



X PRIZE Team Summary Sheet

BRISTOL SPACEPLANES



All the information given in this document has been cleared for official release by the X PRIZE Foundation and the Bristol Spaceplanes team. Quotes provided by Bristol Spaceplanes are shown in italics.

For more information about Bristol Spaceplanes, please visit their web site at www.bristolspaceplanes.com.

TEAM OVERVIEW



Bristol Spaceplanes Limited, based in Bristol, England, was formed in 1991 to provide technical assistance and consultancy to commercial organisations and aerospace companies interested in commercial opportunities in space. Bristol Spaceplanes has been an industry leader in spaceplane design for over thirty years. Bristol has testified to the UK Government on space policy and provided input to further NASA studies on reusable launch vehicles and space tourism.

TEAM LEADER BACKGROUND

David Ashford is director of Bristol Spaceplanes Limited. He graduated from Imperial College, University of London, in aeronautical engineering and spent one year at Princeton doing post graduate research on rocket motor combustion instability. His first job, starting in 1961, was with the Hawker Siddeley Aviation spaceplane design team. He has worked as an aerodynamicist, project engineer or project manager on various aerospace projects, including DC-8, DC-10, Concorde, the Skylark sounding rocket, and various naval missile systems.

DATA AT-A-GLANCE

TEAM SPECIFICATIONS

- Name: Bristol Spaceplanes Limited
- Leader: David Ashford
- Place: Bristol, England, UK
- Registered with X PRIZE: 11 February 1997
- Web: www.bristolspaceplanes.com

VEHICLE SPECIFICATIONS

- Name: Ascender
- Length: 13.7 m
- Span: 7.9 m
- GTOW: 4,500 kg

- Dry Weight:
- Crew Environment: Pressurized cabin with pressure suits.
- Payload Capacity: 270 kg
- No. of Engines: 3
- Propulsion System: 2 Williams-Rolls FJ44 turbofan engines and 1 Pratt & Whitney RL 10 rocket engine
- Rocket Fuel: Hydrogen
- Rocket Oxidizer: Liquid Oxygen
- Total Rocket Thrust: 20,000 lb_f
- Reaction Control System:

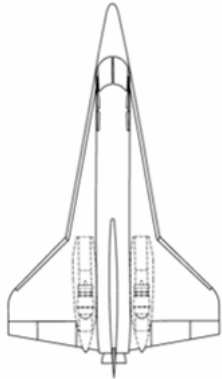
MISSION SPECIFICATIONS

- Ascent Method: Horizontal take off from strip.
- Alt. at Rocket Ignition: 8 km
- Orientation at Ignition: Near vertical
- Max. Accel. Force on Ascent:
- Time and Alt. at Engine Cut-off:
- Max. Speed: Mach 2.8
- Max. Altitude: 100 km
- Time in Weightless Conditions: 2 minutes
- Reentry Method: Ballistic/powerd flight
- Accel. Forces on Descent:
- Landing Method: Horizontal powered landing at air strip
- Total Duration: 30 minutes
- Landing Distance from Take-off Location: 0 km
- Time Between Missions: Days





VEHICLE/LAUNCH SYSTEM DESCRIPTION



Ascender is designed to be the first sub-orbital aeroplane since the X-15, and the first ever to carry passengers to space. It would start a sub-orbital space tourism business that would build up the credibility needed for full orbital tourism. It is based on a design included in a feasibility study for the European Space Agency. Four leading British

aerospace companies took part in this study, Dowty Aerospace Limited, Dunlop Aerospace Limited, Pilkington Aerospace Limited and Ricardo Aerospace Limited. The UK Minister for Space commissioned an independent review of this study that broadly endorsed this concept.

Ascender would be the first airplane capable of taking off under its own power and of making several flights to space per day.

Ascender is well within the aeronautical state of the art. The aerodynamics, structure, engines and systems are all based on those of existing airplanes or launchers. The originality is the way the total concept has been put together so that conventional technology leads to a unique capability.

PROPULSION SYSTEM

During the air-breathing phase of flight, Ascender is powered by two Williams-Rolls FJ44 turbojets. Each is rated for a takeoff thrust of 1,900 lb_f. The rocket engine installed in Ascender is a Pratt & Whitney RL 10 which uses hydrogen and liquid oxygen to deliver approximately 20,000 lb_f of thrust.

MISSION DESCRIPTION

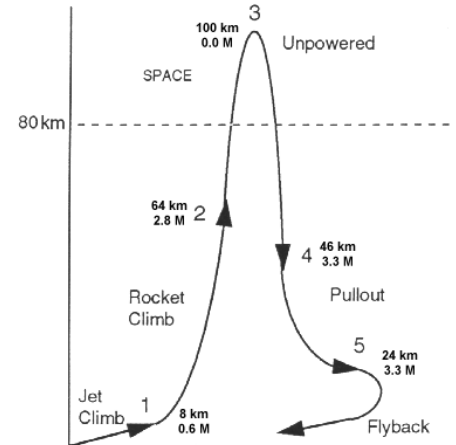
Ascender will carry a crew of two and two passengers (or other payload) to space and back. Passengers will experience two minutes of weightlessness, will see superb views of Earth, and will see the sky turn black even in daytime.

VEHICLE ASCENT

It takes off from an ordinary airfield using its turbofan engine and climbs at subsonic speed to a height of 8 km. The pilot then starts the rocket engine and pulls up into a steep climb.

WEIGHTLESSNESS

When the rocket fuel is used up Ascender is climbing close to the vertical at a speed of Mach 2.8, from which it coasts to a maximum height of 100 km. Ascender then enters a steep dive.



VEHICLE DESCENT AND LANDING

On reaching the atmosphere the pilot pulls out of the dive and flies back to the airfield from which he took off 30 minutes previously.

HARDWARE & TESTS

Successful first flights have taken place of a radio controlled development model for the Ascender spaceplane. This model will be used to validate the low speed aerodynamic design. Ascender itself could be flying to space within three years and carrying passengers on space experience flights within six to seven years. The required investment is comparable to the cost of buying just one jet fighter off the production line.



It offers the UK the opportunity of now taking the lead in slashing the cost of space transportation, and in making flights to space available to the general public. Discussions are taking place with potential strategic partners in order to start full development.

NASA and the Space Transportation Association have recently published their joint study of General



Public Space Travel and Tourism. It says that:- "Now the dream of very many of us during the Apollo era that we could some day take a trip to space for our own personal reasons is finally approaching realization." The study refers to the pioneering work of Bristol Spaceplanes Limited in this field.

A spokesman for WildWings, the Bristol based adventure travel company which has started taking bookings for space flights, said today:- "Ascender is the leading candidate for creating a revolution in the way we carry out space business. It is a more realistic and supportable project than its several US competitors".

A spokesman for Bristol Spaceplanes Limited said today: "Technology has now advanced to the point that it should be possible to bring the cost of a launch down to a thousandth of what it costs to launch the US Space Shuttle today. As a result, industrial firms and commercial organisations in both the US and Japan have started to show serious interest in space tourism. One estimate suggests that there is a business worth £6 billion in Japan alone. We want to make sure that Britain is in at the start, contributes and benefits".



PUBLICITY

PERSONAL APPEARANCES

- The Millennium Dome - These photos are of the Ascender display in the Journey Zone at the New Millennium Experience in Greenwich, London. The display consists of a model Ascender, explanatory text and a diagram of the Ascender's flight trajectory, and two video displays, and is located in the Future of Travel section - look for it near Heathrow Terminal 5.
- Tomorrow's World Live '99 - These photos are of the 1/3rd scale exhibition model of Ascender on display at the Tomorrow's World Live Show that took place in Earl's Court, London, UK, from June 30th to July 4th, 1999.
- BROHP at Charterhouse School over April 2nd, 3rd and 4th of April 2002 at Charterhouse School in Surrey

TEAM BACKGROUND

TEAM MEMBERS

- David Kent - Chief Designer
- Tony Materna - North American marketing representative

X PRIZE QUOTE

"The X PRIZE is doing great things to dent the mindset that is the biggest obstacle to an explosion of creativity in space." – David Ashford

X PRIZE FOUNDATION

Below is contact information for the X PRIZE Foundation.

MAILING ADDRESS

722A Spirit of St. Louis Boulevard
Chesterfield, Missouri, USA 63005

PHONE NUMBERS

Office: +1 314-533-2002
Fax: +1 314-533-6502

INTERNET

Email: info@xprize.org
Web: www.xprize.org

