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

DATE: June 2001

BUDGET ACTIVITY: 03 - Advanced Technology Development

PE NUMBER AND TITLE: 0603601F Conventional Weapons Technology

	COST ($ in Thousands)	FY 2000 Actual	FY 2001 Estimate	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	19,552	22,523	37,617	23,827	24,428	23,723	24,222	24,734	Continuing	TBD
670A	Ordnance Technology	7,009	22,523	12,968	14,295	14,655	14,233	14,530	14,836	Continuing	TBD
670B	Guidance Technology	12,543	0	24,649	9,532	9,773	9,490	9,692	9,898	Continuing	TBD
	Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0	0

Note: In FY 2001, Project 670A and Project 670B were combined into a single project. In FY 2002, Project 670B was separated from Project 670A for clarity in describing the different technology development and demonstration programs. FY 2003 - FY 2007 budget numbers do not reflect the DoD strategy review results.

(U) A. Mission Description

The Conventional Weapons Technology program develops, demonstrates, and integrates ordnance and advanced guidance technologies for air-launched conventional weapons. The program includes two projects: (1) develops conventional ordnance technologies including warheads, fuzes, and explosives; and (2) develops advanced guidance technologies including seekers, navigation and control, and guidance.

(U) B. Budget Activity Justification

This program is in the Budget Activity 3, Advanced Technology Development, since it develops and demonstrates technologies for existing system upgrades and/or new system developments that have military utility and address warfighter needs.

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

		FY 2000	FY 2001	FY 2002	Total Cost
(U)	Previous President's Budget (FY 2001 PBR)	20,753	22,731	21,494	
(U)	Appropriated Value	21,033	22,731		
(U)	Adjustments to Appropriated Value				
	a. Congressional/General Reductions	-28			
	b. Small Business Innovative Research	-495			
	c. Omnibus or Other Above Threshold Reprogram	-637			
	d. Below Threshold Reprogram	-101			

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

		FY 2000	FY 2001	FY 2002	Total Cost
	e. Rescissions	-220	-208		
(U)	Adjustments to Budget Years Since FY 2001 PBR			16,123	
(U)	Current Budget Submit/FY 2002 PBR	19,552	22,523	37,617	TBD

(U) Significant Program Changes:

Fiscal Year 2002 increases are due to the recent DoD strategy review which increased funding for 63670B by $16M. The increase in funding will be used to enhance the Low Cost Autonomous Attack System (LOCAAS) Advance Technology Demonstration flight test program.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)	DATE: June 2001
BUDGET ACTIVITY: 03 - Advanced Technology Development	PE NUMBER AND TITLE: 0603601F Conventional Weapons Technology — PROJECT: 670A

COST ($ in Thousands)	FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
670A Ordnance Technology	7,009	22,523	12,968	14,295	14,655	14,233	14,530	14,836	Continuing	TBD

Note: In FY 2001, Project 670A and Project 670B were combined into a single project. In FY 2002, Project 670B was separated from Project 670A for clarity in describing the different technology development and demonstration programs.

(U) A. Mission Description

The Ordnance Technology project develops, demonstrates, and integrates ordnance technologies for enhancing the effectiveness of air-launched conventional weapons. The project develops conventional ordnance including warheads, fuzes, explosives, carriage and release, and munition integration technologies. This project improves capability for conventional ordnance supporting an Air Expeditionary Force.

(U) FY 2000 ($ in Thousands)

(U) $2,360 Developed and demonstrated advanced conventional armament warhead technologies, including heavy metal liners, less sensitive, high blast penetrator explosives, dense metal warhead cases, fragmentation of thick-walled penetrators, and advanced warhead shapes. These warhead technologies improved penetration and warhead metals designed for high impact loading and directional mass focusing. Also, these warhead technologies provided improved target penetration capabilities, enhanced kill probability against fragmentation sensitive targets, and reduced aircraft sorties that will improve pilot survivability and reduce aircraft attrition. Designed a warhead that is capable of defeating soft targets associated with chemical and biological production and storage facilities. Explored concepts for neutralizing chemical and biological agents with minimum collateral damage. Completed design of a tri-mode warhead and weapon electronics for lethal suppression of enemy air defenses, armor, and interdiction missions.

(U) $2,715 Developed and demonstrated advanced air-delivered munition fuze technologies including impact shock tolerance for hard target penetration, low-cost height of burst fuzing for fixed surface targets, and target imaging for mobile targets. These advanced fuze technologies will improve munitions effectiveness, and allow smaller warheads and munition airframes, thereby increasing strike aircraft load-outs and improving sortie effectiveness. Fabricated brassboard multiple-event, hard-target fuze and evaluated its performance by laboratory testing under high-G shock conditions expected for future penetrating weapons. Evaluated capability of tactical laser radar seeker to provide accurate fuzing information for tri-mode warhead.

(U) $1,934 Developed innovative, air-delivered munition carriage and release equipment, miniature weapon release concepts, and airframe size reduction concepts such as folding fins. These innovative concepts will provide the capability to safely carry and launch multiple small weapons, and provide communication between the aerospace vehicle and the weapons, thereby increasing weapon load-outs, improving sortie effectiveness, and reducing munition airlift requirements for current and future Air Force and Navy strike aircraft. Conducted concept evaluations to establish a

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BUDGET ACTIVITY 03 - Advanced Technology Development	PE NUMBER AND TITLE 0603601F Conventional Weapons Technology
PROJECT 670A	

(U) A. Mission Description Continued

(U) FY 2000 ($ in Thousands) Continued

low-risk, operational concept for Unmanned Combat Air Vehicle (UCAV) weapons employment. Completed affordable small munition dispenser design, fabricated wind tunnel model of small munition dispenser, and evaluated performance with wind tunnel tests. Fabricated brassboard small munition dispenser test hardware for ground and flight test.

(U) $7,009 Total

(U) FY 2001 ($ in Thousands)

(U) $4,040 Develop and demonstrate advanced conventional armament warhead technologies. These warhead technologies will provide improved target penetration capabilities, enhanced kill probability against fragmentation sensitive targets, and reduced sorties to improve pilot survivability and increase aircraft longevity. Ground test a chemical and biological defeat warhead to characterize effectiveness against production and storage capabilities. Continue developing and evaluating concepts for neutralizing a broad spectrum of chemical and biological agents. Fabricate the tri-mode warhead and associated weapon electronics, designed in FY 2000, for lethal suppression of enemy air defenses and weapons interdiction missions.

(U) $4,980 Develop and demonstrate advanced air-delivered munition fuze technologies. These fuze technologies will improve munitions effectiveness, and allow smaller warheads and munition airframes, thereby increasing strike aircraft load-outs and improving sortie effectiveness. Conduct initial field test of multiple-event, hard-target fuze brassboard design. Develop brassboard design of an integrated fuze, improved target detection device, and directional warhead package.

(U) $2,489 Develop innovative air-delivered munition carriage and release equipment, miniature weapon release concepts, and airframe size reduction concepts. The innovative concepts will provide the capability to safely carry, launch, and provide communication between the aerospace vehicle and the multiple miniature weapons, thereby increasing weapon load-outs and improving sortie effectiveness for current and future strike aircraft while reducing munition airlift requirements. Continue UCAV, miniature munition integration, and planning support for the flight test demonstration. Complete ground and flight test of brassboard small munition dispenser.

(U) $2,995 Develop and demonstrate advanced conventional armament seeker technologies. These advanced seeker technologies will be applied to the development of miniature munitions. The advanced seeker will have the capability to autonomously detect, acquire, and guide to targets of interest in adverse weather and battlefield conditions, thus increasing the probability of kill and minimizing collateral damage while providing increased weapons load-out and improving sortie effectiveness. Develop preliminary design of a terminal ladar seeker for a miniature munition that will be effective against high value fixed targets. Fabricate and captive flight test a low-cost, tactical sized laser radar terminal seeker for miniature munitions compatible with UCAV.

(U) $3,035 Develop and demonstrate advanced conventional armament navigation and control technologies to provide increased armament navigation

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BUDGET ACTIVITY 03 - Advanced Technology Development	PE NUMBER AND TITLE 0603601F Conventional Weapons Technology
PROJECT 670A	

(U) A. Mission Description Continued

(U) FY 2001 ($ in Thousands) Continued

accuracy, improved standoff range, enhanced weapon control and operation in electronic jamming environments. Initiate interface design between target detection device, fuze, directional warhead, and weapon terminal guidance seeker. Complete design and fabrication of an integrated laser radar (LADAR) terminal seeker and Global Positioning System/Inertial Navigation System (GPS/INS) navigation and control system.

(U) $4,984 Integrate advanced conventional guidance technologies to provide improved adverse weather performance, faster processing of target information, higher probability of target detection, and an operationally acceptable target false alarm rate. These advanced technologies will enhance the effectiveness of miniature munitions against both mobile and hardened fixed ground targets to reduce sortie rates, improve mission effectiveness, and reduce collateral damage. Complete flight readiness review and final subsystem integration of an autonomous guidance seeker against ground fixed and mobile targets. Conduct free flight tests and analyze flight test data of a powered miniature munition with integrated LADAR seeker and GPS/INS guidance to validate design and determine target false alarm rate.

(U) $22,523 Total

(U) FY 2002 ($ in Thousands)

(U) $4,296 Develop and demonstrate advanced conventional armament warhead technologies, including heavy metal liners, dense metal cases, and less sensitive explosives. The goals of these efforts are to destroy hardened targets by more effectively penetrating protective surfaces and enhance kill mechanisms against softer surface targets. Fabricate and test an innovative warhead capable of defeating a broad range of soft targets associated with development, production, and storage of chemical and biological weapons. Design a weapon capable of high-speed penetration of extremely hard targets by combining new warhead case technology, insensitive explosive, and multiple-event fuze.

(U) $4,980 Develop and demonstrate advanced air-delivered munition fuze technologies and mass focusing warhead technology to improve munition effectiveness, allowing smaller warheads and munition airframes, thereby improving sortie effectiveness by increasing strike aircraft load-outs. Sled test the multiple-event, hard target fuze in an ordnance package. Continue cooperative program with the United Kingdom to design an integrated fuze, an improved target detection device, and a directional warhead package. Design a fuze using Microwave Monolithic Integrated Circuit technologies that will give burst accuracy of 0.5 meter for weapons that have closure rates up to 2,500 meters/sec.

(U) $3,692 Develop and demonstrate conventional munition subsystem and platform integration technologies. These technologies include innovative air-delivered munition carriage and release equipment, miniature weapon release concepts, and reduced airframe size providing the capability to safely carry, launch, and communicate among the aerospace vehicle and multiple miniature weapons. These will increase weapon load-outs and improve sortie effectiveness for current and future strike aircraft while reducing munition airlift requirements. Integrate subsystems by combining ordnance and guidance subsystem technology into an effective payload size. Continue to integrate Unmanned Combat Air Vehicle

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)	DATE June 2001
BUDGET ACTIVITY: 03 - Advanced Technology Development	PE NUMBER AND TITLE: 0603601F Conventional Weapons Technology / PROJECT: 670A

(U) A. Mission Description Continued

(U) FY 2002 ($ in Thousands) Continued

with miniature munition concepts and support integration and planning of a Unmanned Combat Air Vehicle flight test demonstration. Design a low-cost, precision-guided weapon with a Circular Error Probable of 1.4 meter.

(U) $12,968 Total

(U) B. Project Change Summary

Not Applicable.

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

(U) Related Activities:

(U) PE 0602602F, Conventional Munitions.

(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: June 2001
BUDGET ACTIVITY: 03 - Advanced Technology Development	PE NUMBER AND TITLE: 0603601F Conventional Weapons Technology / PROJECT: 670B

COST ($ in Thousands)	FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
670B Guidance Technology	12,543	0	24,649	9,532	9,773	9,490	9,692	9,898	Continuing	TBD

Note: In FY 2001, Project 670A and Project 670B were combined into a single project. In FY 2002, Project 670B was separated from Project 670A for clarity in describing the different technology development and demonstration programs.

(U) A. Mission Description

The Guidance Technology project develops, demonstrates, and integrates affordable, autonomous, and adverse weather advanced guidance technologies for conventional armament delivered from manned and unmanned aerospace vehicles. This project includes development of conventional guidance including: terminal seekers; midcourse navigation sensors for standoff delivery weapons; and, target detection and identification processing algorithms for reducing target location error to improve target kill probability.

(U) FY 2000 ($ in Thousands)

(U) $3,899 Developed and demonstrated advanced conventional armament seeker technologies. The advanced seeker technologies enable the development of miniature munitions with the capability to autonomously detect, acquire, and guide to targets of interest including fixed targets and ground mobile, in adverse weather conditions. While increasing probability of kill and minimizing collateral damage, the miniature munitions provide the Air Force and Navy increased weapons load-out, improved sortie effectiveness, increased pilot survivability, and reduced aircraft attrition. Fabricated laser radar (LADAR) brassboard seekers to conduct ground and captive flight tests against fixed and mobile targets. Designed a tactical-sized seeker with increased range and resolution capability against a variety of ground targets in adverse terrain and weather conditions.

(U) $2,711 Developed and demonstrated advanced conventional armament navigation and control technologies, including weapon guidance laws, state vector estimators, autopilots, inertial navigation, aerodynamic control, and anti-jam global positioning system techniques. These technologies provided increased armament navigation accuracy, improved standoff range, and enhanced weapon control and operation in electronic jamming environments. Also, these technologies provided accurate and adverse weather standoff capability that will reduce aircraft attrition, increase pilot survivability, improve weapon accuracy, and increase probability of kill. Completed lattice wing design to extend range of small direct attack bomb. Fabricated lattice wing range extension kits and conducted flight tests to determine effectiveness.

(U) $5,933 Developed integrated advanced conventional guidance technologies, including seekers, navigation and control, and signal/image processing/algorithm technologies. Also, developed LADAR algorithms, super resolution techniques for millimeter wave seekers and synthetic aperture radars, optical processing techniques, and demonstrated advanced conventional armament guidance capabilities. These technologies provided improved adverse weather performance, faster processing of target information, higher probability of target detection, an operationally acceptable target false alarm rate, and more robust mission planning capabilities. Also, the technologies enhanced the effectiveness of miniature

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BUDGET ACTIVITY 03 - Advanced Technology Development	PE NUMBER AND TITLE 0603601F Conventional Weapons Technology
PROJECT 670B	

(U) A. Mission Description Continued

(U) FY 2000 ($ in Thousands) Continued

munitions against both hardened fixed targets and mobile ground targets to reduce sortie rates, improve probability of one kill per weapon, reduce logistics requirement by requiring fewer munitions, and decrease pilot workload. Fabricated autonomous guidance search and attack test hardware to demonstrate a capability against ground mobile targets. Investigated optical correlator technology for improving terminal accuracy in standoff weapons.

(U) $12,543 Total

(U) FY 2001 ($ in Thousands)

(U) $0 This work was performed in Project 670A.

(U) $0 Total

(U) FY 2002 ($ in Thousands)

(U) $2,551 Develop and demonstrate advanced conventional armament seeker technologies for miniature munitions' applications. These seeker technologies will autonomously detect, acquire, and guide to targets of interest in adverse weather and battlefield conditions. Also, the seeker technologies will increase the probability of kill and minimize collateral damage while providing increased weapons load-out and improved sortie effectiveness. Demonstrate laser radar (LADAR) terminal seeker for a miniature munition that will be effective against high-value fixed and mobile targets.

(U) $2,500 Develop and demonstrate advanced conventional armament navigation and control technologies to provide increased armament navigation accuracy, improved standoff range, enhanced weapon control, and operation in electronic jamming environments. Develop interface design between target detection device, fuze, directional warhead, and weapon terminal guidance seeker. Complete design and fabrication of an integrated LADAR terminal seeker and Global Positioning System/Inertial Navigation System (GPS/INS) navigation and control system.

(U) $3,598 Integrate advanced conventional guidance technologies including seekers, processors, controls, and algorithms. Provide improved adverse weather performance, faster processing of target information, higher probability of target detection, an operationally acceptable target false alarm rate, and enhance the effectiveness of miniature munitions against both mobile and hardened fixed ground targets. Complete flight readiness review and final subsystem integration of an autonomous guidance seeker against ground fixed and mobile targets. Conduct free flight tests and analyze flight test data of a powered miniature munition with integrated LADAR seeker and GPS/INS guidance to demonstrate design and determine target false alarm rate.

(U) $16,000 Enhance the current Low Cost Autonomous Attack System (LOCAAS) Advanced Technology Demonstration (ATD) program by adding more flight and ground testing. Additional LOCAAS ATD tasks include flight testing of a LOCAAS with a live warhead to demonstrate that the integrated technologies perform as expected; preparing the LOCAAS flight test vehicle for carriage and release from a tactical fighter aircraft;

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
03 - Advanced Technology Development	0603601F Conventional Weapons Technology	670B

(U) A. Mission Description Continued

(U) FY 2002 ($ in Thousands) Continued

continuing automatic target recognition algorithm development; designing the Low Cost Autonomous Attack System datalink to improve cooperative attack and communicate bomb damage assessment to the command and control network; and performing an evaluation of using electronic safe and arm fuzing.

(U) $24,649 Total

(U) B. Project Change Summary

Not Applicable.

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

(U) Related Activities:

(U) PE 0602602F, Conventional Munitions

(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.