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## STS - Legal Connotations

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# STS - LEGAL CONNOTATIONS

MARTIN MENTER\*

## I. INTRODUCTION

### A. General

**F**RAGILE MAN, tailored to his planet Earth, having demonstrated in Apollo missions that he can overcome hazards of travel to the moon and return, and in Skylab and Soyuz missions that he can live in the weightlessness of space for an appreciable period of time during which he can maintain an experimental space laboratory, is about to embark in the Space Shuttle on ventures that will truly comprise another giant step for mankind.<sup>1</sup> "The first great era of the space age is over; the second is about to begin."<sup>2</sup> Dr. Frank Press, the Director of the Office of Science and Technology, Executive Office of the President has written: "As we enter the eighties our approach on national programs will be transformed by the advent of the Shuttle, moving us into an era of routine work in space. The transformation will be as historic as man's first landing on the moon."<sup>3</sup>

### B. United Nations

The Scientific and Technical (S&T) Subcommittee of the United Nations' Committee on the Peaceful Uses of Outer Space (COPUOS), pursuant to request of the United Nations General Assembly<sup>4</sup> at its 1979 Session, as a matter of priority, initiated consideration of the subject of Space Transportation Systems. (STS's) The Subcommittee received presentations from the United States, the European Space Agency (ESA) and the Union of Soviet Socialist Republics (U.S.S.R.). The ESA presentation was on the ARIANE program which seeks to achieve in late 1980 an economically competitive European capability of placing satellites in orbit, particularly geostationary satellites weighing about 900 kilograms. The U.S.S.R. pre-

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<sup>1</sup> The United States Skylab, launched May 1973 provided a workshop and living area for its three successive crews whose duration in space were, respectively, 28, 59, and 84 days. In addition to the duration achievement, Skylab proved of enormous value to life on Earth. Its program included over 50 scientific, technological and medical experiments. Skylab re-entered the Earth's atmosphere with surviving parts scattered over Australia in July 1979, but caused no damage or injuries. USSR's Soyuz, 32, with cosmonauts Vladimar Lyakhov and Valery Ryumin, achieved the record duration of a 175 day voyage in space, terminating on August 29, 1979.

<sup>2</sup> Address by President Carter, Kennedy Space Center (1978), *in part found in*, Press, *U.S. Space Policy A Framework for the 1980's*, ASTRONAUTICS & AERONAUTICS 34 (July-August 1979).

<sup>3</sup> *Id.* at 35.

<sup>4</sup> U.N.G.A. RES. 33/16 (Nov. 10, 1978).

sensation described the erection and development of a space transportation system based upon the manned Soyuz and automatic Progress Modules for the effective functioning of long-lived orbital scientific space stations. At its 1980 Session, the subcommittee initiated consideration of its requested UN Secretariat study on the progress being made in space transportation systems and their scientific, technical, economic and social implications.<sup>5</sup>

### C. *Passenger Travel in Space*

Many writers and various studies project concepts of massive space stations in outer space and of large, almost self-sustaining communities in space to which people emigrate from Earth. Dr. James C. Fletcher, while Administrator of NASA in 1977, stated: "About a decade from now - in the mid-1980's - the ancient fantasy of the space station should begin to approach reality."<sup>6</sup> Professor Gerard K. O'Neill's concept of space communities of 10,000 persons is frequently mentioned.<sup>7</sup> Professor J. Peter Vajk wrote: "[G]iven another 50 years of improvements in Earth launch vehicles, it is not unreasonable to envisage tens of millions of passengers per year traveling between Earth and the (space) colonies."<sup>8</sup>

An engineering system design study on "Space Settlements" was held in 1975 at Stanford University. It was jointly sponsored by the American Society for Engineering and NASA. The study, whose conclusions and recommendations are attributed to the participants and not the sponsors, depicted a space colony in a fixed relation to the Earth and the Moon. The inhabitants are engaged in many enterprises including the growing of their own food. The study's report further depicts a tourist's visit to the space colony, with architectural drawings of the colony's structure having interior views of office buildings, homes, streets, and flora.<sup>9</sup>

Let us assume that by the year 2050 such a space community has been established by the United States on an expanding space station over a period of years. There, private companies are engaged in the manufacture of medical compounds, ball bearings, crystals, electronic components and various other products where adhesion and cohesion effects dominate the composition of the article concerned and which may be improved upon in a high vacuum and in zero gravity. Solar power stations are constructed and moved to synchronous orbit. Laboratories of the space station carry

<sup>5</sup> Report of the Scientific and Technical Sub-committee of the Committee on the Peaceful Uses of Outer Space on its 16th Session, U.N. Doc. A/AC. 105/244, at 7, 10, pars. 17, 29 30 (1980).

<sup>6</sup> Fletcher, *Communications Satellites: Past and Future*, COMPUTERS AND PEOPLE 21, 23, (April 1977).

<sup>7</sup> O'Neill, *The Colonization of Space*, PHYSICS TODAY 32, (September 1974).

<sup>8</sup> Vajk, *The Impact of Space Colonization on World Dynamics*, TECHNICAL FORECASTING AND SOCIAL CHANGE 361, 391, (1976).

<sup>9</sup> SPACE SETTLEMENTS - A DESIGN STUDY 56, 60, 87-110, (NASA, 1977).

on further experimentation in improving old and creating new products and processes, including extensive medical research. Additionally, some items are totally locally manufactured, and some are imported from Earth for local use and consumption. Telescopes of an observatory seek to increase man's knowledge of his galaxy and of other galaxies in space with new data as to the early development of the Earth and its inhabitants. Pursuant to bilateral agreements, many nationals of other nations are working with United States personnel on joint projects. Satellite solar power stations, and other satellites engaged in communications, remote sensing of the Earth and its environs, collating and reporting weather information or performing other assigned tasks, are periodically visited and serviced by members of the space community.

In this scenario, let us further depict a daily aerospace flight from Earth bringing supplies and new personnel; items manufactured in the space community and returning personnel are carried on the return flight to Earth. The crew of the aerospace vehicle, the passengers aboard and personnel of the space station are a mix of military and civilian personnel, including Government and contractor employees and personnel of private concerns and organizations. Similar multi-purpose manned space stations erected by or for other States would require flights between space stations as well as flights to and from the Earth.

## II. LEGAL ANALYSIS

### A. *General*

As the scientist advises on the technical feasibility of space development, including space flight, the attorney must address the legal and political implications. Thus, the attorney has the unique opportunity to contribute to space law developments. It is apropos to recall the observation made by Ambassador Arthur Goldberg, the United States' Permanent Representative to the United Nations, on December 17, 1966, when the text of the then draft of the 1967 Space Law Treaty<sup>10</sup> was under consideration in a United Nations General Assembly planning session:

As man steps into the void of outer space, he will depend for his survival not only on his amazing technology but also on this other gift which is no less precious: the rule of law among nations.<sup>11</sup>

Many legal problems relating to space transportation present themselves. What is the status of the crew, passengers and space vehicle? What

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<sup>10</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and other Celestial Bodies, Jan. 27, 1967), 610 U.N.T.S. 205 (effective Oct. 10, 1967).

<sup>11</sup> STAFF OF SENATE COMM. ON AERONAUTICAL AND SPACE SCIENCES, 90th Cong., 1st Sess., REPORT ON TREATY ON PRINCIPLES GOVERNING THE ACTIVITIES OF STATES IN THE EXPLORATION AND USE OF OUTER SPACE, INCLUDING THE MOON AND OTHER CELESTIAL BODIES 16 (Comm. Print 1967).

State(s) have jurisdiction, control and responsibility for the flight, the spacecraft and personnel aboard? Would the conclusion vary if the launch of the space vehicle were by a private corporation in a third country, such as by OTRAG? Should national and/or international regulation be formulated as to spaceworthiness of the spacecraft, competency of crew, traffic control, nuclear propulsion of spacecraft, abandonment of objects in space, return of spent space objects, erection of space platforms, manufacturing or other activity in space (such as collection of solar energy and its transmission to Earth as electricity), the government of space communities and the activities of their inhabitants? Does the advent of the Space Shuttle suggest a need for a delineation or definition of "outer space"? What disposition should be made of the claims of some equatorial States to sovereignty over segments of the "overhead" geostationary orbit? What "authorization" and "supervision" is required by a State for its "non-governmental entities" to pursue activities in space? Should further agreement(s) be made for international cooperation in space travel? Should amendment be made of the 1972 Claims Convention and other rules governing aviation flight? Many more issues will be visualized by other attorneys. This paper will briefly set forth the "solution status" of some of these legal issues.

#### B. *Delineation and/or Definition of Outer Space*

Delineation and/or definition of outer space was the most discussed legal issue in space law during the period immediately following Sputnik I. It is now receiving considerable attention within COPUOS in both the Scientific and Technical and the Legal Sub-committees. The "functional approach" adopted in the 1967 Space Law Treaty specifically setting forth prohibited activities provided a satisfactory, at least temporary, solution. The belief then prevalent was that sufficient knowledge did not yet exist as to space, and establishing a delineation may not have been in the national interest of the subjacent State.<sup>12</sup> The advent of the Space Shuttle, however, appears to have again raised within the United Nations the issue as to whether, and if so, where, a delineation or definition should be made. At the 1978 COPUOS Meeting, Ambassador Oleg A. Troyanovsky, the U.S.S.R.'s Permanent Representative to the United Nations, proposed that the solution might be arrived at in stages; he related that his delegation believed "[b]y way of a first step we might agree that space above 100-110 kilometers above sea level should be considered outer-space."<sup>13</sup> At the 1979 meeting of the Legal Subcommittee (Mar. 12 - Apr. 6), a specific proposal was made by the U.S.S.R., viz: "The region above 100-110 km altitude from the sea level is outer space".<sup>14</sup> The recital further reserved to future

<sup>12</sup> *International Control of Outer Space, Hearings Before the House Comm. on Science and Astronautics*, 86th Cong., 1st Sess. (1959) (statement of Loftus Becker).

<sup>13</sup> U.N. Doc. A/AC. 105 PV. 183, 48-50. Report of the Committee on the Peaceful Uses of Outer Space, U.N. GAOR Doc. A/33/20, 12 ¶ 64 (1978).

<sup>14</sup> U.S.S.R. Working Paper, U.N. Doc. A/AC. 105/C.2/L 121 (1979).

agreement the boundary between air and outer space. Mr. Kolossov of the U.S.S.R. observed that the proposal that 100-110 km. being outer space was but in accord with established practice, and that it was rare for space objects to orbit at a lower altitude.<sup>15</sup> While some delegates supported the proposal, others did not. As stated in the Report of the COPUOS Legal Sub-committee:

They pointed out that the Scientific and Technical Sub-committee had concluded that there were no scientific or technical characteristics of the Earth's upper atmosphere that would make it a basis for a definition and/or delimitation, that past estimate of the lowest altitude at which satellites could survive had been too high . . . and as the Committee on the Peaceful Uses of Outer Space had been unable to identify practical problems which would require a definition and/or delimitation, the question of defining the lower limit of outer space was no longer on the agenda of the Scientific and Technical Sub-Committee.<sup>16</sup>

At the 1979 COPUOS Meeting (June 18 - July 3), the U.S.S.R. proposed a General Assembly Resolution which in part recited:

1. The region above 100-110 km altitude from sea level of the earth is outer space.
2. The boundary between air space and outer space shall be subject to agreement among States and shall subsequently be established by a treaty at an altitude not exceeding 100-110 km above sea level.<sup>17</sup>

The U.S.S.R. proposal, in leaving for later treaty determination whether the demarcation between air space and outer space should be at a lower limit, wisely reflects that Air Law exponents are also concerned in the determination of the upper limits of airspace. However, the International Civil Organization apparently has not yet begun to give serious consideration to this issue.<sup>18</sup>

A third paragraph of the U.S.S.R. proposal at the COPUOS 1979 meeting recites a right to overfly other States' territory below 100-110 km in going into orbit and in returning to the launching State. This would codify what I believe is currently customary international law—a State having a right of onward passage in transiting a nearby State's airspace, when necessary in order to travel to and return from outer space.<sup>19</sup>

<sup>15</sup> U.N. Doc. A/AC. 105/C. 2/SR.314 2, ¶ 2 (1979).

<sup>16</sup> Report of the Legal Sub-committee of the Committee on the Peaceful Uses of Outer Space on its 18th Session, U.N. Doc. A/AC. 105/240, 9, ¶ 45 (1979).

<sup>17</sup> U.S.S.R. Working paper, U.N. Doc. A/AC. 105/L. 112 (1979).

<sup>18</sup> The Report of the Legal Sub-committee of the Committee on Peaceful Uses of Outer Space of its 19th Session recites that the ICAO Observer "stated that the subject of what constitutes air space had not been discussed in the representative bodies of ICAO but that, if requested by a member State of ICAO, it might be considered some time in the future." See U.N. Doc. A/AC. 105/271, 9, ¶ 42 (1980).

<sup>19</sup> See Christol, *Innocent Passage in the International Law of Outer Space*, 7 A.F. JAG. L. REV. (No. 5), 22 (1965).

The United States has consistently opposed proposals to presently determine where outer space begins. With reference to the U.S.S.R. proposal, the U.S. Representative at the 1979 COPUOS session, Neil Hosenball, stated:

On the issue of definition of "outer space", it is significant that although this question has been on the agenda for a number of years, no compelling legal or technical need or justification for such a definition has yet been put forth. To the contrary, it is evident that the setting of an arbitrary demarcation line would result in certain major difficulties. Such an arbitrary boundary would substantially affect our ability to work together as a community of nations toward our common good. We cannot at this time predict with confidence the consequences of choosing an arbitrary boundary. It is clear that had such an arbitrary demarcation line been agreed upon in the past, based on the state of our knowledge as it then existed, many current space activities would have been delayed or permanently inhibited. It is our view that the international community has not yet adequately examined the multitude of scientific, legal, technical, and political factors that are relevant to meaningful definition.<sup>20</sup>

I do not believe the advent of the Space Shuttle itself presents a new requirement for a present determination of the delineation or definition of outer space. Although it has a configuration like an airplane, the landing profile of the Shuttle is similar to that of the Apollo spacecraft. Both have a descent glide for a considerable distance through the airspace. It is not until the Shuttle descends to only about 50,000 foot altitude that it relies upon aerodynamic lift alone. It does not have the capability for even one turn around its landing field. It must make a straight approach "dead stick" landing.<sup>21</sup>

### C. *Claims to Segments of the Geostationary Orbit*

Another item considered in the U.S.S.R. proposal at the COPUOS 1979 session was pursuant to the request of the United Nations General Assembly.<sup>22</sup> This item was that the Legal Subcommittee in its consideration of a definition and/or delineation of outer space, should be "bearing in mind, *inter alia*, questions relating to the geostationary orbit." The 'geostationary orbit' of a space object is about 22,300 miles above the Earth. The speed of such object in orbit in relation to the Earth's orbit is such that the object maintains the same relative position to the Earth below; hence, it is in synchronous orbit. The United Nations General Assembly request was

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<sup>20</sup> Press Release, USUN-61(79), 17-18 (June 20, 1979).

<sup>21</sup> See Menter, *Relationship of Air and Space Law*, Proceedings of the 19th Colloquium on the Law of Outer Space, October 12-17, (1976) 168, 169 (Anaheim, Calif.).

<sup>22</sup> G.A. Res. 33/16, *supra* note 4.

premised on the Bogota Declaration. The Declaration, signed in Bogota, Columbia, December 4, 1976, in part recited:

Equatorial countries declare that the geostationary synchronous orbit is a physical fact linked to the reality of our planet because its existence depends exclusively in its relation to gravitational phenomena generated by the Earth, and that is why it must not be considered part of outer space. Therefore, the segments of geostationary synchronous orbit are part of the territory over which Equatorial States exercise their national sovereignty. The geostationary orbit is a scarce natural resource, whose importance and value increase rapidly together with the development of space technology and with the growing need for communication; therefore, the Equatorial countries meeting in Bogota have decided to proclaim and defend on behalf of their people the existence of their sovereignty over this natural resource. . . .<sup>23</sup>

The Bogota Declaration, if valid, would seriously affect space activities - bearing in mind that communication satellites currently are in geostationary synchronous orbit, that future space stations (possibly including solar power satellites) will be raised to such orbit, that future space vehicles will make routine flights to such stations and that space vehicles whose home port will be a space station will make inspections and repairs of communication and other satellites. To uphold the claim to sovereignty over segments of the geostationary orbit is tantamount to granting control over arrival, stay, and departure of spacecraft and of personnel at space stations in synchronous orbit. Such authority obviously would include power to tax all activities, subject only to such constraints the subjacent sovereign might agree to in bilateral or multilateral agreements. In an early inquiry as to the validity of this claim espoused by the Bogota Declaration, I responded that such claim was invalid as in conflict with customary international law, reflected in a "principle" of the United Nations General Assembly Resolution 1721 of December 20, 1961, and later in the 1967 Space Law Treaty, viz:

Outer space and celestial bodies are free for exploration and use by all States in conformity to international law and are not subject to national appropriation.<sup>24</sup>

The claims asserted by the Bogota Declaration were discussed in both the 1979 COPUOS session and that of its Legal Subcommittee. While generally receiving a sympathetic reception by developing States, the developed States, including the United States and U.S.S.R. generally argued strongly that the

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<sup>23</sup> *El Espectador*, 13A (Bogota, Columbia newspaper, Dec. 7, 1976). For the English translation, see I.T.U., Broadcasting Satellite Conference, Doc. No. 81-E, Annex 4. (Jan. 17, 1977). See also, *Current Documents*, 6 J. SPACE L. 193 (1978).

<sup>24</sup> Letter from Martin Mentor to Hon. Edw. R. Finch, Jr., Chairman, ABA International Law Section's Committee on Aerospace Law, (Mar. 21, 1977).



claim asserted in the Declaration to be invalid as in conflict with the 1967 Space Law Treaty. The claim, however, remains on the agenda of the Legal Subcommittee for further consideration.<sup>25</sup>

#### D. *Jurisdiction in Space*

##### 1. Criminal

Observation has been previously made that the Space Shuttle will have aboard astronauts and others on its journey into space. Further, that it will, with the assistance of upper stages propulsion units, transport persons and property to space stations where they will live and work for substantial periods. Under the 1967 Space Law Treaty, "jurisdiction and control" over such personnel while in outer space would be the responsibility of the State on whose registry the launched spacecraft, that took them into space, was carried.<sup>26</sup> This responsibility imposes on launching States the implied requirement of having authority to exercise such jurisdiction and control.

While the United States has not yet enacted provisions to extend its criminal law to personnel while in space as it has for personnel aboard aircraft of United States registry while in flight over the high seas,<sup>27</sup> it has vested authority in the NASA Administrator to issue rules governing the manner of the operation of NASA and to "establish such security requirements, restrictions and safeguards as he deems necessary in the interest of the national security."<sup>28</sup> The NASA Administrator has exercised this authority by vesting "absolute authority" in the STS Commander to enforce order and discipline during an STS flight and to take action necessary "for

<sup>25</sup> U.N.G.A. RES. 34/66, ¶ 6(b) (Dec. 14, 1979). The COPUOS Legal Sub-committee further considered this matter without resolution, during its 1980 session. See Report of the UN COPUOS Legal Sub-committee, U.N. Doc. A/AC. 105/271, 9, ¶ 37-41 (1980). Cf. Gorove, *The Geostationary Orbit: Issues of Law and Policy*, 73 AM. J. OF INT'L. L. 444 (1979). He relates that while the principles of customary and treaty law "fully support" the legal conclusions, that "it may be circumspect for the United States not to close the door to the development of orderly procedures leading to the acceptance of principles" in accord with the growing tendency to provide recognition to greater sharing of the Earth's resources, commensurate with their positions. *Id.* at 461.

<sup>26</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and other Celestial Bodies, *supra* note 10, at Art. VIII. The Maintenance of such a registry is required by Art. II of the Convention on the Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, T.I.A.S. No. 8480 (effective Sept. 15, 1976). Such Article further provides that where there are two or more "launching States," (defined in Art. I as a State which procures the launch, which launches the space object or from whose territory or facility a space object is launched), they shall jointly determine on whose registry the space object shall be carried. The State so determined would then have jurisdiction and control over the space object and any personnel thereof, unless jurisdiction and control is otherwise provided for in the agreement of the launching States.

<sup>27</sup> See 18 U.S.C. § 7(5) (1976) as to criminal jurisdiction of the United States over aircraft belonging to the United States, a citizen of the United States, or a corporation created in the United States or one of its possessions and flying over the high seas.

<sup>28</sup> 42 U.S.C. § 2455 (a) (1976).

the protection, safety, and well-being of all personnel and on-board equipment, including the STS elements and payloads . . . .”<sup>29</sup> Violation of “any regulation or order” of the Administrator “for the protection or security of any laboratory, station, base or other facility, or part thereof” subjects the violator to a possible fine of up to \$5,000 or imprisonment up to one year, or both.<sup>30</sup> It should be noted that military personnel of the United States are subject to the Congressional enacted Uniform Code of Military Justice (UCMJ) wherever performing assigned duties.<sup>31</sup>

The current 96th Congress has under active study S.1722, a pro-pertaining to a specific offense recites its applicability to “special aircraft posed “Criminal Code Reform Act of 1979”, containing provisions which are intended to extend jurisdiction of the United States to spaceflight. This would be accomplished by defining “aircraft” as “any craft designed for navigation in air or in space” and by creating a “special aircraft jurisdiction”; if a section of the proposed revision of the United States’ Criminal Code jurisdiction”, jurisdiction over such offense could be asserted by the United States. Further United States jurisdiction is provided over space activities under a section on “Extraterritorial Jurisdiction” when the offender or the victim is a national of the United States, or when an international agreement provides for or requires the U.S. to provide for federal jurisdiction over the offense.<sup>32</sup> While the United States may thus obtain jurisdiction, it is recognized that another State, under the nationality principle, may also have jurisdiction; and that under the facts of a particular situation, the United States may waive its jurisdiction in favor of the State to which the offender is a national.

## 2. Civil Law

States contemplating the establishment of space stations having personnel aboard must also assure the existence and adequacy of governing civil law for such station(s). Perhaps we can follow the precedent whereby Congress provided for the Trust Territory of the Pacific Islands. The Congress provided that all legislative, executive and judicial authority necessary for the civil administration of the Trust Territories was to be vested in a person selected by the President, until Congress provides for the government of such territories.<sup>33</sup> It should be noted that the jurisdiction then pro-

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<sup>29</sup> 45 Fed. Reg. 14845, 14846 (1980) (to be codified in 14 C.F.R. 1214.7).

<sup>30</sup> 18 U.S.C. § 799 (1976).

<sup>31</sup> 10 U.S.C. § 802 (1976).

<sup>32</sup> S. 1722 was introduced by Senator Kennedy on September 7, 1979 and referred to the Committee on the Judiciary. 125 CONG. REC. S 12204 (daily ed. Sept. 7, 1979). It is an updated version of S.1437, 95th Congress, and recites similar provisions as to jurisdiction over offenses in space. See S.1722, §§ 111,201 (b), 203 (c), and 204 (j). S.1722 was favorably reported by the Senate Judiciary Committee on Jan. 17, 1980 (S. Rep. 96-553). H.R. 6915, 96th Cong. 2d Sess., is a similar measure under active consideration within the House Judiciary Committee.

<sup>33</sup> 48 U.S.C. § 1681(a) (1976).

vided was over territory in which the United States did not possess sovereignty. This is particularly apropos as it will be recalled that Article II of the 1967 Space Law Treaty expressly precludes any claim of sovereignty with respect to outer space and celestial bodies. It is conceivable that after a period of growth, a station may be granted authority for self government and perhaps given a commonwealth status.<sup>34</sup>

Professor DeSaussure, in a presentation at NASA Headquarters, in Washington, D.C., stated that, "the space voyager should be comprehensively covered with protective rights during the entire duration of the voyage, whether it be for several days, several months or several years and much national legislation for their special protection will be needed as manned activity in space increases."<sup>35</sup>

### 3. Rescue of Personnel in Disabled Spacecraft

I believe the passengers and crew of a disabled STS would be entitled to treatment as provided in the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Space Objects Launched into Outer Space.<sup>36</sup> The words in the text do not use the term 'astronaut' that appears in the title of the Agreement, but speak of rescue of 'personnel of a spacecraft'. If such personnel land in another State's territory by reason of accident, distress, emergency or unintended landing, such State, if Party to the Agreement, is obligated to "immediately take all possible steps to rescue them and render them all necessary assistance." If the landing is on the high seas or "in any other place not under the jurisdiction of any State", States party to the Agreement are obligated to, if necessary, extend assistance in search and rescue operations to assure a speedy rescue. The rescued "personnel of a spacecraft" are to be safely and promptly returned to the representatives of the launching State.<sup>37</sup>

I believe the current international aviation agreements concerned with the protection of aircraft, passengers and crew should be reviewed to de-

<sup>34</sup> See Covenant to Establish a Commonwealth of the Northern Mariana Islands in Political Union with the United States of America. Included in the Covenant are provisions for Studies to be undertaken to determine the provisions of the United States Constitution and Federal laws to be made applicable to the Commonwealth. 48 U.S.C. § 1681 note (1976).

<sup>35</sup> H. DeSaussure, *Future Directions of International Law in Space*, 23 (Aug. 16, 1978) (paper presented at NASA headquarters, Washington, D.C.). Several examples were mentioned by Prof. DeSaussure: In the U.S., a Federal wrongful death statute based on strict liability should be enacted to supersede local state wrongful death statutes. Further, all Federal and state remedial legislation with short statutes of limitation should be revised to permit space sojourners to sue following their return to Earth, regardless of the duration of the voyage. Further, that "laws relating to the carriage of hazardous substances in outer space, the working conditions of the crew, the minimum health standards for space flight, the degree to which in-space medical care must be provided, and any disciplinary authority of mission-in-flight commanders must also be passed." *Id.* at 23-4.

<sup>36</sup> Apr. 22, 1968, U.N.T.S. 119 (effective Dec. 3, 1968).

<sup>37</sup> *Id.* at Arts. 2, 3 and 4.

termine the desirability of their amendment to include space flight or whether a separate agreement should be sought. These agreements include: The Convention of Offenses and Certain Other Acts Committed on Board Aircraft;<sup>38</sup> The Convention for the Suppression of Unlawful Seizure of Aircraft;<sup>39</sup> and The Convention for the Suppression of Unlawful Acts Against the Safety of Civil Aviation.<sup>40</sup> Of course, as further space flight activities are envisioned, other additional treaties and implementary legislation, if necessary, will be sought.

#### 4. Responsibility for Space Objects

Ownership of spacecraft and other space objects launched into outer space is not affected by their presence in outer space.<sup>41</sup> The State on whose registry the launched object is carried retains jurisdiction and control over such object. Absolute liability is imposed upon the launching State for damage caused by its space object on the surface of the Earth or to aircraft in flight; however, if damage is caused to a spacecraft in flight or to persons aboard, the test of liability becomes that of fault.<sup>42</sup> The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space contains requirements as to the return to the launching State of space objects returning to Earth in the territory of another State party to the Agreement.<sup>43</sup>

### III. HAZARDS OF SPACE FLIGHT TRAVEL

The "inventory" of objects detected in space, as of December 23, 1979, is as follows:

	USA	USSR	OTHERS	TOTALS
Payloads in Orbit	410	538	94	1,042
Space Probes	32	27	2	61
Earth Orbiting Debris	2,387	956	58	3,401
Space Probe Debris	43	8	1	52
Objects in Space	2,872	1,529	155	4,556

Separate from the above, 7,088 previously monitored objects in space have decayed, with only about 50 surviving through the atmosphere but causing no damage to life on Earth.<sup>44</sup> While at this time there are over 4500 ob-

<sup>38</sup> Sept. 14, 1963, 704 U.N.T.S. 219 (effective Dec. 4, 1969).

<sup>39</sup> Dec. 16, 1970, 22 U.S.T. 1641, T.I.A.S. No. 7192 (effective Oct. 14, 1971).

<sup>40</sup> Sept. 23, 1971, 24 U.S.T. 565, T.I.A.S. No. 7570 (effective Jan. 26, 1973).

<sup>41</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and other Celestial Bodies, *supra* note 10, at Art. VIII.

<sup>42</sup> Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, T.I.A.S. No. 7762, Arts. II, III (effective Oct. 9, 1973).

<sup>43</sup> Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Space Objects Launched into Outer Space, *supra* note 36, at Art. 5.

<sup>44</sup> Statistics were provided by Public Affairs Office, Hq., North American Air Defense Command (NORAD), Colorado Springs, Colo.

servable objects in outer space, there are additional objects too small or too far out for Earth observation. Observable meteors captured by the Earth's gravitational field are "natural" space debris. Impact of space objects with one another or with meteorites would result in many additional fragments, some too small to be detected by ground-based radar. A high intensity explosion can result in 5,000 fragments, all of which are capable of causing damage and even penetrating spacecraft.<sup>45</sup> In a paper for the International Astronautical Federation (IAF) Congress, at Amsterdam, in 1974, authors David R. Brooks and T. Dale Bess of NASA Langley Research Center stated:

The probability of spacecraft colliding with another man made object, whatever its present value, must be seen as a steadily growing potential threat to Earth Orbital operations. If the established pattern space use persists . . . . It is not a question of whether or not the probability of collision will become unacceptably high, but rather when will this occur.<sup>46</sup>

In a more recent article, Donald J. Kessler and Burton G. Cour-Palais, of the NASA Johnson Space Center related that orbiting fragments resulting from collisions of space objects would each increase the probability of further collisions leading to the growth of a debris belt about the Earth. They relate that under certain conditions the belt could begin to form within this century and could be a significant problem during the next century.<sup>47</sup>

However small the percentage of possibility of collision over a given time period, I believe it is clear that the growing number of orbiting objects does present a danger to further manned spaceflight. With liability for damage in space being premised on proof of fault, as under the present 1972 Liability Convention, such burden of proof would be difficult if not impossible to sustain, in an action growing out of an accident in space. Consideration should be given as to an insurance requirement or other liability coverage for passengers aboard spacecraft flights.

Plans should now be formulated to reduce the foreseeable increase of "shrapnel" in space that would be a hazard to space flight. "Due regard to the corresponding interest of other States" is a phrase frequently appearing in Space Law in regards to the responsibility of a State in its exploration and use of outer space. Scientists tell us there are ways to reduce the number of orbiting objects in space. The design and construction of

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<sup>45</sup> T. BESS, DISTRIBUTION OF MAN-MADE ORBITING SPACE DEBRIS 2, 15 (NASA Technical Note TN D-8108, Dec. 1975).

<sup>46</sup> International Astronautical Federation Congress, Sept. 30-Oct. 5, 1974, *Predicting the Probability that Earth Orbiting Spacecraft will Collide with Man-Made Objects in Space* (Manuscript No. A74-34).

<sup>47</sup> Kessler & Cour-Palais, *Collision Frequency of Artificial Satellites: The Creation of a Debris Belt*, J. OF GEOPHYSICAL RESEARCH, 2637, 2638, June 1, 1978.

objects launched, can be altered, where necessary, to reduce orbital explosions. We can restrict "the deliberate destruction of space hardware to orbits where rapid reentry and vaporization of all fragments will result."<sup>48</sup> Our planning also should include removal from orbit of those space objects no longer useful.

It may be noted that most space objects are found within 2000 kilometers of the Earth with the peak being about 900 kilometers. The Space Shuttle will have the capability to repair or remove space objects in low Earth orbit which would include the majority of such objects. This capability may be further extended by devices under development to raise the Shuttle to higher orbit.

#### IV. USE OF NUCLEAR POWER SOURCES IN SPACE

The COPUOS Report in its 1979 Meeting contains the recommendation that the United Nations General Assembly request the Legal Subcommittee of COPUOS at its scheduled 1980 session in Geneva to undertake "a review of existing international law relevant to outer space activities with view to determining the appropriateness of supplementing such law with provisions relating to the use of nuclear power sources in space."<sup>49</sup> While extensive discussion occurred at the COPUOS 1980 Geneva session, the issue remains unresolved.<sup>49a</sup>

##### A. Space Flight Regulation

In the United States, responsibility is vested in the Administrator of the Federal Aviation Administration and the Secretary of Transportation for issuance of air traffic rules and regulations governing the flight of aircraft for its navigation, protection and identification, including rules for the prevention of collision between aircraft and airborne objects.<sup>50</sup> Uniformity of flight safety standards and practices internationally has been accomplished

<sup>48</sup> *Predicting the Probability that Earth Orbiting Spacecraft will Collide with Man-Made Objects in Space*, *supra* note 46, at 27.

<sup>49</sup> Report of the Committee on the Peaceful Uses of Outer Space on its 34th Session, U.N. Doc. SUPP. No. 20 (A/34/20) 16, ¶ 51, U.N. Doc. "Report of the Committee on the Peaceful Uses of Outer Space", General Assembly Official Records, 1979, Supp. No. 20 (A/34/20), 16, ¶ 51. The Report further contains the findings of the S & T Subcommittee's working group of experts to the effect that nuclear power sources can be used safely in space provided recited safety considerations are met. *Id.* at ¶ 45. The UN interest was due to the survival through the atmosphere and crash into Canada on Jan. 24, 1979 of portions of USSR Cosmos 954 some of which were found to be radioactive. For a discussion of UN consideration of the use of nuclear power for satellites, see Galloway, *Nuclear Powered Satellites: The USSR Cosmos 954 and the Canadian Claim*, 12 AKRON L. REV. 401 (1979).

<sup>49a</sup> See Report of the Committee on the Peaceful Uses of Outer Space of its 19th Session, U.N. Doc. A/AC. 105/271, 10-13, ¶ 43-52 (1980). A Working Paper submitted by Canada (U.N. Doc. A/AC. 105/C. 2/L.126) which received considerable attention is reproduced in Annex III of the Report.

<sup>50</sup> 49 U.S.C. § 1421 (1976). See also 49 U.S.C. § 1655(c) (1976).

through the International Civil Aviation Organization, to which most States are members.

With the expansion of flight above the airspace, what regime, or governing system, should be sought to assure safety of space flight? Should there be a separate control for flights penetrating outer space? We know that flight in an airplane today provides the safest form of transportation. Could not the same agencies responsible for flight safety in airspace extend their responsibilities to include flight to, in and from space? One revered air and space law writer, the late John Cobb Cooper, emphasized the need for a single failsafe control. To such end, he urged the joinder of air and space law into one body of "Aerospace Law."<sup>51</sup> As space traffic grows, the argument for single control becomes even more cogent.

Could we not seek to establish uniform standards and practices for space flight that each concerned State should voluntarily adopt? This has been the highly successful procedure in aviation. As both aircraft and spacecraft are involved in flight and are constructed to carry passengers and freight over great distances safely and comfortably, much governing regulation would tend to be similar. Aircraft flights above the high seas receive airspace protection, and en route and terminal control guidance from air traffic controllers. The latter will provide similar guidance and protection to an aerospacecraft returning to Earth from outer space. In fact, safety would require a single such control for protection of all traffic.

In commenting upon the 1967 Space Law Treaty upon its adoption, I observed: [T]he treaty envisions a legal national status of future spacecraft and of a responsibility on member States for assurance of safe operation of its spacecraft. This obligation appears even greater than that exercised today over domestic and international air travel.<sup>52</sup> This envisaged extension of various national agencies' responsibilities over future spacecraft, including matters of registration, certification as to spaceworthiness of commercial spacecraft and as to competency of their crew members. I further noted that as a State extends its regulatory control in aerospace, further international agreement to facilitate international cooperation and uniform rules should also obtain "such as having a responsible agency like the International Civil Aviation Organization extend its role in relation to aerospace vehicles."<sup>53</sup>

Professor Stanley B. Rosenfield has written as to the need to reach an international consensus on solution of legal issues pertaining to a civil air-space transport system, even though we cannot foresee a precise date for having the system. However, he believes "the obvious starting point is

<sup>51</sup> Cooper, *Aerospace Law- Subject Matter and Terminology*, J. AIR L. COM. 703, 706, (1963).

<sup>52</sup> Menter, *The Developing Law for Outer Space*, 53 A.B.A.J. 703, 706 (1967).

<sup>53</sup> *Id.*

ICAO.”<sup>54</sup> Dr. Diederiks-Verschoor, the President of the International Institute of Space Law, envisions a World International Space Agency patterned after ICAO.<sup>55</sup>

### 1. International Civil Aviation Organization

The International Civil Aviation Organization (ICAO) is the offspring of the Convention on International Civil Aviation, or as popularly known, the Chicago Convention.<sup>56</sup> Article 3 of the Convention expressly recites its applicability “only to civil aircraft, and . . . not . . . to state aircraft.” Of course, at present, all space craft are “state” rather than “civil”. However, State owned commercial aircraft are deemed civil aircraft for purpose of the Chicago Convention. Further, non-commercial State aircraft, including military, with but few exceptions, voluntarily comply with the air traffic rules promulgated pursuant to ICAO standards and assigned responsibility. Under the Convention, each contracting State undertakes to collaborate in securing “the highest practicable degree of uniformity in regulations, standards, procedures, and organization in relation to aircraft, personnel, airways and auxiliary services in all matters in which uniformity will facilitate and improve air navigation.” The Convention further recites: “To this end, the International Civil Aviation Organization shall adopt and amend from time to time, as may be necessary, international standards and recommended practices and procedures.”<sup>57</sup>

<sup>54</sup> Rosenfield, *Beyond Supersonic Transport*, Proceedings of the 19th Colloquium on the Law of OuterSpace, IISL, Oct. 12-15, 1976, 196, 198 (Anaheim, Calif.).

<sup>55</sup> Diederiks-Verschoor, *Observations on the International Civil Aviation Organization and an International Space Agency*, Proceedings on the 20th Colloquium on the Law of Outer Space, IISL, Sept. 25-Oct. 1, 1977, 15 (Prague, Czechoslovakia).

<sup>56</sup> Dec. 7, 1944, 61 Stat. 1180, T.I.A.S. No. 1591 (effective April 4, 1947).

<sup>57</sup> *Id.* at Art. 37. The international standards and recommended practices adopted by International Civil Aviation Organization (ICAO) have been designated as “Annexes” to the Convention. To date, there are 17 such Annexes dealing with the following subjects:

- Annex 1—Personnel Licensing
- Annex 2—Rules of the Air
- Annex 3—Meteorology
- Annex 4—Aeronautical Charts
- Annex 5—Units of Measurements to be used in Air-Ground Communications
- Annex 6—Operation of Aircraft
  - Part I—Internat’l Commercial Air Transport
  - Part II—General Aviation
- Annex 7—Aircraft Nationality & Registration Marks
- Annex 8—Airworthiness of Aircraft
- Annex 9—Facilitation
- Annex 10—Aeronautical Telecommunications
  - Part I—Equipment and Systems and
  - Part II—Radio Frequencies .....Vol. I
  - Communication Procedures .....Vol. II
- Annex 11—Air Traffic Services
- Annex 12—Search & Rescue
- Annex 13—Aircraft & Accident Inquiry
- Annex 14—Aerodromes
- Annex 15—Aeronautical Information Services
- Annex 16—Aircraft Noise
- Annex 17—Security—Safeguarding Int’l Civil Aviation Against Acts of Unlawful Interference



Standards and practices adopted by the ICAO are designated as 'Annexes' to the Convention. Adoption of an Annex by the Council of ICAO requires a two-third vote of its membership. The Annex is then submitted to each Contracting State. It becomes effective at such period as the Council may designate, but not less than three months following submission to the member States, unless a majority of the States register disapproval within such period.<sup>58</sup>

While ICAO's international standards and practices generally do not appear mandatory, there is one important exception. Article 12 of the Chicago Convention expressly provides that "[o]ver the high seas, the rules in force shall be those established under this Convention." The ICAO Council resolved in its adoption of Annex 2 "Rules of the Air" that "the Annex constitutes Rules relating to flight and maneuver of (civil) aircraft within the meaning of Article 12 of the Convention. On the high seas, therefore, these rules apply without exception."<sup>59</sup>

The determination of the organization and regulations for control of space flight are long-range matters. Study should be given to the feasibility of the ICAO approach, including amendments to the Chicago Convention to broaden ICAO's responsibility to include space flight. If so amended, the ICAO Council, its Committees and Navigation Commission would look to experts from member States for recommendations as to standards and practices for inclusion in Annexes relating to space flight, including perhaps: removal of space debris and measures to reduce creation of space debris, operation of spacecraft, spacecraft security, astronomical charts and services, environmental protection, crew qualification and management, use of the geostationary orbit, use of radio spectrum in compliance with governing ITU Radio Regulations. It is recognized that exception for some State aerospace vehicles may be required.

The value of the ICAO approach is that desired standards and recommended practices can be obtained short of requiring continuous supplementary international agreements subject to the more prolonged States' ratification processes. The ICAO approach need not remove COPUOS of its responsibilities. The relationship between the two bodies can be determined in the international agreement(s) to be formulated or possibly by a procedural agreement between the United Nations and its specialized agency, ICAO.

## B. *Commercial Space Flight*

### 1. Growth Potential

J. Henry Glazer, General Counsel of the NASA Ames Research Center,

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<sup>58</sup> Convention on International Civil Aviation, *supra* note 56, at Art. 90(a).

<sup>59</sup> ICAO Annex 2-Rules of the Air, Forward, Chap. 2.1.1., n.1.

has observed that as advanced shuttle systems begin to be used for the general carriage of goods and persons between terrestrial and Earth-orbital sites, ownership and control of United States registered systems might well pass into the hands of the private sector. He further relates that international air carriage looms as the logical choice as future Earth-to-space operating entities.<sup>60</sup> The reader may recall noting in the public press immediately following our first manned moon landing, Apollo 11, a statement attributed to Najeeb Halaby, who was then President of Pan American Airways, that Pan Am had received about one hundred letters requesting reservations for its first flight to the moon. John H. Disher, Director of Advanced Programs in NASA's Office of Space Transportation Systems, Washington, D.C., writes that "revenues from commercial operations in space over the next 25 years will grow to tens of billions of dollars per year."<sup>61</sup> Further, that "commercial utilization of space . . . may well provide a major market for future transportation service" although the near term dominant impact will come from "information services."<sup>62</sup>

## 2. Government Control and Responsibility

The 1967 Space Law Treaty requires all "nongovernmental entities" activities in outer space to have the "authorization and continuing supervision by the appropriate State."<sup>63</sup> NASA currently requires a Space Shuttle user applicant to furnish NASA with sufficient information to verify peaceful purposes and to insure Shuttle Safety and NASA's and the United States Government's continued compliance with law and the Government's obligation.<sup>64</sup> It will be recalled that the launching State bears international responsibility and liability for the space activities of its non-governmental entities. Recent legislation authorizes the Administrator of NASA to obtain liability insurance for any user of the Space Shuttle or other NASA vehicle to protect them from claims by third parties for damages resulting from approved space activities.<sup>65</sup>

<sup>60</sup> Glazer, *Domicile and Industry in Outer Space*, 17 COLUM. J. TRANSNAT'L LAW 67, 97 (1978).

<sup>61</sup> Disher, *Space Transportation, Satellite Services and Space Platforms*, ASTRONAUTICS AND AERONAUTICS 42, 67 (April, 1979).

<sup>62</sup> *Id.*

<sup>63</sup> Treaties on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, *supra* note 10 at Art. VI.

<sup>64</sup> Reimbursement for Shuttle Services Provided to Non-U.S. Government Users, 14 C.F.R. Subpart 1214.1 (1980). Reimbursement for Shuttle Services Provided to Civil U.S. Government Users and Foreign Users who have made Substantial Investment in the STS Program, 14 C.F.R. Subpart 1214.2 (1980).

<sup>65</sup> The National Aeronautics and Space Administration Authorization Act, 1980, Pub. L. No. 96-48, 93 Stat. 348 (1979), adds a new Section 308 to the National Aeronautics and Space Act of 1958 providing for insurance and indemnification under regulations to be prescribed by the NASA Administrator. For a detailed discussion of the new enactment see Smith & Weigard, *Third Party Liability Insurance for the Space Shuttle*, SATELLITE COMMUNICATIONS (April 1979); Mossinghoff, *Managing Tort Liability Risks in the Era of the Space Shuttle*, 7 J. SPACE L. 121 (1979).

### 3. National Space Policy

A review of President Carter's October 11, 1978 announced "U.S. Civil Space Policy"<sup>66</sup> and of Congressional proposed legislation<sup>67</sup> reflects continuation of the national policy of private enterprise in space. This national policy for space was first initiated with enactment of legislation for COMSAT relative to space communications. The announced Civil Space Policy of the United States, among other recitals, was to:

provide for the private sector to take on increasing responsibility in remote sensing and other applications . . . [and] . . . [c]onfirm our support of the continued development of a legal regime in space that will assure its safe and peaceful use for the benefit of mankind.<sup>68</sup>

In November, 1979, the President assigned to the National Oceanic and Atmospheric Administration (NOAA) of the Department of Commerce the management responsibility for civil *operational* land remote sensing activities. The eventual announced goal was private sector operation of the nation's civil land remote sensing activities (LANDSAT). The Department of Commerce will budget funds for fiscal year 1981 to seek ways to enhance private sector opportunities (e.g., joint venture with industry, a quasi-government corporation, a leasing or other arrangement). The Department of Commerce will be the contact for private industry. The Department was directed to establish and chair a Program Board for continuing coordination with other involved Federal agencies. The Program Board will analyze any industry or other proposals received prior to submittal of policy issues to the Space Policy Review Committee (PRC)<sup>69</sup> previously established by the President in June 1978 under the Chairmanship of the Director of the Office of Science and Technology, Executive Office of the President, currently Frank Press. Among other assigned objectives of the PRC is "the encouragement of domestic commercial exploitation of space capabilities and systems for economic benefit and to promote the technical position of the United States."<sup>70</sup>

Dr. Edward C. Welsh, then Executive Secretary of the now defunct

<sup>66</sup> White House Fact Sheet, U.S. Civil Space Policy (Oct. 11, 1978), reprinted in, COMM. ON COMMERCE, SCIENCE AND TRANSPORTATION, 95th Cong., 2d Sess. SPACE LAW, SELECTED BASIC DOCUMENTS, SECOND EDITION 561 (Comm. Print 1979).

<sup>67</sup> S. 212, The National Space and Aeronautics Policy Act of 1979, and S.244, Space Flight Policy Act of 1979. Both bills are concerned with full use of the Space Shuttle in the development of space transportation systems required to achieve goals in space applications and space science. See also S.663, Earth Data and Information Service Act of 1979, S.875, Earth Resources Information Corporation Act of 1979, and H.R. 2337, Space Industrialization Act of 1979.

<sup>68</sup> U.S. Civil Space Policy, *supra* note 66.

<sup>69</sup> White House Press Release, Nov. 20, 1979.

<sup>70</sup> U.S. Civil Space Policy, *supra* note 66.

National Aeronautics and Space Council, in an address on January 11, 1965 before the New York Academy of Sciences, stated:

The one use of aerospace that strikes closest and most directly to the heart of the general public is transportation. We are a nation on the move. We have more commercial aircraft than any nation in the world. We will continue to expand our transportation uses of the aerospace medium. The supersonic and hypersonic transports will be followed eventually by routine flights in space.<sup>71</sup>

The United States Civil Space Policy should eventually assist development of a United States commercial space transportation system. While such a system will also provide transportation to foreign owned space stations, foreign national systems probably will be established. I believe that national agencies concerned with aviation transportation should consider seeking the extension of their responsibilities to space transportation and that ICAO's responsibilities over aviation flight should be extended to include space flight. Further desired legislation and international accords will be evident as future space activities unfold.<sup>72</sup>

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<sup>71</sup> Address by Dr. Edward C. Welsh, New York Academy of Science (1965) (copy of address released by National Aeronautics and Space Council).

<sup>72</sup> It is noted that the Legal Adviser to ESA, M.G. Bourelly, has observed that there is now an overriding need to start work rapidly within the UN framework on an extensive international agreement on the legal system for manned international spaceflights. He has listed many principles that need resolution. See Bourelly, *Towards a Convention on the Legal Status of Manned International Space Flight*, Proceedings of the 21st Colloquium of the Law of Outer Space, IISL 59, (Munich, W. Ger. Sept. 17-22, 1979).

