News Release

Defense Advanced Research Projects Agency

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QUIET SUPERSONIC PLATFORM PHASE II CONTRACTORS SELECTED

The Defense Advanced Research Projects Agency (DARPA) has selected performers for Phase II of the Quiet Supersonic Platform (QSP) program.

Two companies will continue work in the systems studies segment of the QSP program. These system integrators will update their aircraft designs and technology assessments based on revised program goals, perform validation of their designs, perform utility and cost analysis, and develop technology maturation roadmaps:

- Lockheed Martin, Advanced Development Company, Palmdale, Calif., received $2,427,009 in funding, March 25, 2002
- Northrop-Grumman Corporation, El Segundo, Calif., received $2,699,780 in funding, March 14, 2002

Arizona State University, Tempe, Ariz., received $700,000 for Phase II of their project to demonstrate distributed roughness to inhibit crossflow instabilities for natural laminar flow on swept wings.

General Electric, Cincinnati, Ohio, received $3,052,600 in Phase II funding in September 2001. They will conduct advanced propulsion systems studies, mature high-performance nozzle technology and advanced fan technology.

In a separate effort, Northrop-Grumman Corporation, El Segundo, Calif., received $3,435,537 to conduct a flight demonstration of direct sonic boom mitigation using a modified F-5E aircraft. The aircraft will be modified with a specially designed nose glove to produce a shaped sonic boom profile at the ground. The demonstration will include a wind tunnel test to validate computed sonic boom signature predictions, safety-of-flight wind tunnel tests to verify handling qualities of a modified F-5E, and finally a series of flight tests to validate the predicted persistence of shaped sonic booms. The program intends to demonstrate for the first time that an appropriately shaped aircraft will produce a mitigated sonic boom.

For Phase II, the QSP program adjusted the system goals to emphasize characteristics that are more relevant to a long-range supersonic military aircraft. The systems studies will focus on the refinement of vehicle designs. The quality of the vehicle design will depend on the ability of the system integrators to utilize advanced design methods and tools to update QSP vehicle concepts developed during Phase I. The vehicles will be optimized to meet revised sonic boom goals while maximizing range and payload performance. Lockheed Martin and Northrop Grumman will perform trade studies in collaboration with General Electric to quantify desirable

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propulsion performance, size, and weight. Contractors will fabricate and test advanced structural components to failure to validate performance relative to predicted performance. The optimization of swept wing laminar flow to minimize drag using real wing configurations is an important aspect of the Phase II effort.

During the one-year Phase I, the program conducted a series of system studies in parallel with technology development activities. The airframe contractors performed system studies and developed initial designs while integrating elements provided by the technology and propulsion contractors. The challenging QSP goals drove the contractors to a portion of the design space that otherwise would not have been explored. The primary outcome of Phase I was the revelation that high efficiency and low sonic boom could be achieved simultaneously in a properly integrated vehicle.

In Phase I the contractors also determined the technology suite that has the biggest contribution to achieving program goals. Key technologies include passive supersonic laminar flow for decreased drag, configuration optimization for sonic boom reduction, propulsion integration including high efficiency inlets and nozzles for maximum propulsive efficiency, and advanced structural concepts and subsystems to minimize vehicle empty weight. A key finding was that no single breakthrough technology would enable a QSP-type vehicle. A range of technologies has to be properly integrated to approach the stringent sonic boom and performance goals.

The QSP program is focused on the validation of multiple breakthrough technologies to enable an aircraft to achieve sustained, long-range, supersonic flight with substantially mitigated sonic boom. The program is a two-year, $35 million effort to develop and validate advanced technologies for increased supersonic efficiency in conjunction with sonic boom reduction. DARPA believes that QSP technology development can enable a variety of breakthrough aircraft systems. Mitigated sonic boom has the potential to enable unrestricted supersonic flight over land, thereby reducing overall system costs. Integrated QSP technologies can enable a small military supersonic strike vehicle, which would perform more missions per day, deliver more weapons on target per unit time, and provide a rapid, long-range response capability.

The QSP program has performance goals well beyond any attempted before for supersonic flight. The single program requirement is a sonic boom reduction of an initial shock pressure rise of no greater than 0.3 pound per square foot. This is roughly one order of magnitude below what would be obtained for a conventional supersonic aircraft. Additional system goals include a gross vehicle take-off weight of 100,000 pounds, cruise speeds between Mach 2.0 and 2.4, an unrefueled range of 6000 nautical miles and a payload fraction of 20 percent. These performance measures contrast with those of the Concorde, which has a gross takeoff weight of 400,000 pounds, cruises at Mach 2 for 3550 nautical miles and has a payload fraction of approximately seven percent.

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Lockheed Martin and Northrop Grumman artists' concepts are shown below.

Lockheed Martin

Northrop Grumman

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