

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 1999
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BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603216F Aerospace Propulsion and Power Technology
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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
Total Program Element (PE) Cost	31,398	36,867	38,778	39,061	37,895	35,081	29,504	30,335	Continuing	Continuing
2480 Aerospace Fuels and Atmospheric Propulsion	1,444	2,052	2,210	2,170	3,087	3,193	3,260	3,328	Continuing	Continuing
3035 Aerospace Power Systems Technology	3,133	3,388	3,162	2,511	2,724	4,261	4,350	4,441	Continuing	Continuing
681B Advanced Turbine Engine Gas Generator	26,821	31,427	33,406	34,380	32,084	27,627	21,894	22,566	Continuing	Continuing
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0	0

(U) A. Mission Description: This Advanced Technology Development program develops and demonstrates affordable turbine engine high pressure core components, advanced airbreathing engine concepts, high heat sink and thermally stable fuels, and power technology for aerospace vehicles. Anticipated technology advances include turbine engine improvements providing a 33% reduction in aircraft takeoff gross weight for tactical fighter aircraft and a 100% increase in aircraft range/loiter; ducted rocket improvements that increase missile average and terminal velocity by 50% and range by 100% for enhanced lethality; higher temperature fuels for propulsion and thermal management; an aircraft battery with a 20-year maintenance-free life expectancy; and electric aircraft power components projected to provide a two- to five-fold improvement in reliability and maintainability, a 20% reduction in power system weight, and enhanced survivability.

(U) B. Budget Activity Justification: This program is in 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.

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BUDGET ACTIVITY 3 - Advanced Technology Development			PE NUMBER AND TITLE 0603216F Aerospace Propulsion and Power Technology		
(U) C. <u>Program Change Summary (\$ in Thousands):</u>					
	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total</u>
(U) Previous President's Budget/FY 1999 PB	33,126	38,984	40,524	42,132	Cont
(U) Appropriated Value	35,183	36,984			
(U) Adjustments to Appropriated Value					
a. Congressional/General Reductions	-1,148	-117			
b. SBIR	-885				
c. Omnibus/Other Above Threshold Reprogrammings	-226				
d. Below Threshold Reprogrammings	-1,526				
(U) Adjustments to Budget Year Since FY 1999 PB			-1,746	-3,071	
(U) Current Budget Submit/FY 2000 PB	31,398	36,867	38,778	39,061	Cont
 (U) (U) Significant Program Changes: Changes to this program since the previous President's Budget are due to higher priorities within the Science and Technology (S&T) Program.					
FY 1999: \$1,195 identified as a source for SBIR.					

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BUDGET ACTIVITY 3 - Advanced Technology Development				PE NUMBER AND TITLE 0603216F Aerospace Propulsion and Power Technology				PROJECT 2480		
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
2480 Aerospace Fuels and Atmospheric Propulsion	1,444	2,052	2,210	2,170	3,087	3,193	3,260	3,328	Continuing	Continuing
<p>(U) A. Mission Description: Develops and demonstrates new thermally stable and high heat sink fuels and advanced fuel system components that minimize cost, reduce maintenance, and improve performance of aircraft and missiles. Emphasis is on demonstrating the effects/benefits of JP-8+100 on current systems, and advanced high temperature fuel system designs and components on upgraded and advanced systems. Demonstrates unconventional airbreathing propulsion subsystems such as ramjets, air turbo-rockets, dual-mode ramjets, and combined/advanced-cycle engines to assure future propulsion options for high-speed missiles.</p> <p>(U) <u>FY 1998 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> – (U) \$874 Demonstrated thermally stable JP-8+100 and high heat sink fuels that reduce fuel system maintenance on current aircraft and provide greater cooling capacity (performance) for upgraded and future aircraft and missiles. – (U) \$185 Demonstrated effectiveness of thermally stable JP-8+100 for reduced maintenance in a variety of aircraft. – (U) \$325 Demonstrated advanced fuel system designs and high temperature components that permit utilization of the increased cooling capacity of JP-8+100 and high heat sink fuels. – (U) \$60 Completed final documentation on Variable Flow Ducted Rocket technology and concepts. – (U) \$1,444 Total <p>(U) <u>FY 1999 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> – (U) \$1,364 Demonstrate thermally stable JP-8+100 and high heat sink fuels that reduce fuel system maintenance on current aircraft and provide greater cooling capacity (performance) for upgraded and future aircraft and missiles. – (U) \$211 Demonstrate effectiveness of thermally stable JP-8+100 for reduced maintenance in a variety of aircraft. – (U) \$311 Demonstrate advanced fuel system designs and high temperature components that permit utilization of the increased cooling capacity of JP-8+100 and high heat sink fuels. – (U) \$100 Develop and demonstrate the design and construction of critical high-speed propulsion components/structures for manned and unmanned applications which will provide technology at lower risk for future missile systems where time-to-target is critical and for next generation reconnaissance/strike vehicles and airbreathing boosters. – (U) \$66 Identified as a source for SBIR. – (U) \$2,052 Total 										
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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)		DATE February 1999
BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603216F Aerospace Propulsion and Power Technology	PROJECT 2480
<p>(U) <u>FY 2000 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> - (U) \$884 Demonstrate thermally stable JP-8+100 fuel that reduces fuel system maintenance on current aircraft and provides greater cooling capacity (performance) for upgraded and future aircraft and missiles. - (U) \$771 Demonstrate thermally stable JP-8+225 and high heat sink fuels that reduce fuel system maintenance on current aircraft and provide greater cooling capacity (performance) for upgraded and future aircraft and missiles. - (U) \$555 Develop and demonstrate the design and construction of critical high-speed propulsion components/structures for manned and unmanned applications which will provide technology at lower risk for future missile systems where time-to-target is critical and for next generation reconnaissance/strike vehicles and airbreathing boosters. - (U) \$2,210 Total <p>(U) <u>FY 2001 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> - (U) \$868 Demonstrate thermally stable JP-8+100 fuel that reduces fuel system maintenance on current aircraft and provides greater cooling capacity (performance) for upgraded and future aircraft and missiles. - (U) \$760 Demonstrate thermally stable JP-8+225 and high heat sink fuels that reduce fuel system maintenance on current aircraft and provide greater cooling capacity (performance) for upgraded and future aircraft and missiles. - (U) \$542 Develop and demonstrate the design and construction of critical high-speed propulsion components/structures for manned and unmanned applications which will provide technology at lower risk for future missile systems where time-to-target is critical and for next generation reconnaissance/strike vehicles and airbreathing boosters. - (U) \$2,170 Total 		
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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)		DATE
BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced Technology Development	0603216F Aerospace Propulsion and Power Technology	2480
<p>(U) B. <u>Project Change Summary - Description of Significant Changes:</u> Not Applicable.</p> <p>(U) C. <u>Other Program Funding Summary:</u></p> <p>(U) <u>Related Activities:</u></p> <ul style="list-style-type: none">- (U) PE 0602203F, Aerospace Propulsion.- (U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication. <p>(U) D. <u>Acquisition Strategy:</u> Not Applicable.</p> <p>(U) E. <u>Schedule Profile:</u> Not Applicable.</p>		
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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)								DATE February 1999		
BUDGET ACTIVITY 3 - Advanced Technology Development				PE NUMBER AND TITLE 0603216F Aerospace Propulsion and Power					PROJECT 3035	
				Technology						
<i>COST (\$ In Thousands)</i>	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
3035 Aerospace Power Systems Technology	3,133	3,388	3,162	2,511	2,724	4,261	4,350	4,441	Continuing	Continuing
<p>(U) A. <u>Mission Description:</u> Develops and demonstrates aircraft and ground power systems including engine starters, auxiliary power units, and electrical power distribution systems. The principal focus is to provide a two- to five-fold improvement in reliability and maintainability and significantly reduced cost of ownership for aircraft and ground power systems. This will be accomplished by replacing fluid-powered (hydraulics/bleed air) accessories with electrically-powered systems. Representative improvements include increased reliability (900%), improved supportability (15-25%), and reduced vulnerability (15%).</p> <p>(U) <u>FY 1998 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> - (U) \$941 Designed, fabricated, and tested an electrical distribution system which ensures fault tolerant architecture, improving aircraft reliability and survivability. - (U) \$386 Designed, fabricated, and tested components supporting a demonstrator aircraft electrical distribution system for increased aircraft reliability and supportability. - (U) \$1,806 Designed, fabricated, and tested a demonstrator aircraft on-board Integrated Power Unit (IPU) which is critical for aircraft engine starting, auxiliary power, and emergency power. - (U) \$3,133 Total <p>(U) <u>FY 1999 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> - (U) \$444 Design, fabricate, and test an electrical distribution system which ensures fault tolerant architecture, improving aircraft reliability and survivability. - (U) \$958 Develop an aircraft electrical power generation and distribution system for test validation and flight demonstration which will ensure fault tolerant architecture and will improve aircraft reliability and survivability. - (U) \$1,876 Design, fabricate, and test a demonstrator aircraft on-board IPU which is critical for aircraft engine starting, auxiliary power, and emergency power. - (U) \$110 Identified as a source for SBIR. - (U) \$3,388 Total 										
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BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603216F Aerospace Propulsion and Power Technology	PROJECT 3035
<p>(U) <u>FY 2000 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> - (U) \$1,839 Develop an aircraft electrical power generation and distribution system for test validation and flight demonstration which will ensure fault tolerant architecture and will improve aircraft reliability and survivability. - (U) \$910 Design, fabricate, and test a demonstrator aircraft on-board Integrated Power Unit (IPU) which is critical for aircraft engine starting, auxiliary power, and emergency power. - (U) \$413 Design, fabricate, and test power sources for electrically-based aircraft for survival and emergency power. - (U) \$3,162 Total. <p>(U) <u>FY 2001 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> - (U) \$1,558 Develop an aircraft electrical power generation and distribution system for test validation and flight demonstration which will ensure fault tolerant architecture and improve aircraft reliability and survivability. - (U) \$70 Design, fabricate, and test a demonstrator aircraft on-board IPU which is critical for aircraft engine starting, auxiliary power, and emergency power. - (U) \$883 Design, fabricate, and test power sources for electrically-based aircraft for survival and emergency power. - (U) \$2,511 Total. <p>(U) B. <u>Project Change Summary - Description of Significant Changes:</u> Not Applicable.</p> <p>(U) C. <u>Other Program Funding Summary:</u></p> <p>(U) <u>Related Activities:</u></p> <ul style="list-style-type: none"> - (U) PE 0602203F, Aerospace Propulsion. - (U) PE 0602201F, Aerospace Flight Dynamics. - (U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication. <p>(U) D. <u>Acquisition Strategy:</u> Not Applicable.</p> <p>(U) E. <u>Schedule Profile:</u> Not Applicable.</p>		
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BUDGET ACTIVITY 3 - Advanced Technology Development				PE NUMBER AND TITLE 0603216F Aerospace Propulsion and Power Technology					PROJECT 681B	
<i>COST (\$ In Thousands)</i>	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
681B Advanced Turbine Engine Gas Generator	26,821	31,427	33,406	34,380	32,084	27,627	21,894	22,566	Continuing	Continuing
<p>(U) A. <u>Mission Description:</u> This project develops turbine engine gas generator technology to meet the requirements of current and future aircraft propulsion systems. The objective is to provide the continued evolution of technologies into an advanced gas generator in which the performance, cost, durability, repairability, and maintainability aspects can be assessed in a real engine environment. The gas generator, or core, is the basic building block of the engine and it consists of a compressor, a combustor, and a high pressure turbine. Experimental core engine testing enhances early, low-risk transition of key engine technologies into engineering development where they can be applied to derivative and/or new systems. These technologies are applicable to a wide range of military and commercial systems including aircraft, missiles, land combat vehicles, and ships. The Advanced Turbine Engine Gas Generator project supports the Integrated High Performance Turbine Engine Technology (IHPTET) program. IHPTET is a three phase, totally integrated DoD, Defense Advanced Research Projects Agency (DARPA), National Aeronautics and Space Administration (NASA), and industry program focused on doubling turbine engine propulsion capabilities while reducing cost of ownership. The IHPTET program structure provides continuous technology transition for military turbine engine upgrades and derivatives and has the added benefit of enhancing the U.S. turbine engine industry's international competitiveness and demonstrates affordable turbine engine high pressure core components.</p> <p>(U) <u>FY 1998 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> - (U) \$23,888 Designed, fabricated, and performance tested technology demonstration core engines to provide improved performance and fuel consumption for turbofan/turbojet engines for fighters, attack aircraft, bombers, and large transports. - (U) \$596 Designed, fabricated, and durability tested technology demonstration core engines to provide increased durability and affordability for turbofan/turbojet engines for fighters, attack aircraft, bombers, and large transports. - (U) \$2,337 Designed, fabricated, and tested technology demonstration core engines to provide improved performance and fuel consumption for turboshaft/turboprop and small turbofan engines for trainers, rotorcraft, special operations aircraft, theater transports, and large uninhabited air vehicles. - (U) \$26,821 Total 										
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BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603216F Aerospace Propulsion and Power Technology	PROJECT 681B
<p>(U) <u>FY 1999 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> - (U) \$25,558 Design, fabricate, and performance test technology demonstration core engines to provide improved performance and fuel consumption for turbofan/turbojet engines for fighters, attack aircraft, bombers, and large transports. - (U) \$650 Design, fabricate, and durability test technology demonstration core engines to provide increased durability and affordability for turbofan/turbojet engines for fighters, attack aircraft, bombers, and large transports. - (U) \$4,200 Design, fabricate, and test technology demonstration core engines to provide improved performance and fuel consumption for turboshaft/turboprop and small turbofan engines for trainers, rotorcraft, special operations aircraft, theater transports, and large uninhabited air vehicles. - (U) \$1,019 Identified as a source for SBIR. - (U) \$31,427 Total <p>(U) <u>FY 2000 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> - (U) \$26,918 Design, fabricate, and performance test technology demonstration core engines to provide improved performance and fuel consumption for turbofan/turbojet engines for fighters, attack aircraft, bombers, and large transports. - (U) \$2,488 Design, fabricate, and durability test technology demonstration core engines to provide increased durability and affordability for turbofan/turbojet engines for fighters, attack aircraft, bombers, and large transports. - (U) \$4,000 Design, fabricate, and test technology demonstration core engines to provide improved performance and fuel consumption for turboshaft/turboprop and small turbofan engines for trainers, rotorcraft, special operations aircraft, theater transports, and large uninhabited air vehicles. - (U) \$33,406 Total <p>(U) <u>FY 2001 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> - (U) \$24,663 Design, fabricate, and performance test technology demonstration core engines to provide improved performance and fuel consumption for turbofan/turbojet engines for fighters, attack aircraft, bombers, and large transports. - (U) \$5,417 Design, fabricate, and durability test technology demonstration core engines to provide increased durability and affordability for turbofan/turbojet engines for fighters, attack aircraft, bombers, and large transports. - (U) \$4,300 Design, fabricate, and test technology demonstration core engines to provide improved performance and fuel consumption for turboshaft/turboprop and small turbofan engines for trainers, rotorcraft, special operations aircraft, theater transports, and large uninhabited air vehicles. - (U) \$34,380 Total 		
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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced Technology Development	0603216F Aerospace Propulsion and Power Technology	681B
<p>(U) (U) B. <u>Project Change Summary - Description of Significant Changes:</u> Changes to this project since the previous President's Budget are due to higher priorities within the Science and Technology (S&T) Program.</p> <p>(U) C. <u>Other Program Funding Summary:</u></p> <p>(U) <u>Related Activities:</u></p> <ul style="list-style-type: none">- (U) PE 0602201F, Aerospace Flight Dynamics.- (U) PE 0602203F, Aerospace Propulsion.- (U) PE 0603202F, Aircraft Propulsion Subsystem Integration.- (U) PE 0602122N, Aircraft Technology.- (U) PE 0603210N, Aircraft Propulsion.- (U) PE 0603003A, Aviation Advanced Technology.- (U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.		
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BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603216F Aerospace Propulsion and Power Technology	PROJECT 681B
<p>(U) D. <u>Acquisition Strategy</u>: Not Applicable.</p> <p>(U) E. <u>Schedule Profile</u>: Not Applicable.</p>		
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