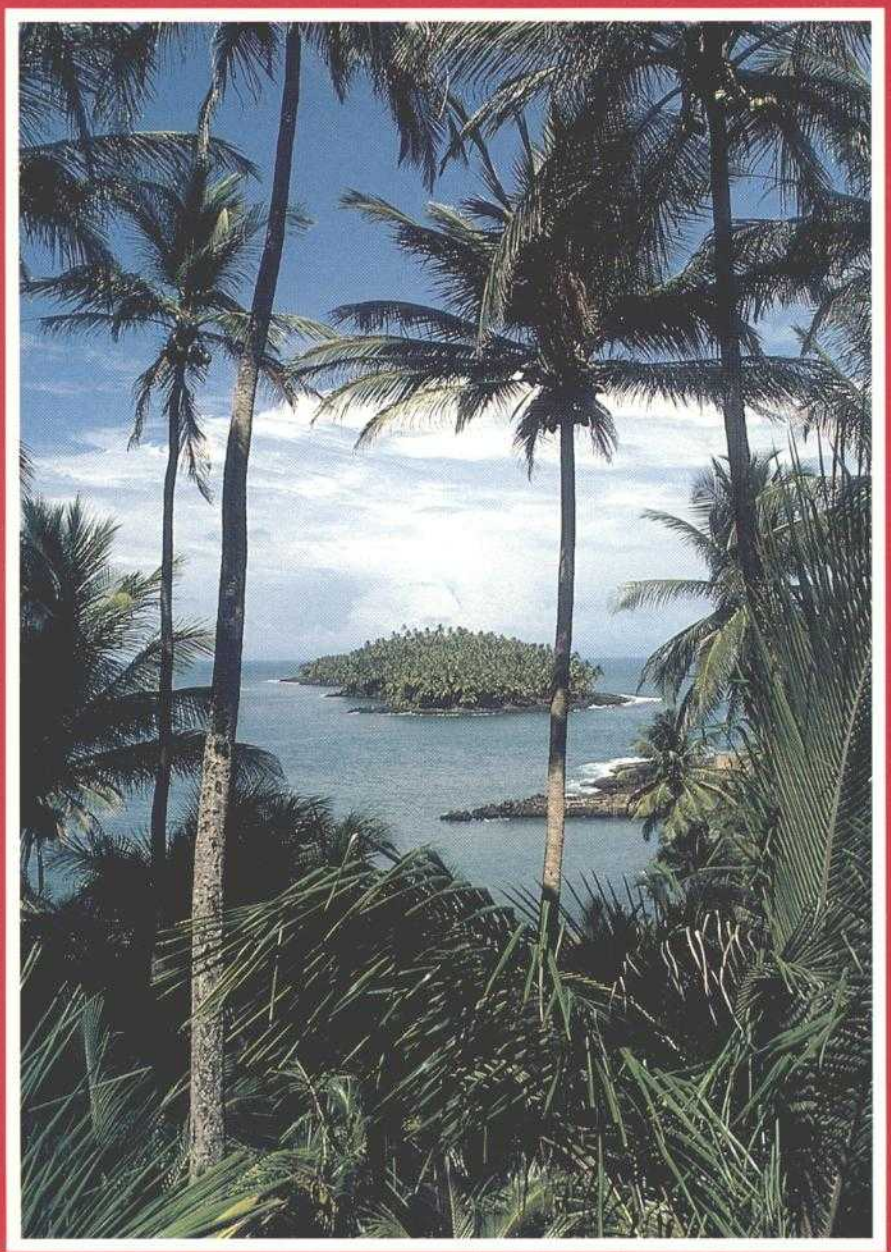
COMSAT

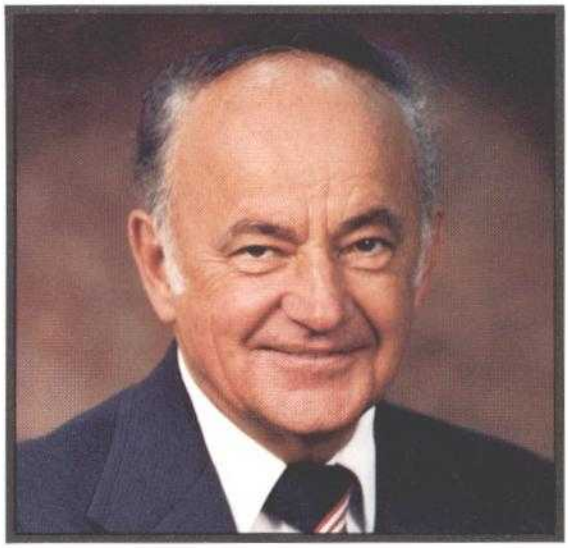
COMMUNICATIONS SATELLITE CORPORATION MAGAZINE

1984



NUMBER 13

VIEWPOINT



by **Dr. Joseph V. Charyk**
Chairman and Chief Executive Officer
Communications Satellite Corporation

Recently I had the opportunity to give testimony before the Senate Foreign Relations Committee on international communications issues and, specifically, on the question of continued U.S. support for the International Telecommunications Satellite Organization (Intelsat). An excerpt of my written remarks appears on page 39 of this issue. After hearing the subsequent arguments of those who continue to assert that some benefit is to be gained by allowing facility competition with Intelsat on its most heavily used routes, I believe further response is needed.

It has been argued that Intelsat's provision of new international business services, as was recently approved by the Intelsat Board of Governors, is somehow not in keeping with the mission of that organization. To refute such a contention, one need only cite Article III of the Intelsat Agreement, which states: "Intelsat shall have as its prime objective the provision, on a commercial basis, of the space segment required for international public telecommunications services of high quality and reliability to be available on a nondiscriminatory basis to all areas of the world."

Such a statement argues powerfully for Intelsat's continued dedication to universality of service including, most assuredly, the provision of services to the world's business communities. The expenditure of funds to improve the satellites carrying these services, through the introduction of the integrated digital Intelsat Business Service (IBS), is in no way a diversion of resources from Intelsat's prime objective; rather it is a means of furthering that objective.

Another argument that needs to be made at this time concerns the increasing demand for satellite locations in the geosynchronous orbit and the fact that the geosynchronous orbit is a precious international resource. The Intelsat approach assures the most efficient utilization of this resource to the benefit of all countries and not its abuse for the benefit of a few.

It is important that we remind ourselves of the upcoming 1985/1988 World Administrative Radio Conference, (WARC), where one of the principal subjects will be the allocation of such satellite slots.

The United States is in the midst of refining the positions that it will present at the upcoming WARC, positions which seek to avoid the implementation of an *a priori* planning scheme that would divide the orbital arc and potentially limit our access to needed locations. If we are to convince other countries to join us in this position, we must first convince them that we will not behave in a parochial manner.

Intelsat, an 108-member nation cooperative, has from its birth represented the single most efficient method of using the limited geosynchronous orbit to provide international communications via satellite. In the face of the growing worldwide demand for orbital slots, Intelsat stands out as a most rational approach. It thus deserves the U.S. Government's undivided support.

COMSAT
No. 13
Publisher:
Editor:
Chief Photograph
Administrative Support:
Corporate Affairs:
Roger Cochetti, Direc
Holman, Director, Adv
Director, Governmen
Regulatory Relations;
M. Glasby, P. Grady,
B. Taylor-Heineback.
Liaison Assistance
Satellite Television C
Financial Planning, A
Comsat Laboratories;
Manager, ERT; Edmo
Broadcast Network P
Analyst, Intelsat Affai
Media Communicatio
External Affairs, Mari
Articles in Comsat M
not necessarily be th
may be obtained by w
dressed to Stephen A
tions Satellite Corpora
20024.

From the E

The theme o
will quickly b
who takes e
features sec
which in just
mark the 20
applications
ications Con
development
directly com
Intelsat coop
portion of its
tions system
fully as poss
this type of
tion that to t
divided supp
As several a
fects of such
far-reaching
than may ha
The gues
is Wreatham
member of t
State's Polic
and a man c
Department'
Intelsat conc
for his articl
wish to exte
bers of the s

COMSAT

No. 13 1984

Publisher: Communications Satellite Corporation
Alfred P. Statham
Vice President
Corporate Affairs

Editor: Stephen A. Saft

Chief Photographer: William J. Megna

Administrative Support: Shirley T. Cofield, Cathy Randall

Corporate Affairs: Daniel N. Crampton, Director, Communications; Roger Cochetti, Director, Public and Investor Relations; Kathryn Holman, Director, Advertising and Display Services; Ernest B. Kelly III, Director, Government Relations; Robert J. Oslund, Director, Regulatory Relations; K. Baumgartner, D. Berg, E. Boien, S. Chase, M. Glasby, P. Grady, G. Hughes, J. Martin, S. Perry, B. Taylor-Heineback.

Liaison Assistance: Judith Shannon, Vice President, Public Affairs, Satellite Television Corporation (STC); Douglas L. Davis, Manager, Financial Planning, Amplica; Allan Galfund, Manager, External Affairs, Comsat Laboratories; Jane Casler, Advertising and Promotion Manager, ERT; Edmond Harvey, Manager, Graphic Arts; J. Holmes, Broadcast Network Programs, Comsat General; Betsy T. Kulick, Analyst, Intelsat Affairs, World Systems; Claude Owre, Manager, Media Communications, TeleSystems; Elizabeth Schulke, Assistant for External Affairs, Maritime Services.

CONTENTS

Departments

Articles

Cover: View of Devil's Island from Royal Island in French Guiana. Chief Photographer William J. Megna visited Devil's Island, location of the infamous French prison colony, as part of his assignment to cover the seventh launch of an Intelsat V satellite. For the first time an Intelsat satellite was sent spaceward in a non-U.S. launch vehicle and from a launch site other than the NASA facility in Cape Canaveral, Florida. The story begins on page 19.

From the Editor

The theme of Comsat Magazine No. 13 will quickly become obvious to anyone who takes even the briefest look at the features section. That theme is **Intelsat**, which in just another six months will mark the 20th year of its existence. Two applications before the Federal Communications Commission (FCC) call for development of systems that would directly compete with the 108-nation Intelsat cooperative on the transatlantic portion of its global satellite communications system. We wanted to explore as fully as possible all the implications of this type of competition on an organization that to this point has enjoyed the undivided support of the U.S. Government. As several articles make clear, the effects of such competition could be more far-reaching and far more pernicious than may have at first been realized.

The guest author in the current issue is Wreatham E. Gathright, a longtime member of the U.S. Department of State's Policy Planning Staff, now retired, and a man deeply involved in the State Department's contribution to the original Intelsat concept. We thank Mr. Gathright for his article, and while we are at it we wish to extend our thanks to two members of the staff of the Comsat World Systems Divison for assistance in the preparation of several of the articles pertaining to **Intelsat**. They are Andrea Maleter and Betsy Kulick.

Many people assisted us in our preparation of the two principal photo features in the current issue, and, unfortunately, we can only acknowledge the help of some of them here. For considerable help in the preparation of the article on the launch of Intelsat V Flight Model 7 from the Guiana Space Center in Kourou, French Guiana, our deepest appreciation to Andre Masson of the ESA staff in French Guiana and to Roger Legrand of the CNES staff, also in French Guiana, and to Jacqueline Schenkel of the Washington, D.C., office of Arianespace as well as to Allan M. McCaskill and Frederick Ormsby of **Intelsat**.

For considerable help with the article on Jacques Cousteau, our thanks to Tim Knipe of the Cousteau Society and to Michel Treboz, Electronics Engineer on board the Calypso, and to M. Kim Baumgartner of the Public and Investor Relations staff of the Comsat Office of Corporate Affairs.

Stephen A. Saft

N O T E S

Senate confirms Freeman as Board member of Comsat

The United States Senate has confirmed the appointment by President Ronald Reagan of Neal B. Freeman as the third Presidentially appointed member of the Board of Directors. As mandated by the Communications Satellite Act of 1962, the Comsat Board consists of 12 Directors elected annually by the shareholders of the Corporation and three appointed by the President of the United States. The Presidentially appointed Directors serve for terms of three years.

Mr. Freeman is President of Jefferson Communications, Inc., of Reston, Virginia. The principal activities of Jefferson Communications are newspaper syndication, radio and television production and media consulting, and its features appear in more than one thousand newspapers worldwide. Mr. Freeman also serves as Executive Producer, *American Interests*, a series appearing on public television, and as Chairman, The Blackwell Corporation, and he is a panelist on the President's Commission on White House Fellows.

In prior years, Mr. Freeman was Consulting Editor, Washington Post Writer's Group (1977-1980); Contributing Editor, *The Advocates*, a public television series (1977-1979); and Washington Editor, National Review (1978-1981). In addition, he was the first producer of the television show, *Firing Line*.

The two other Presidentially appointed members of the Comsat Board are Robert M. Garrick and E. Pendleton James.

Neal B. Freeman has been confirmed as the third Presidentially appointed Director on the Comsat Board of Directors.

Net income for third quarter increases over 1982 quarter

For the quarter ended September 30, 1983, **Comsat**'s Consolidated Net Income was $12.7 million, an increase of 15 percent, or $1.7 million, over Net Income for the third quarter of 1982. Earnings per share for the third quarter were 71 cents, on approximately 18 million shares, an increase of 2 cents per share over the amount reported for the third quarter last year when about 16 million shares were outstanding.

The increase in Net Income is attributable to the sale of the digital electronics portion of the Corporation's computer-aided engineering (CAE) subsidiary, as well as increased income from the Corporation's international satellite services, partially offset by increased losses related to the Corporation's partnership interest in Satellite Business Systems (**SBS**) and one-time expenses associated with the Corporation's cost reduction program, including employee severance and early retirement payments.

The Corporation also announced the declaration of a regular quarterly dividend of 30 cents per share, payable Monday, December 12, 1983, to shareholders of record on Friday, November 11, 1983. Today's dividend is the 53rd consecutive quarterly dividend declared by the Corporation to its shareholders.

The Corporation's share of losses from its partnership interest in **SBS** for the third quarter of 1983 increased to $5.7 million from $4.0 million for the third quarter of 1982, after recognizing federal income tax benefits and investment tax credits. Approximately half of this increase is attributable to higher losses sustained by **SBS** during the third quarter of 1983 compared to the third quarter of 1982. The remaining portion of the increase is attributable to the retroactive effect of the change in accounting for depreciation made by **SBS** in the third quarter of 1982. SBS revenues for the third quarter rose significantly, to $38.5 million, an increase of $27.2 million over the $11.3 million reported for the same quarter of 1982, and an increase of $7.2 million, or 23.1 percent, over revenues reported for the second quarter of 1983.

The Corporation's Operating Revenues for the third quarter of 1983 were $114.3 million, up $9.3 million from revenues reported for the third quarter of 1982. For the first nine months of 1983, Operating Revenues increased $33.7 million to $332.7 million. This increase is principally a result of growth in revenues from the Corporation's international communications satellite services and from its equipment manufacturing business.

For the first nine months of 1983, Consolidated Net Income was $41.4 million, or $2.30 per share, up $9.2 million, or 29 cents per share, over that for the first nine months of 1982. The Net

N O T E S

Income increase is primarily attributable to the sale of Ungermann-Bass common stock, the sale of the digital electronics portion of the Corporation's CAE subsidiary and higher revenues resulting from **Comsat**'s international satellite services, partially offset by increased losses related to the Corporation's partnership interest in **SBS** and expenses related to the Corporation's cost reduction program.

General Electric completes buy of digital CAE business

The purchase by General Electric of **Comsat**'s digital electronics computer-aided engineering (CAE) business has been completed. The transaction, initially jointly announced by **Comsat** and General Electric in July 1983, involves a cash payment by General Electric to **Comsat** of approximately $12 million.

The sale of the digital electronics CAE business reflects **Comsat**'s continuing efforts to pursue those businesses in which it holds a strong competitive position. **Comsat** has retained the microwave portion of its computer-aided engineering business and has established a subsidiary, Compact Software, Inc., to develop and market microwave circuit design tools. **Compact Software**, located in Palo Alto, California, joins **Amplica** and **TeleSystems**, manufactures of advanced telecommunications equipment, as part of Comsat Technology Products.

New post to John McLucas, Joel Alper is head of division

Dr. John L. McLucas, President of Comsat World Systems Division since 1980, has been elected to the newly created position of Executive Vice President and Chief Strategic Officer of **Comsat**, reporting to the Chairman and Chief Executive Officer. In this capacity, he is responsible for the development and integration of **Comsat**'s strategic business planning, corporate outreach, marketing, ITU relations, and new business activities. Reporting to Dr. McLucas are the staff functions of Corporate Affairs and Corporate Development.

Replacing Dr. McLucas as President of Comsat World Systems Division is Joel R. Alper, who has served as Executive Vice President of the division since June 1983. Comsat World Systems Division, the company's largest business, principally consists of units that provide international telecommunications services through the International Telecommunications Satellite Organization (**Intelsat**); maritime communications services through the International Maritime Satellite Organization (**Inmarsat**); technical services under contract to **Intelsat**; and research and development programs by **Comsat Laboratories.**

Stephen M.D. Day has been elected to the position of Vice President, Corporate Development, and will report to Dr. McLucas. He will be responsible for strategic planning, acquisitions and divestitures. George Billings, who had served as Vice President, Corporate Development, since 1982, recently left **Comsat** to pursue other business opportunities.

John McLucas, 63, has served as President of Comsat World Systems Division since 1980. From 1979 to 1980, he was Executive Vice President, International Communications and Technical Services, and, from 1977 to 1979, he held the position of President of the Comsat subsidiary Comsat General Corporation. Dr. McLucas was Administrator of the Federal Aviation Administration from 1975 to 1977. During the preceding two and one-half years, he served as Secretary of the Air Force, after serving four years as Under Secretary. Earlier he was President of Mitre Corporation and HRB Singer, and Assistant Secretary General of NATO. Dr. McLucas is President-elect and a fellow of the American Institute of Aeronautics and Astronautics.

Joel R. Alper, 45, new President of Comsat World Systems Division, served from 1981 to 1983 as Vice President, Communications Services, Comsat World Systems Division, where he was principally responsible for the management of **Comsat**'s participation in **Intelsat**. He then was promoted to the post of Executive Vice President of the division.

continued next page

Dr. John L. McLucas has been elected Executive Vice President and Chief Strategic Officer of Comsat. He was formerly President of the Comsat World Systems Division, a position now assumed by Joel R. Alper (photographs on pages 5 and 6).

N O T E S

Since 1981 Mr. Alper has served as the U.S. representative to the Board of Governors of **Intelsat**. He joined the Corporation in 1974 as Senior Advisor, Technical and Operational Planning, International Affairs Division. Prior to joining **Comsat**, Mr. Alper was with TRW Systems for 12 years, serving the last few years as European Regional Director, headquartered in Brussels. Earlier he was with the Jet Propulsion Laboratory at the California Institute of Technology.

Stephen M.D. Day, 38, joined Comsat General Corporation in 1982, where he has most recently served as Vice President, Administration. Prior to joining **Comsat General**, Mr. Day held a variety of positions with DuPont de Nemours and Company in Switzerland and the United States. Mr. Day is a native of England and has received degrees from the University of Leeds and the Georgia Institute of Technology.

Comsat people on the move

Robert W. Baumann has been elected Vice President, Human Resources and Organization Development, of **Comsat**. Prior to coming to **Comsat**, he served as Vice President, Human Resources, of Mead Corporation, headquartered in Dayton, Ohio.

Three Vice Presidential appointments have recently taken place among the headquarters staff of the Comsat World Systems Division:

Edward J. Martin has been named to the position of Vice President, International Operations. In his new capacity, Mr. Martin is responsible for the operation and planning of **Comsat**'s international satellite communications system and the direction of **Comsat**'s 17 earth stations which operate with the Intelsat system. Mr. Martin also assumes the role of U.S. Governor on the Intelsat Board of Governors.

David E. Gourley has been appointed to the newly created position of Vice President, Business Development, with responsibility for establishment of business plans, new communications services, and market development for **Comsat**'s international communication services.

George J. Tellmann assumes the position of Vice President, Maritime Services. In this capacity, he is responsible for the management of **Comsat**'s maritime satellite communications business and serves as the principal representative on the Inmarsat Council.

In addition, Stanley L. Shubilla has been appointed Vice President for Administration at Comsat Laboratories, a part of the Comsat World Systems Division. Mr. Shubilla is responsible for finance, administration, and procurement and contracting for the Laboratories.

John J. Imperial has been promoted to the post of Senior Vice President of Comsat TeleSystems, Inc. Previously, Mr. Imperial served as **TeleSystems**' Vice President of Engineering. In the new position, Mr. Imperial continues to have engineering responsibilities while taking on additional duties relating to the day-to-day operations of the company.

Two other Vice Presidential appointments were recently announced at **TeleSystems**. Robert F. Zenisek has been named Vice President, Manufacturing Operations. He was formerly Vice President, Operations, for the Lenkurt Division of GTE. Kenneth H. Hoch has been promoted to the post of Assistant Vice President, Contracts, **TeleSystems**.

At Satellite Television Corporation (**STC**), James J. Badaracco has been named Vice President, Field Operations. Mr. Badaracco will have overall responsibility for developing and implementing a comprehensive STC installation and service network. He comes to **STC** after 33 years of experience with RCA Service Co., which, from 1979, he served as President.

Also at **STC**, Jenny Johnson has been promoted to Assistant Vice President, Marketing.

At Amplica, Inc., Jerry Moore has been promoted to the post of Vice President, Sales and Marketing, Telecommunications Products Division (TPD).

At the newly formed Compact Software, Inc., James T. Lindauer has been named Vice President and General Manager.

continued page 37

Applic

In recent
been filed
tions Com
ing to est
tions sate
America a
organizati
genuously
ments of
as one of
national T
Organizat
impede a
Intelsat,
unequivoc
challengir
elements
created **I**
do to prof
Atlantic m
of the Inte
damage t
system.

That t
even cons
serious qu
Intelsat m
changes t
with respe
take this
why these
such con
cations fo
if such ap

Origins o
Intels
of the Un
Communi
The chief
enable int
U.S.-deve
technolog
global co
satellite s
system, C
ticular ca
satellite s

THE CASE FOR INTELSAT

Applications for competitive systems raise many concerns

by **Joel R. Alper**, *President, Comsat World Systems Division.*

In recent months two applications have been filed at the Federal Communications Commission by organizations seeking to establish international communications satellite systems between North America and Western Europe. These organizations have, somewhat disingenuously, claimed that existing commitments of the United States Government, as one of the 108 members of the International Telecommunications Satellite Organization (**Intelsat**), should not impede approval of their applications. **Intelsat**, however, has expressed the unequivocal view that these systems, challenging as they do certain basic elements of the Agreements which created **Intelsat**, and attempting as they do to profit from the lucrative North Atlantic market, which is the backbone of the Intelsat system, will inexorably damage those Agreements and that system.

That the U.S. Government would even consider such applications raises serious questions among the other Intelsat members about potential changes to the longstanding U.S. policy with respect to **Intelsat**. I would like to take this opportunity to briefly explain why these applications have caused such concern and what potential ramifications for the United States may result if such applications are granted.

Origins of Intelsat's Concerns

Intelsat was created at the initiation of the United States pursuant to the Communications Satellite Act of 1962. The chief objective of this Act was to enable international exploitation of U.S.-developed satellite communications technology through the creation of a global commercial communications satellite system. In developing this system, Congress instructed that particular care be directed to providing satellite services to economically less developed countries, using the electromagnetic frequency spectrum economically and efficiently, and reflecting the benefits of technology in both quality and cost of service. These governing principles were put forth in the Preamble to the Intelsat Agreement first signed by 79 nations in 1971 and since signed by 29 more nations as they have joined the organization.

Although the Intelsat Agreement does not prohibit the construction or use of non-Intelsat satellite facilities by its member nations, it does obligate members to coordinate with **Intelsat** by providing necessary information "to ensure technical compatibility of such facilities" with the Intelsat system and "to avoid significant economic harm" to **Intelsat**, which would result were Intelsat traffic and revenues diverted to such facilities. The United States, as a Party to the Agreement, is obligated to abide by its commitments to **Intelsat** and to date always has honored that obligation. Several U.S. domestic satellites recently were authorized to extend domestic services for limited transborder use in Canada and Bermuda, and these have been fully coordinated with **Intelsat**. The nature and scope of these services were determined by **Intelsat** not to constitute significant economic harm to the viability of the global system. Similarly, other Intelsat members have expanded domestic satellite systems to serve regional requirements, or have begun establishment of independent regional systems, but those too have all been coordinated with **Intelsat** and, after careful review, the nature and scope of their facilities and services were found not to cause significant economic harm to **Intelsat**.

The two systems for which applications have recently been filed, however, both propose to establish satellite facilities along **Intelsat**'s heaviest traffic route—that between North America and

Europe. Facilities of this nature will inexorably damage **Intelsat**'s economic viability.

It is important to keep in mind that the international telecommunications arena, unlike the domestic one, is not a wide open marketplace. By their very nature, international telecommunications facilities and services can only be implemented with the agreement of two or more nations. Numerous interests must be balanced in considering the implementation of such programs, not only the interests of U.S. ratepayers but also U.S. industrial and trade objectives, the objectives of the other countries involved and, perhaps most importantly, U.S. foreign policy objectives. While it is easy to understand the interest of entrepreneurs who see an opportunity to profit from the growing international telecommunications market between the United States and Europe, it must be recognized that this interest is not necessarily well-received abroad.

The depth and breadth of negative reaction to these separate system proposals was made clear immediately after the first one was filed with the FCC, when the annual Intelsat Meeting of Signatories in April 1983 unanimously

At break during Intelsat Board of Governors' meeting, Joel R. Alper, President, World Systems, and former U.S. Governor to Board, confers with Edward J. Martin, left, new U.S. Governor, and William R. Schnicke, right, Senior Director, International Systems Planning, World Systems.

adopted a resolution expressing grave concerns with the establishment of competitive satellite systems diverting international transoceanic or other heavy route traffic from the Intelsat system. This resolution endorsed concerns expressed by **Intelsat**'s Director General, Santiago Astrain, in an early-April letter to the U.S. Department of State, that such systems challenge the underlying purposes for which **Intelsat** was created, would have a fundamental impact on the viability of the Intelsat system, and would entail serious financial consequences for all Intelsat users.

Why Approval Would Harm U.S.

That the United States—the driving force behind the creation of **Intelsat** and its largest single owner—would violate its obligations under the Intelsat Agreement and in any way reduce its support of the global satellite system is most perplexing to our foreign counterparts.

The puzzlement is not limited to our foreign partners. It is difficult to understand why the U.S. Government would even consider actions that might damage an organization such as **Intelsat**, which the National Telecommunications and Information Administration (NTIA), in its March 1983 Report to Congress, stated, is "an unqualified, outstanding success on institutional, financial and operational grounds and must be considered a triumph of U.S. foreign policy."

Contemplation of such action is particularly disturbing in light of the recent election of the U.S. candidate, Richard Colino, to the position of Intelsat Director General. The election of a U.S. candidate to any position of leadership in an international forum, especially one in which over three-fourths of the participants are from the Third World, represents a significant achievement with clear foreign policy benefits. That the U.S. Government would consider actions that would seemingly undermine U.S. leadership in **Intelsat** at this time appears a glaring contradiction in policy.

It is important to keep in mind that, through its participation in **Intelsat**, the United States receives not only clear foreign policy benefits from its leadership position, but significant economic benefits as well. For example, of about $939 million spent or allocated for satellite construction since 1964, 83 percent (over $778 million) has gone to U.S. firms. In addition, over $700 million has gone to NASA for launch services.

Finally, the establishment of multiple international satellite systems would clearly exacerbate saturation of the limited geosynchronous orbital arc, directly contradicting the mandate in the Satellite Act for efficient use of the spectrum, as well as the position the United States has taken at numerous World Administrative and Regional Radio Conferences.

As the former U.S. Governor to **Intelsat**, I can only share the genuine concerns expressed by representatives

of the 107 other countries in **Intelsat**. Like them, I am concerned with the possibility that the United States Government might threaten the future viability of a successful international cooperative organization, which it created, and through which it receives tremendous gains—not only economic, but also in terms of efficient, high quality global satellite communications coverage, and foreign policy benefits.

Comsat is doing its very best to draw these issues with clarity for U.S. policymakers to permit them to understand the multifaceted benefits and political imperatives of continued support for a viable international satellite communications system. We hope and expect that ultimately our commitment as a nation to this outstandingly successful U.S. foreign policy initiative will be reaffirmed.

U.S. FOREIGN POLICY & INTELSAT

by *Wreatham E. Gathright**

Two-thirds of the world's transoceanic electronic communications—voice, message data, television—are carried by the global satellite network owned and operated by the International Telecommunications Satellite Organization (**Intelsat**). The network serves the organization's 108 member countries and is also used, on a non-discriminatory basis, by nearly all other countries in the world.

Like the satellite technology that has made the network possible, the goals underlying the organization were developed in the United States. Less than five years after Sputnik, the Communications Satellite Act of 1962 established the policy of seeking to create "in conjunction and cooperation with other countries...a commercial communications satellite system, as part of an improved global communications network." The Act laid the basis for incorporating a private sector entity, the Communications Satellite Corporation (**Comsat**), as the U.S. partner in this global effort. An international consortium, consisting initially of major industrialized countries, was formed in 1964. Developing countries were invited to participate in the venture, and they did so in increasing numbers.

The consortium's first satellite was placed in orbit in 1965, and the space segment, providing global coverage, was completed in 1969. This event was as dramatic in the field of space research and communications as was the manned lunar landing of the same year in the field of exploration. Indeed, the availability of the satellite network made it possible for millions of television viewers to participate in the triumph of Apollo 11. Since then, **Intelsat**'s technical capabilities have been steadily improved; traffic over the network has multiplied; charges have decreased; profits have been earned.

In 1979, the National Research Council, an arm of the National Academy of Sciences, issued the first of a series of five-year outlook reports requested by the Congress on scientific and technical advances. In considering the outlook in space and assessing various types of institutional arrangements, the report described **Intelsat** as the "successful" model of an "independent international corporation responsible for developing and managing a single global satellite system."

continued next page

*Wreatham E. Gathright presently serves as a consultant on matters pertaining to foreign affairs and other subjects. From 1959 until his retirement in 1981 he was a staff member of the Department of State and from 1963 until 1981 was a member of the State Department's Policy Planning Staff.

A recent report prepared by the National Telecommunications and Information Administration of the Department of Commerce at the request of the Congress offers the following view: "The global system envisioned by the 1962 Act has become an unqualified success on institutional, financial, and operational grounds, and must be considered a triumph of U.S. foreign policy." These judgments are widely shared. At the same time, perhaps in part because **Intelsat** has proved successful, there is a tendency to take for granted an organization that has made possible the most extensive international communications system in the history of the world.

Certain considerations which shaped the decision of the early 1960s to establish the global network remain significant today. But major changes have occurred, and a new revolution in communications and information is under way. What is the importance of **Intelsat** from the standpoint of U.S. foreign policy today?

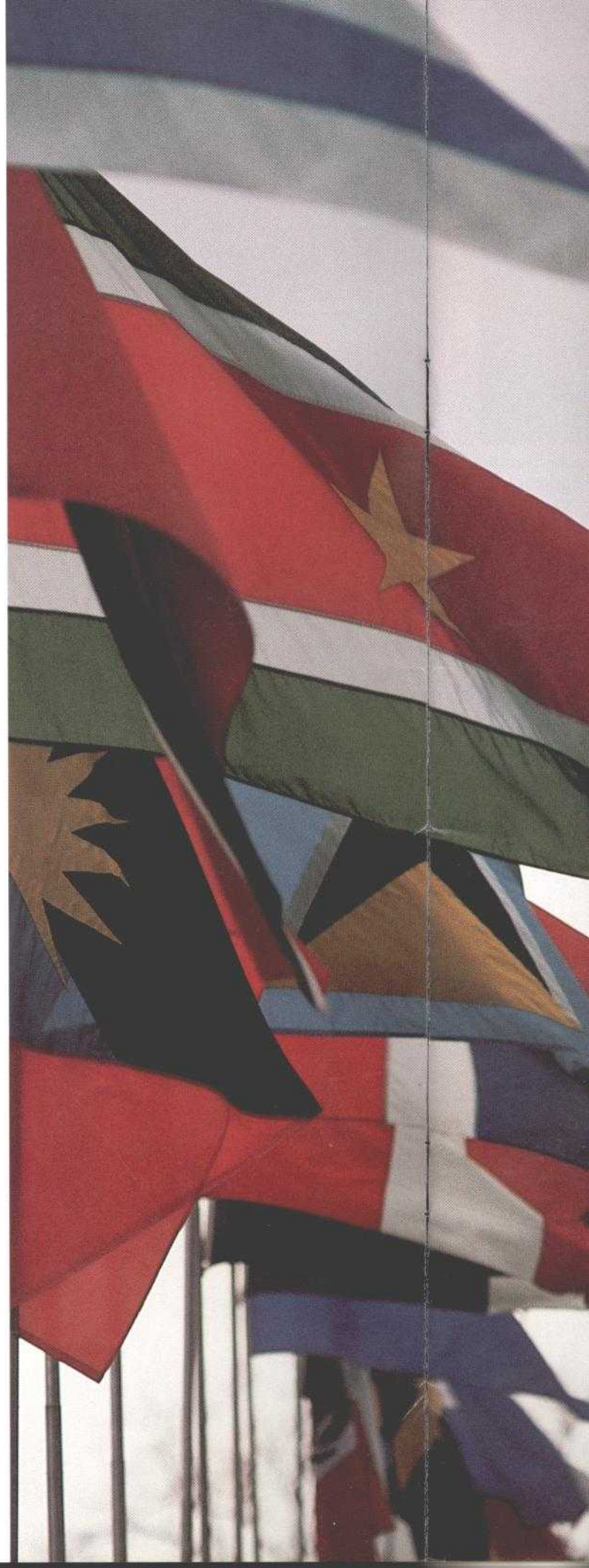
The following foreign policy concerns provide a framework for considering the continuing U.S. foreign policy interest in **Intelsat**:

United States - Soviet Relations. If the Soviet Union managed to jolt the world with Sputnik, the United States took and has retained the lead in communications satellites. The Soviet Union rejected the opportunity to participate in **Intelsat** and chose to sponsor what was intended to be a rival organization, Intersputnik. Today, the Intersputnik network is used by few countries other than those having direct political ties to the Soviet Union.

There is no reason to suppose that the Soviet Union has abandoned the goal of competing in this field. On the contrary, plans have been announced for substantially upgrading Intersputnik's technical capabilities. Whether these plans will in fact materialize is uncertain. Whether even an improved Intersputnik would become a serious competitor of **Intelsat** is questionable.

However, communications and the flow of information are even more significant factors in international relations now than 25 years ago. The continuing success of **Intelsat** is essential in providing a barrier against a further Soviet effort to alter the structure of world communications.

Relations Among Industrialized Democracies. The initial partners of the United States in the steps leading to **Intelsat** included the countries of



Western Europe, Canada, Australia, and Japan. During the 1960s, the Europeans were concerned about what was perceived as a "technology gap" favoring the United States. Some viewed the U.S. proposal for a consortium as an effort to dominate the newly emerging technology of satellite communications. Some feared loss of their own dominance over previously existing international communications networks. Cooperation in **Intelsat** was achieved, but only after hard bargaining.

The initial partners continue to be among the principal holders of investment shares in **Intelsat**. The earth stations serving their needs are among the busiest in the global system. Differences have continued to arise from time to time. Nonetheless, cooperation in **Intelsat** has proved one of the most durable as well as most ambitious joint ventures linking the industrialized democracies.

The United States and the Developing World. From the outset, the United States intended that the global network should serve the needs of developing as well as industrialized countries, and most developing countries have indeed joined the organization. In addition to using the network for international communications, some developing countries (and a few industrialized countries) rely on **Intelsat** to meet important domestic communications needs.

Intelsat was organized before the prolonged North-South economic debate which emerged during the 1970s. An important aspect of this debate involves what Third World countries regard as imbalances between North and South in communications capabilities of all types. The imbalances of concern include the heavy use by industrialized countries of the radio frequency spectrum and orbital positions.

The Board of Governors of Intelsat, including assistants to the Governors, photographed in the Intelsat Operations Center in September.

continued next page

Intelsat is itself a heavy user of these resources, but the global network represents a shared use. Moreover, the efficiency of satellites has been improved over the years through technological advances and new techniques.

To the extent that **Intelsat** can contribute to meeting the varied needs now foreseen for communications satellites, the scope and intensity of the debate concerning use of the spectrum and orbital positions should be more readily contained. Moreover, the global network strengthens the relations of the United States and the developing world in another way as well: It represents a concrete and exceedingly significant expression of the willingness of the United States to work with the developing countries in finding mutually satisfactory ways of advancing common interests.

The International Flow of Information and Ideas. Throughout the period following the Second World War, the United States has strongly supported the principle of the free international flow of information and ideas as a matter of fundamental importance in encouraging the growth of understanding among the world's diverse countries and peoples. The principle is reflected in the Universal Declaration of Human Rights, which was adopted by the UN General Assembly in 1948, but it has never been accepted by the Soviet Union. Over the last decade, the "free flow" principle has also been questioned by many developing countries, which have voiced concern about supposed effects of the flow of information and ideas on their political, economic, and social systems.

Despite the uneasiness many developing countries feel about the apparent coincidence of interest between the Soviet Union and the Third World in opposing the "free flow" principle, efforts have been made to impose a variety of restrictions on the flow of information, including, for example, the reporting of news. The United States has consistently opposed such efforts and will continue to do so.

Intelsat cannot, of course, preclude the imposition of restrictions by countries originating or receiving transmissions through the global network. However, the network is in fact facilitating a vast expansion of the flow of information and ideas through much of the world. Even international broadcasting of television

Former Director General of Intelsat Santiago Astrain photographed in his office at Intelsat headquarters in Washington, D.C.

has been increasing considerably. Over time, it is possible that additional experience with international information flows will encourage broader acceptance of the flow of information and ideas in practice, if not necessarily in principle. The need to establish a working consensus in favor of "free flow" is becoming even more important as the transition to the "information age" proceeds, and because **Intelsat** is used by countries in all regions of the world, it can contribute to forging such a consensus.

The Need To Stimulate Continuing Technological Advance. In contrast to the period before Sputnik, there is today widespread recognition of the need to maintain a strong position in various fields of advanced technology. Communications satellites form a limited but highly significant area in which technological change continues to occur at a rapid pace. Each generation of satellites composing the space segment of the global system has been increasingly more sophisticated than the generation it supersedes. Procurement is conducted on a competitive basis with the objective of obtaining the highest quality satellites at the lowest cost. To date, the U.S. aerospace and communications industry has won the contracts for all of **Intelsat**'s satellites.

Planning is now under way in **Intelsat** to define the characteristics of satellites that will be needed in the 1990s, and studies have been initiated looking toward the end of the century. The requirements resulting from these planning efforts will provide a further challenge to U.S. industry as well as to possible future competitors abroad.

Intelsat is not directly involved in all of the areas of rapid technological change which are providing the basis for the information age. However, by making

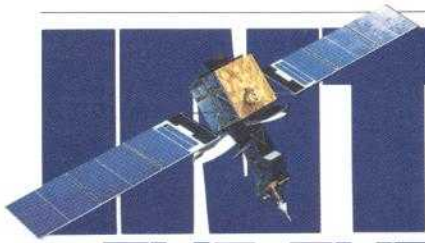
available links needed for international telecommunications of all types, the Intelsat network is helping spur the growth of various sectors of the economy which depend on reliable and efficient transmission of data and information to and from other countries.

The questions and issues which are emerging internationally as the information age proceeds will not be resolved on the basis of technological strength alone. However, technological strength can provide a firm foundation for pursuing those foreign policy actions that will be needed to ensure that the benefits of the information age can be achieved by the United States and other countries as well.

Two qualitative considerations cut across the foregoing ways in which U.S. foreign policy interests continue to be served by **Intelsat**.

Particularly in matters affected by technological change, U.S. foreign policy has frequently been viewed as "reactive." The creation of **Intelsat** represented an active effort to shape the growth of an emerging technology in a manner best serving U.S. interests. This effort has been successful. If the United States has gained from the advantages afforded by the early, favorable "technological balance of power" in communications satellites, it has also gained from the manner in which its technological leadership has been exercised internationally.

There has also been a widespread view that, at least in some respects, U.S. foreign policy proceeds in fits and starts, that it is all too frequently an on-again, off-again proposition. The U.S. commitment to **Intelsat** provides significant confirmation that the United States can in fact be a reliable partner in a major international undertaking. The value of this demonstration of reliability reaches well beyond **Intelsat** itself.



INTELSAT
THE FUTURE COURSE

by **Edward J. Martin**,
Vice President, International Operations,
Comsat World Systems Division

*Edward J. Martin, who has been with **Comsat** since 1964, has recently been appointed Vice President, International Operations, of Comsat World Systems. In this capacity Mr. Martin has assumed from Joel R. Alper the role of U.S. Governor on the Intelsat Board of Governors. Just prior to assuming his new post, Mr. Martin was U.S. Representative on the Council of the International Maritime Satellite Organization (**Inmarsat**) and, from 1982-83, was Chairman of the Council. We asked Mr. Martin, with his fresh perspective, to share his views of the issues which he, **Comsat** and **Intelsat** will be facing in the coming months.*

My early involvement with **Intelsat**'s development largely involved the less conventional service possibilities such as mobile satellite communications. Now after many years developing these ideas outside of **Intelsat**, it is especially clear on reentering the Intelsat arena that **Intelsat** not only has changed dramatically, but is now entering a new, exciting era.

Intelsat now provides numerous services to some 170 countries and territories, most of which maintain highly sophisticated telecommunications networks. The availability of the Intelsat "window-to-the-world" has contributed to the improvement in national telecommunications infrastructures, an often overlooked benefit of **Intelsat**'s success.

The challenge of meeting the growing demand for ever more sophisticated services in an increasingly competitive international environment presents a number of issues which **Intelsat** must address in the near future.

First, there are the new services which **Intelsat** has recently implemented or will soon introduce: full-time international television leases, maritime communications services leased to **Inmarsat**, International Business Services (IBS), low-density telephony for remote community users, and planned domestic lease services (an outgrowth of the almost decade-old and highly

successful preemptible domestic lease service).

In order to meet the demand for these as well as the standard services, **Intelsat** has already procured spacecraft to be launched through 1988, but detailed planning continues on the specific use of these and later spacecraft. This planning represents a second challenge, since **Intelsat**, as the provider of a single multipurpose satellite system, has a clear mandate not only to satisfy the requirements of its users but also to do so while maximizing the efficiency in use of radio frequency resources available for global communications. In order to ensure that it continues to meet this challenge, **Intelsat** is now beginning a transition to the use of new transmission techniques such as Time-Division Multiple-Access, digital speech interpolation (TDMA/DSI)—a highly efficient mode of digital communications transmission. These digital techniques will also make possible on-board satellite switching, facilitating connectivity among users. New international business services, such as high-speed facsimile, electronic mail and, ultimately, videoconferencing will be major beneficiaries of these developments.

Accompanying these developments are related operational issues which **Intelsat** must resolve; for example, provision of the international business services will involve utilization of new frequency bands. Specifications for new earth terminals, including customer-premise antennas as small as 3.5 meters in diameter, have already been provisionally approved for Ku-Band access; by the end of the year, it is expected that performance characteristics for small C-Band antennas may also be approved.

Having undertaken the necessary capital investments to ensure that needed facilities and equipment are available to implement these new services and techniques, **Intelsat** must, of course, ensure their cost-effective operation, and this raises a third significant issue. In particular, after 11 years of annual reductions in **Intelsat**'s charges for standard services, **Intelsat** has found it necessary in the face of inflation and increasingly large capital requirements to maintain its charges for standard services at their 1981 levels. In an effort to ensure that charges for new services are soundly based, **Intelsat** has recently initiated an overall review of its charging policy. In particular, consideration is being given to encouraging the use of the new, more efficient modulation and access techniques which are becoming available and which, while they might require more complex earth station equipment, use satellite capacity more effectively, thus enabling **Intelsat** to consider meeting service demands with reduced growth in the cost of space segment resources.

In addition to these broad issues, there are a number of specific problems requiring decisions in the next few months, including possible plans for **Intelsat** to provide second generation space segment capacity to **Inmarsat**; the development of terms and conditions for the low-density telephony service and for planned domestic lease services; and the selection of launch vehicles for the third, fourth, and fifth Intelsat VI spacecraft. At the end of 1983, **Intelsat**, for the first time, changed its leadership, with the retirement of Santiago Astrain as Director General, and assumption of that office by Richard Colino. Some six months later, **Intelsat** will move into its own headquarters building in northwest Washington, D.C.

The year 1984 will thus be an eventful and challenging one, as **Intelsat** itself changes and faces a new, still evolving environment. The primary challenge, however, remains to ensure continued fulfillment of **Intelsat**'s purpose and prime objective: the non-discriminatory provision of low cost, high quality telecommunicationss services to all areas of the world.

Edward J. Martin, right, U.S. Governor to the Intelsat Board of Governors, and Vice President, International Operations, Comsat World Systems Division, with David M. Leive, left, Intelsat Legal Adviser.

FOCUS

RICHARD COLINO

New Director General talks about the foundations of Intelsat, the future of the organization, proposals for competitive systems, fiber optic cable, and many other subjects.

On June 17, in a unanimous decision, the Intelsat Board of Governors chose Richard Colino, the nominee of the United States, to be the next Director General of Intelsat, a selection confirmed by the Assembly of Parties on October 4. Last September, Stephen A. Saft, Editor of ***Comsat Magazine****, had an opportunity to conduct a lengthy tape-recorded interview with the new Director General, an abridged version of which follows.*

Mr. Colino's involvement with ***Intelsat*** *predates the founding of the organization by two years. As a young lawyer on the staff of the U.S. Federal Communications Commission, he was a member of one of the U.S. Government teams charged with the responsibility of coming up with a formula by which a global communications system based on satellites could be brought into being and managed. Out of that team effort, the concept for* ***Intelsat*** *was born.*

Mr. Colino was Chairman of the Working Committee which concluded the negotiation of the predecessor of the Intelsat Operating Agreement in June 1964, the Special Agreement. Then, after a brief stint with the U.S. Information Agency, he joined ***Comsat*** *in 1965 as Assistant to the Vice President, International, John A. Johnson. During a 15-year career with* ***Comsat****, Mr. Colino served as alternate U.S. representative to the Intelsat Interim Communications Satellite Committee, which preceded the Board of Governors, and in 1973 became the U.S. Governor to the Board.*

At the time of his resignation from ***Comsat*** *in 1979, he was still U.S. Governor to the Intelsat Board and held the position of Vice President and General Manager, International Operations, for* ***Comsat****. For the past four years, Mr. Colino has served as the chief executive in the establishment and operation of subscription television businesses, as the president of a private consulting firm specializing in telecommunications and broadcasting, and as a practicing communications attorney.*

Q: I am sure our readers would like to know something about you. Who is Richard Colino?

COLINO: I was born in New York City in 1936 and was educated in the early years in the city. I went to Brooklyn Technical High School where I had what people think of today as electrical engineering training—five years of calculus, sciences, labs, shops, mechanical drawing—and set off on a path of becoming an engineer. I went to Amherst on a program with MIT that was supposed to mean two years at Amherst and three years at MIT to get both BA and BS degrees, but I never left Amherst. I went into liberal arts and after that went to the School of Law at Columbia University and obtained a Juris Doctor degree. While I was at Columbia I took a lot of

INTELSAT

courses in the business school and always focused on international matters—international trade, international monetary problems, international organizations. I just had an interest in international matters, and that's obviously not changed with the ensuing passage of time.

Q: And when you became a lawyer, did you go into government service right away?

COLINO: No, I was with a law firm in New York City that specialized in what is now called Entertainment Law—motion pictures, books, and the like. We were engaged primarily in antitrust, copyright and contract matters. I had fulfilled my military service obligation, but was recalled to active duty in telecommunications operations in 1961. During my recall, I decided to get into international work.

I joined the staff of the Federal Communications Commission and worked on various regulatory and international matters just prior to the passage of the Communications Satellite Act of 1962. That in turn logically led to the U.S. Government's taking the lead because so much of the world was very curious as to what was meant by satellite communications and how the United States intended to share its benefits with them. Teams from various government agencies were created to come up with different methods for structuring a global satellite system, and I was fortunate enough to be involved in that effort.

What we did was to take a look at submarine cable agreements, which were new then. People don't remember that 1956 was the start of the first transatlantic submarine cable for telephone traffic. And we looked at private/public enterprises in different countries and multilateral and bilateral treaties and conventions. Multinational joint ventures already were known in Europe. We learned a lot and then decided that to get this global system started, the best bet would be to create an interim regime for a flexible cooperative.

Comsat came on the scene as the Government had started discussions with other countries. In 1964 a pretty full partnership developed between **Comsat** and the U.S. Government, a partnership whose first task was explaining the benefits of participation in the system to whoever would listen. The effort resulted in creating what is now known as **Intelsat** on August 20, 1964.

Q: Would you say that becoming Director General of Intelsat is the answer to an international lawyer's dream? Would that be a fair way to describe it?

COLINO: I probably would have thought so 20 odd years ago. I don't think in those terms any more. This is the kind of opportunity and challenge that a person who thinks he is a good executive has to welcome. It is made even more meaningful because **Intelsat** is an international organization paralleled by none in terms of the successful bringing together of so many from such diverse backgrounds, economic systems, sociopolitical systems and so many countries—108 members now. The international element is, of course, a source of philosophical and psychic income because you realize that you are helping to make a contribution that impacts on many, many people around the world. What is a little sobering is the fact that the job carries with it a sense of responsibility to the totality of the users of the system, now some 170 countries and other jurisdictions and the 108 countries which participate through investment and ownership.

Q: I know you began to address this before, but how would you describe Intelsat to someone who had only the barest knowledge of the satellite communications business?

COLINO: **Intelsat** is a reflection of a very wise series of decisions by nations and their telecommunications entities to try to obtain efficiencies and economies while bringing tangible specific benefits to the people of the world through the application of space technology—in other words, to find a way effectively and efficiently to guarantee that people may have telecommunications interconnectivity and instant access to one another by means of telephone, telex, facsimile, high-speed data or television.

It is a very unusual international model. It is not a big multinational company that is trying to make major profits. It is nonprofit. It is not typically intergovernmental, although created by intergovernmental agreements, because it has a very practical operational objective in mind. It is clearly not comparable to other organizations except those that have emulated **Intelsat** in their structure or format subsequent to the creation of **Intelsat**. What it is is a unique model of international, economic and technological cooperation for the specific purpose of bringing telecommunications capabilities and benefits to people all over the world.

Q: In 1984, Intelsat will be 20 years old. In evaluating those 20 years, I think you would term Intelsat a brilliant success. Have there been any disappointments for someone like yourself who has been so involved with the concept from the very beginning?

COLINO: The only disappointment that I would underscore as a major one is the absence of appreciation in many quarters of just what has been accomplished. **Intelsat** put up the first commercial satellites. People forget that. I'm not trying to get anybody bogged down in historical sentimentality. I think that the Intelsat system as it has grown from 1965 to today has cut its charges 12 times or more to the users that have access to it directly. At the same time, it has increased channel capacity in satellites by factors that I can't even begin to multiply right now and has done that smoothly without breaking continuity of service, all the time enhancing interconnectivity. Yet, these achievements don't seem to be registering with a lot of people. That's a disappointment.

If you look at the objectives set out for **Intelsat** in the preamble of the Interim Agreement and you measure the organization against those standards, you would have to call the organization an overwhelming success.

Another of the disappointments I have is what has been called "an absence of nobility." In creating **Intelsat** in 1964, there was an acceptance and a commitment, reaffirmed again under the Definitive Agreements, on the part of a lot of countries to something fairly laudatory, which is that, as in all the successful examples of international cooperation, you sacrifice a little bit of your own narrow self-interest for a larger perceived commonweal or mutuality of interest.

What I see now is a kind of "greed factor." No one is out to hurt **Intelsat**, as best I can tell. There are many, however, who seem to be interested in seeing what they can get for themselves. You can't blame people who want to put up a satellite system and make money. I respect entrepreneurialism. You can't blame countries that say, "We want to prove out our own technology, so we are putting up our own system." That's understandable. You can't blame manufacturers for wanting to sell equipment. You can't blame people who put a system up that initially has too much capacity for wanting to try to use that capacity. But what you can do is hold 108 governments responsible for the consequence of any action and say, "You're supposed to meet a high standard—a standard that officials in your government signed their names to in the Agreements—to try to keep this cooperative venture not only healthy, but thriving and growing for the greater good."

To the extent I sense in the 20 years a little less nobility and a little more parochial interest, that's disappointing. On the other hand, the world has changed in 20 years, and perhaps the Intelsat story hasn't been told as extensively as one might tell it to have people appreciate it. I think that the 20th Anniversary should provide a very good opportunity for people to reaffirm that sense of commitment to a very successful organization with some very lofty purposes.

In the preamble of the Agreements, we are told that **Intelsat** is supposed to make a contribution to world peace and understanding. That's a noble thought, and yet the facts are that **Intelsat** has contributed to world peace and understanding. When a billion plus people see the first step on the moon, when

Richard Colino, long-time Comsat staff member, now Director General of Intelsat, first became involved with the development of the Intelsat concept in 1962.

it becomes standard practice to say that something like a billion people may see the 1984 Olympics, when people can pick up a telephone, send a telex message, or transmit data to virtually any point in the world, that certainly speaks well of **Intelsat**'s ability to provide the facilities and make possible the services that contribute significantly to world peace and understanding.

Q: Will we see changes in Intelsat under your direction that you would be willing to speak of at this early date?
COLINO: It would be foolish to get down to specifics, but I'm perfectly prepared to talk about a few generalities. The international telecommunications environment has been changing rapidly. Consumerism is awake and moves. People all over the world have seen the convergence of information, data processing, and telecommunications and have access to communications equipment and facilities. What that says is that anybody associated with telecommunications must anticipate that consumers are going to demand better, more diversified services at very attractive prices. Secondly, we're seeing the beginning of a move to digital telecommunications, and we're going to see more and more digitalization around the world, particularly as development of international switched digital networks proceeds.

As Director General, I will be building upon some pretty extraordinary successes that have come about under the first and only Director General, Santiago Astrain. Following the period under the Interim Agreements, Mr. Astrain led this organization through a highly transitional time, from a loose consortium in which one of the investors also managed everything to building a staff and to managing a large number of satellites that are far more sophisticated than years ago.

I'm entering office at a time when we are getting more demand from users for greater efficiencies, newer services, and diversification, and they are very cost conscious. What that says is that **Intelsat** has to focus on how to increase its productivity in its use of resources. When I say "productivity," I mean the following: How do we get more channels out of the same satellite? How do we get greater effort out of the same staff? How do we stretch the lifetime of satellites, if at all possible? How do we maximize the productive use of all the resources that this organization has—physical, financial, human? Those are the sorts of challenges that I'm going to have to address.

Q: I would appreciate any comments you would care to make about the two proposals for systems competitive with Intelsat that are now being sought by some U.S. interests.
COLINO: In part I've answered you already. I can't get terribly frenetic about people coming along and saying, "I see a good thing, a chance to make some money." People who propose to put up satellite systems that are redundant to **Intelsat** because they see an opportunity to get some traffic and make a good deal of money are easy to understand. Users who might be interested in using that system because they believe that the existing Intelsat system or the entities that they go through to access the Intelsat system don't have sufficient flexibility and economic attractiveness to meet their needs can understandably be drawn to another system.

What I think is important is that **Intelsat** focus on the positive things it can do and does do. The misapprehensions of **Intelsat** contribute to this problem. For example, one might get the impression that **Intelsat** cannot provide service from the western portion of the United States to Europe, but there is a satellite at 307° that can do precisely that. One might get the impression that **Intelsat** does not offer digital services, but it does. One might have the impression that **Intelsat** does not or will not permit customer-premised earth stations for business services. Yet it spent a fortune of money to modify satellites to do exactly that and will commence such services in the very near future. One might get the impression that **Intelsat** is indifferent to the needs of the United Nations. Yet **Intelsat** has been talking to the United Nations a long time, and decisions are imminent.

What I'm saying is that people with narrow interests can be understood in terms of the personal gain they seek. What **Intelsat** must do is to be positive, offer its services, anticipate requirements, be quickly responsive and let its member governments know and its Signatories know that they have to be productive, that they have to be innovative, that they have to give economically attractive breaks to users, that they have to be sympathetic to user requirements, and that they also have to be very serious about the rights and obligations that they undertook when they created this organization.

Q: I wonder if you care to comment on some other challenges ahead, optical fiber transoceanic cable, for example. Does this represent a threat to Intelsat of any proportion?

COLINO: Fiber optics represents a major and important technological development in the field of telecommunications, and in that sense it can only be good for the telecommunications users and operators around the world. It would be sad if somebody involved in satellite technology would take the attitude that a development in another technology that is also intended to serve people is a bad thing that should be retarded or ignored or held back. What I see optical fiber technology doing is providing broad channel capacity in submarine cables, which heretofore cables have not had. It is complementary to the services that **Intelsat** is offering.

Q: Two-degree orbital spacing?

COLINO: I don't think that two-degree orbital spacing along the lines decided by the U.S. Federal Communications Commission is a concept which is going to be extended internationally. Internationally, an equally efficient use of the resource is to combine your needs into the Intelsat system which serves the globe and to make sure that there are adequate frequency spectrum allocations for Intelsat users internationally and spacing for its global system of satellites.

Q: Would you want to say anything about the whole process by which you came to be selected by the Board of Governors as Director General? Was the selection process basically benign and friendly?

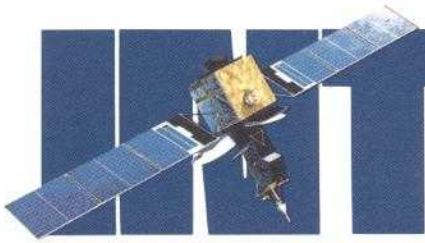
COLINO: It was certainly a unique experience for me, and I'll wager that the other candidates found it something that exceeded their expectations. It exceeded mine. There were four qualified candidates in addition to myself whom I consider friends of mine to this day. We were friends before, and we will remain friends after. I have the highest respect for all of them. These are all qualified and experienced telecommunications people. They conducted themselves in a manner in which I also tried to conduct myself, which was to talk about issues, ideas, approaches to running an organization, and so on. What I think surprised all of us is that some people demonstrated a vigor in terms of international travel that required others to match. I don't consider myself the initiating party in this regard, but I certainly joined in with the same kind of gusto.

I would add the following: That for an international organization, **Intelsat** demonstrated in the selection process of Director General once again how unique it is. Of course, a political aspect, such as the nationality of a candidate, may have entered into the minds of some decisionmakers, but I think basically the examination of the various candidates proceeded on the basis of their qualifications, their experience, their knowledge of **Intelsat**. That is a commentary on **Intelsat**'s ability to be a model of international cooperation. It is also a comment in favor of the other candidates and the way they approached this matter.

I am very grateful for what I think is the confidence that the Board of Governors has shown in selecting me as **Intelsat**'s chief executive, and I am looking forward to working in close harmony with the Board.

Q: Finally, Mr. Colino, should we attach any special significance whatsoever or read anything into the fact that a U.S. citizen has risen to the Director Generalship of Intelsat?

COLINO: No. It should, however, be a good feeling for people in the United States Government and in the U.S. Signatory that as we approach the 20th year of this organization's existence—an organization which was founded at the initiative of the United States as a result of the decision of its government to share satellite technology with other countries—that someone who is an American has been selected from among five highly competent people to succeed a very competent Director General, Santiago Astrain.



INTELSAT IN FRENCH GUIANA

The Guiana Space Center proves up to the task of launching an Intelsat V. Now the facility at Kourou may well become as familiar to satellite owners as is the NASA center in Cape Canaveral.

by **Stephen A. Saft**, Editor, Comsat Magazine.
Photography by **William J. Megna**, Chief Photographer.

Since April 6, 1965, when Early Bird went up, a total of 28 satellites have been successfully launched on behalf of the International Telecommunications Satellite Organization (**Intelsat**). The first 27 of those satellites were launched from the National Aeronautics and Space Administration (NASA) facilities at Cape Canaveral, Florida, using rockets built in the United States. On the evening of October 18, the launch pads at Cape Canaveral were quiet, but the 28th Intelsat satellite—and the seventh in the Intelsat V series—successfully reached space nonetheless. The launch vehicle on this occasion was a three-stage rocket built under the direction of a French organization called CNES (Centre National d'Etudes Spatiales) for ESA (the European Space Agency) and designated Ariane I. Location of the launch was the Guiana Space Center in Kourou, French Guiana, operated by CNES with support from the 10-member-country ESA organization.

The launch of the Intelsat V, Flight Model 7, from Kourou, some 2,000 miles southeast of Cape Canaveral on the northern coast of the South American continent, is clearly an historically significant event for **Intelsat**. It is equally significant for those Western European nations who for two decades have sought some kind of parity in space exploitation with the United States and the Soviet Union.

For the worldwide commercial satellite industry, there is abundant meaning as well. Shopping for launch services is no longer a one-stop affair. NASA no longer operates the only proven satellite launching shop in the world available to serve them.

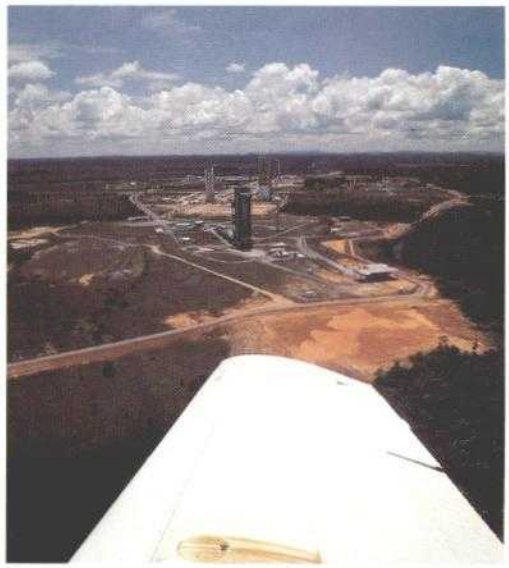
The launch, it must be quickly pointed out, was not the first successful use of the Ariane system. Beginning with Launch L01 in December 1979, six previous Ariane launch vehicles left the Guiana Space Center. Of these, four have been successful, including the launch of the Marecs A satellite for use by **Inmarsat** in December 1981. However, Launch 7 will go down in the record books as the first fully commercial use of the system and its first use by a non-European paying customer. Especially noteworthy is the fact that the customer in this case—**Intelsat**—is the world's largest commercial user of launch services.

On assignment to photograph launch operations for Ariane Launch 7, William J. Megna, Chief Photographer for **Comsat Magazine**, traveled to a part of the world that has been called a land of two oceans—the Atlantic Ocean, which forms its northern border and along which is its only area of development, and the "second ocean," the impenetrable tropical rain forests, the ocean of trees, that are nine-tenths of

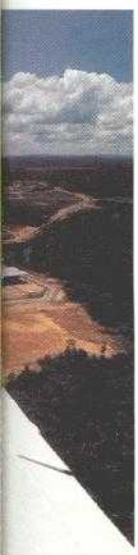
A NEW ERA HAS BEGUN

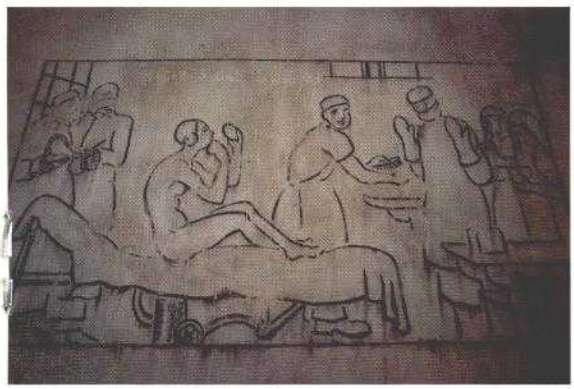
the place. The narrow coastal strip is just 300 miles from the Equator and within 500 miles of the huge Amazon River.

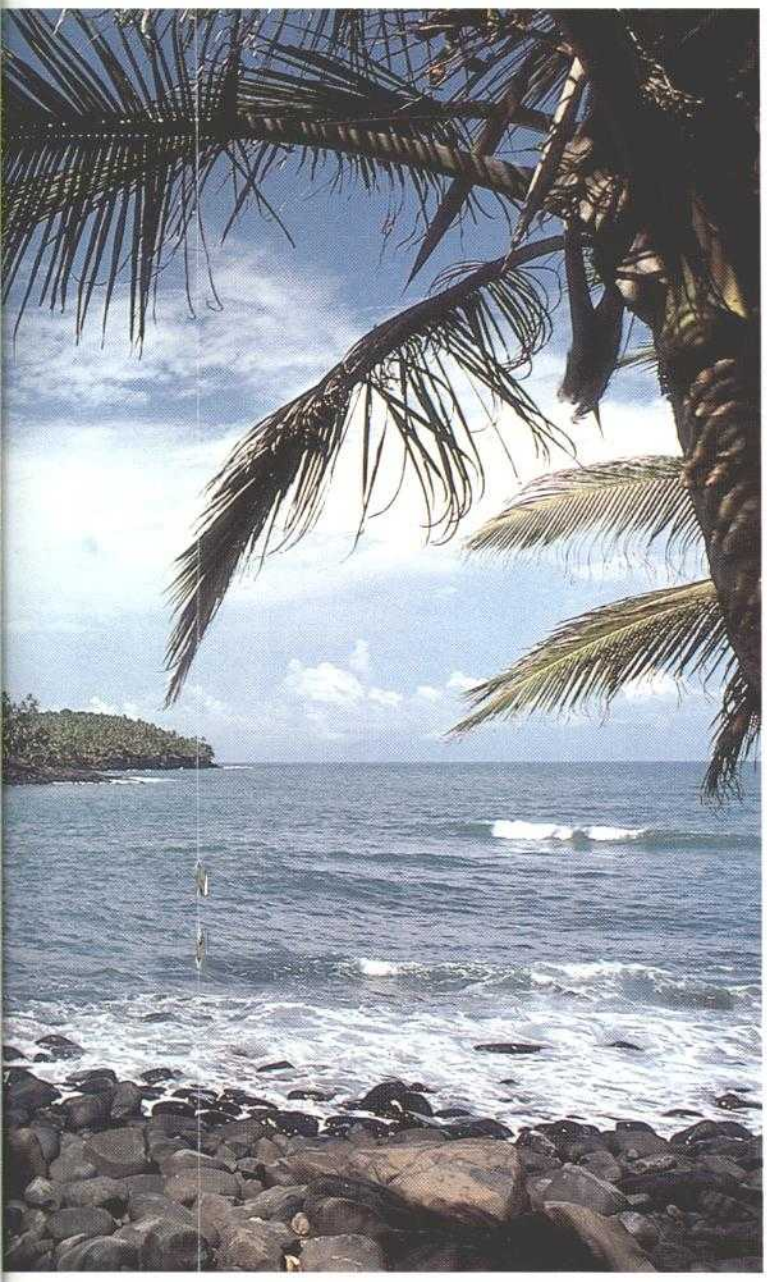
Until development of the Guiana Space Center at Kourou in 1966, French Guiana, which is a full-fledged Department of France, was known in the outside world for one and only one reason—the presence of the infamous Devil's Island prison. The Devil's Island prison was officially closed before World War II, but tales about the fascinatingly sinister place will continue to be told for decades to come, perhaps forever.



Top. *Aerial view of the launch area portion of Guiana Space Center.* ***Bottom.*** *View of Devil's Island from Royal Island. Two islands plus third in Salvation Islands group all housed prisoners until just before World War II, and three together were what the public thought of as infamous Devil's Island prison.*







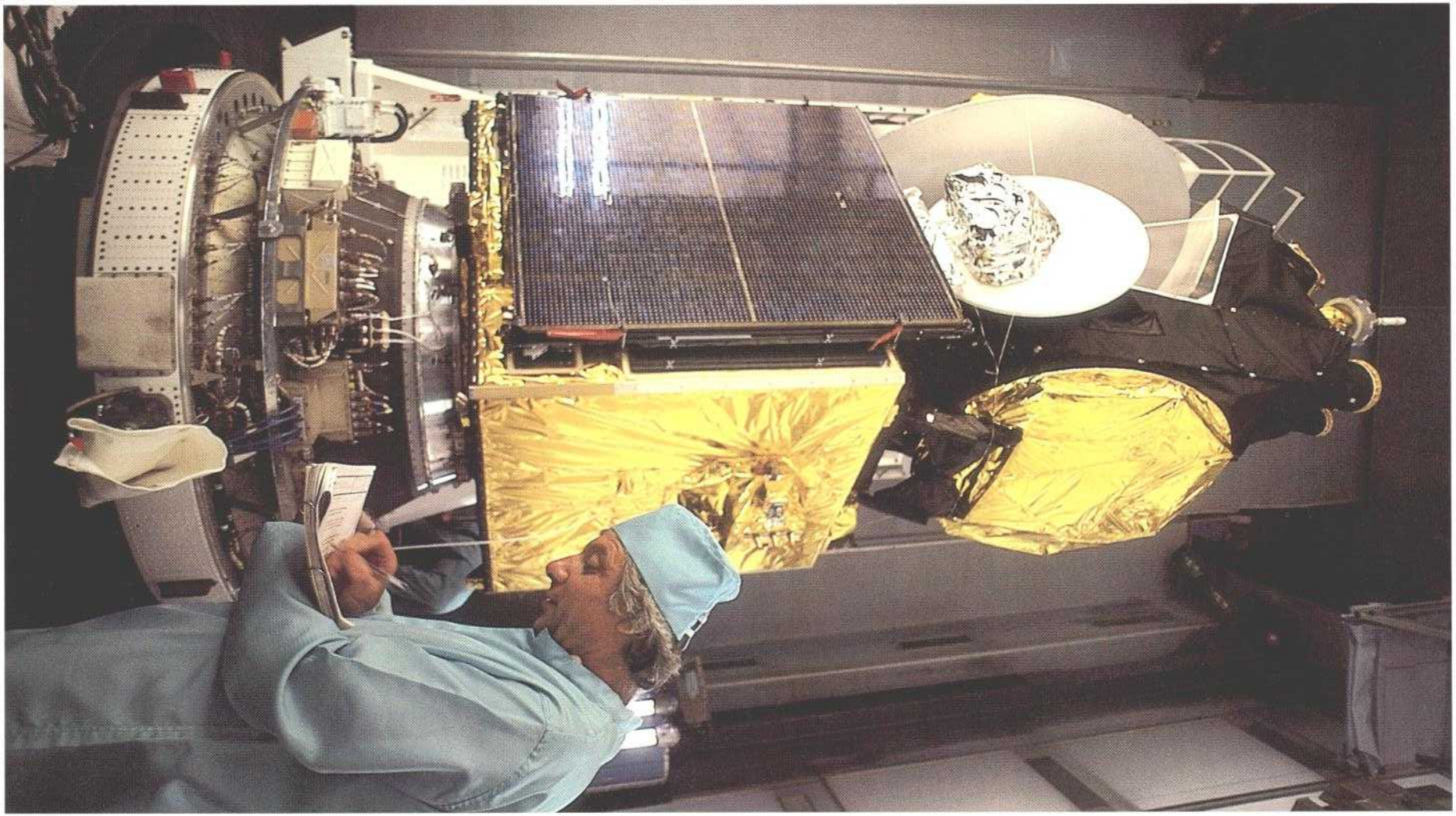
William Megna paid a visit to Devil's Island, actually one of the three islands called the Salvation Islands group about 10 miles north of Kourou, in an 8-foot rubber Zodiac boat. Mostly, however, he spent his time at the Space Center photographing launch and satellite preparations and speaking to officials there.

One of the people interviewed was Marius Le Fevre, Director of the center and an employee of CNES. "I think we have two advantages here," Le Fevre said when asked what he thought the benefits of using the Kourou facility were in comparison with using Cape Canaveral. "Since we are near the Equator, we get more performance out of our launch vehicles. Secondly, our facilities for the preparation of satellites are new, and I think it is easier for the satellite preparation teams of our customers to do their work here. Also we exist solely to help our customers. We have no other launch program."

Top. *Etching by a prisoner on the wall of what was the Devil's Island prison hospital.* ***Below Left.*** *Marius Le Fevre, Director, the Guiana Space Center.* ***Below Right.*** *The Guiana Space Center is guarded by the French Foreign Legion.*

continued next page

The Intelsat V Flight Model 7 in position on top of the Ariane launch vehicle inside the launch pad gantry is checked by a Guiana Space Center safety officer prior to installation of nose cone fairing



It has been estimated that the same launch vehicle could place a satellite with a mass 14 percent greater into geosynchronous orbit from Kourou than from Cape Canaveral. Marius Le Fevre points to another advantage for Kourou as well. "We can launch to the east and to the north," he told us. "We have 120 degrees of launch capacity." In addition, we learned that Kourou is outside the Caribbean hurricane zone.

How difficult is it to get a satellite manufactured in the United States all the way down to Kourou? Not hard at all, commented Allan M. McCaskill, Manager, Launch Vehicle Program Office of **Intelsat**. "The process of getting the satellite from facilities of the manufacturer, Ford Aerospace & Communications Corp. in Palo Alto, California, to Kourou was really quite simple," McCaskill told us. "A chartered C-130 cargo aircraft took the satellite in a shipping container on board in California and, with only one stop in Orlando, Florida, flew on to Cayenne, the capital of French Guiana and the location of its international airport. After unloading from the aircraft in Cayenne, the satellite was trucked to the Technical Center here in Kourou, a distance of about 50 miles.

"A far more difficult task really," McCaskill volunteered, "was the transportation of all necessary testing and support equipment from the Eastern Test Range in Florida down to Kourou. This required the charter of a 747 aircraft, which was filled with 118,000 pounds of this support equipment."

Two more satellites in the Intelsat V series will be launched by an Ariane launch vehicle—Flight Models 8 and 9. Then two of the six satellites in the ensuing Intelsat V-A series will depart from Kourou. Soon the Intelsat Board of Governors will decide if any in the follow-on Intelsat VI series will have a Kourou departure.

Beginning some time in the first half of 1984, launches from Kourou will be handled not by the Ariane I but by its more powerful sisters, Ariane 2 and 3. The Ariane 2 will be able to place a payload of more than 2,000 kilograms into transfer orbit. The Ariane 3, which is the Ariane 2 with the addition of solid propellant strap-on boosters, will handle a single payload of more than 2,580

*Top Left, Intelsat V following extensive work in a satellite preparation building arrives at launch pad gantry, left, in transportation capsule. **Top, Middle and Bottom Right**, View of nose cone fairing and middle and business end of Ariane launch vehicle, all inside removable gantry building.*

kilograms or two payloads of 1,195 kilograms in a dual launch.

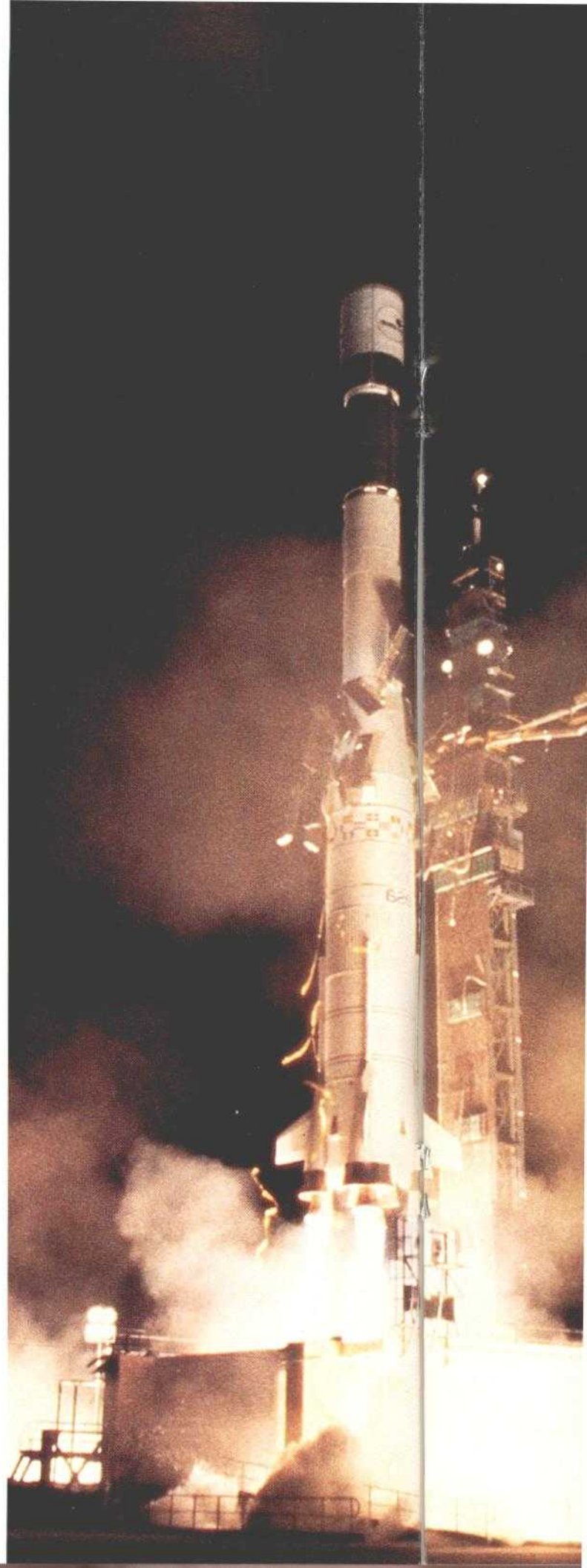
As early as 1985, a family of six launch vehicles, designated Ariane 4, will make their appearance. They will have the ability to launch between 2,000 and 4,300 kilograms, including multiple payloads.

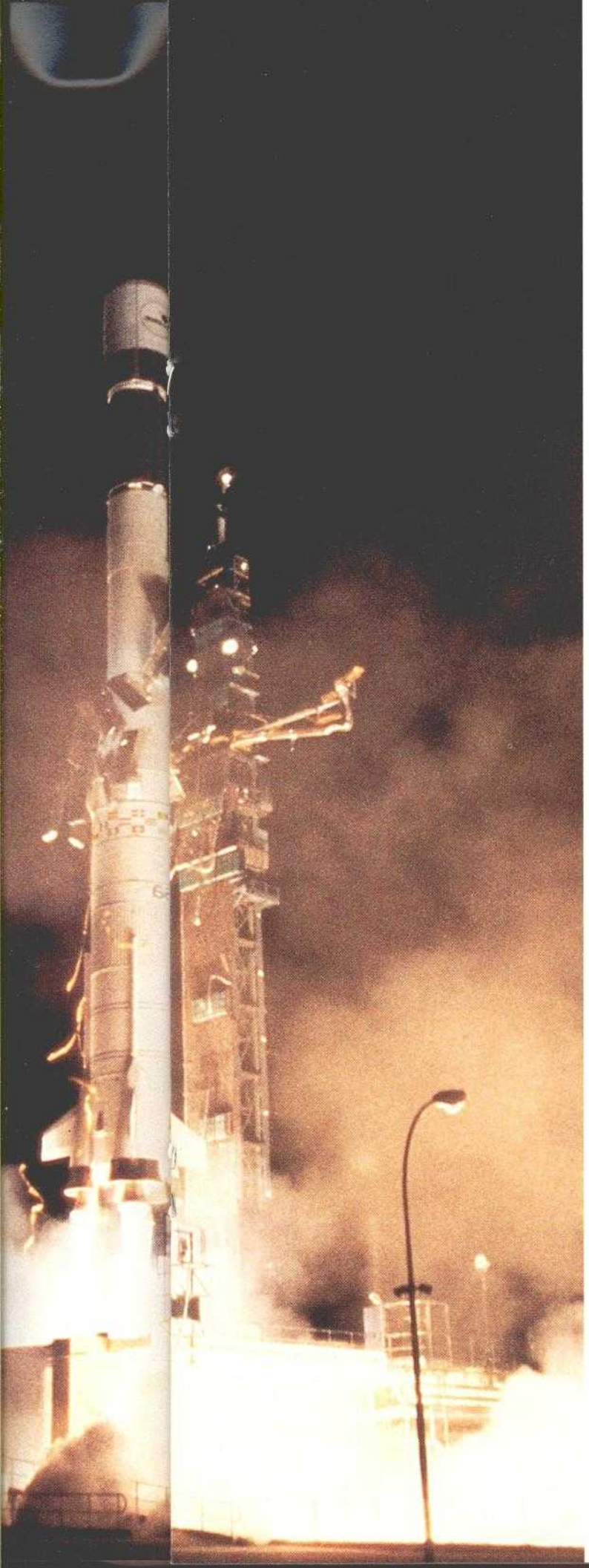
Another near-term change deserving mention is the construction of an additional launch pad at Kourou, designated ELA-2. ELA-2 was specifically designed with the Ariane 4 family of vehicles in mind. Separate facilities for the preparation of launch vehicles and for launch operations are a feature of ELA-2, with the two locations linked by a track system on which will move prepared launchers.

What will ELA-2 mean for the Guiana Space Center as a commercial center for launch activities? Marius Le Fevre answers this way, "At present, we need two months for the preparation of a launcher. With the completion of a new complex, we have the possibility of preparing two launchers at the same time and thus will be able to launch two vehicles with one month in between."

The most interesting near-term change of all for Ariane will be the method by which the launch vehicles will

The Intelsat V Flight Model 7 carries a Maritime Communications Subsystem (MCS) to provide service for Inmarsat. Here a Ford Aerospace engineer works on the L-Band antenna deployment arm, part of the MCS. ***Right****, The launch, photo compliments of Arianespace, Inc.*





Above and Left. *Guiana Space Center technicians in the blockhouse, or control center for the launch, prepare for the big event, just hours away.*

be managed. Arianespace, formed on March 26, 1980, is a private-law company that has been set up to finance and produce Ariane launch vehicles and to market them for the launch of satellites. Its shareholders are the 36 principal European aerospace firms, 11 European banks and CNES. Eleven Western European nations are among its shareholders.

Beginning with a launch scheduled for next March, Arianespace will be fully in charge of the Ariane program and will be operating on a strictly commercial basis.

Is Arianespace management hopeful about the future? "Hopeful" may be too mild a word. The present order book for Ariane just about equals the total development cost for the launch system. Hence Arianespace could be a profitable enterprise in a very short time.

NICKEL-HYDROGEN
means longer life for batteries in space

New battery is culmination of more than 10 years of work at Comsat Laboratories.

by **Allan Gallfund**
Manager, External Affairs, Comsat Laboratories
Photography by **William J. Megna**, *Chief Photographer*

May 19, 1983. The sun is slowly setting as the Atlas-Centaur rocket, bathed in light, is poised for launch at Cape Canaveral. It is in the last stages of the countdown, ready to blast off, an Intelsat V satellite nestled in the nose of the giant rocket.

A thin plume of smoke lazily curls at the base of the rocket, as the voice from the launch control center is heard: "We are now in a built-in 10-minute hold, for a final check on go/no-go." Ten minutes later, the countdown is picked up and winds its way down. All signals are go as the countdown reaches "10, 9, 8, 7 . . . 2, 1 . . . We have ignition . . . We have liftoff."

At 6:27 p.m. EDT, with an earsplitting roar that makes the ground shake under the feet of observers miles away and with a brilliant, blinding fireball, the Atlas-Centaur carrying the Intelsat V (F6) satellite slowly lifts off the launch pad reaching for outer space. The launch is flawless.

Another successful launch of an Intelsat V satellite, a satellite seemingly identical to the five previous satellites in the series that have now been launched. Seemingly identical? Look again. Inside the rectangular body of this latest Intelsat V is a nickel-hydrogen battery, the first one ever to ride in a commercial satellite of any kind.

The new battery is the culmination of more than 10 years of research and development at **Comsat Laboratories**. Battery life was the single largest limiting factor in the overall life expectancy of the Intelsat III and Intelsat IV series of satellites, and the new nickel-hydrogen battery is expected to last longer than the nickel-cadmium battery it replaces by a factor of from two to four.

While the conversion of sunlight through silicon solar cells serves as the primary source of electrical power for communications satellites, batteries are required as a secondary energy source to supply power during the twice-yearly solar eclipse periods, near the equinoxes, when the satellite passes briefly through the earth's shadow each day. In its search for improved satellite secondary energy sources, **Comsat Laboratories** focused on nickel-hydrogen batteries as a promising replacement for the nickel-cadmium batteries.

How did **Comsat Laboratories** bring about the development of the nickel-hydrogen battery to the point where it would be qualified for space? I talked with James Dunlop, Program Manager on the development of nickel-hydrogen battery technology.

Q: Tell me something about the nickel hydrogen battery and what some of its salient features are.

DUNLOP: The nickel-hydrogen battery is a hybrid system combining the best features of the fuel cell and nickel-cadmium secondary battery. The fuel cell hydrogen electrode and the nickel-hydroxide positive electrode are the two most reliable and stable secondary electrodes existing in today's technology. Combining these two electrodes into an electrochemical cell leads to many advantages, with the major one being improved life expectancy. The nickel-hydrogen battery has two to four times the life expectancy of a nickel-cadmium battery. Another important advantage is a significant mass reduction. The nickel-hydrogen battery has about twice the usable energy density of a nickel-cadmium battery.

In its construction, the nickel-hydrogen cell resembles the nickel-cadmium cell, except that the cadmium electrode is replaced by a platinum electrode, which consumes hydrogen gas on discharge and evolves it on charge. The two positive plates, positioned back to back, are electrochemically impregnated nickel electrodes. The hydrogen electrode structure consists of a Teflon-bonded platinum back supported within a thin, fine mesh nickel screen with a Teflon backing. A plastic gas diffusion

GEN
space

aboratories.

e
passes
adow each
d satellite

ed on nickel-
ising
dmium

tories bring
nickel-
where it
I talked
Manager on
drogen bat-

he nickel
ome of its

n battery is
e best
ickel-
The fuel cell
ickel-
are the two
ndary elec-
nology.
es into an
many
ne being
nickel-
our times
l-cadmium
vantage is a
e nickel-
vice the
kel-

kel-
nickel-
cadmium
tinum elec-
gen gas on
harge. The
back to
npregnated
en elec-
eflon-
ed within a
with a
diffusion

Joseph F. Stockel, staff member of the Electrochemistry Dept. of Comsat Laboratories' Physical Sciences Division, with cluster of nickel-hydrogen cells that together make up a nickel-hydrogen battery. Stockel holds an electrode stack, which is found inside a cell.

A nickel-hydrogen cell. Cluster of cells like this one make up the nickel-hydrogen battery.

screen facilitates hydrogen diffusion to the back of this platinum electrode. The electrode-electrolyte-separator stack is surrounded by an atmosphere of hydrogen under pressure.

Q: What started this search for an improved energy storage source?
DUNLOP: Nickel-cadmium batteries were probably the major lifetime limiting subsystem for the Intelsat III and Intelsat IV spacecraft. Because the Intelsat IV satellites were the workhorses for the Intelsat system during the 1970s, most of the attention has been focused on their performance. The Intelsat IV's battery design life was seven years. They didn't make it. After about five to six years in orbit, traveling wave tubes (TWTs) had to be turned off to reduce the load on the battery during eclipse operation. Approximately half of the TWTs were eventually turned off on all the Intelsat IV satellites resulting in a substantial reduction from the original 6,000 circuit capacity.

Lifetime limitations for the nickel-cadmium batteries provided the major incentive for investigating other energy storage systems.

Q: How did Comsat Labs go about looking for a replacement for the nickel-cadmium battery?
DUNLOP: We started with exploratory research and development of secondary hydrogen/oxygen fuel cells. This investigation was supported by **Intelsat**. In the late 1960s, fuel cells seemed to be the most promising of the advanced energy storage concepts. However, in our investigation, we encountered some very difficult technical problems that were never resolved.

Typically, the cells we made would fail after 50 to 100 cycles; that is, they would blow up. The best results we ever obtained were in the neighborhood of 400 to 500 cycles. Obviously, that did not generate the kind of confidence one looks for in aerospace applications. Still we were interested in finding a replacement for nickel-cadmium batteries.

Problems with the fuel cells led to the exploration of hybrid systems; specifically, cadmium-oxygen and hydrogen-nickel oxide. One memorable occasion took place at **Comsat Laboratories** early in 1970. Dr. Giner and Dr. Perry of Tyco Laboratories and Joseph Stockel and I from the Labs discussed the possibilities of investigating the nickel-hydrogen battery as a reliable secondary energy storage system.

Q: When did you build the first nickel-hydrogen cell?
DUNLOP: The first known sealed nickel-hydrogen cells were built and tested here at the Laboratories early in 1970. Early results were promising, and we convinced **Intelsat** to start an R&D program to investigate the potential of a nickel-hydrogen battery. **Comsat**, as manager of the Intelsat R&D programs, awarded a contract to Tyco Laboratories for this investigation. By early 1971 it was clear that the nickel-hydrogen system was far more promising than the hydrogen/oxygen fuel cell.

We worked together with Tyco Laboratories to formulate the original design concepts for the sealed nickel-hydrogen cell. Experimentation at both **Comsat Labs** and at Tyco provided proof-of-principle of our design concepts. Subsequently, several original patents were filed by the principal investigators—myself, Jose Giner, Joseph Stockel, Martin Earl, and Gert Van Ommering.

The next step in the development was to award a second Intelsat contract to Tyco Laboratories to design and fabricate a lightweight nickel-hydrogen cell. Early in the program, Tyco's management decided that their corporation would drop all work on battery systems. Consequently, **Comsat Laboratories** took over this R&D development project. The Labs assumed responsibility for completion of the Intelsat R&D program to design and fabricate a lightweight cell. Credit my boss, Dr. Edmund Rittner, for recognizing the potential advantages of the nickel-hydrogen technology and for his support which allowed us to carry out this development work.

Q: Didn't Tyco's decision to drop its participation work to the advantage of Comsat Laboratories in the development of the technology?
DUNLOP: Yes! It was one of the key reasons for success. Up to that time the Labs was essentially using outside contractual support to do most of the development work. Now we were compelled to go into the hardware development business.

The Laboratories became involved in the design and fabrication of pressure vessels, seals, weld rings, etc. The pressure vessel and electrode cell design that evolved from this effort has proven to be extremely reliable. The know-how

developed at the Laboratories is a significant portion of the "data package" for this whole nickel-hydrogen-cell technology.

Q: What happened next?
DUNLOP: We now decided that we needed to bring in a company with manufacturing capability to build cells. As a result, we initiated two new Intelsat contracts, one with Energy Research Corporation (ERC), essentially a fuel cell company, and one with Eagle Picher, a battery company, with some expertise in fuel cells. These two companies built nickel-hydrogen cells that were tested and evaluated at the Labs. Eagle Picher used the pressure vessel and electrode stack design developed at the Labs, and ERC used a pressure vessel and stack design that they themselves developed.

Cells made by Eagle Picher to the Comsat design proved far superior to the ERC cells.

Q: How did the opportunity arise to get the batteries into space?
DUNLOP: From 1975 on, **Comsat Laboratories** was seeking some experimental method of getting a nickel-hydrogen battery into space. Development had progressed to the point where an actual flight test was needed to confirm its performance. In 1975, Fred Betz from the Naval Research Laboratory, came to the Labs and spoke to me and Joe Stockel about putting a nickel-hydrogen battery on board the Navigation Technology Satellite (NTS-2). This was the opportunity we had been seeking, and the deal was struck. Plans for such a test began in the fall of 1976. During eclipses, our battery would be the power source. A nickel-hydrogen battery, fabricated by the Naval Research Laboratory, used seven Comsat-supplied cells in series. Two of these batteries made up the energy storage system flown on the NTS-2.

Comsat provided the cells to NRL, and Fred Betz and his crew assembled them into a battery. We worked together as a team on the design and heat transfer concepts. Nelson Hyman of the Spacecraft Lab was a member of this team, and he provided the heat transfer design concept used. The cells were mounted into aluminum cylinders which served the dual purpose of mechanically supporting the cells and also conducting heat to the base plate for radiation into space. Joe Stockel developed a technique for mounting strain gauges onto the pressure vessel to provide a measure of the hydrogen gas pressure within the cells. These same concepts for mounting the cells, for heat transfer, and for measuring pressure are now being used in the Intelsat V program.

Q: After succeeding in placing the nickel-hydrogen battery on the NTS-2, the thought must have crossed your mind: How do we get the nickel-hydrogen battery on board the Intelsat V spacecraft?
DUNLOP: The NTS-2 spacecraft was launched in June 1977, and the nickel-hydrogen battery is now starting its 13th eclipse season in orbit. The NRL people are very pleased with its performance.

Without that flight experience, the battery would not have been on the Intelsat V. It was essential to have it successfully operating in an actual flight test to demonstrate that the technology worked in space.

In 1978 we made a number of presentations to **Comsat**, **Intelsat** and Ford Aerospace managements regarding the use of nickel-hydrogen batteries for the Intelsat V program. The result was an agreement to provide the capability for using either nickel-cadmium or nickel-hydrogen on Intelsat V spacecraft. The nickel-hydrogen battery was designed to be interchangeable with the nickel-cadmium batteries. The Ford program office would have the responsibility for

***Left** James D. Dunlop, Manager of Comsat Labs's Electrochemistry Dept., answers questions about development of the nickel-hydrogen battery. **Below**, Electrode stack, center, found inside the nickel-hydrogen cell.*

making the final decision on which to use, with **Intelsat**'s approval. The Ford Aerospace program office has recommended using the nickel-hydrogen batteries for the remaining eight Intelsat V spacecrafts, F7 through F15.

Q: Who builds the cells for the Intelsat V program?
DUNLOP: Eagle Picher. They are a subcontractor to Ford Aerospace. The Intelsat V cells are built in accordance with the Intelsat licensing agreement, which includes the basic patents covering the original design concepts and the know-how for the electrode stack and pressure vessel design, fabrication, and activation procedures developed by us. **Comsat Laboratories** was the transfer agent for **Intelsat**. Three companies, Eagle Picher Industries and Yardney Electric of the United States and Lucas Industries of the United Kingdom, are licensees of this technology.

Q: What is the status of this technology today?
DUNLOP: Back in the NTS-2 days, the technology was just emerging from the laboratory stage, and we were continually redesigning and improving it. For the Intelsat V program, the cell design and fabrication process were fixed to the NTS-2 technology. Our major effort has been to take this technology from the laboratory stage and transfer it into an established manufacturable product. We have accomplished the transition with the Intelsat V program. Eagle Picher, under the Intelsat licensing agreement, is now capable of manufacturing cells reliably and repeatedly in large quantities. A number of other communications satellite programs have committed to this same Intelsat technology.

But the Intelsat V (F-6) spacecraft, with its nickel-hydrogen battery, is the first communications satellite using this technology. It is the frontrunner, and we're proud of our participation in its development.

Q: What do you see for the future of this technology?
DUNLOP: The nickel-hydrogen technology will probably be around a long time. I would expect to see nickel-hydrogen batteries used on at least the next three Intelsat programs, the Intelsat VI, the Intelsat VII and the Intelsat VIII series, which project out through the 1990s. Energy requirements for these future satellites are expected to increase by a factor of four to eight times that of the stored energy needed for the Intelsat V satellites. New and advanced nickel-hydrogen cell and battery designs will be needed to meet these increased energy storage requirements.

Battery-powered electric propulsion for north-south stationkeeping is another new concept on the horizon which could best be accomplished with the nickel-hydrogen battery system because of its cyclic lifetime advantages.

New and advanced design concepts being investigated include multiple cells in a common pressure vessel (MPVs), bipolar cells, which are of specific interest to NASA for its manned space station, and advanced individual cell pressure vessels (IPVs).

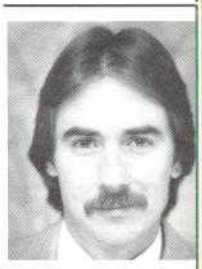
Another exciting prospect is the commercialization of the battery for applications on earth. We are currently working with the Department of Energy under contract with Sandia Laboratories to develop a nickel-hydrogen battery for such applications.

Thus there may be more significant developments in the future, but I doubt that any will be more exciting and rewarding than these first ones for the NTS-2 and Intelsat V programs.

Inside an Intelsat V satellite, the nickel-hydrogen battery is in two sections, and sections are mounted on the lower portion of opposing north and south walls. One section of battery can be seen in the photo—lower right. Cells are covered by a silver-like material in box like structure.

Cousteau
ON MARITIME SATELLITE COMMUNICATIONS

Words and photographs by **William J. Megna**, *Chief Photographer.*



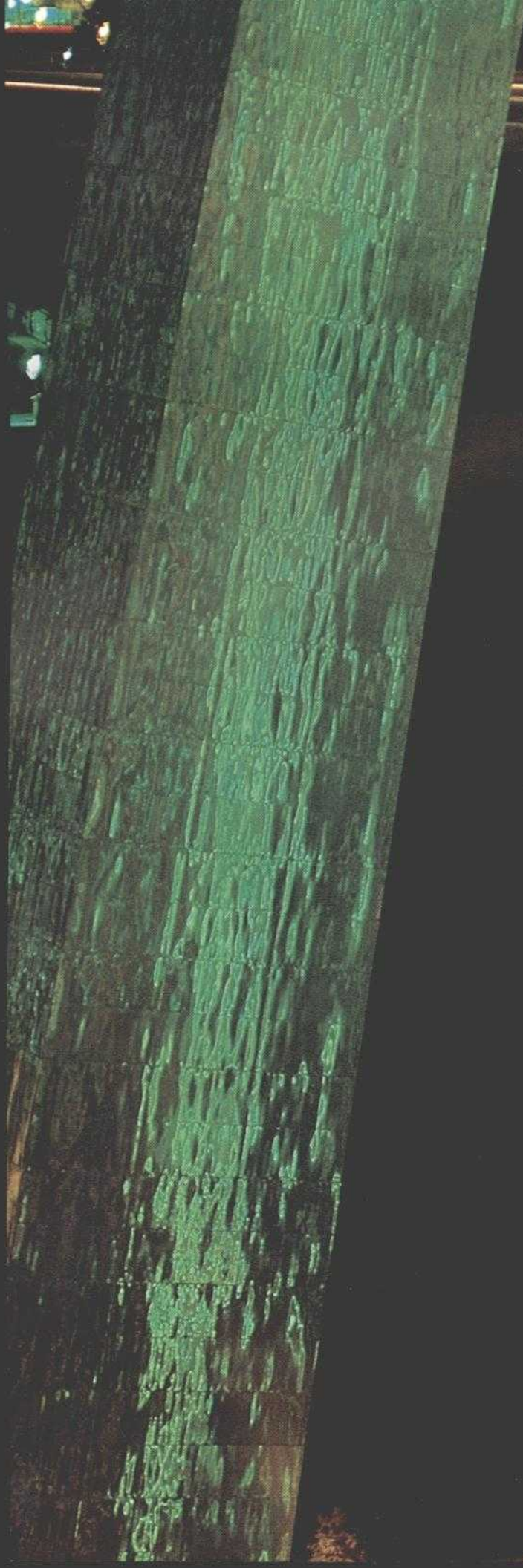
In September, William J. Megna, Chief Photographer for **Comsat Magazine**, *was invited to spend some time on board the Calypso, famous research ship of the Cousteau Society, as it traveled on the Mississippi River. The Cousteau Society is doing a series of films on the major fresh water bodies of the world, and now the Mississippi is the subject of its very capable film makers.* **Comsat** *has made a five-year loan to the Cousteau Society of an MCS-9000 maritime satellite communications terminal, manufactured by Comsat TeleSystems—the second loan of maritime satellite equipment to the Calypso in the last 10 years—and we were invited on board to see the system in operation and to talk with Captain Jacques-Yves Cousteau and his son Jean-Michel. During his stay on the vessel, Mr. Megna was able to conduct a wide-ranging tape-recorded interview with the famed inventor of the Aqua-Lung or self-contained underwater breathing apparatus (SCUBA), who today is best known as a film maker, environmentalist and mariner.*

Comsat*'s loan of the TeleSystems terminal to the Calypso is a major part of the Corporation's participation in World Communications Year, sponsored by the United Nations. Three fellowships for graduate education in communications and electronics, one at Massachusetts Institute of Technology and two at George Washington University, constitute the balance of* **Comsat***'s participation in World Communications Year activities.*

An abridged version of the transcript of Mr. Megna's conversation with Captain Cousteau follows. The windship referred to in the text is an experimental, 65-foot catamaran that is wind propelled not by sails, but a 44-foot high cylinder that looks like a smokestack. The accompanying photographs were taken by Mr. Megna over a period of four days.

Q: Why is the Calypso on the Mississippi River?

COUSTEAU: We cannot consider that we understand the waters of the world if we do not study the fresh water bodies of the world. We have already studied the Nile, the Saint Lawrence, the



Amazon, the Great Lakes, Lake Tanganyika, and Lake Titicaca, and we intend to complete the effort with looks at the Mississippi and the Yangtze.

Q: What is Calypso's itinerary on the Mississippi?

COUSTEAU: We have already gone as far upriver as we could, reaching St. Paul and Minneapolis. Unfortunately, there is very little water at this time of year, and it was impossible for Calypso to reach St. Paul and Minneapolis without touching the bottom a good dozen times. As a matter of fact, we damaged the propeller once. On our way down river, we will be obliged to dry dock in New Orleans to make some repairs. That's the way it is.

Q: Can you tell us some more about the overall objectives of your freshwater projects?

COUSTEAU: The objectives are not the same for each body of water. For the Amazon, for example, we had a very heavy scientific program because a lot of scientific data on the Amazon is lacking. On the Nile, for example, we did a mixture of scientific exploration and photographic exploration. On the Mississippi, it's a radically different story because the scientific data is well known.

If we would be recording data on the Mississippi, we would just be repeating what people have already done, which would be a waste of time and energy. Instead we have collected the available data, and it's very abundant.

Knowing what the problems of the Mississippi have been and are, we are trying to achieve an overview of the relationship between man and the river—in the past, today, and in the future, what the river means for millions of people in the most developed country in the world. Out of this, we hope to learn lessons for rivers that are not yet developed, for the Congo or even the Amazon, for example.

Q: When will the film be aired?

COUSTEAU: We are doing this co-production as a joint effort of the

Cousteau
casting Sy
System do
the progra
We don't k
with the fi
We make
producer.
they can.
well distrib
will too.

*Q: I unde
research a
of marine
What othe
projects is
in?*

COUSTEA
Cousteau
improveme
have the c
ment for t
which mea
protecting
we are als
enough, h
constructiv
latest tech
renewable
better use
so we are
ects.

One br
developme
energies li
A branch
been study
has come
They have
a mechan
relatively
times bett
going to u
windmills
but first th

Cousteau Society and the Turner Broadcasting System. The Turner Broadcasting System does not necessarily have to air the program on a cable system alone. We don't know what they're going to do with the film. This is not our business. We make the film, deliver it to the co-producer. They distribute it the best way they can. In the past, we have been very well distributed. I hope in the future we will too.

Q: I understand that you are engaged in research and development on a new type of marine craft or boat. Is this correct? What other research and development projects is the Cousteau Society engaged in?

COUSTEAU: The broad goal of the Cousteau Society being protection and improvement of life on this planet, we have the duty to help protect the environment for the betterment of human life, which means we are convinced that by protecting any form of life on this planet, we are also protecting man. This is not enough, however. We also have to be constructive. We have to help focus the latest technologies to save the non-renewable resources of this planet and to better use the renewable resources. And so we are involved with two kinds of projects.

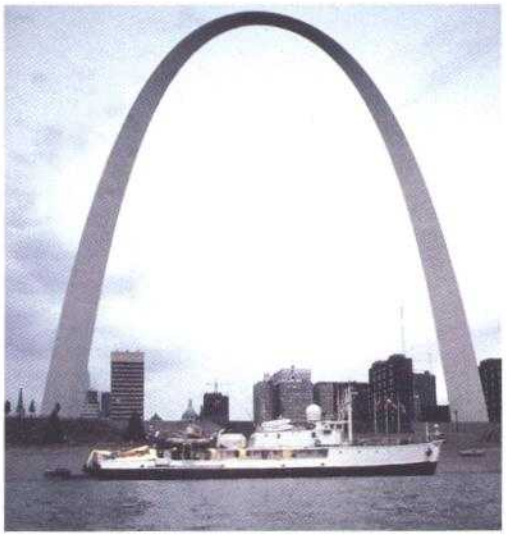
One branch of our activities is the development of better uses of renewable energies like solar energy or wind power. A branch of our society in France has been studying this for three years and has come to very interesting conclusions. They have developed a process by which a mechanical structure—light and relatively small—has an efficiency six times better than ordinary sails. We are going to use this system to make better windmills for the production of electricity, but first the system will be applied to ships, not just sailboats, but the combined population of traditional wind-driven and fuel-driven.

Another project in that same branch is the study of how to use biomass to generate food and energy. That's a renewable resource. Oil and coal are not. This project is going to last five to 10 years.

Q: What are the benefits of satellite communications for the mariner, as you see it?

Opening Page. *Jacques-Yves Cousteau on board the Calypso, St. Louis's Gateway Arch and the Mississippi River in the background.* ***This Page.*** *The Cousteau Society's Calypso tied up in St. Louis, photographed at night. Portion of Gateway Arch is visible, left.*


TOULON
CALYPSO



COUSTEAU: I will tell you a story. Recently, when I began planning for a trip across the Atlantic on my experimental windship, which was only expected to last for 30 days, I thought that the very excellent radio equipment that we have on board would be enough. First, I tested the ship. I went from the French Coast to Sardinia, just a three or four day voyage. I tried to communicate using the radio system. It worked, but what a pain in the neck!

You call a high seas station. They tell you to wait. When it's your turn, the conditions of transmission have changed. You have to change frequency. Finally, you go on with your communication. You understand only half of what is said, and it's just impossible. Twelve years back, I suddenly realized that we just could not do without a satellite communications system. For two months I've had such a system on order for our windship. I just can't do without it.

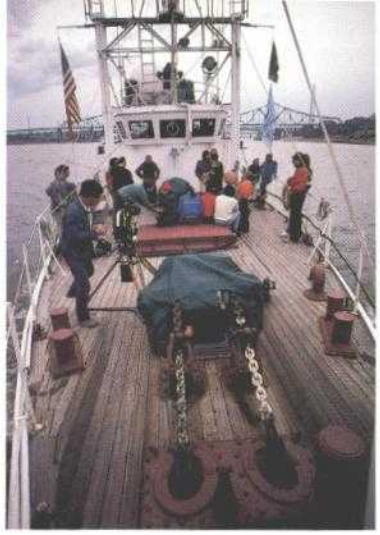
While I am at sea—and I am at sea one-third of my time—I cannot stop directing the rest of my activities, and I do have other responsibilities. I am in charge of Musee Oceanographique of Monaco, a big organization. I am Secretary General of an international intergovernmental organization, the Mediterranean Commission. And, of course, there is the Cousteau Society. I just cannot stop communicating with the people in these organizations while I am at sea. Without the satellite communication system, communications would be hazardous, irregular, incomplete. You have to live with the time that you have. It has become indispensible. Here on the Mississippi is the one place in the world where it is less important. I could stop the ship and go ashore and pick up a telephone but even on the Mississippi I am making wide use of it. I need it.

He's in his seventies, but Jacques Cousteau can still climb monkeybars, as he proves at the Kaskaski Consolidated School on Kaskaski Island in the Mississippi River. An episode in Cousteau film about the Mississippi was filmed on Kaskaski Island.

Q: Can you think of any specific instance where having maritime satellite communications on board has saved you money, time, saved lives or aided in an emergency or medical situation?
COUSTEAU: Yes, the first time I used it was in 1972-73, specifically in February 1973. If I had not had satellite communications you might not be hearing from me today. We were in the Antarctic. It was the first year I had a satellite communications system on board. We were using the ATS-3 satellite. We could, thanks to this, not only get valuable information on the ice, on the weather, but also we could remain in communication to ask for help. In the Antarctic, there was really no other way to communicate. So we are very grateful. I have come to a point where I just cannot imagine a ship without it. I just can't.

Q: You have already accomplished so much. What work do you think still needs

***Facing Page**, Radome portion of TeleSystems maritime satellite communication system on board the Calypso. Goodyear blimp was in town for a tire convention. **Above Left**, Calypso framed by St. Louis Arch. **Below Right**, Jacques Cousteau calls Marseilles using TeleSystems terminal.*



Above, *Episode in the Cousteau Society's film about the Mississippi River is shot on the deck of the Calypso.* **Below**, *Father and son together: Jacques-Yves Cousteau, left, and Jean-Michel Cousteau, Vice President and Director of The Cousteau Society.*

doing? Do you think that there is room for more innovation in man's quest to understand and use the sea?

COUSTEAU: The windship is in development. I think it can revolutionize ship transportation in the next ten years. Maybe it is the most important breakthrough I've ever made. It's amazing to see the efficiency of our system. It opens up new avenues. Very recently—two or three weeks ago—gathering my engineers together, I said, "We have now written the final report on this system. You innovators are no longer involved in this. This is now a commercial and industrial job. It has to be done, but it will be done by others. So let's turn to the future and find new ideas." We decided to put all of our efforts, at least for the next five years, into the developments of new techniques to exploit biomass. After that we will do something else.

Yes, I see a lot of room for innovations. The sea is turning out every year billions of tons of phytoplankton and minute little algae as well as huge weeds like giant kelp, and on land traditional agriculture is destroying valuable waste products every year that also could be used for biomass exploitation. By joining both forces—leftovers of agriculture and the formidable productivity of the sea—humankind could probably find in these systems all the food and all the energy necessary for its development. We're going to work on that. This is especially useful for the developing world, the Third World. It is a gigantic project. We are not the only ones who are working on it but we have new ideas on it. So I hope it works. I hope it proves as productive as the other ideas we've developed.

At the Cousteau Society, we never want to stop inventing or developing. We want to remain at the service of mankind. At the Cousteau Society, we do not blame science and technology for the environmental problems we have. We believe that we are responsible for our evils because we have not used science and technology the right way. We have not used them wisely. We need more science and more technology, not less.

N O T E S

continued from page 4

Intelsat Business Services okayed by Intelsat Governors

The 56th session of the Intelsat Board of Governors was held in Washington, D.C., September 8-15. The following are highlights of the session:

The Board approved implementation of the Intelsat Business Services (IBS) offering, effective 1 October 1983, and adopted tariffs for the new all-digital service specially tailored for the needs of international business communications. The Board also approved modifications to the last three Intelsat V-A spacecraft, for launch in 1985 and 1986, to enhance the IBS capability. These spacecraft are being manufactured by Ford Aerospace & Communications Corp.

In order to provide improved coverage of the United States and Canada, the Board decided to expand the west spot beam of the Intelsat VI (F-4) and (F-5); the Intelsat VI spacecraft are currently being manufactured by Hughes Aircraft Co.

Recognizing the unique role and requirements of the United Nations for critical telecommunications services for peacekeeping and emergency relief services, the Board authorized the Director General to contract on an exceptional basis with the United Nations for provision of 9 MHz of preemptible leased transponder capacity in the Atlantic Ocean Region to be utilized solely for peacekeeping and emergency relief activities. Initiation of service at each location will require conclusion of appropriate agreements between that country and **Intelsat**, including full technical coordination.

In an effort to encourage early action by equipment manufacturers, the Board approved, on a provisional basis, performance characteristics of small C-Band earth stations (Standard D) accessing the Intelsat space segment for low density telephony services. The terms of the service itself will be reviewed at a future meeting.

The Board approved contract awards to Hewlett Packard for procurement of Intelsat VI TTC&M data processing hardware ($2.8 million); and to Computer Projects Inc. of Greensboro, North Carolina, for an Automated Message Switching System ($1.2 million) to be installed in the Intelsat Operations Center.

K-Band service via satellite for NBC to operate in 1984

The NBC Television Network and Comsat General Corporation will begin, in early 1984, the use of an advanced satellite distribution system, using a K-Band satellite to deliver network programs to NBC's affiliates. The system described in the 10-year contract, which is expected to yield revenues to **Comsat General** of several hundred million dollars, will become fully operational by January 1985. The arrangement was announced jointly by Robert E. Mulholland, President and Chief Operating Officer, NBC, and Irving Goldstein, President, **Comsat**.

The national distribution system will initially operate through transponders on a Satellite Business Systems (**SBS**) satellite. The agreement calls for NBC and **Comsat General** to use RCA Americom K-Band satellites when they become available in early 1986.

The agreement supersedes and enlarges an interim (two-year) satellite system arrangement with **Comsat General** announced at the NBC-TV Affiliates Convention last May.

Starting in early 1984, NBC will lease from **Comsat General** up to 10 transponders (four full-time and six for occasional use) on SBS satellites. NBC-TV will also lease from **Comsat General** uplinks at 10 locations, including master stations in New York and Burbank, six transportable uplinks for news and sports, and 170 earth stations situated at NBC-TV affiliates across the country.

Unlike C-Band satellite transmissions, K-Band frequencies allow broadcasters to put earth stations right at their studio locations—anywhere within sight of the satellite. With the addition of transmit electronics, downlinks can be converted into uplinks, and the affiliate can then be an interactive participant in uses beyond the normal reception of network programs.

Subsidiary aims debentures at international markets

Comsat International N.V., **Comsat**'s wholly owned financing subsidiary based in the Netherlands Antilles, has issued

continued next page

N O T E S

$110 million of 15-year convertible subordinated debentures for placement in international capital markets.

The convertible debentures are guaranteed on a subordinated basis by **Comsat** and are convertible into shares of Common Stock of **Comsat**. Due in 1998, they carry a coupon of 7.75 percent and the conversion price is $48 7/8 per share. The offering is not available to citizens or residents of the United States. The terms of the offering are such that, if conversion of the debentures were to occur, foreign ownership of the stock would not exceed the statutory limit of 20 percent.

The issue is being lead-managed by Credit Suisse First Boston Limited, Bank of America International Limited and Nomura International Limited. In addition, there is a co-management group consisting of Swiss Bank Corporation International Limited, Union Bank of Switzerland (Securities) Limited, Julius Baer International Limited, Banque Paribas, Compagnie de Banque et d'Investissements, CBI, Dresdner Bank Aktiengesellschaft, Goldman Sachs International Corp., Lombard Odier International S.A., Morgan Stanley International, Pictet International Ltd, Smith Barney, Harris Upham & Co. Incorporated, and S.G. Warburg & Co. Ltd. The underwriting group is made up of a significant number of major financial institutions from Europe, Asia, and other international financial centers.

Commenting on the offering, Dr. Joseph V. Charyk, Comsat Chairman and Chief Executive Officer, explained: "This offering provides funds necessary for our future plans, including financing our share of **Intelsat**'s new generations of satellites and financing the satellite-to-home pay-television service that our subsidiary, Satellite Television Corporation, is preparing to offer by late next year."

Contract extensions for both Marisat, Comstar announced

The United States Navy has extended its contract with Comsat General Corporation for the use of UHF capacity on each of the three satellites in the Marisat system for an additional year, commencing October 1, 1983. The provision of this additional satellite service is valued at $12.7 million. The U.S. Navy also has an option on these satellite services for the following year.

Developed, owned and operated by **Comsat General**, Marisat is the world's first maritime communications satellite system. Each of the three satellites operates in three different frequencies: UHF for Navy services, and L-Band and C-Band for commercial shipping and offshore industries.

It has also been made known that the American Telephone & Telegraph Company (AT&T) has exercised options extending its leases on **Comsat General**'s Comstar satellite system. The Comstar system comprises four satellites; the first two, Comstar D-1 and D-2, are co-located in orbit and are operated as one satellite unit.

The options exercised by AT&T extend the lease on Comstar D-3's full commercial capacity through September 1984 and establish a monthly lease arrangement for the "single" Comstar D-1/D-2. AT&T's current lease on the third satellite position, Comstar D-4, expires in September 1985. The Comstar satellites were launched between 1976 and 1981, and each has a design life of seven years. Total revenues from the lease extensions is above $4.5 million.

Commercial paper market is entered to aid financing need

Comsat has entered the commercial paper market to meet working capital and interim construction financing needs. The Corporation's commercial paper program commenced in early September, with outstandings reaching $100 million. Goldman Sachs Money Markets Inc. is the commercial paper dealer for **Comsat**'s program.

Commenting on this new financing program, Bruce L. Crockett, Vice President, Finance, explained: "After careful consideration, we feel that the commercial paper market represents the most cost-effective way to meet our working capital and interim construction requirements. That market today offers unique financial advantages to a growing company like **Comsat**, and our total program of about $100 million will satisfy our financing needs for some time."

FOR THE RECORD

Excerpts of what officers of Comsat and subsidiaries said at recent speaking engagements

Testimony of Dr. Joseph V. Charyk, Chairman and Chief Executive Officer, Communications Satellite Corporation, before the Senate Foreign Relations Committee, October 31, 1983.

...In March of this year Orion Satellite Corporation, a newly formed U.S. company, filed an application with the Federal Communications Commission for authorization of a transatlantic satellite system that would offer service in the most heavily used segment of the Intelsat system. A second application was filed in August by International Satellite Inc. that would also offer transatlantic service in competition with **Intelsat**. The grant of such applications would be a major, destructive change in a U.S. policy that has been successful in creating a high-quality, low-cost global communications network in less than 20 years. It would also signal a disregard of the repeatedly expressed concerns of the vast majority of countries that comprise the global network. They would view such action as an abrogation of this country's obligation under the Intelsat agreements.

Let there be no question over what is fundamentally at stake here. It is the issue of continued U.S. support for **Intelsat** as the single global satellite system. If the United States were to unilaterally change the policy of support for **Intelsat** to encourage new entry, we are certain Orion or ISI would be only the vanguard of a large group of entities desiring to siphon off traffic from the high density routes now served by **Intelsat**. We believe it is critically important for the Administration to focus on the possible outcome, both immediate and long-term, of such a fundamental change in policy. For just as surely as the United States is responsible for the creation of **Intelsat**, we can, through our actions, set the wheels in motion for its eventual demise.

New carriers, unlike **Intelsat**, would not have a responsibility to serve thin-route points. **Intelsat**, while continuing to carry that responsibility, would face the immediate diversion of traffic from its heaviest routes. This would negatively affect the economic viability of the entire worldwide system. **Intelsat** has configured its satellites to serve users worldwide. There is simply no way that it could compete against a satellite specifically designed to serve only a high density path without substantial revision of its objectives and in the system configuration.

Make no mistake about it, the importance of the North Atlantic route is paramount to **Intelsat**'s continued success. It currently provides 25 percent of **Intelsat**'s traffic. **Intelsat**'s policy of global rate averaging could not be sustained if it were to lose its most important traffic base. The cost and quality of satellite services available to the rest of the world, and particularly lesser developed nations, would be negatively affected.

In addition, there is the matter of a loss of U.S. influence in **Intelsat**. In the minds of other nations, the United States is more responsible than anyone else for the creation and well being of **Intelsat**. If the United States were to turn its back, in effect, on **Intelsat**, there would be an enormous loss of U.S. prestige and influence among Intelsat member-nations. A continuing unequivocal U.S. commitment to **Intelsat** is essential to its well being. Without it there would likely be an unraveling of **Intelsat** as a cohesive body and the emergence of a chaotic world of duplicative and overlapping international and regional systems. In such an environment, the United States clearly could not have the leadership role it has through **Intelsat** today. The result would surely be poorer service at higher cost, except for a few selected users on a limited number of paths.

Among the consequences that should not be overlooked is the likely Soviet response to a weakening **Intelsat**. The Soviet Union undoubtedly would try to take advantage of the situation to further

continued next page

recruit membership for its system. In fact, the Soviet Union has already begun this process. Intersputnik, created in 1971 as a direct challenge to **Intelsat**, has until recently been predominantly a regional system serving the U.S.S.R. and its Eastern European satellite nations. In the past few years, however, Intersputnik has aggressively increased its membership from other areas of the world and has vastly upgraded its facilities.

Given a weakened **Intelsat**, the ability of Intersputnik to attract more countries to its system would be substantially enhanced. Further, other countries would be encouraged to develop regional satellite systems if they believed additional members could be diverted from their commitment to **Intelsat**. Cuba, for example, has recently notified the ITU of its plans to develop and launch a satellite for Western Hemisphere regional service. Obviously it is in the interests of the United States to encourage friendly and neutral countries to stay in **Intelsat** and not join these systems. The ability of the U.S. to do this effectively would be compromised if this country itself were to authorize international systems that undermine **Intelsat**.

For the past six years **Comsat** has been actively involved in the debate concerning deregulation and competition in the international communications marketplace.

We have pointed out that it is important to distinguish between the domestic and the international marketplace and that the international marketplace differs significantly from the domestic. Since most other countries have placed the ownership and operation of telecommunications facilities under direct government ownership and control, there is little incentive for them to support and operate alternative networks. And, of course, new international facilities cannot be implemented without the acquiesence of the foreign entities involved. The United States should be careful not to press forward with policies that others can exploit for their own benefit at the expense of the U.S. user. Without reciprocal arrangements, foreign entities could simply play off one U.S. system against another.

While **Comsat** supports the goals of many regulatory activities undertaken by the government to promote competition and deregulation in the communications industry, we believe the key to promoting international competition lies in the encouragement of new services. Competition in services is desirable, particularly as technology advances and new information requirements develop. Inefficient and unnecessary duplication of facilities is obviously counterproductive.

This aspect of the rush towards deregulation in the communications industry needs a proper focus. If there is one thing we have learned from the deregulatory initiatives we have begun in the domestic arena, it is that policymakers must take into consideration the long-range implications of their decisions. In an effort to allow competitive entry in selected overseas markets, we are running the risk of angering our allies, alienating third world nations, lessening U.S. prestige and inhibiting our overall effectiveness in the international communications arena. Whether we are talking about domestic or international deregulatory policy, if the end result is a chaotic, more expensive, less reliable and technically inferior overall communications system, none of us will benefit in the long run.

Comsat believes that the continued strength of **Intelsat** is of vital importance to the United States. The negative consequences to the U.S. that would result from the pursuit of actions that pull back from the United States' commitment to a single, global commercial satellite system are of great significance. The U.S. has a tremendous investment in **Intelsat** in terms of foreign policy, technological leadership, national security and economic benefits. This investment should not be placed in jeopardy. Let us not abandon a proven, successful policy to the blandishments of popular buzzwords from a few exploitative sources. Rather, let change be the result of objective and thorough study and a full appreciation of the benefits and risks of the proposed changes.

Corporate Locations

Comsat

Headquarters, Executive Offices
Communications Satellite Corporation
950 L'Enfant Plaza, S.W.
Washington, D.C. 20024
Telephone: 202.863.6000

STC

Satellite Television Corporation
1301 Pennsylvania Avenue, N.W.
Suite 300
Washington, D.C. 20024
Telephone: 202.626.3600

World Systems

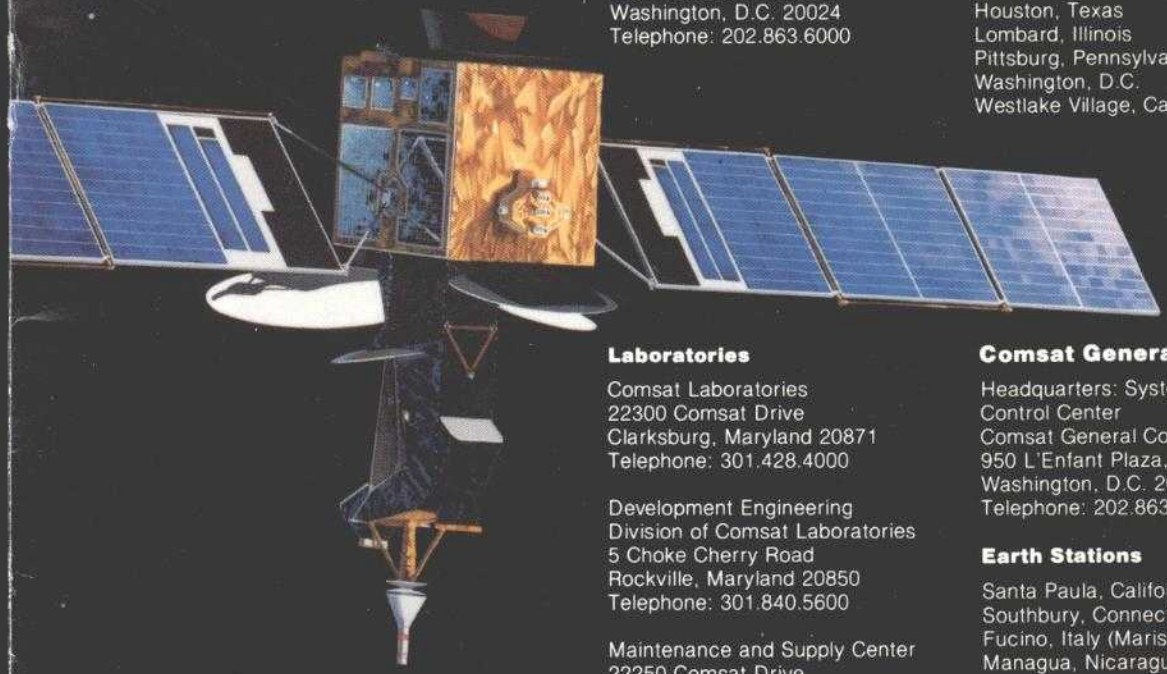
Comsat World Systems Division &
Launch Control Center
950 L'Enfant Plaza, S.W.
Washington, D.C. 20024
Telephone: 202.863.6000

ERT

Environmental Research & Technology, Inc.
696 Virginia Road
Concord, Massachusetts 01742
Telephone: 617.369.8910

Major Offices:

Atlanta, Georgia
Denver, Colorado
Ft. Collins, Colorado
Houston, Texas
Lombard, Illinois
Pittsburg, Pennsylvania
Washington, D.C.
Westlake Village, California



Laboratories

Comsat Laboratories
22300 Comsat Drive
Clarksburg, Maryland 20871
Telephone: 301.428.4000

Development Engineering
Division of Comsat Laboratories
5 Choke Cherry Road
Rockville, Maryland 20850
Telephone: 301.840.5600

Maintenance and Supply Center
22250 Comsat Drive
Clarksburg, Maryland 20871
Telephone: 301.428.4286

Earth Stations

Andover, Maine
Brewster, Washington
Ebeye, Rep. of Marshall Islands
Etam, West Virginia
Jamesburg, California
Kosrae, Fed. States of Micronesia
Majuro, Rep. of Marshall Islands
Pago Pago, American Samoa
Palau, Rep. of Palau
Paumalu, Hawaii
Ponape, Fed. States of Micronesia
Pulantat, Guam
Susupe, Northern Mariana Islands
Truk, Fed. States of Micronesia
Yap, Fed. States of Micronesia

Comsat General

Headquarters: System Control Center
Comsat General Corporation
950 L'Enfant Plaza, S.W.
Washington, D.C. 20024
Telephone: 202.863.6010

Earth Stations

Santa Paula, California
Southbury, Connecticut
Fucino, Italy (Marisat TTC)
Managua, Nicaragua (Nicatelsat)

Technology Products

Amplica

Amplica, Inc.
950 Lawrence Drive
Newbury Park, California 91320
Telephone: 805.498.9671

Compact

Compact Software, Inc.
1131 San Antonio Road
Palo Alto, California 94303
Telephone: 415.966.8440

TeleSystems

TeleSystems, Inc.
2721 Prosperity Avenue
Fairfax, Virginia 22031
Telephone: 703.698.4300

Office of Corporate Affairs, Periodicals
Communications Satellite Corporation
950 L'Enfant Plaza, S.W.
Washington, D.C. 20024
Telephone: 202.863.6102

COMSAT