X PRIZE Team Summary Sheet
IL AEROSPACE TECHNOLOGIES

All the information given in this document has been cleared for official release by the X PRIZE Foundation and the IL Aerospace Technologies (ILAT) team. Quotes provided by ILAT team are shown in italics. For more information about ILAT or if you have questions about ILAT, please visit their web site at www.ilat.co.il

TEAM OVERVIEW

IL Aerospace Technologies (ILAT) was founded with the principal objective to develop a reusable and cost effective technology aimed to transform space tourism into reality and expand the human desire for space exploration. At present, the ILAT team is comprised of 7 original team members with a combined disciplinary experience in physics, mechanics, electronics, aeronautics and material science. All team members are veterans of the Israeli Arm Forces and have worked for leading aerospace, biomedical and semiconductor companies in Israel and abroad. The ILAT team will continue to expand by welcoming additional professionals as well as sponsors, students and volunteers from all walks of life that share the same team vision.

TEAM LEADER BACKGROUND

Dov Chartarifsky is an experienced Mechanical Engineer with an extensive background in aerodynamics and heat transfer. He spent 4 years in the US working in the military and aerospace industry where he developed and integrated thermal dissipation systems into aircraft avionics, weapons systems, armor vehicles, surface ships and submarines. He later managed programs that lead to the development of advanced semiconductor assembly processes. Dov is a co-writer of several patents in tool design for IC interconnection while continuing to work in the Israeli high-tech sector.

DATA AT-A-GLANCE

TEAM SPECIFICATIONS

Name: IL Aerospace Technologies
Leader: Dov Chartarifsky
Place: Zichron Ya'akov, Israel
Registered with X PRIZE: 17 December 2002
Web: www.ilat.co.il

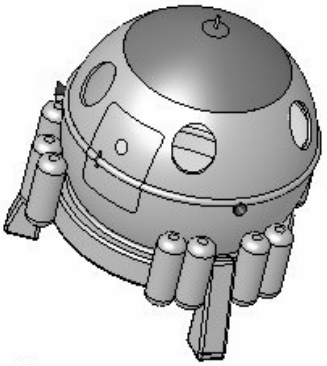
VEHICLE SPECIFICATIONS

Name: Negev 5
Length: 3 meters (9.8 feet)
Diameter: 2.5 meters (8.2 feet)
GTOW: 3,370 kg (7,430 lb_m)
Dry Weight: 1,011 kg (2,229 lb_m)
Crew Environment: Pressurized cabin
Payload Capacity: 674 kg (1,486 lb_m)
No. of Engines: 1
Propulsion System: Pressure fed hybrid
Fuel and Oxidizer: HTPB / LOX
Total Thrust: 50,000 Newtons (11,200 lb_f)
Reaction Control System: Pressurized LOX/vaporized rubber fuel mix

MISSION SPECIFICATIONS

Launch Site: Land or surface ship
Ascent Method: Helium Balloon to rocket launch altitude
Ascent Duration: 2 to 3 hours
Altitude at Rocket Ignition: 30 km (98,425 feet)
Orientation at Rocket Ignition: 70° to 80° pointing up
Max. Acceleration Force on Ascent: 4 G
Altitude at Rocket Engine Cut-off: 80 km (262,467 feet)
Time at Rocket Engine Cut-off: 120 seconds
Max. Speed: Mach 3.5
Max. Altitude: 120 km (393,701 feet)
Time in Weightless Conditions: 10 to 15 minutes
Reentry Method: Angular free fall
Acceleration Forces on Descent: 5 G
Landing Method: Pyrotechnically deployed drogue and 3 main chutes to land or water
Total Flight Duration: 3 to 4.5 hours
Landing Distance from Take-off Location: 45 to 60 km
Time Between Missions: 10 to 14 days

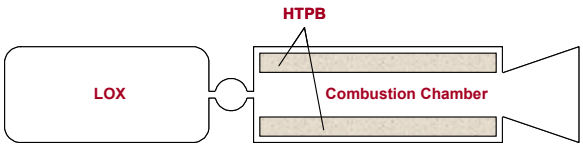
VEHICLE/LAUNCH SYSTEM DESCRIPTION



The Negev 5 will be a self-sufficient reusable sub-orbital space vehicle capable of being launched and recovered anywhere in the world from land or sea without the need of runways, assist aircrafts, costly installations or complicated procedures. The vehicle will be a pressurized 3-person habitat equipped with all the essential instrumentation for flight, navigation, communications and life-support. The vehicle will be constructed employing lightweight aircraft-grade alloys and composite materials, while the propulsion system will utilize the latest hybrid rocket technology.

PROPULSION SYSTEM

The propulsion system concept consists of a single liquid oxidizer-solid fuel hybrid rocket engine rated at 50kN (11,200 lb_f) of thrust. The liquid oxidizer-solid fuel hybrid concept has been studied since the early fifties and, as a result, has become the most dominant and well understood of the hybrid propulsion systems.

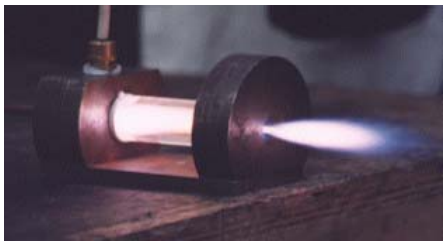


ILAT's hybrid rocket concept is one that uses a combination of Hydroxyl Terminated Poly-Butadiene (HTPB) for solid fuel and LOX (liquid oxygen) for an oxidizer. The HTPB is stored in the combustion chamber into which the LOX is injected. This arrangement means that the fuel and oxidizer only come into contact with one another during the combustion process, unlike a solid rocket in which the fuel and oxidizer are bound together in an explosive mixture. Safety is further enhanced by the use of inert fuels such as polyethylene or rubber, which are extremely safe to store and handle.

A further benefit of hybrid engines is that their thrust can be throttled by controlling the flow of oxidizer and can even be extinguished if this becomes necessary. This is an important advantage over solid motors, which are very difficult to control once lit.

The rubber / LOX combination has even been rated as a non-explosive (0 lb of TNT). The bottom line is that the fuel has to be vaporized in the presence of an atomized oxidizer with a high temperature igniter in order for it to burn. Even in failure mode, it is safe.

The Reaction Control System (RCS) will obtain its maneuvering capability from a series of undersized nozzles designed to exhaust minute amounts of rocket propellant during vital stages of the flight. These nozzles will enable the pilot to yaw, pitch and roll the vehicle at will. The vehicle will be equipped with 6 strategically placed nozzles, each using the same combustion process, propellant, and throttle control as the main engine but in a much smaller scale. Each thruster will produce ~2 kN (~450 lb_f) of thrust.



MISSION DESCRIPTION

The Negev 5 will be launched from ground level using ILAT's own fully reusable High-Altitude Launch Platform (HALP). The concept allows the vehicle to hitchhike a free ride on a large stratospheric balloon filled with helium to its intended rocket launch altitude of 30 Km (98,425 feet) above mean sea level. Most of the atmospheric drag is overcome while saving precious fuel. The HALP concept makes it possible to design a smaller, lighter, more efficient vehicle, hence satisfying the criteria for practical low-cost space access.

VEHICLE ASCENT

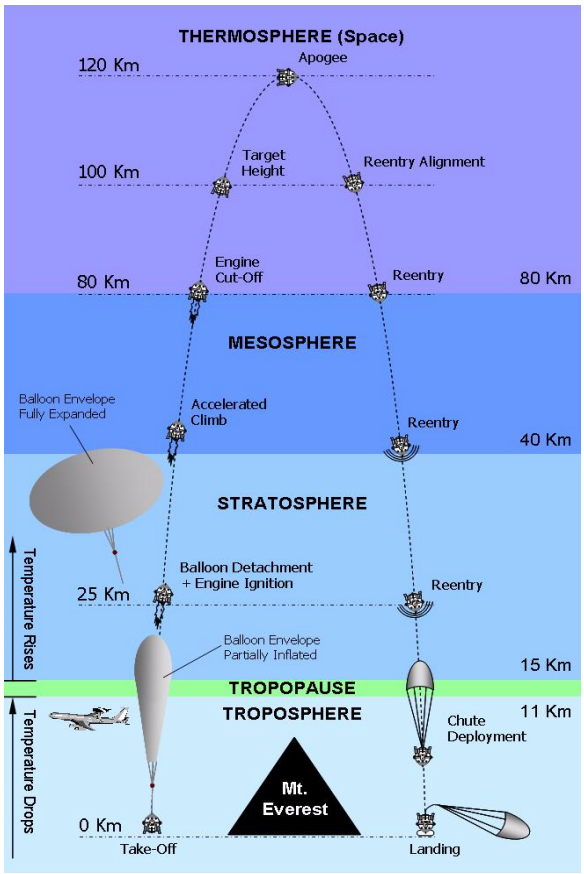
Once the altitude for rocket ignition is reached, the pilot will take over the controls using maneuvering thrusters to align the vehicle away from the balloon. At the correct trajectory angle, the on-board computer will synchronize the balloon's detachment and control the firing of the 50 kN (11,200 lb_f) hybrid rocket engine. The burn will last for about 110 seconds at 70% thrust, accelerating the craft to 3.5 Mach, reaching an altitude of 80 Km (262,467 feet).

WEIGHTLESSNESS

After engine cut-off, the vehicle will continue to cruise pass the 100 Km (328,084 feet) mark where the crew will begin to experience weightlessness conditions for about 10 to 15 minutes. At approximately 120 Km (393,701 feet) the pilot will fire the thrusters to initiate the descend process.

VEHICLE DESCENT AND LANDING

The protective heat shield at the top of the vehicle will be pointed towards the earth in preparation for reentry while the crew cabin is rotated up to 180° by a suspended gyroscopic frame to compensate for the steep reentry. The deceleration will be controlled by a drogue chute initially, then by the deployment of 3 main chutes. The Negev 5 will touch or splash down at an estimated rate of 25 km/hr (15.5 mph). Inflatable bags around the perimeter base will soften the landing and will keep the vehicle afloat should it land on water.



HARDWARE & TESTS

ILAT has begun to build hardware but no testing has been conducted to date. Below is the testing schedule for the ILAT Negev family of vehicles.

NEGEV 1

First unmanned test flight using a 1/3-scale model to test helium balloon and vehicle recovery procedures (no rocket firing at this stage).

Altitude Target: 15 km (49,213 feet)
Launch Location: Negev Desert, Israel
Launch Date: December 2003

NEGEV 2

Second unmanned test flight using a pressurized 1/3-scale model to test environmental conditions at high altitude. The craft will be equipped with atmospheric sensors and video cameras recording the entire flight.

Altitude Target: 25 km (82,021 feet)
Launch Location: Negev Desert, Israel
Launch Date: April 2004

NEGEV 3

First manned test flight to the edge of the stratosphere to test the reaction control system (RCS), navigation and communication equipment.

Altitude Target: 30 km (98,425 feet)
Launch Location: TBD
Launch Date: October 2004

NEGEV 4

Third unmanned test flight with fully configured vehicle and first firing of rocket engine at altitude via remote control. Parachute system will be fully tested and qualified.

Altitude Target: 100 km (328,084 feet)
Launch Location: TBD
Launch Date: June 2005

NEGEV 5

Second manned test flight and first official attempt to win the X PRIZE.

Altitude Target: 120 km (393,701 feet)
Launch Location: TBD
Launch Date: October 2005

* Engine firing tests are yet to be announced

PUBLICITY

GUEST SPEAKING APPEARANCES

- May 2003 - Technion Institute of Technology, Aerospace Engineering Faculty and Maslul, Students for Exploration and Development of Space (SEDS) - Haifa, Israel
- June 2003 - Experimental Aircraft Association (EAA Chapter 1346) - Hertzelia, Israel

TELEVISION AND RADIO

- February 2003 - Team Interview on Channel 2 TV Evening News, Israel

PRINT MEDIA

- February 2003 - "Israeli rocket team to use balloon in race to space", Ha'aretz Newspaper, Israel
- February 2003 - "Spaceships chase after you", The Globes Business Newspaper, Israel
- February 2003 = "Beyond Ofek" - Space News Publication, Israel

TEAM BACKGROUND

TEAM MEMBERS

Other members of the ILAT team include:

- Dr. Yigal Cohen - Chief Scientist and Head of Research (Ph.D. in Theoretical Physics)
- Mr. Shay Glazer - Electronics Engineer (B.Sc. in Electrical Engineering)
- Dr. Edward Berkovsky – Materials Engineer (Ph.D. in Material Science)
- Mr. Oded Loebl - Systems Engineer (B.Sc. in Aerospace Engineering)
- Mr. Leon Chartarifsky - Logistics Manager (MBA)
- Mrs. Yael Glazer - Marketing and Administration

X PRIZE QUOTE

"The X Prize makes a giant leap reviving that special spirit of adventure that was once felt during does early pioneer years of aviation and space exploration."

– Dov Chartarifsky

PHILOSOPHY

"We at IL Aerospace Technologies are proud and honored to represent the first Israeli team to compete in the X-Prize. The opportunity puts us in the unique position to expand our country's presence in space and continue the dream by honoring our first Israeli astronaut, Col. Ilan Ramon (1954-2003) who died a hero in the relentless pursuance of space exploration".

– ILAT Team

MISSION AND GOALS

"Our mission is to be at the forefront of the technology that will transform the concept of space tourism into science fact."

– ILAT Team

X PRIZE FOUNDATION

Below is contact information for the X PRIZE Foundation.

MAILING ADDRESS

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