

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)									DATE February 1999	
BUDGET ACTIVITY 2 - Applied Research				PE NUMBER AND TITLE 0602602F Conventional Munitions						
COST (\$ In Thousands)	FY 1998 Actual	FY 1999 Estimate	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	36,687	40,386	42,205	46,840	47,804	50,030	51,662	53,247	Continuing	Continuing
2068 Advanced Guidance Technology	15,173	16,465	14,403	18,089	18,718	20,245	20,562	19,314	Continuing	Continuing
2502 Ordnance Technology	21,514	23,921	27,802	28,751	29,086	29,785	31,100	33,933	Continuing	Continuing
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0	0
<p>(U) <b>A. Mission Description:</b> This Applied Research program investigates, develops and establishes the technical feasibility and military utility of advanced guidance and ordnance technologies for conventional munitions. The program includes development of: (1) advanced guidance technologies, including seekers, navigation and control, signal and image processing/algorithms, and simulation assessments for low-cost precision adverse-weather autonomous seekers; and (2) conventional ordnance technologies, including warheads, fuzes, explosives, munition integration, and lethality and vulnerability assessments. Payoff from this program is increased warhead penetration effectiveness, enhanced blast and fragmentation weapons, precision fuze control for increased probability of target kill, and precision terminal guidance for improved weapon effectiveness, and the capability to increase weapon standoff range while operating in adverse weather conditions.</p> <p>(U) <b>B. Budget Activity Justification:</b> 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.</p>										

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

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
(U) Previous President's Budget/FY 1999 PB	38,505	41,529	42,826	45,556	Cont
(U) Appropriated Value	40,772	41,529			
(U) Adjustments to Appropriated Value					
a. Congressional/General Reductions	-1,780	-1,143			
b. SBIR	-517				
c. Omnibus/Other Above Threshold Reprogrammings	-1,356				
d. Below Threshold Reprogrammings	-432				
(U) Adjustments to Budget Year Since FY 1999 PB			-621	1,284	
(U) Current Budget Submit/FY 2000 PB	36,687	40,386	42,205	46,840	Cont

(U) Significant Program Changes: Not Applicable.

FY 1999: \$658 identified as a source for SBIR.

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BUDGET ACTIVITY <b>2 - Applied Research</b>	PE NUMBER AND TITLE <b>0602602F Conventional Munitions</b>	PROJECT <b>2068</b>
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COST (\$ In Thousands)	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
2068 Advanced Guidance Technology	15,173	16,465	14,403	18,089	18,718	20,245	20,562	19,314	Continuing	Continuing

(U) **A. Mission Description:** This Applied Research project investigates, develops, and evaluates conventional munition advanced guidance technologies to establish technical feasibility and military utility. This project includes development of advanced guidance, including terminal seekers, navigation and control, signal and image processing/algorithms, and assessments for digital six degree-of-freedom simulations. Project payoffs include: adverse-weather and "launch and leave" precision guidance capability; increased number of kills per sortie; increased aerospace vehicle survivability; improved reliability and affordability; reduced test costs; shorter development programs; and improved survivability and effectiveness of conventional weapons.

(U) FY 1998 (\$ in Thousands):

- (U) \$4,236 Investigated and developed advanced component technology for low-cost precision adverse-weather autonomous seekers that will allow increased standoff launch ranges, reduced pilot workload, and improved aerospace vehicle survivability.
- (U) \$6,322 Investigated and developed advanced navigation and control technologies for current and future munitions that will decrease pilot workload and increase survivability.
- (U) \$2,339 Investigated and developed advanced optical and digital processors and advanced target detection/classification/identification algorithms for autonomous seekers that will provide the basis for smart autonomous weapons that will decrease pilot workload and increase survivability.
- (U) \$2,276 Investigated and developed detailed six degree of freedom and hardware-in-the-loop simulations and models for the analysis of guided munitions and their components to enable requirement studies, design iteration/evaluation, and experiment risk reduction. These advanced simulations will shorten development time, reduce development cost, and provide more effective munitions that will reduce cost per kill.
- (U) \$15,173 Total

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(U) FY 1999 (\$ in Thousands):

- (U) \$3,988 Investigate and develop advanced component technology for low-cost precision adverse-weather autonomous seekers that will allow increased standoff launch ranges, reduced pilot workload, and improved aerospace vehicle survivability.
- (U) \$8,338 Investigate and develop advanced navigation and control technologies for current and future munitions that will decrease pilot workload and increase survivability.
- (U) \$1,786 Investigate and develop advanced optical and digital processors and advanced target detection/classification/identification algorithms for autonomous seekers that will provide the basis for smart autonomous weapons that will decrease pilot workload and increase survivability.
- (U) \$2,085 Investigate and develop detailed six degree of freedom and hardware-in-the-loop simulations and models for the analysis of guided munitions and their components to enable requirement studies, design iteration/evaluation, and experiment risk reduction. These advanced simulations will shorten development time, reduce development cost, and provide more effective munitions that will reduce cost per kill.
- (U) \$268 Identified as a source for SBIR.
- (U) \$16,465 Total

(U) FY 2000 (\$ in Thousands):

- (U) \$4,467 Investigate and develop advanced component technology for low-cost precision adverse-weather autonomous seekers that will allow increased standoff launch ranges, reduced pilot workload, and improved aerospace vehicle survivability.
- (U) \$5,611 Investigate and develop advanced navigation and control technologies for current and future munitions that will decrease pilot workload and increase survivability.
- (U) \$2,586 Investigate and develop advanced optical and digital processors and advanced target detection/classification/identification algorithms for autonomous seekers that will provide the basis for smart autonomous weapons that will decrease pilot workload and increase survivability.
- (U) \$1,739 Investigate and develop detailed six degree of freedom and hardware-in-the-loop simulations and models for the analysis of guided munitions and their components to enable requirement studies, design iteration/evaluation, and experiment risk reduction. These advanced simulations will shorten development time, reduce development cost, and provide more effective munitions that will reduce cost per kill.
- (U) \$14,403 Total

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<p>(U) <u>FY 2001 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> <li>- (U) \$5,099 Investigate and develop advanced component technology for low-cost precision adverse-weather autonomous seekers that will allow increased standoff launch ranges, reduced pilot workload, and improved aerospace vehicle survivability.</li> <li>- (U) \$7,586 Investigate and develop advanced navigation and control technologies for current and future munitions that will decrease pilot workload and increase survivability.</li> <li>- (U) \$2,578 Investigate and develop advanced optical and digital processors and advanced target detection/classification/identification algorithms for autonomous seekers that will provide the basis for smart autonomous weapons that will decrease pilot workload and increase survivability.</li> <li>- (U) \$2,826 Investigate and develop detailed six degree of freedom and hardware-in-the-loop simulations and models for the analysis of guided munitions and their components to enable requirement studies, design iteration/evaluation, and experiment risk reduction. These advanced simulations will shorten development time, reduce development cost, and provide more effective munitions that will reduce cost per kill.</li> <li>- (U) \$18,089 Total</li> </ul> <p>(U) <b>B. <u>Project Change Summary - Description of Significant Changes:</u></b> Not Applicable.</p> <p>(U) <b>C. <u>Other Program Funding Summary:</u></b></p> <p>(U) <u>Related Activities:</u></p> <ul style="list-style-type: none"> <li>- (U) PE 0603601F, Conventional Weapons Technology.</li> <li>- (U) PE 0604314F, Advanced Medium Range Air-to-Air Missile.</li> <li>- (U) PE 0604940D, Central Test and Evaluation Improvement Program.</li> <li>- (U) PE 0604604F, Submunitions Development.</li> <li>- (U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.</li> </ul> <p>(U) <b>D. <u>Acquisition Strategy:</u></b> Not Applicable.</p> <p>(U) <b>E. <u>Schedule Profile:</u></b> Not Applicable.</p>		
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BUDGET ACTIVITY <b>2 - Applied Research</b>	PE NUMBER AND TITLE <b>0602602F Conventional Munitions</b>	PROJECT <b>2502</b>
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COST (\$ In Thousands)	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
2502 Ordnance Technology	21,514	23,921	27,802	28,751	29,086	29,785	31,100	33,933	Continuing	Continuing

(U) **A. Mission Description:** This Applied Research project investigates, develops, and evaluates technologies for advanced weapon dispensers, submunitions, safe and arm devices, fuzes, explosives, warheads for conventional weapons, and weapon airframe and carriage technology. It also assesses the lethality and effectiveness of current and planned conventional weapons technology programs and assesses the vulnerability of targets against which conventional weapons are designed. The payoffs include: improved storage capability and transportation safety of fully assembled weapons; improved non-nuclear warhead and fuze effectiveness; improved submunition dispensing; selectable multimode kill capability; low-cost airframe/subsystem components and structures; reduced aerospace vehicle/weapons drag and radar signature; and more thoroughly tested weapon systems and improved weapon lethality.

(U) FY 1998 (\$ in Thousands):

- (U) \$5,607 Investigated and developed high fidelity analytical tools including computational mechanics model for calculating weapons effects and assessing lethality and vulnerability. Quantified and characterized the coupling of destructive energy into the target, and the means to translate that information into advanced analytical methods for predicting weapon effectiveness. These tools will reduce development time and cost while providing more effective munitions to the Air Force.
- (U) \$3,060 Investigated and developed new affordable explosives that provide higher performance and lower sensitivity for development of advanced munitions that will provide more effective munitions to the Air Force and reduce cost per kill.
- (U) \$3,820 Investigated and developed advanced fuze, including safe and arm, technologies for current and future munitions that will reduce cost and provide increased weapons supportability, safety, and performance for the Air Force.
- (U) \$3,467 Investigated and developed advanced weapon control and carriage technologies for integrated ordnance packages with enhanced lethality for current and future air-to-ground and agile air-to-air missiles that will provide increased accuracy, lethality, and loadout while improving aircrew survivability and decreasing pilot workload.
- (U) \$5,560 Investigated and developed advanced warhead development technologies and advanced kill mechanisms to enhance munitions lethality that will allow reduced sortie rates and lower cost per kill.
- (U) \$21,514 Total

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<p>(U) <u>FY 1999 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> <li>– (U) \$6,698 Investigate and develop high fidelity analytical tools including computational mechanics model for calculating weapons effects and assessing lethality and vulnerability. Quantify and characterize the coupling of destructive energy into the target, and the means to translate that information into advanced analytical methods for predicting weapon effectiveness. These tools will reduce development time and cost while providing more effective munitions to the Air Force.</li> <li>– (U) \$2,178 Investigate and develop new affordable explosives that provide higher performance and lower sensitivity for development of advanced munitions that will provide more effective munitions to the Air Force and reduce cost per kill.</li> <li>– (U) \$3,282 Investigate and develop fuze, and safe and arm technology for advanced munitions that will reduce cost and provide increased weapons supportability, safety, and performance for the Air Force.</li> <li>– (U) \$4,695 Investigate and develop advanced control and carriage technologies for integrated ordnance packages with enhanced lethality for current and future air-to-ground and agile air-to-air missiles that will provide increased accuracy, lethality, and loadout while improving aircrew survivability and decreasing pilot workload.</li> <li>– (U) \$6,678 Investigate and develop advanced warhead development technologies and advanced kill mechanisms to enhance munitions lethality that will allow reduced sortie rates and lower cost per kill.</li> <li>– (U) \$390 Identified as a source for SBIR.</li> <li>– (U) \$23,921 Total</li> </ul> <p>(U) <u>FY 2000 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> <li>– (U) \$6,625 Investigate and develop high fidelity analytical tools including computational mechanics model for calculating weapons effects and assessing lethality and vulnerability. Quantify and characterize the coupling of destructive energy into the target, and the means to translate that information into advanced analytical methods for predicting weapon effectiveness. These tools will reduce development time and cost while providing more effective munitions to the Air Force.</li> <li>– (U) \$2,452 Investigate and develop new affordable explosives that provide higher performance and lower sensitivity for development of advanced munitions that will provide more effective munitions to the Air Force and reduce cost per kill.</li> <li>– (U) \$4,125 Investigate and developed fuze, and safe and arm technology for advanced munitions that will reduce cost and provide increased weapons supportability, safety, and performance for the Air Force.</li> <li>– (U) \$8,603 Investigate and develop advanced control and carriage technologies for integrated ordnance packages with enhanced lethality for current and future air-to-ground and agile air-to-air missiles that will provide increased accuracy, lethality, and loadout while improving aircrew survivability and decreasing pilot workload.</li> <li>– (U) \$5,997 Investigate and develop advanced warhead development technologies and advanced kill mechanisms to enhance munitions lethality that will allow reduced sortie rates and lower cost per kill.</li> <li>– (U) \$27,802 Total</li> </ul>		
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<p>(U) <u>FY 2001 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> <li>- (U) \$6,755 Investigate and develop high fidelity analytical tools including computational mechanics model for calculating weapons effects and assessing lethality and vulnerability. Quantify and characterize the coupling of destructive energy into the target, and the means to translate that information into advanced analytical methods for predicting weapon effectiveness. These tools will reduce development time and cost while providing more effective munitions to the Air Force.</li> <li>- (U) \$2,611 Investigate and develop new affordable explosives that provide higher performance and lower sensitivity for development of advanced munitions that will provide more effective munitions to the Air Force and reduce cost per kill.</li> <li>- (U) \$4,757 Investigate and develop fuze, and safe and arm technology for advanced munitions that will reduce cost and provide increased weapons supportability, safety, and performance for the Air Force.</li> <li>- (U) \$7,469 Investigate and develop advanced control and carriage technologies for integrated ordnance packages with enhanced lethality for current and future air-to-ground and agile air-to-air missiles that will provide increased accuracy, lethality, and loadout while improving aircrew survivability and decreasing pilot workload.</li> <li>- (U) \$7,159 Investigate and develop advanced warhead development technologies and advanced kill mechanisms to enhance munitions lethality that will allow reduced sortie rates and lower cost per kill.</li> <li>- (U) \$28,751 Total</li> </ul> <p><b>B. <u>Project Change Summary - Description of Significant Changes:</u></b> Not Applicable</p> <p>(U) <b>C. <u>Other Program Funding Summary:</u></b></p> <p>(U) <u>Related Activities:</u></p> <ul style="list-style-type: none"> <li>- (U) PE 0603601F, Conventional Weapons Technology.</li> <li>- (U) PE 0604314F, Advanced Medium Range Air-to-Air Missile.</li> <li>- (U) PE 0604602F, Armament Ordnance Development.</li> <li>- (U) PE 0604604F, Submunitions Development.</li> <li>- (U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.</li> </ul> <p>(U) <b>D. <u>Acquisition Strategy:</u></b> Not Applicable.</p> <p>(U) <b>E. <u>Schedule Profile:</u></b> Not Applicable.</p>		
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