



Aeronautics

Mars Airplane

Autonomous collapsible airplane capable
of low atmospheric pressure maneuvers

NASA's Langley Research Center researchers have developed an airplane capable of being stowed in a confined volume and deployed in a high altitude environment for extended duration flight operations in a low-density atmosphere. Engineers, scientists, and end users can take advantage of this innovation that provides previously unattainable high altitude flight operations. The airplane is delivered to a specified altitude folded in a container or rocket. Once released, the plane unfolds and executes a pull-up maneuver to stabilize altitude. In addition, the current suite of onboard scientific instrumentation includes magnetometers, a mass spectrometer, and variable use cameras. NASA is seeking market insights on commercialization of the new airplane design, and welcomes interest from potential producers, users, and licensees.

BENEFITS

- ➔ Execution of a pull-up maneuver in a low-density atmosphere
- ➔ Sustained stable flight in thin atmospheric conditions
- ➔ Delivered via capsule
- ➔ Reliable deployment after extended storage

APPLICATIONS

- ➔ Climate monitoring
- ➔ Weather patterns
- ➔ High-resolution scientific measurements
- ➔ Terrain mapping
- ➔ Near-surface water
- ➔ Planetary magnetic field patterns
- ➔ Forest fire monitoring
- ➔ Storm tracking and research
- ➔ Search and rescue communication relay

technology solution



NASA Technology Transfer Program

Bringing NASA Technology Down to Earth

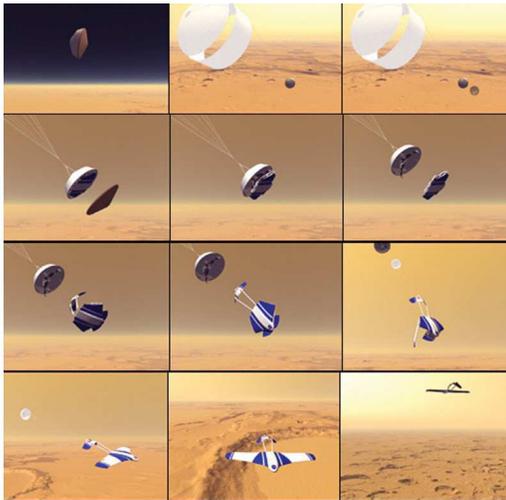
THE TECHNOLOGY

The airplane can be folded in a confined volume, transported by a carrier vehicle, and deployed after delivery to terrestrial or extra-terrestrial venues. The innovation includes the stowaway capsule, and the aerodynamic design of the airplane enables flight in low-density atmospheres such as on Mars. The airplane configuration includes the airfoil sections, folding method, and the outer mold line. The plane has the capability to maneuver in the Martian atmosphere at an atmospheric pressure comparable to 100,000 ft above sea level on Earth.

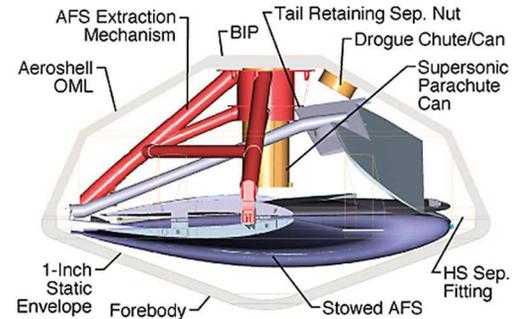
During flight operations, the airplane employs a host of scientific instrumentation for study of:

- Atmospheric properties such as composition, chemistry, and dynamic behavior
- Crustal magnetism for improved understanding of crustal evolution and tectonic history
- Near-surface hydrogen abundance to locate underground water and hydrated minerals

NASA developed the Mars airplane to improve measurement resolution capabilities beyond that of ground rovers and satellite surveyors. The use of an extended-flight, maneuverable airplane in low-density atmospheric conditions provides previously unavailable planetary research capabilities.



Artists rendition of the Mars airplane depicting entry, descent, and deployment sequence of events



Mars airplane in a stowed configuration

PUBLICATIONS

Patent No: 8,196,858

National Aeronautics and Space Administration

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NP-2014-09-1234-HQ

NASA's Technology Transfer Program pursues the widest possible applications of agency technology to benefit US citizens. Through partnerships and licensing agreements with industry, the program ensures that NASA's investments in pioneering research find secondary uses that benefit the economy, create jobs, and improve quality of life.

LAR-17514-1

