

space tourism services has prompted renewed interest in commercial RLV possibilities. To spur entrepreneurial competition and development, the X-Prize Foundation promises a \$10 million purse for the first qualifying contestant to successfully conduct two piloted flights of a privately financed and built vehicle, within a two-week timeframe, to a minimum altitude of 100 kilometers. Ultimately, RLV technology may provide trans-atmospheric high-speed flight around the globe, for rapid international travel.

The FAA issued reports for the years 1998–2001, surveying the various RLV concepts under development, publicly and privately, including announced X-Prize contestants. The reports are available and can be downloaded from the AST Web site: <http://ast.faa.gov>. A brief overview of vehicles featured in the various reports illustrates the range of RLV concepts, from single-stage-to-orbit vertical take-off models to multi-stage air-launched systems employing wing-generated lift to gain altitude before initiating rocket motors to generate thrust.

Some RLV concepts combine aviation and space technology so that they are essentially hybrid in nature. Some vehicles are hybrid because a single vehicle integrates characteristics of both flight technologies, employing them for different stages of flight. Others are hybrid because two vehicles, each capable of operating independently at some point during flight, are combined or joined, to form a launch system, e.g., where one vehicle serves as a high altitude platform from which a second vehicle begins its flight.

RLV designers whose vehicles embody aircraft operating characteristics, in whole or in part, have expressed uncertainty about the type of regulatory regime that would cover flight operations, i.e., whether a launch license or aircraft certification, such as an experimental airworthiness certificate (EAC), would be required for flight authorization. Some also question whether a test flight is a licensable event or requires only aircraft certification as the sole flight authorization, particularly where flight operations would be limited to high altitude atmospheric tests not bound for low Earth orbit or otherwise into outer space.

There is concern that uncertainty regarding the applicable regulatory regime may impede the ability of developers of hybrid suborbital RLVs to obtain the financing needed to take their concepts from the drawing board into flight testing. Concerns stem from not knowing, in advance of operation, whether suborbital flight would be

regulated under the CSLA and the Commercial Space Transportation Regulations, 14 CFR Ch. III, as launch of an RLV that is a suborbital rocket, or under the Federal Aviation Regulations as civil aircraft that must satisfy airworthiness certification requirements. Although both regulatory regimes, launch licensing and aircraft certification, protect the health and safety of the uninformed public, there are differences in the approval processes that may affect technical choices in terms of vehicle design and planned flight profiles, in addition to the perceived difference in cost of regulatory compliance.

At a July 24, 2003 joint congressional hearing on commercial human space flight, witnesses noted the uncertainty surrounding the appropriate flight authorization for a winged suborbital RLV. They urged Congress to reduce the regulatory risk facing potential investors by mandating an enabling regulatory framework for commercial suborbital human space flight with AST taking the lead in regulating the activity.

The FAA is issuing this Notice to eliminate uncertainty regarding the applicable regulatory regime for a suborbital RLV and suborbital rockets, in general. The Notice provides a technical demarcation between launch vehicles and aircraft so that the public, including vehicle developers, can determine in advance of consultation with the FAA whether a launch license or only aircraft certification is required to conduct flight operations.

Suborbital Rocket

The Secretary of Transportation has authority to differentiate between civil aviation and launch of a launch vehicle, including a suborbital rocket. Authority under the CSLA to license suborbital rocket launches and other commercial space transportation activities was delegated to the FAA Administrator in 1995.¹ Licensing authority is exercised by AST, under a delegation from the FAA Administrator. Safety of air commerce and the National Airspace System (NAS) is regulated under separate statutory authority provided in 49 U.S.C. Subtitle VII, Part A, “Air Commerce and Safety.”

A license under the CSLA is required to launch a suborbital rocket. The CSLA

defines a “launch vehicle” to mean a vehicle built to operate in, or place a payload in, outer space, and a suborbital rocket. “Launch” means to place or try to place a launch vehicle or reentry vehicle and any payload from Earth—in a suborbital trajectory; in Earth orbit in outer space, or otherwise in outer space. 49 U.S.C. 70102. for a suborbital rocket, “launch” under the CSLA means placing a suborbital rocket on a suborbital trajectory.

This Notice informs the public of the criteria used by the FAA to differentiate civil aircraft subject to aircraft certification and operating standards for flight in airspace from a suborbital rocket launch subject to licensing under the CSLA. The FAA considers use of rocket propulsion for thrust, as opposed to wing-generated lift, in determining whether a vehicle that flies through airspace is a suborbital rocket under the CSLA, or an aircraft. Quite simply, a vehicle that relies principally upon rocket-propelled thrust to maintain its intended flight trajectory during powered flight is a launch vehicle, or rocket, subject to licensing under the CSLA unless exempt. A vehicle that relies chiefly upon lift generated by its wings in maintaining its intended course during powered flight is an aircraft subject to regulation under the Federal Aviation Regulations. A rocket-propelled civil aircraft that relies upon wing-borne lift for the majority of its powered flight is not a suborbital rocket requiring a license for operation. The “E-Z Rocket,” flown by X-COR, is an example of a rocket-propelled aircraft.

To summarize, a suborbital rocket subject to CSLA licensing is a rocket-propelled vehicle intended for flight on a suborbital trajectory, whose thrust is greater than its lift for the majority of the powered portion of its flight.

The FAA rulemaking regarding RLV missions, concluded in 2000, addressed “suborbital trajectory” in the context of RLVs. The FAA regards a suborbital trajectory as the intentional flight path, or any portion of that flight path, of a launch vehicle or reentry vehicle, whose vacuum instantaneous impact point (IIP) does not leave the surface of the earth. The IIP of a launch vehicle is the projected impact point on Earth where the vehicle would land if its engines stop or where vehicle debris, in the event of failure and break-up, would land. The notion of a “vacuum” IIP reflects the absence of atmospheric effects in performing the IIP calculation. If the vacuum IIP never leaves the Earth’s surface, the vehicle would not achieve Earth orbit and would therefore be on a suborbital trajectory.

¹ Certain small-scale unmanned rocket launches have traditionally been subject to FAA flight authorization under 14 CFR part 101, and are not subject to licensing under the CSLA. FAA authority over those small recreational and hobby rockets was not affected by enactment of the CSLA, nor was delegation of CSLA licensing authority to the FAA Administrator intended to place launch vehicle licensing under 14 CFR part 101 or aircraft certification regulations.