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CASE FILE COPY

ASPECTS OF THE LAW OF SPACE ACTIVITIES *

Paul G Dembling **

I INTRODUCTION

When the first earth satellite was orbited,¹ a new scientific revolution began which perhaps was comparable to the one that is identified with Copernicus

Space exploration has stretched the imagination of man more than any other exploration in human history The large distances involved, known to us from the work of astronomers strike us with new force as we consider traversing them The moon, our nearest neighbor, is approximately 240,000 miles away Venus, our closest planet, is 26 million miles away, the next, which is Mars, is 49 million miles The farthest planet is Pluto, which is 3680 million miles away from the sun and the sun is 93 million miles from the earth²

This boundless area presents tremendous challenges to all—to the physical scientists, to the life scientists, to the educators, to the political scientists, to the sociologists, and to the economists³ While much emphasis has been placed on the work of the physical and life scientists, it is pertinent that we recognize that the social scientists are considering the implications of the activities of space The social impact of satellites on society cannot be divorced from economics Improved long-range weather forecasting will be made possible by scientific data relayed back to earth, and will for example revolutionize the food and fiber industries Crop planting will be gauged better Social scientists must be thinking of the impact of weather forecasting on conservation programs and policies, on national agricultural policies, and even on such corollary questions as price guarantees and subsidies Rapid communications among the nations of the earth will soon be a reality Satellites will usher in a world-wide communications network With radio and television networks encircling the globe as a result of satellites acting as relay stations, man will be able to see and hear events taking place anywhere on the earth's surface The application of satellites to the improvement of mass telephone, television, and radio communications provides many social problems which will have to be met with forthrightness

Social scientists will have to reflect on the types of satellites which will be socially useful and desirable at a given time and in a given place They must be concerned with the myriad of problems engendered by such space activities on the various countries of the world

* An address presented at the 15th Annual Meeting of the American Rocket Society, Washington, D C, December 7, 1960

** At time of address, Assistant General Counsel, (presently Director of Legislative Affairs), National Aeronautics and Space Administration BA and MA, Rutgers University, JD, The George Washington University Law School Member of the bar of the District of Columbia

¹ The U S S R orbited Sputnik I on October 4, 1957 Spherical in shape with a diameter of 22 8 inches, this 184-pound satellite circled the world in an initial time of 96 2 minutes Its orbit was elliptic with an altitude range from 145 to 560 miles and was inclined at an angle of 65 degrees to the equatorial plane It carried 2 radio transmitters operating at 20 005 and 40 002 megacycles

² House Select Comm on Aeronautics and Space Exploration, Staff Report, *Space Handbook Aeronautics and Its Applications*, H DOC NO 86, 86th Cong, 1st Sess (1959), pp 9-18

³ See generally House Committee on Science and Aeronautics, *Proposed Studies On the Implications of Peaceful Space Activities For Human Affairs*, prepared for the National Aeronautics and Space Administration by The Brookings Institution, H REPT NO 242, 87th Cong, 1st Sess (1961)

What of the legal implications of this vast extension of human activity? A considerable body of legal writing has developed on the subject of "the law of space activities"⁴ Much of it deals with political problems of disarmament and international organization The National Aeronautics and Space Act of 1958 stated the policy of the United States—"that activities in space should be devoted to peaceful purposes for the benefit of all mankind"⁵ If this end is to be achieved, it is recognized that it must come about by effective and enforceable international agreements This does not mean that law and lawyers have no place in that area, but that that area cannot be construed to be encompassed in so-called "space law"

II NEW LEGAL PROBLEMS

There are some significant legal problems which are associated with the conduct of space activities which are new and have been raised for the first time because of these activities

First is the question of whether or not there is, or should be, an upward limit of territorial sovereignty⁶ Roman and early common law recognized certain proprietary rights on behalf of private landowners in the air space overlying their land However, these rights cast into the maxim *cujus est solum, ejus est usque ad coelum* (he who has the soil owns upward unto heaven)⁷ which Lord Coke once uttered should not be permitted to obscure the fact that these rights were confirmed solely for the purpose of fostering man's use and enjoyment of his property on the earth's surface The use of navigable air space by aircraft has not been fettered by the maxim

To attempt to find a solution to the question of sovereignty by reference to the Paris Convention on International Civil Aviation of 1919 or the Chicago Convention of 1944 is unfruitful While the Chicago Convention recognizes the sovereignty of every nation in the "air space" above its land and territorial waters, it contains no definition of air space (Furthermore, some of the definitions used therein for other terms are not free from ambiguity) Because of this legal principle, every nation has the unquestioned right to exclude any foreign power from entering its air space

Despite some past arguments, no one seriously contends today that such a rule should apply in outer space Of the earth satellites launched, some 17 are still in orbit* which at this very moment are passing over the territory of every nation on earth No permission was sought in advance to launch these satellites, none was expressly given, and not a single protest has been registered by any

⁴ Hogan, *Space Law Bibliography*, 23 J AIR L & COM, 317-325 (1956), Hogan, *A Guide to the Study of Space Law, Including a Selective Bibliography on the Legal and Political Aspects of Space*, Rand Report P-1290, The Rand Corp, Santa Monica, 1958, House Select Comm on Aeronautics and Space Exploration, Staff Report, *Survey of Space Law*, H DOC NO 89, 86th Cong, 1st Sess (1958), pp 37-60, THE AMERICAN BAR FOUNDATION, *The Law of Outer Space*, Report to the National Aeronautics and Space Administration (1960), and Senate Comm on Aeronautical and Space Sciences, *Legal Problems of Space Exploration, A Symposium*, S DOC NO 26, 87th Cong, 1st Sess (1961)

⁶ 72 Stat 426 (1958), 42 USC 2451

⁷ See generally, Cooper, *High Altitude Flight and National Sovereignty*, 4 INT'L L Q 411-416 (1951), Jenks, *International Law and Activities in Space*, 5 INT'L & COMP L Q 99 (1956), and Haley, *Sovereignty in Space* 7 REV OF CONT'L 13 (1960)

⁷ The maxim appears to have been first applied in *Bury v Pope*, 1 CRO ELIZ 118, 78 Eng Rep 375 (1586), 2 BL COMM 18

* (As of Dec 7, 1960, the date of this address—Ed note)

State. By the actions of the great powers engaged in this activity, it appears that a new principle of international law has been established. This principle is that outer space is not subject to claim of territorial sovereignty, that no State has the right to exclude other States from the use of any part of it, and that it is, therefore, freely available for exploration and use by all, much as the high seas are free. This does not mean, of course, that activities which threaten international peace and security are to be permitted in outer space, nor does it mean that a State is not free to take legitimate measures in outer space for self defense. The extent of territorial sovereignty is obviously not the criterion in judging such matters.

If outer space is free while air space is subject to the sovereignty of the underlying States, the obvious question for every lawyer is "Where does the air space end, and where does outer space begin?" Numerous suggestions have been made to locate a boundary between the two. Some are based on supposed geophysical or astronomical constants, some on the maximum heights at which craft derive their support solely from the atmosphere, and some on purely arbitrary altitudes.⁸ There does not appear to be any ready solution to this problem in the near future.

Another new legal problem occasioned by the activities in space concerns the possibility of claims to all or a portion of celestial bodies. Are such bodies subject to exclusive appropriation by any State or person on earth? The United Nations Ad Hoc Committee on the Peaceful Uses of Outer Space⁹ stated the problem in this way:

"The Committee was of the view that serious problems could arise if States claimed, on one ground or another, exclusive rights over all or part of a celestial body. One suggestion was that celestial bodies are incapable of appropriation to national sovereignty. Another suggestion was that the exploration and exploitation of celestial bodies should be carried out exclusively for the benefit of all mankind. It was also suggested that some form of international administration over celestial bodies might be adopted.

"The Committee noted that, while scientific programmes envisaged relatively early exploration of celestial bodies, human settlement and extensive exploitation of resources were not likely in the near future. For this reason the Committee believed that problems relating to the settlement and exploitation of celestial bodies did not require priority treatment."¹⁰

While all of the problems mentioned by the Committee do not require

⁸ Cooper and Jenks, *supra* note 6, also Cooper, *Legal Problems of Upper Space*, 1956 PROCEEDINGS AMER SOC OF INT'L L 84.

⁹ Established by the General Assembly of the United Nations on December 13, 1958, and requested a report on activities, resources, future organizational arrangements, and "the nature of legal problems which may arise in carrying out of programmes to explore outer space." The Committee established two committees of the whole, the Technical Committee and the Legal Committee, whose combined efforts resulted in the Report to the General Assembly. The membership voted by the General Assembly consisted of Argentina, Australia, Belgium, Brazil, Canada, Czechoslovakia, France, India, Iran, Italy, Japan, Mexico, Poland, Sweden, the Union of Soviet Socialist Republics, the United Arab Republic, the United Kingdom of Great Britain and Northern Ireland, and the United States of America. The report represented the views of 13 of these nations inasmuch as 5 (Czechoslovakia, India, Poland, the United Arab Republic, and the USSR) refused to participate because of dissatisfaction with the Committees' membership.

¹⁰ Report to the United Nations General Assembly, 14th Session, New York, 1959, Part III, Sec III, Part C, paras 30 and 31 (UN Doc A/4141, July 14, 1959).

priority treatment, there appears to be no reason for deferring settlement of the first question mentioned. Now is the time for a clear declaration that celestial bodies shall be deemed legally *not* capable of appropriation to national sovereignty.

Application of existing legal principles.

The history of the development of the law, like the changes in many human institutions, is to depend on analogies to existing legal principles while creating new legal ideas or tools for dealing with the social, economic, and political problems produced by a new technology. There are some legal problems which appear to involve the application of established legal concepts to the new field of space activities.

What is the liability of launching nations for damage to property or injury to persons caused by artificial satellites?

If a satellite launched by the United States Government crashed somewhere, damaging property, it also seems unlikely that anything but the rule of absolute liability would apply and the United States Government would be liable for such damage. The rule holds that liability is imposed without fault for harm which results from dangerous instrumentalities or ultrahazardous activity on the ground that such activity or instrumentalities expose the community to undue risk even though every reasonable precaution may have been taken. Some writers have noted, however, that, while such a doctrine might be applicable in the case of satellites and other space vehicles under Anglo-American law, this does not necessarily follow under non-Anglo-American legal concepts.¹¹

Another problem which does not appear to pose new legal principles concerns the rights and obligations of the launching State and the host State in the case of unscheduled landings of spacecraft and personnel.

"Lost" property is property as to which the owner has involuntarily parted with possession and location of which is unknown to him. "Abandoned" property is property as to which the owner has parted with possession voluntarily. Abandonment occurs when the owner intends to desert or relinquish his property. If the owner of lost property gives up all efforts to recover it, then "constructive abandonment" may be said to apply. Therefore, it is evident that the question of intent is paramount in the concept of abandonment.

The launching of a satellite should not divest a sovereign state of rights of ownership. The general rule is that ownership of sovereign is not lost except by specific declaration of abandonment by the sovereign. This principle finds application in the case of Government ships and aircraft lost at sea. Similarly, Government aircraft unintentionally invading the air space of another country remain in the ownership of the original sovereign, even after being forced down and thus placed effectively beyond that sovereign's control.

We may conclude that sovereignty over the place where such property is located has nothing to do with the ownership of the property as a matter of international law. Aircraft, air-breathing missiles, ballistic missiles, and satellites all appear to be the same in this respect. Neither the entry into "outer space," the orbital motion of the satellite, nor the uncontrolled return to earth should affect the question of ownership of the satellite. Even pieces of a disintegrated

¹¹ Beresford, *Liability For Ground Damage Caused by Spacecraft*, 19 FED B J 242 (1959). See also Haley, *Space Vehicle Torts*, 36 U DET L J 294 (1959).

satellite, if identifiable, should remain in the ownership of the launching party. Ownership should be terminated only by the expressed intention of the owner to abandon the property. Of course, unpermitted entry may give rise to other causes of action.

Property relationships

We have attempted to define some of the legal problems regarding space and the activities of space in order to establish a frame of reference. Perhaps we might characterize these comments as dealing very broadly with the public property rights in space. These are also significant in order that this country may consider how to deal with its nationals regarding their rights.

What are some of the attributes of other property in space? First, some generalizations about property as we understand it today under Anglo-American law might be appropriate.

There appears to be no dispute among legal and political philosophers that property and its distribution occupies a central position in our modern industrial society.

With new social and economic philosophies influencing legal thought, with new and advancing technologies, with new sources of energy, there is a wider concept of "property." Property deals with legal relationships. It is rights and obligations, powers and liabilities, which may be apportioned among different parties to a transaction. It is not limited to a corporeal thing exclusively possessed by one person. Property is not confined to ownership in tangibles but includes patents, copyrights, claims, mortgages. Therefore, property rights are understood to be whole or partial. The holder of a partial right in property, such as a right of use, enjoys the same powers over them as one who has a complete right of property. Consequently, it contemplates degrees of ownership.

The *New York Times* on December 5, 1957, stated, in a significant editorial entitled "Man Into Space," the economic reasons for going into space: "the basic lesson of the history of science is that all advance in scientific knowledge is ultimately transmuted into concrete advances of the greatest economic importance to all humanity. There is no reason to suppose that the knowledge we shall gain as we penetrate farther into space will have any different consequences. It is in this broader perspective that our national policy for the conquest of space must be planned."

The Project Echo satellite successfully launched on August 12, 1960, demonstrates how the new space technology has a very practical purpose to serve. Communications history has been made with it by successfully demonstrating that a passive satellite can be used to relay voice and continuous-wave signals, first across the continent and then across the Atlantic. Mail and photographs have also been transmitted successfully by this means.

Another project to make history has been the successful launchings of TIROS I and TIROS II. With these satellites we have taken the first steps on the road to a revolution in weather forecasting. The photographs that TIROS I took, and TIROS II is taking, of the earth and its cloud cover are remarkable.

A significant aspect of the shape of things to come is the great interest which has been generated by a variety of industries in these fields of satellite communications and satellite weather collection.

The American Telephone and Telegraph Company announced recently that it is willing to spend millions of its own money on launching, ground transmitters, receivers, and spacecraft for an initial system of 30 communications satellites. These plans contemplate having an experimental satellite in orbit within a year. The band width sought for initial experiments will permit either one-way television or voice/data communications, but not both. Television transmission can be in either direction.

The problem of allocating frequencies to nations for use in space activities, and making proper international arrangements for their use, is a matter which does not present essentially new legal questions. The International Communications Union is already grappling with this problem, and while it is a difficult one, it is not legally different in kind.

Successful scientific space exploration requires reliable and uncluttered radio communications. Jamming of radio signals could impair operation of satellites and deflect them from their course, representing a hazard to life and property. International agreement on space telecommunications is necessary.¹²

It appears that once the policy questions have been resolved the legal principles that presently exist could apply. The Government may consider that public interest necessitates that all international arrangements be made through Government channels as is done, for example, in the field of international civil aviation. Here the basic negotiations are carried on on a government-to-government basis with private American airlines constituted and authorized to finalize operational matters.

The potential commercial exploitation points up some of the legal problems. Could privately-owned firms purchase boosters from manufacturers for the purpose of launching communication satellites? Is it legal at present for a commercial organization to launch vehicles on its own? Is it presently within its right to do so? Would a license be necessary?

There appear to be no statutory provisions regarding such activities within this country. Section 308 (b) of the Federal Aviation Act¹³ provides for Government coordination of missile site construction and this might be interpreted as prohibiting unauthorized launchings.

Section 307 (a) of the Act also provides for the Administrator "to develop plans for and formulate policy with respect to the use of the navigable air space" and to prescribe regulations to insure the safety of aircraft. Inasmuch as satellites proceed through the air space, it is reasonable to expect that the Government would regulate operation of satellites from this country by private organizations.

It appears that it is necessary and desirable for the Government to establish the rules for launchings and test firings. A method for licensing the activities in this field must be established. Criteria must be established.

Launchings from this country by private organizations could be undertaken on some joint venture operation. The Government could provide use of the launching base with the commercial organization providing the vehicles and

¹² See report prepared for Senate Comm. on Aeronautical and Space Sciences by Dr. Edward Wenk, Jr., *Radio Frequency Control in Space Telecommunications*, 86th Cong., 2d Sess. (Comm. Print 1960).

¹³ 72 Stat. 737 (1958), 49 USC 1301.

spacecraft With commercial organizations jointly undertaking a combined operation, the question of ownership arises Would the cost of development be the measure of such ownership? Would the amount of contribution by the parties be the measure? How would the Federal and State laws be applied to establish rate structures? Would international agreements now in existence relate to such operations? What would be the measure of control that would be exercised by a corporation (or corporations) over its operations? Would profits be controlled or regulated? What methods should be utilized in amortizing costs?

Space technology has had a revolutionary impact in such fields as metallurgy, chemical processes, data processing, fuels, control devices, and miniaturization Much of the initial research and development in this field has been conducted at Government expense and has resulted in innumerable discoveries which have actual or potential commercial value

The question is immediately posed as to what disposition the Government should make of these valuable rights The purposes and contributions of the American patent system are presently undergoing a critical re-examination Some of the issues which are to be faced are What Government patent policy will produce the most rapid advancement in space technology and allied fields in this country? What Government policy offers the most effective and efficient distribution of economic benefits arising from inventions in this new technology? What policy gives the most promise of securing the national defense and enhancing our international prestige?

Other aspects to insure orderly conduct of peaceful space activities

Something should also be said regarding steps to be taken to seek agreements in those areas where we may achieve some success It is necessary to obtain international cooperation and agreement, it is necessary to work together to achieve results in this field

The United Nations resolution on peaceful uses of outer space looks in this direction and the "Report of the United Nations Ad Hoc Committee on the Peaceful Uses of Outer Space" indicates several areas where we could expect resulting agreements which would be mutually advantageous and likely to be observed for reasons of self-interest

One area of potential agreement is the filing of flight plans in advance of launching A flight plan should be filed in each case, including the load, weight, and size of the satellite, and there should be agreement on satellite orbits The value of notice and agreement on satellite orbits has been cogently pointed out by many, both in order to prevent scientific confusion and to minimize the political danger of falsely identifying peaceful craft as hostile objects Agreement could possibly be reached if nations gave others advance notice of their intent to place a manned or unmanned vehicle into space

There is also the practical problem of physical interference between space vehicles and conventional aircraft This is especially true as the launchings of space vehicles become more numerous Air traffic is already congested in many areas Technical studies in this regard could be undertaken profitably In order to arrive at some international agreement, consideration should also be given to eliminating satellites once they have served their purpose A corollary problem is to prevent the skies from being traversed by a succession of satellites so as to

cause concern to new launchings—what I like to term “pre-emption by occupation”

Another area in which agreement could be reached without great difficulty in my opinion, is the registration and identification of spacecraft. Corollary to the identification is the placing of suitable markings on spacecraft, particularly to facilitate identification upon return to earth. As more nations acquire the ability to utilize space, the need for an international registry of spacecraft, plus requirements that these vehicles carry identifying signals and suitable markings, is intensified. The Report of the Ad Hoc Committee suggests several avenues of approach. One is the allocation of individual call signs to these vehicles. The call signs could be emitted at stipulated regular intervals. “Another means of identification is by orbital or transit characteristics” of the vehicles. Perhaps, the established practices which are in use on seagoing vessels and aircraft could serve as a basis for spacecraft identification.

Registration would also aid in the problem of potential overloading of tracking facilities by affording a convenient method of notification to other countries. This would enable such States to distinguish between these space vehicles and other objects. A further step might be the coordination of launchings.

Little has been done to provide a permanent and continuing record of the orbits of satellites, their performance, and other scientific data. A central depository for such data, perhaps in the United Nations, would be invaluable scientifically and useful in problems arising over space flight interference, damage to property on earth, sovereignty, etc.

We might even strive for pooling of international knowledge, equipment, personnel, and funds where particularly significant and costly projects are to be undertaken.

Can these proposals come to fruition? It is difficult to predict what can happen in the international field. The legal problems are indistinguishable oft times from the technical problems in this new field. It appears that we must work towards agreements to cover the matters just discussed. These areas have been suggested for agreement not only by the West but also by writers from the Soviet. A Shternfeld¹⁴ outlines certain of these areas:

- a exchange of information by scientists and technicians;
- b control and coordination of tests, including the program of selected routes, speeds, time coordinates of takeoff, descent, etc

He concludes that:

“It is quite clear that all these questions, in spite of their complexity, can be solved if there is a positive approach by the negotiating parties and if artificial satellites are utilized only for peaceful purposes.”

E Korovin, the Soviet legal scholar looked forward to

“the solution of such problems as identification markings for scientific apparatus launched into space, and their registration; the elimination of radio

¹⁴ *To Whom Does Outer Space Belong?*, ARTIFICIAL EARTH SATELLITES (Moscow, 1956), pp 174-177

and TV interference in outer space and, in a word, the institution of what might be provisionally called cosmic space 'safety rules' " ¹⁵

In an article in *Soviet State and Law*,¹⁶ Miss Galina also supported the following proposals

- a Identifying signs on satellites
- b Agreement on radio frequencies and elimination of interference
- c Prohibition of the use of outer space for warlike purposes

These areas could serve as the initial stages in the development of the rule of law for space activities

Arthur Kuhn in his *Pathways in International Law*¹⁷ said "Whenever physical, chemical, or electrical science introduces new forces into the life of man, it may reasonably be conceived to be the task of jurisprudence to adjust and coordinate the legal relations both of states and of individuals under the new conditions "

It may also be necessary to adjust the methods by which these legal relationships are established. Perhaps we have overemphasized the negative aspects and failed to concentrate on the positive.

The success of the International Geophysical Year has engendered future international collaboration and established the basis for a sound method of voluntary organization of the world scientific community. The IGY "organized the scientific world into a single unit for the advance of knowledge about the nature of the universe. Barriers of language, nationality, even politics and mutual cold war antagonisms were in this massive quest for exact data mostly surmounted " ¹⁸

It is also noteworthy that for the Lunik II moon shot the Soviets utilized the IGY alerting channels for the first time and also for the first time provided data to the Jodrell Bank Radio Astronomy Laboratory within the time specified by the IGY.

The World Data Centers located in the United States operated by the National Academy of Sciences, in USSR operated by the Soviet Academy, and the others distributed by scientific fields in Western Europe, Australia, and Japan, have been another example of international cooperation.

Collaboration and cooperation have been effective in other areas of international interest besides telecommunications, such as in medical research and in meteorological efforts.

The International Council of Scientific Unions (ICSU), established in 1931 to encourage international scientific cooperation, has done just that—and with success.

¹⁵ *International Status of Cosmic Space*, 5 Int'l Affairs 53 (1959). The author is corresponding member, USSR Academy of Sciences, Chairman, Scientific Research Committee on the Legal Problems of Outer Space, Institute of Law, USSR Academy of Sciences.

¹⁶ On the Question of Interplanetary Law, 7 SOVETSKOYE GOSUDARSTVOI PRAVO 52 (1958). Reprinted in *Translations of Two Soviet Articles on Law and Order in Outer Space* Report T-98, Rand Corporation, Santa Monica, Calif (1958).

¹⁷ 1953.

¹⁸ House Select Comm on Astronautics and Space Exploration, Staff Report, *The International Geophysical Year and Space Research*, H DOC NO 88, 86th Cong, 1st Sess (1959), p 33.

I urge, therefore, that we emphasize and attempt to reach international agreement

- (1) to file flight plans in advance of satellite launchings,
- (2) to avoid interference between space vehicles and aircraft;
- (3) to identify spacecraft;
- (4) to register space vehicles,
- (5) to coordinate launchings; and
- (6) to establish central depository of scientific data on satellites

Conclusion

The future of space exploration rests with the talents of many throughout the world who must join together to broaden the scientific and engineering knowledge, but without law there is no order. A fundamental condition of human life at every level is a system of ordered relationships. John A. Johnson, General Counsel of the National Aeronautics and Space Administration, stated it cogently when he said:

"I think we must recognize that unless collective steps are taken to subject the exploitation of outer space to an orderly restraint, it is quite probable that fear, rather than hope, will dominate man's attitude toward these amazing new developments, and that national security, rather than scientific advancement and the economic benefit of mankind, will keynote every new effort. It is the task of law and international organization to prevent such a disaster"¹⁹

¹⁹Hearings, *Before the House Committee on Science and Astronautics, International Control of Outer Space*, 86th Cong., 1st Sess., at p. 97 (1959)