RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 2002

BUDGET ACTIVITY: 03 - Advanced Technology Development

PE NUMBER AND TITLE: 0603231F Crew Systems and Personnel Protection Technology

COST ($ in Thousands)		FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
	Total Program Element (PE) Cost	17,088	34,023	29,690	35,193	34,490	33,559	34,196	Continuing	TBD
2830	Decision Support and Cognitive Systems	5,500	7,435	6,238	7,695	7,008	6,434	6,387	Continuing	TBD
3257	Helmet-Mounted Sensory Technologies	11,588	9,534	5,938	6,124	5,398	5,497	5,595	Continuing	TBD
4923	Logistics Readiness and Sustainment	0	10,324	7,341	11,806	10,750	11,192	11,565	Continuing	TBD
4924	Distributed Mission Training Technology	0	6,730	7,532	6,664	7,369	7,387	7,392	Continuing	TBD
5020	Directed Energy Protective Systems	0	0	2,641	2,904	3,965	3,049	3,257	Continuing	TBD
	Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0

Note: In FY 2002, all activity previously reported in PE 0603106F will be reported in Project 4923 and all activity previously reported in PE 0603227F will be reported in Project 4924. In FY 2003, the Directed Energy Protective Systems program at Brooks AFB will move from Project 3257 to Project 5020 to align resources with the Air Force Research Laboratory organization.

(U) A. Mission Description

This program develops and demonstrates technologies to enhance human performance and effectiveness and enable the aerospace force. State-of-the-art advances are made to train personnel, protect and sustain warfighters, and improve human interfaces with weapon systems. The Decision Support and Cognitive Systems project develops and demonstrates crew system interface technologies and information operations technologies that promote effective decision-making, control, and execution in operational environments. The Helmet-Mounted Sensory Technologies project, develops, and demonstrates advanced operator interface technologies for multi-functional helmet-mounted displays and night vision devices, and laser eye protection. The Logistics Readiness and Sustainment project develops and demonstrates technologies that will protect the force, enhance logistics, and improve the design, deployability, performance, and support of current and future weapon

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE: February 2002
BUDGET ACTIVITY: 03 - Advanced Technology Development	PE NUMBER AND TITLE: 0603231F Crew Systems and Personnel Protection Technology

(U) A. Mission Description Continued

systems. The Distributed Mission Training Technology project develops and demonstrates advanced training, simulation, and mission rehearsal technologies. The Directed Energy Protective Technologies project develops and demonstrates advanced technologies for laser eye protection and for assuring safety of personnel involved with test, deployment, and operation of high-energy laser weapons. Note: In FY 2002, Congress added $1.0 million for Combat Automation Requirements Testbed and $1.0 million for Head-Mounted Technology.

(U) B. Budget Activity Justification

This program is in Budget Activity 3, Advanced Technology Development, since it develops and demonstrates technologies to protect and enhance the performance of Air Force personnel in operational environments.

(U) C. Program Change Summary ($ in Thousands)

		FY 2001	FY 2002	FY 2003	Total Cost
(U)	Previous President's Budget	17,319	32,356	34,775	TBD
(U)	Appropriated Value	17,479	34,356		
(U)	Adjustments to Appropriated Value				
	a. Congressional/General Reductions		-333		
	b. Small Business Innovative Research	-410			
	c. Omnibus or Other Above Threshold Reprogram				
	d. Below Threshold Reprogram	179			
	e. Rescissions	-160			
(U)	Adjustments to Budget Years Since FY 2002 PBR			-5,085	
(U)	Current Budget Submit/FY 2003 PBR	17,088	34,023	29,690	TBD

(U) Significant Program Changes:

Decrease in FY 2003 is to fund other priority Science and Technology programs.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)

DATE: February 2002

BUDGET ACTIVITY: 03 - Advanced Technology Development

PE NUMBER AND TITLE: 0603231F Crew Systems and Personnel Protection Technology

PROJECT: 2830

COST ($ in Thousands)		FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
2830	Decision Support and Cognitive Systems	5,500	7,435	6,238	7,695	7,008	6,434	6,387	Continuing	TBD

(U) A. Mission Description

This project provides technology to improve human combat performance, combat support performance, and aerospace safety through better information delivery and crew station integration, which are achievable through effective decision support and cognitive systems engineering. Crew stations represent the fundamental interface between the warfighter and equipment across the gamut of aerospace operations. To cope with the recognized data overload in command centers and weapon platforms, this project develops technologies to quantify requirements, develop information interfaces, and evaluate crew performance in selected operational environments. This project includes bioacoustic technologies to complement decision support and visual information technologies as part of an integrated solution to negate information overload in the Air Expeditionary Force environment, while improving sound cueing, voice communications, and hearing protection for weapon systems operators, command centers, and security forces. Note: In FY 2002, Congress added $1.0 million for Combat Automation Requirements Testbed.

(U) FY 2001 ($ in Thousands)

(U) $1,844 Developed and demonstrated human modeling technologies and simulation tools to verify crew performance requirements, reduce the cost and time for system developers to isolate and analyze critical operator tactics in simulated operational exercises, and supported clear accountability in design. Completed development of simulation software and demonstrated integration with human operator models using the High-Level Architecture. Completed a functional specification for using the modeling technology in a simulation-based testbed that supported establishing objective, performance-based crew system requirements.

(U) $2,950 Developed and demonstrated subsystems to protect the aircrew member during combat and emergency operations in current and future aircraft. Demonstrated life support technologies to address specific deficiencies observed in recent combat operations. Decreased risk of major injuries and fatalities for crewmembers, regardless of gender, ejecting at higher airspeeds while wearing Helmet-Mounted Devices (HMD) by developing head, neck, and eye protection for HMD technology during high-speed escape to 600 Knots Equivalent Air Speed threshold.

(U) $706 Developed and demonstrated advanced, user-tailored information management and portrayal technologies that enhance battlespace situational awareness for global-level and MAJCOM-level information operations centers to reduce decision-making bottlenecks. Continued to develop user-tailored visualizations promoting battlespace situational awareness. Demonstrated the capability for effective, time-critical information exchange operations between MAJCOM Network Operations and Security Centers.

(U) $5,500 Total

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)	DATE: February 2002

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
03 - Advanced Technology Development	0603231F Crew Systems and Personnel Protection Technology	2830

(U) A. Mission Description Continued

(U) FY 2002 ($ in Thousands)

(U)	$1,247	Develop and demonstrate human modeling technologies and simulation tools to verify crew performance requirements, reduce the cost and time for system developers to isolate and analyze critical operator tactics in simulated operational exercises, and support clear accountability in design. Complete feasibility demonstration for integrating human modeling technology in a simulation-based testbed to establish performance-based crew system requirements. Develop plan to extend human modeling and simulation technologies to make effective trade-off assessments of crew system concepts to quantify impact on performance, mission effectiveness, and affordability. Demonstrate feasibility of modeling teamwork, intra-team communications, and air center operations in support of effectiveness trades used during acquisition.
(U)	$3,466	Develop and demonstrate aircrew escape subsystems to protect the aircrew member during emergency ejection in current and future high-performance fighter aircraft. Develop head/neck protection systems and Helmet-Mounted Devices (HMDs) that will provide a decrease in head and neck injuries for crewmembers wearing HMDs during high-speed emergency ejections. Conduct windblast testing to verify head, neck, and eye protection are provided to 600 Knots Equivalent Air Speed.
(U)	$990	Develop and demonstrate user-tailored information management and portrayal technologies that enhance battlespace situational awareness for global-level and MAJCOM-level information operations centers to reduce decision-making bottlenecks. Continue to develop user-tailored visualizations promoting battlespace situational awareness. Develop and demonstrate tools to improve information operations planning, execution, and combat assessment within the information warfare flights of the numbered air forces. Perform cross-cultural analysis as a first step in developing a tool to support understanding of adversarial decision-making. Demonstrate the effectiveness of combat assessment tools in joint or Air Force specific exercises.
(U)	$742	Develop high performance bioacoustic hearing protection technologies to achieve 40-45 dB noise attenuation for personnel working in and around aircraft. Demonstrate improved noise attenuation performance metrics in laboratory and field environments. Integrate deep insert earplug technology to achieve 35-40 dB field attenuation.
(U)	$990	Develop and demonstrate technologies to enhance security force situational awareness and threat response time using acoustic sensors. Demonstrate that using an eight microphone array can increase signal to noise ratio for a given look angle, provide three-dimensional (3-D) sound localization, and provide a limited remote detection capability for security forces. Develop and evaluate acoustic algorithms for locating, tracking, and detecting threats. Begin to develop an information management concept for deployed security forces to improve situational awareness by using intelligent algorithms, 3-D audio, and audio symbology to code the detected threats and assist in threat intervention.
(U)	$7,435	Total

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)	DATE February 2002
BUDGET ACTIVITY 03 - Advanced Technology Development	PE NUMBER AND TITLE 0603231F Crew Systems and Personnel Protection Technology
	PROJECT 2830

(U) A. Mission Description Continued

(U) FY 2003 ($ in Thousands)

(U) $651 Develop and demonstrate human modeling technologies and simulation tools to justify crew performance requirements, reduce the cost and time for system developers to isolate and analyze critical operator tactics in simulated operational exercises, and support analysis of alternatives. Continue to extend human modeling and simulation technologies to make effective trade offs between crew system concepts and mission effectiveness. Begin to analyze and develop integrated crew system concepts to reduce manning within air operations centers, showing contribution of human modeling to substantiate time-critical targeting effectiveness and affordability.

(U) $2,761 Develop and demonstrate user-tailored information management and portrayal technologies that enhance battlespace situational awareness for global- and MAJCOM-level information warfare and aerospace operations centers to reduce decision-making bottlenecks. Transition and integrate initial version of combat assessment tools into joint and/or Air Force weapon systems. Develop effects-based adversarial decision-making process and model to characterize different types of adversary systems and assess alternative ways they may be favorably influenced by allied force actions. Develop speech recognition front-end and advanced visualization for operations centers' information management tool. Improve flow of time-critical targeting information into strike aircraft to enhance pilot situational awareness, exploiting capabilities inherent with helmet-mounted display technology.

(U) $910 Develop advanced high performance bioacoustic hearing protection systems to achieve 40-45 dB noise attenuation for personnel working in and around fighter aircraft, with a long-term goal of 50 dB protection. Demonstrate communication capability in 150 dB noise fields. Integrate deep insert earplug technology with active noise reduction to achieve 45 dB field attenuation. Demonstrate improved attenuation and user acceptability in laboratory and field environments.

(U) $1,000 Develop and demonstrate advanced technologies to enhance security force situational awareness and threat response time using acoustic sensors. Demonstrate to deployed security forces an information management concept that can improve situational awareness by using intelligent algorithms, three-dimensional (3-D) audio, and audio symbology to code the detected threats and assist in threat intervention. Demonstrate at a military exercise the operational payoff from using 3-D audio radios and helmets in a mobile patrol squadron. Begin to develop an automated threat assessment system using neural networks and a sound library to evaluate the severity and importance of detected noise.

(U) $916 Develop and demonstrate human-centered science and technology for the Air Force Information Operations (IO) community addressing Information in Warfare and Information Warfare needs. This research will provide the information operations warrior with tailored decision support systems, guidelines for effective selection of information warriors, IO simulators and training systems, improved operational shift schedules to increase personnel efficiency and effectiveness, enhanced decision-making tools, and automated tools to reduce operator task load.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)	DATE: February 2002	
BUDGET ACTIVITY: 03 - Advanced Technology Development	PE NUMBER AND TITLE: 0603231F Crew Systems and Personnel Protection Technology	PROJECT: 2830

(U) A. Mission Description Continued

(U) FY 2003 ($ in Thousands) Continued

Tools will be developed to influence human senses to enable perception management and deception, model and simulate human behavior, develop adversary cultural and decision models, and improve interaction and monitoring capability by determining effectiveness of automated tools in support of intelligence and information warfare units.

(U) $6,238 Total

(U) B. Project Change Summary

Not Applicable.

(U) C. Other Program Funding Summary ($ in Thousands)

(U) Related Activities:

(U) PE 0602202F, Human Effectiveness Applied Research.

(U) PE 0604706F, Life Support Systems.

(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.

(U) D. Acquisition Strategy

Not Applicable.

(U) E. Schedule Profile

(U) Not Applicable.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)

DATE: February 2002

BUDGET ACTIVITY: 03 - Advanced Technology Development

PE NUMBER AND TITLE: 0603231F Crew Systems and Personnel Protection Technology

PROJECT: 3257

COST ($ in Thousands)	FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
3257 Helmet-Mounted Sensory Technologies	11,588	9,534	5,938	6,124	5,398	5,497	5,595	Continuing	TBD

Note: In FY 2003, the Directed Energy Protective Systems program at Brooks AFB will move from Project 3257 to Project 5020 to align resources with the Air Force Research Laboratory organization.

(U) A. Mission Description

This project develops and demonstrates advanced technologies for ejection-safe multi-functional helmet-mounted displays (HMD), and night vision devices. Helmet-mounted tracker and display (HMT/D) technologies development will enable pilots to detect, identify, target, and launch weapons faster and more accurately. Development of improved aircrew night vision goggles (NVG) technologies will enhance aerial combat capabilities at night. Note: In FY 2002, Congress added $1.0 million for Head-Mounted Technology.

(U) FY 2001 ($ in Thousands)

(U) $7,758 Developed and demonstrated advanced HMT/D and subsystem technologies to improve mission effectiveness and pilot situational awareness during day and night missions in all-weather conditions. Developed and demonstrated the utility of color symbology on HMT/D. Integrated and demonstrated a miniature flat display to replace cathode ray tubes in HMT/Ds. Integrated a HMT/D into the air-to-ground strike mission. Continued to develop and demonstrate a high-luminance, high-resolution, low-voltage Active Matrix Organic Light Emitting Diode image source and an inertial head-mounted tracker.

(U) $2,565 Developed and demonstrated technologies for improved aircrew NVG to increase mission effectiveness and enhance air operations by allowing the pilot to perform daytime tactics at night. Continued to develop miniature image sources and smaller format filmless image intensifier tubes to provide aircrew members a wider field-of-view, improved low-light level resolution, and reduced halo. Integrated and evaluated laser eye protection (LEP) technologies with panoramic night vision goggles (PNVG). Integrated imagery insertion on PNVG for flight test.

(U) $1,265 Developed and demonstrated technologies that counter the laser threat, and permit the deployment and use of high-energy laser weapons. Continued to evaluate the biological effects of laser weapons and high-energy laser systems. Initiated aircrew evaluation of dye and dielectric stack technologies for infrared and visible laser eye protection. Conducted optical and performance evaluations, and began aircrew evaluations of airborne laser, and vision corrective LEP spectacles. Delivered Laser Range Safety Tool to missile test ranges to support flight testing of Airborne Laser and other high-energy laser systems.

(U) $11,588 Total

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)	DATE February 2002

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
03 - Advanced Technology Development	0603231F Crew Systems and Personnel Protection Technology	3257

(U) A. Mission Description Continued

(U) FY 2002 ($ in Thousands)

(U)	$4,586	Develop and demonstrate advanced helmet-mounted tracker and display (HMT/D) and subsystem technologies to improve mission effectiveness and pilot situational awareness during day and night missions in all-weather conditions. Demonstrate advanced symbology and video insertion on HMT/D for air-to-ground strike missions. Demonstrate inertial head tracker on HMT/D for air-to-ground strike missions. Develop and demonstrate high-brightness, high resolution, miniature flat panel display and assess utility as a replacement for cathode ray tube on future daytime HMT/Ds.
(U)	$2,104	Develop and demonstrate technologies for improved aircrew night vision goggles to increase mission effectiveness and enhance air operations by allowing the pilot to perform daytime tactics at night. Demonstrate miniature image sources and smaller format filmless image intensifier tubes to provide aircrew members a wider field-of-view, improved low-light level resolution, and reduced halo effects. Demonstrate Integrated Panoramic Night Vision Goggles (IPNVG) technologies integrated with laser eye protection (LEP) technologies. Continue flight evaluation of IPNVG and demonstrate imagery insertion in flight.
(U)	$2,844	Develop and demonstrate technologies that counter the multiple wavelength and agile laser threat and permit safe testing, deployment, and use of high-energy laser weapons. Continue evaluation of the biological effects of non-lethal laser weapons and high-energy laser systems. Finish aircrew evaluation of dye/dielectric stack combination LEP. Complete performance evaluation of vision-corrective prescription capability and airborne LEP of dielectric stack-based technologies, and begin aircrew evaluations of these devices. Demonstrate next generation rugate technology for visible wavelength protection. Continue assessment of laser glare effects on visual performance of human subjects wearing reflective LEP compared to combined dye/dielectric stack technologies.
(U)	$9,534	Total

(U) FY 2003 ($ in Thousands)

(U)	$2,947	Develop and demonstrate advanced HMT/D and subsystem technologies to improve mission effectiveness and pilot situational awareness during day and night missions in all-weather conditions. These technologies help pilots to detect, identify, target, and launch weapons faster and more accurately. Investigate and develop advanced symbology sets for tactical HMT/Ds to improve targeting, increase situational awareness, and reduce spatial disorientation. Integrate ultra-sonic transducers with inertial head tracker to improve tracker accuracy. Investigate utility of advanced daytime HMT/D incorporating miniature color display for future simulations and flight evaluations.
(U)	$1,534	Develop and demonstrate technologies for improved aircrew night vision goggles to increase mission effectiveness and enhance air operations by allowing the pilot to perform daytime tactics at night. Incorporate and evaluate laser hardening technologies for image intensifier tube.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)	DATE: February 2002

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
03 - Advanced Technology Development	0603231F Crew Systems and Personnel Protection Technology	3257

(U) A. Mission Description Continued

(U) FY 2003 ($ in Thousands) Continued

Integrate IPNVG with a HMT/D.

(U) $1,457 Develop and demonstrate subsystems to protect the aircrew member wearing Helmet Mounted Devices (HMDs) during emergency ejection in current and future high-performance fighter aircraft. Advanced head/neck protection systems will provide a decrease in head and neck injuries for crewmembers wearing HMDs during high-speed emergency ejections. Conduct tests to verify head, neck, and eye protection are provided to 600 Knots Equivalent Air Speed (KEAS) threshold, 700 KEAS objective.

(U) $5,938 Total

(U) B. Project Change Summary

Not Applicable.

(U) C. Other Program Funding Summary ($ in Thousands)

(U) Related Activities:
(U) PE 0602202F, Human Effectiveness Applied Research.
(U) PE 0602102F, Materials.
(U) PE 0603112F, Advanced Materials for Weapon Systems.
(U) PE 0603319F, Airborne Laser Program.
(U) PE 0604706F, Life Support Systems.
(U) PE 0604201F, Integrated Avionics Planning and Development.
(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.

(U) D. Acquisition Strategy

Not Applicable.

(U) E. Schedule Profile

(U) Not Applicable.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)

DATE: February 2002

BUDGET ACTIVITY: 03 - Advanced Technology Development

PE NUMBER AND TITLE: 0603231F Crew Systems and Personnel Protection Technology

PROJECT: 4923

COST ($ in Thousands)	FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
4923 Logistics Readiness and Sustainment	0	10,324	7,341	11,806	10,750	11,192	11,565	Continuing	TBD

Note: Prior to FY 2002, efforts in this project were reported in PE 0603106F, Project 2745.

(U) A. Mission Description

This project develops and demonstrates technologies that will enhance logistics, and improve the design, deployability, performance, and support of current and future weapon systems. This includes technology development to model and simulate intelligent behavior; improve the accuracy of logistics process modeling; create intelligent software agents to perfect human and logistics representation in large-scale military simulations; and create more effective logistics information systems. This project also develops and demonstrates technologies to incorporate human operator, maintenance, and support considerations into the weapon systems design process, and to make related data available electronically throughout weapon systems life cycles. The resulting efforts will reduce deployment airlift and footprint requirements, improve the logistics information system, and improve the command, control, and decision making in worldwide logistics management.

(U) FY 2001 ($ in Thousands)

(U) $0 FY 2001 activity reported in PE 0603106F, Project 2745.

(U) $0 Total

(U) FY 2002 ($ in Thousands)

(U) $1,820 Develop and demonstrate technologies that will enhance and streamline aircraft maintenance processes to improve the Air Force's ability to meet Air Expeditionary Force requirements by providing faster and more accurate methods of diagnosing and predicting component failures. Continue development of diagnostics capability to provide technicians with more effective tools for isolating faults on software intensive, reconfigurable systems found on modern aircraft and advanced aircraft systems currently in development. Begin development of a prognostics capability to accurately predict when a component will fail so that parts can be replaced before failure.

(U) $4,298 Develop and demonstrate intelligent software agents and realistic human behavior models. These software agents and models will add realism and fidelity to large-scale synthetic environments and war games, and improve the user interaction with logistics information systems. Develop intelligent agents that extend the role player's ability to monitor events and execute missions, and better represent logistics functions in synthetic exercises. Develop software agents that anticipate problems and offer decision options to command center personnel during mobility operations.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)	DATE: February 2002
BUDGET ACTIVITY: 03 - Advanced Technology Development	PE NUMBER AND TITLE: 0603231F Crew Systems and Personnel Protection Technology
	PROJECT: 4923

(U) A. Mission Description Continued

(U) FY 2002 ($ in Thousands) Continued

(U)	$4,206	Develop and demonstrate logistics technologies for improved deployment operations, supportability, and planning. These technologies will enhance deployments and mobility operations. Continue to develop technology to provide wing commanders and senior logisticians with advanced logistics information and management capabilities, including rapid access to real-time resources status information, proactive problem identification, decision support aids, and process tracking. Focus will be on the information feeds required to support the wing commander and senior logisticians in effectively assessing the wing logistics support status.
(U)	$10,324	Total

(U) FY 2003 ($ in Thousands)

(U)	$2,645	Develop and demonstrate intelligent software agents and realistic human behavior models. These computer agents and models will add realism and fidelity to large-scale synthetic environments and war games, and improve the user interaction with logistics information systems. Develop intelligent software agents that mimic the functionality of command/control echelons and opposing forces and that better represent logistics functions in synthetic exercises.
(U)	$3,054	Develop and demonstrate logistics technologies for improved deployment operations and improved system supportability. These technologies will maximize the efficiency and effectiveness of Air Force deployments and mobility operations in support of agile combat support initiatives and the emerging Air Expeditionary Force concepts. Continue to develop technology to provide wing commanders and senior logisticians with advanced logistics information and management capabilities, including rapid access to real-time resources status information, proactive problem identification, decision support, and process tracking. Initial software tool set will be tested and transitioned to users.
(U)	$1,642	Develop and demonstrate advanced user interface technologies to enhance the utility of Air Mobility Command's command and control systems. These interfaces will combine artificial intelligence software with automated, work-centered collaborative planning and decision support technologies. Command and control operators will have immediate access to integrated, decision quality information from multiple sources, thereby enabling faster, more accurate decision making and problem resolution during mobility operations.
(U)	$7,341	Total

(U) B. Project Change Summary

Not Applicable.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)	DATE: February 2002

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
03 - Advanced Technology Development	0603231F Crew Systems and Personnel Protection Technology	4923

(U) C. Other Program Funding Summary ($ in Thousands)

(U) Related Activities:
(U) PE 0602201F, Aerospace Flight Dynamics.
(U) PE 0602202F, Human Effectiveness Applied Research.
(U) PE 0603721N, Environmental Protection.
(U) PE 0604708F, Civil, Fire, Environmental, Shelter.
(U) PE 0604740F, Integrated Command & Control Applications.
(U) PE 0605801A, Programwide Activities.
(U) PE 0708011F, Industrial Preparedness.
(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.

(U) D. Acquisition Strategy

Not Applicable.

(U) E. Schedule Profile

(U) Not Applicable.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)

DATE: February 2002

BUDGET ACTIVITY: 03 - Advanced Technology Development

PE NUMBER AND TITLE: 0603231F Crew Systems and Personnel Protection Technology

PROJECT: 4924

COST ($ in Thousands)		FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
4924	Distributed Mission Training Technology	0	6,730	7,532	6,664	7,369	7,387	7,392	Continuing	TBD

Note: Prior to FY 2002, efforts in this project were reported in PE 0603227F, Project 2743.

(U) A. Mission Description

This project develops and demonstrates advanced training, simulation, and mission rehearsal technologies that will improve warfighter capabilities and mission readiness by enhancing operator and team performance skills. This effort includes the development of technologies that enable integration of computer models, live weapon systems, and weapon system simulators to portray the global battlespace, including all-weather, day/night flight operations, command and control, force protection, and aerospace operations. This project develops and demonstrates advanced training and simulation technologies that will improve warfighter readiness by enhancing mission training and mission rehearsal capabilities. Development and effective use of this global battlespace requires advances in training systems, interconnection, information, visual, and representation technologies. The resulting mission training and rehearsal capabilities will enhance the mission essential competencies of the combat and combat support individuals and teams that comprise the aerospace force.

(U) FY 2001 ($ in Thousands)

(U) $0 FY 2001 activity reported in PE 0603227F, Project 2743.

(U) $0 Total

(U) FY 2002 ($ in Thousands)

(U) $1,811 Advance warfighter training capabilities by developing and demonstrating representational technologies and training techniques for integrated aerospace operations training which includes training for aerospace, command and control, force protection, and warfighters. Techniques will increase fidelity of mission training and rehearsal systems, reduce the learning time for new operators, sustain critical mission competencies, and ensure that deployed personnel have the knowledge and skills to accomplish their mission. Demonstrate training benefits of distributed mission training technology for fighter aircraft individual flying skills, fighter weapons school, and aircrew training program. Complete development of a tactical decision trainer for security forces. Begin development of data capturing tools for crew and team performance assessment in both simulator and field environments. Design and develop technologies for realistic databases and electronic combat simulators.

(U) $1,983 Develop and demonstrate the application of information and communications technologies for realistic mission training and mission rehearsal

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)	DATE February 2002
BUDGET ACTIVITY 03 - Advanced Technology Development	PE NUMBER AND TITLE 0603231F Crew Systems and Personnel Protection Technology
	PROJECT 4924

(U) A. Mission Description Continued

(U) FY 2002 ($ in Thousands) Continued

in a distributed simulation environment. These technologies will increase readiness training by enabling more realistic employment of weapon systems within a horizontally and vertically integrated system of sensors, command and control, and weapons platforms. Design a communication bridge to enable virtual simulators, operating at different security levels, to interact with one another in a real-time simulation environment. Develop and demonstrate enhancements to the High-Level Architecture that will enable more rapid development of simulator federations and enhanced simulator performance. Develop a testbed for command and control training research with links to existing command and control centers. Evaluate techniques for integrating operational command and control systems into the Distributed Mission Training (DMT) environment.

(U) $1,584 Demonstrate advances in simulator visual system technologies through the development of high fidelity image generation, display, and databases. Advanced visual systems will provide operators greater visual definition to identify other aircraft, ground vehicles, roads, and bridges at realistic tactical ranges or to properly assess their aspect angle, increasing mission rehearsal capability for the warfighter. Continue development of a PC-based high resolution real-time image generator. Continue development of an ultra-high resolution laser projector for DMT simulators.

(U) $1,352 Develop and demonstrate technologies for high fidelity Night Vision Goggle (NVG) simulation to support and increase mission training, preview, and rehearsal capabilities. This development will reduce the cost of initial NVG qualification, allow for effective advanced night operation mission pretraining prior to in-aircraft training, and increase combat training realism by adding simulated weather, seasonal, and environmental changes. Test the use of an automated material classification toolset for rapid build of multi-spectral databases. This toolset may increase the capability to rapidly respond to world changes with realistic visualization of the new or changing operating areas. Evaluate effectiveness of on-line NVG and laser courseware, and assess impact of these technologies on mission effectiveness and risk management.

(U) $6,730 Total

(U) FY 2003 ($ in Thousands)

(U) $2,418 Advance warfighter training capabilities by developing and demonstrating representational technologies and simulation techniques for integrated training and rehearsal, which includes training for aerospace operations, command and control, force protection, and air base defense warfighters. Develop and validate training technologies and methods to enable deployed personnel to maintain mission essential skills. Implement and evaluate the next generation threat system in DMT testbed, while integrating with multi-hyperspectral and weather databases. Develop functional requirements for hyperspectral databases to support realistic sensor simulation.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)	DATE: February 2002
BUDGET ACTIVITY: 03 - Advanced Technology Development	PE NUMBER AND TITLE: 0603231F Crew Systems and Personnel Protection Technology / PROJECT: 4924

(U) A. Mission Description Continued

(U) FY 2003 ($ in Thousands) Continued

(U)	$1,845	Develop and demonstrate the application of information and communications technologies for realistic mission training and mission rehearsal in a distributed simulation environment. These technologies will increase readiness training by enabling more realistic employment of weapon systems within a horizontally and vertically integrated system of sensors, command and control, and weapons platforms. Demonstrate the capability to establish a High Level Architecture federation that provides aircrew and command and control training to geographically separate audiences. Demonstrate a High Level Architecture federation operating at multiple security levels.
(U)	$1,807	Demonstrate advances in simulator visual system technologies through the development of high fidelity image generator display, components, and databases. Advanced visual systems will provide operators enhanced cuing in simulated high-definition immersive environments and greater visual detail to identify other aircraft, ground vehicles, roads, and bridges at realistic tactical ranges, thus increasing mission rehearsal capability for the warfighter. Develop and demonstrate less expensive, optical infinity display components for the simulator. Develop and demonstrate a proof-of-concept ultra-high resolution, color laser projector. Integrate and evaluate high bandwidth PC-based image generator with high-resolution laser projector.
(U)	$1,462	Develop and demonstrate technologies for night vision device training and high fidelity Night Vision Goggle (NVG) simulation. This development will reduce the cost of initial NVG qualification and increase combat training realism. Complete generic NVG simulation and generic Forward Looking Infra-Red simulation using same tools used for NVG functionality, allowing for high-fidelity, completely correlated visible and sensor simulation imagery. Develop proof-of-concept for dual mode, covert and overt, external aircraft lighting for F-15C. Complete digital conversion of introductory and instructor courseware. Evaluate simulator-based training scenarios for initial qualification, spatial orientation, and advanced combat night operations.
(U)	$7,532	Total

(U) B. Project Change Summary

Not Applicable.

(U) C. Other Program Funding Summary ($ in Thousands)

(U) Related Activities:

(U) PE 0602202F, Human Effectiveness Applied Research.

(U) PE 0604227F, Distributed Mission Training.

(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)		DATE: February 2002
BUDGET ACTIVITY: 03 - Advanced Technology Development	PE NUMBER AND TITLE: 0603231F Crew Systems and Personnel Protection Technology	PROJECT: 4924

(U) D. Acquisition Strategy

Not Applicable.

(U) E. Schedule Profile

(U) Not Applicable.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)

DATE: February 2002

BUDGET ACTIVITY: 03 - Advanced Technology Development

PE NUMBER AND TITLE: 0603231F Crew Systems and Personnel Protection Technology

PROJECT: 5020

COST ($ in Thousands)	FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
5020 Directed Energy Protective Systems	0	0	2,641	2,904	3,965	3,049	3,257	Continuing	TBD

Note: In FY 2003, the Directed Energy Protective Systems program at Brooks AFB will move from Project 3257 to Project 5020 to align resources with the Air Force Research Laboratory organization.

(U) A. Mission Description

This project develops and demonstrates advanced technologies for laser eye protection (LEP) and for assuring safety of personnel involved with test, deployment, and operation of high-energy laser weapons. The project develops technologies to provide protection against laser threats and hazards, without compromising performance, vigilance, and mission effectiveness. It also develops tools and guidelines for testing and deploying high-energy laser systems and technologies to enhance personnel safety and effectiveness in aerospace operations.

(U) FY 2001 ($ in Thousands)

(U) $0 FY 2001 activity reported in PE 0603231F, Project 3257.

(U) $0 Total

(U) FY 2002 ($ in Thousands)

(U) $0 FY 2002 activity reported in PE 0603231F, Project 3257.

(U) $0 Total

(U) FY 2003 ($ in Thousands)

(U) $590 Develop and demonstrate LEP technologies in the form of spectacles and visors for aircrew and ground personnel to provide protection from lasers while minimizing negative impacts on vision. Evaluate protective performance, visual acuity impacts, life support equipment compatibility, and aircrew acceptability of next-generation, fixed-line tristimulus protection against multiple visible wavelengths.

(U) $1,330 Develop and demonstrate agile LEP technologies for aircrew and ground personnel. Technologies will result in a single device that can be used by all aircrew for protection against any/all laser hazards or threats. Continue development and integration of LEP with Integrated Panoramic Night Vision Goggles. Continue design, development, and evaluation of a Laser Familiarization Program for warfighters toward integration with Distributed Mission Training system. Continue supporting development and evaluation of a Laser Detector and Warning system toward integration into aircraft cockpits and with agile LEP.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)	DATE: February 2002

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
03 - Advanced Technology Development	0603231F Crew Systems and Personnel Protection Technology	5020

(U) A. Mission Description Continued

(U) FY 2003 ($ in Thousands) Continued

(U)	$721	Develop and demonstrate technologies that permit safe testing, deployment, and use of high-energy laser weapons. Integrate probabilistic Risk Assessment technology into laser range hazard assessment tools for use by test ranges with high-energy laser weapon systems, including airborne laser flight tests. Continue to evaluate the biological effects of high-energy laser systems. Conduct damage threshold studies on short pulse (sub-microsecond) high-energy laser pulses. Continue to evaluate the biological effects of non-lethal laser weapons.
(U)	$2,641	Total

(U) B. Project Change Summary

Not Applicable.

(U) C. Other Program Funding Summary ($ in Thousands)

(U) PE 0602102F, Materials.
(U) PE 0602202F, Human Effectiveness Applied Research.
(U) PE 0603112F, Advanced Materials for Weapon Systems.
(U) PE 0603319F, Airborne Laser Program.
(U) PE 0604706F, Life Support Systems.

(U) D. Acquisition Strategy

Not Applicable.

(U) E. Schedule Profile

(U) Not Applicable.