment for a next generation mid-range, ship launched, precision strike weapon (Counterbattery Attack Munition-CBAM).
  - (U) Low Cost Active Terminal Seeker development for Cruise Missile Real Time Retargeting. Development includes: signal and image processing and weapon interface in accordance tactical TOMAHAWK performance requirements.
  - (U) Conduct image Analysis Survey and develop methods for target exploitation in image and video streams

- (U) Develop chemical and mechanical processes for low cost Fiber Optic Gyroscope inertial measurement unit fabrication as part of Precision Strike Navigator.
- (U) Integration studies of an advanced dual mode anti-radiation missile seeker incorporating a balljoint gimbals into a ramjet-powered missile airframe for a flight test demonstration of seeker Anti-Radiation Missiles effectiveness at high-speed.
- (U) Hyper-spectral Imaging System: Develop rugged, high through-put Infra-Red Spectrometer, optical train analysis, select position/ pointing system reference, and enhance detect algorithms for real time processor
- (U) Survey and develop targetable submunition warhead variant for Tomahawk while preserving unitary performance.
- (U) Develop digital secure weapon link for SLAM-ER.

The Discovery and Invention efforts for the Time Critical Strike thrust 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 support of expeditionary operations will be conducted.

- (U) ($17,542) Autonomous Operations: This thrust continues with significant efforts associated with the Future Naval Capability (FNC) of Autonomous Operations as well as other efforts. Autonomous Operations FNC includes:

- (U) UAV Technology: For Situational Awareness, the development of sub-system self-awareness sensors to enable adaptation and independent action for detection (threats & terrain), display, and decision.
- (U) Intelligent Autonomy: Development of alternative designs and risk reduction assessments for intelligent vehicle self-management and fault tolerance targeting concepts.
- (U) UAV Propulsion: Development of an advanced propulsion system for reliable UAV systems. Development will be in conjunction with the IHPTET Phase III JETEC effort.
- (U) Unmanned Ground Vehicles (UGV): Design and development of mobility Unmanned Ground Vehicle (UGV) testbed for platform, sensor, and command & control sub-systems.
- (U) Unmanned Underwater Vehicles: Development and demonstration of undersea, autonomous operations for Undersea Search and Survey, and Communications/Navigation Aid utilizing a network of multiple, mobile nodes. Also, development and demonstration of undersea, autonomous operations for Maritime Reconnaissance utilizing a submarine launch-capable vehicle.

The Discovery and Invention efforts for the Autonomous Vehicles thrust completes the fabrication and demonstration of an advanced linear motor system intended for affordable recovery of air vehicles. It will demonstrate single-sided portion of linear motor recovery with a simulated aircraft recovery loading.

- (U) ($8,028) Total Ownership Costs: This thrust continues with significant efforts associated with the Future Naval Capability (FNC) of Total Ownership Cost as well as other projects. The Total Ownership Cost FNC will:
  - Complete 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.

The Discovery and Invention efforts for the Total Ownership Cost thrust will continue development and flight demonstration of enhanced Vectoring ESTOL Control Tailless Operation Research (VECTOR) air platform.

3. (U) FY 2003 PLANS:

- (U) ($58,928) Time Critical Strike: This thrust continues with significant efforts associated with the Future Naval Capability (FNC) of Time Critical Strike (TCS) as well as other Discovery and Invention efforts. The TCS FNC efforts are:
  - Initiate development of Weapons/Image Link: Develop high bandwidth digital secure weapon link for SLAM-ER.
  - Advanced gun projectile propulsion technology and associated advanced Gun-Barrel Technology.
  - Mission Responsive Ordnance technology will develop targetable submunition warhead variant for Tomahawk while preserving unitary performance.
  - Naval-Unmanned Combat Air Vehicle (UCAV-N) Phase II: Conduct simulated carrier and mission operations, perform subsystem demonstrations, and prepare for surrogate and demonstrator aircraft flight test. Continue refinement of operational system concept.
  - Real Time Execution Decision Support System (REDS): Develop software methods for collaborative planning, options generation, and mission target folder generation.
  - As part of the Counterbattery Attack Munition-CBAM, program analysis of seeker alternatives and mission need assessment for a next generation mid-range, ship launched, precision strike weapon.
  - Continue development of low cost terminal seeker for Cruise Missile Real Time Retargeting.
  - Conduct image Analysis Survey and develop methods for target exploitation in image and video streams.

- Within the Precision Strike Navigator program development of chemical and mechanical processes for low cost Fiber Optic Gyroscope inertial measurement unit will continue.
- Conduct Integration studies of an advanced dual mode anti-radiation missile seeker incorporating balljoint gimbals into a ramjet-powered missile airframe for a flight test demonstration of seeker for high-speed Anti-Radiation Missile effectiveness.
- Hyper-spectral Imaging System: Develop rugged, high through-put Infra-Red Spectrometer, optical train analysis, select position/ pointing system reference, and enhance detect algorithms for real time processor.

The Discovery and Invention efforts for the Time Critical Strike thrust include a continuation of the advanced rocket motor technology for high-speed strike weapons. In addition continued development and testing will be conducted for the National Aerospace Initiative (hypersonic missile development) and the advanced weapons seeker and guidance programs to reduce specific risks support Strike missions.

- (U) ($16,319) Autonomous Operations: This thrust continues with significant efforts associated with the Future Naval Capability(FNC) of Autonomous Operations. The Autonomous Operations FNC include:
  - UAV Technology: For Situational Awareness, the development of self-awareness sensors 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, the development of 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, development of the ability for a single human to control multiple vehicles. Design of a planning system that allows for autonomous vehicle to re-plan in real time based on current environmental and conditions and vehicle state.
  - (U) Intelligent Autonomy: Development of 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).
  - (U) UAV Propulsion: Continued development of an advanced propulsion system for reliable UAV systems. Development will be in conjunction with the IHPTET Phase III JETEC effort.
  - (U) Unmanned Ground Vehicles (UGV): Continue design and development of mobility UGV test bed for platform, sensor, and command & control sub-systems

- (U) Unmanned Underwater Vehicles: Development and demonstration of undersea, autonomous operations for Maritime Reconnaissance utilizing a submarine launched capable vehicle. Development and demonstration of undersea, autonomous operations for Undersea Search and Survey, and Communications/Navigation Aid utilizing a network of multiple, mobile nodes.

- (U) ($3,000) Total Ownership Costs: This thrust continues with efforts associated with the Future Naval Capability (FNC) of Total Ownership Costs (TOC) as well as other Discovery and Invention efforts. The TOC FNC is: Continue the Reconfigurable Rotor Blade efforts of twist actuation design and fabrication of scale model system.

  Discovery and Invention efforts for the Total ownership cost Thrust include continued development and testing for the Vectoring ESTOL Control Tailless Operation Research (VECTOR) air platform.

(U) PROGRAM CHANGE SUMMARY EXPLANATION:

(U) Schedule: Not Applicable
(U) Technical: Not Applicable

D. (U) OTHER PROGRAM FUNDING SUMMARY:

(U) Navy RELATED RDT&E:
(U) PE 0601153N Defense Research Sciences
(U) PE 0602114N Power Projection Applied Research
(U) PE 0602236N Warfighter Sustainment Applied Research
(U) PE 0603123N Force Protection Advanced Technology
(U) PE 0603782N Mine and Expeditionary Warfare Advanced Technology
(U) PE 0603236N Warfighter Sustainment Advanced Technology
(U) PE 0603790N NATO Research and Development
(U) PE 0305204N Tactical Unmanned Aerial Vehicles
(U) PE 0603502N Surface and Shallow Water Mine Countermeasures
(U) PE 0603654N Joint Service Explosive Ordnance Development
(U) PE 0602131M Marine Corps Landing Force Technology

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(U) NON-NAVY RELATED RDT&E: These PEs adheres to Defense S&T Reliance agreements with oversight provided by the JDL.
- (U) PE 0603285E ASP-01 Advanced Aerospace Systems
- (U) PE 0603709D Joint Robotics Program
- (U) PE 0604709D Joint Robotics Program - EMD
- (U) PE 0602203F Aerospace Propulsion
- (U) PE 0603202F Aerospace Propulsion Subsystems Integration
- (U) PE 0603216F Aerospace Propulsion and Power Technology
- (U) PE 0603205F Flight Vehicle Technology
- (U) PE 0603245F Advanced Flight Technology Integration

E. (U) SCHEDULE PROFILE: Not applicable

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CONGRESSIONAL PLUS-UPS

This section describes the following Congressional Plus-Ups appropriated in FY 2001 and FY 2002 whose efforts fall within the scope of this (restructured program), or which were appropriated in this program element:

Affordable Weapons
Aircraft Affordability Project DP-2
Aircraft Lightening Protection Applique System
Eye Safe Ladar
HEL-Low Aspect Target Tracking
Integrated High Performance Turbine Engine Technology (IHPTET)
Integrated Hypersonic Aeromechanics Tool Program (IHAT)
Magdalena Ridge Observatory
Precision Strike Navigator(PSN)
Synthetic Aperture Radar All Weather Precision Targeting System (AWPTS)
Thermobaric Warhead Development
Variable Deliverable Pump / Variable Engine Nozzle
Vectored Thrust Ducted Propeller (VTDP)

1. (U) FY 2001 Congressional Plus-Ups

- (U) ($4,343) Aircraft Affordability Project DP-2: Continued development of the half scale DP2 vertical takeoff aircraft. Successfully ground tested the existing half scale aircraft to insure integrity of the composite thrust vectoring system, completed development and improvement of the computer flight control system. Work is being performed by DuPont Aerospace in San Diego and Mississippi State Univ. (Funded in PE 0603217N)

- (U) ($4,842) Eye Safe Ladar: Funds were used to develop an advanced detector for use in a LADAR Seeker and to integrate an eye safe laser (developed by Acculyte, Seattle WA) into a LADAR seeker. The detector passed the milestones and will be considered as part of the Cruise Missile Real Time Retargeting (CMRTR) Time Critical Strike Future Naval Capability project. The integrating performer was Raytheon, Tucson AZ. (Funded in PE 0603217N)

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- (U) ($966) Integrated High Performance Turbine Engine Technology (IHPTET): Continued the Phase II Joint Expendable Turbine Engine Concepts (JETEC) effort. The JETEC technology demonstrators are turbine engines with the potential capability of propelling missiles or unmanned air vehicles to speeds approaching Mach 4-5. Performer was Allison Advanced Development Company (AADC), Indianapolis, Indiana. (Funded in PE 0603217N)

- (U) ($2,417) Integrated Hypersonic Aeromechanics Tool Program (IHAT): Developed an architecture and middleware code for the purpose of supporting a hypersonic weapon configuration model and design optimization tool. This effort analyzed the development feasibility of a single hypersonic engine and airframe integration-modeling tool capable of analysis of hypersonic weapons configurations. This proved feasibility of such a modeling code. Performer included ADVANTECH Pacific Inc, Redlands Ca. (Funded in PE 0603217N)

- (U) ($4,355) Precision Strike Navigator(PSN): Developed the advanced production techniques and processes for potential automation of the currently manual process of assembling and integrating the components of a silicon-based Precision Strike Navigator (PSN) Inertial Measurement Unit (IMU). Purchased new micro-fabrication and metrology equipment, performed polymer development, performed microchip development for an automated system. Elements of this are being considered as part of the Time Critical Strike Future Naval Capability. Performers include AEgis Systems Inc., Huntsville, AL and support at the Naval Air Warfare Center China Lake (Funded in PE 0603217N)

- (U) ($3,867) Synthetic Aperture Radar All Weather Precision Targeting System (AWPTS): Developed a monopulse antenna adjunct for the high resolution Synthetic Aperture Radar (SAR) developed by Sandia National Laboratory and suitable for use on a tactical Unmanned Aerial Vehicle (UAV). Designed algorithms for precision tracking using this system and demonstrated them. Potential use as payload for UAVs. Primary performer was General Atomics, San Diego, CA. (Funded in PE 0603217N)

- (U) ($3,090) 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 thrust vectoring control. Developed flight control, power and propulsion system and H-60 airframe structural modification designs (conducted Preliminary Design Review). The prime contractor for VTDP is Piasecki Aircraft Corporation, Essington, PA. Navy efforts are focused at Naval Air Systems Command, Patuxent River, MD.(Funded in PE 0603792N).

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2. FY 2002 Congressional Plus-Ups:

- (U) ($6,938) Affordable Weapons: Flight-test 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.

- (U) ($5,551) Aircraft Affordability Project DP-2: Continue 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.

- (U) ($1,487) Aircraft Lightening Protection Applique System: Apply composite protection technology to small air ehicles to enhance survivability/effectiveness. This is also applicable to surface and ground based composite structures.

- (U) ($8,326) HEL-Low Aspect Target Tracking: Investigate 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.

- (U) ($2,676) Integrated Hypersonic Aeromechanics Tool Program (IHAT): Develop 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.

- (U) ($8,326) Magdalena Ridge Observatory: Using a Naval Research Laboratory and New Mexico Technologic University team, develop an interferometric system for use in the Magdalena Ridge Observatory to be run by New Mexico Tech.

- (U) ($1,784) Precision Strike Navigator(PSN): Initiate 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).

- (U) ($2,081) 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.

- (U) ($1,487) 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.

- (U) ($3,370) 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 thrust vectoring control. Continue 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.