RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 1999		
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide BA3 Advanced Technology Development					R-1 ITEM NOMENCLATURE Advanced Aerospace Systems PE 0603285E, R-1 #32					
COST *(In Millions)*	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost To Complete	Total Cost
Total Program Element (PE) Cost	0.000	0.000	19.664	19.000	23.000	5.000	5.986	9.986	Continuing	Continuing
Advanced Aerospace Systems ASP-01	0.000	0.000	19.664	19.000	23.000	5.000	5.986	9.986	Continuing	Continuing

(U) Mission Description:

(U) The Advanced Aerospace Systems program element (PE) is budgeted in the Advanced Technology Development Budget Activity because it will address high payoff opportunities to dramatically reduce costs associated with advanced aeronautical systems or provide revolutionary new system capabilities for satisfying current and projected military mission requirements. Research and development of integrated system concepts, as well as enabling vehicle subsystems will be conducted. This new PE has been created to satisfy an Agency requirement for a dedicated host for aerospace research that has progressed beyond the applied research stage and no longer belongs in the 6.2 based Tactical Technology PE. Two of the three initial programs in FY 2000 are outgrowths of Tactical Technology efforts that were previously budgeted in PE0602702E.

(U) The Supersonic Miniature Air-Launched Interceptor (MALI) program will demonstrate an inexpensive supersonic air platform with a low cost uncooled infrared (IR) sensor to provide cruise missile defense by exploiting large rear aspect IR signatures and overtaking incoming missiles from the rear. As a further cost reduction, the program will leverage off the existing miniature air-launched decoy (MALD) program's technology and off board surveillance and tracking sensors to provide tail-on missile end game opportunities (MALD is funded in FY 1999 from Project TT-06, PE 0602702E). An advanced unmanned air vehicle avionics development effort will be incorporated into the MALI core program due to the required data transmit/receive configuration of the interceptor mission.

(U) The Navy and the Marine Corps have a need for affordable, survivable, vertical take-off and landing (VTOL) unmanned air vehicles (UAV) to support dispersed units in littoral and urban areas. The Defense Advanced Research Projects Agency (DARPA), in partnership with the Office of Naval Research (ONR) and industry, have formulated the Advanced Air Vehicle program (AAV) to explore two innovative vertical take-off and landing (VTOL) concepts with the potential for significant performance improvements that would satisfy stressing mission needs. The first, an advanced Canard Rotor/Wing (CRW) aircraft, offers the potential for a high speed (350 knots), rapid response capability from a VTOL unmanned air vehicle (UAV) with significant range (500 nm) and stealth improvements as compared to other VTOL concepts. Detailed design,

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fabrication and flight test of this scaled vehicle concept will be conducted to validate the command and control, stability and control system and aerodynamic performance required for vertical take-off, landing and hover via a rotating center wing which is stopped and locked in place for efficient high speed cruise. The second concept (A160), will exploit a hingeless, rigid, rotor concept to produce a VTOL UAV with very low disk loading and rotor tip speeds resulting in an efficient low power loiter and high endurance system. This unique concept offers the potential for significant increases in VTOL UAV range (>2000 nm) and endurance (>24-48 hours). Detailed design, fabrication and testing of this concept will be conducted to establish its reliability, maintainability and performance. The A160 and CRW programs were initiated in FY 1998 under PE 0602702E, TT-07, Aeronautics Technology, but are funded in ASP-01 beginning in FY 2000 in recognition that their technological maturation dictates Budget Activity 3 placement.

(U) The Advanced Space Transportation and Robotic Orbiter (ASTRO) program will develop one or more approaches to "affordably" place small (<100kg) payloads in space for the purpose of servicing, upgrading, or reconfiguring satellites. An important element of ASTRO is the projected economic impact of such capability on current space missions and its potential for enabling new space missions. Phase I program elements will address novel launch techniques (gas guns, small expendable vehicles, small recoverable vehicles); small payload concepts and designs (expandable replacement, subsystem replacement/upgrade, reconfiguration); robotic space operations; and modular, serviceable satellite designs. Given an economically viable and technically achievable approach from Phase I, Phase II will develop needed technologies and demonstrate the concept on orbit.

(U) Program Accomplishments and Plans:

(U) FY 1998 Accomplishments:

- Not Applicable.

(U) FY 1999 Plans:

- Not Applicable.

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(U) FY 2000 Plans:

- Advanced Air Vehicle (AAV): Continue fabrication and conduct hardware in the loop and ground testing of Canard Rotor/Wing (CRW) and A160 concepts. ($ 9.503 Million)

- Supersonic Miniature Air-Launched Interceptor (MALI): Conduct engine and low cost miniature sensor testing, fabricate, assemble and conduct ground and early risk reduction testing of air vehicle. Initiate detail test planning for flight demonstration of interceptor and collaborative formation mission. ($ 7.161 Million)

- Advanced Space Transportation and Robotic Orbiter (ASTRO): Conduct assessment and affordability analysis of potential launch concepts; preliminary design of preferred low cost launch systems, including the robotic transfer vehicle; develop test plan for launch demonstration; conduct preliminary design for satellite concepts that enable robotic on-orbit servicing and upgrade; conduct proof-of-concept tests for robotic servicing concepts. ($ 3.000 Million)

(U) FY 2001 Plans:

- Supersonic Miniature Air-Launched Interceptor (MALI): Continue fabricate, assemble and conduct ground testing. Perform supersonic engine flight verification and seeker/warhead verification. Conduct Flight Demonstration of supersonic vehicle interceptor and collaborative formation flying mission. ($ 9.000 Million)

- Advanced Space Transportation and Robotic Orbiter (ASTRO): Perform critical design review for preferred launch concept, robotic transfer vehicle, and spacecraft; conduct critical component launch demonstration. ($ 10.000 Million)

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(U) Program Change Summary (*In Millions*)

	FY1998	FY 1999	FY 2000	FY 2001
Previous President's Budget	0.000	0.000	0.000	0.000
Current Budget	0.000	0.000	19.664	19.000

(U) Change Summary Explanation:

FY 2000-01 Increases reflect transfer of the Advanced Air Vehicle and expansion/further application of MALD technologies previously funded in PE 0602702E, and initiation of the Supersonic Miniature Air-Launched Interceptor (MALI) program.

(U) Other Program Funding Summary Cost:

- Not Applicable.

(U) Schedule Profile:

Plan	Milestones
Oct 99	Canard Rotor/Wing (CRW) Critical Design Review.
Nov 99	Conduct Supersonic Miniature Air-Launched Interceptor (MALI) Requirements Definition.
Feb 00	Canard Rotor/Wing Detailed Design Review.
Jan 00	Flight test A160 air vehicle.
Jan 00	Select preferred Advanced Space Transportation and Robotic Orbiter (ASTRO) system concept.

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Jan 00	Perform MALI Critical Design Review after conducting performance trades.
Jan 00	Conduct Preliminary Design Review (PDR) for ASTRO System.
Jun 00	Complete CRW ground testing.
Aug 00	Complete A160 flight control system testbed flights.
Aug 00	Complete ASTRO Flight Test Demonstration Plan.
Sep 00	Conduct ASTRO Proof-of-Concept demonstration.
Nov 00	MALI demonstrates higher thrust output of TJ-50 derivative.
Dec 00	Conduct Critical Design Review (CDR) for ASTRO System.
Mar 01	Demonstrate SLCCMI low cost seeker requirements.
Jun 01	MALI Supersonic Flight Demo.
Sep 01	Complete ASTRO Critical Component Demonstration.