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Mr. Dembling earned his Bachelor of Arts and Masters of Arts degree at Rutgers University. In 1951 he was awarded the degree of Juris Doctor from The George Washington University Law School, where he was an editor of the law review. Mr. Dembling served as editor-in-chief of the Federal Bar Journal from 1962 to 1969 and has written more than thirty articles for law reviews and other professional journals. He is a Professorial Lecturer at The George Washington University National Law Center and has lectured extensively in the fields of space technology and government contract law. He serves currently as the President of the Federal Bar Association.

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It is a distinct pleasure for the Journal to welcome these two distinguished authorities as members of its Editorial Board and Advisers.

INTELLECTUAL PROPERTY RIGHTS IN SPACE VENTURES†

*Gerald J. Mossinghoff**

Strong legal protection for the results of private ventures in space is essential if such ventures are to flourish. This paper discusses the status of existing legislation, regulations, and policies which apply to intellectual property rights in space and includes pertinent sections of relevant documents as appendices. It also highlights those areas in which no formalized policies have been established.

Section 305 of the National Aeronautics and Space Act of 1958[1] governs the disposition of property rights in inventions made under NASA contract. At the time it was written, Section 305 was unique in government. It attempted to strike a balance between a license policy, under which the government would merely take a license to inventions made under federal sponsorship and leave title or commercial rights with the contractor, and a strict title policy such as that of the Atomic Energy Commission under the AEC Act of 1946 and the amendments of 1954.

NASA has worked to refine Government policy regarding disposition of property rights in inventions and has contributed to the two government-wide memoranda that have been issued—the presidential memorandum issued in 1963 by President Kennedy, and the 1971 amendment by President Nixon to increase the rights that commercial concerns could obtain.[2] NASA also worked very hard toward the enactment of Pub. L. No. 96-517 (an act to amend the Patent and Trademark Office, approved December 12, 1980) which contains what is essentially a license policy leaving title to inventions automatically with contractors. However, Pub. L. No. 96-517 applies only to contractors which are small business concerns or nonprofit institutions. So the larger corporations, the ones which really account for a significant number of inventions made in the aerospace business, were not covered by Pub. L. No. 96-517.

The Reagan Administration has made a policy decision to support actively enactment of a comprehensive patent policy patterned after S. 1657 (written by Senator Harrison H. Schmitt) and H.R. 4564 (introduced by Congressman Allen Ertel). These bills are intended to establish once and for all a single patent policy that will be applicable to all contractors and to all agencies of Government, replacing the patchwork of some 26 laws and regulations that now control federal patent policy. The Administration hopes for enactment of a comprehensive patent policy measure in 1982.

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†This article represents the opinions of the author and not the Department of Commerce. It is based on a presentation at the International Conference on Doing Business in Space: Legal Issues and Practical Problems, co-sponsored by the International Bar Association, the Smithsonian Institution and the American Law Institute and held in Washington, D.C., November 12-14, 1981.

[1] 42 U.S.C. § 2451 *et seq.* (1970).

[2] 36 Fed. Reg. 166 (1971).

With the advent of the space shuttle, the question of who should hold rights on inventions made by commercial users during shuttle flights has become important. NASA decided that the user should retain all patent rights and all data rights. That policy is written into the regulations on shuttle reimbursement.[3]

The general policy says, "NASA will not acquire rights to inventions, patents, or proprietary data privately funded by a user, or arising out of activities for which a user has reimbursed NASA under the policies set forth herein."[4] It further states, "However, in certain instances in which the NASA Administration has determined that activities may have a significant impact on the public health, safety or welfare, NASA may obtain assurances from the user that the results will be made available to the public on terms and conditions reasonable under the circumstances."[5]

The circumstances requiring such assurances are not specifically defined, but the determination as to the necessity for those assurances will be made at the time the agreement is entered into rather than after an invention is made in space. In other words, if the NASA Administrator determines that a given experiment requires these assurances—and they really are analogous to the assurances of the so-called "march- in rights" under federal patent policy—that will actually be written into the agreement. At that time, the user will be able to argue whether the policy is a fair one.

The rationale behind this policy is that some areas of experimentation could well be very significant to public health and safety. Users on the shuttle pay reimbursement fees to cover operational expenses, but they are still subsidized by the investment of U.S. taxpayers in the space shuttle research and development costs. There is no amortization of the research and development under the user policies. That was the basis for concluding that there ought to be some provision in the regulations for assurances that inventions affecting the public health and safety will be made available to the public.

The second part of the policy governing patent and data rights on the shuttle is that the user will be required to furnish NASA with only that data which is sufficient to verify peaceful purposes and to insure shuttle safety and NASA's and the Government's continued compliance with existing laws and Government obligations.[6] There is no plan to acquire proprietary data from a user. This regulation is written to limit the data NASA would receive solely to that which indicates that the payload is for peaceful purposes and which shows safety of the shuttle itself is guaranteed.

NASA has virtually that same policy for international users, but with one exception. That exception concerns the European Space Agency (ESA) and Canada, both of whom have made major contributions to the shuttle program through Spacelab (ESA) and the remote manipulator system or RMS (Canada). When ESA, ESA member

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[3]14 C.F.R. §1214.104(a) (1981) ("NASA will not acquire rights to inventions, patents or proprietary data privately funded by a user, or arising out of activities for which a user has reimbursed NASA under the policies set forth herein."(*see infra* Appendix B for complete text of the regulation).

[4]*Id.*

[5]*Id.*

[6]*Id.* at §1214.104(b).

nations, or Canada are flying experimental science or applications payloads with no near-term commercial implications, NASA will obtain for U.S. Governmental purposes rights to inventions (See Appendix D). The rationale is that those missions on which the European Space Agency and Canada benefit from lower user fees because of their contributions to the space shuttle program, and on which there are no near-term commercial implications, are public purpose or public policy research missions, not commercial missions. Therefore, the U.S. Government will take rights to patents, data, and inventions to be consistent with the purposes of the reduced fees and the research and development nature of the mission. The regulations, however, do not specify what those rights are.

Another issue relevant to intellectual property rights in space concerns under whose jurisdiction those inventions are made. This is a problem in the patent system, as it relates to activities in space, which has not yet been defined. The NASA Authorization Act for fiscal year 1982 contains a provision[7] stating that importing a spacecraft into the United States solely for purpose of launch into space will be regarded under the patent laws in the same way as ships of other countries coming into a U.S. port, or aircraft of other countries coming into a U.S. port, or aircraft of other countries coming into the United States to land. The patent laws regard such ships or airplanes, if they have patented technology aboard, as having temporary presence in the United States and therefore they are held not to infringe U.S. patent laws.[8]

The patent law is not changed by applying it to spacecraft, because the patent law in that section refers to vehicles. A good case could be made that a spacecraft imported into the United States solely for launch into space is indeed a vehicle—a space vehicle—and it probably would be referred to as such and concluded to be such internationally. This provision of the NASA Authorization Act merely clarifies that things coming into the United States for launch into space have a temporary presence, so that it would not be a matter requiring litigation.

Whether there can be infringement of a U.S. patent (or any other patent, for that matter) in space is another issue that has not been defined by statute. NASA decided not to try to spell that out in law, because it is an extremely complicated issue. There is a case that says that certain activities outside national boundaries, if they are tied to a station within the boundaries in some way through a telemetry connection, might be regarded as being an infringement.[9] On the other hand, it is clear that neither the U.S. patent laws nor patent laws of any other country have extra-territorial reach as such.

If the United States, under the Outer Space Treaty has command and control of a spacecraft, the spacecraft could be argued as being analogous to a piece of U.S. territory while it is in orbit. Though this issue of patent infringement in space is not of great importance now, when it does become so, it will clearly indicate a maturing of activities in space.

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[7]NASA Authorization Act, Pub. L. No. 97-96, §7 (1982).

[8]35 U.S.C. §272 (1970).

[9]Decca Ltd. v. United States, 544 F.2d 1070 (ct. cl. 1976).

The question of when an invention is made is also important for space activities. U.S. patent law is virtually unique in the world. The United States, Canada, and the Philippines are the only three countries that have what is called a "first to invent" law. That is, the person who first invents on U.S. territory (with actions on U.S. territory) is entitled to a patent against someone who later invents the same thing.

All the other countries of the world have a "first to file" system. Whoever gets to the patent office first with an application is presumed conclusively to be the first inventor and is entitled to the patent. In all those countries, whether something is invented in space and can be so proved is really not relevant. The only relevant data is the date a person files in a country's patent office.

In the United States it remains an open issue whether inventions made aboard the shuttle can be proved to show an individual is the first to invent. There is no case law on it yet, and it has not been an issue on which NASA was ready to go forward with a legislative recommendation. It probably would be better handled through case law, i.e., the common law approach to developing precedents.

The patent indemnification provisions of STS launch service agreements are in Appendix C. Those provisions say that if the shuttle itself, or any of the standard equipment that goes along with the shuttle, infringes someone's patent, the U.S. Government, in the form of NASA, will be responsible for any patent infringement liability.

However, if the optional services that are designed and specially put together to support a given mission infringe a patent, NASA will demand to be indemnified from any costs incurred relating to infringement by the user. So if the user spacecraft infringes a patent or if a user's experiment (for example, a process for making something), is held to infringe a patent, and NASA was not connected with any of the decisions on what would be flown and what would be its configuration, NASA requires full indemnification of the user. In that case, the user stands in NASA's place if NASA is sued for patent infringement.

The same provision of the NASA Authorization Act for fiscal year 1982 mentioned above[10] also inserted the following provision into the 1958 Space Act: "The use or manufacture of any patented invention incorporated in a space vehicle launched by the United States Government for a person other than the United States shall not be considered to be a use or manufacture by or for the United States within the meaning of section 1498(a) of title 28, United States Code, unless the Administration gives an express authorization or consent for such use or manufacture."[11]

Finally, the issue of trade secret and data rights may also affect space activities. NASA has no intention of obtaining trade secret data resulting from its reimbursable launches. If NASA does get such data, and someone were to demand it under the Freedom of Information Act, NASA would resist as heartily as it could any attempt to acquire the data. That would put the matter squarely in a district court. NASA's policy will be not to get the data internally so that such data does not become subject to

[10]NASA Authorization Act, Pub. L. No. 97-96, §7 (1982).

[11]*Id.*

requests under the Freedom of Information Act. Appendix E contains the pertinent text of NASA's launch service agreement relating to trade secrets and data rights.

The NASA policies described above are the standard policies reflected in the regulations involving reimbursable launches and in the reimbursable launch contracts themselves. NASA did enter into a unique agreement with the McDonnell Douglas Astronautics Company for a joint venture in space involving electrophoresis. NASA characterized that agreement as not coming under the patent provisions of the National Aeronautics and Space Act. The "Space Act" requires that NASA take title to inventions "made in the performance of work," unless NASA waives that right. If NASA waives, it still must take license and march-in rights. Soon after the Space Act was enacted in 1958, NASA interpreted the phrase "made in the performance of work" to refer to research and development contracts only. This interpretation is reflected in literally hundreds of thousands of contracts that NASA has entered into since 1958. Supply contracts with NASA, for example, have no patent rights clauses.

Thus, for over 20 years NASA has construed "contract for the performance of work" to mean research and development contracts and those are the only ones that have patent rights clauses in them. Based on that interpretation, NASA adopted a policy for the joint venture in space under which McDonnell Douglas and its partners would retain all rights. The Government would not take a license, nor would it take march-in rights. McDonnell Douglas and its partners would retain all rights unless two very specific things happened, i.e., the NASA Administrator declares a national emergency or the device was urgently needed for public health reasons. In those cases the agency would be able to exercise what could be referred to as march-in rights if it was determined, subject to the Contract Disputes Act of 1978[12] either before the Board of Contract Appeals at NASA or the U.S. Court of Claims, that either of those two conditions existed.

The significant thing about the NASA/McDonnell Douglas joint venture in space is that if McDonnell Douglas decides to walk away from the joint venture under its termination clauses, then NASA is entitled to take full rights. All parties to the agreement thought that was fair. As long as the companies were pursuing the invention, NASA would not take rights. However, if they abandoned that effort, then NASA would take rights, including rights to background data. Appendix F contains clauses of the NASA/McDonnell Douglas joint-venture agreement which spell out the intellectual property rights. Appendix G contains a statement of NASA's legal position on the applicability of Section 305 of the National Aeronautics and Space Act to joint endeavors.

There is a specific provision in the Ertel bill, H.R. 4564 (discussed above), which would permit deviations to the minimum rights to be acquired by the Government under the act. Those deviations would be for the Government to waive march-in rights on a class basis in contracts involving co-sponsored, cost sharing, or joint venture research when the contractor is required to make substantial contributions of funds, facilities, or equipment to the work performed under the contract. If this measure is enacted in the 97th Congress, the issue about the scope of the National Aeronautics and Space Act will become moot, and H.R. 4564 will govern all federal contractors' rights.

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[12]Contract Disputes Act of 1978 Pub. L. No. 95-563 (1978).

As this nation's space programs mature to become an integral part of human activity on earth, all of the incentives provided by patent and trade secret law will routinely be used to stimulate private investment in space research and development ventures. In this transition period, NASA has adopted policies specifically designed to facilitate the experimental use of space by private entrepreneurs. I hope this presentation will prove helpful to those interested in those current NASA policies.

Appendix A

Section 305, NASA Act of 1958, as amended.

PROPERTY RIGHTS IN INVENTIONS

Sec. 305(a) Whenever any invention is made in the performance of any work under any contract of the Administration, and the Administrator determines that—

> (1) the person who made the invention was employed or assigned to perform research, development, or exploration work and the invention is related to the work he was employed or assigned to perform, or that it was within the scope of his employment duties, whether or not it was made during working hours, or with a contribution by the Government of the use of Government facilities, equipment, materials, allocated funds, information proprietary to the Government, or services of Government employees during working hours; or
>
> (2) the person who made the invention was not employed or assigned to perform research, development, or exploration work, but the invention is nevertheless related to the contract, or to the work or duties he was employed or assigned to perform, and was made during working hours, or with a contribution from the Government of the sort referred to in clause (1),

such invention shall be the exclusive property of the United States, and if such invention is patentable a patent therefor shall be issued to the United States upon application made by the Administrator, unless the Administrator waives all or any part of the rights of the United States to such invention in conformity with the provisions of subsection (f) of this section.

(b) Each contract entered into by the Administrator with any party for the performance of any work shall contain effective provisions under which such party shall furnish promptly to the Administrator a written report containing full and complete technical information concerning any invention, discovery, improvement, or innovation which may be made in the performance of any such work.

(c) No patent may be issued to any applicant other than the Administrator for any invention which appears to the Commissioner of Patents to have significant utility in the conduct of aeronautical and space activities unless the applicant files with the Commissioner, with the application or within thirty days after request therefor by the Commissioner, a written statement executed under oath setting forth the full facts concerning the circumstances under which such invention was made and stating the relationship (if any) of such invention to the performance of any work under any contract of the Administration. Copies of each such statement and the application to which it relates shall be transmitted forthwith by the Commissioner to the Administrator.

(d) Upon any application as to which any such statement has been transmitted to the Administrator, the Commissioner may, if the invention is patentable, issue a patent to the applicant unless the Administrator, within ninety days after receipt of such application and statement, requests that such patent be issued to him on behalf of the United States. If, within such time, the Administrator files such a request with the Commissioner, the Commissioner shall transmit notice thereof to the applicant, and shall issue such patent to the Administrator unless the applicant within thirty days after receipt of such notice requests a hearing before a Board of Patent Interferences on the question whether the Administrator is entitled under this section to receive such patent. The Board may hear and determine, in accordance with rules and procedures established for interference cases, the question so presented, and its determination shall be subject to appeal by the applicant or by the Administrator to the Court of Customs and Patent Appeals in accordance with procedures governing appeals from decisions of the Board of Patent Interferences in other proceedings.

(e) Whenever any patent has been issued to any applicant in conformity with subsection (d), and the Administrator thereafter has reason to believe that the statement filed by the applicant in connection therewith contained any false representation of any material fact, the Administrator within five years after the date of issuance of such patent may file with the Commissioner a request for the transfer to the Administrator of title to such patent on the records of the Commissioner. Notice of any such request shall be transmitted by the Commissioner to the owner of record of such patent, and title to such patent shall be so transferred to the Administrator unless within thirty days after receipt of such notice such owner of record requests a hearing before a Board of Patent Interferences on the question whether any such false representation was contained in such statement. Such question shall be heard and determined, and determination thereof shall be subject to review, in the manner prescribed by subsection (d) for questions arising thereunder. No request made by the Administrator under this subsection for the violation of any criminal statue, shall be barred by any failure of the Administrator to make a request under subsection (d) for the issuance of such patent to him, or by any notice previously given by the Administrator stating that he had no objection to the issuance of such patent to the applicant therefor.

(f) Under such regulations in conformity with this subsection as the Administrator shall prescribe, he may waive all or any part of the rights of the United States under this section with respect to any invention or class of inventions made or which may be made by any person or class of persons in the performance of any work required by any

contract of the Administration if the Administrator determines that the interests of the United States will be served thereby. Any such waiver may be made upon such terms and under such conditions as the Administrator shall determine to be required for the protection of the interests of the United States. Each such waiver made with respect to any invention shall be subject to the reservation by the Administrator of an irrevocable, nonexclusive, non-transferable, royalty-free license for the practice of such invention throughout the world by or on behalf of the United States or any foreign government pursuant to any treaty or agreement with the United States. Each proposal for any waiver under this subsection shall be referred to an Inventions and Contributions Board which shall be established by the Administrator within the Administration. Such Board shall accord to each interested party an opportunity for hearing, and shall transmit to the Administrator its findings of fact with respect to such proposal and its recommendations for action to be taken with respect thereto.

(g) The Administrator shall determine, and promulgate regulations specifying the terms and conditions upon which licenses will be granted by the Administration for the practice by any person (other than an agency of the United States) of any invention for which the Administrator holds a patent on behalf of the United States.

(h) The Administrator is authorized to take all suitable and necessary steps to protect any invention or discovery to which he has title, and to require that contractors or persons who retain title to inventions or discoveries under this section protect the inventions or discoveries to which the Administration has or may acquire a license of use.

(i) The Administration shall be considered a defense agency of the United States for the purpose of chapter 17 of title 35 of the United States Code.

(j) As used in this section—

(1) the term "person" means any individual, partnership, corporation, association, institution, or other entity;

(2) the term "contract" means any actual or proposed contract, agreement, understanding, or other arrangement, and includes any assignment, substitution of parties, or subcontract executed or entered into thereunder; and

(3) the term "made," when used in relation to any invention, means the conception or first actual reduction to practice of such invention.

Appendix B

NASA Patent and Data Policy for Shuttle Services Provided to non- U.S. Government Users, 14 CFR § 1214.104:

(a) NASA will not acquire rights to inventions, patents or proprietary data privately funded by a user, or arising out of activities for which a user has reimbursed NASA under the policies set forth herein. However, in certain instances in which the NASA Administration has determined that activities may have a significant impact on

the public health, safety or welfare, NASA may obtain assurances from the user that the results will be made available to the public on terms and conditions reasonable under the circumstances.

(b) The user will be required to furnish NASA with sufficient information to verify peaceful purposes and to insure Shuttle safety and NASA's and the U.S. Government's continued compliance with law and the Government's obligations.

Appendix C

Patent Indemnification Provisions of STS Launch Services Agreements.

6. *Patent Infringement Claims*

a. The User agrees to reimburse NASA for a pro rata share of any cost incurred by the Government as a result of an unlicensed use (infringement) of privately-owned U.S. patents to the extent that any such costs are attributable to products, processes, or articles of manufacture actually used by NASA in connection with the furnishing of services to the User under provisions of the Agreement. Such costs shall include, but are not limited to, administrative and litigation costs, and settlement payments made by NASA as a result of administrative consideration of claims against NASA for infringement of such patents, as well as costs incurred by the U.S. Government in the form of a judgment against the U.S. Government by a court of competent jurisdiction.

b. If the User is licensed under a privately-owned third party patent, and to the extent that the launch and associated services furnished by NASA under this Agreement constitutes a licensed use under the User's license and is not covered by a U.S. Government license, any compensation for such use shall be handled directly by the User with the third party licensor. In the event it is the decision of either the third party licensor or the User, or both, that such use is not within the scope of the User's license, then the use will be considered an unlicensed use and governed by the terms and conditions of subparagraph 6.a. above.

c. The reimbursement by the User of costs associated with patent infringement settlements or judgements will be governed solely by this Article. Therefore, except as provided in subparagraph 6.a. above, the User shall have no liability to NASA with respect to any third party claims against NASA of patent infringement by NASA in connection with the furnishing of services to the User under the provisions of this Agreement. Further, any costs reimbursable to NASA by the User under the provisions of subparagraph 6.a. above shall be reduced pro rata by any amount actually paid to the Government by a third party or to which the Government has a right to payment from a third party as reimbursement or indemnification for any or all of the patent infringement costs cited in subparagraph 6.a. above.

d. NASA will notify the User as promptly as possible of any patent infringement claim asserted against the U.S. Government, whether by suit or otherwise, under which the User might be liable for reimbursement of costs under subparagraph 6.a. above; in particular, NASA will notify the User prior to any administrative settlement of a claim

under subparagraph 6.a. above, and as promptly as possible after the institution of any suit, and preferably before same, based on such a claim. With respect to costs reimbursable by the User under subparagraph 6.a. above, NASA will, promptly after paying any such costs, present the User with a statement itemizing in reasonable detail such costs and identifying the applicable patents associated therewith. Within thirty (30) days after receipt of the NASA settlement of such costs, the User shall have the right to request a review of its correctness as provided for under Part II, Article VI, subparagraph 4.c.(2), of this Agreement.

e. With respect to any suit against the U.S. Government based on a claim of patent infringement, the costs for which the User would be liable under subparagraph 6.a. above, NASA agrees that, subject to law and regulations of the Department of Justice, the User may, at its option, assume a major role in the defense of the suit. In the event that the User exercises its option to assume such responsibility, NASA agrees to provide to the User, at NASA's expense, such information and assistance as is available to NASA. The User's right of election to assume a major role in the defense of such a suit shall not in any way affect any other rights otherwise available to it under contract or general principles of law; in particular, should the User not exercise such option, its right to intervene in the suit, under applicable rules or procedures, shall in no way be affected or diminished.

Appendix D

NASA Patent and Data Policy for Foreign Users Who Have Made Substantial Investment in the STS Program, 14 CFR § 1214.204.

(a) When accommodating missions under this Subpart. i.e., experimental science or experimental applications missions for ESA, ESA member states or Canada with no near-term commercial implications, NASA will obtain for U.S. Governmental purposes rights to inventions, patents and data resulting from such missions, subject to the user's retention of the rights to first publication of the data for a specified period of time.

(b) The user will be required to furnish NASA with sufficient information to verify peaceful purposes and to insure Shuttle safety and NASA's and the U.S. Government's continued compliance with law and the Government's obligations.

Appendix E

Handling of User Provided Data and Data Derived from the Payload (Provisions of STS Launch Services Agreements)

ARTICLE III—HANDLING OF USER PROVIDED DATA AND DATA DERIVED FROM THE PAYLOAD

1. *Technical Data Furnished to NASA by the User*

a. All technical data furnished to NASA under this Agreement shall be provided with unlimited rights (the right to use, duplicate, and disclose in any manner for any purpose whatsoever), and without a restrictive legend, except as provided pursuant to Subparagraph b. below. It is the intent of the Parties that the designation of technical data as a trade secret shall be kept to a minimum in order to facilitate implementation of this Agreement.

b. In the event any of the technical data required to be furnished to NASA under this Agreement is considered a trade secret (such as detailed design, manufacturing and processing information) and the User desires to maintain trade secret rights for such data, the User shall inform NASA that the data is considered a trade secret and shall only provide such data to NASA upon the written request of the NASA Technical Manager. Any data so provided shall be marked with the following (and no other) notice prior to submission to NASA:

NOTICE

> This data is a trade secret of _____ and is submitted in confidence to NASA under Launch Agreement No. _____ on _____. It shall not, without permission of the User, be duplicated or used for any purpose other than as necessary to carry out NASA's obligations under this Agreement nor disclosed outside the United States Government, except as needed for use by contractors in support of the Launch and Associated Services to be provided under this Agreement and only after such contractors have agreed in writing to protect the data from unauthorized use, duplication and disclosure. This notice shall be marked on any reproduction of this data, in whole or in part.

2. *Financial and Commercial Data*

It is recognized that NASA may have access to certain financial and commercial (business) data of the User, or his contractors, which may be considered confidential or privileged, and which, if subsequently disclosed to the public, could cause substantial harm to the User's competitive position or impair NASA's ability to obtain necessary information in the future. NASA will use its best efforts to protect the User's financial and commercial data to the extent permitted under the law.

3. *Data Derived from the Payload*

NASA considers all data (including data reduction and analysis) obtained or derived from the Payload as the result of activities for which the User has paid NASA under this Agreement (except for McDonnell Douglas Astronautics Company SSUS performance data) to be property of the User, and, in order to protect trade secrets and other property rights of the User in such data, NASA will maintain such data in confidence.

Appendix F

Clauses in the Joint Endeavor Agreement between NASA and McDonnell Douglas Astronautics Company on Materials Processing in Space:

ARTICLE VIII - DATA RIGHTS

A. Data means recorded information, such as but not limited to writings, drawings, recordings, and pictorial representations, regardless of form or the media on which it may be recorded.

B. All data furnished to NASA pursuant to ARTICLE IX of this Agreement and performance data relating to separation tests on NASA samples furnished pursuant to ARTICLE I, paragraph E. hereof, shall be furnished with unlimited rights (the right to use, reproduce, disclose in any manner and for any purpose whatsoever), and without restrictive legend. Recognizing that the requirements for, and the need for protection of, data may change during different phases of this Agreement, NASA and MDAC-St. Louis may from time-to-time, upon mutual agreement, change the listing of data to be furnished pursuant to ARTICLE II.

C. Other than as provided in paragraph B., above, NASA will use its best effort to assure that any data required to be furnished, or in fact furnished under this Agreement will be used, reproduced, and disclosed by the Government only for the purpose of carrying out its responsibilities under this Agreement. In the event the data qualifies as a trade secret and the originator of such data desires to maintain trade secret rights therein, such data shall be marked with the following (and no other) notice and the Government will thereafter treat the data in accordance with the Notice:

NOTICE

This data is a trade secret of _____
_____ and is submitted in confidence
to NASA under Joint Endeavor No. _____
on _____. It may be used, reproduced and disclosed by NASA for the purpose of carrying out its responsibilities thereunder, with the express limitation that it will not, without permission of the originator, be disclosed outside the

Government; excpet that, subject to reasonable notice to the originator and agreement by recipient to protect this data from unauthorized use and disclosure, it may be disclosed outside the Government as needed for use by NASA contractors in carrying out NASA's responsibilities under this Agreement. This Notice shall be marked on any reproduction of this data, in whole or in part.

D. MDAC-St. Louis or any party in privity therewith agree to furnish data first produced in carrying out the responsibilities of ARTICLE II of this Agreement to responsible parties or to NASA, and they further agree that NASA itself may furnish such data to responsible parties, upon ten and conditions reasonable under the circumstances, if the NASA Administrator or his/her designee determines such action is necessary (i) because MDAC-St. Louis or any party in privity therewith has not taken, or is not expected to take within a reasonable time, effective steps to achieve commercial utilization of the results demonstrated or to be demonstrated under this Agreement; (ii) in response to a national emergency involving a serious threat to the public health and upon a showing that (a) no competitive alternative to the subject matter covered by the data is reasonably available from other sources and (b) MDAC-St. Louis or its parties in privity are not supplying the subject matter covered by the data in sufficient quantity and at reasonable prices to satisfy market needs, or (iii) to enable the practice of any license rights to patents or inventions acquired by NASA pursuant to ARTICLE II, paragraph B.1. of this Agreement. Any of the above determinations by NASA Administrator or his/her designee shall be in accordance with the notice, hearing and disputes requirements of ARTICLE XI, paragraph C. hereof.

ARTICLE IX - RELEASABLE INFORMATION

It is recognized that from time-to-time the parties may desire to release to the public and appropriate governmental organizations information about the endeavor. The parties agree to consult with each other prior to any such release except as specified below. In the release of such information, the parties agree to exercise reasonable discretion, considering the nature of this endeavor and the need to keep the public informed.

A. The contents of this agreement.

B. Performance targets and objectives for the various C-F-E devices.

C. Data showing the performance of the various C-F-E devices, both on the ground in the space environment, but excluding data on specific pharmaceutical products.

D. Progress information on the correlation of analytical with experimental data, including comparisons of the two.

E. Overall system descriptions, including external dimensions, of the C-F-E devices, but excluding design details.

F. General information on potential applications of C-F-E technology, including research and medical applications which may benefit from the technology, but excluding references to specific applications and pharmaceutical products.

G. Data as may be needed for interface verification, payload integration and checkout.

ARTICLE X - RECORDS AND ASSOCIATED DATA

MDAC-St. Louis and NASA agree to maintain records, documents, and other associated data pertaining to the design, development, manufacture, test, integration, and operation of experiments involved in the C-F-E program. These records and documents shall be of sufficient detail and completeness that, in the event of determinations made under ARTICLE VIII or ARTICLE II or termination by one party, the other can continue the program if it so desires. Upon request the NASA JEM or a mutually agreed designee shall have access to MDAC-St. Louis generated records at all reasonable times during regular business hours. All data reviewed under this Article which qualifies as a trade secret shall be treated as trade secrets in accordance with ARTICLE VIII, paragraph C. entitled "DATA RIGHTS." The records, documents and other associated data identified above shall be preserved for a period of 7 years from the date of termination of the C-F-E prorgram or its completion as contemplated herein, whichever comes first. The parties agree to maintain accounting records with a distribution of total costs according to a mutually agreed upon classification of accounts.

ARTICLE XI - PROPERTY RIGHTS IN INVENTIONS

A. Except for the rights reserved by NASA in the separate agreement described in ARTICLE I, paragraph E., in paragraph B. below, and those rights provided pursuant to ARTICLE XXVII entitled "Terminations," MDAC-St. Louis and any party in privity therewith shall retain all right, title and interest to any invention conceived or first actually reduced to practice in carrying out its responsibilities under this Agreement as described in ARTICLE II of this Agreement.

B. With respect to any invention subject to paragraph A., above, the following will apply:

1. NASA shall have a contingent royalty free license to practice or have practiced in a space environment only, such inventions by or on behalf of the Government for any Governmental purpose. The contingent royalty free license is a nonexclusive paid-up license to all inventions contained in paragraph A., above, and all data and patents necessary to practice or have practiced such inventions in space, which data will be furnished to NASA, and will become effective if the NASA Administrator or his/her designee determines such action is necessary, (i) because MDAC-St. Louis or any party in

privity therewith has not taken, or is not expected to take within a reasonable time, effective steps to achieve commercial utilization of the invention; or (ii) in response to a national emergency involving a serious threat to the public health and upon a showing that (a) no competitive alternative to the subject matter covered by the patent is reasonably available from other sources and (b) MDAC-St. Louis or its parties in privity are not supplying the subject matter covered by the patent in sufficient quantity and at reasonable prices to satisfy market needs; or (iii) in the event of a unilateral termination by MDAC-St. Louis in accordance with ARTICLE XXVII, paragraph B.2.a.

2. If a determination is made by the NASA Administrator of his/her designee that action is necessary as a result of (i) or (ii) in paragraph B.1., above, NASA has the right to require the granting of a license to responsible parties, upon terms and conditions reasonable under the circumstances, or to so grant such a license itself, if in the judgment of the NASA Administrator or his/her designee that MDAC-St. Louis or its parties in privity have not effectively taken steps or have been unsuccessful in licensing to satisfy the requirements of (i) and (ii), above.

C. Prior to the making of a determination by the NASA Administrator or his/her designee under paragraph B., above, NASA's Associate Administrator, Office of Space and Terrestrial Applications, shall give MDAC-St. Louis sixty days written notice of intention to make such determination and provide findings in support thereof and shall afford MDAC-St. Louis an opportunity to be heard and offer evidence in support of its position. Any determination will be subject to ARTICLE XXV, "DISPUTES."

D. MDAC-St. Louis shall, at the request of NASA, provide NASA with a brief description of any invention subject to paragraph A., above, and of any action taken to obtain patent protection thereon, and of the final disposition of such action. Any brief description so provided shall be subject to protection from disclosure under the provisions of paragraph C. of ARTICLE VIII, "DATA RIGHTS" until a patent is issued thereon or the patent application is otherwise made available to the public.

ARTICLE XII - PROCESS EXCLUSIVITY

To promote necessary innovation, the parties agree to the following form of process exclusivity. During the term of this Agreement, NASA will not enter into another joint endeavor or international cooperative agreement to develop C-F-E technology or demonstrate C-F-E devices in the low gravity environment of space nor fund or make equipment available for such efforts except as otherwise provided in this ARTICLE XII. The C-F-E device(s) as contemplated herein refers to device(s) which separate materials electrophoretically in a medium continously flowing through a chamber, and does not refer to other device(s) such as that which separate principally by a pH gradient accompanying an electrical field, such as isoelectric focusing.

This agreement does not restrict NASA or others from conducting or funding analytical and experimental research work or demonstrations for advancing the state-of-the-art of continuous flow electrophoresis device(s) or process(es), where the work is not directly related to development of a commercial device or process and would not otherwise compromise MDAC-St. Louis' work with regard to commercialization of its C-F-E device(s) and related process(es) work. Further, this agreement does not restrict

NASA's activities in other areas of electrokinectic separation, such as static or moving wall electrophoresis, isoelectric focusing or isoachophoresis, nor does it preclude NASA from selling flight time on the STS to other organizations on a fully reimbursable basis in accordance with existing charge policies for any purpose.

Appendix G

NASA's Legal Position on the Applicability of §305 of the National Aeronautics and Space Act to Joint Endeavors.

This responds to your request that I address the issue of whether "section 305 of the National Aeronautics and Space Act of 1958, as amended [hereinafter "Space Act"] applies to inventions made in the course of joint endeavors; for example, endeavors undertaken in the Materials Processing in Space Program."

In this memorandum I will review the legislative history of section 305, discuss NASA's interpretation and application of the section over the years, summarize the experience gained, and state the conclusions to be drawn therefrom.

The basic legal issue is whether a "joint endeavor" is a contract of the Administration for the performance of work within the intent of section 305, such that any inventions made in the course of the endeavor are subject to the ownership requirements of subsection 305(a).

For the purposes of this memorandum, a joint endeavor is defined as follows:

> A joint endeavor is an arrangement between NASA and a party or parties in which each undertakes to contribute to or participate in a project of mutual benefit, and which usually involves the use of equipment, facilities, services, personnel or information made available by one or more of the parties for use by the others. Such endeavors do not involve the transfer of funds or title to property between the parties, and are not considered a procurement or an assistance transaction within the purview of P.L. 95-224. Services which may be involved do not constitute the employment of one of the party's employees by the other.
>
> In answer to the legal issue raised, it is concluded that a joint endeavor is not subject to the legal constraints of section 305. This conclusion is based on the Space Act and the long-standing administrative interpretation of section 305 by NASA that there are many arrangements which NASA may enter into, a joint endeavor being one such, that are not contracts covered by subsection 305(a).

1. *Section 305 of the Space Act*

The pertinent language in the Space Act[1] dealing with the allocation of property rights in inventions is as follows (emphasis added):

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[1] 42 U.S.C. §2451 *et seq*. (1976 and Supp. 1982); particularly 42 U.S.C. §2457. For a text of section 305, *see supra* Appendix A.

• Subsection 305(a) requires that [w]henever any invention is made "*—in the performance of any work under any contract of the Administration, and the Administrator determines that* -

(1) *the person who made the invention* was employed or assigned to perform research, development, or exploration work and the invention is related to the work he was employed or assigned to perform, or that it was within the scope of his employment duties, whether or not it was made during working hours, or with a contribution by the Government of the use of Government facilities, equipment, materials, allocated funds, information proprietary to the Government, or services of Government employees during working hours; or

(2) *the person who made the invention* was not employed or assigned to perform research, development, or exploration work, but the invention is nevertheless related to the contract, or to the work or duties he was employed or assigned to perform, or was made during working hours, or with a contribution from the Government of the sort referred to in clause (1)"

such invention becomes the exclusive property of the United States unless the Administrator waives rights thereto in conformity with the provisions of subsection 305(f).

• Subsection 305(b) specifies that "[e]ach *contract* entered into by the Administrator with any party *for the performance of any work*" is to contain effective provisions for the reporting of inventions "*which may be made in the performance of such work.*"

• Section 305(j) (2) defines the term contract as meaning "any actual or proposed contract, agreement, understanding, or other *arrangement,* or subcontract."

It is the meaning, interpretation and application of the phrase "in the performance of any work under any contract of the Administration" when considered in the context of the whole statute, its legislative purpose and intent, and its long standing practical interpretation by NASA, that determines whether a joint endeavor, which meets the literal definition of "contract" as set forth in subsection 305(j) (2), comes under subsection 305(a).

2. *Legislative Purpose and Intent Behind Section 305*

The legislative purpose and intent underlying section 305 is not set forth in the Space Act;[2] however, the legislative history of section 305 does provide insight in this

[2]The Declaration of Purpose and Policy in section 102 of the Space Act does not address the disposition of rights in inventions covered in section 305. *See* 42 U.S.C. 2451.

regard. Although the legislative history of section 305 has been characterized as "extremely thin" and not providing guidance, or as "very scanty," requiring NASA to use "its best judgment as to what Congress had in mind" with regard to the interpretation of such difficult and complicated legislation,[3] a careful review of the report of the House-Senate Conference on the bill,[4] and the transcripts of the floor

[3]*See,* for example, the testimony of John A. Johnson, General Counsel of NASA during *Hearings Before a Subcommittee of the Select Committee on Small Business of the United States Senate on The Effect of Federal Patent Policies on Competition, Monopoly, Economic Growth, and Small Business,* 86th Cong., 1st Sess., 255 and 267; and during *Hearings Before the Subcommittee on Patents, Trademarks, and Copyrights, of the Committee of the Judiciary,* pursuant to S. Res. 55 on S. 1089 and S. 1176, 87th Cong.; 1st Sess., Part 1, p. 161.

[4]House Rept. No. 2166, 85th Cong., 2nd Sess. (July 15, 1958) at 22-24. An extensive discussion of the events that led up to this conference report can be found in Appendix A of *An Evaluation of the Patent Policies of the National Aeronautics and Space Administration, Report of the Committee on Science and Astronautics, U.S. House of Representatives, 89th Cong., 2nd Sess. (1966).* Some key events discussed are:

(a) The introduction of the original House and Senate bills (H.R. 1181 and S. 3609, on April 14, 1958) containing no patent provisions.

(b) The subsequent hearings on S. 3609, during which the Deputy Secretary of Defense recommended that no special patent provisions be included in the legislation, based on the expectation that the policies and procedures of NASA (similar to those of DOD) would be applied by regulation.

(c) The reporting of H.R. 12575 (replacing H.R. 1181) out of House committee (May 24, 1958), with a section 407 entitled "Patent Rights," patterned after similar provisions of the Atomic Energy Act.

(d) The unanimous passing H.R. 12575 (June 2, 1958) with no debate or comment on section 407.

(e) The subsequent expressions of displeasure by industry and the private bar over section 407, primarily because of its similarity with what they considered the restrictive and arbitrary provisions of the Atomic Energy Act.

(f) The reporting out by the Senate Committee (June 11, 1958) of amended S. 3609 with a new section 303, almost identical to section 407 of H.R. 12575.

(g) The successful floor amendment by Sen. Johnson during debate on amended S. 3609 to have section 303 deleted and the matter referred to conference.

(h) The subsequent appointment, by Rep. McCormack (Chairman of the Select Committee on Astronautics and Space Exploration) of a patent subcommittee (chaired by Rep. Natcher) to review the matter prior to any House-Senate conference. This subcommittee recommended an approach which provided, inter alia, that the Administrator would be entitled to ownership to inventions made under contract only when certain findings (based on the relationship of the invention to the duties of the employee of the contractor making the invention) were made; and as a separate matter would be authorized to waive ownership of inventions to which the Administration was entitled in the national interest. Thus the report of the Natcher subcommittee indicated an intent not to automatically vest ownership in the Administration under all contractual situations (no matter how broadly defined), as under the Atomic Energy Act. This report, unpublished, is entitled *"Report of The Patent Subcommittee, House Committee on Astronautics and Space Exploration re Section 407, H.R. 12575."*

(i) The adoption of the final version of section 305, coupled with favorable floor comment. While worded and structured differently than section 407 appearing in the report of the Natcher subcommittee, it contained many of the salient features recommended in the report. Thus, when the conference report refers to the adoption of "entirely new patent provisions," it is in reference to the earlier draft of section 407 in H.R. 12575, and not in the rewrite of section 407 by the Natcher subcommittee. This is emphasized by the floor statements of Rep. Keating, which follow the report of the Natcher subcommittee rather closely in explaining the basis for new section 305.

debate prior to its passage,[5] does reveal a consistent thread of legislative purpose and intent underlying section 305.

The report of the conference, for example, after briefly setting forth the previous House and Senate actions that led up to the need for conference on the issue, states:

> "Operating on the theory that the Government's interests must be protected, but with the concomitant purpose of protecting private interests and of keeping private incentive and initiative at a high level, the Committee of Conference adopted entirely new patent provisions."[6]

The report then continues with a very brief explanation of Subsection 305(a), indicating that inventions are to become the property of the United States "*according to a specified standard.*" (Emphasis in report). This standard is set forth in subparagraphs (a) and (2) of subsection 305(a), and is based on a relationship of inventions made to both the duties of the contractor employee performing under the contract and contract requirements.[7]

During floor discussion prior to final passage of the Space Act, Rep. McCormack stated in his opening address:

> The patent provisions of the House bill is the only part of the bill extensively revised by the conferees. The Senate version carried a patent provision closely similar to the provision of the House bill. This was droppped by floor amendment just before passage in the Senate to allow this section to go to conference. The review and redrafting were wise. The select committee created a special subcommittee to study the matter, and after talking with many experts in and out of Government arrived at a new version, drawing upon Senate and House suggestions. The original patent provision was too closely patterned after the stringent requirements of the Atomic Energy Act which are not fully applicable to the space field. The substitute provision agreed to by the conferees protects

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[5]104 Cong. Rec. 13978 (1958).

[6]House Rept. No. 2166, at 22.

[7]On this point the report of the Natcher subcommittee (see note 4(h) above) states, by way of explanation of its redraft of section 407(a):

> The new version is not designed to be applicable to inventors or others directly employed by the Agency as Government employees. The rights of Government employees in such matters are already set forth by Executive Order (E.0. 10096, Jan. 23, 1950).

The report then continues with an explanation of subsection 407(b) by stating "This spells out two conditions under which the Administrator is entitled to claim ownership in invention." The two conditions described are essentially the same as subparagraphs (1) and (2) of subsection 305(a), and are analogous to the basic policy set forth in paragraph 1. of E.O. 10096. Thus, there appears to be an intent to establish a relationship whereby, for the Administrator to be entitled to claim ownership to invention rights, the contractor employee is to be required to perform work for the Administration, indirectly through contract, in a manner analogous to the direct requirement for employees of the agency to perform such work.

> both the interests of the Government and affords enough flexibility to the Space Administrator to let him meet needs for preserving inventions of the individuals and companies whose efforts it is public policy to encourage.[8]

Rep. Keating also commented rather extensively on the patent provisions. Included in his summary of section 305 was the statement:

> The conferees recognized that research and development in aeronautical and space sciences will not be comparable, in most respects, to that in the field of atomic energy, and hence that there is no necessity for a Government monopoly of rights or interests in all inventions and/or discoveries relating to space exploration.
>
> And the patent provisions in this conference report do not automatically, as I understand the Atomic Energy Act does, give all property rights in inventions to the Government.[9]

The above-noted comments from the conference report and statements made during floor debate, viewed in light of drafting changes that culminated in the final version of section 304, clearly suggest that there was a legislative intent not to follow the restrictive and stringent approach taken in the field of atomic energy, which approach automatically created a "Government-monopoly" on inventions in the entire field based on some rather broad and generalized contractual relationships.[10] To the contrary, the Congressional intent behind the redrafts that became section 305 was to loosen the grip of government ownership of technology resulting from the space program. This was accomplished by incorporating the "standard" of subparagraphs (1) and (2) into subsection 305(a) wherein the Government acquires rights to inventions only in specified situations in which contractors and employees thereof are required to perform work of an inventive nature for the Administration.

Thus, even though the legislative history lacks a detailed analysis of the various provisions of section 305 and their interplay, two key points are evident from the conference report and the floor statements, quoted above. First, there was an underlying legislative purpose to maintain private incentive and initiative; and second, there was a legislative intent that the restrictive provisions of the Atomic Energy Act, which essentially preempt private ownership of patent rights in an entire field of endeavor,

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[8]104 Cong. Rec. 13978, 13986-13987 (1958). The provision dropped by floor amendment was section 303 (similar to section 407 in H.R. 12575) which was criticized as being too much like the restrictive and arbitrary provisions of the Atomic Energy Act. Also, the statement that "—the stringent requirements in the Atomic Energy Act—are not fully applicable to the space field—" is one of the principal conclusions of the report of the Natcher subcommittee.

[9]*Supra* note 8, at 13987-13988. Rep. Keating's statements, like those of Rep. McCormack, are markedly consistent with, and supportive of, the conclusions and recommendations of the report of the Natcher subcommittee.

[10]The Natcher subcommittee, for example, noted in its report (see note 4(h)) that the original section 407, as it stood, tended to be "arbitrary and restrictive" and might "stifle interest and private endeavors in the space research and development field."

were not to be carried over to space activities. Accordingly, NASA has from the onset adopted a liberal administration of section 305 and has made this known to Congress.[11] This is illustrated by the numerous examples discussed below.

3. *NASA Interpretation and Application of Section 305*

Consistent with the pronouncement to liberally administer section 305, and in harmony with the aforementioned legislative purpose and intent, NASA has over the years taken a more restricted interpretation as to the type of contracts that are subject to the title-taking constraints of subsection 305(a) than is literally suggested by the broadly worded definition of subsection 305(j) (2).[12] Accordingly, it has been the long standing official interpretation and administrative practice of NASA to limit the application of subsection 305(a) to activities performed for NASA that have the potential for making inventions.[13] This is reflected in NASA's regulations and practices over the past two decades, as the following review illustrates. This review covers a number of arrangements that NASA determined were not covered by subsection 305(a), a joint endeavor being one such arrangement. In each instance the determination made by NASA, and relied

[11]Testimony of John S. Johnson, General Counsel of NASA, during *Hearings Before the Special Subcommittee on Patents and Scientific Inventions of the Committee on Science and Aeronautics, U.S. House of Representatives,* on H.R. 1934 and H.R. 6030, 87th Cong., 1st Sess., at 17.

[12]There is no question as to the binding effect of a statutory definition of a term. However, as observed by authorities on statutory construction, such as the treatise of *Sutherland Statutory Construction,* Sec. 4707 (Sands, 4th ed. 1973) [hereinafter Sutherland]:

> Definitions are themselves. . .written in words whose meaning, whether viewed separately or in conjunction with the terms being defined and other language comprising their context, may be determinable only through further practice of the methods of interpretation."
>
> . . .words of an act may be restricted by its subject in order to avoid repugnance with other parts of the act (cite omitted). . .[and] [t]he application of the words of a single provision may be. . .restricted to bring the meaning of the clause in question into conformity with the intention of the legislature. . .

[13]The official interpretation reflected in the regulations and long standing practices of an administrative agency charged with the duty of enforcing a statute has great weight in determining the operation of a statute. Although not binding on a court, it is unlikely that such interpretation would be overturned unless found to be clearly erroneous. *Sutherland,* Sec. 4905 (and cases cited therein); C.D. Sands, 4th ed. 1973; also 82 C.J.S. Statutes, Secs. 358, 359 (and cases cited therein).

on by the other party, has had a direct effect on the vesting of property rights to inventions made by that party.[14]

a. *Proposals Submitted to NASA*

A literal interpretation of subsections 305(a) and 305(j) (2), taken together, would require the Government to take title to any privately funded inventions made in the course of preparing a proposal (i.e., a "proposed contract") for submittal to NASA. Such interpretation, however, is manifestly at odds with the legislative purpose of section 305(a) to protect private interests and to maintain private incentive and initiative. Thus, NASA took a restrictive interpretation of the phrase "any . . . proposed contract" appearing in subsection 305(j) (2), and limited it to work performed upon an understanding that a contract would be awarded, such as when a written authorization is given to proceed with the work pending formalization and execution of a contract.[15]

b. *Contracts for Supplies, Construction and Utility Services*

In developing NASA's procurement regulations, interpretations of section 305 were made to determine the types of contracts that were subject to subsection 305(a), and therefore required the inclusion of a provision as specified in subsection 305(b) NASA concluded that the legislative intent was to apply section 305 only to those types of contracts requiring the performance of inventive type work for NASA,

[14]The courts are particularly reluctant to overrule a long-standing administrative interpretation of a statute where to do so would unsettle titles, or prejudice persons who have acquired contract or property rights in reliance on such construction; *see also* 82 C.J.S. Statutes, Sec. 359 (1953) (and the cases cited therein). Needless to say, a literal construction of subsection 305(a) and 305(j) (2) at this time would have the effect of unsettling a myriad of rights in any inventions that may have been made in those instances where NASA has exercised reasonable judgment in making practical interpretations consistent with the legislative purpose (e.g., as has been done regarding the preparation of proposals, supply contracts, reimbursable launch service agreements, and numerous joint endeavors).

[15]The Assistant General Counsel for Patents memorandum dated June 23, 1959 to the General Counsel on The Applicability of the "Property Rights in Inventions" Section of the National Aeronautics and Space Act of 1958 (Section 305) to inventions made in the performance of research and development work, the cost of which is not charged to NASA.

Two significant points made in the memorandum are:

(a) It is inconceivable that the Congress would have intended that NASA could establish a relationship with a party whereby all the inventions made by that party or its employees under the circumstances defined in Provisions (1) and (2) of subsection 305(a) would become the exclusive property of the Government merely by NASA proposing to such party that it do work for the Administration"; and

(b) "In order not to work a completely incongruous result, it is recommended that NASA interpret the terms 'proposed contract,' as used in subsection 305(j) (2) in defining 'contracts,' as relating back to work done upon an understanding that a contract would be awarded."

and so advised Congress.[16] This interpretation is reflected in the NASA Procurement Regulations, which limit the use of a patent rights clause that would invoke section 305 to specified types of contracts having a prospect of inventive work being performed.[17]

c. *Launch Service Agreements*

NASA has provided launch services to non-NASA entities during most of its history. Many of the launches have been provided on a reimbursable basis for private domestic concerns, wherein the launched spacecraft has been developed and owned by the concern for whom NASA provided such services. In addition, there have been numerous reimbursable launches for other U.S. Government agencies, foreign countries and international organizations.

(i) *The AT&T Launch Agreement*

The first launch service agreement was with American Telephone and Telegraph (AT&T) (July, 1961) to launch the experimental Telstar communication satellites. This

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[16]That interpretation was made clear in the testimony of John A. Johnson, NASA General Counsel, during *Hearings Before The Subcommittee on Patents and Scientific Inventions of the Committee on Science and Astronautics of the U.S. House of Representatives,* on Public Law 85-568, 86th Cong. 1st Sess. In answer to a question by Rep. Fulton (pg. 14) regarding the distinction between research and development contracts and supply contracts in the field of aeronautics and space, the General Counsel testified:

> We did make that distinction. We have made it administratively and we were without any published legislative history on this to help us because we simply could not believe, in the context of this section, that every time we entered into a contract for the supply of some office supplies or something of that kind it was intended that this kind of patent clause should enter into it. We have confined our patent clause to-we have a rather elaborate formula in our regulations; but, to oversimplify it, it is basically a research and development type contract. We felt, after all, that this was the only reasonable intention we could read into this section of the law; but the language is so broad that some of the initial commentators on this section made it appear more horrible than it actually is in practice.

In his response to the General Counsel's answer Rep. Fulton made this point that the "law is too broad" and went on to—

> compliment the NASA, the Administrator, and the people who have been advising him on making the distinction as to the type of contract that the patent provisions apply to.

[17]The NASA Procurement Regulations 41 C.F.R. § 18 (1981) requires the use of a section 305 patent rights clause only in contracts which entail technical, scientific or engineering work of a kind performed in a contract having as one of its purposes (1) the conduct of basic or applied research, (2) the design or development, or manufacture for the first time, of any machine, article of manufacture, or composition of matter to satisfy NASA's specifications or special requirements, (3) any process or technique for attaining a NASA objective not readily attainable through the practice of a previously developed process or technique, or (4) the testing or practice of a previously developed process or technique to determine whether the same is suitable or could be made suitable for a NASA objective. This official interpretation was initially taken in 1959 (14 CFR 1201.101-2(a) (1982)), and is still followed (see NASA PR 9.107-4, revised Dec. 1976).

agreement differed considerably from the typical research and development contract entered into by NASA since the satellites were to be designed, built, funded and owned by AT&T, and AT&T was also to reimburse NASA for its "out of pocket launch costs." Thus, the roles of the parties were reversed from the normal contractual situation in that NASA was being paid to perform work for AT&T.

The agreement was made subject to section 305, and NASA took, and then waived back, title to all inventions made by AT&T in the design and development of the Telstar satellite, but retained a worldwide, royalty free license for governmental purposes. In addition, NASA acquired the right to grant licenses to others for the practice of such inventions throughout the world for any purposes whatsoever upon such terms and conditions as the Administrator may prescribe. This right to license others was unrestricted as to both the parties to be licensed and the purposes for which the inventions may be practiced.

The rationale for acquiring these rights under the AT&T agreement was the existence of exceptional circumstances; that is, the desire to keep options open in an uncertain area until such time as the Congress and the President acted on an approach to be taken in establishing a communication satellite system.[18]

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[18]Statement of Mr. James B. Webb, Administrator, National Aeronautics and Space Administration, Before the Committee on Science and Astronautics, House of Representatives, August 10, 1961. (NASA NEWS RELEASE NO. 61-173). This consideration is seen as reflected in the following language taken from Mr. Webb's statement:

> The significance of the patent provisions agreed to by NASA and AT&T is that whatever form of organization may be determined to be in the public interest and approved by the Federal Communications Commission for providing communication to the public through satellite relays, that organization will be able to use inventions made by AT&T while in this cooperative relationship with NASA.

The patent provisions of the NASA/AT&T agreement were unique in many respects: (1) inventions "conceived or first actually reduced to practice in the performance of work under or in anticipation of the Agreement on or after May 18, 1961 were, by specific agreements of the parties, to "be regarded as being made in the performance of work under a contract. . .within the meaning of section 305" of the Space Act; (2) title to such inventions was waived in advance to AT&T but in addition to the usual rights under section 305, NASA also retained the right to sublicense United States business throughout the world in the field of communications satellites; and (3) with respect to inventions made by AT&T during the period of the contract but *unrelated* to the contract save for being contemporaneously made and of similar use, the Government was to receive a broad royalty-free license together with the right to require sublicenses. For a thorough analysis of the AT&T arrangement, which has not been followed in any other instance, see Allnutt, *Patent Policy for Communications Satellites: A Unique Variation, 46 Marquette L. Rev.* 63 (1962).

(ii) *Subsequent Launch Agreements*

The next launch service agreement where the applicability of section 305 was raised was in 1964, when NASA negotiated an agreement with the Communications Satellite Corporation (Comsat) to launch on a reimbursable basis, Comsat's privately funded and owned satellites. In formulating a patent policy for this agreement note was made, and consideration given, to the position previously taken by NASA with respect to NASA/AT&T Telstar launch agreement. It was concluded, however, the reasons that gave rise to the particular NASA/AT&T patent policy no longer existed.[19] It was observed that while the NASA/Comsat launch agreement was a "contract for the performance of work" and hence could be construed to be covered by section 305, under the specific terms of the agreement NASA was to perform the work for Comsat, as contrasted with the typical situation where the contractor performs work for NASA.[20] In other words the conventional roles were reversed under this type of agreement.

NASA made the interpretation that the launch service agreement with Comsat was not subject to section 305 because no work was to be performed for NASA, and thus there was to be no transfer of NASA funds to Comsat. However, to insure against a later amendment of the agreement calling for the performance of work *by the corporation for NASA* it was decided to include a section 305 patent clause in the agreement as a precautionary measure. To this end, the clause began with the language "If and to the extent that any work is performed *for NASA* under this agreement. . . ."[21] Thus, NASA

[19]Assistant General Counsel for Patent Matters memorandum of February 3, 1964 to the General Counsel on Recommended Patent Clause for the Cooperative Agreement Between NASA and the Communications Satellite Corporation.

The memorandum notes that the position recommended therein for the Comsat agreement is quite different from that previously taken in the AT&T agreement. It points out, however, that the rather marked departure (taken in the NASA/AT&T agreement) from standard NASA patent practices was essentially prompted by two reasons neither of which is "effective today."

As to the first reason, it was pointed out that the need to insure freedom of action in the communication satellite field pending a Congressional decision on a communications satellite system no longer existed in view of the establishment of the Communications Satellite Corporation under the Communication Satellite Act of 1962. 76 Stat. 421, 47 U.S.C. 721(b) (1962).

The second reason dealt with the practical difficulty of determining whether AT&T inventions relating to Telstar were made under the NASA/AT&T agreement or as a result of AT&T's independent research programs. To avoid this difficulty, the Government under the NASA/AT&T agreement acquired rights to all such inventions.

The memorandum took the position that NASA was not entitled to any rights to inventions made by Comsat or its contractors since "if Congress intended for NASA to attempt to acquire patent rights in inventions developed in the corporation funded research, either to insure royalty-free use of such inventions by the Government, or as a means of assuring effective competition among the corporation's suppliers, there is no doubt that such a prescription would have been included in the Act. . . . .The view that NASA is not entitled to demand such an interest in the cooperative agreement is reinforced by the fact that the FCC and not NASA is charged under the Act with the responsibility of insuring effective competition among the corporation's contractors."

[20]*Id.*

[21]Agreement Between the National Aeronautics and Space Administration and Communications Satellite Corporation for Satellite Launching and Associated Services to be Furnished by NASA In Connection with the Launching of Intelsat II and Certain Intelsat I Satellites, dated July 22, 1966, ARTICLE X - Property Rights in Inventions.

made the further interpretation that, in addition inventive type work had to be performed *for NASA* in order for section 305 to apply.[22]

The interpretation that a launch service agreement does not constitute a contract for the performance of work for NASA, and hence not a contract subject to subsection 305(a), has been consistently followed since 1964.[23] In fact, experience has shown over the years that the standard launch service agreements have never required any work to be performed *for NASA*, and the above-mentioned precautionary section 305 patent rights clause is no longer used.

4. *Joint Endeavors*

The above review illustrates a number of instances where NASA has made an official interpretation and adopted administrative practices to support the position that not all contracts are subject to subsection 305(a). Joint endeavors represent yet another instance where NASA has made an interpretation that an agreement or arrangement which literally meets the definition of contract under subsection 305(j) (2) is not a contract in the context of subsection 305(a).

With the development of advance facilities, such as wind tunnels, sensing and communications satellites and a space transportation system, and the creation of high technology, such as supercritical wing and ADP systems, NASA found it to be in its interest, both national and international, to enter into arrangements whereunder NASA would contribute the use of its facilities or technology to other parties in return for the other parties agreeing to furnish their products or services to carry out a program or project of mutual interest. The parties then share the results and benefits of the project. Often these activities are carried out as a joint endeavor, as previously defined.

Joint endeavors may vary as to the number of parties involved, the type and amount of contributions made by the parties, as well as the technical nature of the

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[22]As a further clarification of this interpretation of section 305, ARTICLE II - Par. 1.C. of the NASA/Comsat Agreement (note 21) contained the following language:

"c. The Corporation represents that it proposes to do the following, which will not, however, constitute work performed under this Agreement.

(1) Provide for the design, development, and testing of all spacecraft.

(2) Perform all spacecraft pre-launch tests at ETR.

(3) _____"

[23]The most recent interpretation is found in paragraph 6(a) of NASA Management Instruction (NMI) 8610.8 of January 21, 1977 (14 CFR 1214.104(a) (1982)) entitled *Reimbursement for Shuttle Services Provided to Non-U.S. Government Users:*

"6. Patent and Data Rights

a. NASA will not acquire rights to inventions, patents or proprietary data privately funded by a user, or arising out of activities for which a user has reimbursed NASA under the policies set forth herein. However, in certain instances in which the NASA Administrator has determined that activities may have a significant impact on the public health, safety or welfare, NASA may obtain assurances from the user that the results will be made available to the public on terms and conditions reasonable under the circumstances."

endeavor undertaken. In general these activities and arrangements differ considerably from a formal NASA contract and somewhat from those activities previously discussed in that they are usually informal in nature, are sometimes bottomed on a best efforts basis, do not involve the reimbursement or exchange of funds between the parties, and are not deemed as requiring employment of one party's employees or contractors by the other party in making the contribution of facilities, equipment or services to the joint activity.

NASA's first interpretation as to whether section 305 applied to a joint endeavor occurred in April 1959, in response to an inquiry by a private company regarding an arrangement whereby NASA would contribute one of its facilities for the testing of privately developed equipment, and NASA and the owner of the equipment would share the resulting test data.[24] The position was taken that, while such an arrangement had the appearance of a contract with NASA, the fact that the company contributed equipment to the joint endeavor would not mean the company assumed any obligations to perform any work for NASA in the sense of subsection 305(a). Hence the interpretation was made that subsection 305(a) would not be applicable to any inventions made by the company or its employees during the testing of the company's equipment or any activities incident thereto. The interpretation was also made that should any of the company's employees participate in the testing, and should they as a result make an invention, the invention would not be covered by subsection 305(a) because it would not have resulted from the performance of any work *for NASA*.[25]

Subsequent to this initial interpretation, NASA has had many occasions to determine whether an arrangement or agreement structured as a joint endeavor was to be considered a contract subject to subsection 305(a). The interpretation has been consistent that, under joint endeavors neither party is assuming any obligations to perform inventive type work for the other, and accordingly each party retains rights to any inventions that may be made in the course of carrying out its activities that are contributed to the effort.[26] This interpretation and the resulting practices are illustrated by the examples set forth below.

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[24]Letter of April 6, 1959 from NASA General Counsel to Patent Counsel, General Electric Company, Cincinnati, Ohio (April 6, 1959).

[25]*Id.*

[26]This is not to say that NASA does not obtain rights to inventions which may result from joint activities under an endeavor. However, such rights are obtained by negotiation and agreement, and not by the imposition of subsection 305(a). Typically, when the resulting activities are of an inventive type, NASA acquires at least a royalty-free license to practice, for governmental purposes, any inventions arising from such results. On a case-by-case basis greater rights may be acquired to assure that the results of a joint endeavor are made available to the public upon reasonable circumstances.

(a) *Use of NASA Facilities*

Where NASA's contribution is the use of a ground-based facility, and the other party furnishes equipment or services, NASA does not apply section 305, but acquires license rights to any inventions resulting from such use through negotiated provisions in the agreement.[27]

NASA has a similar policy where the contribution is the use of its orbiter to carry the other party's payload for testing, demonstration, or performing other operations or analysis in space.[28]

(b) *Use of Satellite Data and High Technology*

Other joint endeavors in which NASA has not applied section 305, involve activities wherein NASA's contribution is its satellite data[29] or its high technology such as supercritical wing technology in exchange for results of the analysis thereof. When the

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[27]For example, NASA's policy for the use of its installation research facilities by individual researchers is set forth in the NASA Supplement for the Federal Personnel Manual, Chapter B11, issued September 29, 1977, which provides:

> rights to any inventions conceived or first reduced to practice during, and resulting from use of Government facilities should be stated in the agreement. Normally NASA should obtain a royalty free license for the U.S. Government to practice the invention for governmental purposes.

[28]This policy is reflected, for example, in the Announcement of Opportunity for Materials Processing Investigations on Space Shuttle Missions (A.O. No. OA-77-3, Feb. 8, 1977) seeking investigations comprising applied and basic research projects in branches of material sscience where the weightlessness and ultra high vacuum obtainable in orbital flight can be exploited to unique advantage. It is stated, in paragraph V.2.:

> "For a Cooperative Project, NASA will obtain a royalty free license to practice for U.S. governmental purposes any inventions and patents resulting from the experiment and the right to use and disclose the resulting data for U.S. governmental purposes.

[29]Typical arrangements where a significant NASA contribution is its satellite data are:

(a) "Agreement Between National Aeronautics and Space Administration and the GEOSAT Committee, Inc." for the purpose of demonstrating improved remote sensing techniques for mineral and petroleum exploration;

(b) "Cooperative Agreement Between the California Department of Water Resources and the National Aeronautics and Space Administration for an Application Systems Verification and Transfer (ASVT) Project Involving Irrigated Land Assessment For Water Management," to evaluate the utility of LANDSAT as a source of data for use as input to water management models and decisions;

(c) "Cooperative Agreement Between The Appalachian Regional Commission and The National Aeronautics and Space Administration For Appalachian Lineament Analysis" to conduct a joint project involving LANDSAT-derived information for certain land use purposes;and

(d) "Memorandum of Understanding Between NASA and the Agency (ESA) for LANDSAT Ground Stations" wherein NASA provided LANDSAT data and ESA established a system for the reception, pre-processing, archiving and dissemination of such data.

resulting activities are not of the inventive nature, no patent provisions are included; when it is anticipated that inventions may be made, a patent provision may be included by negotiation.[30]

(c) *Contributions of Technical Interface and Technical Monitoring Assistance*

NASA also entered into a joint endeavor with the McDonnell Douglas Corporation (and a similar one with the Boeing Company) whereunder McDonnell Douglas developed at its expense a spin stabilized payload assist module (SUSS/PAM) for launching payloads from the orbiter, and NASA provided technical interface and monitoring assistance and services.[31] Subsection 305(a) was not deemed applicable to this joint endeavor, but under negotiated provisions NASA would acquire rights to inventions made by McDonnell Douglas in developing the SUSS/PAM in event of termination for default.[32]

(d) *Cooperative Launch Activities*

In addition, NASA has entered into arrangements whereby NASA launches, at no cost to the other party, spacecraft and/or experiments provided at no cost to NASA by the other party, with the understanding that NASA and the other party are to share in the results, usually by exchange and/or publication of the information and data derived from the resulting activity. Again, section 305 has not been deemed applicable to these arrangements, but a provision may be included, by negotiation, to acquire license rights for governmental purposes if it is determined that the resulting activity is of an inventive

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[30]Thus for example, in a model "Cooperative Endeavor Agreement" under which NASA made certain of its scientific and technical data available under specified conditions and the recipient provided NASA with reports of the result of applying such data to commercial aircraft, the following patent provision was included:

5. *Patents*

(a) NASA, acting on behalf of the U.S. Government, has filed application for Letters Patent in the United States and certain foreign countries on an invention made by Richard T. Whitcomb and entitled, Airfoil Shape for Flight at Subsonic Speeds. The supercritical aerodynamic technology furnished by NASA to Lear Avia under this Agreement is based, in large part, upon the novel concepts, theories, formulae, and technology encompassed by this invention. In recognition of these contributions offered by the Government, Lear Avia agrees that should its application of such technology to commercial aircraft, as contemplated under this Agreement, result in patentable modifications or improvements to the supercritical aerodynamic technology, Lear Avia will provide NASA with the disclosure of such inventions and grant to the U.S. Government a nonexclusive, irrevocable, royalty-free license to practice such inventions throughout the world for government purposes.

Such agreements have been entered into with Lear Avia, Cessna, Beech, and Gates Lear Jet.

[31]Agreement of November 24, 1976, between McDonnell Douglas Corporation and NASA concerning the design, manufacture, test and delivery of a spin stabilized payload assist module for launching spacecraft.

[32]*Supra* note 31, ARTICLE IX - Termination for Default.

nature. Other than such license rights, invention rights reside with the respective parties (or their employees or contractors) of the joint endeavor.[33]

(e) *Contribution of Major Hardware*

Other NASA joint endeavors have involved activities where the various parties have made significant hardware contributions to a common program. As in the previously discussed joint endeavors, subsection 305(a) has not been deemed applicable, and any invention rights involved reside with the party (or its employees or contractors) who contributed the hardware. License rights, for governmental purposes, are acquired if it is determined that the resulting activity is of an inventive nature.[34]

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[33]Examples of arrangements of this type are:

(a) "Memorandum of Understanding Between The Federal Minister for Scientific Research of The Federal Republic of Germany and The United States National Aeronautics and Space Administration" for Project HELIOS, having the general objective to provide new understanding of fundamental solar processes and solar terrestrial relationships by the study of phenomena such as solar wind, magnetic and electric fields, cosmic rays, and cosmic dust.

(b) "Memorandum of Understanding Between The United States National Aeronautics and Space Administration and The Netherlands Agency for Aerospace Programs" for the Infrared Astronomical Satellite to perform an all-sky survey of extraplanetary, galactic and extragalactic infrared sources.

(c) "Memorandum of Understanding Between The United States National Aeronautics and Space Administration and The European Space Agency for The International Solar Polar/Out-Of-Ecliptic Mission" to conduct coordinated observations of the interplanetary medium and the Sun simultaneously in the northern and southern hemispheres of the solar system.

(d) Letter agreement between NASA and The Centre National d'Etudes Spartrales, France, selecting a proposal entitled "Multipurpose French Cooperative Environment Tests to be Conducted on NASA LDEF," for participation in the NASA Long Duration Exposure Facility (LDEF) Mission. The proposal was submitted in response to the NASA Announcement of Opportunity AO-OAST-76-1, and has as a scientific objective the investigation of the effect of long term space exposure on thin metal film and evaporated cathodes, optical coatings, holographic gratings, thermal coatings, structural materials, and fiber optics.

(e) Letter agreement between NASA and the University of Sydney, Australia, selecting a proposal entitled "Aggregation of Human Red Blood Cells," in response to NASA Announcement of Opportunity AO-OA-77-3 (see note 28). The scientific objective of the proposed experiment is to observe the aggregation of human red blood cells under conditions approaching zero gravity.

No patent provisions were included in examples (a) - (c), but examples (d) and (e) included the following:

> It is further understood that should any inventions and patents result from this project, NASA is granted a royalty-free license to practice such inventions and patents for U.S. Government purposes."

[34]Representative examples of joint endeavors involving contributions of major hardware are:

(a) "Memorandum of Understanding Between The National Aeronautics and Space Administration and The European Space Research Organization for a Cooperative Programme Concerning Development, Procurement and Use of a Space Laboratory In Conjunction With the Space Shuttle," wherein ESA and its members developed the Spacelab (some of the subcontract research and development work performed by U.S. companies) to be utilized with the NASA developed orbiter;

5. *Summary and Conclusions*

It is clear from the foregoing that during its nearly two decade history NASA has entered into numerous actual or proposed contracts, agreements, understandings or other arrangements, all within the literal definition of "contract" of subsection 305 (j) (2), that were not deemed subject to subsection 305(a). In some instances they were for the procurement of goods and services (supply contracts using appropriate funds); in other instances they were for launch services or the use of NASA facilities on either a reimbursable or joint basis; and in still other instances they involved contributions of hardware on a joint basis. The issue does not turn on whether the arrangement between the parties falls within the literal definition of contract as defined in subsection 305(j) (2). Rather, the common basis for the decision not to consider these types of "contracts" under subsection 305(a) was a determination, consistent with the legislative history, purpose and intent, that they did not involve *the performance of work of an inventive type for the Administration* in the context of subsection 305(a).

This determination is equally valid with respect to joint endeavors, wherein each party performs, or has performed, work on its own behalf in order to make contributions to the common project. To the extent that any inventive activity is performed by a party's employees or contractors, it is performed by or for that party for the purpose of enabling that party to make contributions to the joint endeavor. That is, one party is not performing, or not having performed, work for the other party, but rather, for itself. Neither party is empowered to direct, assign or require work of an inventive nature to be performed by the employees or the contractor employees of the other party. Thus, a joint endeavor is not different than the numerous other arrangements NASA has determined not to be subject to subsection 305(a) in that it does not require the performance of work of an inventive type for NASA.

In addition, there is nothing in the legislative history of section 305, nor of NASA's long-standing interpretation and administrative practices relating thereto, to suggest the determination should be any different because the technology involved may find commercial application, as may be the case for joint endeavors under the Materials Processing in Space Program. If it is determined that the activity does not involve the performance of work of an inventive type for NASA, subsection 305(a) is not applicable notwithstanding the nature of the technology involved or its commercial potential.

(b) "Memorandum of Understanding Between The National Aeronautics and Space Administration and The National Research Council of Canada For a Cooperative Program Concerning the Development and Procurement of a Space Shuttle Attached Remote Manipulator System (RMS)," wherein Canada developed the RMS to be employed on the NASA developed orbiter;

(c) "Memorandum of Understanding Between The European Space Agency and The United States National Aeronautics and Space Administration," under which ESA is to develop major hardware to be incorporated into the NASA developed telescope; and

(d) "Memorandum of Understanding Between The Department of Communications of Canada and The Centre National D'Etudes Spartrales of France and The National Aeronautics and Space Administration of The United States of America," wherein Canada is to develop significant hardware (some to be produced in the U.S. under subcontract) to be used in and with a U.S. developed satellite.

No patent provisions were included in examples (a) - (d), above.

Because joint endeavors are not contracts under subsection 305(a), any rights to inventions made in the course of a joint endeavor undertaken in the Materials Processing in Space Program must be acquired by negotiation. It is recommended that at a minimum NASA continue the established practice of acquiring a royalty-free license to practice, for governmental purposes, all inventions made in the course of the resulting activities of a joint endeavor undertaken in the Materials Processing in Space Program. Consideration may be given to acquiring license rights of the same scope to practice any inventions specifically made in the course of any preparatory or background activities, to the extent necessary to practice inventions made in the course of the resulting activities. Beyond this, it will be necessary to consider each proposed joint endeavor case-by-case. However, it is recommended that, consistent with the policy set forth in NMI 8610.8 dealing with reimbursable launches,[35] NASA obtain assurances, by way of directed licensing rights, that the results of any joint endeavor activity which may have a significant impact on the public health, safety or welfare be made available to the public on terms and conditions reasonable under the circumstances.

It is therefore concluded that:

(a) NASA does enter into many types of arrangements falling within the literal definition of contract under subsection 305(j) (2) that are not contracts in the context of subsection 305(a);

(b) a joint endeavor is an example of one type of arrangement that is not a contract in the context of subsection 305(a);

(c) a joint endeavor under the Materials Processing in Space Program is no different regarding the interpretation and application of subsection 305(a) than any other joint endeavor, and therefore is not a contract in the context of subsection 305(a); and

(d) the allocation of property rights in inventions under any joint endeavor is a matter of agreement between the parties that must be specifically set forth in the joint endeavor.

[35] *Supra* note 23.

THE CONTRIBUTIONS MADE BY INTERNATIONAL ORGANIZATIONS TO THE FORMATION OF SPACE LAW

*Michel Bourély**

Creating new rules of international law has always been the prerogative of States, and it is they who are primarily responsible for applying them. However, the development of international cooperation since the First and Second World Wars has given the international organizations—themselves, admittedly, created by the will of the various States—an increasingly important part to play in this legislative process. The tendency is particularly evident with space law which, grafted onto the tree of international law some 25 years ago, has now grown into a branch in its own right.[1]

The manner in which international organizations are involved in space law varies widely. First of all, they provide the framework in which sovereign States come together to work out the new rules which will govern activities in space. This is the case with the United Nations Organization. Secondly, organizations exist which issue rules to govern space activities within their own sphere of competence. The prime example is the International Telecommunications Union. Thirdly, certain international organizations are set up for the primary purpose of undertaking activities in Space. These activities may involve all areas covered by that term such as the European Space Agency,[2] or closely defined areas such as telecommunications, where Intelsat and Inmarsat are good examples.[3]

The purpose of this article is to throw a certain amount of light onto the first two aspects of the role currently being played by international organizations where space law is concerned. The third aspect, that of space activities actually being carried on by an international organization, is not explored here, as it has more to do with the law of international institutions than with space law. The domestic law of these organizations,

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[1]We shall not go into the discussions that can arise from the mandatory force of the various rules which, taken together, form what is known as "space law". They may be given or deprived of this mandatory force depending on distinctions which are commonly made in international public law, and which stem from the form in which the rules have been recorded. Thus, treaties, conventions and agreements are looked on as being binding on their signatories, while this is not true of declarations or resolutions. A discussion of this kind would indeed be outside the scope of the present study, since it concerns space law in general and is not germane to the contributions that the international organizations can make to its formation.

[2]M. G. Bourély, *The Legal Status of the European Space Agency*, in Proc. of the Twenty-Third Colloquium on the Law of Outer Space 129, 129 (1980).

[3]*See* Matte, *Institutional Arrangements for Space Activities: An Appraisal*, 6 Annals Air and Space L. 439, 448-51 (1981).

however, does contribute to the application of space law, and their principles must be respected.[4]

Finally, it should be made clear that the term "international organizations" is being used to mean those of an intergovernmental type. They are the only ones recognized by the international community, and by the group of States that have set them up. In the case of the United Nations Organization and its specialized agencies, their membership includes virtually all States. This gives the texts they have submitted for the approval of all States, or have adopted themselves, an unequalled degree of authority. It seemed reasonable, however, for us also to mention various non-governmental international organizations that have played or are still playing an active role in creating space law - though their role cannot go beyond making recommendations to the States or intergovernmental international organizations.

I. *The United Nations Organization*

The United Nations thus provided the cradle for space law, where it continues to grow today. A brief historical outline is needed before we describe the machinery that exists today, list the results of the work that has been done today, and assess its importance.

A. *The Beginnings of Space Law in the United Nations*

Though the idea of exploring and making use of outer space had occupied man's mind since ancient times,[5] the launching of the first artificial earth satellite (Sputnik I) by the Soviet Union on October 4, 1957, with all its political, military, scientific and economic implications, forced the United States—like all the other countries of the world—to set out as a matter of urgency the principles on which the carrying on of activities in space should be based. In the political climate of the time, it was essential that the first of these principles should be the use of space for peaceful purposes.

One might have expected certain countries to have taken the initiative in calling international conferences devoted specially to an examination of the problems presented by space activities, or that certain specialized international organizations might have started to debate them. In any event, it was in the framework of the United Nations that space law began to be formulated. This was wholly reasonable, since the UN's authority is both universal in the geographical sense, and general from the political point of view.

Following an American proposal in January 1957—prior to the launching of Sputnik I, but given fresh impetus by that event—the UN General Assembly

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[4]It must also be added that the four international agreements concluded following the 1967 Space Treaty have allowed for the possibility of intergovernmental international organizations stating that they accept the rights and obligations given to State by these agreements. At the present time the only organization to have made such a declaration is the European Space Agency. This Declaration has been made in respect of the agreement on the rescue of astronauts, the convention on international liability and the Convention on registration.

[5]Pépin, *Les Problèmes Juridiques de l'espace, bibliography 1910-1950,* Revue Française de Droit Aérien 4 (1959).

recommended[6] the regulation, limitation and balanced reduction of all armed forces and all armaments, and the prohibition of certain weapons of mass destruction. Furthermore, the General Assembly urged on the countries concerned "the joint study of an inspection system designed to ensure that the sending of objects through outer space shall be exclusively for peaceful purposes."

Early in 1958 the General Assembly was presented with proposals, from both the USSR and United States, laying down basic rules that would apply to the peaceful use of outer space. The Political Committee examined concurrently two draft Resolutions which aimed, among other things, at the setting up of a committee to study the problems of space.

The American draft having been adopted on 13 December 1978,[7] the Committee was formed; but only 13 members took part in its discussions, the countries of the Eastern bloc having decided not to take their seats. The Committee met, nonetheless, and at once set up two sub-committees (technical and legal). It prepared a report, incorporating a plan of work, which was submitted to the 1959 General Assembly. The General Assembly decided, on 12 December 1959[8], to enlarge the Committee to a membership of 24. This brought to an end the hostility of the socialist countries, and made it possible for the Committee to operate normally, under the title of "Committee on the Peaceful Uses of Outer Space."[9]

Two years of work were needed before the Committee achieved the adoption, by the General Assembly, of a resolution entitled "International Cooperation in the Peaceful Uses of Outer Space."[10] This was supplemented and expanded two years later by a resolution entitled "Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space"[11], which forms the cornerstone upon which space law has been built.

B. *The Committee on the Peaceful Uses of Outer Space*

The Committee for the Peaceful Uses of Outer Space (COPUOS) is thus the crucible in which, slowly and painfully, space law is being forged.

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[6]U.N.G.A. Res. 1148/XII, 14 Nov. 1957.

[7]U.N.G.A. Res. 1348/XIII, 13 Dec. 1958.

[8]U.N.G.A. Res. 1472/XIV, 12 Dec. 1959.

[9]The acronym of the Committee on the Peaceful Uses of Outer Space is COPUOS. The French title is Comité des utilisations pacifiques de l'espace extra-atmospherique: CUPEEA.

[10]U.N.G.A. Res. 1721/XVI, 20 Dec. 1961.

[11]U.N.G.A. Res. 1962/XVIII, 13 Dec. 1963.

1. *The Committee's Structure*

Because of the constantly increasing number of members of the United Nations, the Committee's strength has grown from 24 to 28 members in 1962,[12] to 37 members in 1973,[13] and finally was expanded to 47 members after the 1978 United Nations Session.[14] Another increase in membership has been authorized by Resolution A/Res/35/16 of December, 1981. However, it seems that the composition of the Committee, which now comprises 53 members and one non-member, has reached a size beyond which any further increase would make achievement of solid results impossible, particularly in view of the working methods of the Committee.[15] It has become the custom for the subcommittees to meet successively early in the year (in January/February and April/May respectively), while the full Committee sits only at the end of the first half of the year (June/July). This makes it possible for reports and proposals to be submitted to the Political Committee for their meeting, and then to the UN General Assembly during the second half of the year. Meetings are generally held in New York, although there have been some in Europe (in Geneva or Vienna). A proposal currently being discussed by the Committee is that it might be well for the two subcommittees to meet simultaneously (rather than successively, as at present), so that the experts could consult each other.[16]

To help the Committee and its subsidiary bodies, in 1962 the UN Secretary General established the Outer Space Affairs Division within the Department of Political and Security Council Affairs of the UN Secretariat. The purpose of this division is to furnish technical and administrative back-up for both the Committee on the Peaceful Uses of Outer Space and its scientific and technical subcommittee and working groups. The legal subcommittee is serviced by the Legal Counsellor's department.[17] Furthermore, the Outer Space Affairs Division exercises certain functions of an executive kind, such as keeping a register of launchings. This division could well constitute the embryo for a UN specialized agency if the longstanding plan to set one up were one day to come to fruition.[18]

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[12]U.N.G.A. Res. 1721/XVI, 20 Dec. 1961.

[13]U.N.G.A. Res. 3182/XXVIII, 18 Dec. 1973.

[14]U.N.G.A. Res. 169B/XXXII, 20 Dec. 1977.

[15]For example, in October 1968, the scientific and technical subcommittee set up a working group on direct broadcast satellites. The study of this topic has since been carried on in parallel by the two subcommittees.

[16]Report of the 22nd meeting of COPUOS, U.N. Doc. A/34/2, item 121.

[17]Abdel-Ghani, The Outer Space Affairs Division, S. Doc. No. 57, 92d Cong., 1st sess. 235 (1971).

[18]This question will be studied by the United Nations Conference on Space (UNISPACE), to be held in August 1982; the agenda will have an item entitled "Evaluation of the role of the United Nations in using space techniques for the benefit of all countries, and examination of the need for strengthening this role and of the opportunities offered for achieving this." *See* Report of the 22nd meeting of COPUOS, UN Doc. A/34/20, item 99.

2. *Working Methods*

The most interesting feature of the Outer Space Committee and of its two subcommittees, is that their work is done entirely by the "consensus method"[19]; a decision-making process used solely by this UN Committee.[20]

"Consensus" is one of the methods that allows a group of individuals or legal entities, including States, to arrive at a decision without using a system of votes which would require a simple or qualified majority or unanimity. The fact that in this special case there is no requirement on every member of the Committee to take a definite action—i.e. to vote for or against—means that there is greater flexibility and makes it possible to apply the maxim that "silence signifies consent." Similarly, reliance on the tacit acquiescence of all the States makes it possible to avoid the expression of certain divergences of view that Committee members would have been obliged to voice if they had been called upon to cast a vote. On the other hand, "consensus" carries with it the risk of misunderstandings or reservations about the scope and interpretation of the text in question. However, it is then the responsibility of the countries concerned to make their reservations heard, and to have them recorded in the minutes of the meeting.[21]

The consensus method is "a practice under which every effort is made to achieve unanimous agreement; but if that cannot be done, those dissenting from the general trend. . .simply. . .make their position or reservations known and placed on the record."[22]

The decision to utilize consensus rather than formal voting was made after long and difficult negotiations surrounding the establishment of the Committee. In March, 1962, the Chairman of the Committee announced that "through informal consultations, it has been agreed among the members of the Committee that it will be the aim of all members of the Committee and its subcommittees to conduct the Committee's work in such a way that the Committee will be able to reach agreement in its work without need for voting."[23]

The consensus method has made it possible for the five agreements which, at present, form the "corpus" of space law to be drafted and adopted by the General Assembly, prior to being opened for signature by the States.[24]

In practice, this method has led the Outer Space Committee and its subcommittees to establish extremely flexible procedures for their discussions. Generally, after a formal

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[19]Galloway, *Consensus Decision-Making by the United Nations Committee on the Peaceful Uses of Outer Space*, 7 J. Space L. 3 (1979).

[20]The rules of procedure of the other UN committees and conferences generally provide for the possibility of deciding by majority vote even if the participants in fact try to have decisions reached by a consensus.

[21]This may even result in the recording of an interpretation agreed by the committee. This was the case with the recent agreement on the Moon. *See* Report of the 22nd meeting of COPUOS, UN Doc. A/34/20, items 62, 63 and 65.

[22]U.N. Jurid. Yb. 163-64 (1974).

[23]*See* Galloway, *supra* note 19, at 5-7.

[24]*Id.* at 7.

opening to the meeting during which delegations espouse statements of principle, it is immediately decided to set up working groups for each of the questions outstanding.[25] These working groups, assisted in their discussions by interpreters and a secretariat, sometimes establish "mini-groups" in which the real negotiations are undertaken, supplemented and facilitated by informal consultations. In this way, texts may be drawn up providing either alternative wordings or suggestions for the deletion of certain passages. These suggestions are placed between brackets and eventually disappear as the text moves up through the various levels.

The consensus method offers certain advantages.[26] In the first place, it suits the special nature of space law, since human activities in space necessarily transcend national frontiers and thus oblige all nations to agree among themselves that these activities will be carried on in a peaceful fashion and in the interests of mankind as a whole. Similarly, space law can be evolved only by taking a multidisciplinary approach, one in which technical factors are intermingled with political, economic and cultural factors to demand the legal formulation of a number of rules.

The method also takes account of considerations which deal with the very structure of the Committee, whose small membership, coupled with the personality of its successive chairmen, have made possible rewarding human contacts and a harmonious approach to the problems.

Finally, as a negotiating method, consensus leads to a tendency to form a shared viewpoint, whereas voting implies that the opinion of the majority has triumphed over that of the minority. This is a psychological aspect which is far from unimportant in a setting such as the United Nations, where national susceptibilities are heightened.

It must be recognized, however, that this method does lead to unusually long delays before concrete results can be achieved. It tends to prolong discussion on problems that have already been fully debated, and on which a solution can be reached only through political compromise. Such compromises mean that solving problems of space is dependent on factors outside the subject being discussed, so that a solution can be obtained only if conditions are favorable elsewhere. Adoption of the Space Treaty of 1967, for example, is a direct consequence of the East/West detente of that time.

In all events, the time needed to arrive at a decision is measured in years. Many topics have taken ten years of discussion in the Legal Subcommittee.[27] These questions are thus carried over from the agenda of one meeting to that of the next, even though the General Assembly may have requested the Committee to examine them "as a matter of priority."

Obviously, the increase in the membership of the Committee is bound to make it more difficult to arrive at a consensus. The intervention (in the dialogue between the USSR and the USA) of groups of countries based on geographical affinity (Europe), political affinity (the non-aligned countries) or economic interests (the developing

[25]During the 22nd meeting of COPUOS certain delegations suggested that this practice should be abandoned in the meetings of the two subcommittees, but the proposal does not seem to have met with a particularly warm reception. *See* report of the 22nd meeting of COPUOS, U.N. Doc. A/34/2, item 122.

[26]Galloway, *supra* note 19, at 11.

[27]In particular, the agreement on liability and the agreement on the Moon.

countries), groups which are far from homogeneous, makes the situation immeasurably complicated. One may even fear that this, taken together with the current deterioration in East-West relations, will prolong for many years the stalemate reached on the more delicate matters, such as remote sensing and the status of the geostationary orbit.

Should it be concluded from this that the consensus method has served its turn, and that the Committee should now agree to turn to a voting procedure so that it may continue to make progress? The least one can say is that if such a proposal were to be made it would give rise to fresh discussions, which would be a repeat of those that led to the present method's adoption. In fact, a consensus would have to be found first on abandoning the method, and then on what method should take its place. One may doubt whether the effects of making such a change would justify the time and effort necessary to achieve it. Additionally, use of a majority vote system would most likely discourage members from continued participation in the Committee work.

In fact, it is not the decision-making machinery that is at fault; for what truly matters is the objective being sought.[28] The Committee is a "crucible," a tool. Its goal to draft an international agreement which will eventually be opened for signature by the States. While the drafts recommended by the Committee and the General Assembly do carry a special political weight, no State is obligated to sign an agreement of which it does not approve. Similarly, no State can be bound by an agreement which it has not signed. Thus, the Committee should be a forum where all members can have a meaningful voice in the drafting of an agreement. The consensus method facilitates the Committee's taking account of the views of all members by encouraging unanimous agreement. Unfortunately, the consensus method could be used to systematically stonewall the work of the Committee. Such delay could lead some States to look for a forum other than the United Nations in which to establish a system of legal rules for the carrying on of space activities. We can still hope that under the pressure of technical progress the need to come to a decision will inevitably generate the political will to answer the problems. Certainly, in answering the problems, we must avoid giving up the method of voting which has, so far, provided sound results.[29]

3. *The Committee's work and achievements*

An assessment of the work of the Committee on the Peaceful Uses of Outer Space must first include an account of the five international agreements that form the basis of space law proper; and secondly, a list of questions that it is still discussing.[30]

The most important text is the *Treaty on the Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and Other*

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[28]*See* Galloway, *supra* note 19, at 11.

[29]M. G. Bourély, *Towards a Convention on the Legal Status of Manned Spaceflights*, in Proc. 22nd Colloquium on the Law of Outer Space 59 (1979).

[30]For a report on the results achieved by COPUOS, see Hosenball, *The United Nations Committee on the Peaceful Uses of Outer Space: Past Accomplishments and Future Challenges*, 7 J. Space L. 95 (1979). *See also* Matte, *supra* note 3, at 440-43.

Celestial Bodies.[31] This treaty, which reiterates the principles set out in Resolution 1721 (XVI) of 20 December 1961 and in Resolution 1962 (XVII) of 13 December 1962, was signed in London, Moscow and Washington on 27 January 1967 and came into force on 10 October 1967. At the present time, 112 States have signed or acceded to the treaty.

Four further texts, which might be described as "implementing texts", were prepared on the basis of the Outer Space Treaty by COPUOS before they later took on the status of international agreements.

The *Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer space*[32] was signed in London, Moscow and Washington on 22 April 1968 and came into force on 3 December 1968. At the present time it has been signed or acceded to by 99 States.

The *Convention on International Liability for Damage Caused by Space Objects*[33] was signed in London, Moscow and Washington on 29 March 1972 and came into force on 9 October 1973. It has been signed or acceded to by 104 States.

The *Convention on Registration of Objects Launched into Outer Space*[34] was signed in New York on 14 January 1975 and came into force on 15 September 1976. At the present time, 38 States have signed or acceded to this convention.

The *Agreement Governing the Activity of States on the Moon and Other Celestial Bodies*[35] has been signed by 11 States.

The Committee's work is far from finished. It still must bring to a close discussions started several years ago concerning three particularly thorny topics. Thus far, it has not been possible to find a consensus.[36]

The first of these is *direct television broadcasting by satellite.* The legal subcommittee, giving up the task of putting forward a draft text for an international agreement, is trying to at least define principles for governing this activity which have been accepted by all parties. It has still not been possible to achieve this aim because there is no agreement on two fundamental issues: whether the State undertaking such broadcasting should have to obtain the prior agreement of the other States, and whether the State where the signals are received direct can exercise control over them.

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[31]Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (hereinafter "Outer Space Treaty). Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205 (effective Oct. 10, 1967).

[32]Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched Into Outer Space (hereinafter "Rescue and Return Agreement"), April 22, 1968, 19 U.S.T. 7570, T.I.A.S. No. 6599, 672 U.N.T.S. 119 (effective Dec. 3, 1968).

[33]Convention on International Liability for Damage Caused by Space Objects (hereinafter "Liability Convention") March 29, 1972 24 U.S.T. 2389, T.I.A.S. No. 7762 (effective Oct. 9, 1973).

[34]Convention on the Registration of Objects Launched into Outer Space (hereinafter "Registration Convention") January 14, 1975, T.I.A.S. No. 8480 (effective Sept. 15, 1976).

[35]Draft Agreement Covering the Activities of States on the Moon and Other Celestial Bodies, U.N.G.A.O.R., 34th Sess. Supp. No. 20 (Doc. A/34/20).

[36]*See* Report of the 27th meeting of COPUOS, A/35/20, items, 48-64.

The second is *remote sensing of the Earth by satellite,* where despite efforts by both the technical and the legal subcommittees, and despite the fact that here too the latter has abandoned the idea of putting forward the text of an international agreement, the definition of generally accepted principles is still hampered by the impossibility of reaching agreement on the matter of prior consent by the State whose territory is being observed. Furthermore, some States insist on being able to exercise control over the dissemination of data and information concerning their resources, especially when this dissemination works to the advantage of third States.

Defining or delimiting outer space has again become a burning issue since the equatorial countries have made known their demands in respect to *geostationary orbits.*[37] These two matters are now being examined simultaneously by the legal subcommittee, and have formed the subject of detailed proposals by the USSR which are still being studied. The Scientific and Technical Subcommittee is contributing to this study, and ICAO has suggested taking part in the discussions.

To these three topics, which have been on the agenda of the Committee and its subcommittees for several years, must be added a more recent subject which arose from the fall of the Soviet "Cosmos 954" satellite on Canadian soil on 4 January 1978. That subject is the *use of nuclear sources of energy in outer space.* Basing itself on work done by the Scientific and Technical Subcommittee, the Legal Subcommittee is at present considering whether there is a need to supplement the existing provisions of international law.

We should also mention that the Committee has recently been faced with the question of *space transport systems* and their impact on the future of space activity. The Legal Subcommittee will therefore have to work out legal principles on the use of space transport systems, or even draft an agreement on the subject.

Finally, in view of the growing militarization of outer space, certain delegations have asked the Committee to look into ways of ensuring that space is used solely for peaceful purposes.

II. *The Other International Organizations*

In line with the distinction we drew earlier, we shall divide the international organizations regarded as having made a contribution to the formulation of space law into two groups, the governmental and the non-governmental.

A. *Intergovernmental Organizations*

Certain specialized agencies of the United Nations act as a forum for working out the rules of space law in areas matching their particular sphere of activity.

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[37]Declaration signed on 3 December 1976 at Bogota by a number of equatorial countries (Brazil, Colombia, Congo, Ecuador, Indonesia, Kenya, Uganda, Zaire). For text in English, see 6 J. Space L. 193 (1978).

1. *International Telecommunication Union (ITU)*

Radio frequencies are obviously essential for carrying on space activities, the development of which has made it necessary to set aside particular frequency bands, and to divide these frequencies among the various users and to adopt detailed rules on how they are to be used.

The ITU is the oldest of the UN specialized agencies, and was also the first to produce legislation covering activities in space.[38] Its objective is to contribute to international cooperation for the improvement and rational use of telecommunications of all kinds, to promote their efficient operation, and to harmonize the actions of nations to this end. It allocates the frequencies in the radio spectrum and keeps a record of frequency assignments. Furthermore, it ensures that harmful interference between radio communication stations in various countries is avoided or eliminated.

The ITU has a General Assembly (the Plenipotentiary Conference) which meets every five or six years to decide the organization's policy. In the intervals between these conferences, a 36-member Administrative Council meets once a year, and executive duties are carried out by a General Secretariat.

One of the prime functions of the ITU is to draw up regulations for radio communications which, after approval, are annexed to the Convention. The drafting of regulations is undertaken by administrative radio conferences, which are convened by the Plenipotentiary Conference and which allocate frequencies to States for each of the services using radio communications. These frequencies are subsequently assigned by the various States (or their relevant administrative bodies) to the radio stations under their jurisdiction, and notice of these assignments are then sent to the ITU which keeps a register of them.

Also, the ITU has an International Frequency Registration Board (IFRB), and an International Radio Consultative Committee (generally known by its French initials, as the CCIR) and an International Telegraph and Telephone Consultative Committee (similarly known as the CCITT).

In the case of space radiocommunications, the UN Committee on the Peaceful Uses of Outer Space had realized from 1959 onwards that there was in existence an organization that was tailor-made for "dealing with the problems of allocating radio frequencies for use in outer space"—the ITU.

An administrative radiocommunications conference, meeting in Geneva in 1959, decided to first allocate special frequency bands for "Space" and "Space-Earth" services, and second to call an extraordinary administrative radio conference to discuss the problems of space radiocommunications. This conference was held in Geneva in 1963, and it revised the chart of frequency band allocations. It also adopted a resolution on international cooperation and technical assistance in the field of space radiocommunications, and a further resolution on distress frequencies that would also be applicable to spacecraft. Finally, the conference adopted a resolution dealing with

[38]The International Telecommunications Convention repeats and amends several conventions, the earliest being the one held in 1965. The last revision was carried out at Malaga-Torremolinos, and came into force on 1 January 1973. 28 U.S.T. 2495; T.I.A.S. 8572 (effective for the U.S. on April 7, 1976).

the use of direct radio broadcasting satellites. All these decisions came into force on 1 January 1965.[39]

With the continuous development of space activities, the start of commercial telecommunications in this sphere,[40] and the growing use of the geostationary orbit, it was decided to hold a world administrative radio conference at Geneva in July 1971 to reconsider the decisions of the 1963 conference. During this conference, it was emphasized that space communications were a finite natural resource, and that it was therefore necessary to share them between countries, and distribute them between the various services, making due allowance for the interests of all nations—not just those who had the means of undertaking space activities.[41]

Among the amendments the Conference made to the radio regulations, special attention was given to direct broadcasting satellites, to earth sensing satellites, and to the question of maritime communication satellites. It was also decided to reserve certain frequencies for later allocation to the developing countries.

Among the many resolutions and recommendations adopted by the Conference, special mention should be made of the principle subscribed to in Resolution Spa 2-1, which concedes to all States an equal right to the use of frequencies and to the use of geostationary orbit. Conversely, no State has or acquires a permanent right to an orbit merely from the fact of having put a satellite into orbit and having occupied certain positions on that orbit. Finally, the Conference undertook to work out definitions for a number of terms used in the carrying on of space activities, such as "deep space", "space station" and "space radiocommunications".[42] The conference had also asked that the study on the problem of the radiocommunications services be continued.

All the decisions of the 1971 Conference came into force on 1 January 1973. When, in September 1973, a Plenipotentiary Conference was summoned by the ITU Administrative Council at Torremolinos for the main purpose of revising the ITU Convention, a number of new provisions were adopted to clarify the ITU's role in space telecommunications.[43] We may note, in particular, the task allotted to the IFRB, under the new article 10 of the Convention, of drawing up a list of stations put into geostationary orbit. Also of note is the new article 33, under which "[i]n the use of frequency bands for space radiocommunications, members shall take account of the fact that the frequencies and the orbit of geostationary satellites are limited natural resources which should be utilized effectively and economically, in order that access to the orbit and frequencies may be equitable to the different countries or groups of countries, according to their needs and to the technical means at their disposal, in conformity with the provisions of the Radio Regulations."

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[39]15 U.S.T. 887; T.I.A.S. 5603.

[40]*Comsat* was set up in the United States by the Communications Satellite Act of 31 August 1962. This was the first step towards the creation of *Intelsat*, which has in its final form become an intergovernmental organization.

[41]Final Acts of the World Administrative Radio Conference for Space Telecommunications (Geneva, 1971).

[42]*Id.*

[43]International Telecommunication Convention of Oct. 25, 1973, Malaga-Torremolious, *supra* note 38.

Following this Plenipotentiary Conference, several administrative conferences have been held, all of which dealt with questions affecting space telecommunications. They include:

a) the world administrative conference on maritime broadcasting services, in Geneva (April/June 1974);
b) the world administrative conference on the planning of satellite broadcasting services, in Geneva (January 1977);
c) the world administrative radio conference in Geneva (September-December 1979);
d) a further world administrative radio conference, to be held between the present and 1984 in order to examine the use of geostationary orbit and the planning of services making use of it.

The legal system set up by the ITU to govern space communications comprises overall provisions, and provisions applying only to certain classes of radioelectrical service.

The basic idea is that all frequencies will have to be recorded in a main international register of frequencies (the "Master Register") kept by the IFRB in order to avoid "harmful interference" by other services. Although this term has not itself been defined, this does mean that the registered frequencies will enjoy a certain measure of protection. Other countries will generally avoid using these frequencies, both in their own interests and in the interest of cooperation with the other countries in the ITU.

This protection against harmful interference is granted only where the countries wanting to assign a frequency to space communications comply with certain coordination procedures, with the help of the IFRB, and carry out the formalities of notification and registration in the "Main Register."

The sanctions against any countries that may break the rules, or cause harmful interference, are very limited and difficult to enforce. An exception to this, however, exists in the case of satellite broadcasting services, which are given absolute protection against the later assigning of frequencies for other services.

One may note that the rules set up by the ITU offer technical solutions to two problems that the UN Outer Space Committee has been unable to settle from the legal and political viewpoint—that of direct satellite broadcasting (imposing the obligation to reduce the inevitable spill-overs), and that of geostationary orbit (recognizing the right of States to use this).

2. *The United Nations Educational, Scientific and Cultural Organization (UNESCO)*

In carrying out its mission of serving education, science, and culture, UNESCO, a UN specialized agency, was bound to take an interest in the role that satellites play in this field as media for mass dissemination.

In liason with other international governmental organizations such as the ITU and the United International Bureau for the Protection of Intellectual Property (BIRPI) [44]

[44]This organization subsequently became the World Intellectual Property Organization (WIPO).

and non-governmental organizations such as the European Broadcasting Union (EBU), UNESCO took a hand in producing two texts covering space activities.

The *Convention Relating to the Distribution of Programme-Carrying Signals Transmitted by Satellite,* a text adopted by an international conference held in Brussels in May 1974,[45] stems from the realization that while the use of satellites for transmitting programme-carrying signals is growing apace, both in terms of volume and of the area covered, there are no worldwide rules to prevent acts of piracy against these signals.

The purpose of the Brussels Convention is to establish an international system to prevent the distribution of program-carrying signals by a distributor for whom the signal is not intended. This prohibition covers both distribution by satellite within the territory of the signatory States and distribution from their territories towards other States. It is for each of the signatory States, and for them alone, to decide what measures they consider suitable to implement the Convention on their own territory.

One may note that the Convention is limited to the protection of programs broadcast by satellite, and does not apply to a subsequent land broadcast. The Convention further excludes from its field of application program-carrying signals emitted by direct-broadcasting satellites.[46]

The *Declaration of Guiding Principles on the Use of Satellite Broadcasting for the Free Flow of Information, the Spread of Education and Greater Cultural Exchange*[47] was prepared during a large number of meetings organized by UNESCO, and was adopted by the 27th General Conference in October/November 1972. It tries to reconcile the principle of freedom of information with that of the sovereign right of the States, and it would seem to lean more to the latter than to the former. This no doubt explains why the Declaration was not adopted unanimously.[48]

3. *Other Intergovernmental Organizations*

Since the purpose of the present chapter is to chart the drafting of space law, there is no need to mention here the many intergovernmental organizations that have an interest in the carrying on of space activities which have a bearing on their special area of competence. To name a few examples among the UN specialized agencies:

a) the International Civil Aviation Organization (ICAO);
b) the World Meteorological Organization (WMO);
c) the Food and Agriculture Organization (FAO);
d) the World Health Organization (WHO);
e) the World Intellectual Property Organization (WIPO); and
f) the International Agency for Atomic Energy (IAEA).

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[45]For text, *see* 13 *Int'l Leg. Mat.* 1447 (1974).

[46]N. Matte, *Aerospace Law* 40 (1977).

[47]For text, *see* UNESCO Doc. 17 c/98 (14 Nov. 1972).

[48]N. Matte, *supra* note 46 at 42.

All these organizations make every effort to use space technology in carrying out their projects or can provide technical assistance in studying the problems of space law. They do not take part directly or on their own account in the process of drafting space law which we have been describing.[49]

Other intergovernmental organizations exist, however, whose very *raison d'être* is the carrying on of space activities. These include, for instance:

a) the International Telecommunication Satellite Organization (Intelsat);
b) the International Maritime Satellite System (Inmarsat);
c) the International System and Organization of Space Communication (Intersputnik);
d) the European Communications Satellite Organization (Eutelsat);
e) the Arab Space Communications Organization (ASCO); and
f) the European Space Agency (ESA).

The legal instruments establishing these organizations specializing in the space field must be counted among the texts that comprise space law. In these, however, the institutional character predominates, so the creation of these organizations cannot be looked upon as a contribution to the formulation of space law in the strict sense of the word. The "space organizations" do, however, play an essential role in applying space law.[50]

B. *Non-Governmental International Organizations*

The contribution that non-governmental organizations have made to the drafting of space law has come from a number of scientific bodies which bring together scientists of all nationalities. Some of these bodies have even been the sponsors and promoters of activity in space; subsequently, they have been more or less officially associated with progress in the exploration of space, and are still consulted by national and international government bodies—in particular, by the United Nations.

We shall not be looking here at the status or activities of these "international learned societies"; we shall indicate the spheres in which they have been—and still are—able to make a direct contribution to the formulation of space law.

1. *The International Council of Scientific Unions (ICSU)*

The primary purpose of the ICSU, set up in Brussels in 1919 under the title of "International Council of Scientific Unions", is to facilitate and coordinate the work of international scientific unions in the fields of the exact and natural sciences. It brings

[49]It should be remembered, for example, that WIPO, together with UNESCO, convened the conference which adopted the Brussels Convention on 1974.

[50]M. Bourély, *The European Space Agency's Contribution to the Development of Space Law,* in Proc. 19th Colloquium on the Law of Outer Space 21 (M. Schwartz ed. 1976).

together on the one hand the international scientific unions in the various branches of science, and on the other the national academies of science or scientific organizations, as well as the national research councils.

It was the ICSU which was entrusted with running the IGY, the International Geophysical Year (1957-58), during which the first artificial satellites were launched. In 1958 the ICSU set up a Committee on Space Research (COSPAR), which is made up of representatives of worldwide scientific unions and specialized national science organizations.

COSPAR has a number of working groups and plays a part in a variety of international scientific programs in the various fields of application of space activities (scientific research, meteorology, surveying, research into the atmosphere).

COSPAR collaborates closely with the United Nations Outer Space Committee, where it enjoys observer status. It has cooperated with the working groups set up by the Committee on Remote Sensing, and has carried out a study on space technology applied to environmental problems. It also took part in the preparatory work for the convention on the registration of objects launched into outer space.

2. *The International Astronautical Federation (IAF)*

The International Astronautical Federation, founded in 1950, embraces the national scientific societies of a large number of countries. It is concerned less with science than with space techniques and applications. Its aim is to promote the development of astronautics for peaceful purposes and to encourage international cooperation in this sphere. The IAF collaborates closely with the UN Outer Space Committee, on which it has observer status.

In 1960 the Federation set up an *Academy of Astronautics* and the *International Institute of Space Law*. The latter is made up of members elected on an individual basis from among legal experts from all countries who have an interest in space law. Its symposia, held at the same time as the Federation's annual congresses, provide these legal experts with an opportunity to put forward their personal views on topical problems and to compare them with the opinions of their colleagues. A growing participation by members of the Outer Space Division of the UN Secretariat, and by many delegates to the legal subcommittee of COPUOS, is evidence of the high level of the papers read and of the ensuing discussions. Publication of the proceedings of the symposia held over the past 24 years provides an indispensable source of documentation on the subject for legal experts concerned with space law.[51]

3. *Miscellaneous Organizations*

Certain national or international organizations dealing with legal matters have set up, on a basis of greater or lesser permanence, committees to deal specifically with space law.

Such is the case, for example, with the *International Law Association,* whose Space Law Committee undertakes studies on specific subjects such as the delimiting of space,

[51]A booklet on the work of the IISL is included in the Proceedings of the Twenty-Third Colloquium on the Law of Outer Space, Tokyo, 1980. This booklet has also been published separately.

satellite communications, registrations, direct broadcasting and so on, and submits resolutions to the Association's General Assembly.[52]

Several universities that have courses in space law organize occasional symposia or colloquies which allow lawyers to develop their thinking on the subject. Among these, we should mention in particular the existence of institutes specializing in air and space law, which maintain close contact with the international organizations and provide centers for study and research into space law. These include McGill University in Montreal, the University of Cologne in the Federal Republic of Germany, and the University of Rome.

CONCLUSION

Having come to the end of a study which is far from claiming to have exhausted the subject of the contribution that international organizations have made to the formulation of space law, we can make a number of comments by way of a summary.

1. As in other branches of international public law, the drafting of international agreements setting out the rules for the carrying on of space activities is a prime responsibility of States.

2. In this creation of space law, the international organizations—where they are intergovernmental—play a twofold role:

a) they provide the framework within which this drafting of space law takes place—the United Nations and, in more specialized areas, the International Telecommunication Union and UNESCO;

b) they are themselves sources of regulations making up space law, since they publish resolutions and recommendations or formulate declarations which become part of the corpus of space law, with a less binding effect than the agreements.

3. However, international organizations—intergovernmental or otherwise—do make a far from negligible contribution at two levels to the drafting of space law:

a) by carrying on activities in outer space, since by this very fact they formulate the objectives for their programs and draw conclusions from what they have done before;

b) by giving advice or making recommendations during the process of drawing up legal rules, within the limits of their area of competence and their own mission.

4. This aspect of the contribution made by international organizations can be seen in the setting up of more or less formal links with the States or between themselves; these links may, for instance, take the form of the granting of observer status in the UN Committee on the Peaceful Uses of Outer Space, where the organizations can get a direct hearing from those who are actually engaged in the drafting of space law.

5. The international organizations, whether or not they are intergovernmental, are subject to space law in the same way as States and the natural and juridical persons under their jurisdictions. This may be:

a) indirect, via the member States (and this is most commonly the case), or

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[52]N. Matte, *supra* note 46, at 17.

b) direct, when under the actual provisions of a particular international space agreement an international organization signs a declaration in which it accepts the rights and responsibilities arising from the agreement in question. This is, however, open only to intergovernmental organizations.

6. Making an organization like this directly subject to an international agreement represents a major innovation in international public law.

However, the ability to make a declaration of acceptance concerns only the organizations which themselves undertake space activities, not those that have recourse to space services provided by a State or by another organization. This explains why, in the present state of space law and bearing in mind the subject areas covered by the existing space agreements, there is only one organization—the European Space Agency—that has signed declarations to make itself bound by the agreements on rescue, liability and registration. When space law has been extended to include texts governing the use of space systems—and not just the provisions of these systems—these texts (laying down the principles governing broadcasting or remote sensing) will undoubtedly give rise in turn to the signing of declarations of acceptance by organizations whose activities lead them to use space techniques for carrying out their mission.

7. When they undertake activities in space in compliance with the rules laid down by the international agreements the intergovernmental international organizations have to take implementing measures in accordance with their own domestic rules (agreements, resolutions or regulations). These measures cannot, of course, have the same effect as general international agreements, and they cannot be applied outside the circle of the members of the organizations, or of the States or entities which are linked to the organization by an agreement.

8. Nonetheless, these measures constitute precedents, and contribute towards the building up of an international usage and custom, which adds to the corpus of space law.

Thus the international organizations—mainly those with an intergovernmental status—can be seen both as active in the formation of space law and as important components in its development. This is a welcome realization; it is wholly in the spirit of the principles set out in the Outer Space Treaty, under which the exploration and use of outer space inevitably involves international cooperation.

THE PROBLEM OF DEFINITION AND DELIMITATION OF OUTER SPACE**

HE QIZHI*

One of the prominent issues relative to the legal status of outer space is its definition and delimitation with the air space, which has been the subject of debates in the United Nations Committee on the Peaceful Uses of Outer Space and other forums of space law ever since the ushering in of the space era. Agreement on this problem appears not yet to be in sight.

I.

The term "outer space" as a concept of space science has existed for a long period of time. It is generally used to refer to the whole space beyond the earth's atmosphere. In international law, some writers in the early fifties began to use the term "outer space" to denote the entire space beyond state sovereignty, no matter whether it starts from within or above the atmosphere. Meanwhile some other terms were also adopted to refer to the same concept, such as "cosmic space", "extraterritorial space", "interstellar space" and "upper space", and so on. It was only after the United Nations General Assembly unanimously passed the resolutions on establishing the Ad Hoc Committee on the Peaceful Uses of Outer Space in 1958 and the present Committee on Peaceful Uses of Outer Space (COPUOS) as a permanent body in 1959, that the term "outer space" began to appear frequently and to be used officially.

Though "outer space" has become a commonly used term in international law and space science, it nonetheless lacks a definition accepted by all. Due to divergent views, the subject has undergone intermittent and drawn-out discussions in the COPUOS and its two subsidiary bodies, the Legal Sub-Committee and the Scientific and Technical Committee. As early as in 1959, the problem of the definition and delimitation of outer space was raised in the United Nations Ad Hoc Outer Space Committee. In 1962, the Legal Sub-Committee established by the COPUOS put this issue on its agenda, but the discussion was repeatedly postponed until 1967. At that time the Legal Sub-Committee in compliance with the United Nations General Assembly Resolution 2222 (XXI) of December 19, 1966, requesting the COPUOS to begin the study on the issue relative to the definition of outer space, gave a more detailed discussion and, as a result, sent a questionnaire to the Scientific and Technical Committee, asking the latter to give its views on the selection of scientific and technical criteria of the definition of outer space. After an exchange of views, the Scientific and Technical Committee came to the conclusion that at present it would be impossible to identify scientific and technical criteria that permit a precise and lasting definition of outer space and expressed that it

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would continue its consideration on this issue at its future sessions. Thus the question of defining and delimitating outer space remains on the agenda of the COPUOS and its Legal Sub-Committee to the present.

II.

Although some states and many learned authorities are unwilling to agree on a precise demarcation line as to the upward extent of state sovereignty in space, the principle that each state should retain its sovereign right over the airspace above its territories has been established by the theory and practices of modern international law. Article I of the 1944 Chicago Convention on International Civil Aviation[1] provides that "[T]he contracting States recognize that every State has complete and exclusive sovereignty over the airspace above its territory." Article II of the Convention on the Law of the Sea adopted by the Third United Nations Conference on the Law of the Sea in 1982,[2] also provides that the sovereignty of a coastal state "extends to the airspace over the territorial sea." Insofar as national legislation is concerned, more than fifty countries have made analogous regulations. In juridical writings, the principle of state sovereignty over its airspace was treated and confirmed in one way or another in nearly all works of air and space law.

As regards the legal status of outer space that stretches above the airspace of the earth, the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and Other Celestial Bodies (hereinafter referred to as the Outer Space Treaty) of 1967,[3] though giving no definition of outer space, lays down clearly the principles that outer space shall be free for exploration and uses by all States on a basis of equality and shall not be subject to national appropriation. Thus the Treaty denies that territorial sovereignty could be automatically extended by the underlying state beyond its airspace into the far reaches of outer space. Many articles in the Treaty are related to these principles.

Paragraph 2 of Article I provides that "[O]uter space, including the moon and other celestial bodies, shall be free for exploration and use by all states without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies." Paragraph 3 of the said Article also stipulates "there should be freedom of scientific investigation". Closely related to freedom of uses, Article II stipulates that "[O]uter space, including the moon and other celestial bodies is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means." In a certain sense Article II is a kind of restriction to the principle of freedom of uses. It rejects the proposition that outer space should be regarded as *res nullius*, so that it could be claimed for ownership through effective occupation. On this basis, some international

[1]*Convention on International Civil Aviation*, Chicago, Dec. 7, 1944, 61 Stat. 1180, T.I.A.S. No. 1591; 15 U.N.T.S. 295.

[2]130 countries voted in favor of and 4 against the Convention. There were 17 abstentions.

[3]Treaty on Principles Governing Activities of States in The Exploration and Use of Outer Space, Including the Moon and Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205, Article V.

lawyers hold that by prohibiting appropriation of outer space the Treaty confirms that outer space should be accepted as *res communis omnium*. This is reflected in paragraph 1 of Article I. It provides that the exploration and uses of outer space "shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic and scientific development, and shall be the province of all mankind." In this regard, the Agreement Governing the Activities on the Moon and Other Celestial Bodies of States adopted by the United Nations General Assembly in 1979,[4] further lays down in paragraph 1 of Article XI, that "the moon and its natural resources are the common heritage of mankind." Paragraph 5 of the same Article further provides that: "[S]tates parties to this Agreement undertake to establish an international regime, including appropriate procedures, to govern the exploitation of the natural resources of the moon as such exploitation is about to become feasible."

There are some other articles in the Outer Space Treaty related to the above said principles. Article VIII provides that a launching state shall retain jurisdiction and control over an object and personnel in it which was launched into outer space. This provision on the one hand embodies the principle that outer space is free for uses by confirming the ownership of the launching state over the object launched into outer space, but on the other hand it denies national sovereignty over outer space by rejecting the jurisdiction and control of other states over the object in question. Similarly, Article VI and Article VII, which provide that a launching state should bear international responsibility for the damage resulting from its activities in outer space, can also be taken as an extension of the principle of freedom of uses and exploration in outer space. Apart from that, the provision of Article III on "observing international law including the Charter of the United Nations" and Article IX on paying "due regard to the corresponding interests of all other states parties to the Treaty," as well as Article IV on undertaking not to place in orbit around the earth any object carrying nuclear weapons, and providing that the moon and other celestial bodies shall be used by all states parties to the Treaty exclusively for peaceful purposes can also be interpreted as a kind of restriction to the principle of freedom of uses.

The main purpose of the provision that the uses of outer space "should be in the interests of all peoples irrespective of the degree of its economic and scientific development" enunciated in the preamble of the "Outer Space Treaty" and the provisions of paragraph 1 of Article I, should be to safeguard the interests of the developing countries. But the above mentioned provisions are only worded in general terms to express the wish of the developing countries. As to what kind of activities are in the interests of all states and who will determine which activities are for the benefit of all states, the Treaty does not mention. So after the conclusion of the Outer Space Treaty, the question of how to elaborate in more clear terms the relevant instruments such as Direct Television Broadcasting by Satellite, Remote Sensing of the Natural Resources of the Earth, and the like, so as to ensure to common interests of the developing countries and all other states, will be an important problem facing the developing countries.

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[4]Agreement Governing the Activities of the States on the Moon and Other Celestial Bodies, U.N.G.A.O.R., 34 Sess. Supp. No. 20 (Doc. A/34/20).

III.

A number of proposals have been put forward in the literature of space law for determining the altitude boundary of state sovereignty. Among them were: the proposal to fix the altitude at a height up to which aircraft can ascend; the idea to limit airspace in terms of atmosphere resulting in the emergence of various criteria relative to the boundary of air-filled space; the suggestion of a line to be established at a point where aerodynamic lift yields to centrifugal force; the proposal that sovereignty should extend as far upwards as the subjacent state could exercise effective control; the approach by analogy to the law of sea in regulating a contiguous area (mesospace) with the right of free transit to and from outer space; and so on.

But a more sensible approach would seem to be the suggestion that national airspace is limited by the least possible altitude of orbital flight. By this approach, all satellites launched into orbits up to now are in outer space and outside the realm of state sovereignty. As regards the demarcation line between outer space and airspace, the view was expressed that it is more urgent to establish the lower limit of outer space while the question of upper limit of airspace might be left aside for the time being."[5] However, the generally held view seems to be that the whole space beyond earth is divided into two rather than three areas—that is, airspace and outer space. So the lower boundary line of the outer space must automatically be the upper limit of the airspace. As to the question of transit of space objects in airspace to orbits or returning to the territory of the launching state, it could be settled in some other way, for example, by general agreement that no space object launched from the territory of any state may enter the airspace of another state without the consent of the latter, and that such consent should not be withheld if prior notice and the assurance that no harm or prejudice will be caused by the said space object in transit have been given to the latter state.

IV.

With the growing importance of the use of geostationary orbit coupled with the technological advance of the space age, the issue of the legal status of the geostationary orbit has been brought to the fore, and calls for new attention and consideration of the question of definition and delimitation of outer space. As is well known, claims were advanced by the equatorial states in the Bogota Declaration of 1976[6] to sovereign rights over those segments of the geostationary orbit superjacent to their respective territories. This issue was brought before COPUOS and its Legal Sub- Committee. As a result, the United Nations General Assembly in its Resolution 1961 (XXXII) of December 20, 1977, accepted the recommendation of COPUOS by changing the original wording of the item to read: "questions relating to the definition and/or delimitation of outer space and outer space activities, also bearing in mind questions relating to the geostationary orbit." This item linked the issue of definition and delimitation of outer space with the issue of geostationary orbit and has been one of the problems raising vehement debate in COPUOS and its Legal Sub-Committee.

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[5]*Cf.* Kopal, *The Question of Defining Outer Space,* 8 J. Space L. 170-71 (1980).

[6]For an English translation, *see* 6 *J. Space L.* 193 (1978).

From the deliberations in recent years in the above mentioned organizations, the trend seems to be that a number of countries have favored the view that proper arrangement should be made of the use of geostationary orbit on the basis of equity and fairness within the framework of the Outer Space Treaty. The equatorial states, while claiming sovereign rights in general over segments of the geostationary orbit above their territories, have been stressing that in formulating the definition and delimitation of outer space, the special interests of the equatorial states must be taken into account. The representative of Colombia stated what Colombia were opposed to was the placing of any object at a fixed position at any height above its territory without its prior consent.[7] Colombia, Brazil and Kenya[8] all expressed their willingness to consider the altitude of 90 or 100 kilometers as the lower boundary of outer space, provided the issue of geostationary orbit would also be solved, taking due account of their special interest in this orbit. Among the developing countries, Egypt expressed the view that "a serious consideration of the allocation of the geostationary orbit is required, instead of the present system of 'first come, first served' ".[9] India stated that "[A]ccess to the geostationary orbit must be based on equity and justice and on due regard for the geographical position, population and special needs of each country".[10] The Philippines added that "a legal regime of a *sui generis* character should be established for the geostationary orbit that not only would safeguard its use, but would also ensure its utilization for the benefit of all countries, in particular the developing countries."[11] Finally, Brazil stated that "Appropriate criteria must be found for guaranteeing positions on the geostationary orbit, with the interests of the Equatorial States receiving due weight."[12]

As to the relation between the definition of outer space and the issue of the geostationary orbit of the earth, the Soviet Union at the 1981 Session of the Legal Sub-Committee suggested[13] that the two questions be divided into two agenda items, or into two sub-items under one agenda item for consideration, with the item on the definition and/or delimitation of outer space receiving priority consideration in a working group set up in the Sub-Committee. The United States, United Kingdom, and some other states gave good response to the former suggestion but dissented from the view of setting up a working group to give priority consideration to the problem of definition and/or delimitation of outer space. The equatorial countries also proposed that a working group be established to give priority consideration to this agenda item as existed, but were opposed to the suggestion to divide the existing agenda item into two

[7]U.N. Doc. A/AC. 105/C. 2/SR. 355, p. 6.

[8]U.N. Doc. A/AC. 105/C. 2/SR. 356, p. 4; SR. 355, pp. 5 and 10.

[9]U.N. Doc. A/AC. 105/PV 219, p. 68.

[10]U.N. Doc. A/AC. 105/C. 2/SR. 356, p. 3.

[11]U.N. Doc. A/AC. 105/PV. 221, p. 5.

[12]U.N. Doc. A/AC. 105/C. 2/SR. 355, p. 5.

[13]U.N. Doc. A/AC. 105/C. 2/SR. 354, pp. 2-3.

agenda items or two sub-items, stressing that without a solution to the question of the geostationary orbit, there could be no definition and/or delimitation of outer space.

V.

A consideration of the documents of the sessions of the COPUOS and the Legal Sub-Committee makes it possible to identify three groups of views put forward by member states of the Committee:

1. Those favoring the "spatial approach" insist that the concept of outer space has to be defined and that airspace and outer space have to be distinguished by establishing a spatial demarcation boundary line.

2. Those preferring the "functional approach" insist that the legal regimes in space can only be associated with the character of activities under regulation; if it is a spacecraft carrying on space activities, then outer space law should be applied; on the other hand, an aircraft carrying on air activities should be subject to air law. The entire space is an inalienable whole, and it is undesirable to delimit outer space and airspace.

3. Time is still not ripe to define outer space and determining its boundary and the question needs further study along with the development of space technology.

Developments in recent years show that a growing number of spatialists have tended to accept the lowest height of the artificial satellite orbit flight as the lower boundary of outer space. At the 1975 Session of COPUOS, Italy proposed[14] the altitude of 90 kilometers above sea level as the upper limit of airspace. In 1976, Argentina, Belgium and Italy[15] lent support to a demarcation line of 100 kilometers. After the equatorial states claimed sovereign rights over the segments of the geostationary orbit above their respective territories, this trend has become even stronger. At the 1979 Session of the Legal Sub-Committee, the Soviet Union submitted a working paper,[16] proposing that the region above 100-110 kilometers altitude from sea level of the earth is outer space, and that this definition should be established in a treaty form, while the space objects of states should retain the right to pass through the airspace of other states when their purpose is to reach orbit or return to earth in the territory of the launching state. However, the above view has met with objections from some other states, mainly the United States, United Kingdom, and Japan. They regard the proposal of 100-110 kilometers as a demarcation line as arbitrary and request not to push for a definition that might later be found inappropriate.

In view of the controversy over the definition and delimitation of outer space, there seems to be little possibility in the near future to reach consensus on the proper solution to this issue. Nevertheless, it is generally recognized that outer space and airspace are two different concepts, and distinction should be drawn between them in theory. To stress that the entire space constitutes an inalianable whole without making distinction between airspace and outer space would lead to the denial of the principle of state sovereignty over airspace. On the other hand, it would seem still premature to establish

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[14] 29 Yb. of the United Nations 1975, p. 87.

[15] 30 *id.* 1976, p. 65.

[16] U.N. Doc. A/AC.105/C.2/L.121.

a clear demarcation line between them. In a statement made at the 1981 Session of the Legal Sub-Committee, the Chinese delegate made the following remarks on this problem:

> "The Chinese Delegation favored the formulation of a definition of outer space which would be acceptable to all, so that the legal status of outer space could then be distinguished from that of airspace. A definition would help greatly towards the safeguarding the territorial air sovereignty of states and promoting the further development of outer space law. However, the choice of a suitable altitude for the boundary not only raised complex scientific and technological questions, but was also a highly political and legal issue involving the sovereignty and security of states. Due regard had to be paid to the latter two factors, particularly as far as the developing countries were concerned, also to the present state of outer space technology and activities, the physical features of the space above the earth and the reasonable needs of outer space exploration. Serious studies and patient consultations were needed. Any hurried decision would be unhelpful."[17]

VI.

To sum up, the problem of definition and delimitation of outer space is a complicated one involving scientific, technological, security, political and legal questions. In the development of the past thirty years, the legal regime of outer space has taken shape. The principles that the exploration and use of outer space shall be carried out for the benefit and in the interests of all countries and that outer space shall be free for explorations and use by all states and not subject to national appropriation are laid down in the Outer Space Treaty. Although agreement has not yet been reached on the definition and delimitation of outer space, more and more countries are inclined to the view that this important issue must be duly solved in order to define the scope of the legal regime of outer space. In seeking a solution to the question of definition and delimitation of outer space, the use of the geostationary orbit of the earth should also be considered, so that proper arrangement could be made on the basis of equity and justice to guarantee the legitimate rights of all states and in particular the developing countries and equatorial countries.

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[17]U.N. Doc. A/AC. 105/C. 2/SR. 355, p. 3.

ASTRONAUTS AND SEAMEN—A LEGAL COMPARISON

*Hamilton DeSaussure**

In many respects, the astronauts of today are the modern equivalent of the ancient mariners. Like the mariners of old, they live in a cooped-up environment for significant periods of time, isolated from land-based communities, totally dependent upon the cooperation and assistance of fellow crewmen, and constantly under the shadow of tragedy from an essentially hostile environment. On the other hand, the airman, although his occupation is a hazardous one, does not actually live on-board his aircraft but spends the larger part of each day within the framework of normal community living. How the law will develop as to the legal characterization of astronauts depends largely upon whether the courts, legislatures, and, international conferences cast them in the role of a special breed of employees, as seamen have been treated, or merely as ordinary employees working in a new environment, as airmen generally have been treated.

This article briefly reviews how seamen are treated in maritime law, why they are so treated, and to what degree the same justification for their special treatment might extend to the astronaut. First, it is necessary to consider who is an astronaut, who is a seaman, and, for that matter, who is an airman, even though he has no special status.

At present, there is no precise legal meaning for the word "astronaut." It is not defined in the Outer Space Treaty (1967),[1] the Astronaut Agreement (1968),[2] the Liability Convention (1973),[3] or the Registration Convention (1976).[4]

Unfortunately, the four principal space treaties do not make a clear distinction between an astronaut and other persons on board. It can be inferred that, as a minimum, an astronaut must be one who has a mission to perform in space. The Outer Space Treaty refers alternatively to astronauts, personnel of a space object, and state representatives on the moon.[5] The title and preamble to the Astronaut Agreement uses the term "astronauts," but the operative portions of the agreement refer only to

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[1]Treaty on Principles Governing Activities of States in The Exploration and Use of Outer Space, Including the Moon and Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S.No. 6347, Article V [hereinafter cited as Outer Space Treaty].

[2]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. No. 6599 [hereinafter cited as Astronaut Agreement].

[3]International Liability for Damage Caused by Space Objects, March 29, 1972, 24 U.S.T. 2389, T.I.A.S. No. 7762 [hereinafter cited as Liability Convention].

[4]Registration of Objects Launched into Outer Space, January 14,1975, 28 U.S.T. 695, T.I.A.S. No. 8480 [hereinafter cited as Registration Convention].

[5]Outer Space Treaty, *supra* note 1.

spacecraft personnel.[6] The Liability Convention never once refers to astronauts, only to persons on board and to foreign nationals participating in the operation of the spacecraft. The recent Moon Treaty, not yet in force in any state, generally uses the terms "personnel of a spacecraft," "persons," or "astronauts" when referring to human activity in relation to the moon.[7] For the purpose of safeguarding life and health, however, all persons on the moon are regarded as astronauts within the meaning of Article V of the Outer Space Treaty and as personnel of a spacecraft within the meaning of the Astronaut Agreement.

Legal writers are not in agreement as to how broadly the term "astronaut" should be construed. "Astronaut" is not defined in the latest edition of *Black's Law Dicctionary,* and there is no case law as to its meaning.[8] Manfred Lachs, member of the International Court of Justice, has written that all persons on board the space vehicle should share a common legal status as astronauts regardless of the functions that they may perform. He added, however, that when the day arrives when passengers are carried, greater clarification will be necessary.[9] Dr. V.S. Vereshchetin, Vice President of Intercosmos, Moscow, agrees that international space law should provide an equal status to all persons on board, whether servicemen or civilians, regardless of their specific function.When regular space journeys occur, Dr. Vereshchetin believes that there might be a need to create a special legal status for passengers.[10] Dr. Stephen Gorove, Director of Graduate Studies, University of Mississippi, takes a similar view. He believes that the term "astronaut" includes all personnel of a spacecraft, *i.e.* all persons assigned to and accompanying the spacecraft, such as scientists and physicians.[11]

The NASA Act of 1958 as amended does not define the term "astronaut."[12] Also, the term is not given specific meaning in either the implementing regulations of NASA or in Space Transportation System User Handbook published by NASA.[13] NASA regulations, however, do define who is a mission specialist and who is a payload specialist. A *mission specialist* is a career NASA astronaut who is skilled in the operations of STS systems related to payload operations and who is thoroughly familiar with the operational requirements and objectives of the payload with which the mission

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[6]Astronaut Agreement, *supra* note 2.

[7]Senate Committee on Commerce, Science and Transportation, Agreement Governing the Activities of the States on the Moon and Other Celestial Bodies, Comm. Print, 96th Cong. 2d. Sess. (1980) [hereinafter cited as Moon Treaty].

[8]*Black's Law Dictionary* (5th. ed. 1979).

[9]M. Lachs, *The Law of Outer Space* 71 (1972).

[10]Vereshchetin, *Legal Status of International Space Crews,* 3 *Annals of Air and Space L.* 559 (1978).

[11]S. Gorove, *Studies in Space Law: Its Challenges and Prospects 98 (1977).*

[12]National Aeronautic and Space Act of 1958, 42 U.S.C. § 2451-77 (1976).

[13]N.A.S.A., Space Transportation System User Handbook (1977) [hereinafter cited as STS Handbook].

specialist will fly.[14] A *payload specialist* is an individual selected to operate assigned payload elements on a specific STS flight or mission.[15] A payload specialist may or may not be an astronaut. The STS Handbook lists the commander, the pilot, the mission specialist, and the payload specialist as part of the flight crew complement of the Space Shuttle Orbiter.[16] Commanders, pilots, and mission specialists, but not payload specialists, must be flight qualified.

From its regulation, it is clear that NASA does not consider payload specialists as a class to be astronauts, although mission specialists who are astronauts may be used in this category. Payload specialists can be non-flight qualified private employees of companies entering contractual arrangements with NASA. This makes the astronaut class a very restricted one indeed. It is not likely that either the courts, legislatures, or diplomats themselves will be so restrictive in defining who is an astronaut or in considering what are an astronaut's rights and duties. Astronauts will not always be individuals employed by NASA, the Defense Department, or some other United States Government agency; moreover, astronauts will not always be flight qualified. It is likely that the courts and Congress will seek out parallels to seamen and to airmen in working out a definition of who is an astronaut.

The right to seaman status is broadly determined. Although the determination of who qualifies as a seaman will ultimately depend on the particular convention, statute, or regulation that is being considered, the trend has been toward enlarging rather than restricting the scope of the term. The Shipowner's Liability Convention applies to all persons employed on board any vessel, other than a ship of war, registered in a territory for which the Convention is in force and ordinarily engaged in maritime navigation.[17] The general definition of a seaman contained in the United States Code is a person who is employed or engaged to serve in any capacity on board a vessel.[18] Some judicial decisions have also stressed the employment relationship of the persons serving on board, extending the seaman classification even to on-board fish packers:

> As presently employed, a seaman is not a mariner in the full sense of the word, a person who can "hand, reef and steer." Changing conditions and necessities for changes extended the term to include all persons employed in a vessel to assist in the main purpose of the voyage. Clearly the main purpose of the voyage was to pack and salt fish.[19]

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[14]*Id.* at 4-23; 14 CFR § 1214.301(e).

[15]STS Handbook at 4-23, 24; 14 CFR § 1214,301(a).

[16]STS Handbook at 4-23.

[17]Shipowner's Liability (Sick and Injured) Convention, October 24, 1936, 54 Stat. 1693, T.S. 951 Art. I [hereinafter cited as Shipowner's Liability Convention].

[18]46 U.S.C. § 713 (1976).

[19]The Z-R-3, 18 F. 2d 122, 123 (W.D. Wash. 1927).

In granting seaman status, other courts have required only that a person has been employed to serve in some capacity on board a vessel and has so served,[20] and that his duties have been maritime in character and have been rendered on a vessel in commerce in navigable waters. Cooks, clerks, bartenders, musicians, hairdressers—all those employees with shipboard duties have been held to be seamen under the Jones Act.[21] Considering the normal seaman to be one who performs services on board ship in commerce in navigable waters, the comparison to astronaut status becomes more comprehensible. Under this comparison, an astronaut would be a person who is employed on a spacecraft in navigation underway and who is serving some purpose in aid of the voyage. A scientist, geologist, or astronomer who was placed on board to discharge one of the basic purposes for orbiting the spacecraft would be considered an astronaut. On the contrary, a journalist, commentator, perhaps even a congressman, or any ordinary passenger would be a person on board but not an astronaut.

Most astronauts are pilots and all are flight qualified. The space shuttle commander and pilot need to be aircraft operators because of the shuttle characteristics.[22] On its return from orbit, it flies back through the airspace and lands in a manner similar to a large commercial jet aircraft. Many persons besides pilots, however, are considered to be airmen under FAA rules. The FAA rules provide that an airman is:

> any individual who engages as the person in command or as pilot, mechanic or member of the crew in the navigation of an aircraft while underway; and any individual who is directly in charge of the inspection, maintenance, overhauling or repair of aircraft, and any aircraft dispatcher or air traffic control tower operator.[23]

If the definition stopped after the words "while underway," it could be adopted as a definition for current astronauts by changing the word aircraft to spacecraft. By adding ground personnel—inspectors, repairmen, air traffic controllers, the definition becomes too broad. Spacecraft maintenance crews and mission controllers are normally not astronauts.

FAA rules define a flight crew member as a pilot, flight engineer, or flight navigator assigned to duty in an aircraft in flight.[24] It is flight crews, therefore, no airmen in general, who resemble astronauts in the nature of their duties. Flight crews, and all airmen, enjoy no special status in the eyes of the law. Their relation to their employer is governed by either the workers' compensation laws or the normal common law principles of master and servant. Off duty, the airman, like any land-based worker, is not the responsibility of his supervisor; the employer is liable to the airman only for injuries or sickness sustained on duty, and only when these result from the employer's own negligence or his agent's negligence. In any suit by the airman-employee, the

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[20]Antus v. Interocean S. S. Co., 108 F. 2d 185, 187 (6th Cir. 1939).

[21]G. Robinson, *Handbook of Admiralty Law in the United States* 280 (1939).

[22]14 C.F.R. § 1214.703 (1981) defines "commander" and "pilot." The pilot is second in command.

[23]49 U.S.C. § 1301(7) (1976).

[24]14 C.F.R. § 1.1(1981).

employer has the normal common law defenses of contributory negligence, assumption of the risk, or the fellow-servant rule. In most instances, however, the workers' compensation laws, enacted by every state, have provided an administrative substitute for normal tort liability. Although the employer's liability under the workers' compensation laws is absolute for on-duty injuries, the compensation under such laws is far more modest than what a victim might receive under normal tort law. Also, there is no liability under the workers' compensation laws for off-the-job accidents or for illness.

The seaman has a far more intimate relation with his ship than does the airman to his aircraft; his ship is his home for the duration of the trip. The fine distinctions between on and off duty and the determination of what is in the course of employment have little relevance in maritime law. Maritime law has recognized the necessity to depart from the normal rules governing master and servant relations and to provide the seaman with a unique status with regard to his health and welfare. The astronauts, as crewman, will resemble the aircraft crewmembers only during the brief transition phase from outer space to earth landing. While in orbit or in navigation to another planet, the astronaut's life will revolve around his spacecraft just as a seaman's does around his ship.

The status of astronauts as envoys of mankind was first officially declared in UN Resolution 1962, approved by the General Assembly on December 13, 1963. The last paragraph of that resolution provides:

> States shall regard astronauts as envoys of mankind in outer space, and shall render to them all possible assistance in the event of accident, distress, or emergency landing on the territory of a foreign state or on the high seas. Astronauts who make such a landing shall be safely and promptly returned to the State of registry of the space vehicle.[25]

This same language with certain minor drafting changes became the first paragraph of Article V of the Outer Space Treaty of 1967. Other than the right of all possible assistance in the event of accident, distress, or emergency landing, what legal benefits flow from being designated envoys of mankind have yet to unfold. The probability remains that not all space voyagers, but only astronauts in particular, were meant to receive preferential treatment. Although the precise status of astronauts will be determined by the courts and the legislatures, this study reflects how seamen, as the nearest counterparts to astronauts, have been the recipients of special protection.

As wards of the admiralty, seamen have always been regarded with parental concern. Two quite distinct reasons are given by the courts to justify this preferential treatment. One reason stems from the concept that seamen are uneducated, irresponsible, and naive. The second reason is based on the precarious nature of their work and on the need to promote their welfare to achieve national security and economic health.

Nearly one hundred and sixty years ago, Justice Story, one of the most respected admiralty judges of all time, referred to seamen as "generally poor and friendless, with

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[25]. "Declaration of Legal Principles Governing Activities of States in the Exploration and use of Outer Space," submitted by Committee on Peaceful Uses of Outer Space Resolution 1962 (XVIII) adopted by the General Assembly on December 13, 1963 (1280th meeting), as recommended by First Committee A/5656, draft resolution I.

habits of gross indulgence, carelessness, and improvidence, who, as a class, were remarkable for their rashness, thoughtlessness and improvidence." He further wrote: "Seamen combine, in a singular manner the apparent anomalies of gallantry, extravagance, profusion in expenditure, indifference to the future, credulity, which is easily won, and confidence which is readily surprised."[26] Obviously, this type of characterization is not descriptive of the modern astronaut. It has been noted, however, that neither do modern seamen, at least United States seamen, fit this ancient description of the modern astronaut. The average United States seamen is now well-educated, well-paid, and well- represented by a powerful union. Yet his status as a ward of the admiralty is unchanged.[27]

The second line of reasoning underpinning the wardship theory for the seaman relates more significantly to the astronaut and to the development of a special status for the astronaut:

> There is the great public policy of preserving this important class of citizens for the commercial service and maritime defense of the nation. Every act of legislation which secures their healths, increase their comforts, and administers to their infirmities; binds them more strongly to their country; and the parental law, which relieves them in sickness by fastening their interest to the ship is as wise a policy as it is just an obligation.[28]

Special protection, wrote Justice Story, encouraged persons to take up the call of the sea and to engage in perilous voyages with more energy and at lower wages.

There are, as of August 31, 1981, seventy-nine qualified astronauts on duty with NASA.[29] The need to encourage astronaut applications by promising special benefits is not likely to arise until a space journey becomes as ordinary and as commonplace as a sea voyage. Certainly by the middle of the next century, in the lifetime of those already born, space journeys should be as common as air flights and sea voyages are today. As the population of spacefarers grows, so will the number of spaceflight crews or astronauts who will be needed to routinely transport personnel and cargo. Astronauts as a class will perform the same duties relating to the carriage of goods and personnel to, from, and in space that seamen now perform on the navigable waters of the world.

Since seamen are confined to their ships over long voyages, their health and welfare are closely linked to the operation and management of the ship. When seamen become sick, their duties must be performed by others. Sick seamen must be cared for as part of the ship's complement until port is reached, unless, of course, medical evacuation by air or by sea is possible. A strong body of maritime law has developed to protect the seaman who becomes disabled; it has no counterpart in the shore-based common law and falls under the heading "maintenance and cure." The Supreme Court has described

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[26]Brown v. Lull, 4 F. Cas. 407, 409 (C.C.D. Mass. 1836) (No. 2,018).

[27]H. Baer, *Admiralty Law of the Supreme Court* 105-06 (3d ed., 1979).

[28]Harden v. Gordon, 11 F. Cas. 480, 483 (C.C.D. Me. 1823) (No. 6,047).

[29]115-1 *Av. Week & Space Tech.* 11 (1981).

maintenance and cure as one of the most pervasive incidents or responsibility anciently imposed on shipowners for the well-being of their crews. It was first recognized in a Supreme Court decision in 1902. Justice Brown wrote: The law was settled that the vessel and her owners are liable in case a seaman falls sick or is wounded in the service of the ship to the extent of his maintenance and cure and to his wages, at least so long as the voyage is continued.[30]

Maintenance and cure has sometimes been compared to shore-based workers' compensation laws because it places a liability on the ship owner for the welfare of the seaman without regard to any fault on the ship owner's part and is based solely on the seaman's employment relationship. While workers' compensation is the exclusive land remedy against an employer, maintenance and cure is not the exclusive maritime remedy against an employer. The seaman may also sue his employer for negligence under the Jones Act or for breach of duty for failing to provide a seaworthy vessel. Additionally, the right to maintenance and cure is a charge on the vessel as well as on the employer himself. The seaman can assert a maritime lien of the highest priority against the vessel by a suit in rem while still suing the shipowner in personam.

Maintenance and cure is a product of the maritime law of all nations. The Shipowners' Liability Convention provides that the shipowner shall be liable for the sickness, injury, and death resulting therefrom of all persons employed on board any vessel, but not a warship, ordinarily engaged in maritime navigation.[31] By national law, however states may exempt the shipowner from liability for injury incurred that is not *in the service of the ship* or that is due to the willful misbehavior or intentional concealment of illness by the seaman. The Convention also provides that the shipowner is liable for the expenses of medical care and support until the sick or injured seaman reaches maximum cure.[32] The Supreme Court has held that the seaman who is injured while on shore leave or while returning to or leaving the ship is in the ship's service and is entitled to maintenance and cure. Justice Rutledge has said, "It is the ship's business which subjects the seaman to the risk attending hours of relaxation in strange surroundings."[33] The seaman's right to maintenance and cure is absolute, unless it can be shown that he intentionally concealed a disability or illness at the time he signed on. In a case where a seaman was discovered to have active tuberculosis, the Supreme Court discussed the duration of the obligation of the shipowner: Maintenance and cure is designed to provide a seaman with food and lodging when he becomes sick or injured in the ship's service; and it extends beyond the period when he is incapacitated to do a seaman's work and continues until he reaches maximum recovery.[34]

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[30]The Osceola, 189 U.S. 158, 175 (1903).

[31]Shipowner's Liability Convention, *supra* note 17.

[32]*Id.*, Art. 4(1).

[33]Aguilar v. Standard Oil Co., 318 U.S. 724, 734 (1943).

[34]Vaugh v. Atkinson, 369 U.S. 527, 531 (1962).

Seamen employed by the United States Government are not given the broad remedies that are given seamen employed by private shipowners. The government seaman is restricted to those rights held by a shore-based government employee. In reviewing the statutory history regarding United States Government seamen, Chief Justice Warren wrote: Congress thought of these employees more as Government employees who happened to be seamen than seamen who by chance worked for the Government.[35] There was a strong dissent to this position by Justice Harlan who stated that, normally, government seamen, in general, would be better off under general maritime law than they would be under the rules and regulations for ordinary government employees.[36]

This raises the question whether there is any reason to consider as possible precedent the maritime rule of maintenance and cure as long as astronauts remain government employees. Certainly when seamen employed by the United States have no maritime remedies, NASA astronauts will fare no better. The space frontier will not long be the exclusive domain of astronauts in the military and civil service however. As industrialization takes place and private enterprise brings its personnel and material into this new environment, the number of astronauts who are not government employees will measurably outdistance those who are, particularly if a broad scope is attached to the meaning of "astronaut." The doctrine of maintenance and cure should apply equally in space, where isolation and perils will be as prevalent as at sea.

The concept of providing for the welfare and health of those crews who regularly sojourn in space and who live on-board spacecraft or space stations for considerable periods of time justifies the need for a protective law on health and welfare. A simple rule based upon the maritime analogy of placing the absolute duty of care and support on the spacecraft owner and operator has many advantages. Such a rule could place at the federal level all United States law on the subject and would abolish any common law defenses of spacecraft owners and operators, such as assumption of risk, contributory negligence, and the fellow-servant rule. A ruled based upon maritime principles would also aid in providing a unified federal rule in place of the piecemeal legislation by the various states and would also promote uniformity among sovereign spacefaring nations. Additionally, it would place the risks on the party most able to bear them, the owner and operator, and would allow insurance premiums to be calculated on the basis of each space flight, rather than on the astronaut himself or his employer. Space travel will be hazardous, voyages long and hardships endured, for the most part, as yet unimaginable. Justice Story's remarks concerning seamen, in 1823, when referring to "the real public policy of preserving this important class of citizens for the commercial service in maritime defense of the nation", seem just as relevant to space crews.

Whether or not it was intended to give astronauts special protection by addressing them as envoys of mankind or to equate them to seamen who deserve special considerations, there is merit in providing astronauts with the right to a spaceborne maintenance and cure remedy.

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[35]Amell v. United States, 384 U.S. 158, 163 (1966).

[36]Id. at 172-74 (Harlan, J., dissenting).

The seaman is the beneficiary of another remedy that is peculiar to maritime law: the right to sue the shipowner if the seaman is injured because his ship is unseaworthy. The obligation of the shipowner to furnish a seaworthy vessel for the crew extends not only to the fitness of the ship itself, but to the appliances and equipment on board and to the competence of the crewmembers.[37] The shipowner's duty is an absolute one; the seaman does not have to prove any negligence on the shipowner's part in order to recover.[38] This contrasts with the duty to provide an airworthy aircraft. No special body of tort law has developed concerning airworthiness. The final responsibility for airworthiness lies jointly with the FAA, which issues the Airworthiness certificate, and the owners and operators, who must comply with the FAA rules.[39] The aircraft owner's obligations, however, do not reach as far as the shipowner's. The aircraft owner's liability for injuries resulting from the operation of an unsafe aircraft is predicated on negligence, not on strict liability.[40] As long as the owner has taken all reasonable measures, including pre-flight checks, to insure that his aircraft is airworthy, and has secured the appropriate certification, neither the pilot nor the owner bear responsibility for accidents that might occur because of defects in the aircraft.

In addition, the shipowner's duty to the crew to furnish a vessel seaworthy in all respects is nondelegable.[41] He cannot, by chartering the ship to another or by giving a portion of the trip over to the control of stevedores, escape the ultimate responsibility for maintaining a safe vessel.[42] The fact that another seaman may have noticed the unsafe condition on board the vessel but failed to correct it, or even that another seaman may have created the unsafe condition, will not operate to relieve the shipowner of this responsibility.[43] Even a temporary unseaworthy condition, one that developed after the vessel left port, can make the shipowner liable for any damage that ensues. Nor can the seaman be held to have assumed the risk when he uses some patently defective equipment or attempts to do some obviously risky task. It has been held that his duty to obey orders overrides the consent ordinarily implied from the knowledge of the danger.[44]

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[37]*G. Gilmore & C. Black, The Law of Admiralty* 65 (2d. ed. 1976) [hereinafter cited as *Gilmore & Black*].

[38]2 M. Norris, *The Law of the Seaman* § 622, 625 (1970) [hereinafter cited as *Norris*]; see also, Carlisle Packing Co. v. Sandanger, 259 U.S. 255, 259 (1922) (boat held unseaworthy where not provided with life preservers).

[39]As to the pilot's responsibility, see 14 C.F.R. § 91.29 (1981).

[40]See Wilson v. Colonial Air Transport 180 N.E. 212, 214 Mass. (1932) (for common carriers); *see also* 1 *L. Kreindler, Aviation Accident Law* § 4.01 (rev. ed. 1981) (for discourse on private carriers).

[41]*Norris, supra* note 38, at § 622.

[42]*Id.*

[43]*Id.*

[44]Mahnich v. Southern S. S. Co., 321 U.S. 96, 103 (1944).

The liability of the shipowner can be mitigated, but not defeated, by showing that the seaman-claimant was negligent in the manner in which he performed his duties or handled ship equipment. In most jurisdictions, an aircrewman's own negligence that contributed to or caused his injuries would rule out any tort recovery from his employer or the pilot.

Why the duty for seaworthiness is imposed on the shipowner rather than on the shipmaster is explained by Judge Augustus N. Hand: "A ship is an instrumentality full of internal hazards, aggravated, if not created, by the uses to which she is put. It seems to us that everything is to be said for holding her absolutely liable to her crew for injuries arising from defects in her hull and equipment."[45]

The shipmaster is not comparable to the aircraft pilot, who has the personal duty to insure the safe condition of his aircraft before he takes it off the ground. Even though the modern aircraft has become a complex machine, the pilot still must inspect it, run through a pre-flight checklist, and conduct a warm-up before he is cleared to take off. The shipmaster, however, must rely on the expertise of many different categories of experts, including engineers, firemen, electricians, marine architects, surveyors, and inspectors to certify that the vessel is ready for launch or departure. The vessel inspection laws of the United States have been described by Chief Justice Hughes as a maze of legislation; without professional expertise on the various laws regarding this subject, it would be extremely difficult for any person, regardless of competence, to be the sole responsible officer for issuing final clearance.[46]

The complexity of the space shuttle is indicative of how future space transport craft will be constructed, equipped, and operated. The shuttle, in diversity and sophistication, seems more comparable to large ocean-going vessels than to the less complex transport aircraft. The dependence of the shuttle on computers and pre-flight programing as well as the state of its propulsion and life support systems requires a variety of expertise no single commander could possibly possess.

Therefore, it seems that the responsibilities of the spacecraft commander resemble more closely those of the ship captain than those of the aircraft commander. It will be the spacecraft owner or charterer rather than the commander who plans the mission, establishes its duration and routes, decides on the go or no-go launch mission, determines the fitness of the craft for its intended mission, and determines the overall safety of the flight. The commander will be responsible primarily for the operation, navigation, and management of his spacecraft during the voyage. The internal hazards to which Judge Hand referred will be ever present on space voyages, and it is the spacecraft owner, like the shipowner, who should have the undeviating duty to maintain his craft fit, tight, and staunch in all respects. Spaceworthiness, like seaworthiness, should be an absolute, nondelegable duty upon the owner, a duty not to be defeated by the common law defenses of assumption of risk, contributory negligence, or the fellow-servant rule. Maritime law rather than aviation law charts the better course for developing rules as to owner and operator liability and responsibility in space operations.

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[45]The A. H. A. Scandrett, 87 F. 2d 708, 711 (2d cir. 1937).

[46]F. Pat Kelly v. Washington, 302 U.S. 1, 4 (1937).

The rights to maintenance and cure and to an indemnity for an unseaworthy vessel are not the only remedies available to a seaman against his employer. In 1920, Congress passed an amendment to the Seamans Act of 1915 to provide the seaman with a common law remedy based on the negligence of his employer.[47] This amendment known as the Jones Act, gave the seaman the same rights against his employer as the railway employee had against his employer. The amendment also provided the seaman with a right to jury trial at his election. The railroad employee is covered by the Federal Employers' Liability Act, so the provisions of that Act were made applicable to the seaman.[48] It is beyond the purview of this study to go into the Jones Act or the Federal Employers' Liability Act in detail; however, the effect of the Jones Act was to give the seaman or his representative a third ground on which to base a remedy against the negligent shipowner if the seaman was injured or killed.

Setting aside the issue of governmental immunity, the injured astronaut could benefit from an extension of the Jones Act to cover astronauts as well as seamen. Alternatively, separate legislation to give space crews essentially the same rights against their employer as are given by the Federal Employers' Liability Act to railroad employees would accomplish the same purpose. The astronaut, as mankind's envoy, could then have the same favorable status granted to the seaman: the right to comprehensive health and medical benefits (maintenance and cure), the right to a vehicle that is spaceworthy (seaworthiness), and the right to hold his own employer-spacecraft owner liable for negligence (Jones Act).

The STS Handbook provides that the spacecraft commander is responsible for the safety of personnel on board and has the authority to deviate from the flight plan to preserve crew safety.[49] When a person on board, and more particularly, for the purposes of this section, a crewmember, becomes sick or injured, it will be the commander's duty to determine what arrangements to make for his well-being. The question of adequate medical care may present two distinct issues. The first concerns the amount of medical provisions that should be kept on board a space transport. The second concerns the threshold at which a commander, in the interest of his disabled crewman, should abort the mission and return the disabled spaceman to earth or request an intra-vehicular space rescue.

With the advent of space travel over a period of weeks or more, rules for the protection of merchant seamen are important precedents for the determination of rules for the protection of spacemen. Maritime law has never required the presence of a licensed physician on board every oceangoing vessel, but, as a matter of practice, most pleasure liners do carry a doctor as part of the ship's complement.[50] Aircraft flight attendants are trained in emergency medical procedures.[51]

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[47] 46 U.S.C. § 688 (1976).

[48] 45 U.S.C. §§ 51, 53, 54, 56, 59 (1976).

[49] STS Handbook, *supra* note 13, at 4-23.

[50] *Norris, supra* note 38, at § 539.

[51] 14 C.F.R. § 121.417 (1981).

Merchant vessels undertaking prolonged voyages are required by statute to carry medicine chests, and failure to have one on board subjects the shipmaster or owner to a $500 fine.[52] Although no similar law exists as to spacecrafts, a spacecraft owner would be negligent for failing to make corresponding medical supplies available.

When a mission in space should be aborted for the health and safety of a crewmember, it poses a dilemma where an extended voyage is under way. Early mission termination could involve the loss of millions of dollars in time and equipment. In the early phases of spaceflight, the final decision to abort might rest either with the launch authority at Kennedy or with Mission Control at Johnson. Once the manned spacecraft voyage extends beyond low earth orbit, the shuttle commander's recommendation as to the dangers involved and to the costs of an early return will be decisive. Here, maritime decisions on unscheduled port call have precedential value.

As a general rule, a shipmaster has a duty to put into the nearest port when he has a seriously injured or sick seaman on board. Justice Brown wrote that while the duty to provide proper medical treatment for seamen falling ill in the service of the ship is imposed on the shipowners by all maritime nations, each case depends on its own facts:

> [A]ll that can be demanded of the master is the exercise of reasonable judgement. . . . He is not absolutely bound to put into such port if the cargo be such as would be seriously injured by the delay. Even the claims of humanity must be weighed in balance with the loss that would probably occur to the owners of the ship and cargo. A seafaring life is a dangerous one, accidents of this kind are peculiarly liable to occur.[53]

Like the shipmaster, the astronaut in command could be confronted with the choice of continuing the mission at some risk of the loss of expensive investigations or explorations underway. When a space rescue service is inaugerated, intervehicular transfers will somewhat alleviate the problem of what to do with seriously sick personnel on board, but this will not totally solve the problem where the voyage is to a distant planet or otherwise beyond the range of rescue vehicles. In the final analysis, the saving of life, and not the preservation of equipment and cargo, should be the paramount concern; the difficult determination will arise when the premature de-orbit to save one life places the rest of the personnel on board in some jeopardy.

In 1980, NASA, for the first time, promulgated a regulation dealing with astronaut commander of the space transportation system.[54] NASA cited in support of this regulation the NASA Act relation to the security and plenary powers of the Administrators, sections of the criminal code relative to punitive sanctions for violating NASA regulations, and Article VIII of the Outer Space Treaty. The NASA regulation provides that all personnel on board an STS flight are subject to the authority of the commander and to this order.[55] The STS commander's authority is absolute, and he

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[52] 46 U.S.C. § 667 (1976).

[53] The Iroquois, 194 U.S. 240, 243 (1904).

[54] 14 C.F.R. § 1214.700 (1981).

[55] *Id.* § 1214.702-.704.

may take whatever action he deems necessary to enforce order and discipline, to provide for the safety and well-being of all personnel on board, and to protect the spacecraft and its payload. The STS commander may use any reasonable and necessary means, including the use of force, to fulfill his responsibilities. His authority is not limited to United States employees or to United States nationals. When necessary for the safety of the STS and other personnel, the STS commander may subject any person on board to restraint.[56] In case the STS commander becomes incapacitated, the second in command, the pilot will assume the duties of the commander.

The Federal Aviation Regulations (FARS) do not go into the same detail with respect to the disciplinary authority of the aircraft commander. The regulations simply provide that the pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft.[57] In an emergency the pilot in command may deviate from the rules governing flight operations to the extent required. The regulations also provide that no person may assault, threaten, intimidate, or interfere with a crewmember in the performance of his duties aboard an aircraft being operated.[58] There is no specific provision concerning the disciplinary powers of the pilot in command, but they can be implied from other provisions. For example, one provison states that no pilot in command may allow any object to be dropped from his aircraft in flight if that creates a hazard to persons or property.[59]

The powers of the aircraft commander are specially delineated in Chapter III of the Tokyo Convention, to which the United States is a party.[60] The commander may impose reasonable measures, including restraint, when necessary to protect the aircraft, personnel, and property, to maintain discipline, or to maintain custody until appropriate authorities on the ground can take custody.[61] The basic objective of the Tokyo Convention is to prevent crimes on board and to forestall any threats to flight safety. Although an agreement between the contracting parties, the Tokyo Convention requires specific implementation by each country's own law. There has been no statutory implementation in the United States, however, of the specific powers of the aircraft commander. The Federal Aviation Act does make aircraft piracy punishable by twenty years imprisonment, or more if death results from the act or attempt.[62] The Act also makes it a crime to interfere with flight crew members. Since neither the statutes nor the FARS are specific on the aircraft commander's responsibilities, they must be inferred from the powers given to him under the Tokyo Convention.

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[56]*Id.* § 1214.702(d).

[57]14 C.F.R. § 9163(a) (1980).

[58]*Id.* § 591.8(a).

[59]*Id.* § 91.13.

[60]Convention on Offenses and Certain Other Acts Committed on Board Aircraft, September 14, 1963, (1969), 20 U.S.T. 2941, T.I.A.S. 6768 [hereinafter cited as Tokyo Convention].

[61]*Id.* at art. 6.

[62]49 U.S.C. § 1472(n) (1) (1976 & Supp. III 1979).

Maritime law provides the master with absolute authority on board ship. Shipping articles contain the promise that the crew will be "obedient to the lawful commands of the . . . master, or of any person who shall lawfully succeed him and of their superior officers in everything relating to the vessel . . . ."[63] In holding that under the Articles, a crew may not strike, Justice Byrnes of the Supreme Court said:

> Ever since men have gone to sea, the relationship of master to seamen has been entirely different from that of employer to employee on land. The lives of passengers and crew as well as the safety of ship and cargo are entrusted to the master's care. Everyone and everything depends on him. He must command and the crew must obey. Authorities cannot be divided.[64]

Quoting from an economic survey of the United States Merchant Marine, Justice Byrnes inserted a footnote: "[W]hen a man puts foot on the deck of a ship, he becomes part of a disciplined organism subject to the navigation laws of the United States."[65] There are numerous provisions in the laws governing merchant seamen that provide statutory sanctions for the master's authority over his crew. The master may place a willfully disobedient seaman in irons and if disobedience continues, may place him on bread and water for four days at a time.[66] Any seaman who incites another to resist lawful orders of the master or to neglect his proper duty on board may be punished by a $1,000 fine or by five years of imprisonment. Any revolt or mutniy of seamen is a serious offense punishable by a fine of $2,000 or by ten years imprisonment, or both. The refusal by seamen to obey orders while on board their vessel can amount to mutiny.[67] The authority of a master over his crew has been compared to that of a parent over his children, and the master has been referred to as standing in *loco parentis*.

In some ways the maintenance of discipline on board spacecraft can best be analogized to the maintenance of discipline on board aircraft. In other respects, it is the totalitarian authority of the sea captain that may have the most resemblance to the authority of the aircraft commander. The Tokyo Convention deals explicitly with the authority of the aircraft commander.[68] Although it spells out the commander's authority to enforce discipline on board, its major thrust is to provide security against the passengers who harbor criminal intent. By contrast, the emphasis in the maritime laws concerning the master's authority relates to his control of the crew, rather than to his control of the passengers on board. The reason is partly historical. Seamen, as wards of admiralty, were considered vagrant and irresponsible and in need of a stern hand while the maritime passengers were considered more educated and respectable. In contrast, aircraft crews have generally been regarded as, and in fact have been, highly-

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[63]46 U.S.C. § 713 (1976).

[64]Southern S. S. Co. v. NLRB, 316 U.S. 31, 38 (1942).

[65]*Id.* at 45.

[66]46 U.S.C. § 701 (1976).

[67]18 U.S.C. § 2192 (1976).

[68]*See supra* note 60 and accompanying text.

trained and motivated as well as self-disciplined. Most of the disciplinary problems on board aircraft have come from the criminal or uninhibited, sometimes intoxicated, elements among the passengers. A disruptive passenger on board an aircraft is normally far more dangerous than one on board ship.

For the immediate future, STS commanders are not likely to encounter disciplinary problems. Crew members will be highly trained and motivated, and the passengers, or the payload specialists, will be carefully selected and will be retained for their roles under NASA guidance. Disciplinary problems can be expected to occur when non-mission related passengers are carried, such as journalists, technical representatives of contractors, and foreign observers, and when the Shuttle becomes a space bus to transport construction and repair personnel to work on space stations and orbital factories.

As space missions take transport spacecraft farther from earth and require larger on-board maintenance and operational crews, the precedent of maritime law will become increasingly important. When great distances separate the spacecraft from its home port, it will not be as easy to offload the recalcitrant or disorderly crewman or specailist as it is for the aircraft to offload the offending air passenger by making an unscheduled landing. Spacecraft crews that live together over extended periods of time provide a greater potential for dissension and word disruption than do aircraft crews that have only transitory relations with their fellow crewmen on board. Just as mariner finds limited diversion opportunities at sea to provide relief from the monotony of work, spacemen, without even limited opportunity for shore leave, may find time heavy on their hands. Crew morale is an extremely important factor at sea and will be equally or more important in space. The need for the absolute, undivided disciplinary authority of the shipmaster, then, becomes a striking parallel to spell out in detail the full range of the disciplinary authority vested in the spacecraft commander by NASA regulation. There will have to be a statutory basis for command authority, authority which is not limited to NASA spacecraft commanders, but to all in charge of any object in space. The Tokyo Convention will have its application to spaceflight and so will the disciplinary laws and regulations pertaining to the Merchant Marine.

This article has attempted to survey the law of astronauts as it might develop along parallel lines to the law of seamen. Quite obviously only time will reveal how and to what degree the legal status of astronauts will be assimilated to the legal status of seamen. Yet the problems of astronauts' safety and welfare over long periods of space travel will inevitably bring forth a new body of law in this area. Because jurisprudence is achieved by comparisons and analogies, it is the view here that this will lead decision makers and legislators to draw extensively on the most beneficial treatment provided seamen when shaping new law to protect astronauts in space.

A. Past Events

(a) Reports on UNISPACE 82

1. UNISPACE 82 and Beyond

UNISPACE 82,[1] was born out of a desire to explore how the world-wide activities in outer space, including international cooperation, could be developed to ensure that the potential benefits from space science, technology and their applications would be truly realized for all countries. There was a general feeling that the potential of space was much greater than currently appreciated and utilized by most countries and that the benefits were not shared as widely as they could be. It was also felt, in a sense, that one should now move beyond widening the already existing highways to building new pathways in the wilderness.

The planning for the Conference was carried out by the 53-member United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) and its Scientific and Technical Sub-Committee; these two were designated as the Preparatory Committee and Advisory Committee, respectively, for the Conference.

The decision to hold the Conference was made after lengthy discussions lasting several years. The drawing up of the agenda of the Conference was in itself a significant part of the initial preparations—to the extent that the detailed agenda itself recognized, and set a tone for the manner in which the Conference might address various issues. While "legal" issues as such were not included, it was clearly stated that "the Conference should not be limited to discussions of science and technology, but should also consider the relevance to man and his environment." This was specifically stated to counter a move to convert the Conference to an international scientific and technical symposium, somewhat along the lines of the 1968 Conference on Space. The broad scope of the Conference was further emphasized by stating that the agenda should be broad enough to include all considerations set out and "permit discussion of scientific, technical, social, economic, organizational and other aspects as well as their interrelationship."

This is perhaps not the time to recount all the details of the extensive preparations for the Conference, lasting well over two years, but some of the elements might be of interest. The draft report of the Conference was to be based primarily on the national papers submitted by various member states, reports of various specialized agencies and the discussions within the Preparatory Committee. One important source of input for preparations was the series of twelve background papers produced with the help of about 200 scientists from around the world. These papers were edited and circulated to all member-states and everyone else concerned with the Conference. It is significant to note that among the many organizations and individuals who contributed to this vital

+ This report is based on an invited lecture delivered by the author at the Congress of the International Astronautical Federation (Paris, Sept. 27, 1982).

[1]United Nations Conference on the Exploration and Peaceful Uses of Outer Space (Vienna, Aug. 9-21, 1982).

activity, the IAF,[2] along with COSPAR,[3] played a stellar role. Recognizing that the value of these background papers goes beyond this Conference and that the interested audience might be much larger than the participants in UNISPACE 82, an edited version of these papers has been published in the form of a book entitled "The World in Space"[4].

A large number of regional and inter-regional seminars on Space Applications—and the meaning of the Conference in this regard—were organized in several places around the world. The agenda of UNISPACE 82 was addressed extensively in these seminars, some of which were also able to discuss the earlier versions of the draft report. The reports of these seminars provided useful material for revising the draft report and some additional background information to the participants of the Conference. Several other activities for public information and generation of a global interest in the issues of the Conference were carried out. These included essay and poster contests, space exhibitions at the UN Headquarters, newsletters and a number of seminars and meetings initiated by the Conference Secretariat and arranged by several interested organizations.

The first version of the draft report was prepared by the Secretary-General of the Conference and presented to the Advisory Committee at its meeting in January 1982. In preparing this draft an attempt was made by us to synthesize the views expressed in various national papers, regional seminars and discussions in the Preparatory Committee, drawing upon the information and analysis contained in the background papers and, of course, our own learning and understanding of the state of space science and technology around the world and various efforts and aspirations in this regard. Taking into account the comments of the Advisory Committee and those of various specialized agencies and organizations, a revised version of the draft report was prepared for consideration of the Preparatory Committee in March 1982. This was considered on a paragraph-by-paragraph basis and a number of amendments were made. The final version of the draft report had 430 paragraphs out of which only fifteen could not be adopted by general consensus, and were therefore put in "square brackets". This draft, as approved by the Preparatory Committee, was circulated to all member-states and others concerned in May 1982 and was the main topic of discussion at the Conference in Vienna in the month of August 1982.[5] Those who participated in the Conference would recall that the discussions were intense and the atmosphere very dynamic. It is noteworthy that the final report of the Conference was adopted by agreement of all concerned.[6] This result bodes well for the future of world-wide space activities and international cooperation in this important, many facted adventure of man.

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[2]International Astronautical Federation (IAF).

[3]Committee on Space Research (COSPAR), International Council of Scientific Unions.

[4]The World in Space (Chipman ed., 1982).

[5]Draft Report of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space, U.N. Doc. A/CONF. 101/3 (1982).

[6]Report of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space, U.N. Doc. A/CONF. 101/10 (1982).

Before dilating on the outcome of the Conference and its future significance, let me touch on one of the important, perhaps peripheral, activities which took place during the Conference—an activity which might come to have a wider relevance for the future. These were connected with a series of "space demonstrations" that we had organized with the cooperation of various countries and organizations. The purpose was to highlight ways in which space technology is actually being applied in various countries, in different social and physical settings and to attempt to bring to the conference hall in Vienna varying images of humanity in different parts of the world as it is being touched by space technology (*e.g.*, scenes from village India, Indonesia and Northern Canada). Several of the demonstrations were brought live to the conference hall using a number of satellites and earth stations, and projected onto a large screen. Included was an experiment in remote interpretation (with interpreters in New York) and the operational use of satellite channels for transmission and translation of documents. The implication is that in the space age large international conferences and other professional and political dialogues can be held at many places around the world which otherwise would have been unacceptable; further, that there could be, in principle, a substantial cost saving.

It is difficult to remain impartail in evaluting something, in the creation of which one has played some modest role. It is therefore not surprising that I tend to agree with the assessment of a friend that the document incorporating the conference report[7] is perhaps the best existing material, between two covers, dealing analytically with the current status, social implications, and the future agenda of space activities, keeping in mind the diversity of the current social and techno-economic situation on the planet. If generally accepted as it is hoped it would be, this would be a rather remarkable statement about a document produced by an international conference, where so many different points of view need to be accommodated. The analysis of issues is followed up with specific recommendations for studies and other action. The suggestions and recommendations are addressed to countries themselves, to specialized agencies, international organizations and the UN system itself. Among the numerous recommendations in the report, the following are, in my view, of special importance:

1. Feasibility studies on the need and viability of operational international satellite systems for meteorology, remote sensing and navigation.
2. A substantial programme for human resource development involving a number of fellowships for indepth exposure of developing-country personnel to space science, technology and applications.
3. Stimulation of greater cooperation amongst developing countries through exchange of information and by encouraging use of equipment developed in these countries.
4. Setting up of an international space information service.
5. Expanding and re-orienting the United Nations Programme on Space Applications.
6. Strengthening and expanding the United Nations Outer Space Affairs Division and, if the General Assembly so decides, converting it to a Centre for Outer Space.
7. Giving appropriate attention and high priority to mechanisms for responding to the grave concern of the international community about an arms race in outer space.

[7]American Institute of Aeronautics and Astronautics (AIAA).

The report stresses the need and advantages of greater international cooperation and, at the same time, emphasizes the importance of stimulating the growth of indigenous nuclei and an autonomous technological base in developing countries. While giving a rather balanced assessment of the state of space science and technology and stressing the need for pursuing space science even in the developing countries, the report rightly gives more attention to the earth-bound applications of space technology. Considerable attention is devoted to actual means and mechanisms, including the organizational elements, through which the full benefits of space could be realized and shared more widely and equitably. This is a matter of great importance if space technology is not to become, as many other technologies have in the past, a cause for further widening of these disparities.

Unlike many recent world conferences, this one did not choose to recommend the creation of a large new fund or a major new institution. Such simple symbols of having done something big and important as a result of a large world conference are often facades to hide the lack of agreement and understanding on substantive issues.

The Conference report is laced with suggestions and recommendations for various types of studies. This arises from the fact that the Conference engaged in a searching enquiry into a very complex question of finding ways to convert and bend this most modern of technologies into becoming an appropriate means for enhancing the human condition in different parts of the world. There was also a concern that the introduction of this technology should not lead to an increase in dependence; instead, it should provide ways of inter-linking people everywhere, giving voice to those who are never heard, an initiative to the latent energies of large masses of humanity far away from centres of action and influence. Suggestions for some of the major studies arise from a concern that people around the world, after being introduced to, and possibly addicted to, the applications of some of the experimental space systems in meteorology, remote sensing and navigation should have some assurance that the services provided by such systems would be available on a continuing basis. That is why it is vital to give due importance to the recommendations about feasibility studies on the need and viability of operational international systems for meteorology, remote sensing and navigation. As of now there is no guarantee of any kind that data from such systems, or from more appropriate systems to be developed in the future, would continue to be available at affordable prices to all countries. If these studies finally do result in the establishment of operational international systems in these fields, it would be an important achievement of UNISPACE 82.

The recommendation about the setting up of an international space information system, "initially consisting of a directory of sources of information and data services", is relatively easy to implement in terms of mechanics. However, the categorization of relevant data, and even an appropriate index thereof, would require imaginative handling, with due appreciation that often-times the need is for information, equipment and methodologies which, on the face of it, may not have much to do with satellites, launch vehicles, receiving stations or computarized processing equipment. One will have to learn to assess the information needs from the point of view of the end-user and not suppliers of the most sophisticated hardware. The appreciation for what is relevant can clearly come through a close working with the real life problems which

might have a space-related component. Such an information system within the UN could play a very important catalytic role in development of true international cooperation in space-impacted areas and perhaps even beyond these areas.

The report refers to the need for regional cooperation. A great deal already exists, but there is a largely untapped scope for this, especially between developing countries. The already existing initiatives in this regard are the African Remote Sensing Council, AFROSAT, ASEAN cooperation with regard to PALAPA utilization, the Asian Remote Sensing Programme, proposals for a Latin American Remote Sensing Council and even a space agency, and so on, and these should be more actively pursued. The European Space Agency (ESA) provides an outstanding example of what regional cooperation in space can yield. Perhaps the focus, in the case of developing countries, would have to be somewhat wider than the merely technical and financial cooperation, but even this itself would go far towards building islands of self-confidence in parts of the world where few exist. Hopefully, the recommendations of the Conference in this regard would be pursued vigorously both at the national and international level.

Increasing military uses of outer space was initially not a topic of the Conference agenda. However, while considering the need and means for enhancing international cooperation in the peaceful uses of outer space, it is natural that the attention of the participants in the Preparatory Committee and the Conference would be drawn to the already existing, and the potential for increased, non-peaceful uses of space. After a great deal of discussion, the Conference agreed to express its grave concern over the extension of an arms race into outer space and urged all nations to contribute actively to the prevention of this. Attempts of a large majority of the countries to introduce language to the effect that the testing and deployment of anti-satellite weapons should be banned and that the inviolability of all peaceful space activities must be guaranteed did not find a general consensus. It is my personal belief that the development of peaceful uses of space would ultimately suffer from increased military activities even though some people point to the great spin-offs for civilian use which come from military research. One should be filled with despair at the general consensus in the current world wisdom that society will bring forth its best creative energies and financial support only for the design and production of systems meant for the destruction of parts of it. One would have thought that a deep involvement with what space itself means in terms of knowledge and understanding would have led mankind away from such archaic and tribal ways of looking at ourselves.

In this connection, I would like to end by recalling some personal reflections from my keynote address at the AIAA Symposium in Aspen last year:

> I share the excitement of those first pictures of the whole earth taken from space and believe that this was an act of communication of a rather unique significance. I also believe that space has an important role to play, in understanding the earth, the planets, the universe, and our relationship to the whole of creation. Such space activity is a necessary part of being human. Space activity is of course not a separate "science" *per se;* we have been engaged in this since the time we first looked at the star-studded sky and started wondering about the meaning of it all. But I believe that through the coming of the space age a potential revolution has occured in human knowledge, which in my view, goes beyond knowledge, perhaps even to "knowing". What concerns me greatly is that this revolution has not sufficiently percolated into the folds and fabric of our society even where the state of the technological and industrial development is the highest. When one begins to have a feeling, even an understanding, not only for the

possible origins of the solar system, but also the connections between the earth, the solar system and the rest of the universe—how various elements were synthesized, the fact that the stuff we are made of was at some time cooked in the middle of the same star, from the same ingredients, that indeed there is a geneological connection between various segments of the universe, between things we call dead and those we call living, not only between all people but everything around—one would have expected that man's actions would begin to be controlled by a new shared ethos.

Is this kind of hope just a romantic extension of a scientific mind given, as some would accuse, to mystic rambling? I can't help feeling that somehow all this is centrally related to the kind of questions humans have been asking for ages. I do not know of any blue-blooded—or for that matter red-blooded—religion which has not addressed the personal question: who am I, what am I, where did I come from, where am I going?

But this new consciousness of common origin and destiny and our global connection is something which has not been shared at a deep personal level by most of humanity. This picture in its essentials is not meant only for scientists, or for societies in which most of the science is done; this should be the new back-drop against which man everywhere should begin to define his meaning, his purpose, and his practical functions. Perhaps man has been so successful in applying science, that he has not had the detachment required to appreciate the meaning behind our new knowledge. Perhaps the rate of collation of this new awareness is by its very nature much slower than the rate at which technological tools can be produced to solve some of the problems which have arisen from yesterday's living and yesterday's action. These problems are, of course, important and we have demonstrated our technical virtuosity in dealing with their symptomatic manifestations. Our solutions create new problems, demanding new solutions, and we proceed every more vigorously in a direction set by urges of a parochial man, rather oblivious to the beauty of the new countryside, with its flowers and its new possibilities. We do not have the time to stop and ponder whether, finally, the time has not come to redefine our agendas, somewhat more consistent with the new vision that has come our way. We have reached some sort of cross-roads during last 30 odd years, when we are beginning to learn not only the way of doing things but have also touched the periphary of a new understanding which should also impact the question of what is worth doing; not only the "possibilities" of what can be done, but also the world of "desirables" ought to change. I say "ought to", but what is "ought to"? Clearly, one cannot legislate that. But, somehow, we don't have this awareness percolating. No doubt we are impressed and "wonder-struck" by what we find about the universe and its working, as also by our great new abilities, amongst others, to see and communicate with the whole world. . . . . but what is the human meaning behind all this knowledge and what are the new responsibilities arising from these new capabilities? Do these questions arise often enough when we go about the business of taking real-life, practical, decisions?

I have talked, as have others, about the meaning of the understandings about the large scale universe, and our place in the scheme of things, that view of the earth from space in its meaningful loneliness, universal communication, abolition of distance, redefinition of neighbourhoods, common origins and common destiny, a world ecology encompassing life, people and things. I realize, of course, that these supposedly new elements in our consciousness are not so new. Many of these concepts have been with us through the holistic discoveries of the past—some of them parts of the philosophic and ethical frameworks of great religions, others resulting from the work of secular philsophers. What is new is that for the first time, we have found and done things which begin to "objectify" these concepts. The world of values and the worlld of science (including its practical applications) begin to develop a deeper connection. I begin to see the possibility of a new type of "religiosity" not based on dogma or revelation which might begin to encompass the earth. I am impatient that this is taking so long—and sometimes apprehensive that there might be an inherent difference in the natural time constants for development in these two realms and we might end up losing the new vision that is just beginning to emerge. Perhaps we scientists have a new role to play. But

> then most of us are so taken up with the intellectual and practical adventure of what we discover and create, and so impressed by our own technical virtuosity, that we either do not have the time to step back and look at the implications of what we do, or we are too embarrassed to talk of things which are supposed to be in the curriculum of some other department. Perhaps the real communicators of this vision will be others—those who create the colour and character of society through stories and fables, poems and pictures. How do we influence the art and poetry of our time and share the glimpses of beauty and harmony that have come our way through our privileged pursuits?

Of course, UNISPACE 82 did not have these questions on its agenda. However, one suspects that during the period of its preparation, some of these thoughts did surface more often than before, and that some of the discussions at the Conference were illuminated by such a vision. Many of the recommendations of the Conference are in the nature of a practical agenda, and, in my view consistent with the rather philosophic and romantic ideas presented. The real work, of course, lies in the future, much of it in your hands.

Yash Pal
Secretary-General, Second United Nations
Conference on the Exploration and
Peaceful Uses of Outer Space.

2. The Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82)

International special conferences convened on an *ad hoc* basis to consider specific subjects have been of particular importance to poorer and weaker States of the third world as instruments of foreign policy. The majority of numbers which they command and the opportunity afforded by interactions within multilateral conferences to form coalitions, have reinforced the importance of such fora. The concept of *ad hoc* conferences also has a long history as a teaching, problem-solving, information-sharing and conflict-resolving mechanism. During the last two decades, the United Nations has convened over a dozen such *ad hoc* special conferences on various global issues, including food, trade, industry, law, population, women, and science and technology.

Since the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space held in 1968, six science and technology related *ad hoc* special conferences have been held by the United Nations: The UN Conference on the Human Environment (1972); the UN Conference on Human Settlement (1976); the UN Conference on Desertification (1977); UN Water Conference (1977); the UN Conference on Technical Cooperation among Developing Countries (1978); and the UN Conference on Science and Technology for Development (1979). The primary stated purpose of these conferences was to bring these issues to world-wide attention in order to stimulate the necessary political will to institute policies at the national, regional and international levels that would alleviate the problems encompassed within each area discussed. Depending on one's point of view and definitions, these conferences achieved varying degrees of success in terms of publicity, policy changes and international cooperation to solve common problems.

Much of the initiative for convening UNISPACE 82 also came—especially at the outset—from the developing countries. In particular, these countries expressed a desire to explore how the world-wide activities in outer space, including international cooperation, would be developed to ensure that the potential benefits from space science and technology and their applications, would be truly realized for all countries. There was a general feeling that the potential for space was much greater than currently seen and utilized by most countries and that the benefits were not shared as widely as they could be.

The growing involvement of all nations, developed and developing in the once-limited sphere of outer space activities was reflected in the work of UNISPACE at which 94 States participated.[1] In addition, representatives of several international intergovernmental and nongovernmental organizations participated in the Conference.

The Conference provided a unique opportunity for the entire international community to gather together to consider in great detail the complex issues of this new global concern. It dealt with the entire gamut of space science and technology and their applications from scientific, technical, political, economic, social and organizational points of view and their interrelationships. Some countries felt that legal issues should also be discussed. However, these issues were excluded from the agenda primarily at the insistence of developed countries. Nevertheless, the Conference discussed legal implications of certain issues and the results of the discussions at the Conference provide the backdrop against which legal issues will have to be considered in the future. Similarly, at the insistence of certain developed countries, the agenda of the Conference was limited to peaceful uses of outer space. The Conference, however, discussed at length the military implications of outer space, particularly during the general debate when almost all countries expressed their concern on the growing military activities in space.

The first United Nations Conference on the Exploration and Peaceful Uses of Outer Space was held in 1968. Its objective was "to assess the practical benefits to be derived from space exploration and to find the practical means for the sharing of these benefits by all countries". That Conference helped to create greater awareness among nations about the possibilities and potential of space technology for peaceful applications. It was, however, organized basically as a "scientific exposition" and unlike the second conference, was not mandated to make any recommendations. UNISPACE 82 was specifically requested to make recommendations and was not intended to be a scientific symposium merely for the exchange of information as the first conference was.

The rapid progress since 1968 in the development of space technology, and particularly the vast increase in actual and potential applications, led some countries to suggest, in the mid-70's, the convening of a second conference. In the following years, the desirability and need for such a conference was widely felt. The original preparations for the conference began in 1976 when the Scientific and Technical Sub-Committee of the United Nations Committee on the Peaceful Uses of Outer Space set up a working group to consider this matter. On the basis of these considerations, the General

[1]This conference was held at Vienna, August 9-21, 1982. *See* Report of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space, U.N. Doc. A/CONF. 101/10 (1982) [hereinafter cited as UNISPACE Report]. A summary of recommendations from the report appears in the section of Current Documents, I, *infra*.

Assembly of the United Nations convened the conference by its resolution 33/16 in 1978 and designated the Committee on the Peaceful Uses of Outer Space and its Scientific and Technical Sub-Committee as the Preparatory Committee and Advisory Committee, respectively, for the Conference.[2] The lengthy discussions, lasting several years, concerning the holding of the Conference itself, the drawing up of the agenda and other initial preparatory work set the tone for the manner in which the Conference was to address the various issues and, accordingly, these discussions formed an important and integral part of the Conference proceedings.

Equally important were the various other preparatory work undertaken for the Conference over the last few years through the holding of several regional and international meetings in various parts of the world, the preparation of a multitude of background papers prepared by a team of over 200 space scientists and engineers from a number of countries, the preparation of national papers for the Conference by over 60 countries, and the holding of several exhibitions and conducting public information activities. All of these activities, not only provided a wealth of information and an opportunity for detailed discussion of space technology, but also clarified the various issues facing the Conference and narrowed them down to a manageable extent so that they could be dealt with successfully by the high level delegations that assembled at the two-week Conference in Vienna.

The Conference had three broad goals: to assess the present and future state of space benefits and technology, to consider their applications of space benefits and technology, to consider their applications of space technology for economic and social development and to address the question of international cooperative programmes related to space and the role of the United Nations. While giving a rather balanced assessment of the state of space science and technology, the Conference paid more attention to the earth-bound applications of space technology. Considerable attention was paid to actual means and mechanisms, including the organizational elements, through which full benefits of space could be realized and shared more widely and equitably.

The Conference paid particular attention to how developing countries could derive greater benefits from space technology and recommended a number of concrete measures, including cooperation among developing countries as a means of maximizing gains. The Conference, while stressing the need and advantages of greater international cooperation, emphasized the importance of the development of human resources, not only in the context of technological development and utilization, but also as a necessity for developing an autonomous technological base in the developing countries.

In this connection, the Conference suggested exchange of information, and of scientists and decision-makers, as a way of promoting such cooperation, as well as building up an indigenous nuclei of experts to conceive and manage appropriate space programmes in the respective countries. The Conference noted that cooperation among developed countries, as well as developed and developing countries, have been very productive and recommended that such cooperation should not only continue but be intensified and suggested ways and means of doing so. The United Nations and its specialized agencies were requested to play an important and catalytic role in this process and were assigned various functions which would promote this objective.

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[2]UNISPACE Report, at 107.

On the matter of military implications of outer space, the stage was set for the discussions of this matter when the Secretary-General of the United Nations, Javier Perez de Cuellar, in opening the Conference, expressed grave concern and emphasized the importance of this matter as follows:

> I spoke earlier of one factor that marred the rosy picture of cooperation in space. Now I wish to mention another one that, like approaching storm clouds, threatens to cut off all rays of hope: this is the increasing and rapidly escalating militarization of outer space. . . An arms race in space would increase the areas and the potential for confrontation, adding a new dimension to the human destruction that would stem from it; it would also divert urgently needed resources from programmes of social and economic development. We must oppose vigorously the increased militarization of outer space. We have time - but very little. Almost daily we read of proposals and even plans to increase the military component of space programmes. It is essential that the forces of reason and peace join together to counter what would be a frightening escalation of the arms race.[3]

Similarly, Mr. Wilibald Pahr, Foreign Minister of Austria, on assuming the presidency of the Conference, also emphasized the importance of the matter when he stated:

> For the first time in many years the spectre of military confrontation in space is rising before our eyes. . . . Much international concern has been raised by the pursuit of research programs in the field of anti-satellite and ABM-technology, programs which might lead to a costly and destabilising arms race in an area which should exclusively serve peaceful cooperation. . . . Steps for the militarization of outer space should not only be weighed against the risks of armed confrontation in outer space, but against the profound changes such activities would also have on the development of peaceful uses of outer space. . . At the moment we are certainly at a crossroads between two options. There is the option of peace security and cooperation. But there is also the dark option of carrying hostilities beyond the confinement of the earth, to disrupt the free interchange of science and applications and to plant all the seeds for destruction and conflict in outer space. I trust that this Conference will raise a clear signal towards the right direction.[4]

The Conference called the extension of an arms race into outer space "a matter of grave concern to the international community" and urged all States to adhere strictly to the 1967 Outer Space Treaty.[5] The Treaty which barred nuclear weapons and weapons of mass destruction from outer space was formulated by the United Nations in 1967. Last year, the General Assembly of the United Nations asked the Committee on Disarmament based in Geneva to embark on negotiations to achieve agreement on a draft treaty on the prohibition of stationing of any kind of weapons in outer space. The military implications of outer space was indeed a matter that was foremost in the minds of the participants at the Conference—both governmental and nongovernmental—and

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[3] *Id.* at 107-10.

[4] *Id.* at 138.

[5] *Id.* at 141.

it was one of the issues on which the Conference had to have delicate and protracted negotiations. As a result of these negotiations, the Conference made the following recommendations:

> 1. The extension of an arms race into outer space is a matter of grave concern to the international community. It is detrimental to humanity as a whole and therefore should be prevented. All nations, in particular those with major space capabilities, are urged to contribute actively to the goal of preventing an arms race in outer space and to refrain from any action contrary to that aim.
>
> 2. The maintenance of peace and security in outer space is of great importance for international peace and security. The prevention of an arms race and hostilities in outer space is an essential condition for the promotion and continuation of international cooperation in the exploration and use of outer space for peaceful purposes. In this regard, the Conference urges all States to adhere to the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies and strictly to observe its letter and spirit.
>
> 3. The Conference strongly recommends that the competent organs of the United Nations, in particular the General Assembly, and also the Committee on Disarmament when dealing with measures aimed at a prevention of an arms race in outer space, in particular those mentioned in the relevant resolutions of the General Assembly, give appropriate attention and high priority to the grave concern expressed above.[6]

Attempt of a large majority of countries to express a sentiment to ban the testing and deployment of anti-satellite weapons and the inviolability of all peaceful activities must be guaranteed did not find a general consensus.[7]

Dealing with other matters, the Conference felt that the introduction of space technology should not lead to an increase in dependence; instead, it should provide ways of interlinking people everywhere. Internationalization of space activities was seen as a way to pool scarce resources and encourage greater number of countries to actively participate in deriving the benefits of space technology without being dependent. In this connection, the Conference recommended that feasibility studies be undertaken on the need and viability of operational systems for meteorology, remote sensing, and navigation in order to guarantee the availability of services from such systems on a continuous basis at affordable prices to all countries. If at least some of these studies lead to the establishment of such international systems in the future, the Conference would indeed have served its purpose.

The Conference, recognizing that the geostationary orbit is a unique natural resource of vital importance to a variety of space applications, noted that "there is real concern that some parts of the geostationary orbit are approaching saturation on certain frequency bands". The Conference noted that recent years have seen the explosive growth in the use of the orbit, especially for communication satellites. To the extent that this signifies increasing use of space technology for beneficial purposes, the Conference felt that it should be welcomed. However, while the orbit is occupied largely by developed countries' satellites and international systems, there are countries which have

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[6] *Id.*

[7] A manifestation of the Code of consensus may be found, for example, in the text of the Declaration of the Group of 77, Doc. A/CONF. 101/5 (1982), reproduced in Current Documents, II, *infra*.

not placed satellites in the orbit. Increasing concerns have been expressed that those positions may not be available when they desire to use them, and assignments in certain frequency bands may become more difficult to obtain in the future due to congestion.

While noting that technical advances are on the way which will probably permit, among other changes, a closer spacing of satellites and their satisfactory co-existence, the Conference decided that it was "imperative" that studies and research to achieve this objective be intensified, in order to ensure the most effective utilization of this orbit in the interest of all countries, including the developing countries which have not yet used it. The Conference further recommended that it is "imperative that its use be properly and justly regulated".[8]

In this connection, the Conference noted that the present system of registration and coordination of geostationary satellites by the ITU may need to be improved to guarantee, in practice, for all countries, equitable access to the geostationary orbit and the frequency bands allocated to space services. The Conference also noted that the orbit is getting increasingly crowded with objects that have outlived their utility and that this problem is likely to become more serious in the future. The ITU was called on to examine the feasibility of incorporating in its future regulations a stipulation that a satellite owner is responsible for removing its satellites from the orbit when they are no longer usable.

In dealing with the implications of remote sensing, the Conference pointed out that a possible situation in which data are not available to the "sensed" State, but are available for commercial and other forms of exploitation by another country, has been a cause for concern to a number of countries. The Conference, therefore, noted that it is important to reach agreement on principles governing satellite remote sensing and recommended that the current discussions on this issue in the United Nations Committee on the Peaceful Uses of Outer Space should be concluded expeditiously. In this connection, the Conference recommended that the sensed State shall have timely and nondiscriminatory access under reasonable conditions to the primary data obtained by remote sensing from outer space which related to its territory.

Similarly, the Conference, while noting that direct broadcasting satellites have been used experimentally by a few countries and that they have particular usefulness for rural areas, remote from city-based transmitting towers, recommended that it was now time for countries to agree as soon as possible on legal principles governing the use of such satellites. The Conference also called for an examination of the feasibility of satellite space segments, owned internationally or regionally, for providing direct broadcasting television service. In this connection, it noted that INTELSAT may choose to consider developing broadcasting satellite systems which could be used internationally for educational purposes.

The Conference called for similar regional and international cooperation in the establishment of remote sensing and meteorological satellite systems and the operation of regional data research centres as an attractive way particularly for developing countries to derive the benefits of these technological advances without exorbitant investments or duplication of national efforts.

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[8]UNISPACE Report at 141-42.

In the same vein, the Conference made several recommendations concerning the need for compatibility and complementarity between different satellite systems in order to avoid frequent and costly changes in equipment and services. The Conference made these recommendations while pointing out the need that they should in no way inhibit new ideas, innovations or advances in technology or hinder technological self-reliance.

Recommendations were also made concerning space transportation and space platform technologies. In particular, the Conference felt that these were programmes of great magnitude that required renewed consideration of wider participation by the international community in these activities. Studies were therefore called to examine the implications for international cooperation of these new concepts of large-scale space systems. The Conference made recommendations on a variety of other matters dealing with subjects such as space debris, protection of the near-earth environment, astronomy, and the search for extraterrestrial intelligence.

It also addressed recommendations to the United Nations and its specialized agencies concerning future activities to promote international cooperation. These include the establishment of an International Space Information system, identification of a series of technical and other studies to be carried out and the provision of technical assistance through an expanded United Nations Space Applications Programme. These activities, the Conference recommended, should be carried out mainly through voluntary contributions of Member States and called upon States to contribute to these activities generously in cash and in kind.

The Conference could not agree on a proposal concerning the establishment of a United Nations Centre for Outer Space but did recommend that the General Assembly of the United Nations decide on this matter.

These and other recommendations of the Conference were reflected in a report adopted by consensus at the Conference.[9] The report lists nearly 135 major recommendations and conclusions made by the Conference on a variety of subjects. The Secretary-General of the Conference has noted that the report is perhaps the best existing material between two covers dealing analytically with the current status, social implications and the future agenda of space activities, keeping in mind the diversity of the current social and technological situation on the planet. He stated that if generally accepted, as he hoped it would be, this would be a rather remarkable statement about a document produced by an international conference, where so many different points of view needed to be accommodated.

In assessing the results of the Conference, the Secretary-General of the Conference, Prof. Yash Pal in his concluding remark stated as follows:

> I feel we have achieved a great deal. What is set out in our reports, is only a part - though an important part - of our achievement. In addition, the Conference has created a wide awareness - I hesitate to say a world-wide awareness - about capabilities of man in space technology and its applications and of the potential this holds for our future. The Conference has brought together scientists and statesmen, politicians and policy-makers from almost a hundred countries who have, I hope, developed a better understanding of the many multi-dimensional features of our subject and a great appreciation of each other's point of view. . . .we have examined in some detail the problems of using space

[9]UNISPACE Report.

> in different ways for the good of all mankind. . . .there is a whole new agenda here for various countries, individually and jointly, to ensure that this new happening in human history will have meaning for the largest number of people. . . Of course, what we have adopted today is not a blueprint for the uplift of humankind, nor even a moderately exhaustive plan of action for future space activities. It could not have been, because we are still groping. . . .It is for each country, individually and in cooperation, to decide its goals and to chart its own course to achieve these goals. . . .recipes and guidelines are, however, clarified in our reports. And yet there are some common imperatives of the space age. We have to move and prosper with each other and with our earth. We can no longer live off each other nor can we merely exploit our earth. . . .We have to combine our new technical virtuosity with a new awareness of our connectivity, with each other and with our planet. To a small measure the work of this great Conference makes such an attempt.[10]

In his closing statement, the President of the Conference, making an overall assessment of the Conference, concluded that "personally, looking upon our deliberations here and at final output—I am indeed grateful by what we have been able to achieve. The recommendations for concrete action, though they may at first seem modest, are well thought-out steps that should set the pattern for a more cooperative and equitable sharing of the benefits from space".[11]

N. Jasentuliyana
Executive Secretary of UNISPACE 82,
and Chief of Section,
Outer Space Affairs Division,
United Nations

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[10] *Id.* at 137.

[11] *Id.* at 138.

3. NGOs at UNISPACE 82

The Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82) took place in Vienna, Austria, August 9-21, 1982.

The fact that some 120 nations participated in UNISPACE 82 is one measure of the growing impact of space and the importance assigned this new technology since the first UN space conference in 1968.

Nongovernmental organizations (NGO's) have been slow to realize the implications for earthly welfare of our entry into outer space. UNISPACE offered an opportunity to show the world as a whole and the NGO community in particular that in addition to the technical, engineering and legal aspects, the social, political and economic implications of space have also become important and that there is a growing need for international and national organizations to become aware of these new areas of activity and to participate in them. It was for this reason that the Committee for NGOs at Unispace 82 set up the extensive program of NGO activities in Vienna.

The NGO Conference at Unispace took place over a full ten days covering a very wide range of topics. The program was divided into the following subject areas: impact of space on development; bio-resources and environmental aspects of space; energy from space; private sector participation in space; maintaining peace in space; future developments in space; education and space; medical, legal and philosophical aspects of space.

More than 120 speakers from around the world took part in the discussions which maintained a high level from the very outset. The first day was devoted to space and development. The issues discussed by the various speakers, which included the leader of the official Pakistani delegation, covered most of the questions that were central to the Conference. These may best be summarized in the form of one central question: If space is for all mankind, what institutional structures and methods can be created to ensure that its benefits are distributed equitably? Not unnaturally in view of past and present practice, the developing nations are concerned that they will be left behind in the opening of this new frontier. Space exploration and development requires a high-technology infrastructure and considerable funds—neither of which are present in most third world nations today. They fear that either through design or default, space could become a new area for economic imperialism. An understanding of this position is central to understanding third world attitudes toward many specific space issues. For example, questions concerning the allocation of geosynchronous orbital slots, and the ownership and distribution of remotely sensed data. These and other such issues received considerable attention on the first day, thus setting the tone for the conference as a whole.

Energy is the overriding issue facing developing nations and two whole days were devoted to an examination of solar power satellites and the possibility this concept offers for unlimited energy from space. *Dr. Peter Glaser,* the originator of the idea, chaired the sessions. Through the International Space Solar Energy Committee he had put together a most impressive panel of experts from around the world. Although no work on solar power satellites is presently being funded by the U.S. government, the topic continues to receive considerable attention in other nations. Although the present worldwide economic recession may have put back the day, it is widely believed that despite the magnitude of their up-front costs and questions regarding their

technological feasibility, solar power satellites are inevitable in the not too distant future. It is important, therefore, that international research continues in this area.

Experts from both East and West also met in small group discussions around the twin questions of space and the environment, and space and bioresources. These, and later panels on medical issues, were the most scientific discussions held during the conference. They proved to be extremely valuable to the participants who were able to address each other directly rather than read prepared papers to a wide audience.

The role of the private sector in space was the next subject to be discussed. From the outset of planning for the conference, it was felt that this was a subject of the greatest importance for an international audience, most of whom were unaware of the extent that the private sector in the U.S. is becoming involved in space. *Dr. Klaus Heiss,* President of Space Transportation Company, Inc., which hopes to purchase and operate a fifth Shuttle, chaired the meeting. It included papers by representatives from other groups such as Space Services, Inc. that was shortly to launch a private expendable vehicle from Matagorda Island in Texas.

The discussions opened new vistas to the participants from the developing nations who quickly realized that these new ventures offered their nations alternative routes to space development other than complete reliance upon the governments of other nations. Not only would this mean cheaper access to space, but as later presentations plainly showed, it could also mean the ownership of dedicated remote sensing and communication satellite systems. In his presentation, Dr. Norman MacLeod, President of Astec, a Washington-based company, quoted an all-up price of less than twenty million dollars for a remote sensing system with capabilities similar to the early Landsats.

The weekend was dedicated to an examination of the military issues in space. This subject had already become a *cause célèbre* in the governmental conference, which had bogged down on the issue owing to U.S. reluctance to discuss it. A small group of NGO delegates had been active from the beginning of the conference in putting together a panel of major speakers for this event. They were most successful as finally the panel included a U.S. Congressman (Rep. *George Brown*), the noted author *Arthur C. Clarke,* and *Dr. Bhupendra Jasani,* writer and well-known analyst on military issues from SIPRI (Stockholm International Peace Research Institute).

In the original planning for the NGO Conference we had expected that this subject could and would generate considerable controversy as it would not be an issue in the governmental discussions. We were however mistaken. At the opening ceremonies of the government conference, the delegates were charged with the responsibility of tackling the question of space militarization as the most important issue facing them. It was quite evident by the response from successive speakers that not only were they as delegates prepared to face the issue, but that they roundly condemned any attempt to introduce armaments into space.[1] In any event, much of the controversial aspects that otherwise might have attended NGO discussions of the question had faded into the background by the time of the event. It was more a case of talking to the converted than

[1]The U.S. delegation stumbled badly here in holding, for eleven days, to the position that the Unispace Conference had no right to discuss the military question, since it properly belonged under the UN Committee on Disarmament. Whatever the initial rationale behind this argument, it quickly lost any meaning and served only to make the U.S. look as if it were attempting to hide something.

had been expected—itself an interesting and, indeed, hopeful commentary on an issue that will surely become of greater public knowledge and concern in the near future.[2]

The second week of the NGO Conference commenced with an examination of anticipated future developments in space. Papers included new concepts and advances in communication and information satellite systems, launch vehicles, free-flying platforms and manned space stations. These were short term; longer range possibilities included lunar and asteroidal mining, space manufacturing facilities and climate control capabilities by means of large orbiting mirror systems.

The following day was devoted to an outline of some innovative concepts by groups already in existence. The audience was in many cases surprised to learn of operations such as Peacesat, an educational and information distribution system utilizing ATS-1 to link together eight South Pacific nations. They learned more about the intent of India to follow up its experience in linking 6,000 villages in an educational experiment with ATS-6 by developing and orbiting their own educational and communication satellite system for this purpose.

Three students outlined the establishment of an international student organization (SEDS) devoted to space development. It will initially be headquartered at George Washington University and hopes to have many branches and activities throughout the world. The Chairman of the Foundation for Scientific Progress and Continual Exploration (S.P.A.C.E.) recently established in Houston, Texas, told of the foundation's program in international education. Students are brought from South American countries to see the U.S. space program at work and then are offered scholarships at selected U.S. universities on the understanding that they will return to use their knowledge for the benefit of their native country. The Foundation's ultimate objective is to advance international cooperation by building an internationally manned space station utilizing the external tank of the Shuttle.

The day devoted to the medical aspects of space saw Soviet and U.S. experts discuss the many vital issues facing man as he tentatively sets out to live in and explore this new environment. It is evident that many advances have been made in this area and it was heartening to see that the international scientific community is well prepared to pool its knowledge in this and other fields.

Legal and political aspects were next discussed. This is the subject of a separate report[3]; so no additional commentary will be made except to note that despite the politeness of the speakers some of the issues under discussion appear almost intractable.

The closing day saw a presentation on the philosophical and spiritual aspects of space by *Dr. Vasant Merchant.* The Universe about us has always had a deep impact on man's thinking. It was fitting, therefore, that this subject should be included in an international conference devoted to the future of man in space. The final session brought a discussion of the need for new educational efforts in and about space. The chairman ended the conference with an outline of the historical drivers pushing man inexorably toward greater international cooperation. A process that would be greatly aided by the establishment of an international space station, hopefully the next great advance in our move into space.

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[2]*See,* for example, the recent three-part series on the question in the *New York Times,* Oct. 17-19, 1982.

[3]*See, Events of Interest,* 4, *infra.*

NGOs at Unispace 82 was the most extensive conference devoted to space issues ever organized by private groups. Despite the small audience (a consequence of placing the NGO meetings in a different location from the governmental conference), the NGO Conference clearly demonstrated that the economic, social and political implications of space are as important as the scientific and technical issues, and that the private sector could bring together a group of experts second to none. From the NGO viewpoint, the conference showed that if the non-technical issues are to be treated in the future with the seriousness they deserve, an international organization must be created for this purpose, with the scope and clout of COSPAR, IAF, and IISL. The early establishment of such an organization was announced at the conference. It is to be hoped that it will receive widespread support.

Dr. David C. Webb,
Chairman of the Committee for
NGO's at UNISPACE 82,
President of the Foundation for S.P.A.C.E.

*4. NGO's at UNISPACE 82: Session on Legal and Political Aspects, Vienna, Aug. 19, 1982.**

One of the notable sessions of the NGO group at UNISPACE 82 was devoted to a discussion of the legal and political aspects of space under the general chairmanship of *Edward R. Finch Jr.* The session - along with the other NGO sessions - was held in the Messepalast.

After opening the session, the chair introduced *Mrs. Eilene M. Galloway,* honorary vice-president of the International Institute of Space Law and IAF delegate to UNISPACE 82 who spoke on Perspectives in Space Law in the following terms:

> Space Law is both national and international, and it covers outer space both as a geographic area and as functions performed in outer space. All the problems of space law are multidisciplinary, so you have to consider the politics, economics, cultural affairs, science, law and educational aspects. Consequently, space law is not something that is just out there in outer space orbiting around; it is something that is on the earth. It involves people with problems on the earth; it involves funding and institutions, rules and regulations. I would like to give you the framework that has evolved in the last 25 years on space law, because space activities have brought about more international peaceful space cooperation than any other activity. These patterns have developed in the U.N., outside the U.N. and in national laws.
>
> I will take up first the patterns that have developed in the U.N. There are two Subcommittees under the Committee on Peaceful Uses of Outer Space (COPUOS). One is Legal, and the other one is Scientific and Technical. In addition, you have an Outer Space Affairs Division, that is, the Secretariat to the COPUOS Committee and its two Subcommittees. They meet every year and have formulated five treaties, four of which are in force. These treaties began with the 1967 Outer Space Principles Treaty, which is

*The writer is grateful to Mr. Edward R. Finch Jr., a member of the Journal's Editorial Board and Advisers, for making available his brief, edited summary (*not* containing *all* the statements by distinguished speakers and any floor discussions) of the proceedings of this session which formed the basis of this report. All speakers stated that they spoke in their personal capacities.

like a charter or a Ten Commandments. It sets up basic principles in various provisions and is very foresighted in keeping space for peaceful purposes and not having harmful results.

There are many harmful things that can happen to prevent you from having space activities other than weapons or military activity. There can be all kinds of damage from contamination or other kinds of harmful things that can happen to the environment. I think the main thing that happened with the 1967 Treaty was a process that was set in motion which was far superior to that followed by the law of the sea, because we have general provisions and if a problem arises that is not solved by the general provisions, then you can go ahead and take that provision and make another treaty. You do not have to do away with the 1967 Treaty because it does not solve every problem that you have today. Furthermore, it covers not only the exploration of outer space, but the use of outer space, and that does not mean uses that existed only in 1967.

The 1967 Treaty is in force and is the law of the land of many nations, and it covers all uses, including direct broadcast satellites and many other kinds of uses that you may have. This was one of the very foresighted provisions. I think the most foresighted one that did away with a lot of conflicts that might have developed is in Article II. Article II says that outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty by means of use or occupation or by any other means. There has been great interest in this particular conference on the military uses. There is an Article IV that bans weapons of mass destruction from orbiting or being installed in outer space, and it also provides that the moon shall be used exclusively for peaceful purposes. But when it became evident that there were problems about the treatment of astronauts and cosmonauts and the return of space objects if they should fall to earth, we got another treaty by taking a provision of the 1967 Treaty and, in 1968, we got the Treaty on the Rescue and Return of Astronauts and Cosmonauts and the Return of Space Objects.

Then in 1973 the COPUOS negotiated the Treaty on Liability for Damage and this is a very good illustration of the evolution—in fact, it is essential. You must know the facts of science and technology about space in order to do anything with laws or rules or regulations. Originally, we were told that if anything entered the atmosphere, it would burn up completely. If that had been the case, we would not have had the necessity for creating the Treaty on Liability for Damage, but it did happen that some of these component parts did fall to earth and we got the Treaty on Damage to go as far as we could go in reimbursing people for damage in case that happened.

Then in 1976, another provision of the 1967 Treaty was reviewed and we got the Treaty on Registration of Space Objects. It is very important to scientists and engineers to know exactly what is up there at all times and what can be put up there in addition. It was the practice of the United States and the Soviet Union to register their space vehicles in the U.N. even before we had this Treaty.

Then we got the Moon Agreement, which was in 1979. It has not been signed or ratified by many nations and it is not yet in force. It will go in force anytime for its signatories, but it is in a somewhat different category than the other treaties.

The way in which these treaties were negotiated was by a process of consensus. Consensus does not mean that you have always the least common denominator. Consensus means that they really hammered out the provisions. They came to an agreement. The Soviet Union and the United States, as well as many other countries, are parties to these treaties. So, when the Soviet Cosmos 954 fell in Canada, the Soviet Union, the United States and Canada were aware of these treaties and their provisions, so that countries could deal with this type of problem.

In case of the consensus method, you have a procedure. If you can get an agreement on the first sentence, then you go to the next sentence and then maybe someone will disagree and you put it in square brackets. Any one nation can disagree on this. The U.N. Committee on Peaceful Uses has grown from 24 to 28 to 37 to 47 and it consists now of 53 countries. You might think that it would be now more difficult to get consensus, but the addition of new members is not the only reason why we could not get

a consensus on a DBS Treaty and remote sensing. Those are very hard-core issues on which there are basic philosophical differences of governments so that it takes time. In this particular business, if you get bored or impatient, you should take on something else. The consensus practice is very valuable. If you did not agree at the end of a year or at a U.N. session, you would simply know what you had agreed on, or disagreed on, and in the intervening year, you could work on the disagreements and do something about them. So this is quite different from a vote, in which you require a unanimous consent because the vote would mean that you ended it. The consensus would mean that you go and discuss it further for another year.

At the present time at the U.N., there are four main pending issues (a) remote sensing, (b) direct broadcast satellites, (c) the definition and/or delimitation of space and the geostationary orbit, and (d) nuclear power for satellites.

We have other organizations that have developed simultaneously with these in the United Nations. The evolution of space law has set up institutions to deal with specific functions. We already have the International Telecommunication Union and the World Meteorological Organization. Any organization that had a function simply took space technology over, because it helped them to perform the function better. But then we had to devise specific institutions for functions for which there was a worldwide demand. There are a number of those. The International Telecommunication Satellite Organization (INTELSAT) has 106 members and is responsible for worldwide and local commercial communications;other organizations are the INMARSAT, which deals with maritime navigation, the European Space Agency, Intersputnik, and ARABSAT and EUTELSAT. We also have a number of bilateral and multilateral agreements among nations and space activities that have particularly promoted the growth of outer space cooperative regionalism. So a separate study of that could emerge.

One the subject of national laws for those of the United States, I should mention that our first law was the National Aeronautics Space Act of 1958, in which Congress declared that space be for peaceful purposes for the benefit of mankind and also provided for a program of international space cooperation. In 1962, Congress passed the Communications Satellite Act, which makes a provision that areas of less economic development should be covered by the local communications even though they did not make a profit. Then in 1976, we passed the National Science and Technology Policies Organizations and Priorities Act, in which space technology is one of the goals mentioned, along with other goals in the whole field of technology.

Deep problems of equity-sharing and representation have been solved by INTELSAT and INMARSAT. When one talks generally about information or developing countries without differentiating between them, it is more difficult to get agreement. The Space Law we have already is very foresighted and fortunately for the past 25 years we have been able to concentrate on peaceful purposes.

Following *Mrs. Galloway's* presentation the chair asked her to moderate the balance of the morning's session; she introduced *Professor Krateros M. Ioannou,* the delegate of Greece to UNISPACE 82, who made the following observations:

I am speaking here today only in my individual capacity and not as a delegate from Greece to UNISPACE 82. I would like to speak on what is actually being done in the field of space law creation. I agree with what Mrs. Galloway has just said. The main space law committee today is the U.N. Committee on the Peaceful Uses of Outer Space. The Committee has changed. Compared to 1967 and the previous years to that, we are living in a different political environment. Countries were very eager to create the necessary legal conditions for cooperation in the field of outer space activities. It was under these conditions that COPUOS was particularly accelerated.

I understand that you would know the expression "instant custom," which was suggested by some of our colleagues as a phoenomenon of space law, where instant custom needed some practice and some opinions. All of this was actually done and formulated within this General Assembly Committee, COPUOS.

After the 1967 Treaty, we moved to some very specific problems. Suddenly, after four treaties were drafted, signed, ratified and in force, something different emerged. The 1979 Moon Treaty is something different from the other treaties, but I do not think that is the problem. There are many things which can not be easily accepted either by the U.S. legislators or Soviet law makers. One of them is the "Common Heritage of Mankind," which is open to interpretation in the field of diplomacy and has been transplanted into the new treaty. If one reads the discussions on the Moon Treaty in some of the congressional committees one may see one of the reasons why American legislators have been so hesitant to accept that treaty. I assume similar ideas exist on the Russian part, although their information is not open to the press. So right now the pace of lawmaking in space has slowed because the overall international political environment does not favor it. We have, in the Committee of Peaceful Uses of Outer Space, some very interesting items which can go on for years. The Committee has had enormous and endless discussions about words and phrases in the drafts of resolutions, treaties and declarations on various principles.

A factor not so strong in the 1960's, when space law creation started, is the factor of the Third World. Third World countries were originally not included in the making of space law. The situation today is completely different. Decisions in the space law field are influenced by what Third World countries are actually desiring and trying to promote within the Committee on Peaceful Uses for Outer Space. It is not enough now to have the super powers accept or reject principles. It is evident that the Third World countries have some difficulties with several aspects of the drafting procedure which goes on within the Committee for Peaceful Uses of Outer Space.

The consensus principle was created so that draft treaties would have no trouble finally being accepted once the draft treaty left the committee and moved to the next legal procedure. But the consensus principle is being endangered. The Third World countries have tried over the years to include some ideas which would be transplanted into principles within the consensus procedures, but to little avail, particularly in the field of regulation of Direct Broadcast Satellites. This is the procedure of taking the issue out of the hands of the Committee on Peaceful Uses of Outer Space and putting the issue directly into the hands of the U.N. General Assembly. One can come out in the General Assembly with principles and resolutions not acceptable to the Committee on Peaceful Uses of Outer Space, but acceptable to the majority of the U.N. General Assembly, which, as we all know, is controlled by a majority of Third World countries.

The first attempt, even as a hidden threat, was in the field of direct broadcasting by satellite. The issue was pending in the Legal Subcommittee for some time, in one case, ten or more years. First, the issue was taken from the Legal Subcommittee and brought before the full Committee on Peaceful Uses of Outer Space, which is progress. It is now pending before the next session of the General Assembly. I will not be astonished if the final result is a resolution incorporating all that we worked on already. It will not be what the COPUOS Subcommittee on Science and Technology wished.

Another problem is the principle of sovereignty. You can broadcast directly to an individual country. In the future, transmissions from satellites could not be protected for us. We want to be able to control the information broadcasted into our territory. The Western position claims the right to freedom of information as a human right under international protection. The argument arose that accessible information should be free to all people, so everybody has a right to such information and this right is guaranteed under provisions and resolutions on human rights and in human right instruments; and the right to receive, seek and impart any information is necessary for cultural development. A return argument cites that Third World countries will not be protected from commercial or non-commercial broadcasting alien to a country without controlling these types of direct satellite broadcasting. This is the main problem toward which we seem to be heading regarding the direct satellite broadcasting principles.

Following Mr. Ioannou's remarks, *Mrs. Galloway* called upon *Dr. Stephen Gorove*, from the I.A.F. Delegation to UNISPACE 82, a professor at the University of Mississippi Law School, and chairman of the Editorial Board of *The Journal of Space Law* who subsequently summed up his statements on "Major Legal Issues of the Geostationary Orbit" in the following way:

> The astonishing scientific and technological developments brought about in the wake of man's entry into space have given increasing impetus to the utilization of the so-called geostationary orbit which is located at a distance of approximately 22,300 miles (35,800 kilometers) above the earth's equator. The growing importance of this orbit has been reflected in a multitude of uses by satellites for telecommunications, broadcasting meteorological and other services.
>
> If one takes a closer look at the geostationary orbit, it may be more correctly identified as a three-dimensional corridor in which satellites move at different altitudes, speeds and inclinations to the plane of the equator. While this corridor has its limitations of physical size, the major concern has been the prevention of electromagnetic interference with other satellites and other users of the radio spectrum. As a study prepared by the UN Secretariat correctly observed: It was impossible to determine how many satellites could occupy the geostationary orbit. It was, however, possible to determine whether a specific satellite system, with all its physical parameters defined would or would not interfere with other systems.
>
> The interrelationship between geostationary orbital positions and frequency assignments has been recognized by the International Telecommunication Union, a specialized agency of the UN which deals, *inter alia*, with the coordination and regulation of space telecommunication services and which characterizes both the orbit and the spectrum as limited natural resources. While overcrowding of the orbit may not become a problem for many years to come, or perhaps may not even occur due to improved techniques, nonetheless, the increasing concern of less developed countries with the possible preemption of the orbit by more developed nations has given rise to a number of major issues.
>
> One of the major issues relating to the use of the geostationary orbit is whether it is or is not in outer space. This issue has been brought to the fore by the Bogota Declaration of 1976 in which eight equatorial countries claimed sovereignty over segments of the orbit lying above their national territories and also declared that segments of the orbit over the high seas constituted the common heritage of mankind. The fact that the claims had no generally acceptable legal or scientific foundation became apparent from their rejection by an overwhelming number of countries in the United Nations. As to this issue it may be pointed out that both international customary law and treaty law appears to support the position that the geostationary orbit is located in outer space and, as a result, relevant provisions of international space treaties are fully applicable to it.
>
> Insofar as international customary law is concerned it may be recalled that prior to the recent claims of equatorial countries no formal objections have been made against the orbiting of satellites by underlying states. This tacit negative behavior over almost two decades of spatial experiments appeared to indicate a general consensus that orbiting satellites moved in outer space and not within an area subject to the sovereignty of the underlying state. Thus while there has been no precise demarcation line between air space and outer space the contention that segments of the geostationary orbit, many thousands of miles above the altitude of satellites in low earth orbit, were parts of the national territory of underlying states appeared to be in clear conflict with the newly emerged international customary law of space.
>
> As to treaty law, it may be pointed out that the Outer Space Treaty of 1967 was negotiated out of a desire to lay down principles governing man's activities in outer space. Inasmuch as these activities related mostly to earth-orbiting satellites, –in the absence of any evidence to the contrary—it seems logical to assume that the drafters

intended to apply the treaty provisions, including the freedom of exploration and use of outer space, to all such activities, irrespective of whether the satellites moved in lower or higher orbit. In view of the preceding considerations, it was of no surprise that the claims of equatorial countries found little support in the United Nations.

The second major issue which has been raised by some of the equatorial states is whether Article II of the Outer Space Treaty prohibiting national appropriation of outer space in fact bars the placing of satellites in geostationary orbit by individual countries. For an adequate answer to this query, the concept of "appropriation" must be scrutinized. In a legal sense and briefly put, the term refers to the exercise of exclusive dominion and control (over an object capable of appropriation) with a sense of permanence. While a state may exercise exclusive control over traditional objects, it is not entirely clear that a satellite in geostationary orbit would be capable of occupying the very same physical area without any aberration over a period of time. But even if this were possible—in order to constitute a possible violation of Article II—such act would have to be done with a "sense of permanence" and not on a temporary basis. While it has been suggested that the keeping of a solar power satellite in orbit for a period of 30 years would not constitute appropriation,in actuality 30 years would probably satisfy the "sense of permanence" requirement, unless the geostationary orbit were regarded as a natural resource, as characterized by the International Telecommunication Convention of 1973 and claimed by the equatorial countries. The reason for this is that there is authority to support the view that the ban of national appropriation of outer space does not relate to resources. This position has been shared by UNCOPUOS, at least insofar as natural resources of the moon and other celestial bodies were concerned. As a result, the utilization of solar energy for transmission to earth by satellites would not fall under the prohibition of Article II of the 1967 Treaty.

The third major issue that time permits me to touch upon in this presentation relates to Article 33 of the International Telecommunication Convention which speaks about "equitable access" both to the geostationary satellite orbit and the radio frequencies in conformity with the Radio Regulations and according to the countries' "needs and the technical facilities at their disposal". While this article will likely be considered at the forthcoming Plenipotentiary Conference in Nairobi,—as it stands, it draws attention to the significance of the phrase "equitable access" which was reiterated in Resolution 3 of the 1979 World Administrative Radio Conference. The meaning of "equitable access" has not been defined but I believe any interpretation, or practical implementation of the phrase, will have to consider the other vital criteria upon which such access is to depend, namely, the countries' "needs" and their "technical facilities." It should also be borne in mind that Article 33 also stipulates "efficient and economic use" in addition to "equitable access". Ultimately, what is or is not equitable access will have to be determined on the basis of accepted criteria to be applied in each situation by an accepted forum, in an agreed upon manner. This is a challenge that the international community will have to face in the years to come.

Following *Dr. Gorove's* presentation, *Mrs. Galloway* gave the floor to *Mr. Edward R. Finch,* a New York attorney, member of the U.S. Delegation to UNISPACE 82 and Chairman for the Legal Aspects of the UNISPACE '82 discussions. *Mr. Finch* who wrote a great deal on space law, wished to make a few comments about *Dr. Gorove's* remarks and add a few more thoughts on the geostationary orbit. His recorded remarks were as follows:

First, we have in outer space more than 1,000 satellites, particularly in the geostationary, which are junk. These are satellites whose useful life has been expended. I was very pleased to see in the geostationary discussion in the U.N. book called *The World in Space,* sold here in UNISPACE '82, that INTELSAT is removing from the geostationary orbit its satellites whose useful lives have been totally expanded. I think

that makes a real contribution to the crowding problem both from the point of view of the radio spectrum and physical spacing, which *Dr. Gorove* so well covered.

It might be of interest to you that the American Bar Association, by its Aerospace Law Committee, International Law Section, had a poll on the subject of the geostationary crowding, and the questions and conclusions, in brief, were four-fold.

First, that the claim of the equitorial countries, *i.e.*, the Bogota claims to sovereignty over the segments of the geostationary over their respective countries, is in direct violation of the 1967 Treaty on Outer Space, which many of them have actually signed and ratified. There are, to my knowledge, only four of them who did not sign and ratify that treaty. These four fall into the category discussed this morning on customary international law.

The second conclusion that came out of the debates of that American Bar Association Committee was that the attempt in Paragraph 3 of the Bogota Declaration to set forth "a legal status of the geostationary requiring previous and expressed authorization on the part of the concerned state" is an infringement of the basic freedom of outer space—to which almost all of those countries have heretofore subscribed. And again, in Paragraph 3 of Bogota Declaration, the phrase "not to condone existing satellites in geostationary orbit" is a direct breach of the 1967 Treaty.

Finally, the geostationary orbit is included in outer space by common consensus and practice of international law—that is, customary international law—which *Dr. Gorove* was just referring to, for more than ten years; and the fact that the U.N. has not established a definition of outer space does not support this entire attempt by a few equatorial countries to directly breach the freedom of outer space and the 1967 Outer Space Treaty.

Perhaps, I can take one more minute to discuss some issues and analogies to the use of the geostationary orbit. The use of the LaGrange libration points, that is the L2 and L5, the proposed location that Dr. O'Neill of Princeton has marked out for the lunar material catcher, is an issue that should be considered here. Here is an instance of preferred positions in space, which might, if used by a single nation, be regarded as an appropriation, in violation of Article 2 of the 1967 Outer Space Principles Treaty, about which *Mrs. Galloway* spoke. However, given international practice, with regard to the use of earth orbits, it might be preferable to regard such de facto occupation not as a violation of the 1967 Outer Space Treaty, but rather a privilege, in return for which the launching state might agree to submit to appropriate international regulations, such as the ITU and the competent organizations serving with it and under it. In any event, the contemplated use of these positions, such as by INTOSHAB, would not violate the requirements of the 1967 Outer Space Treaty, that the use be for the benefit and in the interest of all countries. It would certainly not be in derogation of the prescription of national appropriation. Other orbits for the global habitats and solar power satellites which *Dr. Gorove* has mentioned, may become desirable (other than geostationary) and hence could also be claimed as a valuable natural resource. For example, a space manufacturing facility on which we have had five years of conferences at Princeton, might be located in a one-to-one resonant orbit in the earth-moon system, and transfer of material from the moon to the L2 point, as well as transfers of manufactured products from the geostationary orbit, would be more economical than to and from the LaGrange libration points, L4 and L5. It also has been suggested that energy produced by solar power satellites might be made more economical and more available to some countries if positioned in northern and southern latitudes rather than in geostationary. For example, consider the use of orbits, plus or minus 45° to the plane of the eliptic, and to the altitude of 4,630 kilometers.

Last, I would like refer to a point that *Mrs. Galloway* so often makes in the meetings of the International Astronautical Federation for which she is an observer here at UNISPACE '82. Her point is that science and law of outer space each have thresholds of viability for each new process, and international space law and freedom of outer space must not be impeded in its progress for the benefit of mankind by alleged claims. It also

appears that the United States and the U.S.S.R. are substantially in agreement that international law does not recognize the geostationary claims of the eight equatorial countries that we have been discussing here.

The progress of outer space science and outer space international law must not be impeded by any nation, whether a less developed country or not, seeking to advance its own economic interest at the expense of all other nations, particularly where the 1967 Treaty stands as a guiding principle. A science law analysis by professionals on the geostationary orbit indicates that with experience gained from the U.S. Gemini program and from Apollo—Soyuz progress on control, guidance and station-keeping, there will be no need for many decades for new international regulations of the use of the limited geostationary orbital slots. This assumes an energy demand growth factor of 5%, and spacing can be as close as 10-20 kilometers, which is now technically possible. This does not assume what may happen beyond the year 2,000 with physical linkage of the geostationary satellites which is possible with the present technology, to increase the slots in the geostationary orbit. I thank you very much for letting the chairman make these interventions.

Following *Mr. Finch's* remarks *Mrs. Galloway* called upon *Mr. Daniel E. Cassidy*, Vice President of Marsh & McLennan Aviation and Aerospace Services Co. in Washington, D.C., who spoke on the subject entitled "Where Outer Space Begins—A Private Sector View" in the following terms:

I would like to say at the beginning that free and unencumbered passage to and from earth orbit, and while in earth orbit, as is presently guaranteed under international space law, has substantial appeal to the commercial world - essentially the non-government users of space. Space activities conducted for peaceful purposes have enjoyed privileged and protected status up to this point in time without concern for the consequences of violating sovereign rights of nations. Particularly now, with increasing opportunities for non-government activities in space, it must be assured that whatever action may be taken with respect to defining outer space, such action will not discourage or inhibit the aggressive use of space. I am addressing myself in particular to private sector uses which will have a major affect on the commercialization of space.

The question of where outer space begins has proven to be a complex issue. It is particularly complex from two aspects: *First,* there is substantial disagreement among the various governmental representatives and legal scholars as to whether a precise definition of outer space is needed at all. *Secondly,* there is no natural boundary which can be used to define outer space. The delimitation problem has been wrestled with at the United Nations Committee on the Peaceful Uses of Outer Space and its two Subcommittees - the Scientific and Technical Subcommittee and the Legal Subcommittee. Many definitions have been advanced and none have proven to be satisfactory. Some examples include: defining the atmosphere and its many layers - troposphere, stratosphere, mesosphere, ionosphere; using the maximum altitude aircraft or balloons can fly at; where aerodynamic lift is exceeded by centrifigal force; the lowest perigeé of satellites; and the limits of the earth's gravitational effects. There have been others. The conclusion is that at best any definition would be arbitrary.

Those who support establishing a definition, even though arbitrary, believe that the existence of the international treaties covering outer space requires a precise definition of outer space to assure the proper application of the law. Their concern is that there now exists legal ambiguities which must be resolved. The other side of the issue believes that arbitrary definition could lead to complications because of the inability of most countries to observe and control a designated boundary. In addition it is believed that this could impede further developments in space. This side also argues that, although the absence of a definition of outer space might seem to leave a logical gap, no practical difficulties have arisen from the absence of a definition. Essentially, if something is not broken, do not fix it.

From the commercial viewpoint, the conditions which would produce the *least uncertainty* and, therefore introduce the *minimum risk* to any particular space operation would be the most desirable. Presently, under the space treaties, it is resumed that non-government activities can be conducted with authorization and continuing control by the appropriate national government, free of foreign interference. There is minimum concern for the particular altitude of the operational orbit, or what minimum perigee might result during the mission - by design or otherwise. If it is a space activity it falls under the space treaties and their provisions, which *inter alia* exclude national claims of sovereignty. Also under the treaties, in the event of, for instance, an unplanned or forced landing on foreign territory, persons involved in the space activity would be returned to their country and objects (including commercial satellites) would be returned to the owner. Changing what specific space activities are protected could introduce new risks of space operations. These risks could be real or perceived, and in either case discourage use.

Space activities in the future promise to be sufficiently challenging to private enterprises in view of the facts that new technologies will have to be developed, that the cost of operating in space will be high and financial sources will have to be developed and protected. Introducing unnecessary boundaries based on new territorial claims such as claims which would essentially affect activities in low earth orbit (not necessarily geostationary orbit) as well as opportunities for these new claims should be discouraged if the net effect inhibits full use of space for peaceful purposes. For this reason it is strongly suggested that the effects of delimitation be further analyzed. Specifically, in further deliberation by the COPUOS and its Subcommittees, more attention should be given to what the consequences might be to non-government entities from a precise definition of outer space. A definition which results in watering-down the effectiveness of the space treaties could frustrate their underlying objective of encouraging broad international use of space to assure that benefits are derived for mankind to the greatest extent possible.

Space is still the new frontier in more ways than physical boundaries. Just what future activities will be involved is anything but certain. However, as stated in the preamble of the 1967 Outer Space Treaty the state parties expressed that they are "Inspired by the great prospects opening up before mankind as a result of man's entry into outer space." Much has been accomplished since 1967 as evidenced at UNISPACE 82. Much more will be accomplished. If we have to change the rules, let us know why and what the effects will be.

Mr. Cassidy's presentation was followed by a lunch break after which *Dr. Vladimir Kopal,* Deputy Chief of the U.N. Outer Space Affairs division was asked by the Chair to serve as moderator for the afternoon session. *Dr. Kopal* started by pointing out that he grew up understanding what a "moderator" means. Then he went on to state:

It means the moderator should himself be moderate, that he should try to do his best that the audience be also moderate, because I see many familiar faces with whom I have been associated for so many years. I think our discussion will be very rebellious yet at the same time useful and friendly. I would like to give, with your permission, Mr. Chairman, the floor to Mr. Bortzmeyer, the Deputy Secretary-General of UNISPACE '82, who is here among us now. He has kindly accepted our invitation to come and speak here because, first, he is the Deputy Secretary-General of this Conference, and, second, he served as the Chairman of the United Nations Group of Experts on the work and preparation of a study for the U.N. on the project of establishing the International Satellite Monitoring Agency, submitted on June 10, 1982 to the Secretary-General (Doc. A/AC. 206/14). I think it is a great advantage to have him here with us and I would like him to be kind enough to speak to us on the technical part of that program.

In taking the floor *Mr. Bortzmeyer,* promised to be brief and went on to say:

I had the honor to chair a group of experts for the U.N. on the subject of the project of establishing an International Satellite Monitoring Agency—for the purpose, among others, of world peace and monitoring the disarmament and arms control agreements. The scope included technical, legal and financial aspects. Just to highlight some of the technical aspects of this problem, let me randomly pick out a few of them, which, in my view at least, should be kept in mind, when later on, one discusses the legal aspects.

An International Satellite Monitoring Agency is a proposal that would basically do on a U.N. global or world-wide level, for the benefit of Member States, a job that other countries do with separate reconnaissance satellites, as presently being done by the two outer space super powers, to enable them to keep some strategic bounds between the two of them. The establishment of such an Agency requires first, that a group of its Member States be able to provide some sort of technical input into it. You are aware of the fact that the technology for reconnaissance satellites or types of observation satellites is presently available. I wish to point out that this technology is in the process of spreading out and being disseminated. Like many of the technologies, the high-quality electronic devices are needed for such satellites and are slowly being spread out among other countries. It has been said that the deepest we have been in China has been by reconnaissance satellites, which contained photos of the earth from space. France has made a full study of a major reconnaissance satellite system and the Japanese defense establishment has been playing with ideas of major observations for the Japanese defense agency. The civilian observation technologies by satellites, the so-called remote sense technology, disseminated throughout the world, established satellite space segments as we call them: that is the American LANDSAT system, and the corresponding system in the Soviet Union. The French are getting ready to launch, in 1984, a very much improved "Spot" civilian remote sensing satellite. I might say it is almost on the borderline between what is useful for strategic purposes, as opposed to civilian purposes. The European Space Agency has a remote sensing program which could get into outer space in about 1987. All the countries, perhaps the majority, or most countries, have monitoring programs of their own which are being implemented right now or will be soon in orbit—China, India, Japan and others. Technology for civilian satellites and monitoring satellites is spreading out whether we like it or not.

Reconnaissance technology has disseminated to a large extent. European countries are in possession of it, the Japanese also, India is, China is. There is plenty of room for reconnaissance function in Latin America. And finally, many countries are associated with the groundwork processing data from observation and monitoring satellites and data is disseminated worldwide. Africa, Latin America, Asia and remote places, Third World places, can receive and process data from satellites now or in the near future from remote sensing satellites. Therefore, I am confident almost any member country from the international community would be able to feel he can be a piece of the stone of the edifice at the start of the edifice of an International Satellite Monitoring Agency.

I keep mentioning monitoring satellites because clearly if one is going to monitor disarmament agreements or arms control agreements, on an international basis, one has to use satellites having a performance that major powers use presently, to get information on the other parts of the world. These reconnaissance satellites are not essentially different from the civilian remote sensing satellites. They have more powerful devices. But in essence, the devices are not much different, except in technology and their state of scientific refinement for their reconnaissance purposes.

There is one big difference in terms of strategic utilization or peacekeeping utilization which is very unique. When using telephoto lenses, the scope of the landscape explored tends to decrease. If one runs into high resolution, one must accept a sharp reduction in the breadth of the swath reach of the satellite camera sweep when it passes over the earth. A civilian orbit takes about 19 days to photo the whole surface of the earth. For the reconnaissance satellite to pinpoint details of one meter or ½ meter in size would

require hundreds of days. So this type of peacekeeping reconnaissance satellite has to be maneuvered in some way to cover those parts of the world one is interested in at the moment. One can not rely on indifferent monitoring, for it could take hundreds of days to get exactly what one wanted. These are some of the technological problems apart from the organizational, operational and funding problems of an International Satellite Monitoring Agency.

After *Mr. Botsmeyer's* presentation *Mr. Finch* made the following concluding observations:

First, I want to call your attention to a new non-profit private organization formed in the U.S. similar to the proposed International Space Agency much discussed at UNISPACE '82. This is called "International Association for Space Cooperation." It is incorporated in the State of New York and is in the process of funding. It is trying to set up for the benefit of peaceful non-governmental organizations and others (including the private sector) available information regarding research projects being carried out by the diverse outer space research organizations throughout the world. Its purpose is simply to stop duplication. However, a second purpose is to try to coordinate the times of major meetings, conventions and functions of space-related, non-governmental organizations, because the major meetings often conflict, thus creating problems for every organization, as well as governments and specialists.

My second point is that in giving a great deal of thought to outer space, I have found some basic economic truths of outer space, which are tied to the science and law of outer space. Since our discussion here today was essentially a focus upon the legal, economic and political problems of the peaceful uses of outer space, I would like to conclude by listing the six elements that permeate the world legalities, politics and economics of Outer space.

The world is becoming aware of the term "Ecospace," first introduced internationally in 1975 in Montreal, Canada at the President's Function of the American Bar Association. The basic Ecospace truths are as follows:

1. outer space peculiarly requires very long-range policy planning. A minimum 5-year program is essentially in outer space planning. Otherwise, a tremendous waste of money and time is the result;
2. Outer space is inherently international by nature;
3. Outer space holds an important solution to the global resources conflict;
4. Outer space is the key factor for world peace, world information, world trade, every nation's economic development and every nation's national security;
5. The greater the number of nations participating in an outer space policy or project, the greater the assurance of non-threat to any nation's national security, and the greater its national popular support and thus the greater its contribution to world peace.
6. Outer space is so big and so vast in economic cost and expense and so rich in rewards that it has the same scope as the word infinity has to a scientist.

Pragmatic, materialistic, scientific benefits we now enjoy on earth have really come to mankind because of the last 25 years of mankind in outer space. Many scientists have wondered if Einstein and outer space are not really the true keepers of world peace, in the biggest sense of the word.

The highly successful session was closed by the chair at 4 p.m.

Stephen Gorove
IAF delegate to
UNISPACE 82

*5. UNISPACE FORUM organized by COSPAR and IAF, Vienna, Aug. 4-6, 1982**

The UNISPACE FORUM which preceded the UNISPACE 82 conference was organized at the initiative of Professor *Yash Pal,* the Secretary-General of UNISPACE 82, by Prof. *J. F. Denisse,* the President of COSPAR and Prof. *L. Perek,* the President of IAF. There were a total of 184 people from 42 countries participating in the FORUM.

Following the general introduction by Prof. *Denisse* a report was presented on the COSPAR/COSTED/UN Symposium on the Role and Impact of Space Research in Developing countries, which was held in conjunction with the COSPAR meeting in Ottawa, in May 1982. The Forum then concentrated on the discussion of a number of subject areas which included the Relevance of Space science for Development, Remote Sensing, Communications, Social and Economic Implications, Management of Space, and Future Space Programs of Interest to Developing Countries.

The session on the Relevance of Space Science for Development stressed the importance for developing countries of obtaining scientific and technical capacities and the necessity of international cooperation. It listed well informed decision makers, creation of enduring local competence and a minimization of the negative effects—as some of the conditions for success.

The session on Remote Sensing covered two areas: first Meteorology, Climatology and Oceanography and, second, Agriculture, Geology and Geodesy. With respect to the first area, the systems characteristics were identified and the importance of the continuity and consistency of acceptable operational systems were stressed. It was also pointed out that long-term time series and data from different types of satellites were essential for oceanographic and climate studies. As to the second area, the potentials and limitations of space observations were discussed. In this connection, it was pointed out that there was a need to move toward a well coordinated multi-national remote sensing system with compatible and complementary satellite and ground components and a long-term strategy had to be developed to confirm space and assure stability and calibrations of instrumental performances so as to monitor the relatively slow but important changes on the surface of the Earth which have a direct bearing on the quality of life.

The session on communications was also divided into two segments: one dealing with educational uses of Communications Satellites and the other focusing on "Communications Satellites: Point to Point, 'Commercial Uses' ". The presentation on the first topic noted about 41 projects running from India, Indonesia and China to the U.S.A. and Canada and stressed the necessity of implementing new technology in reaching remote areas with the required educational materials. Coverage of the second topic pointed to the remarkable technological development of satellite communications achieved in the last 20 years and the general trends in space technology toward larger spacecraft, smaller earth stations and digital transmission. The advantages of the concept of clusters of satellites was emphasized along with the possible system configurations for various services. Attention was also focused on the implementation of satellite communication system in the developing countries.

*For a more detailed account of the FORUM, *see* UNISPACE 82, Doc. A/CONF/BP/14 (8 August 1982).

There were a number of major policy issues raised by Ambassador *P. Jankowitsch* in his keynote paper addressed to the Social and Economic Implications. Among them were: the question whether countries advanced in space technology were ready to share their knowledge and benefits with other countries; whether it was necessary and possible to bring total international control over all space developments; whether it was possible to control military developments in space; whether and in what manner could terrestrial and space science and technology be combined for maximum benefits to all of humanity; and the issue of the impact of large-scale space industrialization on the terrestrial environment.

The session on Management of Space was devoted to two distinct subjects: Communications Frequencies and Interactions of Space Objects. The first one focused on the role of the International Telecommunication Union, its bodies and regulatory procedures while the second topic embraced discussions on possible interferences and interactions between space objects of all types, and between space objects and the environment with a view to provide an objective basis for possible measures restricting or avoiding any possible harmful effects.

Finally, representatives of nine space agencies took part in a round table discussion on Future Space Programs of Interest to Developing Countries. The session was coordinated by *Roy Gibson* (U.K.), former Director General of ESA, and the agencies on behalf of which representations were made included Arabsat *(Dr. Ali Al-Mashat)*, the Chinese Academy of Technology *(Prof. Jindong Sun)*, CNES *(Prof. Pierre Morel)*, DFVLR *(Prof. Hermann Jordan)*, ESA *(Mr. E. Mallett)*, the Indian Space Research Organization *(Prof. S. Dhawan)*, the Space Research Institute (IKI) in Moscow (Academician *R. Z. Sagdeev*), NASA *(Dr. Burton I. Edelson)*, and NASDA *(Dr. Hiroshi Uda)*. The statements dealt with some of the planned activities of the respective agencies and the ensuing brief discussion stressed, *inter alia*, the need to pay more attention to educating the general public as to the real and practical benefits which expenditure on space programs bring.

Stephen Gorove
IAF delegate to UNISPACE 82

6. *The 25th Colloquium on the Law of Outer Space, Paris, Sept. 27-Oct. 2, 1982*

This Colloquium took place during the XXXII Congress of the International Astronautical Federation in the Congress Building near Port Maillot in Paris.

The Colloquium was very well attended by lawyers from all parts of the world and also by representatives of several international organizations, among them the United Nations.

The four official subjects on the Colloquium's agenda were the following: Legal Aspects of the Protection of the Earth and Outer Space Environment, Legal Aspects of the Peaceful Use of Outer Space in the Light of Article IV of the 1967 Outer Space Treaty, Determination of Applicable Law to Living and Working in Space, and Legal Aspects of Direct Broadcast Satellites. On these subjects so many papers were received that it is not possible to discuss them all.

Professor Pépin was the Honorary President, whereas *Professor Colliard* acted as President of the Colloquium as a whole. As such, he commented on the papers and discussions after each session. Because of its quality this proved to be a great asset to our sessions. After the opening remarks of the President of the International Institute of Space Law, *Dr. Bourely* chaired the first session and *Dr. Haanappel* acted as Rapporteur. The authors of the papers written for this session gave a summary of their papers after which a discussion followed. One of the papers that awoke a lot of interest was *Dr. Perek's* (Czechoslovakia) paper on Traffic Rules in Space with very realistic and practical observations on collision avoidance, traffic separation, rules on inactive vehicles, pollution prevention, identification, and so on. In the discussion *Professor Cocca* (Argentina) backed these ideas and explained the Argentine doctrine on the subject matter. Another subject on which reactions were received was the problem of debris, a topic on which several authors wrote a paper. In the discussion, *Professor Gorove* (USA) stressed that current space law only knows the notion of "space object" and that it would be important to determine whether a "space object" includes "space debris". *Dr. Majorsky* (USSR) did not think that it would be necessary to define the term "space debris", there already being a definition of "space object". He observed that the Treaty of 1967 was not interpreted and used to its full potential. *Dr. Majorsky* did not think in terms of an international body but he stressed international cooperation on all levels. *Dr. Okolie* (USA) was of the opinion that when a space object desintegrates, it is debris. *Dr. Finch* (USA) considered that inactive space vehicles were not debris and that there was an obligation to re-orbit such vehicles, especially when they were in geostationary orbit. In several papers the need of an Outer Space Agency was stressed. In this connection, opinions expressed at UNISPACE 82 in Vienna were mentioned.

The synthesis of *President Colliard* (France) stressed that law in the field of environmental protection had still to be created and that the terms in the treaty dealing with accident and damage did not cover debris.

The second session was chaired by *Dr. Kopal* (UN) with *Dr. Benkö* (FRG) acting as rapporteur. On this important subject there was a long list of speakers, so that the discussion and synthesis of *Professor Colliard* had to be adjourned until the fourth session. The authors of papers gave their different views on the interpretation of Art. IV of the Space Treaty of 1967. The session continued in a peaceful atmosphere but brought no new ideas, and controversial views were subdued. Only the paper of *Mrs. Galloway* brought to the fore a constructive solution in proposing cooperation between technicians and lawyers to see what could be done to prevent military developments in space.

In general two views could be discerned: one preferring to regulate satellite weapons (western countries), the other wishing to outlaw all weapons in outer space (eastern countries). Moreover, it seemed to me that there has been more and more of a tendency to interprete the term "peaceful uses" in the sense of "non-military" instead of "non-aggressive". Several papers referred to the French proposal of 1978 to establish an international agency for monitoring satellites (ISMA), as a means of verification. Satellites as verification means are allowed under the SATL I Convention. Further problems under discussion included weapons of mass destruction and free passage through cosmic space. *Dr. Majorsky* remarked during the discussion that the views expressed were theoretical and that no practical solutions were mentioned.

Professor Colliard observed in his synthesis that Art. IV has a limited scope. First of all, he said there are problems of definition and delicate problems of disarmament. Then he pointed out that the fundamental text was not Art. IV but Art. III, that refers to the Charter of the United Nations stressing the peaceful uses of outer space as a principle, notwithstanding developments. Furthermore, he observed that the U.N. General Assembly has passed Resolution 3969 in this connection and that non-militarization was to be preferred to demilitarization.

The third subject, less controversial and more of the future, contained a palet of subjects treating the applicable law on space activities, varying from a philosophical approach to very down-to-earth observations on contracts relating to these activities and to the law that could be applied to them. On this respect, the liability of private companies working in space could cause problems. Also the term "common heritage of mankind" was considered. Not all papers referred to the official subject "Living and working in space". However, the topic of the session was discussed in terms of the choice of law applicable to activities in space, as well as the conflicts of law problems. The substantive and conflicts comparison approaches were taken by the papers of *Haanappel* and *Dessausure,* and *Sterns* and *Tennen,* respectively. The topic of living and working in space also extended to a discussion of local government for a space settlement, as well as to the legal problems between settlements and the earth nations involved. The session was chaired by *Dr. Vereshchetin* (U.S.S.R.) with *Dr. Heere* as rapporteur.

Professor Colliard emphasized in his synthesis the importance of the use of telecommunications, the consent to allow flights above the territory of a state, and contracts concluded between states. He stressed that the astronauts and cosmonauts do not live in space but, at present, only stay there for a certain time. He noted several problems that could occur,—seeing in general the same classical problems in space as on earth in this respect.

The fourth session on direct broadcast satellites was the last but certainly not the least because of the subject's importance. The session was chaired by *Mrs. Eilene Galloway* with *Marcia Smith* acting as rapporteur. Besides surveys on national legislation on the subject several general topics were handled such as the use of geostationary orbit, the ITU, Radio Conferences, and so forth. Reconciliation of views between countries with particular interests will be necessary. *Professor Christol* (USA) in his paper singled out what the common interests were. *Dr. Finch* (USA) referred to the discussions on this subject in UNISPACE 82 and submitted that "Ecospace, the economics of outer space, and rapid technological changes are now the prime factors for developed and less developed countries" in relation to DBS. After some observations from the participants in the discussion, *Professor Colliard* gave a synthesis of the subject reflecting his great knowledge of the topic.

Finally, it must be mentioned that on October 2, a Round Table of technicians and lawyers was held on Energy from Outer Space.* *Professors Gorove, Cocca* and *Diederiks-Verschoor* took part from the side of lawyers, each covering a different aspect of the problem, such as WARC Conferences, sovereignty and relevant treaty provisions. The discussion was very lively, but touched mainly on technical problems.

Dr. I.H. Ph. Diederiks-Verschoor
President, International Institute
of Space Law, IAF

*For a report on the Round Table, *see* Events of Interest, 7, *infra.*

7. Roundtable on Energy from Outer Space, IAF Congress, Paris, Oct. 2, 1982.

Under the auspices of the 33rd International Astronautical Congress in Paris, a roundtable on Energy from Outer Space: Problems of Technological Feasibility and International Cooperation, was held in the Palais des Congrès, Porte Maillot, on October 21, 1982. This session was organized by the Scientific-Legal Liaison Committee, a body jointly established by the International Academy of Astronautics (IAA) and the International Institute of Space Law (IISL). The Committee, the establishment of which was once initiated by the late Professor John Cobb Cooper (USA), is composed of members of both these institutions and its main task consists of studying problems of common concern for both, scientists and lawyers.

It should be recalled that the IAA-IISL Scientific-Legal Liaison Committee, has so far been the only international body in which scientific, technological and legal experts get together in order to consider selected topics of the present or prospective space activities. Such discussions permit a better understanding of problems which deserve such a complex consideration from the part of different scientific and humanistic disciplines. Headed by Professor *Manfred Lachs,* judge and formerly President of the International Court of Justice, who for many years has been orienting the interest of the Committee to subjects of high significance, the Committee already succeeded in convening as many as nine roundtables in the period of the past 15 years. Most of them were prepared jointly by *Mr. Pierre Contensou,* formerly Director General of ONERA (France) and *Dr. Vladimir Kopal,* now Deputy Chief of the Outer Space Affairs Division (United Nations), who served as organizing co-chairman of these sessions with *Dr. Michel Bourely* from ESA as rapporteur.

The list of the roundtables accomplished up-to-date indicates what the scope of interest of the Committee has been. The first two sessions, held respectively in Belgrade (Yugoslavia), 1967 and New York (USA), 1968, discussed the problems of a definition of outer space in the light of scientific factors important for defining outer space. Two roundtables dealing with space activities which might have harmful effects on the environment were held, the first in Constance (FRG) in 1970, the second in Vienna (Austria) in 1972. The following discussion of this type was convened to Amsterdam in 1974. Its subject read "Space Stations—present and future. Scientific and technological opportunities; Identification of legal problems involved." Two roundtables, held respectively in Prague (Czechoslovakia) in 1977 and Dubrovnik (Yugoslavia) in 1978, were devoted to scientific and legal aspects of international cooperation in remote sensing. In 1979 a session on "Scientific and Legal Aspects of Large Systems in Space: Problems and Prospects" was held in Munich (FRG). Contributions submitted to these roundtables were regularly included as *Addenda* in the respective volumes of Proceedings of the Colloquia on the Law of Outer Space published by the International Institute of Space Law of the International Astronautical Federation. Finally, the roundtable in Paris followed in 1982. The remaining part of this report will be dedicated to this session.

Certainly, the Paris roundtable on problems of energy from outer space was not the first discussion on this attractive topic. As a matter of fact, this subject was also included in the program of the panel discussions organized by a group of nongovernmental organizations during the Second United Nations Conference on the Exploration and

Peaceful Uses of Outer Space in Vienna, in August of the same year.[1] Moreover, many other meetings held in previous years and an extensive list of publications on this subject might be recalled here.

Nevertheless, the Paris roundtable had a specific character, for its aim was not only that of outlining the main technological problems to be solved in order to make a solar energy project feasible, as was usually the case of the foregoing meetings. In addition to this aim, the roundtable was to identify the legal problems connected with establishing solar power systems. Finally, an outlook on the main fields of international cooperation to be developed for these purposes was to be given.

The organizers of the Paris roundtable succeeded in engaging a considerable list of speakers on the subject. The name of *Dr. Peter E. Glaser,* President of the Solar Energy Foundation (USA), whose pioneer efforts developed in this field are widely known, was on the top of this list. In his paper called "Space industrialization—the context for energy from space", he presented a comprehensive image of the state of the problem. *Dr. Glaser* particularly emphasized that during the next few decades, space technology, first developed to meet scientific goals, would be adapted and expanded to make increasingly important contributions to the world economy. Space industrialization could provide valuable new services, products, and processes on Earth and lead to further expansion of human activities in space. In this connection, the speaker reminded the audience that energy from space was especially promising. Broad-based technical studies and comprehensive societal, economic and environmental assessment during the past had indicated that such a development could be of global benefit.

The speaker then described the technical scheme of SPS and recalled that the SPS development would benefit from the experience gained in many other space-related activities, as well as from the development of generic technologies. In concluding his contribution, *Dr. Glaser* said: "The transition to renewable non-polluting energy sources is inevitable, and the SPS is a major option for assuring a secure and continuous supply of electricity on a global scale. Furthermore, the SPS is an integral part of the evolution of technologies contributing to a growing and maturing space industry. Energy from space is a worthy goal for expanding human activities in space with the widest possible global benefits."

The second speaker was *Rudolf C. Meiner* from the European Space Research and Technology Centre (Noordwijk, the Netherlands) who presented a paper called "The Solar Power Satellite. A programme for development aid". From among many aspects of SPS—technical and economic, environmental, societal, political and institutional—he qualified the latter as the most difficult problems to solve. In contrast to the development in space telecommunications the SPS was only a concept for which an international organization was needed long before any hardware would be developed. Hence, he suggested to initiate a gradual, phased approach which would allow a relatively modest start and create increasing incentives for expansion, because of early tangible results and a clearly understandable long range goal. After a more detailed description of three phases suggested for the establishment of a full Solar Power Satellite System, the speaker predicted that this large development and building program whose cost was estimated by him in the range of 100 billion dollars, would create an

[1]For a report on the NGO's at UNISPACE 82, *see,* Events of Interest, 3, *infra.*

industrial/economic boom like no other single project ever before. Such boom could be shared by a very large number of nations and over a relatively long time period.

The third speaker, Professor *Stephen Gorove* from the University of Mississippi Law Center (USA),stressed at the outset of his contribution that a careful analysis of all the factors and ramifications, including the impact of SPS project on socio-economic, legal, environmental, international and other considerations and an evaluation of alternative courses of action and their likely effects was imperative before any rational decisions could be made. Further in his paper he concentrated on legal implications of the use of the geostationary orbit for purposes of SPS and presented a detailed analysis of all relevant documents relating to the use GSO as worked out in the last decade within the framework of ITU. In particular, he suggested an interpretation of the role of the forthcoming World Administrative Radio Conference which should "guarantee in practice for all countries equitable access to the geostationary satellite orbit and the frequency bands allocated to space services". Bearing in mind that the legal problems associated with the use of GSO are not unique to SPS, the speaker at the same time admitted that they could become unique in relation to the determination of priorities with respect to types of uses, should be increasing demand on the use of this limited resource call for a determination of such priorities. Future energy scarcity on earth, should it arise, would place the use of SPS in a category of higher priority than some of the other types of uses. In concluding, Professor *Gorove* reminded that among several challenges the international community was facing was the determination of acceptable criteria for defining "equitable access" and the development of new techniques for a more efficient use of GSO and the radio frequency spectrum in order to alleviate possible increasing pressures on their use.

Professor *Aldo Armando Cocca* from the University of Cordoba (Argentina) qualified in his paper SPS as a visionary and, at the same time, realistic concept. As he said there ssemed to be no technical obstacles that could not be surmounted in the next two decades or perhaps before. The speaker also attired most of its attention to the problem of GSO and geosynchronous satellites saying that whether SPS were to be deployed as a microwave, laser, or mirror system, it would affect some portion of the electromagnetic spectrum. A microwave system would be the most problematic bacuse communications of all sorts shared this portion of the spectrum.

Turning to the legal aspects of the problem, Professor *Cocca* first made it clear that there was no specific regulation of solar energy. The first document on this subject presented to the United Nations had been "International problems arising from the exploitation of solar energy and other related energies" submitted by Argentina on 25 May 1976.[2] He also recalled that already in 1976 he had proposed general principles on solar energy and introduced the last amended text of those principles to the roundtable. It was declared in this draft *inter alia* that the principle of the "common heritage of mankind" was applicable to the Sun and its natural resources, as well as to all other energy captured in outer space and transmitted to Earth (principle I); and that the management of solar and related energies should be carried out through international machinery with sufficient capacity to ensure its rational and equitable use (principle XII).

[2]Doc. A/AC. 105/L. 91 (1976.)

Professor *I.H.Ph. Diederiks-Verschoor* from the University of Utrecht (The Netherlands) presented a paper called "Legal aspects of solar power satellites—Impact on the environment". First in this paper, she analyzed the risks that SPS operations would imply for the human environment. In this light, she then examined what place environment was occupying in the existing structure of international law, and whether that structure was sufficiently geared to cope with the problem. Professor *Diederiks* arrived at the conclusion that a rudimentary foundation for protection of the environment existed, thanks mainly to the 1967 Space Treaty. On the other hand, the fabric of that legal structure was very loosely knit, leaving many important gaps to be filled. Particularly unsatisfactory was the lack of any rule making it mandatory for States to act in such a way as to preclude any possibility of contamination of the environment. Another such aspect was the absence of adequate rules of liability and sanctions. With a view to future SPS experiments serious thought should be given to the question whether and in what way the situation could be remedied or at least improved. Professor *Diederiks* considered as the best solution "to lift issues affecting the environment completely out of the current legal structure and to make a concerted effort supported by as many States as possible to arrive at a special Convention or even Charter". In her opinion, such an agreement would also have to include special safeguards that might be required in connection with SPS operations, as well as well-defined and compulsory standards of behavior for States to ensure that any damage be reduced to an acceptable level. In addition, a satisfactory definition of "environment" and "damage", the latter to replace that given in the Liability Convention, should be spelled out in the new agreement. In this connection, the speaker recalled that a Study Group of the David Davies Memorial Institute, which had previously prepared a Draft Code of rules on the exploration and use of outer space, also drafted rules concerning changes in the environment of the Earth.

The last speaker, *Dr. André Lebeau* (Etablissement Public de la Villette, Paris, France) first considered in his intervention the feasibility of SPS projects. Furthermore, he analyzed the question of their economical competitiveness in comparison with other methods of producing energy. The speaker said that the economic feasibility of SPS would be a function of the dimensions of the system which again would raise the question of accessibility to this system. In his opinion the economic feasibility of SPS was incontenstable in the short run, but it was not possible to say anything as to the long run.

In the discussion that followed after the presentation of papers, a number of technical, economical and juridical issues were recalled. First of all, a very principal question was raised by *Wilbur L. Pritchard,* President of Direct Broadcast Satellite Corporation (USA), namely why it was necessary—given the absolute necessity of using solar energy, its inexhaustibility and non-polluting nature—to collect it in the geostationary orbit. In his opinion, it was technically much easier, undoubtedly cheaper and politically not more difficult to collect the solar energy and distribute it terrestrially. Also the environmental issues and coordination with communications and other services, would be much easier.

Another question was raised by *Dr. R.J.L. Morel* from the North-Holland Publishing Company (The Netherlands): Was it not true that the rich countries would only invest in such higher investment projects when developing countries committed

themselves to participation in a SPS project *a priori*? He considered, however, such commitment too high, adding that the developing countries would continue their traditional solar projects which were difficult and expensive enough.

In answering these questions *Dr. R. C. Meiner* made it abundantly clear that it was not possible to compare a small solar panel near the equator with the cost of SPS, but rather, in the long run, the investments needed to assure a large part of the baseload electric energy for the industrialized world in the 21st century, where the only alternatives would be fission, breeder or fusion reactors.

In replying to another question by *Dr. Morel,* whether the sums to be invested in an enormous space infrastructure for SPS would ever be made available, *Dr. Meiner* emphasized that large infrastructures would have to be established in space for other purposes, too, such as space manufacturing, service and maintenance of satellites and hence SPS could evolve from an existing industrial base in space. He reminded that his paper outlined a plan with a 'phases approach' in order to delay heavy investments as long as possible.

In this part of the discussion *Mr. P. Contensou* (France) noted that one of the drawbacks of SPS was the fact that the system itself was an energy consumer. He wondered what the ratio between energy used for SPS and energy sent to Earth would be.

As to legal aspects of the problem, Professor *Carl Q. Christol* from the University of Southern California (USA) first recalled that legal instruments were often behind, or even in conflict with the technological development. He evidenced this affirmation by an analysis of Article II of the 1967 Space Treaty and Article 11, para. 2 of the 1969 Moon Agreement. Furthermore, he made it clear that the ITU Convention was based not only on the principle of equitable and efficient use of natural resources but also on distributing these resources on the basis of the needs and contributions of those having the capability of using them. This principle would be also applied in case of SPS. Thus the ITU Convention and, similarly, the WARC resolutions allocating frequencies and positions in orbit to States, though not having the same legal nature as the space treaties, were contradictory to the principles of the 1967 Space Treaty and the 1979 Moon Agreement which prohibited any appropriation in space.

In his answer Professor *Stephen Gorove* expressed a different opinion relating to the interpretation of the 1967 Space Treaty: Article of that Treaty appeared to abolish only the territorial and not the functional aspects of sovereignty which reappeared in Articles VI, VII and VIII confirming the jurisdiction and control of States over objects launched by them into outer space. On the other hand, the only appropriation prohibited by Article II was that which was purely "national" and other forms of appropriations were not excluded.

In this connection Professor *Charles Ch. Okolie* (USA) expressed the view that Article II was not disputed by SPS which did not imply any appropriation of outer space. At the same time, he emphasized that all countries, whatever their capabilities of participating in the establishment of SPS they might be, had an equal right to benefit from this achievement.

The roundtable discussion on energy from outer space held in Paris thus confirmed a high complexity of the problems involved. Much remains to be done before a project

of this kind, feasible from technological, economical and political point of view, could be started. A close cooperation of all those wishing to work for its accomplishment is necessary. The Paris Roundtable was a modest, but certainly not the least significant contribution for this end.

Vladimir Kopal
Deputy Chief, Outer Space Affairs
Divison, United Nation Secretariat

(b) Short Accounts

8. Seminar on the Applicability of Space Science, April 19-23, 1982, Quito, Ecuador.

On the occasion of the Second U.N. Conference on Peaceful Uses of Outer Space (UNISPACE 82) held in Vienna, member states of the United Nations were requested to present national monographs regarding the status of science and space technology in different countries and its political and legal implications.

In one of the sections of the National Monograph of Chile it was established that one of the most feasible means to obtain a rational utilization of space technology was the creation of a Latin American Space Agency. It was further stated that only through a regional mechanism of effective cooperation could negotiations with developed countries be carried out with better possibilities of success and could a more rational channeling and a less costly technology be obtained.

Prior to UNISPACE 82, a preparatory Seminar on the Applicability of Space Sciences was held in April of this year in Quito, in which representatives of all Latin American nations participated and Chile's proposal for the creation of a Latin American Space Agency was approved by consensus.

In support of the establishment of such agency *Mr. Raimundo Gonzalez* of Chile made the following observations:

> The social and economical growth of the Latin-American countries should be based on the use of their own capabilities and resources.
>
> Latin America should use the best available tools to improve its condition at a faster pace. Space technology is one of these tools. Buying it from developed space countries is only justifiable as a step toward a more independent future. Therefore, self sufficiency in this field should be established as a desirable and achievable objective.
>
> Since Latin American countries, isolated from each other could not reach the "critical mass" required for an effective lift-off toward said self reliance, the way out is to add up the available human and material resources in a joint venture: A LATIN AMERICAN SPACE AGENCY.
>
> The first objectives of the Latin American Space Agency should be those of establishing the capabilities to utilize space technology applications, with the idea of progressing toward gradual technical self reliance. The first tasks, for instance, could be those of designing ground systems to be integrated with building blocks purchased abroad, and not turn-key systems. One important condition to be borne in mind is that the systems that be selected as the initial tasks of the agency should satisfy important needs of the Latin American countries, so that the people of these nations realize the advantages of using "space age" tools.

The next step could be to establish goals such as the design and construction of the building blocks of ground systems, so as to progress towards more difficult tasks such as complete space segments.

One important collateral result of activities of this type is that work of people of different Latin American countries toward common objectives will constitute a partnership that may eventually lead to better expressions of the common destiny to which we are guided by our inheritance of race, creeds, language and other cultural manifestations.

In the course of the seminar a body of principles, entailing the most significant legal and political elements required to get the Agency underway, was examined by the above mentioned parties. It was agreed that the Economic Commission for Latin America (ECLA) would be entrusted with the preparation of a study regarding the technical, institutional and financial feasibilities in connection with the creation of said organ. To this effect, it was deemed imperative that ECLA be assisted by a Group of Multidisciplinary Experts on the Subject.

Finally, the Chilean Delegation to UNISPACE 82 obtained the inclusion of new paragraph (par. 353) in the final Report of the Conference, recommending the creation of a regional cooperation mechanism and requesting the Organization of the United Nations to promote this initiative.

Raimundo Gonzalez
First Secretary, Permanent Mission
of Chile to the United Nations

9. Space Law Session, International Law Association Conference, Aug. 29-Sept. 4, 1982, Montreal, Canada.

There were two reports on space law submitted during the 60th Conference of the International Law Association which was held in Montreal from August 29 to September 4, 1982. The first one dealt with the Moon Treaty and was prepared by the Chairman of the Space Law Committee, Professor D. Goedhuis who summed up the discussion following the presentation of his report in the following manner:

1) The Conference, convinced that the Moon Treaty, containing a number of legal, moral and political guidelines, can have a salutory effect on international space relations and can contribute to a greater measure of international cooperation, stressed the importance of States ratifying this Treaty without further delay. The Conference considered that the concern expressed by a number of American opponents of the Treaty on the possible harmful consequences which a ratification might have on American conomic and security interests, were unjustified.

2) The Conference, noting the divergent opinions expressed in the U.N. Committee on the Peaceful Uses of Outer Space on the import of the principle of the "Common Heritage of Mankind" contained in Art. XI (1) of the Moon Treaty, decided to draw the attention of the U.N. to the importance of working out legal norms aimed at the implementation of this principle.

3) The Conference, rejecting the arguments put forward by some jurists that under the terms of the Moon Treaty a pre-emptive exploitation of the natural resources of the Moon was not allowed, expressed the opinion that no moratorium on the exploitation of these resources, prior to the establishment of the international regime provided for in the Treaty, existed.

4) The Conference, taking note of the dangerous escalation in the military uses of outer space, an escalation which, if not halted, would likely lead to profound changes in the strategic balance of the world decided to draw the attention to the Geneva Committee on Disarmament (which at present is discussing means aimed at a prevention of such escalation) to the importance of a strict observance of Art. III of the Moon Treaty, which, in its first paragraph, provides that the Moon shall be used by all States Parties exclusively for peaceful purposes.[1]

The second report focused on the settlement of space law disputes and was prepared by the Rapporteur of the Space Law Committee, *Professor Bockstiegel* who summarized his statement in the following way:

The discussion on a Draft Convention on the Settlement of Space Law Disputes took place on the basis of the respective printed report submitted by the Committee Rapporteur, Prof. Bockstiegel. As suggested in that report, one decided not to enter yet into details of drafting such a convention, but to concentrate first on achieving a common opinion on major basic questions regarding such a convention. There was an agreement that the convention should be open for adherence from states and international governmental organizations only, but that private enterprises active in space activities might also be admitted access to respective courts and arbitral tribunals. The choice provided to members of the convention in Resolution II was considered essential in enabling as large as possible a number of states to sign and ratify such a convention, a solution also accepted in the Law of the Sea Conferences. On the other hand, there was also general agreement that, nevertheless, each state had to accept at least one method for binding settlement, because otherwise such a convention would only serve its purpose in a very limited sense. The convention would, therefore, not allow participating states only to accept recommendations or conciliation as means for the settlement of disputes, since such means would not lead to a definite settlement of the disputes in cases where one of the parties does not agree. Otherwise, Resolution II is self-explanatory.[2]

D. Goedhuis
Chairman, Space Law Committee,
International Law Association

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[1]On the basis of the report on the Moon Treaty the conference approved Resolution I the text of which is repdocued in CURRENT DOCUMENTS, VI, *Infra.*

[2]On the basis of the report on the Settlement of Space Law Disputes, the conference adopted Resolution II the text of which is reproduced in CURRENT DOCUMENTS, VI, *infra.*

10. Direct Broadcast Satellite Conference, Washington, D.C., Sept. 20-21, 1982.

A major international conference on direct broadcast satellites was held in Washington, D.C. on September 20 and 21, 1982. The Conference, entitled "DBS: Prospects and Opportunities," brought together leading business and government representatives in the field of satellite communications from all over the world. It represented the first time that officials of European and Japanese concerns joined their American counterparts in addressing a forum on DBS in the United States.

Co-sponsored by the Phillips Publishing Company and the law firm of Schnader, Harrison, Segal & Lewis of Philadelphia and Washington, D.C., the Conference was chaired by *Delbert D. Smith,* a partner in its Washington office.

The Conference faculty included spokesmen for each of the nine U.S. applicants before the Federal Communications Commission for authority to operate DBS systems, as well as representatives of international DBS operators, the financial, brokerage and underwriters' communities, government agencies and equipment suppliers. The faculty included, among others, such distinguished individuals as *Peter Marshall,* General Manager and Deputy Chief Executive, Visnews, Ltd., London, England; *Donald E. Quinn,* Vice President, New Business Development, R.C.A. Americom, Inc.; *Rolf Arnim,* Managing Director of Eurosatellite, Munich, Germany; *Charles Akrich,* Deputy Director General in Charge of Space Affairs, Telediffusion de France, Montrouge, France; *Paul G. Dembling,* Partner, Schnader, Harrison, Segal & Lewis, Washington, D.C.; *Marcel Mihaeloff,* Chairman, Alpha Telecommunications and Technology, Ltd., Great Britain; *Lars Anderson,* TELE-X Project Manager, Swedish Space Corporation, Stockholm; *Brian Hughes,* Senior Vice President, U.S. Aviation Underwriters, Inc., New York; *Brian Stockwell,* President, Coroon & Black /Inspace, Inc., Washington, D.C.; *Tadihico Inada,* Washington Representative of the National Space Development Agency of Japan, Washington, D.C.; *A. W. Brook,* Assistant Vice President, Satellite Planning, Western Union Telegraph Company; and *Stephen A. Sharp,* formerly General Counsel and now a Commissioner on the FCC.

Paul G. Dembling
Partner, Schnader, Harrison,
Segal & Lewis, Washington, D.C.

11. Law Professors Workshop, St. Louis University, Dec. 10-11, 1982

A Law Professor Workshop on "The New International Economic Order" was held at St. Louis University School of Law, Dec. 10-11, 1982, under the joint sponsorship of the Standing Committee on Law and National Security and the International Law Section of the American Bar Association. A part of this workshop dealt with the "Sharing of Resources: The Common Heritage of Mankind" which was addressed by *Professors John Norton Moote* of the University of Virginia and *Stephen Gorove* of the University of Mississippi Law Schools.

Stephen Gorove
President, Association of the
U.S. Members of the IISL

12. Other Events

The National Space Club held its 1982 Government/Industry Conference on June 22-23 in Tyson's Corner, Virginia with the participation of NASA, DOD and NOAA senior officials.-The 25th Anniversary of the launching of Sputnik was celebrated in September 1982 in Moscow. Cosmonauts of the Intercosmos program and dignitaries from socialist and nonsocialist countries were among the participants. Among the attendees from the U.S. were Dr. Stark C. Draper, Fred Durant, Mrs. Eilene W. Galloway, Ms. Mireille Gerard, and Professor Stephen Gorove. The American Astronautical Society held a meeting during October 1982 in Houston. Ronald F. Stowe of Satellite Business Systems was a featured speaker.

Also in October 1982 legal experts of the Intercosmos countries met for a conference in Prague. The United Nations University and The Hague Academy of International Law held a Workshop in November 1982 on the Settlement of Disputes over New Natural Resources. Dr. Diederiks-Verschoor, Professor Stephen Gorove, N. Jasentuliyana, Lubos Perek and Dr. Delbert D. Smith were among the speakers.

13. Brief News

As a result of a ten-month review the President announced a national space policy that is to set the direction of US space efforts for the next decade. . .STS-6 will introduce the second Orbiter, Challenger. . .The first ESA/NASA joint Spacelab mission is scheduled to take place in 1983. . .The 4th World Telecommunications Exhibition will take place Oct. 26-Nov. 1, 1983 in Geneva, Switzerland.

B. Forthcoming Events

The Twenty-First Goddard Memorial Symposium will be held on March 24-25, 1983 in Greenbelt, Maryland. Its theme will be Space Applications at the Crossroads.

The Association of the U.S. Members of the International Institute of Space Law is expected to cosponsor a program on Space Telecommunications during the annual meeting of the American Society of International Law on April 15, 1983, in Washington, D.C. As in the past, a short business session will follow the program.

The Societé Francaise de Droit Aérian et Spatial will hold a program on "Air, Space and Law" on April 14-5, 1983 in Paris, France.

The 1983 IISL Colloquium will be held in Budapest, Hungary, from Oct. 9 - Oct. 15, 1983, during the IAF Congress, the theme of which will be "International Cooperation in Space." The subjects to be discussed will be: Telecommunications and the Geostationary Orbit; Interrelationship Between Air and Space Law; Responsibility for Space Activities; and Legal Aspects of International Cooperation in Space.

Outer Space and Law (in Russian), edited by P. I. Lukin and A. I. Rudev (U.S.S.R. Academy of Sciences, Institute of State and Law, Moscow, 1980), pp. 140.

In the Soviet Union great attention is given to scientific development of legal problems of outer space exploration. The publication of the book entitled "Outer Space and Law" is a vivid illustration of this fact. The book is written by a group of lawyers, experts on international law, including, *E. G. Vasilevskaya, V. S. Vereshchetin, S. V. Vinogradov, R. V. Dekanozov, E. P. Kamenetskaya, Y. M. Kolossov* and is edited by *P. I. Lukin* and *A. I. Rudev*. This work is devoted to the study of fundamental theoretical problems of international space law not only of today but, also of those problems which may arise in the future.

In the introduction by Professor Y. Kolossov who holds a doctorate in law, it is stated that the use of space by states is directly connected with their political, economic and scientific interests. Analyzing Art. I of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and Other Celestial bodies the author writes that in international space law there exists not just the freedom of space, as stated by many scientists, but a number of "freedoms" beyond which there are limitations rather than absolute freedom. It is also stressed that the pace of progress in science and technology in space exploration is supposed to bring about quicker development and adoption of new international legal rules of space law. The regulating role of these rules will become more important on account of indivisibility of outer space and on account of the really global character of many aspects of space activity (pp. 4-7).

Taking into consideration further extension of space exploration the chapter on "Legal Contents of the Notion of Outer Space" is focusing attention on the importance of the solution of one, probably, the most complicated problem of outer space definition. On the basis of an extensive analysis of publications of Soviet and foreign scientists this work points out a different approach to the issue of outer space definition and the determination of its boundaries. It explains the reasons for the Soviet standpoint on this issue and states that the border between airspace and outer space is to be determined by an agreement and is to be set at a height of 100-110 kilometers above sea level (pp. 44-45).

It is known that in the international law doctrine the question regarding the juridical nature of outer space and celestial bodies as well as of their resources is considered not to be sufficiently studied. The merit of the work reviewed is that this gap is, to a certain extent, bridged by the chapter on "The Juridical Nature of Outer Space, Celestial Bodies and Their Resources". Having studied international legal acts the author of this chapter draws the conclusion that the fundamental principles on which the legal status of outer space is based are the principles of nonappropriation and those of common use. It is interesting to note the way in which the author puts the problem concerning the difference between the juridical nature of the resources of celestial bodies and that of the celestial bodies themselves. The author comes to the conclusion that it is reasonable to use the term "international territory of common use" while defining the juridical nature of outer space and celestial bodies (pp. 46-61).

The chapter entitled "International Space Legal Relations" reveals the meaning of the notion "legal capacity" in international law. The author states that wrong interpretation of this notion might result in the acknowledgement of juridical inequality of states in international law from the standpoint of the ability of states to obtain rights and duties by their actions. Regarding general problems of international law and particular problems of international space law, the author analyzes the major aspects of international space legal relations and properly stresses the idea that rights and duties of international law subjects originate from the major principles and rules of general international law, principles of international space law, as well as specific rules of space law.

The section on "International Legal Regime of Joint Flights of Cosmonauts from Different States" discusses the meaning of the notion "jurisdiction and control" and "any personnel" (crew) which are used in Art. VIII of the Outer Space Treaty. The author concludes that jurisdiction in international space law should mean rights and powers of a state to exercise not only its judicial power but its legislative, and executive powers as well over persons and objects while in outer space, including on celestial bodies (p. 78).

Further development of space exploration will necessitate moving crews from space vehicles belonging to one state to space vehicles of other states. In connection with this there may arise a problem concerning determination of the state which is to exercise jurisdiction and control over these crews. This will call for reaching an agreement about the manner of exercising jurisdiction over cosmonauts—citizens of different states (especially, in the event of creation in the future of permanent international settlements in outer space). The obvious merit of this chapter is that it covers a wide range of international legal problems arising out of joint flights of space crews of different states. Among these problems are: exercising jurisdiction over cosmonauts who may have an emergency landing on the territory of some other state, rendering mutual aid in space, giving notice of dangerous phenomena, and so forth. Moreover, the author does not only bring to light and analyze these problems but tries to solve them.

In the practical uses of outer space increasing importance is attached to manned space stations in Earth orbit. Therefore, it is necessary to make an all-round scientific investigation of international legal aspects of the use of such stations. These issues are considered in the chapter dealing with the "International Legal Status of the Manned Space Stations in Earth Orbit". The authors define the term "manned space stations in Earth orbit", show the features of their international legal regulation depending on their location in earth or circumlunar orbits or on the surface of the Moon. They also focus attention on the legal problems associated with space shuttles and analyze the term "jurisdiction and control" with regard to manned space stations in Earth orbit.

In the reviewed book the authors consider legal problems connected with prevention of harmful influence of space activity over the Earth and outer space. The section on "Space Activity and Protection of the Environment" is, in particular, devoted to this subject. A number of international legal acts are analyzed in it. These acts are considered to be a legal basis of international law and order in space and, at the same time, they directly concern the protection of environment. Studying a wide range of issues on this problem the authors come to the conclusion that in international space law principles and rules aimed at prevention of the Earth and space contamination resulting from space activity are still in the making.

Most important and urgent problems are considered in the book with a thorough analysis of the subject. Therefore, the book should be of great interest to the reader.

Dr. I. Kotlyrov
Lawyer (U.S.S.R.)

History of the International Institute of Space Law, IAF, by Eugène Pépin (American Institute of Aeronautics and Astronautics), pp. 117, $5.00.

This first published history of the International Institute of Space Law (IISL) was introduced at the 25th IISL Space Law Colloquium (Sep. 1983) in Paris—the home of its author—as a tribute to him. Dr. Pépin was a co-founder and a past President of the IISL. The History relates that the IISL parent organization, the International Astronautical Federation (IAF), meeting at The Hague, sponsored the first colloquium on space legal problems in 1958. During that meeting a Resolution was adopted recognizing that international agreements would be necessary to solve space legal problems, and to such end an IAF Permanent Legal Committee was to be created "to study all legal problems concerning space law;" further, the Resolution provided that the UN Secretary-General should be advised thereof and of the IAF's "desire to cooperate with any initiative" taken by the UN "in the area of Astronautics". In the following year, at the Second Colloquium, a Resolution was adopted resulting in the creation of the IISL as a successor to the Permanent Legal Committee.

The History relates the aims, objectives, organization and management of the IISL. Annexes of the History, contained in the booklet and appropriately incorporated by reference, include the "Statutes" of the IISL, its Board of Directors membership, a listing of past IISL Space Law colloquia and of the subjects treated and papers presented, a recital of awards made by IISL and of their recipients, and an alphabetical listing of the IISL world-wide membership—including the address of each member.

Orders for the History should be addressed to the American Institute of Aeronautics and Astronautics, 1290 Avenue of the Americas, New York, N.Y. 10104, with a check payment of $6 which includes postage and handling.

Martin Menter
Vice President, IISL

The World in Space: A Survey of Space Activities and Issues, edited by Ralph Chipman. Prepared for UNISPACE '82. Published in cooperation with the United Nations (Prentice-Hall, 1982), pp. 689. $50.00.

At present the biggest success of the Second United Nations Conference on the Peaceful Uses of Outer Space, held from 9-21 August 1982 in Vienna, Austria, has been the documentation generated for and by the Conference. Part of the preparations for UNISPACE '82 included Background Papers compiled by the UN Secretariat with the assistance of international scientific organizations and individual scientists. With the

editorial assistance of Mr. Ralph Chipman, the material has been revised to incorporate new information and published as *The World in Space* with a table of contents and index.

The topics covered correspond to the agenda for UNISPACE '82. Part I consists of four chapters constituting a general review of space science and technology, an assessment of applications and a look at developments that are likely to occur in the next decade. Parts II and III comprise five chapters examining the key issues before UNISPACE '82, *i.e.* the social and economic implications of the use of space technology. Part IV consists of three chapters on the activities of international organizations concerned with space.

The book is a comprehensive and authoritative review of space activities and international cooperation in space. To complete the UNISPACE '82 documentation, *The World in Space* should be read along with *Outer Space: A Selective Bibliography*, UN Doc. ST/LIB/SER.B/33 (1982), *Report of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space,* UN Doc. A/CONF.101/10 (1982), and *List of Conclusions and Recommendations of the Second United Nations Conference on the Peaceful Uses of Outer Space,* UN Doc. A/CONF.101/11 (1982). These publications will influence the legal discussions of outer space for years to come.

Amanda L. Moore
Treasurer, Association of the U. S. Members of IISL

The United States and the Debate on the World "Information Order" by J. F. Gunther *et. al.* (Washington: U.S. Int'l Communication Agency, 1979), pp. 202.

This book makes a valuable contribution toward fuller understanding of the implications for space law of the current debate on a world "information order." Prominent American experts on international communications have produced this overview of the context of the debate, its historical development in international fora, and its primary issues and implications.

The "National Sovereignty" section analyzes the issues that most directly affect space law. The discussion begins with the observation that proponents of a new information order perceive the information environment of a country as an important resource whose use the nation is entitled to control and supervise as an aspect of its national sovereignty. Emerging satellite technology, including direct television broadcasting, remote earth-sensing, and transborder flow of computer data can circumvent a nation's "informational sovereignty" and has generated demands for laws requiring prior consent and regulation of its use.

The first issue which the authors analyze is whether "direct television broadcasting by satellite from one country to another without the prior consent of the receiving state is a violation of national sovereignty." It is pointed out that although direct broadcast satellites (DBS) would represent a substantial technological escalation of international broadcast capabilities, the United States opposes any present regulation of DBS as inhibiting technological progress, interfering with a nation's sovereign right to broadcast within its borders, and unnecessary in light of other remedies available to nations who wish to block foreign satellite broadcasts. The discussion notes that despite

the fact that DBS is not yet a technological reality (so that debate cannot be based upon actual conditions), many countries have already concluded that unrestricted operations of DBS is unacceptable. Proposals mentioned by the authors to safeguard national sovereignty range from the Canadian-Swedish call for rules of prior consent and participation in programming by the recipient countries to the claimed right by the USSR to prevent any DBS broadcasting into its borders.

Attention is next turned to whether "remote sensing by one nation of another nation's territory without prior consent is an incursion against the sensed nation's sovereignty." While there is recognition of the view that military use of remote-sensing technology infringes upon a nation's sovereignty and has only been conducted covertly, the authors also mention that remote sensing could eliminate the thorny issue of on-site inspection which has stalled talks on nuclear disarmament. On the civilian side, the discussion raises the concerns of developing nations over the use of remote-sensing data about their natural resources by sophisticated governments and corporations in making international political and business decisions. Inasmuch as the U.S. Landsat satellite program is the source of most data and analytical expertise, the emerging nations disapprove of having to share intimate knowledge of their resources with the U.S. government and would prefer to have remote sensing conducted by an international body. The position of advocates of a new world information order is that a state has exclusive rights to information on its own natural resources.

Finally, the authors consider whether unsupervised transborder flows of information on domestic matters via satellite is a breach of national sovereignty. Western European governments initially raised this issue when they encountered problems of safeguarding their citizen's personal records against transferral to foreign data banks whose privacy laws may be more lax. However, the authors noted that access by Western banks to the banking and computerized credit files of Third World governments may be an area of possible future concern, since perceived threats to "informational sovereignty" may be met with such action as Algeria's ban on any transmission of computer data to other countries.

This book also discusses the activities of COPUOS and WARC relating to proposals for regulation of space satellites advanced by proponents of the new world information order. Also included are eight valuable appendices and a lengthy bibliography.

Outer Space and Legal Liability, by Morris D. Forkosch (Martinus Nijhoff Publishers) pp. 290, $43.50.

Outer Space and Legal Liability is an analytical look at the current state of the law dealing with both present and future international liability arising from man's continued conquest of its last frontier, outer space.

Prof. Forkosch begins his book by giving the reader a look at the Liability Treaty of 1972. It is this treaty at which the main thrust of the book is aimed. The premise of the book is that the 1972 treaty "was formulated somewhat hastily and drafted somewhat inaccurately, so that the product is not only a pallid version of a *desideratum* but is also ambiguous, erronius and fallacious. . . ." (p. 23) This book has been written to provide the basis upon which the above premise is formulated.

The book goes into both the 1967 Outer Space Treaty and the 1972 Liability Treaty and points out what the author regards as the inconclusiveness of both in establishing any legal liability. Both treaties are given detailed analysis by the author and he then draws conclusions as to needed changes and additions to them.

Prof. Forkosch concludes with the proposal that there be established an International Court for Outer Space. His suggestions include that the proposed court be formed first as a legislative-judicial body and then ultimately evolve into a purely judicial one.

Space - New Opportunities for International Ventures, edited by William C. Hayes, Jr., (American Astronautical Society, Science and Technology Series, vol. 49, Univelt Inc., 1980), pp. 290.

This volume is based on papers presented at the Seventeenth Goddard Memorial Symposium held March 28-30, 1979. Even though the volume is over three years old, it presents information and ideas which are important for the future.

The central theme of the book is cooperation between governments in the space field, as well as cooperation between governments and the private sector. The book, however, is not limited to these concepts. Papers presented in this volume include discussions about the Tracking and Data Relay Satellite System, Space Travel Systems, and the Space Shuttle, with insight as to how the private sector may take advantage of these programs.

One paper sets forth the plans for the new Tracking and Data Relay Satellite System (TDRSS). It discusses the improvements of the system when compared to the old system. Western Union contracted to design and develop the TDRSS and its president submitted a separate paper which briefly summarizes the reasons why the company engaged in satellite programs, steps they have taken to minimize risks, and the methods which have been used to finance their space activities.

Dr. Myron Malkin, Director of the Space Shuttle Program, authored a paper concerning present and future capabilities of the Shuttle. Emphasis was placed upon the physical characteristics of the Space Shuttle in his paper. Mr. Gilbert Keyes discussed what private enterprise could offer the space program and the private operation of the space shuttle. He took the position that "space" offers U.S. industry important investment opportunities, and that U.S. industry could fill important voids in space program funding if such action could be made profitable. His paper suggested the creation of a government space program which has as one of its assigned goals the major involvement of private enterprise in space.

Dr. James Kramer dealt with the technological programs being used by NASA, and the input of current programs on future programs. He discussed the process of determining needs within the agency, and how new technologies develop from those perceived needs. There is also an overview of technology programs concerning information systems, spacecraft systems, and transportation systems.

Finally, Robert La Blanc, submitted a paper entitled Financing the Space Investment. Two broad topics were covered. The first dealt with changes taking place in the telecommunications area, the second concerned the attitude of the investor toward investing in outer space.

Satellite Communications in the Next Decade, edited by Leonard Jaffe, (American Astronautical Society, Science and Technology Series, vol. 44, Univelt Inc., 1977), pp. 177.

This thoroughly illustrated volume covers the 14th Goddard Memorial Symposium, on the subject of "Satellite Communications in the Next Decade." A series of presentations and panel discussions addresses such topics as satellite communication uses, technology, space transportation for satellite communications, frequency and orbit needs for satellite communications, and the challenge of a changing telecommunications market, as well as national and international issues for satellite communications.

Of particular interest to legal scholars is the latter topic. Bernard Strassburg, of Western Union International, leads the section with an article expressing his impression that the FCC, rather than Congress, is the more effective U.S. innovator of institutional approaches to the use of satellite technology.

An address by Donald Jansky, from the Office of Telecommunications Policy, follows with an emphasis on the need for better satellite use planning on an international scale, including the Soviet Union.

Finally, there is a presentation on the historical development of global technology activity and the methodology of accessing the technology which is involved in long-term satellite communications. This paper was prepared by C. Louis Cuccia, of the Ford Aerospace and Communications Corporation.

Commercial Operations In Space: 1980-2000, edited by John L. McLucas and Charles Sheffield, (American Astronautical Society, Science and Technology Series, vol. 51, Univelt Inc., 1981), pp. 201.

This book represents a collection of the papers and speeches presented at the 18th Goddard Memorial Symposium, held in March of 1980.

The symposium's main theme was the expanding commercial and industrial opportunities related to space transportation as evidenced by the United States' Space Shuttle. The greater portion of the book was devoted to papers dealing with the commercial and technological aspects of space development opportunities. For those interested in space law, note should be made of the paper presented by Daniel Cassidy, then counsel for the Subcommittee on Space Science and Applications, Committee on Science and Technology, House of Representatives. The paper discusses the Space Industrialization Act, which has been pending before Congress (HR 2337), and governmental encouragement of commercial development of space by private enterprise.

The symposium also included a public debate on the Agreement Concerning the Activities of Space on the Moon and Other Celestial Bodies or "Moon Treaty" (approved by the UN General Assembly, but, awaiting ratification). The discussions, unfortunately, were not made available for publication, with the exception of a paper delivered by David L. Kuck, Geological Consultant, Oracle, Arizona. The Kuck paper investigates the possible use of mining laws, similar to those employed in the United

States in the 19th century, to stimulate private exploitation and development of "extraterrestrial mineral resources and planetary surfaces, considered by the treaty to be owned by everyone" , such ownership being viewed as the equivalent of the public domain of the United States during the 19th century.

International Space Technical Applications,19th Goddard Memorial Symposium, edited by Andrew Adelman and Peter Bainum (American Astronautical Society, Science and Technology Series, Vol. 52, 1981), pp. 176.

This volume is a compilation of selected papers which were presented at the Nineteenth Goddard Memorial Symposium held in Pentagon City, Virginia in March 1981. Primarily, the papers focus on issues which will materialize upon the development of an operational space transportation system.

Among the various topics discussed are industry in space, domestic satellite communications, advances in satellite utilization for weather and climate study, and space based energy generation. Most of the essays also explore the role of private sector applications of technology to produce a commercially viable overall space program,and one of them deals with legal issues which need further analysis prior to actual investment by the private sector in shuttle systems and operational support.

Orders of Magnitude: A History of NACA and NASA, 1915-1980, by Frank W. Anderson, Jr. (NASA History Office, Washington, D.C., 1982), pp. 106.

Orders of Magnitude presents a brief organized history of the American space program. The focus of the book is on the major developments of the American space program which have had a noted impcat on the history of man and space.

This monograph presents an overall view of the reasons why the American space program expanded when, and in the areas, it did. Thus the book is a helpful aid in the attempt not only to grasp and understand the history of man's activities in space, but also to grasp a sense of what those activities will be in the future.

The Endless Space Frontier: A History of the House Committee on Science and Astronautics, 1959-1978, by Ken Hechler (American Astronautical Society, History Series, Vol. 4, San Diego: Univelt, Inc., 1982), pp. 434.

This volume contains an indepth historical study of the origins and accomplishments of the House Committee on Science and Technology, formerly known as the House Committee on Science and Astronautics. The Committee was formed in 1959 as a direct response to the Soviet launching of Sputnik in October, 1957. With Sputnik's launching, Congress became acutely aware that the United States was lagging far behind in the space race and needed a directing force to lead our program.

Mr. Hechler details the Committee's coordination and mobilization of NASA (National Aeronautics and Space Administration) through the different chairmen which

headed this select committee. One of the most interesting chapters reviews the initial planning stages of the Space Shuttle which has become our space program's crowning achievement.

The author concludes that the United States' preeminence in space technology will be continued through the coming decades with the outstanding leadership supplied by the Committee on Science and Technology.

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I.

REPORT OF THE SECOND UNITED NATIONS CONFERENCE ON THE EXPLORATION AND PEACFUL USES OF OUTER SPACE

(Following is a summary compilation of the main conclusions and recommendations of the Conference as contained in the report. There is no attempt to exhaustively list all of the suggestions, etc., which are covered in the report; instead, only the major conclusions and recommendations are presented, enumerated according to the three major topics of the agenda. The wording is identical to that used in the respective chapters, except as necessary for proper contextual understanding. For convenience, the listing is in sequential order and not necessarily in order of priority and categorized on the basis of whom they are addressed to. Reference is given to the specific paragraph(s) from which the recommendation has been drawn.)*

I. Introduction and State of Space Science and Technology

1. Conclusions and recommendations addressed to Member States

All nations, in particular those with major space capabilities, are urged to contribute actively to the goal of preventing an arms race in outer space and to refrain from any action contrary to that aim. (Para. 13) In this regard, the Conference urges all States to adhere to the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies and strictly to observe its letter and spirit. (Para. 14)

Space science should continue to have a high priority; in fact, in view of its promising future, it is desirable that support be substantially increased. (Para. 44)

It is desirable that co-operation aimed at launching experimental payloads and crews from one country on spacecraft of another country should continue and be further encouraged. Major space observatories to be set up in the future should also be open to scientists and experimenters from all countries. (Para. 45)

The encouragement of space science and space astronomy in universities and institutions of developing countries could provide an important stimulus and strong support to the development and practical applications of space technology. (Para. 46)

A thorough scientific understanding of the limits of stability of the terrestrial atmosphere under the impact of man-made modifications is one of the most urgent tasks of space science. (Para. 32)

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* Taken from UN Doc. A/CONF.101/11 (1982).

It is essential that the results of experimentation in the field of materials sciences continue to be widely disseminated and readily available to scientists all over the world. It is desirable that the benefits of production in space of new materials be made available on reasonable terms to all nations and all mankind. (Para.54)

It is desirable that opportunities to use facilities in space for biological studies continue to be made available to scientists of all countries in a co-operative and co-ordinated manner. (Para. 58)

It is desirable that experimental research in the microgravity environment be supported and carried out in a co-operative and co-ordinated manner in view of its long-term implications and its interest to humanity as a whole. (Para. 61)

The development of large communications platforms and of electronically interconnected "satellite clusters" should be encouraged. The expected impact of large platforms on GSO must be thoroughly studied in order to avoid any unnecessary congestion in the GSO. (Paras. 71, 72)

International organizations which operate communications satellites should make them available at minimal or no cost during disaster oeprations. An appropriate body of the United Nations system should be mandated to govern the overall operations of the disaster operations communications system. (Para. 76)

Development of technologies and techniques for monitoring pollution and changes in atmospheric constituents, identifying pollutants, and for observations over oceans should be continued and encouraged. (Paras. 83, 84, 85)

Development of meteorological systems that combine frequent observations with the capability for selective high-resolution observations and transmit data at low bit rates should be encouraged. (Para. 86)

The use of rockets for hailstorm control - as demonstrated in the USSR, Argentina and China, for example - should be studied for other countries also. (Para. 88)

All possible efforts must be made to maintain continuity in programmes of operational meteorological satellites, particularly with regard to their financing or any other modification that may be introduced. (Para. 89)

It is desirable that co-operation in meteorology - exemplified by co-ordination of efforts, the free availability of data from meteorological satellites through decentralized, direct reception and rapid world-wide data exchange - be not only continued, but further intensified. (Para. 90)

It is important that operators of remote sensing satellites should give definite indications regarding continuity and unrestricted availability of data at reasonable prices, so that countries can continue to invest in ground equipment or devise alternative means of obtaining the data. (Paras. 92, 96). Also, when systems become operational, a number of users have expressed the need to institute arrangements to enable them to have continued access to data at reasonable costs. (Para. 98)

Space photography is a low-cost approach with respect to data analysis and therefore is particularly attractive for developing countries which cannot afford large investments in ground hardware. A great deal can also be done through simple, inexpensive equipment and appropriate techniques. (Paras. 103, 104)

Ground truth, data processing and analysis of remote sensing data need greater emphasis and it is desirable that countries devote special effort to work in these fields. (Para. 105)

The low investment on ground equipment and the high pay-offs in terms of new information make satellite geodesy and navigation attractive and suitable for most countries. (Para. 109)

It is desirable that wider deployment of both fixed and mobile high-performance laser ranging stations take place, so that internationally co-ordinated measuring campaigns can help develop a better scientific understanding of the earth and its dynamic features. (Para. 113)

Space-based laser-ranging equipment might be useful and cost-effective for certain purposes and its development deserves to be encouraged. (Para. 114)

It is desirable that the computation techniques, equipment and the necessary information for navigation/position-location using satellites be widely disseminated (Para. 119). It is also desirable that world-wide access be provided to satellite navigation systems such as the United States Global Positioning System. (Para. 125; see also Paras. 122-124)

It is desirable that launching services should be provided through bilateral or multilateral arrangements, on equitable terms, to all countries wishing to use them for peaceful purposes; also, the development of more economical space transportation systems should be encouraged in every possible way. (Para. 135)

2. Conclusions and recommendations addressed to international agencies/bodies

All work aimed at reductions in the cost of the ground equipment for satellite telecommunications and broadcasting is worthy of encouragement and support by all countries and international organizations. (Para. 65)

It is imperative that studies and research to achieve the closer spacing of satellites in the GSO and their satisfactory coexistence be intensified, including a closer examination of techno-economic implications, particularly for developing countries, in order to ensure the most effective utilization of this orbit in the interest of all countries. (Para. 66)

It is desirable that ITU continue to study the optimum allocation of bands for various services, the criteria for sharing, and the use of the GSO, with a view to adopting appropriate changes at future World Administrative Radio Conferences or Regional Radio Conferences. (Para. 68) In this regard, careful studies of various trade-offs are needed to arrive at an optimum solution. (Para. 69)

It is desirable that technologies and systems be developed that will enable smaller ships as well to use satellites for maritime communication. (Para. 75)

It is necessary that all possible encouragement and assistance be provided - especially to developing countries - to undertake basic science pursuits. (Para. 77)

WMO should be encouraged to continue its examination of the feasibility of setting up regional or international centres for meteorological data reception and analysis. (Para. 89)

The long-term consequences of the increasing number of launchings should be studied; if there are harmful consequences, corrective measures should be taken. (Para. 135; see also para. 294)

Studies should be made of the implications for international co-operation of the new concepts of large-scale space systems. (Para. 144)

II. Applications of space science and technology

1. Conclusions and recommendations addressed to Member States

It is desirable that developing countries examine the importance of communication (especially to and from rural areas) as an integral element of development (para. 148) and undertake studies to determine the best approach for their communications needs (para. 149).

Countries planning to use satellite communication systems would be well-advised to pay special attention to equipment interfaces, appropriate modems, organizational co-ordination, etc. (para. 150).

Countries planning satellite-based land-mobile communication systems should be encouraged to look at the feasibility of using these systems for rural communication in developing countries (para. 155).

For high data-rate remote sensing satellites, as an alternative to large, expensive national reception and data processing facilities, a network of close co-operation between the national agencies and regional facilities might be considered, possibly in conjunction with a system of distribution of processed data to simple, low-cost user terminals. At the same time, the development of "user friendly" satellites that can work with simple, inexpensive "user terminals" needs to be encouraged (para. 168).

It is likely that many developing countries may have similar needs; those countries should jointly take necessary steps to study these needs and assess appropriate remote sensing systems to meet them (para. 173).

Each country should carry out studies regarding costs and benefits before deciding upon the adoption of a particular application. It should take account of not only economic aspects, but also technical, environmental and social effects that may result from the use of space technology (para. 191). Decisions to use space technology should be based on a proper "needs-conditions-alternatives" assessment and, if possible, also be based on the results of a pilot project (para. 197).

All possibilities for mutually beneficial co-operation between different countries by undertaking complementary efforts should be fully exploited (para. 193).

Space applications do have to potential to make significant economic contributions, and expenditures in this field should be looked upon as capital investments on which there will be a return. Thus, while financial support for such projects through bilateral or multilateral financing agencies is important, countries should themselves strive to raise internally at least part of the finances required (para. 197).

Identification and maximum utilization of already existing expertise in one's own country, or in other developing countries with similar conditions, together with a systematic development of knowledge and abilities required, are important pre-conditions for effective development (para. 199). In order for each c however small or economically poor - to have some element of technological autonomy, it is necessary that due encouragement be provided to indigenous technological development (para. 201).

Countries which desire to engage in the manufacture of various space hardware should seek the advice of competent agencies concerning problems of transferring technology from the laboratory to industry and from country to country (para. 202).

The stimulus of space technology has the potential to help the developing countries narrow the gap and to accelerate the process of development along paths of their choice. This, however, requires that all countries be encouraged to participate in various space applications so as to derive the fruits of space technology. All countries should take all possible steps to further such universal participation in the benefits of space technology (para. 207).

Existing nuclei of experts need to be identified and organized by developing countries, and the necessary institutions and conditions created for expanding them rapidly (para. 212).

Countries planning to use space technology need to pay special attention to the organizational frameworks and should organize and set up inter-agency co-ordination mechanisms appropriate to their situation and needs, and conducive to speedy implementation of efforts (para. 214).

There is a strong case for encouraging indigenous fabrication to the maximum extent possible (para. 221; see also para. 219). If equipment has to be imported, developing countries would be well advised to first look for appropriate equipment from other developing countries. Alternatively, they may have to adapt off-the-shelf developed-country equipment (para. 220).

Developed countries should continue to provide use of their spacecraft for pilot/experimental purposes, on equitable terms, wherever feasible (para. 223).

Countries should examine and modify as necessary their education system and curricula to place greater emphasis on science and technology. At post-graduate level, interdisciplinary work on areas connected with space technology and its applications must be encouraged (para. 237).

It is desirable that there should be wide access to knowledge and steps should be taken to facilitate such access. Countries should not place undue restrictions on the sale of components, sub-systems or systems required for space applications (para. 242).

It is essential that developing countries organize and encourage indigenous development of capabilities for development of space technology. Developed countries should consider providing all possible help for this (para. 243).

Developing countries should encourage and fully develop their existing technological capabilities and take planned measures to decrease their dependence on foreign expertise. Developed countries should not always provide equipment in complete-system or "package" form, but should be willing to provide individual elements. Developing countries should strive to import such separate elements instead of integrated systems (para. 244).

It is suggested that countries examine the feasibility of using DBS to aid the spread of education. They could explore the possibility of sharing the space segment or the feasibility of an internationally or regionally owned space segment (para. 249).

It is desirable that strong encouragement, including financial and technical assistance, be given to efforts aimed at developing low-cost community receivers for DBS and low-cost, preferably renewable, power sources to operate the system in unelectrified locations (para. 251).

Efforts at developing more powerful broadcasting satellites should be continued in conformity with the applicable international agreements and regulations and taking into account the pertinent operational arrangements (para. 252).

Countries which plan to set up a DBS system would be well advised to devote effort and attention to "software" aspects (para. 255).

Efforts should be devoted to the development of CCT and film products of remote sensing data which are platform and sensor independent in a cartographic projection (para. 270).

Remote sensing system operators might keep in mind the importance of continuity in data availability in a form compatible with present systems (para. 272).

While compatibility and complementarity between different systems is generally desirable, certain considerations and restraints need to be borne in mind (para. 275).

Efficiency of GSO and RF spectrum usage is important, and any plan and/or other arrangement that is formulated must encourage greater efficiency. However, efficiency should not be a barrier to attempts at technological self-reliance consistent with the provisions of international regulations. The positive efforts of the developed countries to increase efficiency should be supported and continued (para. 281).

It is desirable for all users of the geostationary orbit to keep in view the advantages of adopting, wherever practicable, newer technologies which could in practice facilitate more effective use of the geostationary orbit. There is already a positive trend toward the utilization of new technology, and this should be continued (para 281).

Any planning method and/or arrangement that is evolved for the GSO-RF spectrum should recognise and accommodate the future needs of developing countries and should not result in unnecessarily hastening their plans to the detriment of their financial and self-reliance interests (para. 282).

Countries should examine whether for their needs they could use a satellite in elliptical orbit rather than in GSO (para. 285).

It would be useful for those countries that are interested to evolve a broad design for large space platforms. In this context, it should be mentioned that improvements in the use of GSO could also be achieved by using both ground and satellite-based narrow-beam antennas (para.286). Development efforts undertaken by technologically advanced nations aimed at evolving new techniques that contribute to more efficient use of GSO and of the RF spectrum should be encouraged and continued (para. 287).

To minimize the possible future eventuality of an accidental collision between a "live" space object and a piece of space debris, the international community should, on the basis of more detailed studies, agree to appropriate measures such as designating "disposal" orbits, removing from orbit all inactive satellites, minimizing space debris or even organizing scavenging missions (para. 289).

It is now time for countries to agree on the legal implications of remote sensing of the earth from space and on principles governing the use of artificial satellites for international direct TV broadcasting (para. 309).

2. Conclusions and recommendations addressed to international agencies/bodies

Studies about the importance of communication (especially rural communication) as an element of development should be undertaken by appropriate United Nations agencies - especially ITU and UNESCO. Adequate funding for systems (national and regional) that aim to strengthen the communications infra-structure should be provided by funding institutions (para. 148).

The United Nations system should provide, or arrange to provide, to Member States assistance - on request - for studies related to communication (para. 149), maritime communication requirements (para. 157), and cost-benefit and impact analysis (para. 191); for choices of applications or systems (para. 192 and 212); for systems studies (para. 215); for co-operative efforts by developing countries (para. 222); for DBS feasibility studies (para. 249); to develop appropriate system configurations for using space technology for education (para. 259).

The United Nations, in association with appropriate specialized agencies, e.g. ITU through CCIR and UNESCO, should make a study of the economic aspects of the use of satellites in low orbit by the developing countries for non-instantaneous communication (para. 153).

INMARSAT (with ITU and IMO) should continue its efforts to develop smaller and quite inexpensive ship-borne terminals for communications, distress and safety applications. It should examine necessary changes in the overall system design to enable greater usage by developing countries (para. 157; see also para. 75).

It is desirable that studies on an operational aeronautical communication system be continued by ICAO and INMARSAT (para. 159; see also para. 75).

The United Nations system should examine the implications and potentials of the new developments in communications technology, especially for the developing countries (para. 161).

The United Nations system (FAO, UNESCO, UNIP and UNEP) should strengthen their programmes and encourage dialogues among Member States so that interested countries could (a) take steps to study the remote sensing needs and assess appropriate remote sensing systems to meet them; and (b) engage in dialogues between users/potential users and designers/producers of satellite systems in order to determine user needs and the extent to which those needs can be met. The regional commissions, with the assistance of the United Nations system, should carry out the necessary studies on the most efficient and practical ways of co-operation among the countries in their respective regions, on space activities; and, as appropriate, on mechanisms for their implementation (para. 173).

The current discussions in COPUOS on principles governing satellite remote sensing should be completed expeditiously (para. 174; see also para. 225).

Access to data from operational meteorological satellites is free, and because many countries have become dependent upon this system, it is necessary to ensure continuation and intensification of such services (para. 176).

In view of the importance and humanitarian nature of search and rescue systems, it is desirable that the present co-operation be continued and efforts be made to evolve a world-wide operational satellite-based search and rescue system as soon as possible (para. 185).

The operational applications, manufacturing or processing in space, space power systems, etc., are probably many years away, but it is already time to examine their relevance and their implications. Their possible biological, ecological and radio-frequency interference impacts must therefore be studied and identified by ITU and other United Nations agencies with the necessary informatio to decide on them (para. 189).

The provision of experts should not be a mandatory part of any aid package provided by international agencies (para. 199).

It is recommended that data banks at national and international levels should be strengthened and expanded and that existing international satellite data banks (including especially those in the Remote Sensing Centre of FAO and in DNRE/TCD in the United Nations) be strengthened in so far as required to support regional and national centres. It is also recommended that FAO Remote Sensing Centre and regional centres for remote sensing should also continue to assist Member States in the development of remote sensing of renewable resources, including the provision of training (para. 211).

An information service that acts as a central clearinghouse should be established in the United Nations Outer Space Affairs Division (para. 211; see also paras. 205, 432 and 434).

The United Nations should collect, collate and disseminate information on the co-ordination and organizational mechanisms devised by various countries who have had experience in space applications (para. 214).

International financial agencies should provide financial support, as appropriate, for demonstration projects undertaken by developing countries (para. 223).

All countries should continue to have free access to meteorological data and WMO should be encouraged to ensure optimal use of space techniques, in particular in the related aspects of facilities for data reception and processing, data analysis and dissemination. WMO should also envisage to undertake a study concerning the possibility of setting up an international structure providing access to satellite meteorological data (para. 224).

A study should be undertaken to assess the need for and viability of a world-wide remote sensing system (para. 227).

The feasibility and desirability of specially designed systems for rural telecommunications should be examined. It is also most desirable to examine whether such systems could become available on a non-profit basis (para. 230).

The United Nations should organize a fellowship programme for in-depth, long-term exposure of selected graduates or post-graduates to space technology or applications. Such exposures on a bilateral or multi-lateral basis should also be encouraged. On-the-job experience should be included and the training centres should, as far as possible, be in developing nations (para. 238: see also para. 212)

The United Nations should support the development of appropriate training centres at regional levels linked, whenever possible, to institutions implementing space programmes. Necessary funding should be made available through international financial institutions. These training centres should organize - with United Nations assistance if necessary - regular training courses of varying durations for different levels of trainees from developing countries (para. 239).

The United Nations, in association, where appropriate, with concerned specialized agencies, should conduct regular three to five week "managerial" seminars for high-level personnel concerned with space applications and technology (para. 240).

The United Nations and international financing agencies should consider providing all possible help to developing countries in setting up indigenous centres for the absorption, adaptation and development of space technology (para. 243).

Organizations such as INTELSAT may choose to consider developing broadcasting satellite systems which could be used for educational purposes (para. 249).

The United Nations, in co-operation with appropriate specialized agencies (including especially UNESCO) should initiate a study on the educational opportunities that emerge from satellite and related telecommunications technologies and firmly support the implementation of studies which have already been carried out and programmes which relate to the use of satellite systems for technical training and education and are of regional, sub-regional and national, especially those involving developing countries (para. 258).

WMO should continue to actively promote international co-operation in space meteorology, encourage compatibility and complementarity between different systems and take all necessary steps to ensure continuity of data availability to all countries (para. 264).

It is recommended that a study be made of the feasibility of establishing an international satellite navigation system with the active participation of all States (para. 274).

ITU should examine the feasibility of incorporating in its future regulations a stipulation that each satellite owner is responsible for removing its satellites from GSO, when they are no longer usable to be able to have spare satellites in the orbit (para. 283).

It is desirable that Member States, within the ITU, continue to evolve some criteria for the most equitable and efficient usage of GSO and the RF spectrum and to develop planning methods and/or arrangements that are based on the genuine needs, both present and future, identified by each country. Such a planning method should take into account the specific needs of the developing countries, as well as the special geographical situation of particular countries (para. 284). It should also be flexible enough to permit the introduction of new types of systems taking into account the needs and requirements of all countries (para. 286).

The feasibility and over-all advantages of using elliptical orbits for international communication merit re-examination (para. 285).

The United Nations - in particular, UNEP - should encourage the continuation and expansion of on-going studies aimed at examining the effects of release of gaseous or other materials in space and recommending limits on such releases, determining the effects of rocket launches and evaluating the effects of using ion engines for propulsion (para. 294).

An integrated global ozone observing system should be created, under the aegis of WMO and UNEP (para. 299).

World-wide monitoring of the earth's environment and necessary remedial action should be co-ordinated by UNEP. All countries should promptly provide all relevant data required for such monitoring purposes to UNEP (para. 300).

The feasibility of undertaking a joint international effort with regard to SPS should be examined and - as a corollary - the means of sharing internationally the benefits that result (para. 304).

With regard to the use of extra-terrestrial material for space processing, or for use on earth, note should be taken of the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (para. 306).

The United Nations - in association with concerned specialized agencies - should periodically organize studies to examine all the global implications - technical, social, economic, environmental and legal - of new space developments, especially for developing countries (para. 312).

III. International co-operation and the role of the United Nations

1. Conclusions and recommendations addressed to Member States

It is desirable that all countries might support the participation of their scientists and relevant institutions in non-governmental organizations like COSPAR and IAF (para. 351).

It is urgent to encourage countries to set up appropriate regional mechanisms designed to achieve international co-operation among them for the purpose of joint preparation, implementation and financing of space technology, research and application projects (para. 353).

It is important that bilateral co-operation not only continue, but be intensified (para. 359).

More extensive co-operation, and more co-operative projects aimed at specific problems are necessary. Greater benefits from space can be derived by intensifying international co-operation and in this the technologically-advanced nations have a special responsibility (para. 360).

Developing countries - despite their widely varying levels of economic, scientific, technological and industrial development - recognize the similarity of their problems and the complementarity of their needs and resources. It is highly desirable that they get together and co-operate with each other, so as to collectively make the most of what they have (para. 369).

Efforts should be made - both by the countries concerned and by international agencies - to encourage the flow of equipment made by developing countries to other developing countries (para. 370; see also para. 220).

Developing countries might find it to their mutual advantage to seek and provide expert assistance - when required - from and to each other (para. 371).

Developing countries should promote exchange of information and visits of scientists, technologists and decision-makers amongst themselves (para. 372).

Developing countries should take concrete steps to conceive, initiate and implement specific co-operative programmes among themselves on a regional, bilateral or multilateral basis (para. 377). Since the technical and economic advantages of jointly-owned systems are already obvious in many situations, the developing countries should, through an act of political will, take steps to implement such co-operative programmes (para. 378).

It would be most useful if developing countries with active programmes of space applications would provide on-the-job experience or training opportunities to persons from other developing countries (para. 379).

In order to derive the fruits of space technology and use it to accelerate their development, it is imperative that developing countries take steps to work co-operatively and pool their limited resources to derive the maximum benefit (para. 380).

2. Conclusions and recommendations addressed to international agencies and bodies

The United Nations should promote initiatives aimed at establishing regional mechanisms and should encourage its regional economic bodies to carry out studies that will facilitate their establishment (para. 353).

International funding and technical assistance agencies, when providing expertise assistance, might first seek the necessary experts from developing countries (para. 371).

While the initiative to organize joint regional stores for selected critical but expensive spares must come from the countries concerned, they should be provided all possible support and encouragement by international agencies (para. 374).

The United Nations and concerned specialized agencies should examine how best to organize the collection, collation, documentation and dissemination of the experiences of developing countries related to space applications (para. 375).

The United Nations and its regional economic commissions should play a role in supporting initiatives for regional space activities (para. 376).

The United Nations and its specialized agencies should, where necessary, be provided with the means to fund expert missions to define specific, need-based, co-operative programmes between groups of developing nations (para. 378).

Co-operation in training among developing countries should be actively encouraged by the United Nations and its specialized agencies by providing available assistance, inter alia, funding for fellowships (para. 379).

The proposed new or expanded activities, including personnel costs, of the United Nations are to be funded mainly through voluntary contributions of States, either in money or in kind (para. 423).

It is recommended that the General Assembly, through its competent organs, rearrange priorities within the United Nations' next regular budget in such a way that the modest increase in personnel costs may be absorbed within the available resources (para. 423).

It is strongly recommended that the competent organs of the United Nations, in particular, the General Assembly, and also the Committee on Disarmament, when dealing with measures aimed at a prevention of an arms race in outer space, in particular those mentioned in the relevant resolutions of the General Assembly, give appropriate attention and high priority to the grave concern expressed in paragraphs 13 and 14 (para. 426).

COPUOS should continue consideration of the best and most suitable working methods for the Committee and its two sub-committees. It should have on its agenda regular items pertaining to the follow-up of Conference recommendations (para. 427).

The primary responsibility for arranging and/or conducting studies within the United Nations (in association, where appropriate, with concerned specialized agencies and inter-governmental or non-governmental organisations) should remain with COPUOS, which will also have to decide on the most appropriate methods of conducting these studies (para. 428).

The United Nations Programme on Space Applications should be directed towards promoting a greater exchange of actual experiences and greater co-operation in space science and technology, developing a fellowship programme, organizing regular seminars, helping the development of indigenous nuclei and an autonomous technological base in countries, disseminating information and providing (or arranging to provide), on request, technical assistance (para. 430).

The activities of other units of the United Nations system involved in space activities must be continued and strengthened, as appropriate, but with special emphasis on the imperative need to avoid duplication of programmes and to achieve full co-ordination in this field (para. 431).

An international space information service should be organized consisting initially of a directory of sources of information and data services (para.432; see also paras. 205 and 211).

One possibility could be to consider an integration of the expanded activities (mentioned in para. 434) into a Centre for Outer Space which would consist of the Outer Space Affairs Division of the Department of Political and Security Council Affairs. Alternatively, the proposed integration and expansion could take place within the existing Outer Space Affairs Division strengthened with additional personnel and resources. It is requested that the General Assembly at its thirty-seventh session consider both alternatives (para. 434).

The ad hoc Sub-Committee on Outer Space Activities of the Administrative Committee on Co-ordination should continue to meet annually. It should discuss ways of ensuring closer co-ordination between the various agencies concerned and should also examine the feasibility of using each other's expertise more fully through joint co-operative programmes. All space-related programmes of each of the agencies should be discussed and co-ordinated at this forum before finalization The procedures of co-ordination should be such as to minimize delays in implementation (para. 435).

The proposed Centre for Outer Space or the Outer Space Affairs Division with enlarged responsibilities should work in close co-operation with the various technical agencies in the United Nations system as well as with funding agencies so that proper co-ordination of projects is ensured within the United Nations system (para. 436).

The Conference recognizes that the effective participation of the regional economic commissions in the execution of activities resulting from the recommendations of the Conference necessitates the reinforcement of the role of the regional economic commissions concerned and therefore recommends the provision of adequate resources (para. 437).

It is recommended that the approved proposals of the Conference be forwarded to the funding agencies and bodies with established operational activities, so that they may be taken into account in the planning and setting up of programmes (para. 438).

II.

DECLARATION OF THE GROUP OF 77*

Group 77 nations met a few times to discuss some important issues having interconnexion with the over-all activity of the Conference and having bearing on the work of all Committees. The following positions have been arrived at:

NOTE: As part of the series of special demonstrations connected with UNISPACE 82, the original text of the present document, upon its receipt in Vienna, was relayed via satellite to United Nations Headquarters in New York, where it was translated, typed and subsequently beamed back to Vienna via satellite link.

*Made at UNISPACE 82; taken from Doc. A/ Conf. 101/5 (1982)

(1) Group 77 nations are firmly of the view that the issue of militarization of Space is a matter of great concern. Group 77 nations urge that the Conference recommends that all Member Nations and, especially, those who have the capability, be asked to refrain from any activities which lead to the extension of arms race into Outer Space. Group 77 nations further reiterate that militarization of Space is detrimental to the entire humanity and hence extension of arms race to Outer Space, the moon and other celestial bodies that are the common heritage of mankind, should not be permitted. The position of the Group 77 nations is that testing, stationing and deployment of any weapons in Space should be banned. The Group of 77 considers necessary the adoption of a legal instrument that definitely bans the emplacement of weapons in outer space and verifiable controls and guarantees. In view of their special responsibility in this field, it is recommended that the two major space powers open negotiations for an early agreement to prevent an arms race in outer space. Such negotiations should not inhibit or prevent the General Assembly from giving the necessary directives to the Committee on the Peaceful uses of outer space and the Committee on Disarmament for the urgent consideration of this question in conformity with the spirit of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies.

(2) Group 77 nations are fully convinced that the limited and scarce resources of the GSO and allied radio frequency spectrum should be optimally utilized for the benefit of all countries. Group 77 is of the firm view that the present regulatory mechanism for assigning orbit positions and radio spectrum does not ensure equitable access to this resource, and that developing countries are particularly at a disadvantage. Group 77 is, therefore, of the view that a change to this mechanism is called for. Group 77 notes that WARC-79 of the ITU examined this problem in detail and decided to convene a Special Conference and other Regional Conferences "to guarantee in practice for all countries equitable access" to the said resource and to agree on appropriate planning and other approaches to fulfil this objective. Group 77 considers that the principle of guaranteed and equitable access should be the essence of any new regulatory mechanism and should take into account the particular needs of the developing countries including those of equatorial countries.

III.

Proposal submitted by Mexico on behalf of the Group of 77*

Statement

The Group of 77 firmly holds the view that activities in the field of remote sensing should be carried out in full respect for the sovereign rights of states. The Group of 77 believes that sensed states should have timely and unhindered access on a priority basis at nominal cost, to all data and information obtained over their territories. Dissemination of such data and information derived from it to a third party should not

*Submitted at UNISPACE 82; taken from Doc. A/ Conf. 101/L.3 (1982).

be done without the prior consent of the sensed country. The Group of 77 urges UNISPACE 82 to recommend, through the General Assembly, to the Committee on the Peaceful Uses of Outer Space and its Legal Sub-Committee to finalize the work on the elaboration of draft principles concerning remote sensing of the earth from space as a matter of high priority.

The Group of 77 firmly holds the view that activities in the field of international direct television broadcasting through satellites should only be conducted in full respect for the sovereignty of states. In this regard the recognition by the international community of principles embodying a) broadcasting state's responsibility, b) prior consultation and agreement between broadcasting and receiving states and c) the radio regulations of the ITU, inter-alia, are of utmost importance. The Group of 77 welcomes the text of 16 nations' draft elaborating principles governing the use by states of artificial earth satellites for international direct television broadcasting. The Group of 77 regrets that this draft has not yet met with consensus and that even after ten years of efforts by COPUOS to finalize it have not been successful. The Group of 77 urges UNISPACE 82 to recommend that the General Assembly at its 37th Session approve a set of principles governing the use by states of artificial earth satellites for international direct television broadcasting in accordance with the 16 nations' draft, as aforementioned.

The Group of 77 firmly holds the view that the existing mechanism of the United Nations body dealing with outer space affairs should be strengthened. The Group of 77 urges that the United Nations through its competent organs strongly support programs and activities of the developing countries and of regional, sub-regional and national interests relating to applications of space technology through training, education, technology transfer and expert technical advice.

IV.

INTERNATIONAL CO-OPERATION IN THE PEACEFUL USES OF OUTER SPACE

PREPARATION OF AN INTERNATIONAL CONVENTION ON PRINCIPLES GOVERNING THE USE BY STATES OF ARTIFICIAL EARTH SATELLITES FOR DIRECT TELEVISION BROADCASTING*

Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Egypt, India, Indonesia, Iraq, Kenya, Mexico, Niger, Nigeria, Pakistan, Peru, Philippines, Romania, Uruguay, and Venezuela: revised draft resolution

The General Assembly,

Recalling its resolution 2916 (XXVII) of 9 November 1972, in which it stressed the necessity to elaborate principles governing the use by States of artificial earth satellites for international direct television broadcasting and mindful of the importance of concluding an international agreement or agreements.

Recalling further its resolutions 3182 (XXVIII) of 18 December 1973, 3234 (XXIX) of 12 November 1974, 3388 (XXX) of 18 November 1975, 31/8 of 8 November 1976, 32/196 of 20 December 1977, 33/16 of 10 November 1978, 34/66 of 5 December 1979, 35/14 of 3 November 1980 and 36/35 of 18 November 1981 in which it decided to consider at its thirty-seventh session the adoption of a draft set of principles governing the use by States of artificial earth satellites for international direct television broadcasting,

Noting with appreciation the efforts made in the Committee on the Peaceful Uses of Outer Space and its Legal Sub-Committee to comply with the directives issued in its resolutions mentioned above,

Considering that several satellites direct broadcasting experiments have been carried out and a number of direct broadcasting satellite systems are operational in some countries and may be commercialized in the very near future,

Taking into consideration that the operation of international direct broadcasting satellites will have significant international political, economic, social and cultural implications,

Believing, that the establishment of principles for international direct television broadcasting will contribute to the strengthening of international co-operation in this field and further the purposes and principles of the Charter of the United Nations,

Adopts the Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting set forth in the annex to the present resolution.

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*Taken from U.N. Gen. Assembly Res. 37/92 (Dec. 10, 1982). The note was 107 in favor and 13 against the Resolution, with 13 abstentions.

Annex

PRINCIPLES GOVERNING THE USE BY STATES OF ARTIFICIAL EARTH SATELLITES FOR INTERNATIONAL DIRECT TELEVISION BROADCASTING

Purposes and objectives

1. Activities in the field of international direct television broadcasting by satellite should be carried out in a manner compatible with the sovereign rights of States, including the principle of non-intervention as well as with the right of everyone to seek, receive and impart information and ideas as enshrined in the relevant United Nations instruments.

2. Such activities should promote the free dissemination and mutual exchange of information and knowledge in cultural and scientific fields, assist in educational, social and economic development particularly in the developing countries, enhance the qualities of life of all peoples and provide recreation with due respect to the political and cultural integrity of States.

3. These activities should accordingly be carried out in a manner compatible with the development of mutual understanding and the strengthening of friendly relations and co-operation among all States and peoples in the interest of maintaining international peace and security.

Applicability of international law

Activities in the field of international direct television broadcasting by satellite should be conducted in accordance with international law, including the Charter of the United Nations, the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, of 27 January 1967, the relevant provisions of the International Telecommunication Convention and its Radio Regulations and of international instruments relating to friendly relations and co-operation among States and to human rights.

Rights and benefits

Every State has an equal right to conduct activities in the field of international direct television broadcasting by satellite and to authorize such activities by persons and entities under its jurisdiction. All States and peoples are entitled to and should enjoy the benefits from such activities. Access to the technology in this field should be available to all States without discrimination on terms mutually agreed by all concerned.

International co-operation

Activities in the field of international direct television broadcasting by satellite should be based upon and encourage international co-operation. Such co-operation should be the subject of appropriate arrangements. Special consideration should be given to the needs of the developing countries in the use of international direct television broadcasting by satellite for the purpose of accelerating their national development.

Peaceful settlement of disputes

Any international dispute that may arise from activities covered by these principles should be settled through established procedures for the peaceful settlement of disputes agreed upon by the parties to the dispute in accordance with the provisions of the Charter of the United Nations.

State responsibility

1. States should bear international responsibility for activities in the field of international direct television broadcasting by satellite carried out by them or under their jurisdiction and for the conformity of any such activities with the principles set forth in this document.

2. When international direct television broadcasting by satellite is carried out by an international intergovernmental organization, the responsibility referred to in the above paragraph should be borne both by that organization and by the States participating in it.

Duty and right to consult

Any broadcasting or receiving State within an international direct television broadcasting satellite service established between them requested to do so by any other broadcasting or receiving State within the same service should promptly enter into consultations with the requesting State regarding its activities in the field of international direct television broadcasting by satellite without prejudice to other consultations which these States may undertake with any other State on that subject.

Copyright and neighbouring rights

Without prejudice to the relevant provisions of international law States should co-operate on a bilateral and multilateral basis for protection of copyright and neighboring rights by means of appropriate agreements between the interested States or the competent legal entities acting under their jurisdiction. In such co-operation they should give special consideration to the interests of developing countries in the use of direct television broadcasting for the purpose of accelerating their national development.

Notification to the United Nations

In order to promote international co-operation in the peaceful exploration and use of outer space, States conducting or authorizing activities in the field of international direct television broadcasting by satellite should inform the Secretary-General of the United Nations to the greatest extent possible of the nature of such activities. On receiving this information, the Secretary-General of the United Nations should disseminate it immediately and effectively to the relevant United Nations specialized agencies, as well as to the public and the international scientific community.

Consultations and agreements between States

1. A State which intends to establish or authorize the establishment of an international direct television broadcasting satellite service shall without delay notify the proposed receiving State or States of such intention and shall promptly enter into consultation with any of those States which so requests.

2. An international direct television broadcasting satellite service shall only be established after the conditions set forth in paragraph 1 above have been met and on the basis of agreements and/or arrangements in conformity with the relevant instruments of the International Telecommunication Union and in accordance with these principles.

3. With respect to the unavoidable overspill of the radiation of the satellite signal, the relevant instruments of the International Telecommunication Union shall be exclusively applicable.

V.

Resolution adopted by the General Assembly of the United Nations
(Thirty-sixth session)

A/RES/36/40

WORLD COMMUNICATIONS YEAR: DEVELOPMENT OF COMMUNICATIONS INFRASTRUCTURES

The General Assembly,

Recalling its resolution 32/160 of 19 December 1977 on the Transport and Communications Decade in Africa, in which it requested the Secretary-General, in consultation with the International Telecommunication Union and other specialized agencies concerned, to propose for consideration, as appropriate, one year during the Decade as a World Communications Year, in view of the importance of transport and communications to other regions of the world,

Recalling also its resolution 35/109 of 5 December 1980 on the World Communications Year, by which it endorsed the arrangements made by the Economic and Social Council concerning the Year,

Recalling further Economic and Social Council resolution 1981/60 of 23 July 1981 in which the Council proposed that the year 1983 should be proclaimed as World Communications Year: Development of Communications Infrastructures,

Taking into account the guidelines for future international years adopted in its decision 35/424 of 5 December 1980,

Having examined the note from the Secretary-General of the International Telecommunication Union concerning the mobilization of voluntary resources for the World Communications Year,

Recognizing the fundamental importance of communications infrastructures as an essential element in the economic and social development of all countries,

Convinced that a World Communications Year would provide the opportunity for all countries to undertake an in-depth review and analysis of their policies on communications development and stimulate the accelerated development of communications infrastructures,

1. *Endorses* the proposal made by the Economic and Social Council in paragraph 1 of its resolution 1981/60 and proclaims the year 1983 World Communications Year: Development of Communications Infrastructures, with the International Telecommunication Union serving as the lead agency for the Year and having responsibility for co-ordinating the interorganizational aspects of the programmes and activities of other agencies;

2. *Requests* all States to participate actively in the attainment of the objectives of the World Communications Year;

3. *Invites* the competent organizations and agencies of the United Nations system to co-operate closely with the Secretary-General of the International Telecommunication Union, within their respective terms of reference, for the implementation of the programme for the World Communications Year;

4. *Invites* non-governmental organizations and users of communications services to participate actively in the World Communications Year and to secure the fullest possible co-ordination of their programmes for the Year, particularly at the national level;

5. *Invites* Governments and other interested organizations to make voluntary contributions to the World Communications Year through the special Fund for World Communications Year co-ordinated by the International Telecommunication Union, in order to ensure increased financing of projects at the national, regional and global levels;

6. *Appeals* to governmental authorities and appropriate organizations to make circuits available for reporting on the activities of the World Communications Year through existing means of information, including radio and television broadcasts, in collaboration with those authorities;

7. *Requests* the Secretary-General of the International Telecommunication Union to report to the General Assembly at its thirty-seventh session, through the Economic and Social Council at its second regular session of 1982, on the state of preparations for the World Communications Year.

VI.

RESOLUTIONS ON SPACE LAW ADOPTED BY THE 60TH CONFERENCE OF THE INTERNATIONAL LAW ASSOCIATION, AUGUST 29 - SEPTEMBER 4, 1982 MONTREAL, CANADA

RESOLUTION I

The 60th Conference of the International Law Association held in Montreal 29 August - 4 September, 1982:—

1. *Is convinced* that a generally accepted Moon Treaty can contribute to a greater measure of international cooperation in outer space, and recommends to States who have as yet not ratified this Treaty to do so without further delay;

2. *Considers* that the principle of "Common Heritage of Mankind," as adopted in the Moon Treaty, is in need of further elaboration, and draws the attention of the United Nations to the importance of the United Nations working out legal norms aimed at the implementation of this principle;

3. *Is of the opinion* that under the terms of the Moon Treaty, there is no moratorium on the exploitation of the natural resources of the moon, prior to the establishment of the international regime as provided for in Art. XII (5) of this Treaty;

4. *Draws the attention* of the Geneva Committee on Disarmament to the importance of a strict observance of Art. III of the Moon Treaty, and expresses the hope that the United Nations will consider measures for insuring such observance.

RESOLUTION II

The 60th Conference of the International Law Association held in Montreal 29 August - 4 September, 1982:—

Notes with approval the report of the Rapporteur of the Space Law Committee based on answers from Committee Members to a questionnaire, *recommends* that the

Committee now start the formulation of a *Draft Convention on the Settlement of Space Law Disputes* on the basis of the report, of the discussion held during the Montreal Conference, and on the basis of the following:

Basic Principles for a Draft Convention on the Settlement of Space Law Disputes:

1. The Convention should provide states with a choice for its application to:
   (a) all space law disputes with other states parties;
   (b) application to specific areas of space law as may be dealt with in specific bilateral or multilateral treaties;
   (c) certain categories of disputes or certain sections of the Convention, subject to such exceptions that the state may wish to claim.

2. The Convention should in one section provide for non-binding settlement methods including recommendatory awards, but should in another section provide for binding methods of settlement upon application by one of the parties, if the other party does not agree to the conclusions of such non-binding methods.

3. The Convention should provide states with a choice among different settlement methods which, for binding settlement, should include adjudication by the International Court of Justice as well as administered and ad-hoc arbitration.

4. The Convention should provide that states parties have to select one method for binding settlement within the choice given according to Principle 3.

5. The Convention should stress that states parties have an obligation to fulfill decisions of the tribunal chosen under Principle 4.

6. In the Convention or as an annex thereto a "dispute settlement clause" should be drafted which could serve as a model to be included into future bilateral or multilateral treaties on Space Law.

VII.

SOUTH AMERICAN SPACE AGENCY *

PREAMBLE

The States Parties to this Agreement:

Considering that international co-operation must transcend morality and charity and occupy a clear position in the field of law,

Reaffirming the principles contained in resolution 1721 (XVI) of 20 December 1961 on the peaceful uses of outer space, and the 1970 Declaration on the Prohibition of the Use or Threat of Force, which is universal in character,

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* Translated from Spanish and made available through the courtesies of Mr. Raimundo Gonzalez, First Secretary, Permanent Mission of Chile to the United Nations. For a discussion of this proposal, see Events of Interest, p. 218, *supra*.

Declaring that pursuant to these principles and those set forth in the "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies", outer space must be used and exploited for the benefit and in the interest of all countries, regardless of the level of their scientific or economic development,

Bearing in mind the Declaration on Social Progress and Development of the United Nations General Assembly, especially article 3 (d) on permanent sovereignty of each nation over its natural wealth and resources,

Aware that, for these principles to have practical application, it is necessary to establish regional machinery for co-operation and that the establishment of such machinery implies, furthermore, the elimination of any possibility of militarizing outer space in the South American region,

Have agreed as follows:

Article 1

An international intergovernmental body known as the South American Space Agency shall be established. It shall be constituted by the present Agreement and its statutes. It shall have legal personality and the capacity necessary for the exercise of its functions and the achievement of its objectives, including the capacity to:

(a) Conclude agreements with States or international organizations;

(b) Employ staff;

(c) Acquire and dispose of property;

(d) File lawsuits.

Article 2

The South American Space Agency shall channel the cooperation among the countries in the area towards a mutual elaboration, execution and financing of projects for the utilization of space technology entailing economic and social development of the peoples.

Article 3

All the countries of the South American region, who should be willing to comply with this convention and its statutes may be members of the Agency.

Article 4

There shall be equal participation of the various States and said participation shall not be subject to any sort of discrimination. The only requirement for joining this body is that of being a South American country.

Article 5

The main objectives of the body shall be to ensure and to develop, exclusively for peaceful purposes, the cooperation among the South American countries in the fields of research and utilization of space technology.

Towards this end, a long-term space policy shall be drawn and the coordination and the integration of national programmes with those pertaining to the Agency shall be ensured.

Article 6

The programmes shall be based on the principles of independence, balance and cooperation.

Article 7

An equitable distribution of resources between the scientific programmes and those of applicability (tele-observation, meteorology and tele-communications) should prevail. To this effect, the Agency shall exert itself in an effort to secure adequate means and infrastructure towards that end. Should this not be feasible, in a first stage, it shall seek to negotiate the necessary agreements in order that the region may wholly benefit from such an important development instrument.

Composition of the body

Article 8

The highest organ of the Agency shall be the Council, which shall be entrusted with the elaboration of the policy. The Council shall be composed of representatives of all member States and it shall draw the policy to be followed in scientific, technical, administrative and financial fields. To this effect, each State shall have the right to speak and shall be entitled to one vote.

Article 9

Unanimity of members of the Council shall be required for the adoption of decisions which affect the current budget of the Agency or its modification.

Other types of decisions shall be taken by a two-thirds majority of the total members of the Council on first reading and by a two-thirds majority of those present on second reading.

No more than 15 working days shall elapse between the first and second readings.

Article 10

There shall be established under this Agreement a Committee for Programmes and Scientific Research with the task of carrying out research and proposing projects for more effective use of space technology.

The implementation of projects shall be decided upon unanimously by members of the Council and shall be compatible with what each State is carrying out individually in that field.

Article 11

If circumstances so require, various committees shall be established in the areas to which the Council deems it necessary to accord priority.

Article 12

The Council shall appoint, by unanimous decision of its members at its first regular session, a Director-General, who shall be of the nationality of one of the member States. In the event that there is no agreement on his appointment, an extraordinary meeting shall be convened and shall take the necessary decision by the two-thirds majority mentioned in the second paragraph of article 9 of this Convention.

The Director-General shall have a term of office of three years and shall be eligible for re-election only once. His functions shall be:

(a) To convene meetings of the Council and of the respective committees;

(b) To employ, in agreement with the Council (two-thirds of its members), the staff necessary for the proper functioning of the Agency;

(c) To act as the representative of the Council;

(d) To carry out on behalf of the Council the functions which it assigns to him.

He shall be assisted in his functions by directors in charge of the various areas of work.

Article 13

The directors of the area shall be appointed by a two-thirds majority of the members of the Council and on the proposal of the Director General. Only to this effect, the Director General shall be entitled to one vote.

Article 14

The members of the Council shall be required to hold, in their respective countries, the rank of Minister of State or the equivalent. They may be represented by highly qualified persons on space matters, of a political, juridical or technical nature.

Article 15

There shall be a Legal Adviser in the Organization, who will depend directly on the Director General and who shall be appointed in accordance with provisions of Art. 13. He shall assist him on all legal matters and suggest new courses of action in international fora, both public and private, in which the formulation of positive norms of Space Law should be discussed. In that regard, he shall also be entrusted with studies and research conducive to a speedy consolidation of said juridical science, for the benefit of all developing countries. The Council shall be informed of said research in an extraordinary sessions, which shall be attended by the Director General and by the Legal Adviser.

Cooperation with other States and Organizations

Article 16

The body shall promote the cooperation with non-member States and with public or private international organizations, which may be granted the status of observers in the Agency.

In this regard, it shall basically seek the collaboration of nations which might contribute effectively to the plans of utilization of technology for the economic and social development of the region.

The establishment of an institutionalized relationship with the European Space Agency is specifically recommended in order to plan the exchange of missions and to enable technicians of the area to enjoy grants offered by said agency.

Financing

Article 17

The budget of the organization shall be financed by the member States, who shall contribute in accordance with their national income.

The ordinary budget shall cover the following items:

(a) Operating expenses of the Agency;

(b) Donations received from member States, international organizations or third States;

(c) Costs of the necessary scientific and research activities.

There shall be optional programmes which shall be carried out in accordance with a flexible formula. Each State which participates in a specific programme shall decide upon the percentage of its contribution.

Settlement of disputes

Article 18

All disputes which arise in connexion with the rights and obligations of member States, and those in connexion with the interpretation of this Agreement, shall be settled by diplomatic negotiation between the parties and in general by the procedures set forth in article 24 of the Charter of the Organization of American States.

In any event, whenever a dispute arises between two or more member States which, in the opinion of one of them, cannot be settled through current diplomatic means, the parties shall agree on any other peaceful means that will permit them to reach another solution.