X PRIZE Team Summary Sheet
SCALED COMPOSITES

All the information given in this document has been cleared for official release by the X PRIZE Foundation and the Scaled Composites team. Quotes provided by Scaled Composites are shown in italics.
For more information about Scaled Composites, please visit their web site at www.scaled.com.

TEAM OVERVIEW

Scaled Composites, LLC (SC) was founded in April 1982 to develop research aircraft. The company currently employs 95 people at the Mojave, California airport. SC has been the world's most productive aerospace prototype development company. Most of SC's current projects are proprietary to the customer. SC is currently developing new composite manufacturing processes for application to general aviation, fighters, and new space launch vehicles.

TEAM LEADER BACKGROUND

Mr. Rutan worked for the U.S. Air Force from 1965 until 1972 as Flight Test Project Engineer at Edwards Air Force Base, California. Then in March 1972, he became director of the Bede Test Center for Bede Aircraft in Newton, Kansas. In June of 1974, at Mojave, California, Mr. Rutan formed the Rutan Aircraft Factory (RAF) to develop light homebuilt aircraft, and to market technical and educational documents. In April 1982, Mr. Rutan founded Scaled Composites, LLC.

DATA AT-A-GLANCE

TEAM SPECIFICATIONS

- Name: Scaled Composites, LLC
- Leader: Burt Rutan
- Place: Mojave, California, USA
- Registered with X PRIZE: 28 January 1997
- Web: www.scaled.com

VEHICLE SPECIFICATIONS

- Name: White Knight (first stage), SpaceShipOne (second stage).
- Wingspan: 82 feet (first stage), 16.4 feet (second stage)
- GTOW: Information not disclosed.
- Dry Weight: Information not disclosed.
- Crew Environment: Short-sleeved, pressurized cabin.
- Payload Capacity: Information not disclosed.
- No. of Engines: Two turbojet engines (first stage), one rocket engine (second stage)
- Propulsion System: afterburning J-85-GE-5 engines (first stage), hybrid engine (second stage)
- Fuel and Oxidizer: JP-1 (first stage), N_2O-HTPB (second stage)
- Total Thrust: 7,700 lb_f thrust (first stage), information not disclosed (second stage)
- Reaction Control System: Cold pressurized CO_2 gas.

MISSION SPECIFICATIONS

- Ascent Method to Ignition Alt.: Carrier aircraft
- Ascent Duration: Approximately 60 minutes
- Alt. at Ignition: 53,000 feet
- Orientation at Ignition: 80-90 degrees
- Max. Accel. Force on Ascent: 3-4 Gs
- Alt. at Engine Cut-off: Information not disclosed.
- Time at Engine Cut-off: 65 seconds
- Max. Speed: Mach 3.5 (240 knots equivalent airspeed, KEAS)
- Max. Altitude: 62 miles
- Time in Weightless Conditions: 3.5 minutes
- Reentry Method: Ballistic reentry
- Accel. Forces on Descent: 5 Gs peak, >4 Gs for 20 seconds
- Landing Method: Unpowered horizontal
- Total Duration: 90 minutes
- Landing Distance from Take-off Location: 0 miles
- Time Between Missions: Information not disclosed.

VEHICLE/LAUNCH SYSTEM DESCRIPTION

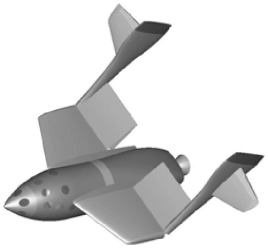
The X PRIZE competition launch system proposed by Scaled Composites (SC) consists of two stages: a carrier aircraft, the White Knight, and a second stage rocket, SpaceShipOne (SS1).

The White Knight is a manned, twin-turbojet research aircraft intended for high-altitude missions.

The design mission of White Knight is to provide a high-altitude airborne launch of a manned sub-orbital spacecraft, SS1. The White Knight is equipped to flight-qualify all the spacecraft systems, except rocket propulsion. The White Knight's cockpit, avionics, electronic control system, pneumatics, trim servos, data system, and electrical system components are identical to those installed on SS1. The White Knight's high thrust-to-weight ratio and enormous speed-brakes allow the Astronauts in training to practice space flight maneuvers like boost, approach and landing, with a very realistic environment. Thus, the aircraft serves as a high-fidelity, moving-base simulator for SS1 pilot training.

Other White Knight mission capabilities include, reconnaissance, surveillance, atmospheric research, data relay, telecommunications, imaging & booster launch for micro- satellites.

SpaceShipOne (SS1) is a three-place, high-altitude research rocket, designed for sub- orbital flights to 100 km altitude. The unique configuration allows aircraft-like qualities for boost, glide, and landing. During descent, the ship's empennage converts (using pneumatic-actuated 'feather') to a stable, high-drag shape for atmospheric entry. This "Care- Free" configuration allows a 'hands-off' reentry and greatly reduces aero/ thermal loads. Designed for a 'shirt- sleeve' environment, the 60" diameter cabin has a space-qualified electronic control system and dual-pane windows. The ship uses three flight control systems- manual-subsonic, electric-supersonic and cold-gas reaction control system.



PROPULSION SYSTEM

A new non-toxic liquid-nitrous-oxide/rubber-fuel hybrid propulsion system was developed specifically for SS1. Its unique design simplifies mounting and reduces leak paths. The composite nitrous tank and case/throat/nozzle components were developed at SC, with Thiokol providing the tank's filament wound over-wrap, and AAE Aerospace supplying the ablative nozzle. Development of the 'rocket science'(fuel, bulkhead, controller, valve, injector, igniter and ground test program) is being competed with two rocket motor developers - eAc (Environmental Aeroscience Corp of Miami) and SpaceDev of San Diego.

MISSION DESCRIPTION

The duration of the White Knight-SS1 mission lasts approximately 90 minutes. Before the horizontal take-off from a traditional runway, SS1 is mounted to the underside of the White Knight and the nose cone is detached so the three crew members can enter SS1. The nose is reattached and the mated vehicles are ready to begin their mission.

VEHICLE ASCENT

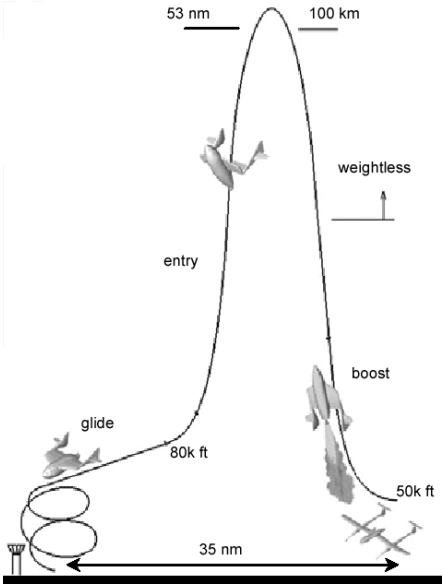
The White Knight horizontally takes off from an airport runway like a traditional airplane, powered by its twin turbojet engines. The aircraft slowly ascend to approximately 53,000 feet over a time period of approximately 60 minutes. At this time, the White Knight releases SS1 and pulls away from the undocked spacecraft.

SS1 glides forward and the pilot pulls it to a nose-up attitude of approximately 85 degrees. At this point, the pilot ignites the hybrid rocket engine and maintains a nose-up pitch as the engine accelerates SS1 over 65 seconds through a speed of Mach 3, exposing the crew to acceleration forces of 3 Gs.

WEIGHTLESSNESS

As soon as the engines are turned off, the crew experiences weightlessness and momentum causes SS1 to continue climbing past an apogee of 100km. The crew can control the attitude of SS1 by using carbon dioxide compressed gas thrusters.

After reaching apogee, SS1 begins its return to earth. The crew continues to experience weightlessness until the density of the Earth's atmosphere increases enough to begin decelerating the spacecraft.



While there are no atmospheric forces acting on SS1, the pilot deploys the "feather" mechanism. This will help stabilize and decelerate SS1 in a controlled manner during its descent.

VEHICLE DESCENT AND LANDING

As the atmospheric forces build on the vehicle, the crew experiences acceleration forces exceeding 4 Gs for over 20 seconds, with peak loads approaching 5 Gs. As SS1 descends through approximately 80,000 feet, the "feather" mechanism is reset to the horizontal position and the crew controls SS1 to an unpowered horizontal (glide) landing at the same runway from which it took off.

HARDWARE & TESTS

Scaled Composites has built, ground tested, and flight tested all components of their X PRIZE launch system. Below are some of the notable milestones in the development and testing of hardware.

- 1 August 2002 - First flight of White Knight carrier aircraft.
- 18 April 2003 – Public roll-out of all launch system components, including White Knight, SpaceShipOne, mobile tanker, simulator, mobile mission control station, and mobile test stand trailer.

Rutan is quoted as stating "I would like to do a manned spaceflight before the Wright Brothers' anniversary." (The centennial anniversary of the Wright Brothers' first flight is 17 December 2003.)

PUBLICITY

Information not disclosed.

PERSONAL APPEARANCES

Information not disclosed.

TELEVISION

Information not disclosed.

PRINT MEDIA

Information not disclosed.

TEAM BACKGROUND

TEAM MEMBERS

Information not disclosed.

X PRIZE QUOTE

"I strongly feel that, if we are successful, our program will mark the beginning of a renaissance for manned space flight. This might even be similar to that wonderful time period between 1908 and 1912 when the world went from a total of ten airplane pilots to hundreds of airplane types and thousands of pilots in 39 countries. We need affordable space travel to inspire our youth, to let them know that they can experience their dreams, can set significant goals and be in a position to lead all of us to future progress in exploration, discovery and fun. Thanks to the X PRIZE for the inspiration." – Burt Rutan

PHILOSOPHY

"Our flight safety approach of "question, never defend" has allowed us to take courageous steps by safely flying new ideas and new performance envelopes. We are now focusing on the big step of developing a high-altitude supersonic light aircraft. This program, if successful, will result in the first non-government manned space flight (above 100 km altitude)." – Burt Rutan

MISSION AND GOALS

"Our goal is to demonstrate that non-government manned space flight operations are not only feasible, but can be done at very low costs. Safety, of course is paramount, but minimum cost is critical. We look to the future, hopefully within ten years, when ordinary people, for the cost of a luxury cruise, can experience a rocket flight into the black sky above the earth's atmosphere, enjoy a few minutes of weightless excitement, then feel the thunderous deceleration of the aerodynamic drag on entry." – Burt Rutan

X PRIZE FOUNDATION

Below is contact information for the X PRIZE Foundation.

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