JOURNAL OF SPACE LAW

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A journal devoted to the legal problems arising
out of man's activities in outer space

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All correspondence with reference to this publication should be directed to the Journal of Space Law, University of Mississippi Law Center, University, Mississippi 38677.

Journal of Space Law. The subscription rate for 1987 is $47 domestic and $52 foreign for two issues. Single issues may be ordered at $26 per issue.

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STAR NAMED

In recognition of his contribution to the understanding of international space law, *Professor Stephen Gorove* of the University of Mississippi School of Law receives a special award from the student staff of the JOURNAL OF SPACE LAW presented by senior *Sarah C. "Sally" Jubb* of Sardis at the Law School's Awards Day ceremonies.The framed declaration from the International Star Registry affirms that a star has been given the name of *Stephen Gorove* in the following terms:

International Star Registry

Know ye herewith that the International Star Registry doth hereby redesignate star number LACERTA RA 22h 25m 38sd 47o51' to the name *Stephen Gorove*. Know ye further that the star will henceforth be known by this name. This name is permanently filed in The Registry's vault in Switzerland and recorded in a book which will be registered in the copyright office of the United States of America. In witness whereof we hereunto set our hands and affix the seal of the International Star Registry this 20th day of March 1987.

(Signed by the Secretary and the Registrar).

THE 15th ANNIVERSARY OF THE FOUNDING OF THE JOURNAL OF SPACE LAW

The year 1987 is indeed significant to the discipline of space law. This exciting, rapidly developing area of the law will celebrate its thirtieth anniversary this year, having been born along with the space age when Sputnik was launched on October 4, 1957. Twenty years have passed since the first and most widely accepted space treaty, The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and other Celestial Bodies, was ratified on October 10, 1967. This year also marks the fifteenth edition of the *Journal of Space Law*. Because the *Journal* is now exactly one-half the age of the legal era with which it deals, this fifteenth anniversary issue presents an opportunity for review.

The founding of a law journal dedicated to the field of space law was undertaken by *Dr. Stephen Gorove* in 1970. Volume one of the *Journal of Space Law* went to press in 1973 under the supervision of *Dr. Gorove* and with the eager support of a group of far-sighted students. Establishment of the *Journal* filled a void in international legal periodicals as the only law journal in existence devoted exclusively to the legal problems arising out of man's pioneering efforts in outer space. In an attempt to insure a high quality scholarly publication with lasting value as a research and reference tool, the aid of world-renowned authorities in the field of space law was sought. The *Journal* was honored to have *Judge Harold Berger*, Chairman of the Federal and Inter-American Bar Associations' Committees on Space Law; Professor *Aldo Armando Cocca* of Argentina; *Ernst Fasan*, Secretary of the International Institute of Space Law of the International Astronautical Federation; *Eilene Galloway*, Senior Specialist in the International Relations in the Library of Congress; *Professor D. Goedhuis* of the Netherlands; *Wilfred Jenks*, Director of the International Labour Office; *Myres S. McDougal*, Sterling Professor of Law at Yale; *Eugene Pepin*, President of the International Institute of Space Law of the International Astronautical Federation; *Michael S. Smirnoff*, member of the Board of Directors of the International Institute of Space Law; and *Isodoro Zanotti*, Chief of Division of Codification and Legal Integration of the Organization of American States, agree to serve as members of the initial Editorial Advisory Board.

The inaugural issue of our publication dealt exclusively with papers and materials presented at a "Symposium on Earth Resources Survey Satellites and International Law" which was held at "Ole Miss" on April 7 and 8, 1972. The articles addressed various aspects of the national and international legal issues arising from the monitoring of Earth's surface from outer space, anticipated the launching of a unique craft known as the Space Shuttle and examined the wisdom of a multilateral treaty on earth resources satellites. Articles in the second issue of volume one concerned the entry of European nations into the satellite field, the legal status of lunar stations, the newly adopted

Convention on International Liability for Damage Caused by Space Objects, INTELSAT, and direct broadcast satellites. The first volume also contained special features on space law such as reports on events of interest, book reviews, a bibliography of recent publications and the full text of current documents.

Through the years, the articles in the *Journal of Space Law* have reflected the progression of the law of outer space. Issues raised by earth remote sensing by satellites have continued to be a topic of frequent discussion. The Space Shuttle has become a reality and the world has mourned the losses suffered in the Challenger explosion on January 28, 1986. The United Nations has promulgated Draft Principles of Remote Sensing. Questions presented by lunar stations have given way to those surrounding permanently manned international space stations. Various aspects of liability are continually addressed. The Stategic Defense Initiative has spurred renewed interest in issues of arms control and demilitarization of space. The special features found in the *Journal's* premier issue have become standards incorporated in every issue,

Ever increasing in recognition around the world, the *Journal* has had the benefit of able student editors and staff members over the past fifteen years. These students themselves benefited from their work, gaining invaluable knowledge and experience in the process. As a result, they have gone on to make a contribution to the legal profession, some in the active practice of space law. The membership of the Editorial Advisory Board has been enlarged since that first issue by the addition of such distinguished authorities as *Dr.I. H. Ph.Diederiks-Verschoor* of Holland in 1974, *Dr. Edward R. Finch* of New York in 1975, *Professor Karl-Heinz Bockstiegel* of the Federal Republic of Germany in 1978, *Michael G. Bourely* of France and *Nandasiri Jasentuliyana* of New York in 1979, and *Paul G. Dembling* of Washington, D.C. and *V.S. Vereshchetin* of the U.S.S.R. in 1982. These leading authorities have provided vital counsel, contributed to virtually every issue and several of them, along with *Dr. Carl Q. Christol,* have individually served as guest editors upon occasion. The *Journal* is greatly indebted to them for their continuing invaluable support.

Above all other factors, the *Journal of Space Law* owes its success to the tireless devotion of *Dr. Stephen Gorove.* Serving as Chairman of the Editorial Advisory Board and faculty advisor, *Dr. Gorove* has provided both inspiration and motivation. His efforts have been instrumental in gaining recognition for the *Journal of Space Law* as the leading legal periodical in its field in the world. In 1977, the International Institute of Space Law awarded *Dr. Gorove* a testimonial in recognition of his leadership and distinguished contribution to the law of outer space as the founder of the *Journal of Space Law.* To commemorate the fiftteenth anniversary of the Journal, the student staff has had the International Star Registry redesignate the star located at Lacerta RA 22h., 25m.,38sd., 47°51'. Henceforth, this star will be known by the name, *"Stephen Gorove".* This name is permanently recorded in the Registry's vault in Geneva,

Switzerland and recorded in a book which will be registered in the copyright office in Washington, D.C.

Each of us who has been associated with the *Journal* can take pride in its fifteen year history. As the twenty-first century approaches, it is hard to imagine where the development of the law of outer space will lead. Whatever its progression may be, the *Journal of Space Law* will continue to strive to provide a forum for discussion of both current legal issues and future visions arising from human exploits on the final frontier.

Victoria A. Doucet, Editor
John T. Sparks, Editor
Sarah C. Jubb, Editor
Anita Clinton, Co-editor

REGULATING THE GEOSTATIONARY ORBIT: ITU'S WARC-ORB - '85-'88*

*Stephen E. Doyle***

Introduction - Statement of a Problem

Satellite communication is the primary commercial exploitation of space. In 1986, it was a more than $1 Billion annual business. Communication satellites (comsats) are providing telephone, telegraph, facsimile, data, or television relay services in more than 140 countries.[1] These satellites are used and owned nationally, regionally and globally. Growth in comsat use is now limited primarily by the extent of telecommunication infrastructure on the ground and the emergence of new, low cost, high capacity, terrestrial trunking technologies for high density communication routes.

National use of satellites, especially in developing countries, has increased rapidly in recent years.[2] With global availability of services from the International Telecommunication Satellite Organization

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* This article is an elaboration of a presentation made by the author at the American Bar Association's Air & Space Law Forum Committee Meeting in San Diego, California on October 11, 1985. The views expressed in this article are those of the author and do not necessarily reflect the views of any organization or institution with which he is affiliated.

** Director, Strategic Planning, Aerojet TechSystems Company, Sacramento, California; Chairman, FCC Public Advisory Committee on WARC-ORB-85 (Nov. 1981- Nov. 1985).

1. CCIR, *Technical Bases of the WARC-ORB (1) CCIR CONFERENCE PREPARATORY MEETING REPORT* 45 (ITU 1984). Intelsat alone provides extensive service on a global basis. In addition, systems such as Intersputnik, Palapa, Arabsat and Eutelsat offer regional or global services, some limited to specialized space services. "At the end of 1983, the space segment (of Intelsat) consisted of a total of 750 antennas at 601 earth station sites in 149 countries providing more than 30,000 full-time voice and data circuits and over 26,000 hours of television transmissions." *Id.*

2. ITU WARC-ORB 85 Second Advisory Comm. Rep., Second Rep. of the Advisory Comm. for the ITU WARC-ORB-1 (January 1985), *submitted in* FCC Doc. GEN 80-741 (January 31, 1985) (hereinafter Second Advisory Comm. Rep.). "Gradually, more countries are using satellites for domestic or regional services. By 1985, 26 countries, of which 18 are developing countries, will lease INTELSAT capacity for domestic use and 23 countries will participate in regional satellite system. Brazil and Mexico will have joined Indonesia and India in owning their own domestic systems." *Id.* at 2.

(Intelsat), there has been rapid expansion of use of satellites by even the least economically developed nations. Today some of the world's smallest nations are considering how to use this technology to foster more effective economic development. Some are even considering establishment of dedicated national systems.[3] This nearly global interest in comsats has produced a major political and institutional problem. *How shall the world community efficiently and equitably regulate access to and use of the geostationary satellite orbit (GSO) on which cost effective communication satellites operate?*

This paper deals with the identities and roles of: (1) the International Telecommunication Union (ITU),[4] (2) the geostationary satellite orbit (GSO), (3) the national, regional and global communication satellite systems in use and planned, (4) the ITU-WARC-ORB-'85-'88, and (5) the currently contemplated regime for regulation of the use of the GSO.

1. The International Telecommunication Union (ITU)

The ITU is a specialized agency of the United Nations providing global coordination and regulation of international telecommunication system operation. The ITU originated as the International Telegraph Union, established in Paris, France in 1865, and has had an important continual functional role in regulating and coordinating international communications for more than a century. At year-end 1986, about 160 nations were members of the ITU.

The organization's headquarters are located in Geneva, Switzerland, where there are: a permanent Secretariat staff, headed by an internationally elected Secretary General; a coordinating staff and Director for the International Consultative Committtee on Telegraph and Telephone (CCITT); a coordinating staff and Director for the International Consultative Committee for Radio (CCIR); and the staff and member offices

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3. For a list of national transponder leases on the Intelsat space segment between 1974 and 1986, see ITU WARC-ORB-85 First Advisory Comm. Rep., First Rep. of the FCC Advisory Comm. for the WARC-ORB-1 (December 1983), ***submitted in*** FCC Doc. GEN 80-741 at 4-15 (December 22, 1983) [hereinafter First Advisory Comm. Rep.] A later list may be available from the Intelsat Secretariat, Washington, DC.

For details of current national programs, actions and plans, see ITU, Twenty-fourth Report by the International Telecommunication Union on Telecommunication and the Peaceful Uses of Outer Space (Booklet No. 33, Geneva, 1985). This report is prepared for and submitted to the United Nations Committee on the Peaceful Uses of Outer Space.

4. International Telecommunication Convention, Nairobi, 1982 (ITU 1982) [hereinafter Nairobi Convention]. This convention is the current constitutional instrument of the ITU. The Union's Convention is reviewed periodically for revisions to take into account changing circumstances in the conduct of world telecommunications.

of the International Frequency Registration Board (IFRB). The work of the Union is done through a variety of mechanisms and forums including: international study groups, plenary assemblies of the CCI's, the Administrative Council that meets annually; specialized, extra-ordinary, regional and global administrative conferences; and the supreme organ, the Plenipotentiary Conference of the Union, convened once every eight to ten years.

Summarizing the International Telecommunication Convention (Nairobi, 1982, Art. 4), the purposes of the Union are to:

(1) maintain an extend cooperation for improvement and rational use of telecommunication;
(2) promote development of facilities and their efficient operation to improve services, increase their usefulness, and make them, so far as possible, generally available to the public; and
(3) harmonize actions of nations in attaining these ends.[5]

During the periodic constitutional Plenipotentiary Conference held by the ITU in Nairobi in 1982, the Union membership modified Ariticle 33 of the Union's convention dealing with "Rational Use of the Radio Frequency Spectrum and the Geostationary Satellite Orbit." As adopted at Nairobi, Article 33 now reads in part:

> 2. In using frequency bands for space radio services Members shall bear in mind that radio frequencies and the geostationary satellite orbit are *limited natural resources* and that they must be used efficiently and economically, in conformity with the Radio Regulations, so that countries or groups of countries may have equitable access to both, taking into account the special needs of the developing countries and the geographical situation of particular countries.[6]

In 1973 seeds of discontent concerning the GSO were sown in Article 33 in Malaga-Torremolinos, Spain when Article 33 was first introduced, and the phrase "limited natural resources" was first used to officially describe the radio spectrum and the GSO.[7] This phrase is the primary driver of developing country interest in the GSO. It likens the

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5. *Id.*

6. *Id.*

7 International Telecommunication Convention, Malaga-Torremolinos, 1973 (ITU 1974), T.I.A.S. No. 8572.

GSO to the mineral resources of the seabed, the natural resources of the high seas, and the resources on the moon. In doing so, all of the quasi-legal, but primarily socio-political arguments that surround the Treaty on the Law of the Sea and the 1979 Treaty on the Moon, are dredged up or extracted from our imagination. The arguments are immediately applied to the GSO, making it another *cause celebre* in the continuing north/south debate over what constitutes "the common heritage of mankind."

Consideration of the radio frequency spectrum and the GSO as *"limited"* natural resources is a fundamental misconception stimulating a great deal of current GSO debate. The radio frequency spectrum and GSO are:

- physical phenomena existing in perpetuity with quantifiable characteristics that make them useful.
- inexhaustible, nonconsumable resources that cannot be "used up," and
- commonly shared natural phenomena like oceans, air or sunlight, the use of which requires common sense, cooperation and mutual accommodations.

But the radio frequency spectrum and the GSO are not subject to elimination, diminution or control by any sovereign to the exclusion of any other.[8]

In the past 25 years we have learned a great deal about the use of radio spectrum and the GSO. We will undoubtedly learn a great deal more in the next 25 years. However, if we were collectively to agree, and to behave as though the radio frequency spectrum and the GSO are limited natural resources that must be partitioned among nations, preserved for future use, and subjected to sovereignty, we would fly in the face of logic, deny ouselves use of an extraordinary productive tool, and constrain technological development to our universal discredit and disadvantage.

2. *Understanding the Geostationary Satellite Orbit (GSO)*

A satellite moving at a fixed rate from west to east in a circle lying on the plane of the equator at an altitude of 22,300 miles above the earth has an orbital period of approximately 24 hours. Under these conditions, a satellite will orbit the earth in synchronization with a point below it on the earth's equator, so that it remains always above that point. The satellite thus appears to stand still in the sky. We call such satellites "geostationary." Because the satellite orbit is synchronized with the rotation of the earth it is also called "geosynchronous." (All

8. *See* Doyle, *Legal and Policy Implications of Treating Natural Resources as the Common Heritage of Mankind,* PROC. 29TH COLLOQ. L. OUTER SPACE 31 (1986).

geostationary satellites are geosynchronous, but not all geosynchronous satellites are geostationary).

In the late 1950's and 1960's, when satellites such as SCORE, ECHO, TELSTAR and RELAY were being flown experimentally, communication satellites were not geostationary. They rose over the horizon, moved across the sky and set in various periods of time, and with various ground tracks, depending upon their altitudes and angles of inclination to the plane of the equator. In 1962-1963, with the flight of SYNCOM satellites, by NASA, geostationary satellite concepts were first practically demonstrated.[9] With the launch of the Early Bird satellite, in April 1965, the world's first commercial communication geostationary satellite was established. Originally designed and constructed under contract to the U.S. Comsat Corporation, the Early Bird satellite was later subrogated to Intelsat as the first internationally owned commercial communication satellite.

At year-end 1986, there were more than 80 operating communication satellites in the geostationary satellite orbit. About one half of them were U.S. satellites.[10] The attractiveness of this orbit is based on the absence of satellite motion. Static earth stations do not have to track satellites moving across the sky and that fact has significant economic and operational implications. With a few antennas, nations can communicate across oceans or continents, into mountains, jungles, dessert or tundra regions, making geostationary satellites attractive to all nations, large or small, developed or developing.

2.A. *How the GSO Problem Arose*

The ITU has in place a regulatory regime for management of the GSO and spectrum use. The current regulatory process (most recently amended by the World Administrative Radio Conference of 1979) is controlled in ITU Radio Regulations, Articles 11 and 13, and associated Appendices 3, 4, 28 and 29. The process provided for in the regulations involves three basic steps: (1) advance publication of a proposed satellite system through the IFRB, (2) coordination of any identified problems involving other countries, and (3) notification of registry of the system in the International Frequency Register.

A national Advisory Committee to the Federal Communications Commission published a report in 1983 in which the ITU's performance

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9. For an initial state-of-the-art statement defining alternative early communication satellite systems, see *Space Satellite Communications: Hearing Before the Subcomm. on Monopoly of Senate Comm. on Small Business*, 87th Cong., 1st Sess. 120-37 (1961) (testimony of Dr. Elmer W. Engstrom).

10. *See* Second Advisory Comm. Rep., *supra* note 2, at 2-6 (detailed statistics set forth).

record for facilitating geostationary orbit access was reviewed.[11] The following material is drawn substantially from that report.

The current registration procedure provides flexibility in use of the orbit and affords flexibility to Administrations in the choice of system parameters. The current space registration procedures are based on the traditional approach used by the ITU in terrestrial radio services registration. The coordination regulations are a first-come, first-served regime.

The regulations require that a proposed system successfully coordinate with any radio system with a potential interference problem which has an earlier IFRB notification receipt date. However, another provision of the Radio Regulations assures registration of any system. Any Administration can submit a system's characteristics for notificaion and be placed in the Master Register with a designating mark indicating its sequential filing status. The mark can be removed if the system operates for four months without causing interference. Moreover, the regulations require prior users to "consider" adjustments to later arriving users' requirements.[12]

Another provision of the Radio Regulations, Section 1053, titled "Resolution of Difficulties" reads: "...Administrations concerned shall together make every effort to resolve...difficulties by means of *mutually acceptable adjustments* " (emphasis added). Similarily, Resolution 2 of the 1979 WARC provides that first registration and use do not provide "permanent priority" and "should not create an obstacle to the establishment of [other] space systems."[13]

There are provisions also in the Radio Regulations, Appendix 3 (Notification Data) and Appendix 4 (Advance Publicaition Data) which require Administrations to specify "visible arc" and "service arc." Administrations must specify the portion of the geostationary arc over which the space station is visible from the service area on Earth at a minimum elevation of 10° (visible arc), and the portion of the arc over which the space station could provide the required service (service arc), and reasons for any discrepancy between the size of the two arcs. This information is intended to provide flexibility to accommodate future users; satellites could be moved within their service arc, if necessary, to accommodate users entering at a later time.

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11. *Id.* at 57-60.

12. I.T.U. Radio Reg. 1051 (1982).

13. *See Id.* at Resolution 2. For discussion of Resolution 2 of the 1979 WARC and other related provisions, see Smith, *Space WARC 1985: The Quest for Equitable Access*, 3 B.U. INT'L L.J. 229, 238-39 (1985).

2.B. Coordination Experience Precipitated a Challenge to the System

According to the Annex to IFRB circular 1555, dated May 24, 1983, some 85 geostationary satellites were notified worldwide and 95 were then in the coordination process. An estimated 20-30 satellites have been notified since inception of the current system, in addition to those which are currently in the International Frequency List. Well over 100 satellites have been coordinated and notified to date, and more than 90 are in the process. No country has ever been denied acess to the GSO. While a large number of satellites have been sucessfully registered, at times difficulties have arisen during the intersatellite coordination portion of the regulatory process.

In 1974 and 1975, difficulties arose in coordinations involving India, Indonesia, the USSR and Intelsat. Registration difficulties were experienced by India for Insat and by Indonesia for Palapa. Both systems were finally successfully coordinated after a number of operational concessions were made by the later arriving satellite system owners, *viz.* India and Indonesia. The problems which arose in these cases grew out of the coordination process, but were created by factors separate from the ITU regulatory procedure.

Wide differences in system operating characteristics, usually called "inhomogeneity," result from different coverage and service requirements. In addition, constraints emerge resulting from multi-purpose use of space segments. Occasionally, low cost implementations involve restrictions; and difficulties can be created by conservatism of those already in orbit seeking to protect their operations from interference.

Lack of consistent use of ITU (CCIR) interference criteria also can lead to difficulty. Most of the difficulties in the Indian and Indonesian cases were associated with the Intelsat Article XIV process,[14] not the ITU regulations. Also the bilateral nature of the process itself leads to some difficulties. An agreement between two Administrations may negate or impact an earlier agreement with a third party by either or both parties to a new bilateral negotiation.

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14. 1971 Intelsat Agreement, Art. XIV. Article XIV provides in part as follows: (c) To the extent that any Party or Signatory or person within the jurisdiction of a Party intends to establish, acquire or utilize space segment facilities separate from the INTELSAT space segment facilities to meet its domestic public telecommunications service requirements, such Party or Signatory, prior to the establishment, acquisition or utilization of such facilities, shall consult the Board of Governors, which shall express, in the form of recommendations, its findings regarding the technical compatibility of such facilities and their operation with the use of the radio frequency spectrum and orbital space by the existing and planned INTELSAT space segment.
Space Law: Selected Basic Documents, Senate Comm. on Commerce, Science and Transportation, Comm. Print 175, 215-16 (1987).

As a member of Intelsat, India was obligated under Article XIV of the Intelsat Agreement, to coordinate with Intelsat using Intelsat's coordination guidelines derived from CCIR Recommendations. This coordination resulted in a number of restrictions on the Indian system to accommodate the Intelsat protection criteria, including: (1) shifting India's preferred orbital position by 5°; (2) restrictions on satellite power with resultant increases in earth station costs; and (3) some restrictions on India's TV operations. The orbit location had been based on India's multipurpose satellite requirements, in particular the meteorological payload, and no study had been made of the orbit problems which might arise with other satellites. Better advance study by India might have prevented some of these problems.

Similar to the problems created for India, Intelsat required operational concessions by Indonesia (under Intelsat Article XIV procedures) despite a 14° orbital separation. Indonesia also experienced difficulties with the USSR in obtaining detailed system information. An active role by the IFRB (at Indonesia's request) was required to resolve the USSR/Indonesian problem. Intelsat has since modified its coordination criteria and has generally relaxed its required protection ratios.[15]

According to the FCC, U.S. commercial coordination experiences have been, in general, positive. In a late 1970s trilateral coordination involving Canada, Mexico and the U.S., the emphasis was on mutual accommodation and an equal distribution of concessions. The U.S. generally takes the approach of coordinating early and informally as soon as system requirements are decided. At the appropriate time, these informal agreements are followed by official ITU paperwork.[16]

The experiences of India and Indonesia with the first-come status of the Intelsat and USSR space segements led them to bring the issue of coordination requiring concessions by latecomers to the entire ITU membership. At the General World Adminstrative Radio Conference of the ITU in 1979, a decision was made to formally address the GSO access problems at a world conference. That subsequent conference is the WARC-ORB-'85-'88.

3. The Satellite Systems in Being

The year-end 1984 population of operating communication satellites on geostationary orbit was 80.[17] These were operating in the

15. First Advisory Comm. Rep., *supra* note 3, at 4-24.

16. First Rep. of the Advisory Comm. for the ITU WARC on the Use of the Geostationary Satellite Orbit and the Planning of the Space Services Utilizing It, 4-22 - 4-24 (December 1983), *filed in* FCC Docket No. GEN 80-741.

17. Second Advisory Comm. Rep., *supra* note 2, at 2.

6/4 GHz band and in the 14/11-12 GHz band. About 48 of these, substantially more than half, were launched since 1979. The greater number (55) were operating exclusively in the 6/4 GHz band. Hybrid satellites (using both 6/4 and 14/11-12 GHz) numbered 10. There were 15 operating exclusively in the 14/11-12 GHz band. Of the 10 hybrid satellites, Intelsat operated 8. Intelsat also had 7 Intelsat IV/IV-A satellites oper-ating exclusively in the 6/4 GHz band. Summarized by regional location:

	6/4GHz	14/11-12GHz	Hybrid	
North/South America (30 W - 180 W)	16	11	5	32
Europe/Africa/Mid-East (30 W - 66 E)	17	3	4	24
Asia/Far East (67 E - 180 E)	22	1	1	24
Total	55	15	10	80

This table reflects communication satellites in the GSO in December 1984, derived from the IFRB's Master Register and other sources.[18] There were a total of 138 satellites of all types confirmed to be in the GSO at the year-end 1984.

In mid-1985, 26 countries, of which 18 are developing countries, were leasing Intelsat capacity for domestic communication use and 23 countries were participating in Regional systems. Australia, Brazil and Mexico joined the community of nations with domestic satellite systems in 1985. (See Table 1 at end of article).

In terms of accommodation of further growth, the FCC Advisory Committee, mentioned above, concluded in its First Report, in 1983, and reconfirmed in its Second Report in January 1985, that:

> "There is a great deal of available radio spectrum, particularly above 10 GHz, that can be used to satisfy communication satellite demand well into the next century. The technology for exploiting these higher frequencies is in early development, and

18. The IFRB Master Register is maintained in Geneva, Switzerland at ITU Headquarters by the staff of the International Frequency Registration Board. Copies of the Register are avilable from the ITU Secretariat on electromagnetic tape. The information presented here was compiled at the Comsat Corporation, Washington, DC, for use by the FCC's Public Advisory Committe. See Second Advisory Comm. Rep., *supra* note 2, at 2-4.

the present cost of implementing systems at these frequencies is greater than the cost of well-established systems."[19]

However, since January 1985, further market research and study of the cost issues has been completed. At the WARC-ORB-85, the United States Delegation introduced Doc. No 141, which explained that the cost of technologies for use of frequencies in the expansion bands and in areas above 10 GHz has been reduced significantly recently, as use of these technologies has been expanding.

4. The WARC-ORB-'85 and '88

The following material is drawn substantially from the report to the Second Session of the Conference.[20]

The World Administrative Radio Conference (Geneva, 1979), in Resolution No. 3, invited the Administrative Council to take all necessary steps to convene a world space administrative radio conference with the objective to guarantee in practice for all countries equitable access to the geostationary satellite orbit and the frequency bands allocated to space services. It also resolved that the Conference should be held in two sessions.

The Plenipotentiary Conference (Nairobi, 1982) in its Resolution No. 1, stated that the agenda of the first session should contain formal adoption for inclusion in the Radio Regulations, of the relevant decisions of the 1983 Regional Administrative Radio Conference for the planning of the Broadcasting Satellite Service in Region 2. In its Resolution No. 8, the Nairobi conference instructed the Administrative Council to consider the question of feeder links, with a view to include in the agenda of the first session, later scheduled for 1985, the planning of the bands allocated to the fixed-satellite service (FSS) and reserved exclusively for feeder links for the broadcasting-satellite service.

The Administrative Council, at its 38th session (1983), following consultation with the Members of the Union, adopted Resolution No. 895. This Resolution, as approved by a majority of the Members, decided that the first session of this Conference should be convened in Geneva on 8 August 1985, for a duration of five and a half weeks; it also drew up an agenda for the first session. In conformity with the terms of reference contained in its agenda, the first session decided:

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19. Second Rep. of the Advisory Comm. for the ITU WARC on the Use of the Geostationary Satellite Orbit and the Planning of the Space Services Utilizing It, 3 (January 1985), *filed in* FCC Docket GEN 80-741.

20. *See* ITU WARC-ORB 85 Rep. to the Second Session of the Conference, Chapter 1 (ITU 1985); *see also* ITU WARC-ORB 85 First Session, Doc. No. 328 (Rev. 2)-E 1-2 (September 15, 1985) [hereinafter ITU WARC-ORB Rep.].

(a) to adopt a report on its work for submission to the second session of the Conference;
(b) to establish the guidelines for the work to be carried out by the IFRB and the studies to be undertaken by the CCIR in preparation for the second session of the Conference, as contained in Chapters 3, 5, 6 and 8 of its report;
(c) to invite the Administrative Coucil to consider the resources and facilities required for intersessional work, taking into account the recommended draft agenda for the second session of the Conference, contained in Recommendation No. PLEN/A (see Attachment B); and
(d) to request the Secretary-General to bring its final report to the attention of the Administrations of all the Members of the Union.[21]

Conference Organization at the First Session (Aug. 8 - Sept. 15, 1985)

The Conference convened, as planned on August 8, 1985, and selected its officers for the management of its work. Seven standing committees were created: 1. Steering Committee; 2. Credentials Committee; 3. Budget/Finance Committee; 4. Technical Committee; 5. Planning Matters (2 Working Groups): A. Decisions on Planning, B. Technical Criteria and Methods; 6. Broadcasting Satellite Matters; 7. Editorial Committee.

The work of the conference began slowly and many non-substansive matters took up a great deal of time in the early weeks of the conference. There appeared to be a strong consensus, unspoken among many delegations, to postpone the debate on substance. Consequently, Committee 5, and particularly Working Group 5A, tasked to decide the bands and services to be planned and the planning principles to apply, were not able to conclude their work by the fourth week, as had been planned.[22] The dilatory tactics of key developing country delegations resulted in Working Group 5A being unable to finish its work or to take final decisions. Similarly, delays in the work of Committee 5 resulted in no final decisions being taken there. As a result, in the final days of the conference, notably from Wednesday, September 11 until mid-day on Sunday, September 15, decisions on bands to be planned and principles of planning could not be concluded except through extended debates in the Conference Plenary.

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21. *Id.*

22. For a more detailed assessment of the causes and rationale of the conduct of the events at the first session, see Smith, *The Space WARC: Reflections on 1985, Prospects for 1988*, Proc. 29th Colloq. L. Outer Space 189 (1986).

In contrast, the less political, more technical issues dealt with in Committees 4 and 6 were more effectively treated.[23] The work of those committees were concluded in a timely manner.

More than 110 nations accredited delegates to the conference, along with observer delegations from 25 international organizations. This impressive number of attendees was not reflected in participation, however, because fewer than 25 delegations generated more than 90% of the conference discussion and debate. Many delegations appeared poorly prepared or not willing to take part in the work of the conference.

No definitive action concerning the Fixed Satellite Service (FSS) will come as a result of WARC-ORB-'85. Some necessary preliminary decisions were made, but a substantial amount of work remains to implement the results of the '85 Session for the FSS.

Definitive action was taken concerning the Broadcasting Satellite Service. The Final Acts of the 1983 Regional Administrative Rardio Conference on Broadcasting Satellite Planning in Region 2 were formally adopted and will be integrated into the Radio Regulations. For this portion of the work of the WARC, Final Acts were prepared and adopted and were transmitted to Member Administrations for their consideration for formal ratification.

5. The Emerging Regulatory Regime

The '85 Session decided that planning shall be applied to Fixed Satellite Services in the 6/4, 14/11-12 and 20/30 GHz bands.

Planning Principles

For any planning to be done in these bands, the conference adopted the following series of 11 principles:

(i) Guarantee of Access and Equitability

The planning methods shall guarantee in practice for all countries equitable access to the geostationary satellite orbit and the frequency bands allocated to the space services utilizing it, taking into account the special needs of developing countries and the geographical situation of particular countries.

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23. ITU WARC-ORB 85 Rep., *supra* note 20, at chapters 2-7; *see also* Smith, *SPACE LAW/SPACE WARC: An Analysis of the Space Law Issues Raised at the 1985 ITU WARC ORB*, 8 HOUSTON J. INT'L L. 227, 229 (1986) (anlysis); *World Administrative Radio Conference: Hearing Before the Subcomm. on Communications and the Subcomm. on Science, Technology and Space Transportation of the Senate Comm. on Commerce, Science and Transportation*, 99th Cong., 1st Sess. 2-35 (1986 assessments by delegation officials).

(ii) Sharing with Other Services

Where frequency bands allocated to one space service using the geostationary-satellite orbit are also allocated to other space services and/or to terrestrial services on an equal primary basis, the planning methods must fully respect the equality of rights to operate in these bands. Therefore, the planning method and associated regulations must not impose additional constraints on terrestrial and/or space services sharing the band on an equal basis.

(iii) Reservation of Resources

a) The planning method should consider the full orbit/spectrum resource. The possibility of setting aside portions of the resources to accommodate unforeseen requirements and requirements of future members of the Union shall be considered after all requirements are satisfied.

b) The planning approach must be consistent with the universally accepted principle, that administrations or groups of administrations are not entitled to permanent priority use of particular frequencies and GSO positions in such a way as to foreclose access by other administrations to the GSO aand frequency bands allocated to space services.

(iv) The Technical Aspects of Special Geographical Situations

The planning method should take into account the relevant technical aspects of the special geographical situation of particular countries.

(v) Consideration of Existing Systems

The planning method shall take into account the existing systems. If necessary, these systems may be subjected to some adjustments to allow for the accommodation of new systems. The degree of adjustment to which a system would be subjected would depend upon the stage of development of the system.

(vi) Provisions for Multi-Administration Systems

a) The planning method shall take into account the requirements of administrations using multi-administration systems created by intergovernmental agreement and used collectively without affecting the rights of administrations with respect to national systems.

b) The planning method shall take into account the specific characteristics of multi-administration systems in order to enable them to continue to meet the requirements of administrations for international services as well as, in many cases, for national services.

c) It is understood that these multi-administration systems include those having a safety-of-life aspect[24] and having feeder links in the FSS.

(vii) Flexibility

The planning method should provide means to accommodate unforeseen requirements and modification of requirements of administrations. It should also be capable of accommodating advances in technology and should prevent the use of technologies which are well proven and widely available.

(viii) Different Planning Solutions in Different Circumstances

A world-wide planning solution would be the most suitable, but the possibility of having different planning methods for different regions, frequency bands or orbital arcs shall not be excluded. In this case, the planning would be done at the same World Conference.

(ix) Efficiency

The planning method should ensure efficient and economical use of the geostationary orbit and frequency bands allocated to space services.

(x) Provisions for Multi-Service and Multi-Band Networks

The planning method should be able to accommodate multi-service and/or multi-band satellite networks, without imposing undue constraints on planning.

(xi) Others

The adminstrative cost of the developing and application of the planning method must be as low as possible.

Planning Method

Two approaches to the planning method were adopted:

a) *An allotment plan* that shall permit each administration to satisfy requirements for national services from at least one orbital position, within a predetermined arc and predetermined bands. The allotment plan shall be established in the bands:

4 500 - 4 800 MHz and 300 MHz to be selected in the band 6 425 - 7 075 MHZ; and

24. Some national systems serve the same purpose.

10.70 - 10.95 GHz, 11.20-11.45 GHz and 12.75 - 13.25 GHz

b) Improved procedures that shall satisfy requirements in addition to those appearing in the allotment plan. These procedures shall be applied in the bands:

3 700 - 4 200 MHz
5 850 - 6425 MHz; and
10.95 - 11.20 GHz,
11.45 - 11.70 GHz,
11.70 - 12.20 GHz in Region 2,[25]
12.50 - 12.75 GHz in Regions 1 and 3,[25]
14.00 - 14.50 GHz,
18.10 - 18.30 GHz,[25,26]
18.30 - 20.20 GHz,[26]
27.00 - 30.00 GHz,[26]

Both parts of the planning method will need to conform to the 11 planning principles just listed above. The planning method must preserve the rights of other services having equal primary status in the bands to which this method is to be applied. This will necessitate the adoption and application of appropriate sharing criteria.

The Allotment Plan

The allotment plan is to be limited to national systems providing domestic services. The procedures associated with this plan should contain provisions permitting administrations with adjacent territories to combine all or part of their allotments with the view to ensure a sub-regional service. The plan is to be prepared on the basis of generalized parameters applicable to all allotments. These generalized parameters were not defined and remain to be developed in the second session of the conference.

Guarantee of Access

All ITU Members shall have at least one allotment in the plan. Each allotment shall consist of: an orbital position in a predetermined arc; a minimum bandwidth within the bands defined in section 4.B.2; a service area. In order to make the plan more flexible, the associated procedures should make it possible to modify an orbital position within

25. In these bands the improved procedures shall apply between networks of the FSS only.

26. The CCIR is asked to study the technical character of the FSS in the frequency band 20/30 GHz and to report to the second session of the Conference with the view of taking a decision on the future plan of these bands by a future competent conference.

the limits of the predetermined arc and to define the conditions for such modifications. The bandwidth associated with each allotment shall be MHz. "A predetermined arc" is used as a means of increasing the flexibility of the plan. The size and position of the arc necessitate intersessional studies.[27]

Duration of the Plan

The allotment plan is established for a period of at least 10 years. The second session of the Conference shall decide on its exact duration. It shall form an integral part of the Radio Regulations and, as such, may be revised if necessary, in accordance with the relevant provisions of the Convention. The 1985 session concluded that the WARC-ORB-'88 should adopt pertinent provisions to ensure that any allotment to satisfy national requirements shall not be deleted without the agreement of the administration(s) concerned. This provision may prove to be very undesirable, because its effect is to give nations permanent rights to orbital claims.

The procedures associated with the plan shall include: the procedures to be applied by administrations wishing to modify their allotments appearing in the plan; the procedures to be applied for converting an allotment into an assignment; the procedures to be applied in order to ensure that new Members of the ITU obtain an allotment in the plan.

Existing Systems

In considering the establishment of the allotment plan, existing systems are:

a) those recorded in the Master International Frequency Register;
b) for which the coordination procedure has been initiated; or
c) for which the information relating to advance publication was received by the Board before 8 August 1985.

Existing systems in the bands designated earlier shall be included in the plan on an equal basis with planned allotments and may be subject to some adjustments. The degree of adjustment to which an existing system would be subjected would depend upon the stage of its develop-

27. Nairobi Convention, *supra* note 4, at No. 500. This paragraph was adopted at the 17th Plenary Meeting when there was insufficient participation for a valid vote to be taken. *Id.* An alternative proposition was maintained by two Administrations. There is, therefore, an unresolved question of the status of this section, if it should be challenged at the second session of the conference. Dean Burch, who headed the United States delegation to the first session, does not expect the lack of a formal vote to become an issue at the second session. *See Hearings, supra* note 23, at 10 (testimony of Dean Burch).

The adjustment criteria shall be drawn up at the second session of the conference.

Planning by Improved Procedures

The principal characteristic of this method is the convening of periodic multilateral planning meetings, which shall be the normal process for gaining access to the GSO/spectrum resources. Additionally, in cases where administrations have an urgent need between multilateral planning meetings, simple matters of access or modifications could be dealt with between adminstrations directly. These cases would then be formalized at the next multilateral planning meeting.

The multilateral planning meeting approach should be a new and separate procedure to be added to the Radio Regulations. The nature of these meetings and the status of their decisions or conclusions should be considered by the second session of the conference. The meeting might be convened at fixed intervals or convened when required, and might or might not need to be covered by new provisions within the framework of the Convention.

Guidelines for Regulatory Procedures for the Allotment Plan

A new Allotment Plan will require:

a) a procedure for the modifications of the Allotment Plan to be applied by the administrations intending to modify their allotments in the Plan or by the new ITU Members which are candidates for an allotment in the Plan;
b) a procedure for the implementation of the Plan to be applied by administrations intending to bring into use assignments in conformity with an allotment in the Plan, i.e., to convert an allotment into a specific orbitial assignment.
c) a procedure applicable to additional FSS users in the bands covered by the Allotment Plan.

Guidelines for Improved Procedures

These guidelines for procedures shall combine the best features of the proposals made by Administrations and the views expressed by Administrations. Some of the possible features of these procedures include:

a) simplification of the advance publication procedure of Article 11;
b) consideration of periodical multilateral planning meetings;
c) "burden-sharing," including proportional burden sharing where appropriate, for possible use in assistance in ensur-

ing access to the orbit/spectrum resources when appropriate;

d) the use of further technical measures in resolving problems of space station coordination;

e) consideration of existing systems in these bands;

f) provisions for bilateral consultations between administrations and the availability of assistance by the IFRB.

Necessary Studies

Administrations should be urged to consider the implications and possibilities of this approach in the intersessional study period, and submit proposals to the second session. Among factors relevant to such meetings which should be considered are: the timing, the status of the decisions taken; the financial implications; the scope and form of requirements and the stage at which they should be submitted; the participants in the meeting; safeguarding the interests of non-participants; the convening authority; whether bilateral agreements reached in the period between meetings be subject to ratification at the next meeting.

6. Analysis of the Results

From the point of view of the United States, the results of the first session are tentatively favorable compared to possible alternative outcomes.[28] Numerous national delegations and several of the developing country caucus groups were initially intent upon an *a priori* plan, dividing up the use of the geostationary orbit among nations. Such a plan would take no account of the relative nature or timing of needs of countries for satellite services. Most of the developed countries were not willing to support an *a priori* planning approach.

It was decided, early in the conference, that whatever form planning might take, it would be limited to the Fixed-Satellite Service (FSS). Other services, such as Mobile, Meteorological, Earth Research, Space Research and Radionavigation-Satellite Services, were considered to be so lightly used, or so unlikely to make significant use of the geostationary satellite orbit (GSO), that they did not warrant planning at this time.

After several weeks of discussion, much of which was non-substansive procedural debate, it was agreed that only the FSS would be planned, that planning would be done in the form of arc allotment plans and improved procedures, and that arc allotment planning would be limited to the 1979 "expansion bands" at 6/4 GHz and 14/11-12 GHz.

Arc allotment plans would provide a guarantee for each country of at least one slot in a predetermined orbital arc, using 800 MHz of radio

28. *See Id.* at 2-67 (comprehensive assessment of the outcome of the first session).

frequency bandwidth in a defined service area. It was understood that some countries might require more than one orbital position.

The second part of the planning approach, referred to as "improved procedures" remains undefined at present. Close attention to this subject in the intersessional work and at the 1988 session of the conference will be important for all governments.

One laudatory result of WARC-ORB-85 was the incorporation into the Radio Regulations of the Final Acts of the 1983 Regional Adminstrative Radio Conference for Broadcasting Satellites in Region 2 (The Americas), referred to herein as RARC-SAT-83. When the World Administrative Radio Conference on the Broadcasting Satellite Service (BSS) of 1977 developed BSS plans for Regions 1 and 3, the countries of North and South America decided not to adopt formal plans, but to study the matter further. Consequently, in 1983, the Region 2 countries adopted somewhat different, more flexible plans for their BSS operations. These plans, in the Final Acts of RARC-SAT-83, are now formally adopted as part of the ITU Radio Regulations.[29] This puts the countries of North and South America on an equal regulatory footing with the countries of Europe, Africa, Asia and the Pacific Basin with regard to broadcasting satellite operations. It is important that the United States complete formal ratification of the results of RARC-SAT-'83 prior to the '88 session in order to formalize the U.S. position on this matter. Final decisions with reference to feeder links for the BSS are included on the agenda of the 1988 session.

All that has been agreed with regard to planning requires a great deal of additional work on implementing procedure, criteria, standards and technical matters. The issues at stake concerning flexibility, workability and practicality of the results of the conference are far from decided. What we have are agreements that are preliminary in nature and subject to substantial possible modification when elaborated. They are not now well defined, consequently, the members of the ITU must not let up on their efforts to work for a mutually acceptable outcome to this conference. A great deal more work is needed.

Implications for the ITU's Future

A problem that has been building in the ITU since the early 1960's is the steadily increasing politicization of the work of the Union. For the 120 years since the original International Telegraph Union was founded, the ITU has been an effective coordinator and regulator of international telecommunication operations. Its work was done efficiently and effectively over the years because, like the Universal Postal Union, it was a specialized organization dealing apolitically with technical matters of international cooperation.

Within the past quarter of a century, that characterization of the Union has been changing. More and more often debates in Union forums

29. International Radio Regulations (ITU 1986).

take on a legalistic, socio-political or political-economic tone. Many countries send highly qualified technical teams to participate in the work of Union meetings. Increasingly, however, we are finding diplomats, lawyers and politicians appearing at ITU meetings and introducing topics and debate that are divisive, non-technical and calculated to destroy, rather than encourage cooperation. An insidious transformation is taking place in the ITU, as well as in other specialized agencies of the United Nations. These developments raise serious questions about the future viability of the ITU.

In 1989, the ITU will convene a Plenipotentiary Conference to review and amend the International Telecommunication Convention of Nairobi, 1982. At that time, it would be appropriate to bring before the Union membership any proposals members might have to modify the roles or structures of Union organs. Considering the complexity and difficulty of the issues to which I allude, 1987 is almost too late to begin serious analysis of alternative proposals countries might consider placing before the 1989 Conference. Topics such as weighted voting in selected forums, reduced size of administrative/technical meetings, modification of roles of selected organs and revisions to planned frequency of meetings could be addressed. This is only a sample list of kinds of issues. A dedicated group of qualified experts could find many more topics useful to consider.

Implications for U.S. Industry Using the GSO

Considering the results of the first session, one concludes that the Federal Communications Commission (FCC) and U.S. industry retain freedom to continue exploiting improving satellite technology. The contemplated arc allotment planning is in limited frequency bands (the so-called 1979 "expansion bands"); planning will apply to the Fixed Satellite Service (FSS) only. The agreed upon approach is very flexible compared to *a priori* or orbital assignment plans that were considered, but not agreed upon because of their rigidity.

Considering the second part of the planning approach adopted and described above, *viz* improved procedures for the FSS in designated bands, many countries proposed alternative approaches. As the first session drew to a close, it appeared that a consensus was forming in favor of some form of regional multilateral planning meetings. However, very little was agreed in this connection and much work remains to be done. The U.S. industry and government should be diligent in this area, maintain close contact with the CCIR and IFRB working staffs, and participate in appropriate Study Group meetings in the intersessional period. As a result of work yet to be done, future international coordination of non-planned networks in the FSS will be under new procedures (probably after July 1989 or January 1990), using some form of multilateral planning meetings, possibly of a cyclical nature. It will be very important for U.S. government agencies to insure that there is effective industry involvement in developing practical and workable procedures, in the intersessional period and at WARC-ORB-88.

7. *Preparations Necessary for 1988*

When one considers: (1) the amount of work, (2) its complexity, (3) the resources and time needed to do it, and (4) the amount of resources in the approved budget of the ITU; then, unless national administrations undertake to do a great deal of the basic study and proposal formulation that is needed, and contribute that work in support of the ITU staff in the intersessional period, there may be neither enough time nor enough budgetary resource available to the Union to do all the work that needs to be done. If enough of the required work is not completed, the Union may have no choice other than to slip the 1988 session to a later time. That kind of conference date change is always difficult because of the number and frequency of other Union meetings.

It is in every member country's national interest to work hard within the stucture of the Union to achieve its goals. If the endemic problem of political distortions and distractions can be overcome, the Union should be strengthened and made more efficient. Its services are vital to the world community. If the political problems being generated in the specialized agencies today cannot be overcome, we will have to find some viable substitute for the functions of the ITU. They cannot simply be abandoned. Consequently, it is in each country's national interest for government and industry alike, working in close cooperation, to do whatever can be done to ensure that WARC-ORB-88 can be convened on schedule and can successfully conclude its work.

Several national, inter-agency and public policy organizations and activities were used in the United States to prepare for WARC-ORB-85. They included IRAC's Ad Hoc 178 and its supporting working groups,[30] the Interagency Coordinating Group, SIG-Telecom and/or SIG-Space Policy Reviews, FCC Public Inquiry through docketed proceedings, FCC Public Advisory Committe and its working groups, CCIR Study Group participation, CCIR National Advisory Committee reviews, and informal collaboration among industry and government organizations to obtain timely, constructive and useful advice for bilateral and multilateral pre-conference coordination with foreign governments and Union staff. All of these useful and proven mechanisms should continue to be employed to prepare for WARC-ORB-88.

In recent years, for major ITU conferences, the Department of State has wisely initiated delegation preparatory work well in advance of actual meetings. Consequently, delegation core groups, including industry advisors, and delegation leaders have been brought into contact with one another well before the conference. The delegation personnel form a mutually reinforcing team and develop an awareness of the strengths

30. IRAC is the Interdepartment Radio Advisory Committee established within the National Telecommunications and Information Administration to coordinate and regulate federal agency uses of radio spectrum in the United States.

brought to the team by its selected members. The early designation of the core group and the identification of Dean Burch made a major contribution to the success achieved in Geneva. The concerned U.S. Government agencies should collaborate early on a core group and obtain early designation of the delegation leader with approval by the White House for the 1988 session.

It will greatly improve the quality and substance of the debate for WARC-ORB-88 if the developing countries, as well, would form core delegation groups, prepare their representatives substatively and go to the '88 Conference equipped to engage in meaningful, substantive discussions for the full duration of the planned meeting.

Work to be Done in the Intersessional Period

The work to be done is well indexed in the draft agenda prepared by the conference for consideration by the Administrative Council. The Council could modify this draft or add items to it. Using the draft agenda as a guide, including its numbering scheme, the intersessional work, at a minimum, will have to address:

1.1 Arc Allotment Planning for the FSS in the expansion bands;
1.2 Regulatory Procedures for the expansion bands' plans;
1.3 Technical Standards, Parameters and Criteria for the FSS in the expansion bands;
2. Review and revision of regulatory procedures and appropriate technical standards, parameters, and criteria for space services and frequency bands not subject to planning;
3. Review and revision of space service definitions;
4. Establishing provisions and plans for BSS feeder links;
5. Consideration of using 10.7 to 11.7 GHz (uplink) in Region 1 for all modes of FSS operations, and consequential RR revisions;
6. Consideration of studies and implications of satellite sound broadcasting as outlined in Resolution No. 505 of WARC-79;
7. A decision on long-term applicability of Resolution No. 2 of RARC-BS-83;
8. Consideration of suitable bands for BSS/HDTV, including revisions to RR Article 8 at a later competent conference;
9. Decisions on consequential changes to the Radio Regulations required by decisions taken at WARC-ORB-88;
10. Consideration of and action on appropriate and relevant Resolutions and Recommendations; and
11. Evaluation of financial implications of decisions taken, in accordance with paragraph 627 and other pertinent provisions of the Nairobi Convention.

Conclusion

A great deal of work has been accomplished. A great deal of work, as described above, remains to be done. The time in which to do it is short. It will take a great deal of effort by many governments, ITU staff and industry organizations if the WARC-ORB-88 is to be concluded successfully and on a timely basis.

TABLE 1

WORLD COMMUNICATION SATELLITE SYSTEM
SUMMARY - EXISTING AND PLANNED - 1987

Domestic Communication Satellite Systems - 1987

- Australia
- Brazil
- Canada
- China
- France
- Germany (FRG)
- India
- Indonesia
- Japan
- Mexico
- UK
- USA
- USSR
- More than 25 countries using leased Intelsat space capacity for domsat services.

Multi-administration Satellite Systems - 1987

- Arabsat (22)
- Eutelsat (16)
- Inmarsat (40)
- Intelsat (112)
- Intersputnik (14)

[Estimated 1987 members = #]

Additional Comsat Systems Under Study or Known In Development

- Andeansat
- Caribsat
- Ireland
- Nordsat
- Israel
- Pacsat
- RASCOM*
- Italy

* Regional African Satellite System (for BSS).

SPACE COMMUNICATIONS TO AIRCRAFT: A NEW DEVELOPMENT IN INTERNATIONAL SPACE LAW (PART I)+

Dr. Wolf D. von Noorden *

Introduction

Largely unnoticed by the international legal community, an important development has been taking place in space law: the creation of an international institutional framework for aeronautical satellite telecommunications. At the Fourth Session of the INMARSAT Assembly, held in October 1985, various amendments were adopted to the INMARSAT Convention and Operating Agreement. The effect of these amendments is to confer on INMARSAT the competence to provide aeronautical satellite telecommunications on a global basis.

In order to discuss this development it is necessary to provide certain background information. First, an outline will be given of INMARSAT, its structure and present operations. Secondly, there will be a description of the potential applications of aeronautical satellite telecommunications. Thirdly, an account will be given of the origin of INMARSAT's involvement in this field and of earlier attempts to establish an aeronautical satellite system.

INMARSAT

The International Maritime Satellite Organization (INMARSAT) came into existence in 1979. Its original purpose was "...to make provision for the space segment necessary for improving maritime communications, thereby assisting in improving distress and safety of life at sea communications, efficiency and management of ships, maritime public correspondence services and radiodetermination capabilities."[1] The origins and nature of the Organization have already been described in

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+ Part II of this article will appear in a later issue of this JOURNAL.

* Legal Adviser, INMARSAT. The views expressed in this article are those of the author and are not necessarily those of any organization with which he is or has been connected.

1. INMARSAT Convention, Art. 3(1).

detail in the pages of this Journal.[2] For present purposes an updated summary will be sufficient.

The decision to establish INMARSAT was taken at the International Conference on the Establishment of an International Maritime Satellite System, 1975-76. The Conference, which had been convened by the Inter-Governmental Maritime Consultative Organization (now the International Maritime Organization), adopted the texts of two international instruments. These were the Convention on the International Maritime Satellite Organization (INMARSAT) and the corresponding Operating Agreement. Both instruments entered into force on 16 July 1979, and the Organization commenced operations in 1982.

Forty-eight States have now joined INMARSAT by becoming Parties to the Convention. Each Party must either itself sign the Operating Agreement or designate a public or private entity within its jurisdiction to do so.[3] The present Signatories to the Operating Agreement are extremely varied, including national PTT organizations, private commercial corporations, State enterprises, government departments and, in a few cases, the Member State itself. The Signatories invest in INMARSAT in proportion to the relative use made by their countries to the INMARSAT system.[4] In return they receive compensation for use of capital at a rate fixed from time to time by the Council.[5]

The Organization levies charges for the use of its space segment. These charges are established at a level sufficient to cover operating expenses, amortization and compensation for use of capital.[6] These are within the discretion of the various entities which operate coast earth stations through which communications are routed. End-user charges typically include the relevant space segment utilization charge as well as charges for the use of coast earth station facilities and terrestrial connections. INMARSAT receives its revenues from the coast earth station operators, not from end-users.

Although the Organization is required to operate in accordance with commercial principles,[7] it has no power or obligation to earn profits

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2. *See* Stephen E. Doyle, *INMARSAT: The International Maritime Satellite Organization - Origins and Structure*, 5 J. SPACE L. 45 (1977); and H.H.M. Sondaal, *The Current Situation in the Field of Maritime Satellite Communication Satellites: "INMARSAT"*, 8 J. SPACE L. 9 (1980).

3. INMARSAT Convention, Art., 2(3).

4. INMARSAT Convention, Art. 5(2); INMARSAT Operating Agreement, Arts. III and V.

5. INMARSAT Convention, Art. 5(2); INMARSAT Operating Agreement, Arts. III and VIII.

6. INMARSAT Convention, Art. 19(1).

7. INMARSAT Convention, Art. 5(3).

for its Signatories. It follows that, if the Organization starts to generate a surplus of revenues, after allowing for operating expenses, amortization and compensation for use of capital, it must stabilize or reduce its space segment utilization charges. A reduction was in fact made in January 1986.[8]

The Organization presently offers maritime satellite telecommunications services on a near-global basis, including telephone, telex, data, slow-scan television and compressed video. Among the most recent introductions are the SafetyNET and FleetNET enhanced group call services. Future service offerings are likely to include various navigational aids and the use of emergency position-indicating radio beacons (EPIRBs). INMARSAT services will also be an important element in the International Maritime Organization's Global Maritime Distress and Safety Service.[9]

At present the Organization leases operational and spare satellite capacity in each of its three ocean regions. However, the Organization has placed contracts to purchase a second generation of satellites, also a ground control system.[10]

The market for maritime satellite telecommunications services has grown considerably since INMARSAT commenced operations. The Organization's total revenues for 1986 were in excess of US$60 million, to which maritime services made by far the largest contribution. About 5,500 vessels are currently equipped to operate via the INMARSAT systems, and this number is increasing at an average rate of 80 per month.

The Organization has three organs: the Assembly of Parties, the Council and the Directorate.[11] The Assembly meets once every two years and is responsible for the general policy and long term objectives of the Organization. The Assembly also decides upon questions concerning formal relationships between the Organization, States and other international organizations.[12] The Council meets three times a year. It consists of representatives of those eighteen Signatories with the largest investment share in the Organization and also of the representatives of four further Signatories elected in order to ensure just geographical representation.[13] The Council is responsible for detailed policy and

8. COUNCIL/21/SR/FINAL/sec. 17 (this is an internal document).

9. *See* GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM, INTERNATIONAL MARITIME ORGANIZATION (London, 1987).

10. 5 OCEAN VOICE 2 (NO.2,April 1985); and 6 OCEAN VOICE 7 (No. 2, April 1986).

11. INMARSAT Convention, Art. 9.

12. INMARSAT Convention, Art. 12.

13. INMARSAT Convention, Art. 13(1).

approves the Organization's annual budget. The Directorate consists of an international staff of approximately 200, headed by the Director General, who is responsible to the Council for the day-to-day management of the Organization.[14] The Directorate is located at the Organization's Headquarters in London.

Aeronautical Satellite Telecommunications

Although, as indicated above, the shipping industry has been quick to take advantage of the possibilities offered by satellite telecommunications, there is as yet no operational system for aeronautical satellite telecommunications. The historical explanation of this belongs in the next section of this Article. At this point it is necessary to describe the demanding requirements of the aviation industry for radio telecommunications and to illustrate how satellites can offer improvements over existing systems in meeting those requirements.

There are three broad categories of aeronautical communications. The first is Air Traffic Services (ATS). This type of communication is safety-related. Its purpose is to prevent collisions between aircraft in the air or in terminal areas; to ensure an orderly flow of air traffic; to provide advice and information for the safety of flights; and to notify appropriate authorities of aircraft in need of search and rescue aid. This is achieved by providing aircraft with meteorological information; and instructing or advising them in whatever way is necessary to avoid collisions, overcrowding of airspace or any other potentially dangerous situation. ATS communications occur in both directions, between pilots and the controllers in charge of air traffic control regions. Typical types of ATS messages are as follows:

(a) Position Reporting: currently done by voice;

(b) Air Traffic Control (ATC): this includes clearance of an aircraft to its planned destination via the route, altitude and speed which it planned to fly. Such clearances may be revised en route in order to prevent collisions with other aircraft;

(c) ATC Advisories: these messages provide information to the pilot about other traffic or runway conditions, data allowing the setting or resetting of an aircraft altimeter and other safety related information;

(d) Meteorological Reports: these include requests for and reports of weather conditions at particular locations, for example, the airport for which an aircraft is heading: and also weather forecasts broadcast for entire regions.

14. INMARSAT Convention, Art. 16.

Some aircraft report on the specific weather conditions that they encounter, to assist in the production of weather forecasts and to warn other aircraft of potentially hazardous situations, such as wind shear and thunderstorms.

The second broad category of communications is Aeronautical Operational Control (AOC). This relates to the safety, regularity and efficiency of flights. Such communications may be between an aircraft and its airline, an operating agency, a maintenance facility or the destination airport. The types of messages are as follows:

(a) Flight Operations: these may report the fact of departure or arrival, or their estimated time; the progress of the flight; or internal and external conditions. Such messages may also be used to advise the assignment of an airport gate to the aircraft; or to check the aircraft's passenger or cargo manifest;

(b) Maintenance Support: this covers reports on the aircraft's physical and technical condition; requests for and reception of engineering assistance from experts on the ground; and the automatic monitoring of engine performance parameters;

(c) Communications Management: this includes messages to check that the aircraft's communications equipment is functioning properly.

The third category of communications is Aircraft Passenger Communications. These are, in general, data messages and may include the transmission of business or personal messages by aircrew; the reception for distribution to passengers of news, weather and financial information; or special services such as medical or interpreter assistance. In addition, it is sometimes possible for passengers to make their own telephone calls from aircraft; although at present such a service is largely confined to the North American continent.

At present, all the above types of communication are made through terrestrial radio systems, operating mostly in the VHF and HF bands. VHS provides high quality but has a limited range. HF suffers from propagation difficulties, depending in particular on ionospheric conditions and the time of day, resulting in unreliable links of low quality. There are substantial areas of the world's airspace in which aircraft cannot be in contact with ATC centres or receive information from radio navigational beacons. In addition, to meet these needs, there

is a requirement for a large number of costly communications facilities.[15]

Satellite systems can provide reliable telecommunications of high quality over any distance on a near-global basis. The implications of this for ATS are dramatic. The speed and reliability of communications will enable ATC centres to reduce the spacing between aircraft, allowing more efficient use of crowded airspace. Routing can be optimized, leading to fuel savings, shorter flight times and reduced workloads for flight crew and air traffic controllers. Of particular importance is Automatic Dependent Surveillance (ADS), which will allow the position of an aircraft, as determined by its instruments, to be reported automatically or on request to an ATC centre without any action on the part of the flight crew.

History of Aeronautical Satellite Communications

In the early 1960's, NASA and Pan American Airlines conducted experiments to demonstrate the feasibility of satellite telecommunications for aircraft. A major development occurred in 1969, when the International Civil Aviation Organization (ICAO) formed a panel of experts to consider and make recommendations concerning the Application of Space Technology Relating to Aviation. This is the derivation of the name given to the Panel: ASTRA.

ASTRA met between 1970 and 1972. The first oil crisis had not yet occurred, and many forecasters predicted that there would be rapid growth over two decades in the demand for air travel. At the same time, many failed to foresee that there would be rapid growth in the use of wide-bodied jets, which would lower the member of aircraft needed to cope with any given level of demand. As a result, it seemed that there would be a great increase in the overall number of flights, straining the capacities of existing communication and air traffic services systems.[16]

It was in the light of such assumptions that ASTRA approached one of the fundamental questions of aeronautical satellite telecommunications: whether international civil aviation should have an exclusively dedicated satellite system, or should share the system with other users. ASTRA decided on favor of the first alternative. In the words of Mr. Duane Freer:

> "The Panel felt that the paramount aviation safety considerations precluded any other options. Thoughts of shared usage of satel-

15. *See* D. W. Freer, *Applications of satellite communication technologies to international civil aviation*, 53 TELECOM. J. 710 at 712 (XII/1986).

16. *Id.*, at 711.

> lites or of a system which was not totally at the beck and call of the aviation community were dismissed as being unthinkable."[17]

The ASTRA recommendations came at a time when the airlines were experiencing a slackening of business, and were at the same time committed to investing in new inertial navigation systems and transponders for secondary surveillance radar. The costs of establishing a dedicated satellite system were considered totally unacceptable, and ASTRA was disbanded. However, at about this time the idea of a dedicated aeronautical satellite system was maintained in the context of the AEROSAT programme. Following a recommendation of an Air Navigation Conference, held by ICAO in 1972, the United States Federal Aviation Administration and the European Space Research Organization (ESRO) agreed to launch an experimental satellite. The objective was to perform a variety of experiments to determine the desired characteristics of an operational aeronautical satellite for mobile communications and position reporting. The satellite was never ultimately launched, and the airlines remained unwilling to invest in an expensive dedicated satellite system.

The AEROSAT programme resulted in one development of lasting importance. A Committee of the AEROSAT Council concluded in the early 1980s that civil aviation might be able to share satellite systems operated for other purposes. It urged ICAO to explore this possibility. The AEROSAT Council suggested that the INMARSAT system might be suitable for such a sharing arrangement.[18]

The origins of the idea of a shared satellite system, however, date back to at least the early 1970s. At this time the ITU, IMCO and ICAO were all considering the desirability of shared radio frequencies for aeronautical and maritime services. The position of the ICAO Council was stated in a recommendation approved on 11 December 1970:[19]

> "(a) That, since from an operational and frequency management viewpoint general sharing of frequency bands between the aeronautical mobile and the maritime mobile services is considered undesirable, any proposals to this effect should be opposed;
>
> (b) nevertheless, that provision should be made to permit the possible future allocation of a frequency channel(s) in appropriate bands for joint use by the aeronautical and maritime services, for a SAR [Search and Rescue] system employing satellite techniques,

17. *Id.* at 711.

18. *Id.* at 711-2.

19. Quoted in IMCO doc.MARSAT II/6, 25 January 1973, p. 2.

for application in the event that the requirement for such a system should emerge in the future."

The ICAO Council approved certain comments on this recommendation which explain the underlying concerns. The following extracts are of particular interest:

> "Any curtailment of the flexibility now available to the international civil aviation interests in the organization of the aeronautical infrastructure would have an unacceptable stifling effect..... Experience over the last 25 years has shown that the coordination of frequency requirements within the aeronautical environment alone has been, and still is, a delicate and difficult undertaking. If the coordination has to include other than aeronautical interests, particularly where there are no common practices and requirements, it is feared that unacceptable delays will be suffered in the implementation of systems to meet the aeronautical needs."[20]

The position of ICAO was summarized by the IMCO Secretariat in the following terms:

> "Until recently the interpretation given to sharing, particularly by the CCIR, had been wholly on the use of common radio frequencies with an emphasis on technicalities and spectrum conservation..... ICAO would prefer to regard the question of radio frequency economy as being only one factor so as not to preclude the possibility of other forms of sharing, for example, a common space vehicle or common launcher even if the two Services use separate transponders operating on exclusive frequency bands. So far the ICAO position on the examples quoted is not defined."[21]

In the same document the IMCO Secretariat noted that the ITU Conference of 1971 had altered the frequency allocations so as largely to give effect to paragraph (b) of the ICAO Council Recommendation referred to above:

> "Thus, for example, in the bands between 1535 MHz and 1660 MHz exclusive allocations are made to both [aeronautical and maritime] Services for communications in the upward and downward direction, in both cases separated by a contiguous band of

20. *Id.* Annex, at 2-3.

21. *Id.* at 1-2.

frequencies available to both maritime and aeronautical mobile Services on a shared basis."[22]

The IMCO Panel of Experts on the Establishment of a Maritime Satellite System was also cautious on the question of sharing. The Panel reported in 1974 its view that the first phase of a maritime satellite service should be confined to meeting maritime needs. However, the Panel shared the views of ICAO and CCIR that consideration should be given to the possibility of suitable forms of sharing, particularly with respect to distress and to search and rescue, in the frequency bands which had been allocated to both aeronautical mobile- and maritime mobile-satellite services.[23]

A more far-reaching proposal was introduced by the representatives of the United States at the International Conference on the Establishment of an International Maritime Satellite System. The proposal was as follows:

> "The United States believes that the international telecommunications community should study seriously the question of ultimately combining maritime and aeronautical communications capabilities, so far as is compatible with sound technical, economic and institutional planning. We believe substantial advantages might well accrue from joint maritime and aeronautical capabilities. Preliminary United States studies suggest that combining these capabilities is technically feasible and might well result in substantially reduced total financial requirements and increased revenue."[24]

In the result the Final Act of the International Conference on the Establishment of a Maritime Satellite System included the following recommendation:

> "THE CONFERENCE RECOMMENDS that arrangements should be made to undertake at an early date the study, without prejudice to programmes in planning, of the institutional, financial, technical and operating consequences of the use by INMARSAT of multi-purpose satellites providing both a maritime mobile and an aeronautical mobile capability. In connection therewith, the

22. *Id.* at 3.

23. MARSAT/CONF/5, October 1974, Attachment, p. 21.

24. MARSAT/CONF/WP. 14, 19 February 1976, p. 1.

advice participation and cooperation of the appropriate aeronautical authorities should be sought."[25]

It was in the light of this recommendation that INMARSAT began to study the requirements of the aeronautical community for satellite communications. The results and consequences of that study will be the subject of the second part of this Article.

25. FINAL ACT OF THE INTERNATIONAL CONFERENCE ON THE ESTABLISHMENT OF AN INTERNATIONAL MARITIME SATELLITE SYSTEM, INTER-GOVERNMENTAL MARITIME CONSULTATIVE ORGANIZATION, 69 (London 1976).

THE U.S./INTERNATIONAL SPACE STATION

John E. O'Brien *

The world community is about to cross over the threshold of the Space Station era. Exciting as this may be, the idea is not new. Mankind has long dreamed of space platforms designed for a variety of useful purposes. This has been especially true here in the United St[1] ates. In fact, as the U.S. planned its post-Apollo space program, a Space Station serviced by a Space Shuttle was considered desirable. However, in the early 1970's it became apparent that budgetary considerations would not permit simultaneous development of both. Accordingly, the political decision made by President Nixon was to proceed with the development of a Space Transportation System which could support a variety of future space activities including a Space Station some day. Therefore, the U.S. proceeded with its Space Shuttle program with the timing of a Space Station decision deferred until a more favorable future time. By the way, it appears that the Soviets, when confronted by a similar choice, made the opposite decision. They proceeded with their station concept and deferred development of their version of a Space Shuttle. In any event, it was not until the Reagan Administration took office that the subject of a Space Station acquired any fresh political momentum.[1] This is not surprising when one considers President Reagan's overall vision of space exploration.

Sample Legal Issues

As we look forward to the initial operational capability of the Space Station and the international participation in its activities, the partners are addressing and assessing the range of legal issues which are

* General Counsel, NASA. This article is based on remarks made at the Annual Meeting of the American Society of International Law, April 11, 1987, in Boston, Mass. The views expressed are those of the author and do not necessarily reflect the views of the United States Government.

1. *See* 20 **WEEKLY COMP. PRES. DOC.** 61 (1984) (President Reagan's address committing U.S. to the building of a permanently manned space station before the mid-1990-s).

bound to arise.[2] Initial understanding on some of the issues are being attempted in the current negotiations between the U.S. and Canada,[3] Japan[4] and the European members of ESA.[5]

Agreement will be reached on some matters, however, some longer term issues will probably be left as the "common law of the Space Station." Allowing a "common law" to develop may be desirable, if not necessary, due to our general lack of familiarity with the effects of a Space Station environment in the context of a permanent manned presence and the undefinable parameters of the extent of interaction between representatives of diverse societies.

It is not my intention to attempt to identify all or nearly all the potential legal issues nor stake out a final position on any of those mentioned. My intent is to merely highlight a sample menu, the contents of which will come as no surprise.

Jurisdiction and Control

A basic legal issue which may or may not lead to a solution to other legal issues involves who has jurisdiction and control over all or a portion of the Space Station. The possibilities appear to be jurisdiction and control by one nation, individual nations in accordance with their contributions or some form of joint jurisdiction and control by the

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2. There has been an ever growing literature on the legal aspects of space stations. *See, e.g.*, **K.-H. BOCKSTIEGEL, SPACE STATIONS: LEGAL ASPECTS OF SCIENTIFIC AND COMMERCIAL USE IN A FRAMEWORK OF TRANSATLANTIC COOPERATION** (Koln, 1985); **DEUTSCHE GESELLSCHAFT FUR LUFT- UND RAUMFAHRT E.V., COMMERCIAL USE OF SPACE STATIONS: THE LEGAL FRAMEWORK OF TRANSATLANTIC COOPERATION** (Bonn, 1987); **D. SMITH, SPACE STATIONS: INTERNATIONAL LAW AND POLICY** (1979). Reference to additional sources can be found in these publications. On scientific and other aspects, *see Space Station: Policy, Planning and Utilization,* 10 **A.I.A.A. AEROSPACE ASSESSMENT SERIES** (1983).

3. Memorandum of Understanding Between the National Aeronautics and Space Administration and the Ministry of State for Science and Technology for a Cooperative Program Concerning Detailed Definition and Preliminary Design (Phase B) of a Permanently Manned Space Station, April 16, 1985.

4. Memorandum of Understanding Between the United States National Aeronautics and Space Administration and the Science and Technology Agency of Japan for the Cooperative Program Concerning Detailed Definition and Preliminary Design Activitites of a Permanently Manned Space Station, January 9, 1985.

5. Memorandum of Understanding Between the National Aeronautics and Space Administration and the European Space Agency for the Conduct of Parallel Detailed Definition and Preliminary Design Studies (Phase B) Leading Toward Futher Cooperation in the Development, Operation and Utilization of a Permanently Manned Space Station, June 3, 1985.

participants. This issue encapsulates within it the matter of registration in accordance with the 1976 Convention on the Registration of Objects launched into Outer Space.[6] Should registration be the driving force to decide who has jurisdiction and control over any portion of the Space Station? Or should this be determined as a matter of agreement between the United States and its partners as permitted under Article II of the 1976 Convention? How this is finally resolved will go a long way in resolving some of the Station management issues.

Criminal Law

Here we are faced with the fascinating range of possibilities from serious criminal activities to simple misdemeanors. The immediate problem, of course, is that there is no uniformity among nations as to what constitutes criminal activity. Beyond that there are many other problems such as extradition treaties, or lack thereof, between nations represented on the Space Station, authority to apprehend and incarcerate, and subjugation of individuals to foreign criminal laws and courts. Should the solution to the "jurisdiction and control" issue dictate a solution to the criminal law issue by subjecting individuals to the criminal laws of the nation having jurisdiction and control over that portion of the Space Station where the crime is committed? Would it be fair to harness individuals with knowledge of the criminal laws of other participating nations? Or should the nationality of each individual dictate the applicable criminal law no matter where the individual is located on the Space Station when a violation occurs? Should this be a matter of agreement between participating nations?

There have been several views under active discussion within the U.S. One position would place primary jurisdiction in the State of the accused unless waived by the accused in which case secondary jurisdiction could be exercised by the State of the victim or the State of registry of the location of the alleged criminal event. A second view would place primary jurisdiction in the State with physical custody of the accused. Under this approach, it would be anticipated that the State of primary jurisdiction would give sympathetic consideration to a waiver request if a crime was committed against the property or security of a secondary State, the victim is a member of a secondary State crew, or the accused is a secondary State national. A third view would be to ignore the subject in the Inter-governmental agreements and let the "legal chips" fall where they may.

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6. Convention on Registration of Objects Launched into Outer Space, entered into force Sept. 15, 1976, 28 U.S.T. 695, T.I.A.S. No. 8480.

Civil Causes of Action

Although there is an established nexus between the 1967 Outer Space Treaty[7] and the 1973 Liability Convention[8] and launching states, there are many unanswered questions on several levels of activity on the Space Station. Leaving aside the potentially uncertain application of these international laws to activities onboard the Space Station, there are knotty problems involving individual rights, property damage and destruction, and third party liability. Once again, we are immediately confronted with diverse national laws dealing with the entire subject. Many of the same issues are present here as in the case of criminal law application. Should the law follow the individual? If so, should it be the law of the plaintiff's residence, domicile, or should the law be determined by agreement between the international partners? It certainly is a vexatious issue.

Interparty Waiver of Liability

The approach to an international interparty waiver of liability builds upon and expands the NASA approach for the Space Shuttle. It would apply to claims and liabilities arising out of "Protected Space Operations" as defined in the agreements when both the cause of the damage and the damage itself occurs during such operations. Under the approach contemplated, no international partner, party, contractor, subcontractor, or supplier may sue: another party; a related entity of another party; related entities of the same party; the other partners; a related entity of another partner; and employees of the foregoing. Although the coverage would be quite broad, it does not preclude lawsuits: based on contractual relationsips; made by a person or estate or survivor for injury or death or damage to the third parties; or based on intellectual property rights.

Third Pary Liability

Third party liability as it relates to the Inter-governmental agreements is limited to the liability of States and not individuals or business concerns. Clearly, the liability of States for damages flows from

7. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, entered into force October 10, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205.

8. Convention on International Liability for Damage Caused By Space Objects, entered into force for United States October 9, 1973, 24 U.S.T. 2389, T.I.A.S. No. 7762.

the Liability Convention[9] and the Registration Convention.[10] Under the approach the State of registry is the launching State for purposes of the Liability Convention and the State of registry holds harmless any jointly or severally liable States. There would be, of course, other third party liability issues involving users of the Space Station and contractors supporting various Space Station activities. This will have important insurance implications.

Insurance

The immediate concern about insurance in the context of the Space Station is the all too familiar "three C's"; capacity, cost, and continuity. Whether space insurance will be available for Space Station activities is an unknown. If it is not, then participants will be faced with serious decisions on self-insurance and/or indemnification. Absence of insurance will necessarily have an impact on potential commercial uses of the Space Station. Commercial users may require property and third party liability protection from their States as a condition of participation. If the usual insurance is available and affordable, the insurance industry must also be adaptable to new forms of insurance they may not have thought of before. Examples would include life, accident, workman's compensation, personal effects and "Good Samaritan" insurance.

Proprietary Rights

A fundamental issue arising from the nature of activities anticipated on the Space Station involves intellectual property rights. This will be accentuated by the introduction of commercial use of the facility where risk-takers will demand assurance that their investments are secure. The protection sought by participants and users alike will involve the familiar family of protections: patents, trade secrets, and copyright. The U.S. concept regarding patents is basically territorial in nature with a concurrent right of the inventor to file in his or her own State. This means that for the purpose of applying patent law to inventions made on the Space Station, the activity leading to the invention would be deemed to occur within the State which registered the Station element within which the invention is made. If the inventor is not a national of the State whose patent law applies, the inventor will nevertheless have the right to file for patent protection in his/her own State.

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9. *Supra*, note 8.

10. *Supra*, note 6.

Technology Transfer

Inherent in the international participative Space Station program is the issue of technology transfer between the partners. Because of the many technical interfaces involved in an undertaking such as this, a certain amount of technical information must be shared by the partners. But how much is enough? Is there a point beyond which nations are not or should not be expected to be willing to part with unique technical information known only to themselves? A case in point is the United States which has certain export control laws and a critical munitions control list which discourages the sharing of certain technical information with other nations. Compromises must be identified which will allow for needed technical interfaces between the International partners without violating the national security interests of any of them.

Taxation

One fact of life which must also be addressed has been with us since Biblical times - taxes. It would appear to be a truism that whenever a new source of revenue-producing income is discovered there is sure to follow a new form of taxation for the privilege of discovering it. Whether significant commercial interests decide to experiment with the Space Station for economic gain may depend upon the tax structure within which they will be required to operate. There could be a dilemma here. Tax laws of partner States may have to forgive early participation of its private sector interests in order to stimulate this new "space economy" or "Astrobusiness" as Ed Finch has christened it. Yet, as in any other business, "Astrobusiness" should probably be subject to taxation as any other. Why not? The questions are when, by whom, and how much? There is a great deal of thinking necessary here. For example, in the U.S. context, there could be an over-arching U.S. tax issue, but also, there could be a State issue. The U.S. Government might or might not exact a tax on U.S. commercial space activities, but how about individual State governments? Could Florida as the State from which a payload is launched impose a tax of some kind? Florida or California as the "landing States"? Any other State in which the entity is incorporated or has its headquarters? And, how about States through which any data passed? Was it "enhanced" or "value added" thereby justifying taxation? There is much work to be done here in the future. For the present, however, in the Inter-governmental Agreement setting, probably the simplest approach to application of tax laws is to deem that activities on the Space Station have occured in the State of residence of the person deriving income from the activities.

Conclusion

Within the United States Government, development of coordinated legal positions supporting the U.S. posture in the international

negotiations is being performed by an Interagency Legal Working Group. The Working Group membership includes participants from the State Department, NASA, the Office of Management and Budget, and the Departments of Commerce, Treasury, Justice and Transprotation. This process insures that a broad spectrum of U.S. legal interests are considered before final positions are established for negotiation with our international partners. These negotiations, temporarily suspended earlier this year while the interest in the Space Station by the U.S. Department of Defense was sorted out, are proceeding diligently. Once the Inter-governmental Agreements are finally concluded, the latest chapter in the development of space law will have been written. Thereafter, it will be a matter of good faith implementation, refinement of concepts, and composition of the next chapter. It remains mind-boggling!

EVENTS OF INTEREST

A. Past Events

(a) Reports

*1. The 24th Session of the Scientific and Technical Sub-Committee of the United Nations Committee on the Peaceful Uses of Outer Space, 17-27 February 1987**

The 24th session of the Scientific and Technical Sub-Committee of the U.N. Committee on the Peaceful Uses of Outer Space (COPUOS) was held in New York from 17 to 27 February 1987. This session was active and fruitful as some delegations noted it at the end of the meeting when they praised the Chairman of the Sub-Committee, Professor *John H. Carver* of Australia, for his guidance. This outcome could particularly be recorded, though to a different degree, in three areas:

1. In the consideration of two prominent items of the agenda, namely,"UN Programme of Space Applications and the Coordination of Space Activities within the UN System" and "Implementation of the Recommendations of UNISPACE 82";
2. In the question of the use of nuclear power sources (NPS) in outer space, a specific agenda item, in which visible progress was made;
3. In the increased scientific and technical content of the Sub-Committee's work, a trend which has started a few years ago.

Further in this report, attention will be paid to these three areas of the Sub-Committee's dealings in somewhat greater detail.

(a) Implementation of the UNISPACE 82 Recommendations and Performance of the Space Applications Programme

The implementation of the recommendations of UNISPACE 82 and questions relating to the performance of the Space Applications Proggramme became the most important agenda items at this session of the Sub-Committee. For several years, the General Assembly has repeatedly emphasized in its resolutions relating to international co-operation in the

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* The views expressed herein are those of the author and do not necessarily reflect those of the United Nations.

peaceful uses of outer space the urgency and importance of implementing fully the recommendations of UNISPACE 82 as early as possible.[1]

As in previous years, the Sub-Committee combined the implementation of the recommendations of UNISPACE 82 with consideration of the UN Space Applications Programme, since the expansion and reorientation of this Programme has been an integral part of UNISPACE follow-up actions. The Sub-Committee discussed in detail the results accomplished under the Space Applications Programme in 1986 in terms of long-range fellowships, technical advisory services, United Nations workshops, training courses, seminars and meeting of experts.[2] The Sub-committee also considered and endorsed the activities to be performed under this Programme in 1987 and 1988.[3]

However, together with the satisfaction arising from the positive results reached, feelings of discontent and uneasiness over the slow progress of the implementation of UNISPACE 82 recommendations have become manifest during recent years, particularly among the developing countries. This state of affairs has been caused by a lack of consensus among the COPUOS Members as to how to proceed further in this respect and also by the budgetary constraints that the Space Applications Programme experienced during the current biennium.

For this reason, the developing countries initiated, at the 1986 session of the Sub-Committee, the establishment of a Working Group of the whole so that beginning with the 24th session of the Sub-Committee, it could evaluate the implementation of the recommendations of UNISPACE 82. This should have been done with a view "to improving the execution of activities relating to international co-operation, particularly those included within the United Nations Programme on Space Applications and to propose concrete steps to increase such co-operation as well as to make it more efficient."[4]

The Working Group, acting under the chairmanship of *Mr. Gaston Lasarte* of Uruguay, reached consensus on a number of recommendations which have been inserted in its report which is annexed to the report of

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1. *See e.g.* para. 11 of resolution 41/64 adopted on 3 December 1987.

2. *Cf.* reports on these meetings in the following: docs. A/AC.105/374, 19 November 1986; A/AC.105/375, 22 December 1986; A/AC.105/376, 1 December 1986; A/AC.105/377, 8 December 1986; A/AC.105/378, 23 December 1986.

3. As to individual activities taken or to be taken under this Programme during the current period *see* paras. 22 to 35 of the Report of the Scientific and Technical Sub-Committee on the Work of its Twenty-fourth Session, doc. A/AC.105/383 and Corr.1, 3 March 1987, para. 98 at pp. 19-20.

4. *See* Report of the Scientific and Technical Sub-Committee on the Work of its Twenty-third Session, doc. A/AC.105/369, 28 February 1986, para. 21 at p. 5.

the Sub-Committee.[5] These recommendations include measures to be taken by COPUOS, appeals to be addressed to Member States, invitations to IAF and COSPAR, and also a number of specific requests addressed to the Secretariat (Outer Space Affairs Division). While the Working Group expressed concern as to how the proposed and approved activities of the Space Applications Programme could be implemented with inadequate financial resources, a unanimous opinion about the means of redressing this situation could not be reached.[6] The Working Group recommended that it should be reconvened next year to continue its work and the Sub-Committee adopted its report.

In the Sub-Committee itself, under the heading of implementation of the UNISPACE 82 recommendations and the UN Programme on Space Applications, and also during the general exchange of views, delegations from the Socialist countries emphasized that in order to promote international co-operation in the peaceful uses of outer space, efforts should be focused on the elaboration and realization of major projects involving the application of space technology for the purposes of communications, navigation, rescue operations, remote sensing, use of natural resources, study and preservation of the biosphere, global weather forecasting and natural disaster warning system, and development of new sources of energy, materials and technology. They also recommended the convening of a new international conference or other forums to consider all these questions, adopt a programme of action for the future and establish a world space organization. Other delegations, particularly from the group of Western countries, held the view that considerable international cooperative activity was already under way in most of these areas and that the substantial resources needed to convene a new conference would be better applied to support existing mechanisms for international co-operation.[7]

(b) Progress in Specific Items of the Sub-Commitee's Agenda

The Sub-Committee[8] continued its consideration of a number of points that have been in the forefront of its interest for several years.

In the first place, "Questions relating to remote sensing of the Earth by satellites" should be mentioned. Though the Legal Sub-Committee successfully completed its work on the legal principles to govern this kind of activities and these principles were adopted by the

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5. *See* doc A/AC.105/383 and Corr. 1, Annex II, pp. 26-30.

6. As to differing views on this subject, *see* para. 6 of the report of the Working Group, doc. A/AC.105/383 and Corr. 1, Annex II, para. 6 at p. 27.

7. *See* doc. A/AC.105/383 and Corr.1, para.20 at p. 5.

General Assembly in resolution 41/65 on 3 December 1986,[8] this question has remained on the agenda of the Scientific and Technical Sub-Committee. During its consideration the Sub-Committee, *inter alia*, reiterated that remote sensing from outer space should be carried out, taking into account the fundamental urgency to provide appropriate and non-discriminatory assistance to meet the needs of developing countries. The Sub-Committee also emphasized the importance of the availability of remote sensing data and analyzed data at reasonable cost and in a timely manner. Finally, the Sub-Committee recommended that this subject should be retained as a priority item for its next session.[9]

A more visible advance was reached in consideration of "Use of nuclear power sources (NPS) in outer space." This point, too, was regularly discussed by the Sub-Committee at its previous sessions, and in 1979, 1980, 1981, 1984 and 1985, a special Working Group was convened which produced a series of progressive reports on this subject.[10] At the 1987 session, the Sub-Committee, to which a working paper was submitted by Canada for discussion on safety assessments and notifications, and on guidelines and criteria for safe use,[11] succeeded in drawing some con-clusions relating to these aspects of the problem. Noteworthy is the opinion of the Sub-Committee that reactors should not be activated until the space objects carrying them had reached their planned operating orbit. The Sub-Committee also noted that nuclear safety should be ensured in all phases of a mission of a space object with NPS on board and that during all these phases the relevant recommendations of the International Commission on Radiological Protection (ICRP) should be applied. Moreover, the Sub-Committee felt that it should examine the modalities for assistance to developing countries to improve their ability to cope with problems of radiation caused by an unplanned re-entry of a space object with an NPS on board. It also reconfirmed the need for guidance to States as regards preplanning of area monitoring and countermeasures for protection of the population and the environment in case of radioactive contamination of their territory from an NPS carried by a space object.[12]

On the other hand, divergent views remained on two questions. The first one concerned the invitation by the Sub-Committee to the Inter-

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8 *See* doc. A/RES/45/65, 24 March 1987.

9. *See* doc. A/AC.105/383 and Corr.1, paras. 45-50 at pp. 11-12.

10. It was particularly the 1981 session of this Working Group that completed a comprehensive report in which consensus on many issues was reached. *See* Report of the Scientific and Technical Sub-Committee on the Work of its Eighteenth Session, doc. A/AC.105/287, 13 February 1981, Annex II, pp. 1-9.

11. *See* doc. A/AC.105/C.1/1987/WP.1, 12 February 1987.

12. *See* doc. A/AC.105/383 and Corr.1, paras. 55-63 at pp. 13-14.

national Atomic Energy Agency (IAEA) that the agency consider the possibility of preparing, within its mandate, a document containing advice to States on preplanning of area monitoring and countermeasures for protection of the population and the environment in case of an accident involving dispersal of radioactive material from an NPS after re-entry. The other one concerned the possibility of reconvening the Working Group on the Use of NPS in Outer Space at the next session. Agreement was only reached about retaining the qestion of NPS on the agenda of the Sub-Committee as a priority item.[13]

In contradiction to substantive deliberations on these issues, the consideration of another traditional item - "Questions relating to space transportation systems and their implications for future activities in space" - consisted mostly of reviews of national and co-operative programmes by the delegations of nations or representatives of international organizations developing space activities (China, India, France, Japan, USSR, United Kingdom, United States and ESA). In conclusion of its discussion of this item, the Sub-Committee stressed the importance of international co-operation in this field to provide all countries with access to the benefits of space science and technology.[14]

Finally, only a little progress, if any, could be observed in discussions on item "Examination of the physical nature and technical attributes of the geostationary orbit (GSO)." Delegations only reiterated and elaborated on the views which had been expressed at earlier sessions. However, a view expressed during this discussion by some delegations of developing countries regarding the efficient utilization of GSO deserves to be recalled. They suggested that technical options for increasing the capacity of the orbit/spectrum resource were too sophisticated, complex and costly, thereby reducing the possibilities for developing countries to have access to appropriate orbital positions.[15]

(c) Increasing Scientific and Technical Content of the Sub-Committee's Work

During the 24th session of the Sub-Committee, the trend to increasing the scientific and technical content of the work of this body, became more apparent than at any previous session. This has been a direction initiated by the Chairman of the Sub-Committee, which practically all COPUOS Members felt desirable. The Sub-Committee itself commended this trend when reviewing its future role and work by saying in its report that "it had already taken steps to improve its methods of work, enhance the technical content of its discussions, and promote

13. *Id.* paras. 64-67, at p. 14.

14. *Id.* paras. 68-72 at pp. 14-16.

15 *Id.* paras. 73-76 at p. 16.

opportunities for developing countries." The Sub-Committee also noted in this connection that "these improvements had been made to keep abreast of the latest advances in space activities and potential avenues for international co-operation."[16]

To this purpose the Sub-Committee discussed four fresh agenda items, namely "Matters relating to life sciences, including space medicine"; "Progress in the geosphere-biosphere (global change) programme"; "Matters relating to planetary exploration" and "Matters relating to astronomy."

Moreover, an important step in adding greater scientific and technical content to the Sub-Committee's deliberations has been the selection of special themes for each of its recent sessions. Thus the theme of the 1986 session was "Remote sensing for developing countries" and the theme for the 1987 session was "Space Communications for Development." At the invitation of the Sub-Committee, COSPAR and IAF conducted symposia on these respective themes, which - according to the Sub-Committee's own assessment - "offered valuable insights as to the potential of these technologies for making significant contributions to developing countries."[17]

The 1987 Symposium has been considered as particularly successful. It consisted of two parts, entitled "Scientific considerations" and "Systems." During the first part, chaired by the COSPAR President *Dr. A.I. Axford,* experts from France (*J. Voge,* Ingenieur general, Direction generale des telecommunications) and the United States (*J.V. Evans,* Director, Comsat Laboratories) made presentations on satellite communications for economic development. During the second session, chaired by the IAF Past President *Dr. Jerry Grey,* representatives from Intersputnik (*S.P. Kurilov,* Director General, USSR), Telespazio (*G. Guaglione,* Deputy Director, Italy), Inmarsat (*O. Lundberg,* Director General, Sweden), ISRO-Indian Space Research Organization (*U.R. Rao,* Secretary, Department of Space, India) and Aussat (*W.G. Gosewinckel,* Managing Director, Australia) made presentations on the latest developments in the technical and institutional build-up of their respective national or international organizations in space communications.

Furthermore, a special presentation was also made by COSPAR (*Dr. Jack Eddy,* University of Colorado, USA) on progress in the international Geosphere-Biosphere Programme - Global Change during Sub-Committee's discussions on this item. And finally, nine special technical presentations were made on various topics, with six lectures from the United States (among them astronaut *Dr. Sally Ride and Dr. N.A. Nicogossian,* Director of the NASA Life Sciences programme), three from the Soviet Union (among them *Dr. N.A. Semenov,* from Glavkosmos and

16. *Id.* para. 98 at pp. 19-20.

17. *Id.* para. 99 at p. 20.

Academician *Oleg Gazenko,* Head of the Institute of Medical and Biological Problems of the USSR) and one each from France, the Netherlands and the United Kingdom.

Taking momentum of this experience, the Sub-Committee fixed the theme for special attention of its 1988 session that reads "Microgravity Experiments in Space and Their Applications." As in previous years, COSPAR and IAF should be invited to arrange a symposium with as wide a participation as possible. Similarly, these two international non-governmental organizations which have been granted a consultative status with COPOUS and have effectively participated in implementation of the UN programme relating to outer space for many years, are invited to present reports and arrange a special presentation on progress in geo-sphere-biosphere (global change) programme.[18]

On the other hand, the Sub-Committee felt that still more could be done in this direction, particularly with respect to items relating to remote sensing and space communications. As already mentioned earlier, remote sensing should continue as a priority item on the Sub-Committee's agenda. However, the title of this item has been revised and reads now "Matters relating to remote sensing of the Earth by satellites including, *inter alia,* applications for developing countries." Under this heading such problems as the use of remote sensing for drought early warning and monitoring, for agricultural and fisheries management, and for monitoring short and long term climate change could be discussed. The Sub-Committee also felt that special attention could be given to international programmes which contribute to our understanding of the global environment.[19]

Similarly, the practical applications of space communication technology could be considered by the Scientific and Technical Sub-Committee in greater detail. This would be for the benefit of all nations because almost every country utilizes the services of national and inter - national satellite communications systems and also several developing countries now operate their own communication satellites. In this context, the Sub-Committee also agreed to augment the content of its agenda item relating to the[19] geostationary orbit that has been under discussion for many years. From now on, this item should read "Examination of the physical nature and technical attributes of the geostationary orbit.

18. *Id.* para. 105 at p. 21.

19. *Id.* para. 100 at p. 20.

Examination of its utilization and applications, including, *inter alia*, the field of space communication developments, taking particular account of the needs and interests of developing countries."[20] The report of the Scientific and Technical Sub-Committee from its 24th session will be discussed at the 30th session of COPUOS, to be held in New York, 1-12 June 1987.

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2. *The 26th Session of the Legal Sub-Committee of the UN Committee on the Peaceful Uses of Outer Space, 16 March - 3 April 1987**

The 26th session of the Legal Sub-Committee of the UN Committee on the Peaceful Uses of Outer Space (COPUOS) took place in New York from 16 March to 3 April 1987. Following on last year's unusually productive 25th session[1] -- at which a set of Draft Principles on Remote Sensing of the Earth from Outer Space were agreed upon[2] and two draft principles relating to the use of nuclear power sources in outer space were tentatively approved -- it is not surprising that this year's meetings represented a period of consolidation and preparation for further progress to be made in future years.

As a result of the completion in 1986 of the remote sensing item, the Sub-Committee had only two genuinely substantive matters on its agenda: one on nuclear power sources; and a dual one on definition and delimitation of outer space, and the geostationary orbit. The third non-procedural item was the recursive search for a new substantive item to install on the agenda.

On the question of the use of nuclear power sources in outer space, the Canadian delegation, which in 1980 was instrumental in having this

20. *Id.* para. 101 at p. 20.

* The views expressed herein are those of the author and do not necessarily reflect those of the United Nations.

1. *See Report on the 25th Session*, 14 J. SPACE L. 48-51 (1986).

2. They were thereupon endorsed by COPUOS (*see* UN doc. A/41/20, para. 61 and Annex II) and later adopted by the General Assembly (resolution 41/65 of 3 December 1986).

item placed on the Sub-Committee's agenda, once more initiated and shaped the debate, by introducing a revised version[3] of the proposal it had presented the previous year. Again this consisted of five principles: Safety assessment and notification; Guidelines and criteria for safe use; Notification of re-entry; Assistance to States; and Responsibility of States. Of these, the third and fourth were identical (warts and all) to those tentatively approved in 1986, and indeed these principles were not discussed at all this year, except to note that their subject matter happened to coincide with that of the two post-Chernobyl Conventions adopted on 26 September 1986 by the International Atomic Energy Agency.[4] Instead, the debate, both in the Sub-Committee itself and in its Working Group on this agenda item, concentrated on the other three principles, the new Canadian texts of which differed slightly from the 1986 versions.[5] The Legal Sub-Committee also benefited again from some work done on this subject earlier in the year by the Scientific and Technical Sub-Committee of COPUOS.[6]

In respect of Draft Principle 1 (Safety assessment and notification), working papers were submitted by Sweden and by Brazil, Chile, Egypt, Indonesia, Mexico, Netherlands and Uruguay;[7] the debate[8] related to various issues, particularly as to the respective duties of the state performing the actual launching and of other involved states, the timing of any launch-related notification and interaction with the 1975

3. UN doc. A/AC.105/C.2/L.154/Rev.1, reproduced in Annex III.A.1 of the Report of the Legal Sub-Committee [of COPUOS] on the Work of its Twenty-sixth Session (A/AC.105/385) (hereinafter referred to as the 1987 Report).

4. Convention on Early Notification of a Nuclear Accident and Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, XXV:6 I.L.M. 1370 and 1376; IAEA doc. GC(SPL.I)/2, Annexes II and III. *See* 1987 Report, Annex I, para. 6.

5. UN doc. A/AC.105/C.2/L.154, reproduced in Annex IV.A.I of the Report of the Legal Sub-Committee [of COPUOS] on the Work of its Twenty-fifth Session (A/AC.105/370) (1986 Report).

6. Chapter IV (paras. 51-67) (Use of nuclear power sources in outer space) of the Report of the Scientific and Technical Sub-Committee [of COPUOS] on its Twenty-fourth Session (A/AC.105/383).

7. UN COPUOS docs. WG/NPS(1987)/WP.1, 3 and 8, reproduced in 1987 Report, Annex I, Appendix, nos. 1, 3 and 8.

8. 1987 Report, Annex I, paras. 11-18.

Registration Convention.[9] As to Draft Principle 2 (Guidelines and criteria for safe use), working papers were submitted by Sweden and by the Federal Republic of Germany;[10] these and the points raised in the debate[11] related mainly to the structure of the text, with a view to adequately emphasizing the importance of maintaining a safe orbit for a sufficient period of time (some 300 years), as well as other techniques to ensure safety. As to Draft Principle 5 (Responsibility of States), working papers were submitted by the Federal Republic of Germany and by [13] Argentina;[12] the debate[13] focused, on the one hand, on whether anything had to be said on this subject in light of the existing provisions of the 1967 Outer Space Treaty[14] and the 1972 Liability Convention[15] and, on the other, on whether there should also be a separate principle on liability and on compensation for damages, and on the various elements that might be included in the latter. Finally, Sweden submitted a working paper[16] proposing a new principle on the observance of international law.

Although no agreements could be recorded as to any of these proposals (except, perhaps, generally on the last-mentioned one), towards the end of the session Canada presented a further revision of its paper, incorporating therein the more promising of the proposals that had been

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9. Convention on Registration of Objects Launched into Outer Space, 14 January 1975, set out in *The United Nations Treaties on Outer Space (UN* Publication Sales No. E.84.I.10, New York, 1984) (the Space Treaties Booklet).

10. UN COPUOS docs. WP/NPS(1987)/WP.2 and 5, reproduced in 1987 Report, Annex I, Appendix, nos. 2 and 5.

11. 1987 Report, Annex I, paras. 19-35.

12. UN COPUOS docs. WP/NPS(1987)/WP.6 and 7, reproduced in 1987 Report, Annex I, Appendix, nos. 6 and 7.

13. 1987 Report, Annex I, paras. 36-44.

14. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, 27 January 1967 (set out in the Space Treaties Booklet).

15. Convention on International Liability for Damage Caused by Space Objects, 29 March 1972 (set out in the Space Treaties Booklet).

16. UN COPUOS doc. WP/NPS(1987)/WP.4, reproduced in 1987 Report, Annex I, Appendix, no 4.

advanced in the Working Group, including the addition of a new principle on the applicability of international law (new Draft Principle 1) and separating out the subject of compensation (new Draft Principle 7).[17]

The other substantive item, the joint consideration of matters relating to the definition and delimitation of outer space and to the character and utilization of the geostationary orbit, including consideration of ways and means to ensure the rational and equitable use of the geostationary orbit without prejudice to the role of the International Telecommunication Union, although again allocated its own Working Group,[18] as well as being discussed in the Sub-Committee itself,[19] stimulated no new proposals at all. Instead, aside from a very brief portion of the report of the Scientific and Technical Sub-Committee on its recent session,[20] the input for this item consisted exclusively of papers submitted to and already considered at previous sessions.[21] As to the delimitation portion of this item, the arguments again revolved around the desirability, necessity and feasibility of such an exercise, and no progress was made. As to the geostationary orbit, the situation was little better, with the equatorial states favoring and most other states opposing the acknowledgement of any special rights for the former in that special and valuable circle; under the prodding of the Working Group Chairman but in the face of the skepticism and opposition of certain delegations, others proceeded with informal consultations and made some slight progress in attempting to determine to what extent these positions were reconcilable, by comparing the principal working papers that had previously been submitted for the two sides.[22]

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17. UN doc. A/AC.105/C.2/L.154/Rev.2, reproduced in 1987 Report, Annex III.A.2.

18. For its report, *see* 1987 Report, Annex II.

19. 1987 Report, paras. 30-37.

20. *Op. cit. supra* n. 6, Chapter VI (paras. 73-76) (Examination of the physical nature and technical attributes of the geostationary orbit).

21. 1987 Report, Annex III.B.1-7.

22. On the one hand a 1984 proposal by Colombia, Ecuador, Indonesia and Kenya (A/AC.105/C.2/L.147) and on the other a 1986 proposal by the German Democratic Republic (A/AC.105/C.2/L.153), which were compared in a 1986 working paper by Indonesia (WG/DEF-GSO(1986)/WP.1) (reproduced respectively in 1987 Report, Annex III.B.3, 4 and 6).

Probably the liveliest discussions took place in the search for a new item to add, at the specific behest of the General Assembly[23], to the agenda of the Legal Sub-Committee. As this question was not submitted to a working group, the entire debate is on record[24] and reflected directly in the report to COPUOS.[25] Essentially the following proposals were considered:

1. Strengthening the application (without amending the text) of the 1975 Registration Convention, which had at the previous session of the General Assembly received the 10-year review mandated by Article X[26], as a follow-up to which the Secretary-General had just presented a special report to the Legal Sub-Committee[27] on the application of the Convention.[28]
2. Co-operation in the event of an accident or emergency on board a manned space object endangering the life or health of the crew.[29]
3. Legal status of spacecraft crews, in particular with respect to the conditions governing manned space flights.[30]
4. Legal aspects of human presence, activities and co-operation in outer space or legal aspects of international co-operation in outer space, either of which might subsume proposals (b) and (c).[31]
5. Consideration of the legal aspects related to the access of states to the benefits derived from the exploration and utilization of outer space, an item proposed by the Group of 77 of developing countries and which had been specifically

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23. Resolution 41/64 of 3 December 1986, para. 4(c).

24. UN docs. A/AC.105/C.2/SR.471-477.

25. 1987 Report, paras. 38-44, 48.

26. General Assembly, resolution 41/66 of December 3 1986.

27. UN doc. A/AC.105/382.

28. 1987 Report, sub-para. 43(a).

29. 1987 Report, sub-para. 43(b), and Annex III.C.1 (reproducing A/AC.105/C.2/L.159).

30. 1987 Report, sub-para. 43(c).

31. 1987 Report, sub-paras, 43(d) and (e), and Annex III.C.3 (reproducing A/AC.105/C.2/L.161).

mentioned by the General Assembly in its call for the Sub-Committee to propose a new agenda item.[32]

In the end, the Sub-Committe was unable to reach agreement on any of these proposals, and therefore recommended that consideration of this question be continued, as a matter of priority, at this year's (30th) session of COPUOS.[33]

A recurrent theme, throughout the session and in particular in connection with this last item, was the desirability of rationalizing the work of the Sub-Committee, a charge that the General Assembly had repeatedly, and lately more and more insistently, laid on all its subsidiary organs. A particular impetus for this soul-searching came from a statistical compilation[34] showing that in 1986 the Sub-Committee had established the second-worst record of utilizing conference facilities (measured by the ratio of actual time spent in formal meetings to the time reserved therefor with interpreters and other conference staff standing by).[35] Early in the session the Sub-Committee accepted four proposals of its Chairman designed to boost the utilization factor, and indeed the post-session statistics indicated a marked improvement -- though arguably that may have been due to keeping informal consultations (the usual fora for serious negotiations, but which use no conference facilities) to a minimum, as no special efforts were made to reach consensus as to any substantive questions and, indeed, none were achieved; by contrast, at the 25th session important agreements were recorded, though at the cost of a low utilization factor. Largely at the urging of the United States, eight Western delegations submitted a formal proposal[36] to the effect that:

(1) The length of the Sub-Committee's annual sessions be reduced from three to two weeks;
(2) The Sub-Committee should concentrate on its specific agenda items and forego the traditional "general exchange of views", leaving all non-specific matters to be taken up in the parent COPUOS;
(3) Consideration should be given to combining the annual session of the Legal Sub-Committee with those of the Scientific and Technical one and of COPUOS itself.

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32. 1987 Report, sub-para. 43(f), and Annex III.C.4 (reproducing A/AC.105/C.2/L.162).

33. 1987 Report, para. 48.

34. UN doc. A/AC.172/88/Add.5.

35. 1987 Report, paras. 10-14, 45-47.

36. UN doc. A/AC.105/C.2/L.160, reproduced in 1987 Report, Annex III.C.2.

(4) More care should be taken in scheduling the consideration of the substantive items, with a view to a more rational time allocation;

(5) To avoid the repetitive consideration of questions on which little progress can be made, the Sub-Committee should at pre-set intervals assess the work on each item with a view to considering what further action should be taken;

(6) A working group should be established to consider other ways of making the work of the Sub-Committee more effective and efficient.

As no consensus could be achieved as to any of these proposals -- some of which were strongly opposed -- they were implicitly relegated to the coming sessions of COPUOS and the General Assembly, and, unless decisions are taken in these fora, probably to future sessions of the Legal Sub-Committee.

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3. The US/International Space Station - Aspects of Technology and Law

During the 1987 meeting of the American Society of International Law which met in Boston a panel discussion was held on April 11, 1987, dealing with the topic: "U.S./International Space Station - Aspects of Technology and Law." The meeting was organized and chaired by *Professor Stephen Gorove* of the University of Mississippi Law Center and brought together participants from NASA, the European Space Agency, Canada and Japan for an informal discussion.

In his introduction *Professor Gorove* noted that there has been an ever-increasing interest not only in the scientific but also in the legal aspects of space stations following President Reagan's announcement back in 1984 calling for European, Canadian and Japanese participation in the building of a space station and in the wake of the Soviet Union's accomplishments associated with its "Mir" space station.

Looking at the space station project from an international perspective, *Professor Gorove* recalled that a number of agency-to-agency memoranda of understanding were concluded by the United States with ESA, Canada and Japan, respectively. There were also government-to-government negotiations indicating a dual approach. He observed that as of April 1987, the negotiations have not been concluded and a number of outstanding issues had yet to be resolved. He touched upon some of the

characteristics of the proposed space station complex as well as the contemplated participation of the international partners. He called upon the panel to intimate the short and long-term expectations, particularly whether and in what manner the station was expected to become a stepping stone toward the establishment of stations on the moon and other celestial bodies.

As to the second purpose, the legal aspects, *Professor Gorove* first raised the question of definition: whether a definition in the legal sense of the word was really necessary or whether one should be satisfied with the technical definition of the International Telecommunication Union. As an offshoot of the definitional issue, one may wonder whether it was possible to build a station made out of materials not originating from the earth and also what the legal consequences of such an arrangement would be, since by some interpretation such a station may not be regarded as a space object with the result that the space treaties may not be applicable to it.

Some of the significant issues that *Professor Gorove* felt could be addressed included those of registration, proprietary rights, technology transfer, patent law, liability issues, and dispute settlement. He noted that several issues have been dealt with, to some extent, in the already concluded memoranda of understanding. Crucial to the whole gamut of legal issues was the one relating to jurisdiction and control: who will exercise what jurisdiction and control over whom and what, in what type of situations? Related issues included those of centralization versus decentralization and national versus international decision making.

Professor Gorove also noted the difficulties that have recently surfaced regarding the meaning of peaceful uses. While the United States and its international partners were all committed to peaceful uses, concern has been expressed about the possible implications associated with such uses. Are we to regard the use by the military or participation by military personnel in some activity as always a "military" use? Could any of the international partners raise objection to certain activities which take place in a module under the jurisdiction of another partner? Would it be a good idea to identify the types of uses that all partners regarded as non-objectionable or those which they thought were objectionable? Could a partner object to reconnaissance activities which were recognized by the leading space powers, including the Soviet Union, as a necessary instrument for arms verification purposes? What about the refueling of a military spacecraft or the repair of military hardware by astronauts on the space station? May nonnuclear weapons which are not banned by the Outer Space Treaty of 1967 be kept on the space station? Can a station be turned into a military base or fortification? Can a national security oriented operation on the module of a partner be objected to by another partner? Is there any way of resolving these issues to the satisfaction of all partners and if not, what alternatives are available?

Following *Professor Gorove*'s identification of some of the significant issues, *Dr Terence Finn,* Deputy Director of NASA's Space

Station Office, drew attention to three things that engineers usually ask about a program: how much will it cost, what should it do and when must it become operational. *Dr. Finn* went on to show a number of charts and pictures of the space station complex noting that it was expected to be power-rich, providing 87.5 kilos of power. He added that the station consisted of both manned and unmanned systems designed to serve a variety of users. One of its basic objectives was to provide a permanent, manned facility to be used 365 days a year. This fact alone was expected to change the way we think about space and in the long run, it may also change the way we think about the earth.

The second panelist, *Mr. John E. O'Brien*, General Counsel of NASA, stressed that a whole range of legal issues was bound to arise. While agreement would be reached on some, other long-term issues will probably be left to develop as the "common law" of the space station. He felt that such development may be desirable, if not necessary, due to the general lack of familiarity with the effects of a space station environment in the context of a permanent manned presence and the undefinable parameters of the extent of interaction between representatives of diverse societies.

In elaborating on the legal aspects, *Mr. O'Brien* highlighted some of the legal issues pertaining to jurisdiction and control, criminal law, civil causes of action, interparty waiver of liability, third party liability, insurance, proprietary rights, technology transfer and taxation.*

The next speaker *Dr. Gabriel Lafferranderie*, Legal Adviser to the European Space Agency, observed that the current discussions proceeded both at an intergovernmental level and at the level of the cooperating agencies, NASA and ESA. So far these discussions have mainly been related to the identification and clarification of concepts which underlie drafting of the legal text. While he was not in a position to comment on any text and had no catalog of legal issues. He stressed that the main concern was to build the space station and only after that would one see how the legal aspects develop.

Dr, Lafferranderie stated that he would present some general considerations and discuss some technology transfer issues. He noted that the framework for the "International Space Station Complex," a phrase he preferred to use, was based on international partnership which was to govern all legal issues. While partnership was the spirit from the outset, in reality, there was a dominant partner in addition to the partners who were significant and sometimes competitive. While the project was transnational in nature, the United States retained a pivotal position in it.

Europe responded positively to President Reagan's offer because it considered that it had the ability to make its own contribution to the overall project and to participate in its management and utilization.

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* These issues are espoused by *Mr. O'Brien* in his article on the "U.S./International Space Station" on the preceding pages of this issue of the Journal.

However, it also saw the project as a major opportunity to learn and enhance its own know-how. Resolution No.2 of January 31, 1985 of the ESA Council looked upon participation in the space station as one of the basic elements of the European long-term space plan which aimed at making Europe autonomous toward the end of the present century.

Among ESA's activities, *Dr.Lafferranderie* listed the development of the Hermes Spaceplane and the Columbus program which involved *inter alia:* a pressurized module to be permanently attached to the manned space station, a man-tended free-flyer, a polar-orbiting platform and an upgraded version of the "Eureca" retrievable instruments carrier.

Insofar as issues of technology were concerned, any transfer of technology would be dealt with only between the United States and each of the other partners (Canada, Japan and Europe) and not between the other partners themselves (Japan-Europe, Canada-Europe, Canada-Japan). *Dr. Lafferranderie* stressed that the technology transfer cannot be tackled without taking into account considerations of an economic, foreign policy or national security nature. Such issues may arise at the intergovernmental level, the level of the executive agencies (NASA/ESA) and the level of the main agents, *i.e.*, the industrial firms. The intergovernmental agreement will not be a technology transfer contract. It will be incumbent upon the cooperating agencies to elaborate the procedure, identify the requirements, facilitate the processing of dossiers and define the procedures especially with respect to confidentiality. However, these various arrangements will serve no useful purpose if they are not backed up by corresponding national regulations.

In conclusion, *Dr. Lafferranderie* stated that the space station should provide an opportunity for establishing a new style in the conduct of space activities that would look beyond considerations of competition or the attainment of a dominant position. The technological challenge should be answered by the law, if necessary by innovation.

Mr. Kaname Ikeda, Counselor at the Embassy of Japan to the United States, commenting in his personal capacity, noted the international nature of the space station project to which Japan was contributing as much as $2 billion in connection with its module. He stressed his understanding that the station would be used for "peaceful", that is "nonmilitary" purposes. Such understanding was crucial enough to influence Japanese participation in the program.

As regards decision making, *Mr. Ikeda* felt it was necessary to have some institutional arrangement or mechanism for intergovernmental consultation. Japan preferred to have consensus as a part of decision making. A participant providing a module should have general jurisdiction and control over it. As to operational management, every activity should be, to a reasonable extent, beneficial to the other participants. In conclusion, he stressed that it was necessary to explore the compatibility of peaceful purposes with national security considerations since the Japanese people who fully supported this important project would not be pleased to see it become the victim of some related argument.

The next commentator, *Peter P.C. Haanappel,* Associate Dean of McGill University Law School, echoing the view expressed by the Canadian Minister of External Affairs in a recent TV interview, emphasized that the question of the peaceful uses of the space station would have to be clarified before Canada would definitely go ahead with its planned participation in the program. The only possible quasi-military purposes which could be foreseen as acceptable would be related to reconnaissance and arms verification.

Professor Haanappel believed that it would be more logical and expedient, in view of the international, multilateral character of the space station, if the intergovernmental agreements, the basic international legal instruments, would take a multilateral form. Alternatively, there could be a short multilateral principles agreement and more detailed bilateral intergovernmental agreements. For many aspects of the undoubtedly very detailed memoranda of understanding between participating governmental agencies, the bilateral approach may be called for.

During the ensuing Question and Answer period, in response to *Mr. Andrew Young*, the panel's rapporteur, *Mr. O'Brien* stated that the concept of functional allocation which was originally thought to enhance the capability of the overall station was difficult to define and agree upon, and alternatives are being discussed to utilize the various modules and external attachment points.

Rising from the audience, *Professor Carl Christol* expressed the view that a small group of like-minded countries were committed to the common objective of building a space station. In view of this, a unique opportunity existed to develop an international legal regime for space activities. Since there was no confrontation with the 150 or 160 countries in the U.N. or the I.T.U. in this attempt to establish a legal regime, the singular opportunity at hand should be promoted and exploited. While this comment appeared to be a valid observation to *Mr. O'Brien,* he did not know what it was to propose. If it further complicated the effort to put up a space station, it was hard to take it on, since we already had our hands full with budgetary constraints and difficulties of salesmanship to Congress.

Also speaking from the floor, *Ms. Sterns* stated that there was a need to adjust the legal regime and develop alternative frameworks within which individual stations could develop their own legal regime based on some sort of limited self rule or complete autonomy to allow for freedom of scientific endeavor in the particular establishment.

In response to a question raised by *Kennneth Schwetje, Mr Ikeda* expressed his personal view that "peaceful" purposes meant "non-military" purposes. He added that this was a widely shared understanding making it essential to accommodate the question of the meaning of peaceful purposes.

Finally, *Mr. Finn* observed that the space station offered a unique opportunity to serve as the present of this generation to the next century. It provided an opportunity for all to work together, to do something useful and constructive. At the same time, it also provided an opportunity to

compete commercially. It was a civil venture that had to be approached with understanding and patience as well as the realization that space station benefits were so great that every effort had to be made to bring its promises to fruition.

In his concluding remarks, the *Chairman* stressed that the space station project should not be looked upon as a short-term endeavor but approached in the light of long-term expectations. The issues which appear crucial and devisive at present may become much less significant if one considers the many additional space stations that will be built in different countries both by public and private enterprises. He expressed the hope that the outstanding issues will be resolved since the space station was vital not only for the partners in the alliance but for the world community as a whole.

Stephen Gorove
Chairman, Panel Session
ASIL 1987 Annual Meeting

4. *Meeting of the AIAA Committee on Legal Aspects of Aeronautics and Astronautics*, April 29, 1987.

The American Institute of Aeronautics and Astronautics (AIAA) Committee on Legal Aspects of Aeronautics and Astronautics (LAAA) met on 29 April 1987. The following provides an overview of the presentations and discussions which included legal issues associated with (a) the proposed space station, (b) regulation of U.S. commercial launch services, (c) use of U.S.S.R. and P.R.C. launch vehicles, (d) First Amendment applications of news media use of space remote sensing satellites, and (e) issues of competing international satellite systems and preparation for the 1988 World Administrative Radio Conference ('88 WARC).

(a) Manned Space Operations

The manned space station with envisaged international ownership and collocated private enterprises presents a framework for assessing application of domestic and international law to space operations. Privately owned stations are also being considered. What constitutes a space station; when does it come into being; and how large a contiguous region does it encompass, present uncertainties to space station definitions. When do different national jurisdictions attach and detach during the course of space operations, presents other uncertainties.

Developments in the legal regime for man in space without special treatment would be left to grow as systems and circumstances create conditions requiring resolutions. Some argue this is the appropriate if not only reasonable way to proceed, rather than in the abstract. In some cases intergovernmental agreements and contract law can provide the solutions. In others, case-by-case extension of existing law would be available. In the area of intellectual property, patent legislation is being considered by Congress for explicit extraterrestrial extension. In general, however, a

major concern is that significant rights and responsibilities may not be satisfactorily adjudicated without more extensive *a priori* determination and codification of applicable law.

One proposition advanced is that the importance of space to commerce in the United States may require constituting a space legal commission at the national level. The focus would be directed at defining and resolving issues and recommending appropriate legaislation or regulations to minimize uncertainty, in particular, for commercial uses of outer space. The Committee is considering further development of its role in advancing such a proposition.

(b) Commercial Space Launch Regulation

The Commercial Space Launch Act of 1984 gives the Department of Transportation (DOT) primary jurisdiction over commercial space launch regulation. The Act does not preempt state laws, although it provides a federal focus and is intended to minimize complexities in obtaining a launch license. The two main areas of DOT's Office of Commercial Space Transportation at this time are the issuance of licensing rules and the allocation of risk issue. The interim final licensing regulation was released for comment last year and intended to be finalized within two months.

Still unresolved is the allocation of risk between the U.S. Government and commercial operators associated with space launch. At issue is whether the U.S. Government should indemnify commercial operators and manufacturers for damage to government property and for claims from injured third parties when such amounts exceed commercially available insurance. The commercial operator is obligated to purchase the commercially available insurance and, in the case of third party liability, name the U.S. Government as an insured.

U.S. Government indemnification of non-U.S. Government customers in excess of commercial insurance has been provided by NASA under authority of Section 308 of the NASA Act and to Space Shuttle manufacturers under P.L. 85-804. Indemnification is provided by the French Government for Arianespace customers and believed available from other governments involved in offering space launch services. It is argued that without U.S. Government indemnification, U.S. commercial launch companies will be less competitive in the world market place. Agencies of the U.S. Government are not in agreement as to whether P.L. 85-804 contract indemnification authority and Executive Order 10789 implementation of P.L. 85-804 apply, whether such indemnity constitutes subsidy, and whether specific enabling legislation is required. Also under interagency review are the terms and conditions of the agreement for commercial use of U.S. Air Force space launch facilities and ranges. Basic to this are the allocation of risks, cost of government services, and duties and responsibilities of the parties.

The Committee consensus is that the allocation of space launch risk is of current importance and that it would be timely and constructive

for the AIAA to express a thoughtful position on this matter. The Committee accordingly constituted a Subcommittee on Allocation of Space Launch Risks to draft recommendations. The Subcommittee members are *William D. English*, Chairman, *C. Dennis Ahern, Steven E. Doyle, John B. Gantt* and *S. Neil Hosenball.*

(c) P.R.C. and U.S.S.R. Launch Services

Launch of U.S. and other Western spacecraft on P.R.C. and U.S.S.R. launch vehicles involves issues of technology transfer and export controls. Satellites are on the Munitions List requiring a license for export under the International Traffic in Arms Regulations (ITAR), administered by the Office of Munitions Control (OMC) in the Department of State. The Coordinating Committee (COCOM) is an international group consisting of NATO countries and Japan that cooperate with the U.S. Government in controlling technology exports.

Export license for spacecraft launch from the P.R.C. involve different considerations than for launch from the U.S.S.R. In general, export controls to the U.S.S.R. are more stringent than to the P.R.C. OMC would require the exporter to submit a specific application with associated launch services agreement from which it can assess the security implications. COCOM review may also be required. Both countries have been offering customer controlled security of all spacecraft related systems while on their territories in transit and in preparation for launch.

With creation of the DOT Office of Commercial Space Transportation, additional considerations distinct from OMC policy may be involved in issuing a final license to export a satellite to the P.R.C. or the U.S.S.R. for launch.

(d) Freedom of Press in Space

The current debate over the public media's right to gather and publish information derived from satellite remote sensing involves policy balancing with the U.S. Government's right to limit access in matters of national security. To what extent, as a matter of law, should space technology available for private use be restricted and space derived data be subject to national security and other review prior to publication?

The Land Remote-Sensing Commercialization Act of 1984 gives the Department of Commerce (DOC) regulatory authority and specifies that no satellite remote-sensing license shall be granted unless the applicant complies with "...applicable international obligations and national security concerns of the United States." The media is increasingly becoming aware of the potential for finding and monitoring news spots from space but sees conflict with the vagueness of this restrictive phrase. The cost is substantial for a remote-sensing satellite system with sufficient image resolution to meet the requirements of the so-called "Mediasat". However, promoters believe the prior restraint issue must be resolved with specificity prior to any commitment of private funding.

The DOC is in the process of issuing final rules on the licensing of land remote-sensing satellites.

(e) Other Discussions

PANAMSAT's completed coordination under the Intelsat Agreement was discussed in terms of shifting governmental policy on Intelsat's monopoly role in international satellite communications, and the competitive opportunities in specialized international services not provided for in the Intelsat Agreement. Although the U.S. supports separate systems in the national interest, the U.S. continues to require Article XIV consultation to protect Intelsat both technically and economically. There still remains the question, however, of whether a signatory state is legally bound by an economic harm finding by Intelsat under Article XIV.

Proposed aeronautical services amendments to the Inmarsat Agreement are not expected to limit competing systems. Although technical coordination will be required, economic harm to Inmarsat will not be considered in separate system licensing.

The 1988 World Administrative Radio Conference (WARC) is expected to move more in the direction of *a priori* orbital and frequency assignment. Countries without present need are demanding identifiable rights in the geostationary orbit for future exploitation. The two planning methods outlined in the 1985 Space WARC, designated Allotment Plan and Improved Procedures, will be futher defined. Methodologies are being developed which may allow, from the technical viewpoint, pre-assigned orbital arc segments to certain countries with specific allocations made within the arc segment upon application for use.

Dan Cassidy
Chairman
AIAA - Committee on Legal Aspects
of Aeronautics and Astronautics

(b) Comment/Note

5. Recent Activities of Intelsat Benefiting the Developing Countries

In the center of INTELSAT's mission is the provision of satellite communications to the developing world and the promotion of peaceful uses of outer space. INTELSAT continues to sustain these as foremost operable goals.

In October of last year, INTELSAT co-sponsored with three other organizations a conference in New York City on Telecommunications For Development. The conference attracted 180 representatives from 25 countries and a broad participation of a number of U.N. agencies, the World Bank, the African Development Bank and others. The conference focused on new telecommunications technologies and services for develop-

ing countries. It also presented ideas for innovative financing arrangements for telecommunications investment.

INTELSAT has also been working closely with the U.N. to expand its use of the INTELSAT system, which includes security as well as international peacekeeping, emergency and disaster relief communications. Of potentially great use for disaster relief as well as for a variety of other purposes, INTELSAT recently developed with two earth station manufacturers two "flyaway" earth stations (with 1.8 meter antennas), thus making small, inexpensive earth stations a reality. INTELSAT is working with both the Pan American Health Organization and the World Health Organization as part of its Project SHARE activities to demonstrate how these smaller earth stations can significantly improve delivery of emergency relief and health supplies.

INTELSAT also recently completed a successful simulated "Lifenet" demonstration between Costa Rica and the United States to coordinate disaster relief. This was carried out at the Small Earth Station Symposium held at INTELSAT Headquarters in Washington, D.C. on May 11-13. Under the INTELSAT Assistance and Development Program (IADP), and upon request, INTELSAT has been active in training specialists in ever increasing numbers in satellite communications and earth station technology. INTELSAT conducts seminars, provides material and support for individual and regional training activities, and disseminates information on training centers. INTELSAT provides technical assistance in all areas of satellite communications technology.

INTELSAT now has 20 Assignees, 20 Young Professionals, 4 Visiting Scholars, and up to 70 interns -- representing some 50 countries. The INTELSAT Assignee Program offers opportunities for technically skilled individuals to serve in specialized areas at INTELSAT before returning to their own Signatory organizations. The INTELSAT Young Professionals Program provides training in areas of common interest to both Signatories and INTELSAT, so that participants may return to their sponsoring administrations with skills of immediate and practical use. The INTELSAT Scholars Program offers graduate students, ready to begin careers with a Signatory organization, the opportunity to gain experience working for one year at INTELSAT. The INTELSAT intern program offers short term training opportunities to university students to provide them with valuable operational exposure and hands-on training.

In another area of activity, INTELSAT is preparing for the second session of the ITU's WARC-ORB '85-'88 Conference, to be held August-October 1988. Although INTELSAT attends these meetings as observer and not as official participant, its contribution to these meetings is substantive. INTELSAT believes that one of its most important activities in promoting the peaceful uses of outer space is "to provide, for the benefit of all mankind, through the most advanced technology available, the most efficient and economic facilities possible consistent with the best and most equitable use of the radio frequency spectrum and of orbital space." All this is consistent with developing countries' needs for low cost,

reliable communications, as well as with the efficient use of orbital resources.

Many countries satisfy their national telecommunications needs through lease or purchase of capacity from the INTELSAT system. INTELSAT's new Planned Domestic Service (PDS) program allows member and user countries to lease or purchase INTELSAT transponders on a long term basis for their domestic communications needs. Currently, INTELSAT provides domestic service to 30 countries, of which 12 countries have purchased a total of 32 transponders under the program.

INTELSAT offers VISTA, a basic satellite communications service appropriate for rural and remote communities that currently have inadequate or non-existent communications facilities. This service may be used for either voice or low speed data communications, and the earth stations can in many cases also be used to receive television transmissions transmitted via the INTELSAT system. VISTA has been implemented successfully in the South Pacific, South America, Africa, Australia and other parts of the world.

INTELSAT is helping to arrange financing for new members' capital contribution to INTELSAT, and is exploring how domestic and regional telecommunications requirements might be met under the umbrella of the INTELSAT Agreements, as provided for in Article III(e).

Finally, Project SHARE, which stands for Satellites for Health and Rural Education, has provided free satellite use for rural health and long-distance educational programs for selected projects. Among its accomplishments, Project SHARE has brought higher education video classes to students throughout the vast expanse of the People's Republic of China. As a result, China has acquired capacity from INTELSAT and set up a distribution network of 2,000 earth stations for the purpose. Project SHARE has linked a Canadian hospital in Nova Scotia to provide telemedicine services to medical schools in East Africa and the Caribbean. It has connected doctors at Miami Children's Hospital in the U.S. with 40,000 doctors, nurses and other health professionals throughout South and Central America, the Carribbean and Africa through video health training courses. Also it has restored the University of South Pacific educational programs that otherwise would have ended with the extinction of the ATS-1 satellite, donated for this purpose by NASA. To date, approximately 40 countries have participated in these and other SHARE projects. The program's success and usefulness have been underscored by its extension beyond the initial allotted time period.

INTELSAT believes that satellite communications offers the most effective media for providing communications links to rural and remote areas of developing countries and is ready to provide those links to practically any place in the world.

Aemro Araya
Manager, Policy Analysis and
Development Affairs, INTELSAT

c) Short Accounts

6. Symposium on Commercial Opportunities in Space: Roles of Developing Countries, Taipei, Taiwan, April 21, 1987

(a) Legal and Economic Opportunities in Space

"Legal and Economic Opportunities in Space" was one of the topics discussed in Taipei, Taiwan, April 21, 1987 at a Symposium on Commercial Opportunities in Space: Roles of Developing Countries. Invited speakers included *Professor Carl Q. Christol* from the University of Southern California who presented a paper on "Development of Current Outer Space Law;" *Professor Stephen Gorove* of the University of Mississippi Law Center who addressed the topic "Space Resources and the Developing Nations: A Legal Assessment;" *Mr. P. Kleber* of the Federal Republic of Germany who spoke on "Utilization of Space by Private Sector: A Complex Multidisciplinary Endeavor of Arts, Science and Engineering;" and *Dr. Barbara Stone* of NASA who acted as a moderator and also presented a coauthored paper on "U.S. Commercial Space Policies: Implications for Developing Countries.

Additional panels focused on issues of communications, space processing, remote sensing, spacecraft, space platform, space stations and related technologies.

Stephen Gorove
Chairman, Ed. Board
JOURNAL OF SPACE LAW

(b) Communications

Another topic discussed at the Taipei Symposium related to communications (Session 9). The Communications-I session was concerned with commercial opportunities. An excellent overview of the session was presented by the Chairman, *R. R. Lovelle*, who has twenty-five years of experience with NASA, including seven years as Director of that Agency's program of communications in Washington. He pointed out the pitfalls of commercialization, especially for developing countries, and warned on the necessity "to know your players" since the industry is not a monolith but consists of four major groups: the manufacturers, such as the spacecraft and group terminal industries; the service suppliers (common carriers), who put together the network and provide maintenance; the users, including the value added companies that provide telephone service and entertainment on cable TV; and the beneficiaries, those willing to pay on a recurring basis.

Several speakers went into depth on each of the four groups. *K. Takahara*, managing director of the Mitsubishi Corporation since 1984, pointed out the enormous size of the business of manufacturing, while the paper of *S. Dorfman* of Hughes Aircraft, went into the hardware and service economics of the communication satellite business. As presented

by *M. Sellini*, the paper drew attention to the fact that of 176 commercial satellites, not including those of the Eastern bloc, 75 are in use and their ownership is almost equally divided among the United States, international groups, and others. The 45 commercial satellites that are retired were almost all internationally owned, and 56 are being built mostly by other than the United States or international groups.

The paper of *C. Franklin* of the Canadian Ministry of State for Science and Technology dwelled on the service implications of Mobilsat and how in North America alone there is a huge revenue potential. However, he warned on the need to compete with other technologies, such as fiber optics. While separate marine, land and aeronautical systems for mobile services are not economically feasible on a stand-alone basis, there is still a need for market research. In Canada, over a million dollars has been spent to study the market for mobile services. Other topics covered by the session were that of natural resource management, as studied by *J. D. Dykstra* and *R. Mroczynski*, and *H. Goebel*, DFVLR -- German Aerospace Research Establishment, demonstrated the implications of applying communications in a global way with his talk on the distress radio call system.

In sum, the papers presented and the audience participating made it clear that the substantial opportunities present implied substantial risks to be taken, particularly since there is regulation of profits. Those entering the commercial arena need to thoroughly research the market and analyze the differing values and motivations of each sector of the industry.

Margaret Gorove
Professor and Departmental Chair
The University of Mississippi

7. Vision '87 Symposium on Space and Telecommunications Business Development (Panel 2: Policy), Houston, Texas, June 8, 1987

During the Annual Houston Space and Telecommunication Symposium (Vision '87), a panel discussion was held on June 8, 1987. This panel included three speakers and a moderator. *Richard M. Firestone*, Deputy Chief Counsel of the National Telecommunications and Information Administration, spoke about governmental telecommunications policy for a changing market and technology. *Ronald J. Lepkowski*, former Chief of the FCC Satellite Radio Branch, supplied a regulatory perspective on space telecommunications. *Brigadier General Raymond McMillan*, Air Force Space Command, discussed the U.S. space program from the vantage point of national security and American technological leadership. The panel was moderated by *Nathan Goldman*, Attorney at Liddell, Sapp & Zivley, and the discussant was *Joe Freitag, Jr.*, Vice President of the Society of Satellite Professionals.

The panel focused first narrowly on whether the United States Government should permit American satellites to fly on Soviet rockets.

The only consensus on this issue was that U.S. policy should rebuild the American launch capability so that such a decision would be unnecessary. The panel then focused more broadly on U.S. space policy. A consensus was reached that policy makers should create a decision-making structure that would permit flexible response to the varied sectors, issues and needs of space programs.

Nathan Goldman
Attorney at Law
Panel Moderator
'87 Houston Space & Telecomm. Symposium

8. Other Events

"Telecommunications for Development: Exploring New Strategies" was the theme of an International Forum held on October 28, 1986 and cosponsored by Intelsat, New York University, the Economic Development Foundation and the Intergovernmental Bureau for Informatics.

The IAF/COSPAR Symposium on Space Communications for Development was held on February 17-18, 1987 on the occasion of the meeting of the Scientific and Technical Subcommittee of COPUOS.[1]

At the Vision '87 Houston Space Space and Telecommunications Symposium (Panel 1: Telecomm Law), on June 8, 1987, *Professor Stephen Gorove* of the University of Mississippi Law Center spoke on "Equitable Access to the Geostationary Orbit."

The 8th Biennial Space Studies Institute/Princeton Conference on Space Manufacturing (May 6-9, 1987) had on its agenda issues pertaining to space transportation, exploitation of nonterrestrial resources, solar power satellites, space habitat, international social, economic and bio-medical problems.

9. Brief News

Japan launched its first remote sensing satellite, named "Memo," in English "Peach-blossom."....CSI North Venture, Ltd., a London-based company, plans to build a giant ship from which to launch satellites from the Pacific equatorial region....The United Kingdom joins the other members of the European Space Agency in the Hermes spaceplane program. Hermes is being redesigned to adhere to new safety requirements and Ariane 5 is being redesigned for greater payload capacity....China has agreed to launch a communications satellite, owned by Western Union Telegraph, and Pan Am Pacific Satellite....The Landsat remote sensing program under the direction of the Commerce Department may end unless weather satellite funding is diverted to Landsat or other help is found to support the program....Kodak is planning to build a remote sensing

1. For further details, *see* the first report in this Events of Interest section written by Vladimir Kopal, *supra*.

processing center near Washington,D.C....Geostar is interested in getting FCC approval for global tracking service.

Worldwide spending on telecommunications products and services is expected to be over $108 billion in 1987, an 8.4% increase over 1986.... The Soviets launched 114 space objects in 1986. They are expected to strengthen their space program by starting intensive work projects on the Mir manned space station, stepping up their campaign for commercial space services and completing a series of interplanetary missions with significant international participation....The Space Commerce Corporation, organized by investors in Houston, is expected to market the Soviet proton rocket in the U.S. According to the Soviets, Western commercial payloads making use of Soviet launch vehicles could be shipped in sealed containers to Soviet launch sites and exempted from customs inspection. So far India is the only country to have signed an agreement with the Soviets for a commercial satellite launch.

AT&T has proposed expansion of transborder services to Canada and Latin America using its domestic satellites but any expansion requires Intelsat approval that the plans present no significant economic harm to its system....NASA and the French Space Agency, CNES, agreed on an ocean mapping mission scheduled for an Ariane launch in 1991....Egypt is considering creating a National Space Agency after its withdrawal from Arabsat....Manned flight testing of the Soviets' small spaceplane is expected to start soon. The Soviets are also considering the possibility of launching a small rover to Mars in 1992 and a mission in 1996 to return samples from Mars.

The claims made by families of four challenger crew members, Jarvis, McAuliffe, Onizuka and Scobee, against the government and its contractors have been settled by the Justice Department with Morton Thiokol agreeing to contribute substantially. The widow of another crew member, Smith, filed a $1.5 billion suit against Morton Thiokol, NASA and L.B. Mulloy, the former manager of NASA's booster rocket program in Huntsville...The Law School of Catholic University of Chile has made Space Law a required course for seniors....China using its LZ-2 launch vehicles put a scientific and a communications satellite in orbit. It plans to build an independent space station after the turn of the century....After a repeated effort, a Soviet astrophysical module, named "Quant", carrying both Soviet and West European instrumentation, succeeded in docking with the Mir space station and became part of a huge, manned space complex now consisting of four spacecraft of about 35 meters in length, weighing about 50 tons, and having around 150 cubic meters of sealed compartments....

B. Forthcoming Events

As reported previously, the next IISL Colloquium will be held during the 38th IAF Congress in Brighton, England, Oct. 10-17, 1987. The subjects to be discussed are: 1. Maintaining outer space for peaceful

purposes; 2. Legal aspects of outer space environmental problems; 3. Legal aspects of commercialization of space activities; 4. The United Nations and legal principles of remote sensing.

During the same Congress, under the auspices of the International Academy of Astronautics, Eilene Galloway will coordinate a Symposium on the Geostationary Orbit, to be chaired by Lubos Perek of Czechoslovakia.

Future IAF Congresses are scheduled to be held in Bangalore, India (1988); Beijing, China (1989); Dresden, German Democratic Republic (1990); Ottawa, Canada (1991); Washington, D.C., USA (1992); Belgrade, Yugoslavia (1993) and Haifa, Israel (1994).

During the 5th World Telecommunication Forum to be held in Geneva, Switzerland, October 19-27, 1987, a "Legal Symposium" is planned with the participation of Professor Aldo Armando Cocca of Argentina.

The second international conference on the commercialization of space (SPACE COMMERCE '88) will take place from Feb. 21 through Feb. 25, 1988 in Montreaux, Switzerland.

A second Symposium on Lunar Bases and Space Activities of the 21st Century is expected to be held, April 5-7, 1988 in Houston, Texas under the auspices of NASA, AIAA and the Lunar Planetary Institute.

The Teaching of Space Law Around the World. Edited by Stephen Gorove, University, MS: L.Q.C. Lamar Society of International Law, Monograph Series No. 4, University of Mississippi Law Center, 1986. Pp. iv, 93. Index. $26.

This paperback gathers information on space law teaching in ten countries, conveniently grouped by the editor into the Western Hemisphere (United States, Canada, Argentina), Western Europe (Federal Republic of Germany, the Netherlands), Eastern Europe (the USSR, Hungary, Czechoslovakia, and Poland) as well as the Far East (China). For the comparative lawyer, it offers the additional pleasure of an inside look at legal education at work in major countries of the common law, the civil law and the socialist legal tradition -- plus news about post-Mao China.

The editor's goal has been to assess the current status of space law teaching around the world, and to provide a ready reference work and guide to members of the teaching profession. Both of these goals have been reached. The articles assembled all stem from eminent members of the space law community, mostly from the first generation of outer space lawyers. They differ, however, in focus and depth. They show, once again, how an individual teacher may leave his mark on legal education and, in particular, on law school curricula.

To present the main participants and thrust of their contributions: the editor, Professor *Stephen Gorove*, introduced Space Law to the University of Mississippi School of Law more than 20 years ago. It was the first regularly offered such course at a law school in the United States. Professor *Carl Q. Christol* permeates his International Law classes and Seminars at the Department of Political Science of the University of Southern California with space law topics; his policy-oriented classes may be taken, for credit, also by students of the U.S.C. law school. Professor *William B. Wirin* of the University of Colorado, Colorado Springs, Graduate School of Business, offers his course of Space Law and Policy to an audience working in the aerospace industry, and to present and former members of the military.

Professor *Nicolas M. Matte's* research and teaching program on air and space law at McGill University "stands in a class by itself" *(Christol). Matte* describes, in detail, the educational "triad" of his Institute of Air and Space Law and the Annals of Air and Space Law, published under the auspices of the Centre. He also lists the prerequisites for a (one-year) Diploma in Air and Space Law, and possibly ensuing master's and doctoral degrees. Ambassador *Aldo Armando Cocca*, the dean of space law in Argentina, lists all the institutions engaged in research and teaching of space law in his country, nearly all born under his strong and enthusiastic leadership. His intention is to create an International University of Space with headquarters in Argentina. It should deal with

the study of all sciences relating to space activity. With the recent launching of an International Space University in Boston, this idea might have been somehow preempted.

Professor *Karl-Heinz Boeckstiegel*, director of the Institute of Air and Space Law at the University of Cologne, F.R.G., and successor to the founder of the discipline of air and space law in Germany, *Alex Meyer*, offers optional lectures and seminars on air and space law at the University of Cologne. Similarly, Professor *Isabella H. Ph. Diederiks-Verschoor*, President of the International Institute of Space Law, presented courses on air and space law at the State University of Utrecht up to her most recent retirement. Such courses also are offered at Leyden by Professor *Henry A. Wassenbergh*, successor to Professor *Daniel Goedhuis*.

Professors *V. S. Vereshchetin* and *G. P. Zhukov* describe the status of space law teaching in the USSR. While space law is a new compulsory part of lectures on international law, it is also a special lecture course (of 36 hours) at some institutions of higher learning, *e.g.* at the Patris Lumumba Friendship University, and the Moscow State Institute of International Relations. Although post-graduate students may write a thesis on problems of space law, there are only 15 holders of Master of Science of Law degrees, and 4 holders of a Doctor of Science, Law degree in this area. Teaching staff are "regularly informed on the topical issues of the subject" (p. 78). Interestingly, periodic lectures on space law problems to the public at large, meet a popular demand.

Single-handedly, Professor *G. Gal* created his, now regular, space law course at Budapest University in 1972. His average audience of 90-95 students, he asserts, "presents the possibility of a more intensive teaching of space law" (p. 69). In Poland, Professor *Andrzej Gorbiel*, facing the lack of foreign publications in his library at Lodz, offers space law as an integral part of his general course of international public law. *Vladimir Kopal*, Chief of the United Nations Outer Space Affairs Division, reminisces about the development of space law research in his country, in particular, on the first doctoral dissertation on space law written by Dr. Vladimir Mandl and accepted by the University of Erlangen in 1932. He does not enlighten the reader, however, on the present status of space law teaching at law schools in Czechoslovakia.

Most interesting, however, are the profound remarks by Professor *He Qizhi* on the status of space law teaching in China. He reveals that, due to the "left deviation line and the policy of closing the country to the outside world, ... the study and teaching of international law seriously suffered and came to a standstill" (p. 83). This has changed since 1978: a Chinese Society of International Law has been founded, a Chinese Year-Book of International Law has been created, and academic exchanges within China and with foreign countries have been established. In some universities and colleges, separate courses on international space law have been offered, and, since 1980, postgraduate students enrolled at Beijing University, the University of Political Science and Law of China, or the Beijing College of Foreign Affairs may obtain a master's degree

specialized in space law after two years of research in this area. Professor *He* stresses the necessity of basic legal courses, and of international law and history of international relations, before venturing into outer space law. An introduction to space law should be integrated into the course of international law, before specialized and postgraduate students are admitted to special courses on this topic. His defense of "lecturing" as a teaching approach reads as follows: "[T] eachers usually give explanation and analysis, students take notes. Teachers deliver lectures in their own initiative, and students listen passively for legal knowledge" (p. 87). Socrates was not born in China. In any event, Professor *He* acknowledges that mere lecturing might be inadequate for students of senior classes, suggesting supplementation by discussion of assigned reading materials. The goal is to establish a research center or institute of space law in China.

What may one learn from this overview? First, space law is, in most cases, not offered as a special course, but integrated into the general courses and seminars on international law. The exceptions, however, are noteworthy, and, in many case, connected to the existence of a specialized university institute dealing with matters of air law as well as space law (McGill, Cologne, Utrecht). The courses offered do treat, then, air and space law together, often to the detriment of space law.

Professor *Haanappel*, in a lucid contribution, explains that the latter combination is a consequence of "personal unions" between air and space lawyers (*e.g. Alex Meyer* in Germany, *Goedhuis* and *Diederiks-Verschoor* in the Netherlands). He charges that the bedding of air and space law into one academic subject is no longer justified, one, air law, being built on the principle of state sovereignty, and dealing principally with transportation issues, the other, space law, centered around the international character of outer space and focusing on communications. These differences, however, soon may be dimmed once outer space is integrated into the public transportation network via the projected aerospace plane.

As far as teaching methods and approaches are concerned, the prevailing method still seems to be the straight lecture; the only outlet for student participation seems to be the seminar format for seniors and postgraduates. The lack of concern with teaching methodology is apparent in civil law systems. This aspect is not mentioned in the contributions from the USSR (even the teachers "are informed" on the topical issues) and other European countries. At Cologne, at least upper-level seminars are enriched by the active participation of students, assistants and practitioners in the field. In China, the problem has been realized, and this will be a first step towards remedy. Heading in the right direction, as to be expected, are the representatives of space law teaching in the United States. Concern about the quality of legal education has translated into more problem-oriented approaches, even into the creation of a journal devoted to effective law school teaching techniques (the Journal of Legal Education). Professor *Christol*'s moot court scenarios, Professor *Wirin*'s discussions of space news items and more general issues, as well as

Professor *Gorove*'s problem and policy orientation are testimony to that concern.

The syllabi of the courses on space law also reflect the priorities of the various territorial communities: commercialization and military use in the United States; commercial use in the Federal Republic of Germany; the fight against "militarization" of outer space in USSR curricula; as well as this combined with the use of outer space for the national economic development in China; "the benefit of mankind as a whole" in Argentina.

Professor *Matte* sees the task of space law scholars, at the end of the 20th century, in interpreting and filling in the lacunae left by the outer space treaties. Similarly, Professor *Boeckstiegel* admonishes us to provide safe legal ground for public and private actors that demand our advice as to the lawfulness or unlawfulness of a given or intended activity in outer space. Left untouched, however, was the problem of creating an appropriate map for inquiry about the more important problems of space law. As Professors *He* and *Wirin* at least allude to, what is needed is a problem-oriented, multidisciplinary approach. First of all, the scholar needs to understand the problem at hand. This can only be done by employing most recent knowledge, in this case, of space science and technology. Whenever necessary, experts from this field should preferrably be invited to classes on problems of space law. Second, one should carefully analyze the conflicting claims of the contending parties in the light of bases of power, the situation of decision, identifications, demands, etc. Third, the scholar should look at how the world community reacted to these claims -- by multilateral treaties, actions in universal bodies, or widespread unilateral practice, and analyze the conditioning factors. Fourth, future decisions should be predicted on the basis of future power constellations and situations of decision. Lastly, recommendations should be made on the basis of the foregoing comprehensive analysis and agreed policies in the global common interest.

In sum: this book fills a lacuna in giving teachers interested in the law of outer space an overview of space law teaching contents, formats, and methods, having them share the experience of eminent actors in the field. It gives them choices, alternatives as to how to conduct a class, or portions of a class, on this subject. Beyond that, it has turned out to be a valuable exercise in comparative legal education, highlighting, once again, the entrenched differences in the classrooms of law schools from Mississippi to Beijing.

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Borba SSSR za mirnoe ispolzovanie kosmosa 1957-1985. Dokumenty i materialy v dvukh tomakh. (The Struggle of USSR for Peaceful Uses of Outer Space 1957-1985. Documents and Materials in Two Volumes). Moskva, Izdatelstvo politicheskoi literatury. (Moscow, Publishing House of Political Literature). 1985, Vol. 1, pp. 477; Vol. 2, pp. 527.

The reviewed publication, consisting of two volumes, is a comprehensive collection of documents relating to the peaceful uses of outer space of which the USSR is either author or participant.

The whole content of both volumes is divided into four sections. The first section includes documents and materials concerning the participation of the USSR in the exploration and uses of outer space for peaceful purposes. The second section embraces bilateral agreements and arrangements concluded by the USSR government or its executive agencies with the counterparts of other nations. Multilateral intergovernmental agreements and arrangements follow, including the most important space law-making treaties and documents establishing special institutions dealing with outer space matters such as Intelsat, Intersputnik and Inmarsat. This section also contains essential multilateral non-governmental documents, namely the statutes of COSPAR, IAF, IAA and IISL.

The third section is dedicated to resolutions of the United Nations General Assembly and decisions of other international organizations relating to outer space starting with resolution 1348 (XXIII) which explicitly dealt with the peaceful uses of outer space for the first time. This section continues through resolution 39/96, adopted by the UN General Assembly on 14 December 1984, and listed as the most recent document of this category.

The fourth section called "Our goal - nonmilitarization of outer space" presents relevant political documents published by the Soviet leadership in 1985. The last documents included are those relating to the Soviet-American summit held in Geneva in November 1985.

Also, the annexes printed at the end of Volume II are useful. They include a table of States - Parties to international treaties relating to outer space and an exhaustive list of launchings of manned space objects in the USSR during 1961-1985.

The reviewed collection published by the USSR Ministry of Foreign Affairs is the largest publication of documents relating to peaceful uses of outer space which has been effected in the USSR so far. It was prepared and edited by a representative collegium which included outstanding specialists and administrators, headed by *Professor A. S. Piradov* from the Diplomatic Academy of the USSR Ministry of Foreign Affairs.

The appearance of this collection coincides with the publication of a textbook on international space law which was written by another team, also headed by *A. S. Piradov.* Both these events evidence the deep attention that is atttached in the USSR to outer space matters and the development of international cooperation in this field.

The present collection of outer space materials will be a useful source for all researchers and students on the space law problems of endeavors to maintain outer space for peaceful purposes, as well as for those individuals looking for Russian texts of the relevant space law documents.

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Commercial Use of Space Stations: The Legal Framework of Transatlantic Cooperation, by Deutsche Gesellschaft fur Luft- und Raumfahrt e.v. (Bonn, 1986), p. 222.

This book contains the papers presented and the proceedings of the International Colloquium, Hannover Fairgrounds on June 12th and 13th, 1986. The colloquium was presided over by *Prof. Karl-Heinz Bockstiegel* of the Institute of Air and Space Law, University of Cologne.*

In his opening remarks, *Professor Bockstiegel* he stated that this was the second colloquium of its kind, the first resulting in perhaps "the deepest international research effort on the legal aspect of space stations up to that time." *Professor Bockstiegel* noted that the purpose of this colloquium was to achieve further progress and reach a safer ground for ongoing discussions and negotiations on space stations.

In the first paper entitled "Negotiating the Space Station", *Michael A. G. Michaud,* Special Assistant for Space Policy, U.S. Dept. of State, seeks to provide an American perspective to the international negotiations to establish a permanently manned space station. He notes that cooperation between the U.S. and its allies in not new, but the diplomatic task ahead is a sobering one because the agreements to govern the design, construction, assembly, operation and utilization of space stations will be used outside the lifetime of the negotiations. The principles to be achieved in these new rounds of negotiations should include:

a. Ensuring that international participation in this project strenghtens the ability to establish a permanently manned space station by the mid-1990's.
b. Ensuring that the project strenghtens U.S. relations with its Allies and friends.
c. Establishing a significant and successful model for long term cooperation among the Western nations and Japan.
d. Upgrading western technological capabilities.

* For a short account of the colloquium, *see* 14 J. SPACE L. 172 (1986).

e. Ensuring that the legal regime governing international co-operation in the space station is consistent with U.S. long-term interest in space law.

In his contribution entitled "The Applicable Legal Regime For International Cooperation on Space Stations", *Prof. Stephen Gorove* of the University of Mississippi Law Center states that agreements such as the Outer Space Treaty of 1967 and various Memoranda of Understanding already entered into will provide a basis for the legal regime but future agreements will have to be made to cover other issues which are not adequately covered by present agreements. These issues include *inter alia:*

a. respective responsibilities in the design, development, operation and utilization of the Space Station System, including European responsibility for one or several identifiable element(s) of the system;
b. identification of those operational costs to be shared on an equitable basis; and
c. protection of intellectual property rights, including those of commercial users.

In these future negotiations, the parties will have to keep in mind that domestic law will not be automatically extended to outer space activities. A careful assessment will have to be made on a case by case basis to determine possible applicability. If found desirable United States law may be extended to outer space by international agreement or legislation. The lack of appropriate legal regulation governing space activities could lead to a substantial impairment of commercial developments in space.

In his closing observations *Professor Gorove* states that the crucial issues to be decided by the ongoing international agreeements, are the allocation of authority, the degree of autonomy, if any, and the associated issue of registration. Further questions to be answered include those pertaining to the lines of authority from the space station commander to the pilot, the mission specialist and other personnel, as well as the status, rights, and obligations of persons authorized to be on the space station. Additionally, questions of liability, financial obligations, exchanges of data, proprietary rights and dispute settlements will have to be addressed. *Dr. Gorove* concludes that the U.S./International Space Station should not be looked upon as an *ad hoc*, temporary endeavor but as a long-term partnership that would allow for growth and expansion in the spirit of equitable reciprocity without wasteful duplication, bringing lasting benefits to all participants.

In his presentation on "A Legal Framework for Space Station Activities", *Professor Tadao Kuribayashi* states that there are four alternatives to be considered in connection with jurisdiction and control:

1. a national space station owned by and under jurisdiction and control of a single nation;
2. a multinational space station, jointly owned and under the jurisdiction and control of several nations;
3. a multinational space station, the individual modules of which are independently owned and under the jurisdiction and control of separate nations;
4. an international space station owned, operated and registered by an international governmental organization.

Prof. Kuribayashi notes that the first alternative appears to be the easiest to use but some states with a large economic interest in hte space shuttle might be dissatisfied with such arrangement.

Another contribution, *Prof. I. H. Ph. Diederiks-Verschoor,* suggests that there be an international group established that would develop standards and practices relating to space stations. She also suggests that a management board be created for the space station which would have authority over personnel, be responsible for security and damage to and by the space station, and establish rights of boarding. The space station should also have a medical center that provides a wide range of expertise, including psychological help to the crew to deal with prolonged stays in space.

Richard DalBello of the U.S. Congress Office of Technolgy Assessment, asserts that for a successful operation of the space station, the states and countries involved will have to resolve the question of jurisdiction and choice of law. *Mr. DalBello* also states that future negotiations would have to consider which jurisdiction would apply to cases and controversies. After the appropriate court is selected, it must then be determined what law to apply. In choosing the appropriate law, the conflict between State and federal laws will have to be resolved.

Dennis James Burnett in his presentation on the "U.S. Legal Regime Governing Technological Transfers" deals with technological transfers as a matter of export control. *G. Lafferranderie* of ESA states that the transfer of technology involves not only legal, economic and technological but also political considerations. He believes that the transfer of technology should be limited and the exchange will need to be a balanced two way process with each side benefitting equally. Some additional presentations dealt with issues of material processing in space *(John Egan)* and proprietary rights *(Zanghi, Citarella* and *Kempf).* Others were written in German *(Loosch, Ersfeld).*

Robert Kempf of NASA in his presentation on the "Proprietary Rights and Commercial Use of Space Stations", says that the prorietary rights most relevant to the commercial use of space are manifest in three basic areas; patent, trade secret and copyright protection. The same proprietary factors that are involved on Earth are involved in space.

In determining the applicable law, *Kempf* asserts the Outer Space Treaty becomes particularly relevant because it provides that outer space and the celestial bodies are not subject to national appropriation by claim

of sovereignty, and states party to the agreement bear international responsibility for actions taken in outer space. In determining the applicable law in patent considerations, it must be remembered that patent grants have a patent in each country. Therefore in obtaining patent protection on products and processes derived on board a space station, patent grants must be sought in each state's law that governs the station or module. In regard to trade secrets, there are no specific formulas required to obtatin and maintain trade secrets, so in space the only concern is with the breach of confidentiality. Also, when looking at copyright considerations, it must be remembered that there are no territorial conditions pertaining to such right.

In his closing statement *Prof. Bockstiegel* noted that there had been significant progress in both the areas of practical negotiations and legal discussions, but that there were still a significant number of issues to be settled.

The Legality of Space Militarization, by Bruce A. Hurwitz (Elsevier Science Publishing Co., 1986), pp. 252.

Initially, this work recognizes a change in the use of outer space from passive military activities, such as data gathering, to active military uses wherein space objects themselves become weapons. This change requires an alteration of the focus of internatioal understanding. The author briefly outlines present international agreements regulating the use of outer space. He recognizes the view that present law was developed to "endorse [the arms] race"; however, he concludes that a more accurate statement would be that if it is impossible to eliminate the militarization of space, "space law's main function is to regulate militarization of space."

The author's analysis begins with a brief outline of the developments of space law. He points out the unique speed with which the "customary law" of outer space came about. Space activities are *per se* legal, and are theoretically regulated by global cooperation manifest in United Nations agreements. The author notes that one of the important distinctions between international law of the sea and law of space is that military activities are not prohibited in the sea while they are limited in space. The author concludes the first chapter with a brief review of present agreements regulating space activites.

The next step in the author's analysis is to define the legality of space activities. He begins with the right of "exploration and use of outer space" as outlined in the Outer Space Treaty (OST), and notes that this right is neither absolute nor unqualified. He uses the wording of the OST to identify potential limitations on the propriety of certain types of conduct in space, and to delimit these areas vis-a-vis military activities in space. The author points to inconsistency within the OST and concludes that a strict reading of the treaty does not preclude all military uses of outer space. Although arguments against the overflight of "non-

innocent" objects have been made, precluding overflight of legal objects would "effectively prevent all development in [space]."

As to the legality of satellites the author rejects the notion that general reconnaissance encroaches on national sovereignty on three bases: the twenty years of such activity; the fact that a ban on military reconnaissance would ban civilian reconnaisance; and, the rejection by the U.N. of a proposed prohibition of espionage from outer space. Although the objection to reconnaisance has been declined, remote sensing still creates problems. The author notes that a major distinction between reconnaisance and remote sensing is that remote sensing can detect what happens *inside* the earth, e.g., natural resources. With regards to U.N. opinion, the U.N. Secretariat concluded that the only restriction on remote sensing is present international law and respect for the interests of sensed states. Problems arise with respect to questions of sovereignty over natural resource data. The U.S. position is that remote sensing is within the freedom of exploration of outer space in the OST. The U.S.S.R. concurs with the right to conduct remote sensing but would limit the transfer of data. The author notes an area of agreement in that the data "should not intentionally be used...to the detriment of other states."

The discussion of demilitarization of space covers both nuclear and conventional weapons. Nuclear weapons (and weapons of mass destruction) in space are banned by OST article IV(1). A state, however, may withdraw from the OST upon one year's notice and legally place nuclear weapons in space. The author notes that nuclear sources are not within the scope of the ban. As to conventional weapons, the author concludes that the provi-sions of the OST and the Moon Treaty clearly are inapplicable to anti-satellite and laser weapons. After a brief discussion of the various types of anti-satellite weapons, the author addresses the U.S. position that the right of self-defense was not precluded by OST and the U.S. justification of its anti-satellite program by the existence of the Soviet System. After a discussion of the political and technological development of ASAT systems, the author concludes that agreement appears to exist on the legality of ASAT weapon but questions still remain as to whether ASAT weapons violate the spirit of the OST. Laser weapons present a different problem. According to some, lasers are "weapons of mass distuction" but the author rejects this premise. Although a laser using a nuclear explosion for a power source would violate the OST, a conventionally powered laser would not so long as it was not based on the moon, on celestial bodies, or in orbit around them. The effect of the 1972 ABM Treaty, in the author's view, is to ban antiballistic, space-based laser weapons. However, research on such weapons is legal under the ABM Treaty and development would not violate the OST. In the author's view, it would be illegal to deploy automatic lasers, while non-nuclear, non-automatic weapons may be stationed in earth's orbit.

As to the legality of the use of force in, from and through outer space, the author divides his discussion into three areas: interference with space objects, damage to space objects, capture of space objects. Under certain conditions it is permissible to stop communication *to* a

satellite, but not permissable to stop communication *from* a satellite. Also, under the OST if the activity is legal, it may not be interfered with. The right of self-defense where it involves damage to space objects which threaten a state raises other legal issues. The distraction of a reconnaisance satellite is illegal, while rendering the sensed equipment inoperative may not be. Moreover, the author rejects the idea that intentional destruction of a space object and the resulting damage is not within the ambit of the 1972 Liability Convention.

The U.S. SDI program has raised serious questions as to its legality under present agreements. In the author's view, the U.S. proposal was "research" of a "non-nuclear" program which is not within the prohibited behavior envisaged by the ABM Treaty. The predominant world view is that the *development* would violate the treaty. The U.S. position is that the U.S.S.R. has violated ABM with a radar unit in Siberia. Withdrawal from ABM would, in the author's view, remove a major problem with SDI's legality.

In conclusion, the author states that the "space powers", U.S. and U.S.S.R., appear to be corrcet in their interpretation of international law that nonnuclear militarization of space does not violate *de lege lata* international law. He ends the work with a call for regulation of the activities discussed in the book, saying that nonweaponization may still be possible.

The Role of Scientists in Preventing an Arms Race in Outer Space, edited by Academician Vladimir Landa and Josef Mrazek (Academia, Prague, 1986), pp. 437.

This book is a compilation of papers presented at an international roundtable meeting of scientists and scholars held in Prague, Czechoslovakia, October 4 - 6, 1985. The discussion -- sponsored jointly by the Czechoslovak Academy of Sciences, The World Federation of Scientific Workers (WFSW), and its member organization, the Czechoslovak Trade Union of Workers in Education and Science -- involved experts from seventeen countries -- including the Soviet Union and the United States -- and four international organizations. Twenty-seven participants presented papers in four areas: "Characteristics of the Present State and Developmental Tendencies in the Use of Space for Military Purposes"; "Prospects of Peaceful Uses of Space for Mankind"; "International Law Aspects of the Ban on the Development and Use of Weapons in Space and Space-based Weapons Against Earth'; and the "Role of Scientific Workers in Preventing an Arms Race in Space and Contribution of the WFSW to the 'Year of Peace.'" Given the size and diversity of the resulting publication, no more than a general overview of the book is possible.

From the opening speech by *Drahomira Hanzalova*, president of the host Union of Educational and Scientific Workers, through most of the papers presented in this book, the Strategic Defense Initiative is the central issue. However, anti-satellite weapons (ASAT's), and conventional

and nuclear weapons to be deployed or used in space, as well as non-weapon military uses of space (*e.g.*, reconnaissance satellites) are also touched upon.

In the book's first section, consisting of papers on the present state of military uses of space and prognoses based upon present tendencies, military technology is the core of the topic, but issues of space technology in general, and "Star Wars", in particular, are also discussed.

In the book's second section which deals with the peaceful uses of outer space, the participants consider a number of topics. They include the history of space exploration and exploitation, Czechoslovak participation, the lack of any real obstacles to militarization in space, the percieved obstacles to peace such as the intransigence of the super powers and "Star Wars", and views of future cooperation ranging from short-range projects to long-term expectations. The possibility of war arises as a necessary complement to the prospects for peace.

The third section concerns the impact of international law on space militarization. Former Ambassador *Aldo Armando Cocca* of Argentina begins the section with a historical overview of the theory that "He who wants peace [should] prepare for war." He states that, over the centuries, this view has evolved into the notion of the importance of weapons in and of themselves, and that we must, to assure peace, overcome this ingrained idea. The laser, the atom, and even anti-satellite satellites have benevolent uses. *Mr. Cocca* ends with a call for scientists, and diplomats to preserve space as the common heritage of mankind.

Dr. Stephen Gorove. Professor of Law at the University of Mississippi, in his article entitled "International Legal Aspects of Arms Control in Relation to Space," catalogues applicable treaties and international agreements relating to the ban on deployment and use of weapons in space. He considers possible areas of agreement between the leading space powers. Among the proposals which he believes to have a chance of acceptance are limited-scope bans on the deployment and use of weapons in space or on Earth, if drafted to affect only specified activities, weapons and areas; the extension of bans on weapons of mass destruction under the Outer Space Treaty and, reinforcing or restating existing prohibitions in terms specific to space. *Professor Gorove* also describes several factors which affect the acceptability of such proposals.

The book's scientific editor, *Dr. Josef Mrazek*, contributed an article on general principles on international law and military uses of space in the context of the Soviet initiative in the 40th UN General Assembly. *Dr. Vladimir Kopal*, Chief of the United Nations Outer Space Affairs Division, discusses the threat to the steps already taken toward curbing the inherent dangers of space militarization. *Dr. Kopal* views the primary threats as coming from new space weapon technologies and their expansion into space. He urges that further measures be taken to strengthen the legal safeguards for the peaceful uses of space.

The final chapter of this book, describes both the general obligations of the scientific community to activism, and concrete examples of where and how such activism is needed to preserve peace in space.

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LEGAL ASPECTS OF SPACE COMMUNICATIONS, INCLUDING THE GEOSTATIONARY ORBIT AND SERVICES UTILIZING IT

COMMERCIALIZATION OF SPACE ACTIVITIES

SPACE LAW TEACHING AND THE HISTORY OF SPACE LAW

I.

AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND THE UNION OF SOVIET SOCIALIST REPUBLICS CONCERNING COOPERATION IN THE EXPLORATION AND USE OF OUTER SPACE FOR PEACEFUL PURPOSES

The United States of America and the Union of Soviet Socialist Republics, hereinafter referred to as the Parties;

Considering the role of the two States in the exploration and use of outer space for peaceful purposes;

Desiring to make the results of the exploration and use of outer space available for the benefit of the peoples of the two States and of all peoples of the world;

Taking into consideration the provisions 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, and other multilateral agreements regarding the exploration and use of outer space to which both States are Parties;

Noting the General Agreement Between the Government of the United States of America and the Government of the Union of Soviet Socialist Republics on Contacts, Exchanges, and Cooperation in Scientific, Technical, Educational, Cultural, and other fields, signed on November 21, 1985;

Have agreed as follows:

ARTICLE 1

The Parties shall carry out cooperation in such fields of space science as solar system exploration, space astronomy and astrophysics, earth sciences, solar-terrestrial physics, and space biology and medicine.

The initial agreed list of cooperative projects is attached as an Annex.

ARTICLE 2

The Parties shall carry out cooperation by means of mutual exchanges of scientific information and delegations, meetings of scientists and specialists and in such other ways as may be mutually agreed, including exchange of scientific equipment where appropriate. The Parties, acting through their designated cooperating agencies, shall form joint working groups for the implementation of cooperation in each of the

fields listed in Article 1. The recommendations of the joint working groups shall be subject to the approval of each Party in accordance with its appropriate national procedures prior to implementation. The designated cooperating agencies shall notify each other of the action taken by the Parties on the recommendations within three months of their adoption by the joint working groups.

ARTICLE 3

The joint working groups shall begin their work with the projects listed in the Annex to this Agreement. Revisions to the list of projects in the Annex, which may include the identification of other projects in which cooperation would be of mutual benefit, may be effected by written agreement between the Parties through a procedure to be determined by them.

ARTICLE 4

Cooperative activities under this Agreement, including exchanges of technical information, equipment and data, shall be conducted in accordance with international law as well as the international obligations, national laws, and regulations of each Party, and within the limits of available funds.

ARTICLE 5

This Agreement shall be without prejudice to the cooperation of either Party with other States and international organizations.

ARTICLE 6

The Parties shall encourage international cooperation in the study of legal questions of mutual interest which may arise in the exploration and use of outer space for peaceful purposes.

ARTICLE 7

This Agreement will enter into force on the date of signature by the Parties and will remain in force for five years. It may be extended for further five-year periods by an exchange of notes between the Parties. Either Party may notify the other in writing of its intent to terminate this Agreement at any time effective six months after receipt of such notices by the other Party.

IN WITNESS WHEREOF the undersigned, being duly authorized by their respective Governments, have signed this Agreement.

DONE at Moscow, in duplicate, this 15th day of April, 1987, in the English and Russian languages, both texts being equally authentic.

ANNEX

AGREED LIST OF COOPERATIVE PROJECTS

1. Coordination of the Phobos, Vesta, and Mars Observer missions and the exchange of scientific data resulting from them.

2. Utilization of the U.S. Deep Space Network for position tracking of the Phobos and Vesta landers and subsequent exchange of scientific data.

3. Invitation, by mutual agreement, of co-investigators' and/or interdisciplinary scientists' participation in the Mars Observer and the Phobos and Vesta Missions.

4. Joint studies to identify the most promising landing sites on Mars.

5. Exchange of scientific data on the exploration of the Venusian surface.

6. Exchange of scientific data on cosmic dust, meteorites and lunar materials.

7. Exchange of scientific data in the field of radio astronomy.

8. Exchange of scientific data in the fields of cosmic gamma-ray, x-ray and sub-millimeter astronomy.

9. Exchange of scientific data and coordination of programs and investigations relative to studies of gamma ray burst data.

10. Coordination of observation from solar terrestrial physics missions and the subsequent exchange of appropriate scientific data.

11. Coordination of activities in the study of global changes of the natural environment.

12. Cooperation in the Cosmos biosatellite program.

13. Exchange of appropriate biomedical data from U.S. and U.S.S.R. manned space flights.

14. Exchange of data arising from studies of space flight-induce changes of metabolism, including the metabolism of calcium, both from space flight and ground experiments.

15. Exploration of the feasibility of joint fundamental and applied biomedical experiments on the ground and in various types of spacecraft, including exobiology.

16. Preparation and publication of a second amplified edition of the joint study "Fundamentals of Space Biology and Medicine."

APPLICATION OF THE CONVENTION ON REGISTRATION OF OBJECTS LAUNCHED INTO OUTER SPACE*

Report by the Secretary-General

I. BACKGROUND

1. In 1961, the General Assembly adopted resolution 1721 (XVI), which called upon States launching objects into orbit or beyond to furnish information promptly to the Committee on the Peaceful Uses of Outer Space, through the Secretary-General, for the registration of launchings, and requested the Secretary-General to maintain a public registry of the information furnished pursuant to that provision.

2. In 1974, the General Assembly, by resolution 3235 (XXIX), adopted the Convention on Registration of Objects Launched into Outer Space, which entered into force on 15 September 1976. The text of the Convention is given in annex I.

3. The Convention provides, in article X, that ten years after the entry into force of the Convention, the question of the review of the Convention should be included in the provisional agenda of the United Nations General Assembly in order to consider, in the light of past application of the Convention, whether it requires revision.

4. Pursuant to article X, the General Assembly, at its forty-first session, considered this question and, by resolution 41/66, inter alia, requested the Secretary-General to prepare a report on the past application of the Convention and to submit it to the Legal Sub-committee at its twenty-sixth session, for the information of Member States. The present report has been prepared in compliance with that request.

II. REGISTRATION OF SPACE OBJECTS BY THE UNITED NATIONS

5. Pursuant to resolution 1721 (XVI), States began in 1962 to notify the Secretary-General of their launchings, the first notifications including all launchings since the first object was launched into space in 1957. The Secretary-General designated the Outer Space Affairs Division to maintain the public registry specified by the resolution, and the information furnished by States has been disseminated in a series of documents with the symbol A/AC.105/INF.___. Following the entry into force of the Registration Convention in 1976, documents of this series continued to be issued for launchings notified by States that were not parties to the Convention. As of 28 February 1987, the most recent document in this series is document A/AC.105/INF.394 of 6 January 1984.

6. Following the entry into force of the Registration Convention on 15 September 1976, the Secretary-General, pursuant to article III, established a Register for information furnished under the Convention and again designated the Outer Space Affairs Division to maintain the Register. To provide full and open access to the information in the Register as required by the Convention, a new series of documents with the symbol ST/SG/SER.E/___ was established to publish information furnished by States Parties to the Convention. The initial documents in this series did not contain information on launchings previously published in the A/AC.105/INF.___ series, nor have subsequent launchings by States not party to the Convention been published in the ST/SG/SER.E/___ series. The two series of documents are therefore separate and complementary. As of 28 February 1987, the most recent document published pursuant to the Convention is ST/SG/SER.E/157 of 26 February 1987.

* Taken from U,N.Doc. A/AC105/382 (2 March 1987)

7. Pursuant to article IV of the Convention, the information published in the ST/SG/SER.E/___ documents includes the name of the launching State, a designator or registration number for the object, date and territory or location of launch, basic orbital parameters including nodal period, inclination, apogee and perigee, and the general function of the space object.

8. Another series of documents, with the symbol ST/SG/SER.E/INF___, was established for publication of information furnished by States concerning the establishment of national registries in compliance with article II. The most recent document in this series is ST/SG/SER.E/INF.8 of 2 March 1987.

III. APPLICATION OF THE CONVENTION

9. Annex II contains a list of the States Parties to the Convention, with an indication of the States that have furnished the United Nations with information concerning the establishment of a national registry and the States that have notified the United Nations of objects launched into outer space.

10. Six States and one international organization have sent separate notifications to the Secretary-General of the establishment of their registries pursuant to paragraph 1 of article II of the Convention. In addition, three States have indicated in their notifications of launchings that they had established such registries. One State, while furnishing the Secretary-General with information on launchings, has not informed him of the establishment of a national registry.

11. No communications pursuant to article VI (assistance in the identification of a space object), article IX (amendments) or article XI (withdrawal from the Convention) were received by the Secretary-General during the period under review.

12. Annex III contains a list of all functional objects launched into Earth orbit or beyond since the entry into force of the Convention on 15 September 1976, with an indication of the launchings that have been notified to the United Nations pursuant to the Convention, or, for States not party to the Convention, in compliance with resolution 1721 (XVI), including all notifications received up to 28 February 1987.

13. Annex III lists the objects in chronological order of launch and identifies them by the international designation number assigned by the World Warning Agency on behalf of the Committee on Space Research (COSPAR) of the International Council of Scientific Unions (ICSU). This number is included in the notifications provided by some States.

14. It should be noted that the launching of a functional object into space normally results in a number of non-functional objects, such as rocket motors and protective shields, being put into space at the same time. Since there are a large number of such objects, and since most States have not registered such objects, they are not included in annex III and are not included in the numbers given in the present report. The term objects, as used in the present report, should therefore be taken to mean functional objects.

15. Of 1,474 functional space objects launched in 1,200 launchings between 15 September 1976 and 31 October 1986, 1,438 or 97.6 per cent were registered with the United Nations, either under the Convention or under resolution 1721 (XVI).

16. For the great majority of launchings, notifications were submitted to the United Nations two to six months after launch. In a few cases, launchings were notified within a week or two of launch, and in a few cases, more than a year after launch.

17. The two major launching States have regularly provided the United Nations with lists of launchings, with each notification covering all launchings during a period of one to three months. These States have notified the United

Nations of all of the space objects that they have launched for themselves. These States have also indicated when their objects were no longer in orbit. Other launching States have submitted notifications on a launch-by-launch basis, but some launchings have not been registered. One launching State, not a party to the Convention, has not notified the United Nations of any launchings.

18. One major launching State has regularly registered not only its functional space objects, but also non-functional objects that were incidentally launched into space along with functional objects, including non-functional objects identified after the first notification of the launch. Other States have generally registered only functional objects.

19. One major launching State has provided the United Nations with four additional notifications, pursuant to paragraph 2 of article IV, concerning a space object carrying a small nuclear energy unit of the reactor type.

20. One international organization has declared its acceptance of the rights and obligations of the Convention and has registered with the United Nations all of its own space objects. This organization has also submitted to the United Nations supplementary information concerning the positions of its geostationary satellites.

21. The majority of space objects that have not been registered have been objects launched by one State or by an international organization for another State or international organization. In some such cases, the launching State has registered the launch vehicle but not the space object belonging to another State or international organization. In a few cases, a space object has been registered by both the State which provided the launch and the State for which the space object was launched.

22. The majority of space objects that have not been registered have been objects launched by or for States that have not been party to the Convention, or by or for international organizations that have not declared their acceptance of the rights and obligations of the Convention, at the time of the launch. These cases are indicated in annex III by the indication 'NP' in the remarks column following the name of the State or organization.

UNITED STATES SPACE LAW

National & International Regulation

Compiled and edited by

STEPHEN GOROVE

A newcomer to the family of legal disciplines, space law has experienced one of the fastest growths in legal doctrines and institutional practices during the past two decades, especially in the international field. Today the network of institutions—domestic, foreign and international—dealing with matters of outer space encompasses a broad and ever widening panorama. This service brings together national and international regulations pertaining to outer space. These include national laws, decrees, orders, bills, reports, court decisions, relevant references, tables, and lists. For the international area, there are draft treaties, proposals and reports as well as actual treaties. There will be periodic supplementation to ensure that the material is current.

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* * *

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