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PIONEER
ROCKETPLANE

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Subject: Notice of Proposed Rulemaking for Reusable Launch Vehicles

To whom it may concern:

These comments refer to the 20 Apr 99 NPRM for Reusable Launch Vehicles (RLVs).

Operating an RLV as an aircraft for certain flights

Pioneer Rocketplane believes that there should be provisions in the proposed rule permitting aircraft-like RLVs to be operated as aircraft when not engaged in space launch activities. These would be piloted vehicles with an airworthiness certificates allowing aircraft operations and a launch license allowing launch and/or reentry operations.

There should also be allowances for low-altitude test flights of these aircraft-like RLVs (i.e., flights not reaching outer space) to be conducted under the regulations governing aircraft, rather than as RLVs per se, if conformance with applicable FAR's is demonstrable by the particular RLV.

There is precedent for a dual-nature air vehicle. Orbital Sciences Corporation's L- 10 11 aircraft, which carries the Pegasus rocket, operates as an aircraft when not carrying Pegasus. For those flights it conforms to regulations governing aircraft – with no launch license required. However, when carrying Pegasus it becomes part of a launch system and is subject to the regulations governing expendable launch vehicles. A launch license is required for the Pegasus-equipped L- 10 11 to take to the skies.

The present RLV environment includes at least two systems which could be operated as aircraft, complete with experimental or restricted airworthiness certificate and operating under Part 91 rules. These are the Pioneer Rocketplane "Pathfinder" and the Rotary Rocket "Rotor?'.

The Pioneer "Pathfinder" launch vehicle is a manned aircraft equipped with a rocket engine. When used as a launch system it carries an unmanned upper stage which is ejected near the apex of the aircraft' s suborbital trajectory. However, the Pathfinder may be operated as an aircraft under the power of its turbofan engines. Much of the early flight test program is intended during subsonic and low supersonic flight under turbofan thrust only. After the flight test program is complete, there are plans to ferry the aircraft routinely between landing sites, launch sites and maintenance facilities as mission requirements dictate. These ferry flights would also be done under turbofan power alone. Pioneer would like to conduct these flights under FAR's pertaining to aircraft whenever possible.

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The Rotary Rocket "Roton" may be operated as a helicopter, with sufficient power to attain an altitude of about 8,000 feet using tip rockets on the end of its rotor blades to spin up the rotor. The primary rocket engine would not be used in this mode. These flights are intended during their early flight test program, and may also be used for pilot training throughout the program.

How wouldjlight with an unusedpropulsion system be implemented?

For Pioneer, the vehicle is flown under turbofan power as a piloted airplane. For Rotary Rocket, significant testing can be performed with the main rocket engine unfueled, but with their rotor blade tip rockets active. In Rotary's case, the vehicle would be flown as a manned helicopter to altitudes probably below 10,000 feet.

As a modification to the proposed rule, Pioneer proposes the following:

This Part may not apply when the primary propulsion system enabling exoatmospheric jlight of a piloted RLV is not used The vehicle would require an airworthiness certtjkate, and would operate under a different Part of the Federal Aviation Regulations. Flight would be regulated under the FARs pertaining to that Part. This may be Part 91 for test jlights or ferry jlights, or other parts (such as Part 135) as deemed appropriate depending on the purpose of the flight. The pilot(s) would require a pilot certtjkate appropriate to the jlight being performed with a type rating corresponding to the category and class of the airworthiness certtjkate.

Rocket powered test and/or training flights that don't go to "outer space"

What if the primary propulsion system is activated, but you don't go very high or fast?

The example here is the Pioneer Pathfinder performing a limited-duration rocket firing. This may be during initial flight testing, where rocket firings of several seconds are performed either to test the propulsion system or to accelerate the vehicle to higher speeds for other test objectives. It may also be done on non-revenue flights for pilot training purposes.

In this case, the Pathfinder is no different than a Lockheed C-130 equipped with RATO (rocket assisted take off) engines, or the USAF NF-104 which was equipped with a rocket engine at the base of the vertical fin and flight tested in the early 1960's. Many test flight objectives are planned in this manner, at speeds and altitudes comparable to supersonic military aircraft. These flights should be regulated as aircraft flights.

As a modification to the proposed rule, Pioneer proposes the following:

When the primary propulsion system enabling exoatmospheric flight of a piloted RL V is operated but the flight remains below 328,000 feet, then jlight tests under the auspices of aircraft regulations should be permitted. The vehicle would require an airworthiness certtjkate, and would operate under a different Part of the Federal Aviation Regulations. Flight would be regulated under the FARs pertaining to that Part.

Just where does "outer space" begin, anyway?

The FAA's proposed regulation seeks to require a launch license for flights to "outer space". Pioneer's position is that flights of a vehicle which holds an aircraft airworthiness certificate need not be licensed under the proposed regulation if the flight does not go to "outer space".

The fundamental issue determining the maximum altitude which such a vehicle could be flown as an aircraft (i.e. without a launch license) seems to be the definition of "outer space". Some agencies have defined "outer space" as beginning at 50 nautical miles altitude (appx 304,000 feet) and others have chosen 100 km (appx 328,000 feet) as the threshold of "outer space".

Clearly, flights between 18,000 and 60,000 feet (Class A airspace) would be operated under positive air traffic control. Equally clearly, flights which go to "outer space" would require a launch license. The grey area here is altitudes between 60,000 feet and 300,000 feet. This airspace is classified as Class E airspace, but extends upwards a long ways before anyone would call it "outer space".

Nevertheless, public safety will only be served if the transition between Class A airspace and higher altitudes are handled in an orderly manner. One can imagine an aircraft on a rocket-powered test flight descending into Class A airspace with a clearance reading "cleared direct XYZ VOR, descend and maintain flight level 240, cross the 100 mile DME at or above flight level 600". One could also imagine transitions out of, and back into, Class A airspace being wholly confined to a restricted area or warning area.

Summary

Pioneer suggests that flights of an RLV as a piloted aircraft be allowed without a launch license as long as the following conditions are met:

1. The pilot-in-command has a valid FAA pilot certificate.
2. The vehicle has a valid aircraft airworthiness certificate.
3. The vehicle does not go into "outer space". (This threshold altitude has yet to be determined. There is precedent for this altitude being 50 nautical miles, or roughly 300,000 feet.)
4. The vehicle does not place anything into "outer space".
5. No objects (such as upper stages) are ejected from the vehicle.
6. The vehicle is operated under IFR for flights above the floor of Class A airspace.
7. A flight plan is approved by ATC in advance of the flight. (This is intended to assure preflight coordination with ATC to preclude real-time conflicts with other air traffic.)
8. An IFR clearance is obtained before entering Class A airspace.
9. The flight complies with all FAR's pertaining to the flight (such as generation of sonic booms).

Sincerely,

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