

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

DATE

**February 2000**

BUDGET ACTIVITY

**02 - Applied Research**

PE NUMBER AND TITLE

**0602702F Command Control and Communications**

COST (\$ in Thousands)	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	75,208	52,085	78,749	63,166	71,652	73,735	75,878	Continuing	TBD
624506 Surveillance Technology	11,137	5,116	0	0	0	0	0	Continuing	TBD
624519 Communications Technology	18,503	11,792	22,520	15,484	14,950	15,512	16,861	Continuing	TBD
624594 Information Technology	13,967	14,811	24,167	24,687	25,019	25,438	25,785	Continuing	TBD
624600 Electromagnetic Technology	12,878	6,992	10,593	7,272	6,966	7,118	7,210	Continuing	TBD
625581 Command and Control (C2) Technology	18,723	13,374	21,469	15,723	24,717	25,667	26,022	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0

Note: In FY 2001, the efforts performed in Project 624506, Surveillance Technology, will be preformed in Project 624594, Information Technology, and in PE 0602204F, Project 627622. In FY 2001, portions of work previously performed in PE 0602204F, Project 626096, Project 622003, and Project 627622 move to this PE, Project 624594, Information Technology, Project 625881, Command and Control Technology, and Project 624519, Communication Technology, respectively. This realignment aligns projects with the Air Force Research Laboratory organizational structure.

**(U) A. Mission Description**

This program develops the technology base for Air Force Command, Control, and Communications (C3). Advances in C3 are required to increase warfighter readiness by providing the 'right information, at the right time, anywhere in the world' to the Command and Control (C2) warrior. Current developments include: improving effectiveness and survivability through assured, secure communications; improving processing and presentation of information for real-time battle management; improving the timeliness and quality of data acquisition for decision making; and the technologies, tools, and techniques to protect the critical C3 infrastructure. The program addresses four technology areas: communications; information; electromagnetic; and command and control.

Note: In FY 2000, Congress added \$7.0 million for Electromagnetic Technology, \$0.8 million for Distributed Agent-based C2 Planning, \$0.6 million for Common Battle Space Algorithms/Processing, \$0.6 million for Intelligent Networks for Global Information Assurance, \$0.4 million for Computer Forensics, and \$0.4 million for Real-time Knowledge-based Sensor-to-Shooter Decision Making.

UNCLASSIFIED

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

DATE  
**February 2000**

<b>BUDGET ACTIVITY</b> <b>02 - Applied Research</b>	<b>PE NUMBER AND TITLE</b> <b>0602702F Command Control and Communications</b>
--	--

(U) **B. Budget Activity Justification**  
 This program is in Budget Activity 2, Applied Research, since it develops and determines the technical feasibility and military utility of evolutionary and revolutionary technologies.

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

	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
(U) Previous President's Budget (FY 2000 PBR)	71,661	46,448	52,283	
(U) Appropriated Value	72,175	52,148		
(U) Adjustments to Appropriated Value				
a. Congressional/General Reductions	-514	-18		
b. Small Business Innovative Research	-847			
c. Omnibus or Other Above Threshold Reprogram		-45		
d. Below Threshold Reprogram	4,814			
e. Rescissions	-420			
f. Other				TBD
(U) Adjustments to Budget Years Since FY 2000 PBR			26,466	
(U) Current Budget Submit/FY 2001 PBR	75,208	52,085	78,749	TBD

(U) **Significant Program Changes:**  
 In FY 2001, funds were added to Project 624519 to increase emphasis on assured communications, to Project 624594 to increase emphasis on information technology research, to Project 624600 to increase the emphasis on electromagnetic technology research, and to Project 625581 to increase emphasis on critical infrastructure protection.

**UNCLASSIFIED**

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)								DATE February 2000	
BUDGET ACTIVITY <b>02 - Applied Research</b>				PE NUMBER AND TITLE <b>0602702F Command Control and Communications</b>				PROJECT <b>624506</b>	
COST (\$ in Thousands)	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
624506 Surveillance Technology	11,137	5,116	0	0	0	0	0	Continuing	TBD
<b>(U) A. Mission Description</b>									
The Air Force requires advanced surveillance and fusion technologies to improve the performance and reduce the cost of Air Force surveillance systems. Major Applied Research areas of interest include: low-observable surveillance; passive surveillance; information fusion; and advanced processing technologies. Technologies being developed include: advanced passive bistatic radar; spatial coordinate and time processing techniques; sensor and data fusion; and advanced signal processors.									
<b>(U) FY 1999 (\$ in Thousands)</b>									
(U) \$1,462	Developed and demonstrated sensor performance analysis and software for synthetic aperture radar and moving target indicator from airborne and space-based platforms in hostile (jamming) scenarios.								
(U) \$2,775	Developed technologies and concepts for passive surveillance with emphasis on electronic support measures and airborne wideband bistatics for unmanned aerial vehicle platform applications.								
(U) \$3,900	Developed, tested, and demonstrated improved real-time multispectral and multisensor fusion techniques for enhanced air and space situational awareness. Implemented measures of merit for advanced distributed fusion system evaluation.								
(U) \$3,000	Designed architecture for an affordable, scaleable, teraflop information processor and augmented it to support rapid fusion processing.								
(U) \$11,137	Total								
<b>(U) FY 2000 (\$ in Thousands)</b>									
(U) \$1,589	Demonstrate and assess operational algorithms for processing massive global databases, to produce improved real-time multispectral and multisensor data fusion, delivering an enhanced air and space situational picture.								
(U) \$1,581	Develop multisensor fusion algorithms in a fully distributed environment. Complete development and demonstrate fusion quality measures validating enhanced performance.								
(U) \$1,946	Develop embedded, affordable, scalable, teraflop processing technologies for real-time information fusion and exploitation. Complete design and implementation technologies for fully programmable, scaleable, affordable teraflop processors for real-time fusion and processing.								
(U) \$5,116	Total								
<b>(U) FY 2001 (\$ in Thousands)</b>									
(U) \$0	Effort moved to Project 624594.								
(U) \$0	Total								
Project 624506			Page 3 of 15 Pages				Exhibit R-2A (PE 0602702F)		

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

DATE  
**February 2000**

BUDGET ACTIVITY  
**02 - Applied Research**

PE NUMBER AND TITLE  
**0602702F Command Control and Communications**

PROJECT  
**624506**

(U) **B. Project Change Summary**  
Not Applicable.

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

(U) Related Activities:

(U) PE 0603726F, Aerospace Information Technology Systems Integration.

(U) PE 0603789F, C3I Advanced 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**  
Not Applicable.

**UNCLASSIFIED**

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)								DATE February 2000	
BUDGET ACTIVITY <b>02 - Applied Research</b>				PE NUMBER AND TITLE <b>0602702F Command Control and Communications</b>				PROJECT <b>624519</b>	
COST (\$ in Thousands)	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
624519 Communications Technology	18,503	11,792	22,520	15,484	14,950	15,512	16,861	Continuing	TBD
<p>(U) <b><u>A. Mission Description</u></b>                      The Air Force requires technologies that enable assured, worldwide communications, and enable an agile Aerospace Expeditionary Force by providing the communication technologies which will allow reachback communications for distributed collaborative command and control (C2). The rapid build-up of U.S. presence abroad, via rapid application of air power, requires assured connectivity providing reliable, responsive, affordable transfer of information using all available communications media. This program provides the technologies for: multi-level, secure, seamless networks; advanced communications processors; anti-jam and low probability of intercept techniques such as spread spectrum and adaptive null steering; lightweight and phased array antennas; and modular, programmable, low-cost radios. It includes technologies for advanced processors and devices, advanced network protocols, intelligent communications management and control, advanced algorithms, and enabling processing techniques.</p>									
<p>(U) <b><u>FY 1999 (\$ in Thousands)</u></b></p>									
(U) \$3,414	Developed critical communications technologies (for imagery and video) employing programmable devices, processing technologies, and monolithic microwave integrated circuits to provide global connectivity to aerospace forces in the ultra-high frequency (UHF) and super-high frequency (SHF) spectrums. Analyze weight, cost, and drag for unmanned aerial vehicle (UAV) applications.								
(U) \$4,676	Developed assurance of service and universal transaction service technologies for improved security, survivability, timeliness, and reconstruction of communications networks.								
(U) \$4,639	Developed advanced communications signal processors, an advanced Smart Network protocol, advanced algorithms, and enabling processing technologies essential for survivable radio communications.								
(U) \$5,774	Developed Defensive Information Warfare (DIW) tools and technologies (i.e., pathology and forensics to detect and countermeasure break-ins) to ensure information protection and security of sensitive and encrypted Air Force information systems.								
(U) \$18,503	Total								
<p>(U) <b><u>FY 2000 (\$ in Thousands)</u></b></p>									
(U) \$4,300	Develop assured and survivable information and networking technologies enabling the capability for worldwide command, control and communication operations for Expeditionary Aerospace Forces. Develop assurance of services and universal transaction services technologies for improved security, survivability, and timeliness in a global, seamless, distributed communications network employing wireless and wired links.								
(U) \$5,053	Develop critical communications and signal processing technologies to provide adaptive, covert, anti-jam, and assured global battlespace								
Project 624519			Page 5 of 15 Pages				Exhibit R-2A (PE 0602702F)		

UNCLASSIFIED

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)		DATE
BUDGET ACTIVITY		PROJECT
<b>02 - Applied Research</b>	<b>0602702F Command Control and Communications</b>	<b>February 2000</b> <b>624519</b>
(U)	<b><u>A. Mission Description Continued</u></b>	
(U)	<b><u>FY 2000 (\$ in Thousands) Continued</u></b>	
	connectivity to aerospace forces and greatly reduce equipment footprint. Continue millimeter component development and the Smart Network Radio program.	
(U)	\$2,439	Develop Defensive Information Warfare tools and technologies to ensure information protection and security of sensitive and encrypted Air Force communication and information systems. Develop net visualization tools and attack indicators. Develop automated capability for computer forensics analysis.
(U)	\$11,792	Total
(U)	<b><u>FY 2001 (\$ in Thousands)</u></b>	
(U)	\$7,400	Develop assured and survivable information and networking technologies enabling the capability for worldwide command, control and communication operations for Expeditionary Aerospace Forces. Develop information systems and networking technologies for globally distributed information systems. Continue to develop technologies to provide managed, seamless global information exchange for Air Force, in a joint/coalition environment. Develop technologies to improve quality of service, robustness, security, and survivability of mission-critical information.
(U)	\$7,484	Develop critical assured communications and signal processing technologies to provide adaptive, covert, anti-jam, and assured global battlespace connectivity to aerospace forces and greatly reduce equipment footprint. Continue to develop and apply critical multiband and wideband wireless communications technologies for assured communications in Joint and Coalition environments.
(U)	\$7,636	Develop Defensive Information Warfare tools and technologies to ensure information protection and security of sensitive and encrypted Air Force communication and information systems. Continue to develop net visualization tools and attack indicators. Continue to develop automated capability for computer forensics analysis. Develop preemptive indicators, damage assessment, and recovery techniques.
(U)	\$22,520	Total
(U)	<b><u>B. Project Change Summary</u></b>	
	Not Applicable.	
(U)	<b><u>C. Other Program Funding Summary (\$ in Thousands)</u></b>	
(U)	Related Activities:	
(U)	PE 0603726F, Aerospace Information Technology System Integration.	
(U)	PE 0603789F, C3I Advanced Development.	
(U)	This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.	
Project 624519		Exhibit R-2A (PE 0602702F)

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)		DATE
BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
<b>02 - Applied Research</b>	<b>0602702F Command Control and Communications</b>	<b>624519</b>
<p>(U) <b><u>D. Acquisition Strategy</u></b> Not Applicable.</p> <p>(U) <b><u>E. Schedule Profile</u></b> (U) Not Applicable.</p>		
Project 624519	Page 7 of 15 Pages	Exhibit R-2A (PE 0602702F)

**UNCLASSIFIED**

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)								DATE February 2000	
BUDGET ACTIVITY <b>02 - Applied Research</b>				PE NUMBER AND TITLE <b>0602702F Command Control and Communications</b>				PROJECT <b>624594</b>	
COST (\$ in Thousands)	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
624594 Information Technology	13,967	14,811	24,167	24,687	25,019	25,438	25,785	Continuing	TBD
<p>(U) <b><u>A. Mission Description</u></b>                      The Air Force requires technologies which improve and automate capabilities to generate, process, manage, fuse, exploit, interpret, and disseminate timely and accurate information. This project improves Global Awareness at all levels, enabling warfighters to understand relevant military situations on a consistent basis, with the timeliness and precision needed to accomplish their missions. Global Awareness is achieved by exploiting information provided by the Air Force and other government agencies. The information is fused to support Dynamic Planning and Execution via the Global Information Exchange distribution system. Knowledge, information, and data are archived in the Global Information Base for continued use and historical analysis. The information technologies required to achieve this capability are developed under this project in an affordable manner, and include appropriate access mechanisms for our coalition partners.</p>									
<p>(U) <b><u>FY 1999 (\$ in Thousands)</u></b></p>									
(U) \$3,067	Developed information exploitation capabilities for imagery and electromagnetic signals. Developed technology to transition the capability to tag targets in space and sort large volumes of communications in direct support of information superiority for global engagement.								
(U) \$4,800	Developed information warehousing and protein storage and retrieval technologies to provide timely warfighter access to a complete multimedia, multidimensional suite of Command, Control, Communications, Computers, and Intelligence information.								
(U) \$3,100	Developed technologies for real-time and stored data fusion to support target identification, dynamic planning, and weapons engagement.								
(U) \$3,000	Developed advanced technologies and approaches for the acquisition, analysis, and timely dissemination of intelligence information.								
(U) \$13,967	Total								
<p>(U) <b><u>FY 2000 (\$ in Thousands)</u></b></p>									
(U) \$4,551	Develop information exploitation technologies for imagery and electronic signals to increase global awareness. Automate multisensor and multimedia technologies to automatically detect and track targets using radiated signals across the entire spectrum for precision location and identification.								
(U) \$5,100	Develop and evaluate innovative multisensor collaborative fusion technologies in a fully distributed aerospace environment. Develop innovative multisensor collaboration system to fuse events in time and space, to locate and identify objects, and to project future behavior for spaceborne systems in a fully distributed fusion environment.								
(U) \$5,160	Develop global information base technologies for global, theater, and local situation awareness providing timely and accurate input to dynamic planning and execution operations. Develop information extraction technology to retrieve data from text and automatically put into structured formats enabling the warfighter to process large volumes of text faster and more effectively.								
Project 624594			Page 8 of 15 Pages				Exhibit R-2A (PE 0602702F)		

UNCLASSIFIED

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)		DATE
BUDGET ACTIVITY		PROJECT
<b>02 - Applied Research</b>	<b>0602702F Command Control and Communications</b>	<b>February 2000</b> <b>624594</b>
(U) <u>A. Mission Description Continued</u>		
(U) <u>FY 2000 (\$ in Thousands) Continued</u>		
(U) \$14,811	Total	
(U) <u>FY 2001 (\$ in Thousands)</u>		
(U) \$4,800	Develop information exploitation technologies for imagery and electronic signals to increase global awareness. Continue to develop multisensor, multimedia analytical techniques to automatically detect and track the presence and location of objects (target, non-targets both civilian and military) and extract changes in the information. Investigate advanced information dissemination techniques for seamless integration into the global information base via the global grid.	
(U) \$7,640	Develop and evaluate innovative multisensor collaborative fusion technologies in a fully distributed aerospace environment. Develop and evaluate collaborative multisensor technologies for near-real-time cueing and retasking of sensors for dynamic fusion of information, addressing surface, airborne, and spaceborne systems in a fully distributed environment.	
(U) \$5,081	Develop global information base technologies to achieve situational awareness at all command levels for the dynamic planning and execution process. Develop and investigate technology concepts that employ multiple levels of abstraction to rapidly extract information from globally distributed databases, to provide timely and accurate information to dynamic planning and execution operations. Continue to develop information extraction technology to retrieve data from text and automatically insert into structured formats, enabling the warfighter to process large volumes of text faster and more effectively.	
(U) \$2,674	Develop embedded, affordable, scalable, teraflop processing technologies for real-time information fusion and exploitation. Develop and evaluate technology for real-time information fusion and exploitation for Expeditionary Aerospace Force situational awareness that is 100 times more affordable than current embedded and radiation hardenable high performance processing systems.	
(U) \$1,812	Develop information technologies that significantly reduce the develop cost of complex electronic systems. Complete the development of a requirements modeling representation concisely capturing the engineering requirements for computer-aided simulation, verification, and analysis. Complete the research for making digital hardware models more reusable. Develop an interface between digital hardware models and battlespace models, enabling more of a system to be verified by simulation.	
(U) \$2,160	Develop modeling and simulation technologies to support next generation distributed collaborative environments. Evaluate, exploit and develop techniques to expand the capability while reducing the complexity of existing high-resolution models and simulations for the National Air and Space Warfare Model. Develop simulation techniques to provide accurate, real-time decision support for the next generation distributed collaborative environments.	
(U) \$24,167	Total	
Project 624594	Page 9 of 15 Pages	Exhibit R-2A (PE 0602702F)

UNCLASSIFIED

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)		DATE
BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
<b>02 - Applied Research</b>	<b>0602702F Command Control and Communications</b>	<b>624594</b>
<p>(U) <b><u>B. Project Change Summary</u></b> Not Applicable.</p> <p>(U) <b><u>C. Other Program Funding Summary (\$ in Thousands)</u></b> (U) Related Activities: (U) PE 0603726F, Aerospace Information Technology System Development. (U) PE 0603789F, C3I Advanced Development. (U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.</p> <p>(U) <b><u>D. Acquisition Strategy</u></b> Not Applicable.</p> <p>(U) <b><u>E. Schedule Profile</u></b> (U) Not Applicable.</p>		
Project 624594	Page 10 of 15 Pages	Exhibit R-2A (PE 0602702F)

**UNCLASSIFIED**

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)								DATE February 2000		
BUDGET ACTIVITY <b>02 - Applied Research</b>				PE NUMBER AND TITLE <b>0602702F Command Control and Communications</b>				PROJECT <b>624600</b>		
COST (\$ in Thousands)		FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
624600	Electromagnetic Technology	12,878	6,992	10,593	7,272	6,966	7,118	7,210	Continuing	TBD
<p>(U) <b><u>A. Mission Description</u></b>            This project conducts research in electromagnetics and photonics technologies for application to Intelligence, Surveillance, and Reconnaissance (ISR) Systems. Future surveillance, communications, and imagery/information processing systems will require improved technology for the generation, control, processing, and radiation of electromagnetic and optical energy to reduce system cost, improve system sensitivity, and increase processing rates. Promising technologies for improving ISR systems are electromagnetic propagation and scattering (from targets and clutter) and antennas. This project develops technology and control techniques for large phased array antennas, infrared focal plane array technology, and characterizes phenomena for low-observable surveillance.</p>										
<p>(U) <b><u>FY 1999 (\$ in Thousands)</u></b></p>										
(U)	\$4,384	Demonstrated digital beam nulling techniques and new computer codes for advanced surveillance and communications systems applications.								
(U)	\$1,177	Developed advanced electromagnetic materials and components capable of higher processing speeds for sensing and communications applications.								
(U)	\$5,500	Developed photonic sub-systems and components for control and processing of both data and radio frequency signals.								
(U)	\$1,817	Developed advanced concepts for electromagnetic apertures.								
(U)	\$12,878	Total								
<p>(U) <b><u>FY 2000 (\$ in Thousands)</u></b></p>										
(U)	\$2,000	Design and develop electromagnetic technologies for advanced surveillance and reconnaissance systems applications. Develop and evaluate algorithms for a digital beam-formed multibeam antenna.								
(U)	\$2,000	Design and develop antenna concepts for aerospace surveillance and reconnaissance applications. Develop and evaluate advanced concepts for large, lightweight arrays. Develop and evaluate a three-dimensional optically excited antenna array.								
(U)	\$2,992	Design and develop electro-optical technology to enable passive or active targeting of difficult targets. Investigate ways of mitigating atmospheric phenomenology effects on extended range aerospace sensors. Develop turbulence compensation techniques for precision targeting, target signatures and phenomenology models, and selected multifunction sensor target characteristics. Design and develop infrared focal plane array technology.								
(U)	\$6,992	Total								
Project 624600		Page 11 of 15 Pages					Exhibit R-2A (PE 0602702F)			

UNCLASSIFIED

<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)</b>		DATE <b>February 2000</b>
BUDGET ACTIVITY <b>02 - Applied Research</b>	PE NUMBER AND TITLE <b>0602702F Command Control and Communications</b>	PROJECT <b>624600</b>
<p>(U) <b><u>A. Mission Description Continued</u></b></p> <p>(U) <b><u>FY 2001 (\$ in Thousands)</u></b></p> <p>(U) \$3,421 Design and develop electromagnetic technologies for advanced surveillance and reconnaissance systems applications. Continue to develop and evaluate algorithms for a digital beam-formed multibeam antenna.</p> <p>(U) \$3,200 Design and develop antenna concepts for aerospace surveillance and reconnaissance applications. Continue to develop and evaluate advanced concepts for large, lightweight arrays. Continue to develop and evaluate a three-dimensional optically excited antenna array.</p> <p>(U) \$3,972 Design and develop electro-optical technology to enable passive or active targeting of difficult targets. Investigate ways of mitigating atmospheric phenomenology effects on extended range aerospace sensors. Continue to develop turbulence compensation techniques for precision targeting, target signatures and phenomenology models, and selected multifunction sensor target characteristics. Continue to design and develop infrared focal plane array technology.</p> <p>(U) \$10,593 Total</p> <p>(U) <b><u>B. Project Change Summary</u></b> Not Applicable.</p> <p>(U) <b><u>C. Other Program Funding Summary (\$ in Thousands)</u></b></p> <p>(U) Related Activities:</p> <p>(U) PE 0602204F, Aerospace Sensors.</p> <p>(U) PE 0603203F, Advanced Aerospace Sensors.</p> <p>(U) PE 0603789F, C3I Advanced Development</p> <p>(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.</p> <p>(U) <b><u>D. Acquisition Strategy</u></b> Not Applicable.</p> <p>(U) <b><u>E. Schedule Profile</u></b></p> <p>(U) Not Applicable.</p>		
Project 624600	Page 12 of 15 Pages	Exhibit R-2A (PE 0602702F)

**UNCLASSIFIED**

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)								DATE February 2000		
BUDGET ACTIVITY <b>02 - Applied Research</b>				PE NUMBER AND TITLE <b>0602702F Command Control and Communications</b>				PROJECT <b>625581</b>		
COST (\$ in Thousands)		FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
625581	Command and Control (C2) Technology	18,723	13,374	21,469	15,723	24,717	25,667	26,022	Continuing	TBD
<p>(U) <b><u>A. Mission Description</u></b>                      The Air Force requires Command and Control (C2) technologies which provide the next generation of weapon systems with improved processing and presentation of information for real-time battle management. Technologies being developed in this project will increase capability and quality, while reducing the cost of C2 systems and infrastructure. Work in this project focuses on developing advanced C2 systems capable of providing vast improvements in military decision making. The project develops technology for distributed systems, data bases, and fault tolerance mechanisms; and knowledge-based technologies and systems. It also develops the technologies, tools, and techniques required to ensure protection of critical Command, Control, Communications, and Intelligence infrastructure.</p>										
<p>(U) <b><u>FY 1999 (\$ in Thousands)</u></b></p>										
(U)	\$6,500	Developed intelligent information technologies including preplan-to-react planning technology for noncontinuous planning and tools and techniques for collaborative intelligent systems.								
(U)	\$6,123	Developed architecture-centered technology that provides easier-to-design and easier-to-maintain software for increased capability, quality, and reliability with reduced support cost.								
(U)	\$6,100	Developed distributed computing and database technology including collaborative workspaces shared across a distributed computing environment and optical storage multimedia database management systems.								
(U)	\$18,723	Total								
<p>(U) <b><u>FY 2000 (\$ in Thousands)</u></b></p>										
(U)	\$6,616	Develop the next generation of planning and assessment technologies and tools enabling aerospace commanders to determine and create the desired operational effects at the right place at the right time. Develop intelligent information technologies including planning technology for coalition C2. Develop high performance knowledge base technology for coordination and cooperative use of aerospace C2 resources.								
(U)	\$1,448	Investigate and develop technologies for the rapid development and application of next generation knowledge bases for C2 aerospace systems. Complete development of architecture-centered technology and modeling and analysis of evolvable software for increased capability, quality, and reliability of software-intensive systems. Develop techniques for knowledge base theory slicing, merging, and conflict resolution.								
(U)	\$5,310	Investigate, analyze, and develop intelligent information management and user interface systems that tailor visualization strategies, information, access, and assurance mechanisms based on C2 application parameters.								
(U)	\$13,374	Total								
Project 625581		Page 13 of 15 Pages				Exhibit R-2A (PE 0602702F)				

UNCLASSIFIED

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)		DATE
BUDGET ACTIVITY		PROJECT
<b>02 - Applied Research</b>	<b>0602702F Command Control and Communications</b>	<b>February 2000</b> <b>625581</b>
(U)	<b><u>A. Mission Description Continued</u></b>	
(U)	<u>FY 2001 (\$ in Thousands)</u>	
(U)	\$6,233	Develop the next generation of planning and assessment technologies and tools enabling aerospace commanders to determine and create the desired operational effects at the right place at the right time. Develop technologies to dynamically assess the battlespace, determine measures to create the desired effects, and provide near-real-time command of forces to execute those measures. Develop technologies to provide alternative courses of action and feasibility assessment in uncertain environments.
(U)	\$1,963	Investigate and develop technologies for the rapid development and application of next generation knowledge bases for aerospace command and control (C2) systems. Develop tools and techniques needed by an Expeditionary Aerospace Force for building very large comprehensive knowledge bases by rapidly formulating and creating new knowledge, along with capabilities to re-use, augment, and repair existing knowledge bases. Continue the development of techniques for knowledge base theory slicing and merging, conflict resolution, and context management. Investigate new techniques to allow users to enter, validate, and manipulate knowledge using natural language, sketching, and templating approaches.
(U)	\$6,294	Investigate, analyze, and develop technologies for automatic rapid reconfiguration of distributed intelligent information systems to varying crisis levels faced by Aerospace Expeditionary Forces. Develop and evaluate advanced display and human-computer interface technologies for current and next generation C2 systems.
(U)	\$1,979	Develop tools and techniques to promote assured performance and affordability of complex air and space platforms. Continue to develop new techniques for rapidly incorporating new functions into scaleable, open architecture systems. Develop dynamically reconfigurable aerospace systems using field programmable gate arrays. Develop concepts and preliminary designs for the next generation C2 global information systems which will allow the seamless insertion of highly autonomous unmanned airborne and spaceborne platforms for deployment against time-critical targets.
(U)	\$5,000	Develop the technologies, tools, and techniques required to ensure protection of critical command, control, and communications infrastructure. Develop the technologies which will allow a robust implementation of an overarching, integrated capability for protection of the global C3 infrastructure. Develop protection techniques with emphasis on integrity of information and availability of networks required for distributed, collaborative C2 systems.
(U)	\$21,469	Total
(U)	<b><u>B. Project Change Summary</u></b>	
	Not Applicable.	
Project 625581		Exhibit R-2A (PE 0602702F)

UNCLASSIFIED

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

DATE

February 2000

BUDGET ACTIVITY

**02 - Applied Research**

PE NUMBER AND TITLE

**0602702F Command Control and Communications**

PROJECT

**625581**

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

(U) Related Activities:

(U) PE 060361F, C3 Applications

(U) PE 0303401F, Communications-Computer Systems (C-CS) Security RDT&E

(U) PE 0603726F, Aerospace Information Technology Systems Integration

(U) PE 0603789F, C3I Advanced 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.