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ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)	DATE February 1999
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BUDGET ACTIVITY 2 - Applied Research	PE NUMBER AND TITLE 0602786A Logistics Technology
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<i>COST (In Thousands)</i>	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	17372	18420	23971	23405	24740	24150	22692	23927	Continuing	Continuing
AC60 AC60	2758	1948	2063	910	2097	1719	1045	1107	Continuing	Continuing
AH98 Clothing and Equipment Technology	8788	10211	14221	14524	14492	14080	14065	14831	Continuing	Continuing
AH99 Joint Services Food/System Technology	4201	4576	4864	5071	5249	5434	5388	5663	Continuing	Continuing
D283 Airdrop Advanced Technology	1625	1685	2823	2900	2902	2917	2194	2326	Continuing	Continuing

A. Mission Description and Budget Item Justification: This program element provides technology for the individual soldier and airdrop. Challenging and unique battlefield and weapons demands must be addressed by the future soldier and that soldier's support systems. In order to achieve required individual performance, mobility, and effectiveness, there must be associated technology developments evolving in soldier support equipment, supplies, and systems to make them smaller, lighter, more reliable and durable, more survivable, less manpower intensive, affordable, and more mobile. Technology efforts on clothing and equipment, cutting edge technologies for high-pressure airbeam supported shelters, and materials nanotechnology provide enhanced warfighter protection from both combat threats and from the natural field environment. Novel materials and processing techniques are being developed to provide significant weight reduction while enhancing warrior capabilities, enabling warrior system integration from the sub-microscopic level. The Joint Services Food/System Technology program supports all Military Services, the Special Operations Command, and the Defense Logistics Agency with research and development of high impact/high payoff technologies for performance enhancing military food products, packaging, and combat food service equipment. Work includes the establishment of sensory quality parameters and criteria for enhancing consumption and nutrient composition, developing technologies to minimize physical, chemical and nutritional degradation of combat rations during storage, and providing for logistically effective, mobility and performance enhancing rations to meet the needs of individual soldiers in highly mobile battlefield situations. Similarly, work on advanced airdrop technology supports all Services' requirements for air dropping larger combat and logistics loads while improving delivery accuracy, minimizing vulnerability of aircraft and reducing life cycle costs as well as the need for safer, more combat efficient personnel parachutes. This is a critical capability for rapid force projection, particularly into hostile environments. The work in this program element is consistent with the Army Science and Technology Master Plan (ASTMP) and the Army Modernization Plan. It adheres to Tri-Service Reliance agreements on clothing, textiles, and operational rations and field food service equipment, with oversight and coordination provided by the Human Systems Reliance Panel, the Warrior Systems Technology Base Executive steering Committee, and the DoD Food & Nutrition Research & Engineering Board. There is no unwarranted duplication of effort among the military departments. Efforts are coordinated with those in PE 0603001A (Warfighter Advanced Technology). The program is managed by the U.S. Army Natick Soldier Center, Natick, MA.

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<u>B. Program Change Summary</u>	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
Previous President's Budget (<u>FY 1999</u> PB)	18088	18661	19701	19456
Appropriated Value	18689	18661		
Adjustments to Appropriated Value				
a. Congressional General Reductions	-601	-241		
b. SBIR / STTR	-105			
c. Omnibus or Other Above Threshold Reductions	-49			
d. Below Threshold Reprogramming	-562			
e. Rescissions				
Adjustments to Budget Years Since <u>FY 1999</u> PB			+4270	+3949
Current Budget Submit (<u>FY 2000 / 2001</u> PB)	17372	18420	23971	23405

Change Summary Explanation: FY00 and FY01 funding increased for ballistic protection for individual soldiers and lightweight future soldier system.

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BUDGET ACTIVITY 2 - Applied Research	PE NUMBER AND TITLE 0602786A Logistics Technology	PROJECT AH98
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COST (<i>In Thousands</i>)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
AH98 Clothing and Equipment Technology	8788	10211	14221	14524	14492	14080	14065	14831	Continuing	Continuing

Mission Description and Justification: This project provides applied research to improve soldier survivability and performance through significantly improved materials and new technology applications for combat clothing and personal equipment. Areas of emphasis include: material development to improve ballistic, flame, and directed energy protection; enhanced signature management; materials/concepts for protection in arctic, temperate, tropical, and desert environments; materials and processing techniques to enhance integration and significantly lighten the soldier's load; and three-dimensional textile techniques for achieving rapidly deployable wide-span airbeam supported shelters. Human factors research and simulation and modeling tools applicable to the soldier system are used to quantify soldier performance and determine optimal research and development (R&D) alternatives for individual soldier items.

FY 1998 Accomplishments:

- 4841 - Demonstrated advanced materials systems for protection against combined fragmentation and small arms threats (known ball threats up to/including 0.30 caliber) at a 20-30% reduced areal density (weight) compared to current small arms protection, without significantly increasing other penalties.
 - Optimized fibers from a re-processed silkworm silk that outperformed genetically engineered silk and Kevlar fibers in toughness testing (100% tougher than Kevlar - 30% was goal). Expression level of genetically engineered silk was improved, but is no longer necessary since silkworm silk fiber is available in ton quantities (but must be re-processed) and at a lower price than a genetically engineered product.
 - Synthesized conductive polymers, using a patent pending process, applied conductive polymer coatings to nylon textiles and determined that the electrostatic dissipation of the coated textiles was greatly improved for increased safety.
 - Formulated additional thermal signature reducing facepaints and received toxicity clearance for human use by the Office of the Surgeon General; conducted small scale field experiments to determine performance levels and optimum formulations for transition into the FY99 Soldier Enhancement Program; enhanced thermal signature reducing textiles incorporating advanced countermeasure technologies for demonstration in combat clothing systems in FY99.
 - Incorporated nonlinear optical materials for laser eye protection into a polymer substrate and demonstrated optical limiting in the sample.

- 3947 - Incorporated novel flame retardant chemical additives into an extrudable nylon polymer and demonstrated the fiber production capability; synthesized novel polymers produced by enzymatic catalysis for flame retardant additives or coatings; developed topical flame retardant treatments for use on combat uniform fabrics to add flame protection to battledress systems.
 - Completed an analytic assessment of factors affecting Force XXI Land Warrior lethality that investigated operational effectiveness including: suppression; area fire; target detection; and behavioral adaptation to terrain.
 - Developed whole body scan protocols compatible with ANSUR 2-D database standards to enhance utilization of 3D scanning for design of warrior system clothing and equipment; conducted field test to obtain user feedback and verification of laboratory evaluation on biomechanically enhanced

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footwear characteristics; demonstrated an eleven pound vapor compression microclimate cooling (MCC) prototype to reduce heat stress for mounted or

FY 1998 Accomplishments: (continued)

special purpose ground forces and designed a breadboard lightweight non-electric MCC prototype. MCC technology is transitioning to the Air Warrior EMD program in FY99.

- Established processes to scale-up three-dimensional textile technology to achieve seamless, large-diameter airbeams for use in highly mobile shelters.

Total 8788

FY 1999 Planned Program:

- 6826 - Transition improved small arms protective material systems to advanced development and/or as technology insertions to enhance fielded individual protective items; optimize most effective characteristics of new materials for next generation multiple ballistic threat protection (increased small arms, advanced fragmentation, and improved blast protection).
 - Measure and assess conductive polymers for electromagnetic interference shielding and anticorrosion properties; evaluate silk fiber/blend yarns and material prototypes for ballistic projectile impact properties; synthesize/obtain various nanostructures for incorporation into electrospun membranes or other nanomaterials/composites to produce lightweight materials with improved/integrated flame resistance, electrostatic dissipation, comfort, ballistic and/or environmental protection.
 - Determine effects of soldiers' load volume, weight, and distribution on biomechanical performance of the soldier and validate Integrated Unit Simulation System (IUSS) soldier model predictions with these data. Demonstrate a 10-15% reduction in lower extremity disorders among ground troops wearing new biomechanically enhanced combat boots. Expand anthropometric data extraction software capabilities to include a larger number of critical body measurements required for clothing/equipment system design and evaluation.
 - Expand current physiological model capabilities from restricted laboratory settings into more representative virtual combat environments in order to more accurately simulate and assess warrior performance.
- 3273 - Execute chemical modification of novel flame retardant nylon polymer formulations to improve flammability resistance and fiber strength; demonstrate production capability of topical flame retardant treatments on combat uniform fabrics; establish performance based protection criteria for flame resistant combat clothing.
 - Demonstrate combat uniform systems technology that reduces the soldier's thermal signature by 50% from background levels.
 - Design an optical limiter that can be incorporated into a breadboard tunable laser eye protective device.
 - Demonstrate scaled up, three-dimensional textile technology using subscale prototypes that will ultimately provide highly mobile maintenance shelter capability for large weapons platforms, such as rotary.
- 112 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.

Total 10211

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BUDGET ACTIVITY 2 - Applied Research	PE NUMBER AND TITLE 0602786A Logistics Technology	PROJECT AH98
FY 2000 Planned Program:		
<ul style="list-style-type: none"> • 5306 	<ul style="list-style-type: none"> - Validate soldier system models using Future Warrior Architecture field and/or biomechanical laboratory data to establish the baseline for the Lightweight Soldier effort to reduce the system fighting load from current 75 lbs. to 50 lbs. Identify the most promising materials technologies for application to the lightweight soldier effort. 	
FY 2000 Planned Program: (continued)		
<ul style="list-style-type: none"> • 5572 	<ul style="list-style-type: none"> - Develop improved algorithms, data model and combat vignettes for both battlefield and restricted terrain, (e.g. hallways, tunnels, trenches) to improve the accuracy of simulation based acquisition assessments of warrior systems. - Develop processing methods to combine the most promising nanostructures into very lightweight and low bulk membranes/material/composites, without losing the individual nanostructure functionality's such as flame resistance, conductivity, comfort and environmental protection. 	
<ul style="list-style-type: none"> • 3343 	<ul style="list-style-type: none"> - Transition to PM-Soldier technology that reduces the system weight of the individual countermine protective system (fielded in FY96) by 35%, while providing equal protection; define requirements for assessment criteria and test methodology to determine ballistic casualty reduction potential of emerging technology; evaluate novel materials/systems concepts to increase protection and reduce weight for personnel armor against emerging ballistic threats.. - Quantify the effects of load-carrying gear, clothing, and individual equipment configured for specific squad positions on human performance; complete passive dynamic gait model; support integration of automated measurement and data extraction system for human-system interface analysis and military clothing sizing and issue. 	
<ul style="list-style-type: none"> • 3343 	<ul style="list-style-type: none"> - Scale up novel flame retardant nylon polymer formulations to production level fiber-extruding equipment and construct fabric for material testing; produce sufficient quantities of topically treated flame retardant battledress fabric for field testing; establish test methodology for flame resistant material systems. - Optimize signature management treatments/uniforms for various soldier warrior platforms insuring significantly enhanced protection levels in their system configuration. - Increase the level of achievable laser eye protection using polymer-based limiters. - Optimize the wide span airbeam textile construction and fabricate a full-scale shelter module compatible with rapid deployment of large weapons platform maintenance capability objectives. 	
Total	14221	
FY 2001 Planned Program:		
<ul style="list-style-type: none"> • 6752 	<ul style="list-style-type: none"> - Perform laboratory scale evaluations and demonstrations of nanotechnology composites which may be exploited for use in the lightweight soldier system architecture; develop initial virtual prototyping tool for soldier system. - Develop and validate the capability to assess through modeling and simulation the integration of single and multiple equipment items on the individual warrior in multiple domains (lethality, survivability, mobility). - Assess the physical/chemical properties of the lightweight, multifunctional materials produced through the use of nanostructures and nanotechnology processing methods. 	
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BUDGET ACTIVITY 2 - Applied Research	PE NUMBER AND TITLE 0602786A Logistics Technology	PROJECT AH98
• 4750	- Determine effects of varied topographic and terrain conditions on human performance through biomechanical evaluations; extend the passive dynamic gait model to encompass terrain data; augment 3-D anthropometric scanning capabilities to include tools for applications supporting human-based modeling/simulation and novel uniform and equipment design concepts.	
FY 2001 Planned Program: (continued)	- Transition enhanced test methodology/assessment criteria for personnel armor systems to enable sound acquisition decisions with an acceptable balance of protection, weight, mobility and affordability.	
• 3022	- Demonstrate 30-50% cost decrease compared to the cost of existing flame-resistant clothing systems while maintaining multiple threat protection levels. - Evaluate the unique dynamics an urban battlefield imposes on the available camouflage concealment and deception material solutions and provide optimized treatments for the urban warrior. - Modify the design of proposed millimeter-lens arrays for laser eye protection devices to decrease the length of the optical assembly to ensure human factors criteria are met. - Demonstrate the ability of an airbeam supported structure to span a cross section exceeding 60 feet in width to enable the development of a rapidly deployable large weapons platform maintenance shelter.	
Total	14524	
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BUDGET ACTIVITY 2 - Applied Research				PE NUMBER AND TITLE 0602786A Logistics Technology				PROJECT AH99		
COST (In Thousands)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
AH99 Joint Services Food/System Technology	4201	4576	4864	5071	5249	5434	5388	5663	Continuing	Continuing
<p>Mission Description and Justification: This DoD program, for which the Army has Executive Agency responsibility, addresses high impact, high payoff food and food system technologies to support all military Services, Special Operations Command, and the Defense Logistics Agency. Thrust areas include the applied research of combat rations, packaging, field food service equipment and combat food service systems, all of which enhance the survivability, sustainability, and supportability of the Armed Forces by ensuring optimal nutritional intake to maximize cognitive and physical performance on the battlefield.</p> <p>FY 1998 Accomplishments:</p> <ul style="list-style-type: none"> • 975 - Developed concepts for storing perishable foods for field feeding to ensure food safety and reduce perishable food losses during intermittent electric power availability. <ul style="list-style-type: none"> - Tested catalytic materials, binders, pressures, and temperatures in a mini-tube fuel reformer to maximize yield of hydrogen and light hydrocarbons and completed analysis and design of autothermal reformer based fuel cell cogenerator as two approaches for converting diesel fuel into a clean burning natural gas like fuel to enable the use of commercial gas fired kitchen equipment to reduce costs and improve meal preparation, safety and efficiency. - Completed design of three potential micro fuel atomizers (wick, electrostatic, and microchannel) for low-output burner applications including pocket stove, microclimate cooling/heating, and power generation. - Developed concepts for reducing water and fuel consumption in field kitchen sanitation centers based on durable nonstick kitchen equipment coatings, distilling and recycling waste water, and reducing the number of field burners to maintain food service sanitation. - Prototyped and tested several designs for beverage heating including canteen cup envelope and immersion heating concepts. • 1557 - Established cell culture and in vitro dialysis transfer methodologies that test the functional effects of nutrients for selecting most bioactive form for ration supplementation; demonstrated significant improvement of soldier performance when ingesting specific carbohydrate load; modified computerized ration design optimization model for simultaneously addressing military acceptance and cost. <ul style="list-style-type: none"> - Determined effects of food components on sleep/wake cycles to enhance combat effectiveness. - Evaluated novel preservation technologies and demonstrated the efficiency pH and water activity in controlling growth of microorganisms in minimally processed products for improved food safety; completed assessment of commercial technologies for biosensors for ration quality determinations; developed five new sterilized pouched entrees using irradiation processing for enhanced food safety for use by NASA and in military rations. - Completed study on tyrosine as a performance enhancer, showed that tyrosine improved mental alertness in cold stressed subjects, and transitioned to Demonstration and Validation (6.4) ration design and formulation programs. 										
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BUDGET ACTIVITY 2 - Applied Research	PE NUMBER AND TITLE 0602786A Logistics Technology	PROJECT AH99
<p>FY 1998 Accomplishments: (continued)</p> <ul style="list-style-type: none"> • 1669 - Identified performance requirements for oxygen absorbing pouch material; developed polymeric tray barrier enhanced by glass coating for increased shelf stability and transitioned effort to Demonstration and Validation (6.4) for shelf stable rations. <ul style="list-style-type: none"> - Identified candidate films and conducted accelerated storage test on two barrier post coating systems to ensure shelf stability; transitioned system to fielded ration systems. - Developed four varieties of Mobility Enhancing Ration Components and field tested as part of Meal Ready to Eat (MRE) menus; transitioned components to the MRE for future menu improvements. <p>Total 4201</p> <p>FY 1999 Planned Program:</p> <ul style="list-style-type: none"> • 783 - Complete field tests of prototype individual beverage heaters and transition to Ration Improvement Program for final development and fielding. <ul style="list-style-type: none"> - Complete testing of mini-tube and autothermal reformer critical subsystems; down-select micro fuel atomizer approaches, design and fabricate a prototype 1-2 KBTU/hr burner weighing less than 4 oz for individual soldier heat and power, and transition to Demonstration and Validation. - Develop concepts for a marine expeditionary field feeding system; investigate non-fossil fuel energy sources for field feeding to support Army After Next and equivalent USMC future concepts. • 902 - Complete test and evaluation of waterless kitchen sanitation and environmentally acceptable disposal of wastewater, and transition to Advanced Sanitation Center development program. <ul style="list-style-type: none"> - Develop components and systems for reliable passive cold storage and frozen food handling systems for field kitchens to enable more fresh and frozen foods while ensuring food safety, and transition to fielded kitchen improvements development program. - Investigate Liquid-Injection Cogeneration (heat and electric from one process) for potential dual-use applications in military field services (kitchen, showers, laundries, space heating, etc.) and residential and light industrial energy reliance. • 1238 - Investigate/evaluate evolving preservation technologies for ration components to exploit novel ingredients/processes for stabilizing structure and for controlling microbial growth to produce shelf stable, non-retorted ration components; optimize processing and packaging parameters for shelf-stable vegetables and fruit ration components. <ul style="list-style-type: none"> - Conceptualize the composition and configuration of a tailorable and modular combat ration, and design and test packaging concepts compatible with the tailoring of modules for either minimally or fully sustaining rations. - Evaluate and optimize nutraceutical products for ration supplementation to optimize combat effectiveness. • 1621 - Optimize processing variables of non-thermal and preconcentration processes on a range of selected ration components to reduce degradative effects, cube and weight; explore synergistic combinations of new thermal (ohmic and microwave) and non thermal (high pressure) technologies to reduce overall processing and produce stable, more acceptable, "just prepared" tasting rations; develop and optimize biosensor probes for quality determination of combat rations. <ul style="list-style-type: none"> - Evaluate concepts for bioengineering of high energy ration components, incorporation of complex "nutri-fuels" into rations for improved performance, stress reduction, and protein enhancement of ration components for improved nutritional quality. 		
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		PROJECT AH99
<ul style="list-style-type: none"> • 32 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs. 		
Total	4576	
FY 2000 Planned Program:		
<ul style="list-style-type: none"> • 1944 - Downselect or combine competing reformer approaches and integrate with fuel cell and kitchen thermal fluid heater; test and evaluate reformer with fuel cell and kitchen thermal fluid heater and transition to Advanced Technology Development for field kitchen technology demonstrations. 	<ul style="list-style-type: none"> - Design, fabricate, and test critical subsystems for Liquid-Injection Cogeneration including fluid, heat exchanger and expander for ultimate application to field food service equipment. - Develop concepts and identify high potential chemical subsystems for non-fossil fuel heater/chiller/electric systems for field feeding to support Army After Next and equivalent USMC future feeding scenarios. 	
<ul style="list-style-type: none"> • 928 - Complete development of miniaturized biosensor probe for food quality determination by field ration inspectors and transition to Advanced Technology Development. 	<ul style="list-style-type: none"> - Complete product development and process verification for microwave sterilized meals and transition to ration systems development program. 	
<ul style="list-style-type: none"> • 1992 - Complete studies on enhancers/antioxidants and packaging models for combat optimized ration components. 	<ul style="list-style-type: none"> - Conduct product evaluations on items produced by novel nonthermal methods for liquid removal of water in ration products. - Conduct test of engineering processes for production of carrier matrices for bioengineered protein systems for optimized future combat rations. - Complete test and selection of encapsulation methodologies/carriers for smart food components. - Conduct validation test of combat optimized ration components/supplements for suitability and acceptance. 	
Total	4864	
FY 2001 Planned Program:		
<ul style="list-style-type: none"> • 1751 - Integrate and test subsystems for Liquid-Injection Cogeneration for field kitchens, and transition to Advanced Technology Development. 	<ul style="list-style-type: none"> - Design and fabricate prototype nonfossil fuel food preparing and serving systems for field feeding to support Army After Next. 	
<ul style="list-style-type: none"> • 2196 - Complete testing of combat optimized ration components and transition to Advanced Technology Development. 	<ul style="list-style-type: none"> - Complete study on engineered carrier matrices for bioengineered proteins which provide performance enhancing nutrients in a portable easily consumed acceptable form. - Complete field test of products produced with nonthermal systems for the mechanical removal of liquid which reduce ration weight, volume and total logistics costs; transition to fielded individual ration improvement program. - Fabricate prototype quality status indicators that can be monitored externally by logistics personnel. 	
<ul style="list-style-type: none"> • 1124 - Design ration packaging systems that will mimic the environment to provide a single packaging material for all rations with reduced visible signature. 	<ul style="list-style-type: none"> - Assess biodegradable materials and fabricate a prototype biodegradable carton for shipboard use. 	
Total	5071	
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COST (In Thousands)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D283 Airdrop Advanced Technology	1625	1685	2823	2900	2902	2917	2194	2326	Continuing	Continuing
<p>Mission Description and Justification: This project provides applied research to enhance personnel and cargo airdrop capabilities. These are key capabilities for force projection, particularly into hostile areas. Areas of emphasis include parachute technology for improved performance, precision offset aerial delivery, soft landing system development, airdrop simulation, and low altitude/high speed airdrop systems technologies. Efforts will result in increased personnel safety, more survivable and more accurate cargo delivery and reduced personnel, aircraft, and cargo vulnerability.</p> <p>FY 1998 Accomplishments:</p> <ul style="list-style-type: none"> • 1115 - Demonstrated a gliding personnel parachute with 20% increase in maximum jump altitude and 25% increase in glide ratio as compared to the current MC-4 parachute. <ul style="list-style-type: none"> - Demonstrated a less than 10 ft/sec soft landing velocity of a 1000-lb payload using the retraction of a cluster of parachutes to allow for airdrop of critical items too fragile for airdrop with conventional systems. - Developed new canopy design and construction methods for a new lightweight, low bulk, low altitude, affordable cargo parachute. - Completed testing of the spring and magnetic air release valves for airbags for soft landing, and drive on/drive off capability. - Designed and constructed a pneumatic muscle for soft landing of payloads. • 510 - Applied soft landing modeling capabilities to the Advanced Tactical Parachute System development program (personnel) and cargo systems including incorporation of a novel pneumatic muscle technology and validated results with experimentally obtained data. <ul style="list-style-type: none"> - Demonstrated and validated steady state modeling capability for a variety of parachute systems utilizing a coupled parachute model executing on DoD High Performance Computers, which will enhance the efficiency of the parachute development process. - Incorporated a user defined wind option into state-of-the-art parachute inflation model and performed initial simulations of parachute system wind interactions for both Army and Air Force parachute delivery systems. - Pursued additional partnerships with the Air Force and the parachute industry to apply government parachute system models to experimental and development programs to assist these programs and validate the models. <p>Total 1625</p> <p>FY 1999 Planned Program:</p> <ul style="list-style-type: none"> • 1169 - Construct new prototype cargo parachutes based on the new design for a lightweight, low bulk, low altitude, affordable cargo parachute. <ul style="list-style-type: none"> - Downselect an air release valve and design and construct an airbag system prototype for roll-on/roll-off cargo airdrop. - Test the pneumatic muscle for soft landing of payloads. 										
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	0602786A Logistics Technology	D283
FY 1999 Planned Program: (continued)		
	- Investigate the new parafoil inflation method for cargo airdrop to increase reliability of full parafoil deployment.	
• 501	- Apply state-of-the-art parachute system models to analyze performance, minimize full-scale airdrop testing and assist in design trade-off decisions. Models include: soft landing; trajectory; and guidance navigation and control models.	
	- Complete first generation simulations of fully coupled 3D parachute inflation model on round systems and disreefing models of cross and gliding wing systems, validate results with experimental data.	
	- Demonstrate parachute/wind interaction model and validate from on-going science and technology programs in the Army and Air Force.	
• 15	- Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.	
Total	1685	
FY 2000 Planned Program:		
• 1209	- Demonstrate a smart airbag system for roll-on/roll-off cargo airdrop.	
	- Demonstrate soft landing of personnel by a combined parachute and pneumatic muscle system.	
	- Develop a concept for a pneumatic muscle soft landing system for heavy cargo using subscale testing and modeling and simulation.	
	- Investigate advanced, low-cost parafoil designs for improved flight and landing flare performance.	
• 614	- Apply state-of-the-art airdrop system models to attempt to reduce (by as much as 10%) the life cycle costs by: minimizing feasibility testing; providing predictions of system limitations; shortening development cycle times; and predicting the effects of system modifications.	
• 1000	- Develop concepts (e.g., precision and roll-on / roll-off) for development of an advanced air delivery system for the Strike Force vehicles; conduct trade-off analysis and lab testing.	
Total	2823	
FY 2001 Planned Program:		
• 1252	- Investigate soft landing technology using a combined airbag and pneumatic muscle system.	
	- Design and construct a full-scale pneumatic muscle soft landing system for heavy cargo airdrop.	
	- Construct and test an advanced, low-cost parafoil with improved flight and landing flare performance.	
	- Design and test low cost, affordable precision airdrop systems.	
• 648	- Incorporate additional advanced features into a second generation 3D high performance airdrop system model and validate with concurrent experimentation.	
	- Simulate airdrop systems of interest to DoD, transition results and package software into a user-friendly graphical user interface environment for use as an "airdrop virtual proving ground".	
• 1000	- Design and initiate component testing required for soft landing of the Strike Force Vehicle.	
Total	2900	
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