



X PRIZE Team Summary Sheet

AMERICAN ASTRONAUTICS



All the information given in this document has been cleared for official release by the X PRIZE Foundation and the American Astronautics Corporation team. Quotes provided by the American Astronautics Corporation team leader are shown in italics. For more information or if you have questions about the Spirit of Liberty project, please visit their web site at www.AmericanAstronautics.com/Projects/X-Prize/.

TEAM OVERVIEW

The American Astronautics Corporation team is a group of highly experienced aerospace management, engineering, and manufacturing professionals. Our synergistic combination of capabilities, experience, and commitment to excellence underscores all aspects of our development of low cost, commercial reusable launch vehicles.

TEAM LEADER BACKGROUND

Bill Sprague is a seasoned aerospace management and engineering R&D professional with over 30 years experience in the industry, spanning virtually all areas of rocket propulsion and launch vehicle development from concept through engineering development, testing, deployment, and operation. Mr. Sprague's career has taken him into the nation's major industry leaders, providing him with an exceptionally diverse technical and management background. Mr. Sprague has served in key technical lead and management roles on many major programs, including the Space Shuttle SRB, Trident C-4, Peacekeeper, Small ICBM, ICBM Strategic Force Modernization, Minuteman III propulsion and guidance upgrades, Space Shuttle SSME, Space Shuttle ascent flight program/contingencies development, Titan-Centaur, Atlas-Centaur, and Delta programs. Additionally, he has made significant contributions within many conceptual and advanced development efforts such as the Advanced Launch System, National Launch System, Single-Stage-To-Orbit, Evolved Expendable Launch Vehicle and National Missile Defense programs.

DATA AT-A-GLANCE

TEAM SPECIFICATIONS

- Name: American Astronautics Corporation
- Leader: Bill Sprague
- Place: California & Oklahoma, USA
- Registered with X PRIZE: 17 January 2003
- Web: www.AmericanAstronautics.com

VEHICLE SPECIFICATIONS

- Name: The Spirit of Liberty
- Length: 56 feet
- Diameter: 4 feet (booster), 5 feet (capsule)
- GTOW: 21875 pounds (including crew).
- Dry Weight: 8102 pounds (without passengers)
- Crew Environment: Pressurized cabin, crew seated by pairs in tandem configuration.
- Payload Capacity: 7 passengers
- No. of Engines: 1 primary (booster), 3 (capsule Separation/Emergency Escape System propulsion)
- Propulsion System: AAC American Eagle 1 booster (Pressure-fed liquid bi-propellant rocket)
- Fuel: RP-1 (HT kerosene)
- Oxidizer: LOX (liquid oxygen)
- Total Thrust: 35000 pounds at sea level
- Reaction Control System: Cold gas (booster), cold gas (capsule)
- Redundant computer controlled, inertial GNC w/GPS (booster and capsule individually).





MISSION SPECIFICATIONS

- Ascent Method: Vertical launch from stand
- Max. Accel. Force on Ascent: < 4g
- Alt. at Engine Cut-off: 119,000 feet
- Time at Engine Cut-off: 81 seconds
- Max. Speed: > Mach 4
- Max. Altitude: >110 km
- Time in Weightless Conditions: Not yet disclosed
- Reentry Method: Ballistic reentry with controlled aerobraking (booster and capsule separately)
- Accel. Forces on Descent: Not yet disclosed
- Landing Method: Gliding descent via parafoil, roughly horizontal ground landing on inflatable bags (both booster and capsule)
- Total Duration: Not yet disclosed.
- Landing Distance from Lift-off Location: < 1500 feet
- Time Between Missions: < 5 days (per vehicle)

VEHICLE/LAUNCH SYSTEM DESCRIPTION

Our entry, the Spirit of Liberty, is our first production unit of the AAC Starliner Model 7S rocketship, specifically designed for commercial operations serving the emerging commercial space tourism industry. Based on the AAC American Eagle 1 booster, the Spirit of Liberty will weigh about 22,000 pounds at liftoff with the booster producing some 35,000 pounds of thrust. The booster rocket is 4 feet in diameter while the diameter of the manned spacecraft is a little less than 5 feet. The entire vehicle is some 56 feet long.

PROPULSION SYSTEM

The American Eagle 1 booster is a liquid bi-propellant rocket utilizing a single pressure-fed engine with LOX/RP-1 propellants. The booster is specifically designed for exceptionally high reliability and safety incorporating extensive redundancy through all primary systems, coupled with state-of-the-art on-board health monitoring and control.

MISSION DESCRIPTION

Our approach, based on the legacies of the Mercury, Gemini, and Apollo programs, is the essence of reliability and safety. The passengers are seated in a sealed and pressurized capsule. All flight functions are automatic; the passengers have no duties except to enjoy the ride.

VEHICLE ASCENT

The rocket is essentially a single-stage vehicle that lifts off vertically from the spaceport and powered for 81 seconds, with mainstage cut-off at an altitude of about 119,000 feet and a speed exceeding Mach 4. The capsule is separated from the booster to continue its ascent into space. The booster subsequently executes a series of RTLS maneuvers to alter its trajectory for return to the spaceport.

WEIGHTLESSNESS

The capsule will coast to an altitude of well over 100 km (63 miles), then return back into the atmosphere, providing several minutes of weightlessness with spectacular views for the passengers.

VEHICLE DESCENT AND LANDING

The booster and capsule return separately. The capsule reenters the Earth's atmosphere at a specific attitude controlled by its on-board Reaction Control System. An aerobraking device is deployed in a controlled fashion to reduce its velocity to the subsonic without subjecting the passengers to undue accelerations. At a predetermined altitude, the main parafoil is deployed and unreefed in stages to control acceleration forces during deployment. The capsule, now flying in a controlled horizontal glide, executes a series of maneuvers for Return to Launch Site, and touchdown with deployed pressurized bags.



Under the action of aerodynamic forces, the booster reenters in a controlled, slow flat spin effectively slowing the descent via aerobraking, its velocity being reduced, with the assistance of a deployed drogue, to the sub-sonic at about 20,000 feet. A parafoil is subsequently deployed to slow its descent and provide a relatively horizontal glide back to the launch site for landing using a set of deployed pressurized bags.



HARDWARE & TESTS

Please refer to the company's web site for periodic updates and news releases.

PUBLICITY

PERSONAL APPEARANCES

- None yet disclosed.

TELEVISION AND RADIO

- None yet disclosed.

PRINT MEDIA

- None yet disclosed.

TEAM BACKGROUND

TEAM MEMBERS

- Please refer to the company web site at www.AmericanAstronautics.com

X PRIZE QUOTE

“The X Prize evidences that the spirit of exploration and that of competition originate from the same root – it draws upon the fundamental element of mankind, to further that which separates us from all other elements; that unnatural selection which draws us out to all reaches of the imagination. Indeed, as a species, we are driven to understand, to know, to touch all that we define as Universe. And such as that is, we must reach the stars and possess them. So early in process, this must ultimately be effort of not governments, but as mankind's common goal of existence. The X Prize Foundation serves as the single Center of Gravity with focus on these ends.” – Bill Sprague

PHILOSOPHY

“Adopting a Minimum-Cost-To-Flight philosophy, we leverage existing and well-established technologies and industry-proven approaches towards development and operation of affordable and reliable commercial space launch systems” – Bill Sprague

MISSION AND GOALS

“American Astronautics is actively developing a phased series of launch vehicles and support infrastructure towards meeting the needs of the emerging space tourism industry and other commercial markets.” – Bill Sprague

X PRIZE FOUNDATION

Below is contact information for the X PRIZE Foundation.

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