LEGAL AND POLICY ISSUES OF THE AEROSPACE PLANE+

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Introduction

In recent years increasing attention has been focused on the development of a new versatile vehicle which is becoming known as the aerospace plane.[1] In addition to research efforts in the United States, research organizations in the Federal Republic of Germany, France, Japan, the Soviet Union and the United Kingdom have been conducting development and design studies. In a way, the aerospace plane will be a natural offspring of the space era. Following closely on the heels of the space shuttle, it will attempt to bridge the gap and provide transition between air flight and space flight.

General Characteristics

The development and eventual realization of the aerospace plane is expected to revolutionize long distance intercontinental travel and transportation by substantially cutting down on the time presently required to reach far-away destinations. A flight from New York to Tokyo may take only a couple of hours compared to the currently required time of 16 hours or more.

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+ This article is an elaboration of the author's address on October 14, 1988 at the IAF Congress in Bangalore, India.

1. As of the early fall of 1988, no law journal articles appear to have been published in the United States dealing with the legal and policy issues presented by the aerospace plane. For a recent book on the technical aspects, see T. A. HEPPENHEIMER, THE NATIONAL AEROSPACE PLANE (Pasha Inmarket Intelligence, 1988). See also Albers and others, *Evolution of Air-Breathing Propulsion Concepts Related to the Sanger Space Plane.* Paper prepared for the 39th I.A.F. Congress in Bangalore, India (I.A.F. No.-88-247); Gopalaswami and others, *Concept Definition and Design of a Single-Stage-to-Orbit Launch Vehicle - Hyperplane.* Paper prepared for the 39th I.A.F. Congress in Bangalore, India (I.A.F. No. 88-194).

The aerospace plane is expected to herald the introduction of an advanced space transportation system consisting of a vehicle which would be capable of taking off horizontally and proceeding directly single stage into outer space. It would have the potential of spawning a new generation of commercial aircraft with the ability to span intercontinental ranges in a matter of minutes.[2]

The program relating to the development of the aerospace plane reflects a combination of aeronautical and space technologies. In the United States the program began with the Copper Canyon Program, the purpose of which was to determine its feasibility and whether its critical components could be built. The utility associated with the aerospace plane technologies could be gauged from the vehicle's capability of global unrefueled operation and of reaching any point on the earth in two hours or less. In addition, future versions of the craft could provide routine on-demand access to near space from a large number of bases, not limited to the coastal launch facilities currently in use in the United States. It could also reduce payload to orbit costs for manned operations, and would be capable of a flexibly based rapid response take-off.[3]

Purpose of Inquiry

The purpose of this inquiry is to attempt to shed light on some of the legal and policy issues which are likely to face legal technicians and policy makers when the early prototype of the aerospace plane will make its debut. While at this stage of scientific research, it is not possible to determine with certainty the configuration and eventual capabilities of future aerospace planes, for purposes of our analysis, it will be assumed that early versions of the plane under discussion will be used as a terrestrial transportation device which has the capability to take off from a point on earth, fly at will in the airspace and traverse through the fringes of outer space for the sole purpose of reaching another point on earth.

From the Space Shuttle to the Aerospace Plane - Legal and Policy Alternatives

There are many legal and policy issues which arise in the wake of the development of the aerospace plane. The central policy issues will be to determine what laws, domestic and international, should be applied to

2. *See* The National Aerospace Plane Program, Joint Hearing Before the Subcommittee on Transportation, Aviation and Materials of the Committee on Science, Space and Technology, and the Subcommittee on Research and Development of the Committee on Armed Services, U.S. House of Representatives, 100th Cong., 1st Sess. (March 11, 1987), p. 22.

3. *Id.*

this versatile vehicle if it is used to speed up point-to-point earth transportation.

The issue of whether rules of air law or space law should be applied in connection with a technological innovation is not entirely new. At the time when the space shuttle was born, lawyers and policy makers were already faced with a similarly vexing issue which arose because the shuttle ascends into outer space with the assistance of rockets just as does a conventional spacecraft and descends from outer space in a manner reminiscent of the landing of an aircraft by gliding through the atmosphere and touching down on a runway.

In an earlier study, this writer, after a review of the Federal Aviation Act of 1958, the National Astronautics and Space Act of 1958, the underlying Congressional intent, the relevant legislative history as well as NASA practice and an authoritative statement of the Chief Counsel of the Federal Aeronautics Administration, came to the now well accepted conclusion that space law had to be applied to the shuttle.[4] This determination was in line both with international air law incorporated in the Paris Convention of 1919 and the Chicago Convention of 1944, as well as with international space law embodied in the Outer Space Treaty of 1967 and the subsequent major international conventions dealing with space law. The conclusion was also reinforced by the overall purpose and functions of the shuttle.[5]

While the policy choice to regard the shuttle as a spacecraft appeared inescapable on the basis of the indicated analysis, the aforementioned study cautioned about a "state of the art" caveat suggesting that if future technological developments were to create an aerospace vehicle capable of moving freely in the air like an aircraft and also moving at will in outer space, the whole range of variables distinguishing air law from space law and the applicability of these laws to given situations may have to be re-examined. The same study also suggested that consideration of new laws, both domestic and international, may become necessary in order to adjust legal regulations to the latest scientific and technological innovations.[6]

The overall issue of the applicability or inapplicability of the rules of air law or space law or perhaps both as well as a determination of whether new laws are necessary can only be properly undertaken after a careful analysis of the relevant policy issues with respect to the novel situations ushered in by the aerospace plane.

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4. THE SPACE SHUTTLE AND THE LAW 2-3 (S. GOROVE ed. 1980).

5. *Id.* at 3-5.

6. *Id.* at 5.

Issues of the Delimitation of Airspace and Outer Space

The aerospace plane's capability to fly much as a conventional aircraft through the airspace at different altitudes is likely to revive the hitherto unresolved issue of the delimitation of airspace from outer space. As international customary law stands today, earth-orbiting satellites are regarded to be moving in outer space. While this rule establishes a guideline for the determination of the lowest functional boundary line of outer space, it does not necessarily clarify the legal status of the adjacent underlying area and does not *ipso facto* dispose of the issue of the upward extent of national sovereignty.

The principle of the freedom of exploration and use of outer space, a cardinal principle of the 1967 Outer Space Treaty,[7] in a sense implies the freedom to go into outer space and also the freedom to return to earth from outer space. Because of the very limited number of space flights that might have traversed through the airspace of a foreign state, the exact nature and scope of this freedom has so far not been determined by international customary law. Attempts in the United Nations aimed at establishing a boundary line between airspace and outer space at a height of 100-110 kilometers and according space-faring nations the right of innocent passage through the underlying airspace above the territories of other countries have to date not received sufficient support.[8] As a result, the legal status of the area immediately underlying outer space remains in doubt together with the issue of the upward extent of territorial sovereignty. It may be expected that the development of the aerospace plane will focus on this unresolved issue since the plane will likely traverse over foreign airspace at lower altitudes and on more frequent occasions than has been the case with conventional spacecraft.

Among the policy choices to be considered will be the question of whether to set the upward limit of national sovereignty at a specific height anywhere between the area where satellites can orbit the earth and where aircraft can fly and, at the same time, not require special permission from the underlying state to traverse space above this height on the way to and from outer space, or, alternatively, to give space-faring nations the right of innocent passage through this area while ascending to or descending from outer space. The problem with innocent passage is that disputes can arise out of the interpretation of what constitutes innocent passage and also from the determination as to whose interpretation will prevail.

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7. The Treaty on Principles Governing the Activities of States on the Moon and Other Celestial Bodies, signed on Jan. 27, 1967 and entered into force Oct. 10, 1967, 19 U.S.T. 2410, T.I.A.S. 6347 (herein refererd to as the "Outer Space Treaty").

8. U.N. Doc. A/AC 195/C.2/L.139.

The Status of Astronauts

The aerospace plane may only spend a relatively short time in outer space in the course of a routine flight connecting two distant points on earth. The policy issue to be determined will be whether to regard the personnel of such plane as astronauts. If so, under the Outer Space Treaty of 1967, they would be regarded as envoys of mankind[9] to whom the special privileges extended by the Agreement on the Rescue and Return of Astronauts and Return of Space Objects would be applicable.[10]

The very limited amount of time that people would spend in outer space while flying from one place on earth to another on an aerospace plane would likely militate against the idea of giving them special status similar to that accorded to astronauts under the Rescue Agreement.[11] It is not very likely that states would be willing to grant privileges and immunities on such an aerospace plane to personnel and travelers who have made an emergency landing on the territory of a foreign state.

The law embodied in the texts of the space treaties does not make it clear whether personnel of a space object is to be taken to include not only the crew but also the passengers of a spacecraft. In its general use, the term "personnel" refers to people who are "employed" in some capacity and would not include passengers. While the space treaties do not define the word "personnel," it could be argued and quite correctly that article VIII of the Outer Space Treaty was not intended to take passengers and other non-crew persons out of the jurisdiction and control of the state of registry while they were in outer space. Similarly, the Rescue Agreement's reference to "personnel" was clearly intended to apply to all "astronauts," a term which appears in the title of the agreement. Admittedly, the issue of the status of passengers was not a burning issue at a time when only professional astronauts or cosmonauts were involved in space flights but the advent of the aerospace plane will likely refocus attention on this matter. Additionally, it may rekindle the issue whether apart from the safe and prompt return requirement certain other privileges and immunities should be accorded to astronauts.

Liability Issues

In case of damage resulting from the crash or collision of an aerospace plane, policy makers will have to come to grips with the issue whether strict liability should apply in such situations. The Liability Convention provides for strict liability of the launching state if the space object causes damage on the surface of the earth or to conventional aircraft

9. Outer Space Treaty, art. V.

10. Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, April 22, 1968, 19 U.S.T. 7570, T.I.A.S. 65559, 672 U.N.T.S. 119 (herein referred to as the "Rescue Agreement").

11. *Id.* at arts. 2-4.

in flight. In case the damage is caused elsewhere than on the surface of the earth to a space object of one launching state by a space object of another launching state, the latter is liable only if the damage is due to its fault.[12]

It is conceivable that the policy choice will be to preclude the applicability of the Liability Convention to damage caused by the crash or collision of an aerospace plane, especially since the Liability Convention, much like the Outer Space Treaty, makes the launching state liable for damage caused by the launched object,[13] and there may be no launch of the aerospace plane in the conventional sense of the word. Clear as this observation may be, policy issues regarding liability may still require further consideration.

A possible policy choice would be to disregard the manner in which the aerospace plane ascended whether by launch or in a way a conventional aircraft takes off and make the determination of applicable law irrespective of it. It may be recalled that the determination that space law should apply to the shuttle was also made notwithstanding the fact that the shuttle landed on a runway much like a conventional aircraft.

Among the several possible scenarios involving damage caused by an aerospace plane the following may be considered. If the damage is caused by the aerospace plane to a space object in outer space, the choice may well be to apply the Liability Convention in such a situation and predicate liability on fault. The same rule may also be applied if the damage is caused to another aerospace plane in outer space. The supporting argument for such policy choice may well be that the damage occurred in outer space, a fact that would militate against the application of air law in such a situation. A counter argument against the application of the Liability Convention may be the functional one if in fact the aerospace plane is used solely for speeding up point-to-point transportation on earth and its operation in space is only incidental to this effort.

Unlike issues of liability, those pertaining to international responsibility are not tied to the launching state. Under the Outer Space Treaty states are internationally responsible for national activities in outer space irrespective of whether they are carried out by governmental or nongovernmental entities.[14] Also, the activities of nongovernmental entities in outer space require authorization and continuing supervision by the appropriate state party.[15] It would be hard to see how a state could escape its responsibility in connection with the operation of an aerospace plane while in outer space. It could also be argued, though

12. *See* arts. II and III of the Convention on International Liability for Damage Caused by Space Objects. March 29, 1972, 24 U.S.T. 2389, T.I.A.S. 7762 (herein referred to as the "Liability Convention").
13. *Id.* and art. VII of the Outer Space Treaty.
14. Art VI.
15. *Id.*

admittedly not with equal force, that the international responsibility provision of the Outer Space Treaty should also apply to activities connected with the aerospace plane during its flight in the air when it is on its way to or from outer space.

Issues of Registration

Under the Registration Convention when a space object is launched into earth orbit and beyond, the launching state is required to register the object.[16] Each state of registry must also provide information to the Secretary General of the United Nations about the launched space object.[17]

The issue that arises in connection with the aerospace plane is whether it would fall under the requirements of the Registration Convention. Under a strict interpretation of the Convention, it could be argued that the aerospace plane is not launched into outer space so long as it takes off as a conventional aircraft and if there is no launching in the course of its flight. Apart from the difficulty associated with the requirement of launching, it may be debatable whether the aerospace plane may in all situations qualify as an object placed into orbit.[18]

Aside from the textual interpretation, it is also questionable whether the purposes of the Registration Convention would be served by subjecting a device used for terrestrial transportation to the requirements of the Convention. The general thrust of the Convention is directed toward the registration of objects which are to remain in earth orbit or beyond.[19] This is apparent, *inter alia*, from a reading of article IV of the Convention which requires the state of registry to furnish information to the U.N. Secretary General on the space object's basic orbital parameters, including nodal period, inclination, apogee and perigee. Also, the provision which enables a state to provide from time to time additional information concerning the space object,[20] and the requirement to notify the Secretary General to the greatest extent feasible and as soon as practicable of space objects which have been but are no longer in earth orbit, [21] suggests that it would be unwise to apply the Convention to an aerospace plane whose primary purpose is to speed up global transportation on earth, and whose stay in space is only incidental to this effort and of a very short duration.

To the foregoing line of reasoning one may also add that a basic purpose of the Registration Convention has been to facilitate

16. Arts. II and IV of the Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, T.I.A.S 8489 (herein referred to as the "Registration Convention") .
17. *Id.* at art. IV, para. 1.
18. Emphasis added.
19. *Cf.* art. II
20. Art. IV, para. 2.
21. Art. IV, para. 3.

identification of space objects which have caused damage or which have been of a hazardous or deleterious nature.[22] The identification of an aerospace plane, if engaged in terrestrial transportation, is not likely to create any difficulties in case of an accident and may not require the assistance of other states possessing space monitoring and tracking facilities.

While there may be little or no need to register the aerospace plane under the Registration Convention used for terrestrial transport, it should be subject to the operational requirements imposed upon conventional aircraft by domestic law and international agreement.

In arriving at the foregoing conclusions one should not lose sight of the possibility of technological advances which may necessitate a reexamination of the issues associated with the aerospace plane. Such an eventuality could take place if the aerospace plane of the future would be capable of staying in outer space for longer periods of time and could be used for both earth and space transportation and other dual purposes.

Issue of Space Object

From the preceding discussion of the Liability and Registrations Conventions, it would appear that the policy choice may result in characterizing the aerospace plane in some cases as a space object and in others as not a space object. This would reflect a lack of consistency and perhaps also that of logic which are hardly the hallmarks of a solid legal foundation. However, upon a closer scrutiny, it would seem that the policy choice may not entirely be inconsistent with similar, already existing differentiations.

To be sure, in current international space law there is no full-fledged, authoritative definition of a space object. Only a partial definition is given in the Liability and Registration Conventions to the effect that a space object includes its component parts as well as its launch vehicle and parts thereof.[23] While the launch vehicle after its launch would be regarded as a space object and the Liability Convention would be applicable to any damage caused by it, a similar conclusion may not likely be reached if the damage occurs while the vehicle is still in the manufacturing plant or on its way to the launching pad. Similarly, the characterization of a space object as such an object will also change following its return to earth. This may occur immediately or in some cases at a later point in time, as exemplified by harmful radiation emanating from the debris of a nuclear power source after its crash on the earth. Also, it is not inconceivable that a space object will no longer be regarded as a space object following its landing and stay on the moon or on another celestial body or that different rules will be devised for such an object.

22. Art. VI.

23. Art. 1(d) of the Liability Convention and art. 1(b) of the Registration Convention.

The preceding observations suggest that what may have appeared inconsistent or illogical at first sight, may not necessarily be so. Thus there may be nothing wrong with a policy choice that would necessitate the characterization of the aerospace plane in some cases as a space object while in other circumstances not as a space object within the context of the applicability of a particular space treaty. What is important is that the policy choice should be weighed after a careful evaluation of the attendant factual circumstances of the case at hand. For instance, if an aerospace plane collides with another plane while on an air flight from New York City to Washington, D.C. to pick up passengers before a subsequent flight to Hongkong which would pass through the fringes of outer space, it would seem that the policy choice may well be not to apply the Liability Convention's provisions to such an accident. Should the collision occur during the flight from Washington, D.C. to Hongkong the policy choice may be just the opposite.

Other Issues and a Concluding Thought

Undoubtedly there are many more issues which may have to be addressed following the advent of the aerospace plane. As to jurisdiction, under the Outer Space Treaty the state of registry is to "retain" it with respect to a space object while in outer space.[24] The use of the word "retain" in the aforementioned sentence suggests that the state of registry would also have jurisdiction over the object prior to its reaching outer space. While the principle of the freedom of exploration and use of outer space certainly implies both the freedom to go into outer space as well as the freedom to return to earth, the dearth of relevant international practice to date suggests some caution in drawing the conclusion that the state of registry would retain exclusive jurisdiction during the space object's transit through foreign airspace. However, this may not be the case with the aerospace plane not only during its air flight between two different countries, *e. g.* when flying from New York to Montreal but also during its temporary space flight from Montreal to Singapore while the plane is passing through the airspace of a foreign state. In other words, in both cases the underlying state's consent to the aerospace plane's transit through its airspace may be necessary. At the same time, there is no reason to assume that policy considerations for the aerospace plane would require a rule different from that applicable to a space object while in outer space.

The conclusion that emerges from the preceding lines of reasoning appears to underscore that all relevant international agreements should be closely scrutinized to determine in what way or under what circumstances they would or would not apply to the aerospace plane. The same holds equally true for domestic laws and regulations.

24. Art. VIII.

If the aerospace plane is used as a transportation device on earth, strictly speaking, from a functional viewpoint, it would seem more logical to let it be governed by air law regulations. While in the final analysis this proposition appears to be sound, because of the operation of the aerospace plane in outer space - brief as the latter may be - lawyers and policy makers should not avoid giving thoughtful consideration to the various issues presented by the aerospace plane. Should the policy choice reasonably necessitate the adoption of new rules governing the aerospace plane, special care will have to be exercised to circumscribe the physical attributes and intended operational area of the aerospace plane in the context of which the new rules would apply. Otherwise, the rules may inadvertently be applied in the future to aerospace planes with far different capabilities, functions and purposes from the initial ones to which they may have been intended to apply.