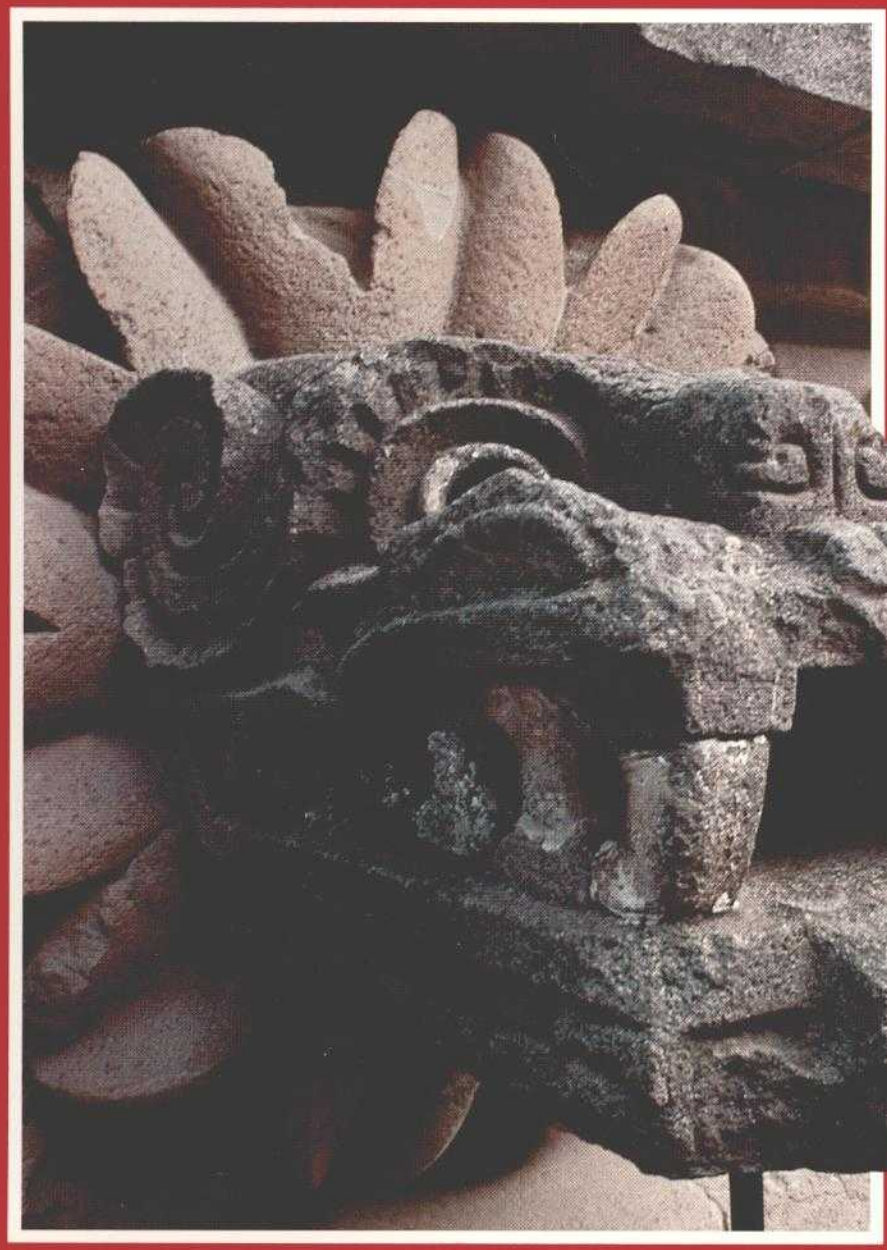
COMSAT®

COMMUNICATIONS SATELLITE CORPORATION MAGAZINE

1982



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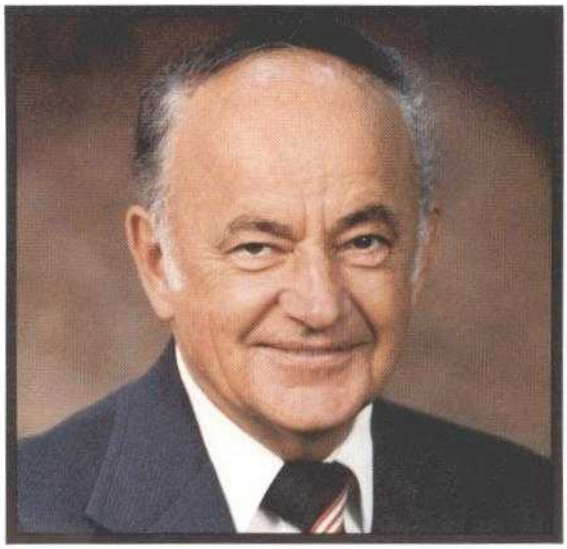

by Dr. Joseph V. Charyk
President and Chief Executive Officer
Communications Satellite Corporation

The United Nations General Assembly through Resolution 36/40 has declared 1983 to be World Communications Year. We at Comsat applaud this recognition of the importance of communications to world stability and peace, particularly the emphasis in Resolution 36/40 on the "development of communications infrastructures."

Our company has, since its founding in 1963, played a central role in creating the electronic highway through which modern communications have been brought to most countries of the world. Through the work of Intelsat, the 106-member-nation satellite communications organization, of which Comsat is a founding member, that communications highway has flourished, and its presence has spurred the development of modern, efficient communication networks in many countries. For still other countries, however, the job of developing communications infrastructures and thus taking full advantage of Intelsat's modern communications highway is only just beginning. For these countries, United Nations Resolution 36/40 on the World Communications Year, under the sponsorship of the International Telecommunication Union, is especially compelling.

On the pages that follow, the reader will find abundant examples of the role that the Comsat family of companies has already played and is continuing to play in leading the development of global satellite communications, both through our role in Intelsat and through numerous other activities. Some of these examples tell of our direct services to countries in helping them improve their domestic communication networks. We are proud of all these accomplishments.

Recently, the Federal Communications Commission granted Comsat's subsidiary, Satellite Television Corporation, permission to begin construction of satellites to provide television service directly to the homes of the U.S. public. We are most pleased by this demonstration of faith on the part of the FCC, and we feel confident that just as we have led the development of the Intelsat system for global communications, we will lead the development of this new, innovative broadcasting highway in the sky.

COMSAT

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

Editor: Stephen A. Saft

Chief Photographer: William J. Megna

Editorial Assistant: Patricia A. King

Corporate Affairs: Daniel N. Crampton, Director, Communications; Roger Cochetti, Director, Public and Investor Relations; Kathryn Holman, Director, Advertising and Display Services; Tina Arthur, Kim Baumgartner, Edgar Bolen, Scott Chase, Shirley T. Cofield, Tish Fonda, Michael K. Glasby, Phyllis Grady, Frank Grasso, Barbara Heineback, Judy C. Holmes, Gunnar Hughes, Ernest B. Kelly III, Len Koch, Dorothy S. Kozman, James D. Martin, Lani Hummel Raleigh.

Liaison Assistance: Bob Billingsley, Manager, Advertising and Public Relations, Comsat General Integrated Systems (CGIS); Judith S. Elnicki, Vice President, Public Affairs, Satellite Television Corporation (STC); Allan Gaifund, Manager, Information Activities, Comsat Laboratories; Sylvia M. Glasser, Marketing Assistant, Comsat General Corporation; Jane Casler, Advertising and Promotion Manager, ERT; Edmond Harvey, Manager, Graphic Arts; Cathy L. Jones, Phototypesetter, Graphic Arts; Betsy T. Kulick, Analyst, Intelsat Affairs, Communications Services; A. T. Murray, Public Relations Coordinator, Comsat General TeleSystems; Elizabeth Schulke, Assistant for External Affairs, Maritime Services.

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Cover: Image of Quetzalcoatl, represented as a feathered serpent, on a pyramid in The Citadel section of Teotihuacan, 20 miles northeast of Mexico City. Comsat Magazine's William J. Megna journeyed to Mexico in September to do a series of photographs on the efforts of TECMA, joint venture company of ERT and Grupo ICA, aimed at fighting Mexico City's air pollution problems. Story begins on page 11.

From the Editor

The international activities of the Comsat family of companies is the theme of Comsat Magazine No. 10.

To a large extent, **Comsat**'s international presence is manifested through **Intelsat**, the 106-member nation organization that operates the extremely successful Intelsat global communications system and in which **Comsat** is the U.S. representative. As Ellen D. Hoff points out in an article beginning on page 5, **Intelsat** is providing many benefits to the developing world—in some cases, directly through **Comsat**.

Through **Comsat General**, the Corporation provides an extensive range of technical services to both developed and developing nations, as the interview with William D. Houser, beginning on page 22, makes clear.

One of several projects to which **Comsat General** is providing technical assistance is the Palapa domestic satellite communications system operated by Perumtel in Indonesia. Jack W. Tennant describes **Comsat General**'s technical assistance to the Palapa system beginning on page 26. Smooth functioning of a satellite communications system is dependent on well-trained technicians. The M&S Center, housed in an attractive new building in Clarksburg, Maryland, offers a full range of courses in satellite communications technology for domestic and foreign audiences alike. (See page 31.)

One of the many goals of the Comsat World Systems Division is to bring the benefits of satellite communications to the U.S. Trust Territories in the Pacific Ocean region. Two territories already connected to the Intelsat system have experienced many benefits, according to George A. Lawler in an article beginning on page 36, and many more benefits are anticipated from the installation of seven additional earth stations in this developing region.

ERT, a leader in environmental consulting and services, also has been very active on the international scene, and the article by Barbara Kelly beginning on page 11 treats in detail one very important project in which this Comsat subsidiary is participating in Mexico.

Finally, we wish to express our gratitude to Rep. Albert Gore, Jr., for his article on a most sensitive and critical issue pertaining to the conduct of international commerce including that involving satellite communications—namely technology transfer. Rep. Gore's article begins on page 9.

Stephen A. Saft

N O T E S

FCC grants first DBS permit to STC for space-to-home TV

Satellite Television Corporation (STC), a Comsat subsidiary, has been awarded the nation's first permit by the Federal Communications Commission (FCC) to build a direct broadcast satellite (DBS) system.

Irving Goldstein, STC's former President, applauded the FCC action at the time of the award. He said: "Today marks the beginning of a new era in the history of television. In December 1980, we were the first to file a DBS application. Now thanks to the FCC's prompt action, we can proceed toward achieving our goal of broadcasting pay television programming directly to the home via satellite. The benefits of DBS will soon be delivered to the American public."

At a press briefing, Mr. Goldstein introduced Richard S. Bodman, who succeeded him as President and Chief Executive Officer of STC. (Mr. Goldstein has been elected Executive Vice President of Comsat.)

Mr. Bodman said: "Today's action by the FCC marks the end of one phase and the beginning of another. Now that the regulatory hurdle has been cleared, we can begin implementing this bold application of satellite technology." Commenting on the FCC action, Comsat President and Chief Executive Officer Joseph V. Charyk noted: "The Commission's decision today opens up to us an exciting business opportunity that results both from advances in technology and the growing market for home entertainment. We expect to vigorously pursue this opportunity and, in the process, bring the benefits of satellite-to-home television to millions of Americans."

The FCC strongly endorsed direct satellite broadcasting in June when it unanimously adopted interim rules for the service. Essentially, the rules will impose only a minimum of regulation on DBS.

STC estimates it will take 36 to 39 months to build and launch its DBS satellites. The system STC proposes will beam multiple channels of premium programming directly to the home via satellite. The first broadcast will cover an area roughly equivalent to the Eastern Time Zone and begin in early 1986. Individual subscribers will receive the signals using 2- to 2½-foot dish antennas.

Comsat reorganization aims at a more 'streamlined' structure

Comsat has undertaken a reorganization that is designed to better position the Corporation in the management of its jurisdictional and its competitive businesses.

Commenting on the reorganization, Mr. John D. Harper, Chairman of the Comsat Board of Directors, explained that "the corporation's continued growth requires a management structure that is more streamlined and capable of directing an increasingly complex business." Dr. Joseph V. Charyk, Comsat President and Chief Executive Officer, added that "by centralizing our management structure and eliminating some duplicative functions, we can take better advantage of our strong management team. The election of Irving Goldstein to the newly created position of Executive Vice President, with responsibility for all of our competitive businesses, except Satellite Television Corporation (STC), is a significant element in this action."

The corporate reorganization does not affect Comsat World Systems Division, which manages the Corporation's Intelsat and Inmarsat businesses and Comsat Laboratories. These businesses, which are Comsat's largest, continue as presently organized in Comsat World Systems Division under the Presidency of Dr. John L. McLucas.

Mr. Richard S. Bodman, formerly President and Chief Executive Officer of Comsat General Corporation, becomes President of Satellite Television Corporation. Joining Mr. Bodman as Executive Vice President of STC is Mr. Michael S. Alpert, formerly Vice President of Communications and Information Products, Comsat General.

Comsat World Systems Division and STC as well as the Comsat corporate functions of Corporate Secretary, General Counsel, Finance, and Corporate Affairs, continue to report to Dr. Charyk.

Mr. Irving Goldstein, formerly President of Satellite Television Corporation,

becomes Executive Vice President of **Comsat**. He is responsible for the management of **Comsat**'s competitive business activities, other than **STC**. These responsibilities include the direction of the Corporation's participation in Satellite Business Systems and these other activities:

- the satellite systems and technical services activities that make up Comsat General Corporation, under Mr. Robert W. Kinzie
- the communications products business of **TeleSystems** and **Amplica**, under Mr. Bruce D. Smith
- the integrated systems/computer-aided design business, under Dr. Stephen Szygenda
- Environmental Research and Technology (**ERT**), under Dr. Norman E. Gaut.

In addition, Mr. Goldstein is responsible for certain corporate support functions, including Personnel, under Mr. David S. Nye; General Services, under Mr. Donald E. Greer; and Corporate Development, which is headed by Mr. George H. Billings.

As part of the reorganization effort, Mr. Robert W. Kinzie has been elected President of Comsat General Corporation. In this capacity, Mr. Kinzie is responsible for management of the Corporation's Marisat and Comstar satellite systems; its partnership venture with Intercontinental Hotels Corporation, through which international teleconferencing services will be provided; the Corporation's worldwide technical services in the development and operation of satellite communications systems; and a variety of new business opportunities, including the establishment of a worldwide satellite launch support system.

Stock ownership limit upped to five percent by the Board

The Comsat Board of Directors has fixed at five percent of the total Comsat Common Stock outstanding the number of Comsat shares that may be owned by any non-carrier (i.e., Series I) shareholder, syndicate or affiliated group of shareholders. This action, effective October 1, 1982, raises the ceiling on such ownership by two percentage points from the former three percent limit. The Board also adopted a regulation defining who is a shareholder and which shares are to be attributed to such shareholder for purposes of the limit.

According to the terms of the Communications Satellite Act of 1962, Series I shareholders are those holders of Comsat Common Stock who are not authorized communications common carriers. **Comsat** presently has 8,000,014 shares outstanding, almost all of which are held by Series I shareholders. Thus, the new ceiling would permit the holding of up to 400,000 Comsat shares. Comsat stock is registered on the New York, Midwest and Pacific stock exchanges, trading under the symbol CQ.

Fifth consecutive increase is recorded in third quarter

For the quarter ended September 30, 1982, Consolidated Net Income was $11.0 million, or $1.38 per share. This amount is an increase of $4.6 million, or $.58 per share, over Net Income reported for the same period of last year; and an increase of $.2 million, or $.03 per share over Net Income for the second quarter of 1982. The third quarter of 1982 was the fifth consecutive quarter for which earnings have increased from those for the previous quarter.

The Comsat Board of Directors declared a quarterly dividend of $.575 per share, payable December 13, 1982, to shareholders of record on November 12, 1982.

Operating Revenues for the third quarter of 1982 totaled $105.0 million. This is the first quarter in **Comsat**'s history during which revenues exceeded $100 million, and the amount is $20.1 million greater than the amount reported for the third quarter of 1981. The increase in Operating Revenues primarily resulted from growth in revenues associated with satellite systems services. Operating Expenses for the quarter ended September 30, 1982, totaled $90.9 million, an increase of $16.2 million over expenses for the same quarter of 1981. This increase in Operating Expenses resulted primarily from planned increases

continued next page

N O T E S

in Operations and Maintenance expense, and from higher taxes resulting from higher pretax income.

With respect to Other Income (Expense) - Net, the most significant item included in the total is **Comsat**'s share of losses related to its partnership interest in Satellite Business Systems (**SBS**). After recognizing Federal income tax benefits and investment tax credits, the amount of this loss decreased to $4.0 million for the third quarter 1982 from $5.9 million for the same period of 1981. A major factor in this reduction was the change in October 1981 in the Corporation's ownership in **SBS** to 33.3 percent from 41.3 percent. This $1.9 million loss reduction was partially offset by lower income resulting from a smaller investment portfolio in 1982 than in 1981. Thus, Other Income (Expense) - Net was a net expense of $3.0 million for the third quarter 1982, a $.8 million decrease in expenses compared to a net expense of $3.8 million for the same quarter of 1981.

For the first nine months of 1982, Consolidated Net Income was $32.2 million, or $4.02 per share, an increase of $11.3 million, or $1.41 per share, over Income Before Cumulative Effect of Change in Accounting Policy for the same period of last year. Net Income for the first nine months of 1981 reflected a nonrecurring item in the amount of $11.8 million, or $1.47 per share, that resulted from a change in accounting policy for investment tax credits related to non-public-utility property.

John D. Harper, Chairman of the Comsat Board of Directors, is the recipient of the first Bryce Harlow Award.

John D. Harper is recipient of first Bryce Harlow Award

John D. Harper, Chairman of the Comsat Board of Directors, is the recipient of the first Bryce Harlow Award for his significant contributions to improving business-government relations. The award, which is named after a former Procter & Gamble vice president who also served on the senior White House staff under Presidents Eisenhower, Nixon and Ford, is to be presented annually. Mr. Harper was one of 50 nominees considered by the nomination commmittee of the Bryce Harlow Foundation.

Substantial savings projected from river monitoring system

The satellite-based monitoring system of the Arkansas River developed by Environmental Research & Technology, Inc. (**ERT**), and Comsat General Corporation will save Coloradans at least $1.5 million if the project continues in 1983. The effectiveness of the river monitoring system was illustrated during a period of heavy rainfall in late July when the system worked continuously to monitor the river as it approached dangerous levels.

The satellite-based water monitoring system tracked events without interruption during the severe storms and floods in July. Local, state, and Federal authorities were alerted in time to take appropriate actions to prevent flooding while providing optimum water diversions to irrigators. The $1.5 million estimate was developed by analyzing the possible property damage that was prevented thanks to existence of the system, and by taking into account the benefits achieved by assuring Colorado its full water entitlements under interstate compacts, by providing more efficient allocation of in-state waters, and by improved management efficiency.

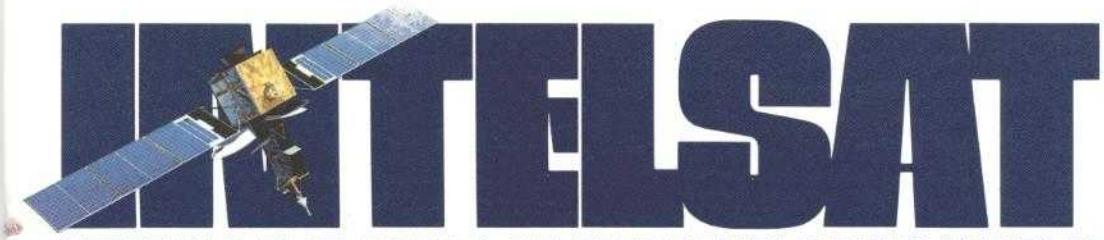
The ERT/Comsat General Arkansas River monitoring system, called the Hydrological Information Service (HIS), consists of computers, satellite communications, and water sensors that measure the height and flow of the river.

ERT maintains an office in Denver as well as a substantial operation in Fort Collins, Colorado. The ERT Fort Collins office provides major environmental baseline studies and prepares environmental impact statements and permit applications. **ERT** and **Comsat General** are **Comsat** subsidiaries.

International carrier status approved for SBS by FCC

Satellite Business Systems (**SBS**) has received authorization from the Federal Communications Commission (FCC) to operate as an international communications common carrier, permitting **SBS** to offer a wide range of advanced telecommunications services between the United

continued page 41.



MEETING THE NEEDS OF THE DEVELOPING WORLD

by **Ellen D. Hoff**, *Director, Intelsat Affairs*
Comsat World Systems Division

Meeting the telecommunications needs of the developing countries in Latin America, the Caribbean, Africa and Asia was among the earliest objectives for the global communications satellite system. The United States Congress, in passing the Communications Satellite Act of 1962, set in motion a chain of events which led to the establishment of **Intelsat** and, in so doing, declared that it was the policy of the United States to establish a global communications satellite system in cooperation with other countries as soon as possible. Further, Congress stated: "In effectuating this program, care and attention will be directed toward providing such services to economically less developed countries and areas as well as those more highly developed. . . ." These principles were carried forward by the United States into the negotiations which led to the creation of **Intelsat** and became part of the underlying philosophy behind **Intelsat**.

Today, the goal of extending the benefits of modern commercial satellite communications to the developed and developing nations of the world is being achieved through the Intelsat system. Fully three-quarters of the 106-member nations of **Intelsat** are developing countries, many of which were only achieving independence in 1962. Earth stations for international communications via **Intelsat** stand in 93 member countries, as well as in 32 nonmember countries and in 11 other territories and areas of special sovereignty, such as Hong Kong. Twenty-four countries and territories are currently planning to build their first Intelsat earth stations in the next few years.

To achieve this wide participation and to expand and diversify the global network, **Intelsat** has made an effort to be flexible in meeting the widely varying requirements of its members and nonmember users. Many countries joining **Intelsat** expected their levels of international traffic to be quite small, at least initially. This low volume of traffic, due in many cases to the absence of adequate domestic communications facilities to bring traffic to an earth station, made construction of an Intelsat A earth station economically unjustifiable. Accordingly, in early 1976, **Intelsat** created a second standard for international earth stations, the Standard B; this antenna is about one-third the size of the Standard A-type design and is generally much less costly to build.

Also in the 1970s, **Intelsat** approved the introduction of two modulation techniques for international satellite communications which are geared especially for the light traffic streams coming from many of the developing countries with Standard B stations: Single Channel Per Carrier (SCPC) and SCPC Pulse Code Modulation, Multiple Access Demand Assignment (SPADE).

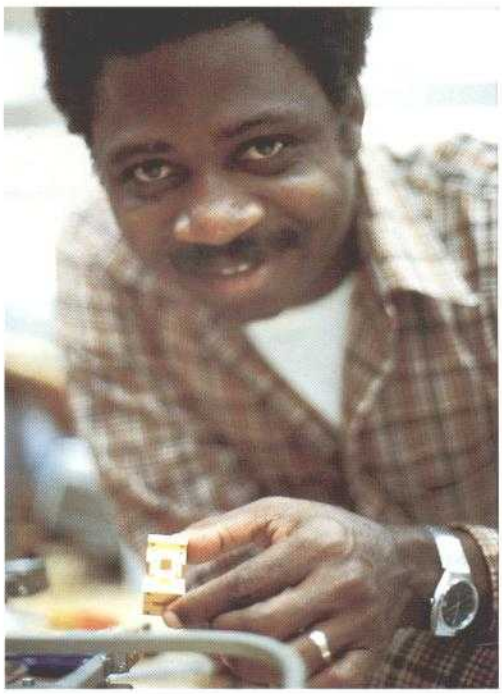
In contrast to the Frequency Modulation/Frequency Division Multiple Access (FM/FDMA) technique used by Standard A stations, both SCPC and SPADE allow carriers containing one channel to be used. This is more appropriate for the developing countries since their initial traffic, in many cases, amounts to fewer than 10 channels. And, importantly, their traffic does not grow in leaps of 10 or 12 channels, but one or two channels at a time. SCPC allows permanent channels to be added one at a time. When there is not enough traffic to a particular destination to warrant a dedicated SCPC channel, SPADE can be used. SPADE equipment allows a connection to be established on-demand through a specially designated transponder in the satellite for the duration of a telephone call. Once the call is ended, the channels in the satellite transponder are released back into the pool of free channels from which they will be "seized" again to make another temporary, on-demand connection.

Having vastly improved their ability to communicate internationally by joining the Intelsat system and constructing their own earth stations, many developing countries have turned to the pressing problems of building communications networks within their countries.

Satellite communications offers an attractive alternative. With earth stations in each major town, a national network

can be created in relatively short time and at much less expense than a terrestrial system. With such a system, telephone connections can be established between points where none existed previously, and, because of the wideband qualities of satellite communications, television can be extended from its origination points, usually in national capitals, to the cities and towns of the countryside.

Thus, in 1974, Algeria approached **Intelsat** and, with strong Comsat support, asked if it could lease one of the transponders on an Intelsat spare satellite, so that it could extend educational television and telephone connections to its cities and towns scattered throughout the Sahara Desert. **Intelsat** created a new type of service, the preemptible lease of spare satellite capacity for the provision of domestic services. Earth stations providing domestic service may be far less expensive than those in internation-



*Intelsat Assignee program helps spread satellite communications technology. **Below**, at Intelsat headquarters are assignees, left, Jose Albuquerque of Brazil and Krishna Prasad from India. **Right**, Assignee Simeon Ajose from Nigeria is at Microwave Laboratory of Comsat Laboratories. Photos by **William J. Megna**.*

Ground Broken for Intelsat Headquarters

Like the unusual design of its building, **Intelsat**'s initiation of construction of its new headquarters was equally innovative. On July 20, 1982, at the groundbreaking ceremony in northwest Washington, D.C., a small explosive charge was triggered by a signal radioed twice around the world via four satellites and five earth stations, including a **Comsat** transportable terminal at the building site.

Designed by the Australian architectural firm of John Andrews International Pty. Ltd., the headquarters will house **Intelsat**'s multinational staff as well as sophisticated technical facilities. The non-traditional groundbreaking was thus in keeping with a business whose concerns are communications via satellite.

Intelsat's new headquarters site is set in the International Center enclave near Connecticut Avenue and Van Ness Street and will occupy twelve acres of federally owned land. Following Congressional and Presidential approval, the U.S. State Department, the agency responsible for administering the site, recently signed a 99 year lease with **Intelsat** for use of the land. Neighboring the new headquarters will be 23 chanceries of small to medium-sized foreign missions, including those of Kuwait, Ghana, Israel and Qatar.

John Andrews International was selected as architect two years ago by the **Intelsat** Board of Governors following an international competition which included 93 firms. Six semifinalists from Australia, Canada, Finland, the United States, and West Germany were invited to present proposals for the site. The Andrews design was selected for its imaginative and innovative concept, as well as its practical, cost efficient and energy saving approach. The design also had to meet the requirements and achieve approval of the local planning authorities, including the National Capital Planning Commission.

The **Intelsat** headquarters will cover some 380,000 square feet, housing conventional offices and suites for the staff, Director General and members of the Board of Governors. In addition, the facility will include the **Intelsat** Satellite Control Center, the Operations Center, simulation and maintenance centers, a technical library and eating facilities. Sophisticated conference facilities will be equipped for groups of up to 300 people and may be made available for other international meetings when not in use by **Intelsat**.

Construction of the $50 million building is expected to take 27 months, with occupancy set for late 1984. Upon completion, 62,000 square feet of expan-

al service. The service is offered on spare satellites so that the cost to the leasing countries can be kept low, with the understanding that, should it be necessary for **Intelsat** to transfer its international traffic to the spare because of failure of an operating satellite, the domestic traffic would be preempted. However, since Algeria became the first to establish a domestic lease network in 1975, no country has lost service through preemption.

Nigeria, Sudan, Zaire, India, Peru, Brazil, Mexico, Colombia, Chile, Saudi Arabia, Oman, Niger, Argentina, Thailand, and Malaysia have established domestic satellite communications systems based on capacity leased from **Intelsat**. The number of countries leasing spare capacity has increased along with the total number of transponders being leased, which now totals 27. Almost 20 additional countries have already announced their intentions to begin such service.

Taking into account the growing number of leases and the dependence many countries have on satellite capacity leased from **Intelsat** for vital domestic communications, **Intelsat** is actively considering how capacity for these leases may be accommodated in the planning of future generations of Intelsat satellites, as well as possible arrangements by which it may provide separate satellites on request to users for their communications needs, including domestic services.

Intelsat has continued to respond to requests for special types of service. Late in 1981, **Intelsat** received a novel request for service from the Signatory of Fiji, in the South Pacific. Fiji asked that it and other administrations in the South Pacific be allowed to establish an audio conferencing system for the University of the South Pacific. The University had been using a NASA experimental satellite, ATS-1, to interconnect a network among its main campus in Suva, Fiji, and

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sion space will be available for leases to foreign governments for chanceries. In addition, plans include 6,000 square feet for permanent commercial lease by shops and restaurants.

The Andrews design, praised by architectural critics as perhaps the most advanced and original office building planned for the Washington area, consists of a series of octagonally shaped four-story "pods." The pods, which have a floor area of approximately 90 by 90 feet, are clustered around considerably taller atriums—glass and stainless steel pavilions. The structural arrangement provides not only for a pleasant working environment, but achieves a high degree of energy efficiency. Utilizing the latest techniques in heat recovery and heating and cooling load minimization, the building will have approximately 60 percent of its energy needs supplied without cost, compliments of nature. Pools of water will be used both outside the building and inside the atriums to cool the summer air and to maintain a sense of repose and beauty. The exterior of the building will present a delicate facade of stainless steel and tinted glass sun screens in front of floor-to-ceiling glass walls. The atriums and sun screens together will admit a maximum of natural daylight, while excluding unwanted direct sun rays.

Making optimum use of the park-like characteristics of the stepped site, Andrews painstakingly preserved 62 large trees, which will serve as natural air conditioners, cooling summer air as it enters the building. The terraced roof areas of the building will also be landscaped gardens.

The building's design and utilization combine to reflect the character of the **Intelsat** organization itself. As John Andrews explains, "This building was designed in a spirit of openness, of optimism, of faith in cooperation between people and groups of people, and in the use of modern technology." The new **Intelsat** headquarters will express what is at the heart of **Intelsat**'s purpose—the communication of new possibilities.

Ingrid Kollist
Intelsat Affairs
Comsat World Systems Division

branch campuses on islands throughout the South Pacific. This network is used for distance teaching, with a lecturer in one location being heard by classes assembled on islands throughout the region, for roundtable discussions, for counseling of students and for administrative purposes.

Intelsat Standard B antennas had in the interim been built on many of these islands, while transmissions from the old ATS-1 satellite grew gradually weaker. The university, therefore, decided that it would be appropriate to move the network onto the Intelsat system, where it would be assured of continued and higher quality service. What made this a novel proposal for **Intelsat** was that it called for sharing of a single telephone circuit by several locations simultaneously. After assuring that such interconnection arrangements would not interfere with adjacent circuits in the satellite, **Intelsat** approved terms for a full-time two-way audio conference service.

Within the last months, **Intelsat** has established a new, shared international TV lease service on spare capacity. Any number of Signatories may share in the lease of TV program capacity, with a modest additional charge per country regardless of the number of receiving stations. This service is proving extremely attractive to news organizations and will also free up capacity for all users on the transponders which handle occasional television requirements.

Intelsat at present is actively considering a new offering for low density telephony networks. This is being developed in response to the needs of the Pacific islands for continuing but comparatively small levels of national and international communications, with extremely cost effective stations.

The service, which may begin on a transponder set aside for this purpose on an Intelsat Pacific satellite, would involve new charging methods appropriate to the often sporadic and low density nature of the service needs. The applicability of such an approach to distributed, remote area communications needs is obvious and promising.

Intelsat has several programs to assist countries by providing specialized expertise. The Intelsat Assistance and Development Program (IADP) was established by **Intelsat** in 1978 to provide technical assistance to any country needing help in modifying and upgrading existing earth stations (a continuous process), selecting sites for new earth stations, planning domestic lease systems, or interconnecting their national telecommunications networks with the Intelsat system. In addition, the IADP holds seminars to explain **Intelsat**'s technology and methods of operation. The program is also helping to develop curricula for satellite earth station operations and maintenance courses which are being instituted in regional training centers in Africa and the South Pacific and is providing the programs with needed Intelsat documentation. Assistance is provided at either no cost or on a cost-reimbursable basis. More than 60 such projects have either been completed or are underway in some 50 countries.

The Training Program for Young Professionals, proposed by Nigeria, was initiated this year to bring junior level staff members (ages 22 to 33) from Intelsat Signatory organizations to work with the Intelsat headquarters staff in such areas as finance, communication engineering, operations, and intersystem coordination. After a one year stay in the United States, the young professionals will return to their homelands with skills needed by the telecommunications administrations which sent them.

The training program is an outgrowth of the Intelsat Assignee program, which was initiated at **Comsat**'s suggestion in the earliest days of **Intelsat**. Its original purpose was to provide **Intelsat** with additional skilled manpower to assist in the development of the then fledgling global communications satellite system and to foster exchange of technical information among the members of the organization.

All of these programs and the special efforts undertaken by **Intelsat** have had a common theme: to make modern satellite communications technology widely available. The IADP, the Training Program for Young Professionals, and the Assignee Program help nations consider how to use this technology efficiently and effectively. The increasing use of the Intelsat system by countries around the world for international and domestic communications, via conventional and new services, is a testimony to the continuing commitment of **Comsat** and other Intelsat Signatories to provide satellite communications to all nations of the world. These innovations are major steps in efforts to heighten the cost effective provision of nondiscriminatory services, as well as the sharing of resources and expertise to increase the efficiency of using the orbital arc and frequency bands to meet exploding communications needs.

Intelsat earth station at Lurin, Peru, showing antennas used for international and domestic service. A growing number of countries like Peru are making use of the global Intelsat system for domestic service. Photo by ***David W. E. Rees.***

TECHNOLOGY TRANSFER, DELICATE BALANCE

by the Honorable **Albert Gore, Jr.**, Chairman
Subcommittee on Investigations and Oversight
Committee on Science and Technology
U.S. House of Representatives

One of the missions of my Subcommittee on Investigations and Oversight for the Committee on Science and Technology is to explore questions of technology transfer. We have examined in the past the impact of technology transfer and restrictions on transfers of academic freedom, peer review, innovation, research, and commercialization. We have explored the impacts of technology transfer on commercial and academic institutions, on the domestic and international scale, and we have examined both legitimate and illegitimate transfers.

Recently, we have continued this exploration by involving technology transfers in the Third World, with specific reference to what is surely one of the most potent and dramatic areas of technology, namely computers and information technology, particularly microprocessors. We have directed our inquiry so as to further identify ways in which computer technology can be adapted to the nonindustrialized nations and to evaluate what the government and private sector are doing to develop this market.

Policies on technology transfer are at best a most delicate of balances. It may be considered wise for the United States to take every commercial and geopolitical advantage of a technological lead —such as the U.S. lead in microprocessing technology—by facilitating technology transfer, as it offers the opportunity to strengthen our balance of trade. At the same time, policies that provide for free flow of technology may squander a technological lead by giving away our best knowledge, by providing ready access to technology we may not want to transfer widely, and by otherwise assisting the aims of nations who do not have our best interests in mind.

When we consider the need to balance these concerns in an arena involving the fiercely competitive computer

and information processing industry and the politically sensitive Third World, the delicacy of these questions becomes all the more acute. Computers, particularly microprocessors, quite realistically have the potential to change the way we live, the way we manufacture our products and the way we defend ourselves.

Let us take education, for example. It is my hope that one day every classroom will have a computer terminal. I believe that microprocessing technology will change the face of American education, and this will take place sooner rather than later. Because of this, I have cosponsored legislation to provide larger tax deductions for computer companies that donate computers to schools. We anticipate that with such writeoffs, we will be able to quickly place computers in every secondary school in the country. This, however, is just one of the potential applications which demonstrate how this particular sector of the American technological effort will have a dramatic impact on life in America.

Since the UNSTAD conference in Vienna three years ago, the countries of the developing world have made it quite plain that they do not wish to be left behind in this technological revolution, and, indeed, a strong case—economically, politically and socially—can be made that it is in the best interests of the United States to develop and capitalize on our technological advantage. These desires have led to a number of formal international discussions concerning how information technology could make a giant step toward ameliorating the economic and technological gaps between the developing and industrialized nations. This is a trend we cannot afford to ignore.

Last May, my Subcommittee heard representatives from the World Center for Microprocessing and Human Resources discuss an ambitious effort by the French Government to develop microprocessing technology for education, and ultimately to increase the computer literacy of the Third World. Whether this effort will succeed is the subject of much debate. There are many substantial problems with transferring microprocessing technology, of which members of the communications, electronics and information industries are most aware. Problems of infrastructure, training and suitable power sources in lesser developed countries all pose formidable obstacles to underdeveloped nations seeking to absorb our microprocessors and information transfer technology. The oftmentioned contrasting image of a modern parabolic dish antenna in a village of grass huts in Ghana illustrates the challenges that lie before us.

As well, there are geopolitical concerns that need to be faced. The various international forums still have much work ahead to design appropriate mechanisms for transborder data flow. Since many of the more developed nations in the Third World, such as Mexico and Brazil, see information technology as an opportunity to develop an indigenous industry, they have placed severe trade restrictions on foreign technology.

We cannot afford to lose sight of what may be a worthy goal merely because questions have been raised about the vehicle to deliver it.

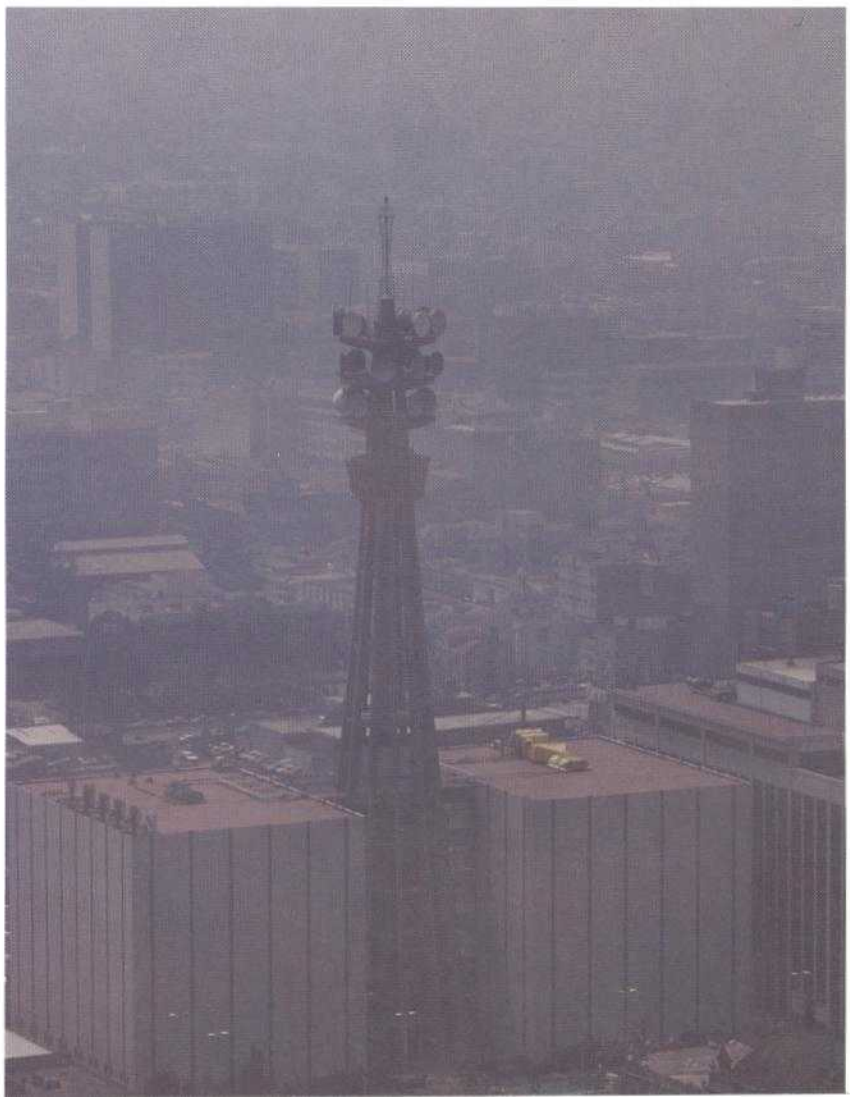
I will continue to address several questions: Is it advisable for the United States to transfer this technology? Is it feasible, considering the numerous practical problems of transferring microprocessing technology to the developing world, including the lack of infrastructure and suspicion of new technologies in many nonindustrial cultures?

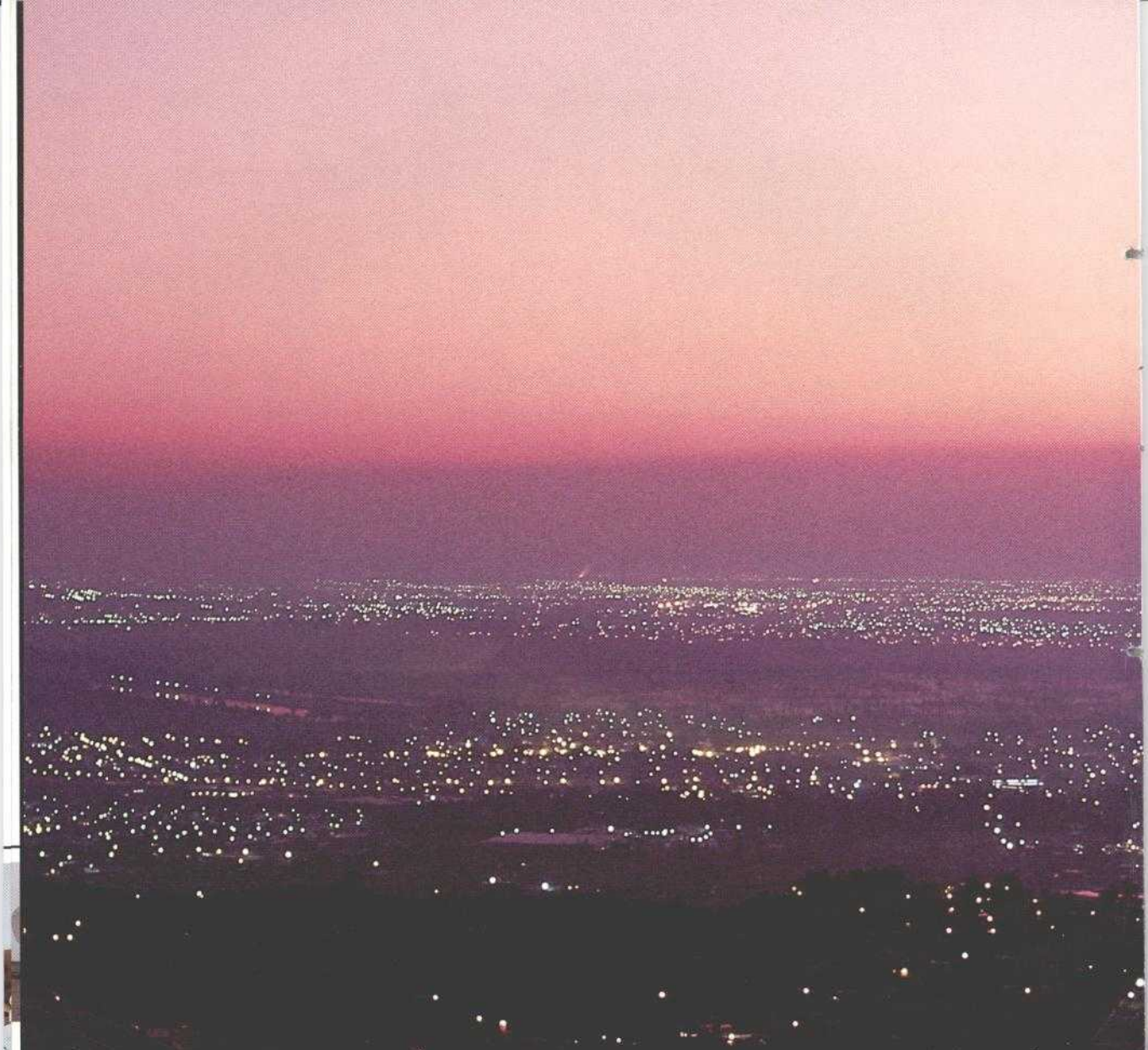
Lastly, ideology, theory and altruism aside, we need to hear from the microprocessing industry as to whether there is even a market out there to begin with, and whether and how a proposed program of transferring computer technology could or should integrate public and private undertakings.

TECMA: FACING THE MEXICO CITY CHALLENGE

Joint venture of Comsat's ERT and major Mexican company Grupo ICA is operating 25 air monitoring sites in and around Mexico City. Objective: to thoroughly document the city's air pollution problems as an essential first step to effecting a cure.

by ***Barbara Kelly***
Promotion/Technical Writer
Environmental Research & Technology, Inc.
Photography by ***William J. Megna***





Suppose you lived in a beautiful Latin American country about one-fourth as large as the United States and with a population of nearly 70 million. The population is growing rapidly, at the rate of more than 3 percent per year. Much of the country is mountain, desert, or jungle; only 15 percent of the land is arable. In the south central part of this country is a high, cool, and dry region surrounded by mountains and in which people have lived since 4000 BC. Because of its history, its pleasant climate, and its growing job opportunities, you may well choose to settle in the city in this region.

The city, of course, is Mexico City, once the Aztec capital and possibly the oldest continuously inhabited city in the Americas. The irony is that the city's climatic desirability is at the heart of its air pollution problems: more than half of Mexico's people live in the central highlands and more than 13 million live in Mexico City. It is estimated that, by the year 2000, more than 30 million people will live in the city. Imagine, then, that you live in a metropolitan area about the same size as Los Angeles but with levels of air pollution about four times as high, that your city is at an altitude higher than Denver's and set in a "bowl" surrounded by mountains, that dust from roads and overgrazed farmlands sits over your city, and that the noise levels, burgeoning industry, and automobiles have changed the complexion of your city. It's obvious that someone has to take steps to combat the problems associated with your city's growth.

Because of the danger to public health and welfare, the Mexican government and private industry realize the urgency of the air pollution problem.

Opening Page. *Downtown Mexico City on a typical hazy day. Building, foreground, with its prominent communications tower, is National Lottery Building.*
This Page. *Beauty of a sunrise over Mexico City is enhanced by air pollution.*

The causes of the high smog levels have been hypothesized but not fully measured, and it is thought that a corrective strategy might be effected more quickly and thoroughly once the causes are scientifically diagnosed.

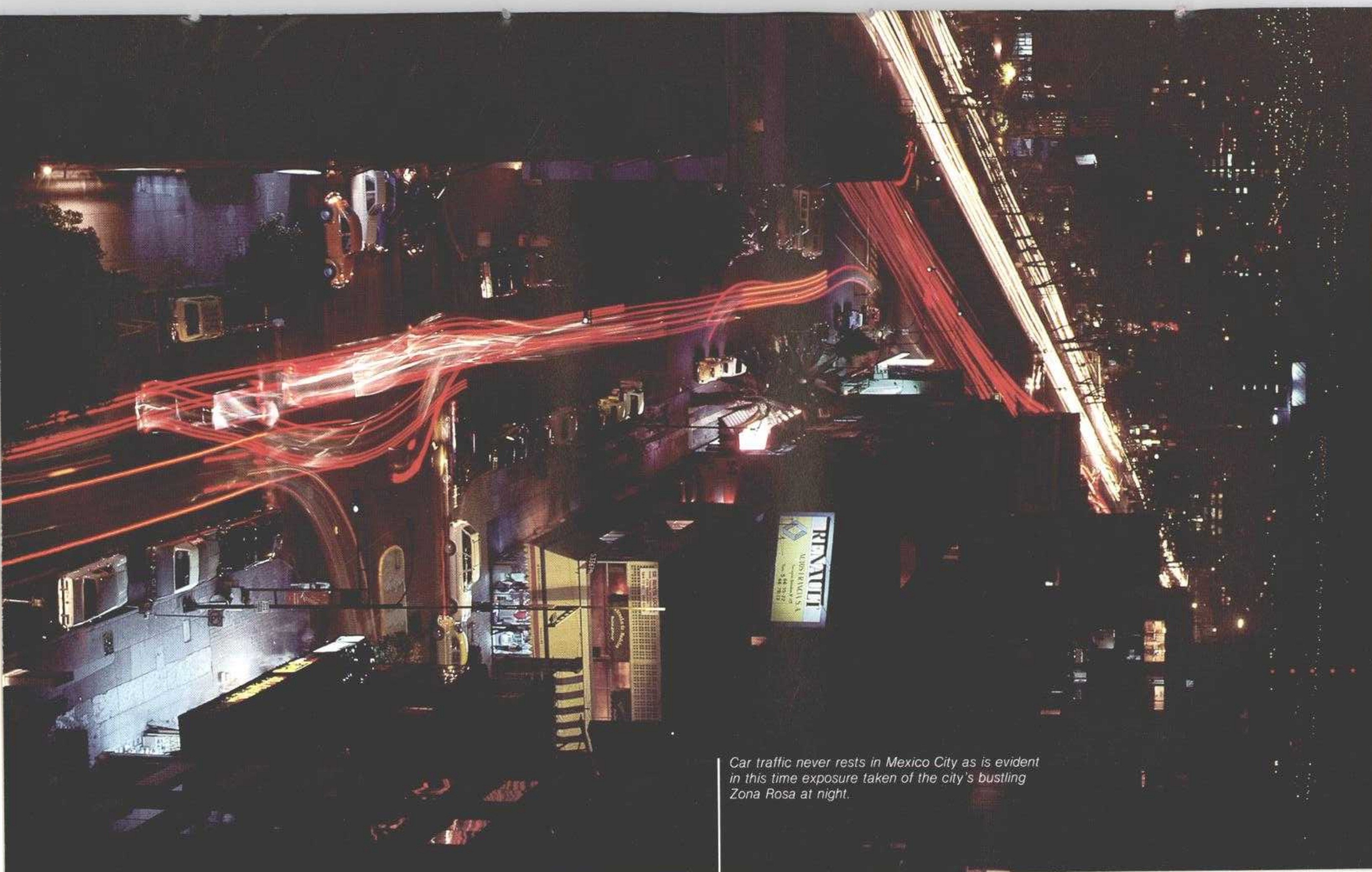
The causes of Mexico City air pollution are both man-made and natural, uniquely combined to result in potential disaster. Buses, trucks and automobiles, which have no pollution control devices, crowd the metropolitan area. Industry burns high sulfur fuel oil or natural gas. Pollutant emissions of sulfur oxides, nitrogen oxides, carbon monoxide, and hydrocarbons are at levels estimated to be unsafe.

continued next page

Windblown dust, much of it from barren land around the city, is a cause of poor visibility. Additionally, sunlight pierces the thin air at the high elevation of the city to cause extensive chemical reaction of certain pollutants, and these secondary compounds form part of the smog over the city. The very location of the city—high, dry, and temperate, which draws the population to settle there—exacerbates the public health problems associated with air pollution. At the high altitude of 7,000 feet (2,100 meters), the air is thinner than at lower elevations. The lungs work harder to inhale the needed oxygen. Scientists and physicians agree that it appears that pollutant concentrations in Mexico City must be reduced to the point at which they are proportionately lower than acceptable amounts for most cities in the United States and Europe to compensate for the lower oxygen content in the air.

To establish the scientific bases for recommending pollution controls in the metropolitan area, it's necessary to measure and record pollutant levels and associated weather conditions in Mexico City. A $2.1 million contract to provide these measurement (monitoring) services has been awarded to Tecnologia del

***Above**, TECMA staff members Umberto Sauri Duch, Program Manager, left, and Patricia Ramirez, right, conduct air monitoring training session for employees of Mexican federal agency Subsecretaria de Mejoramiento del Ambiente (SMA). **Below,** Major problem for city residents: too many cars.*



Car traffic never rests in Mexico City as is evident in this time exposure taken of the city's bustling Zona Rosa at night.

Medio Ambiente, S.A. de C.V. (TECMA), a joint venture company formed by Environmental Research & Technology, Inc. (ERT), a Comsat subsidiary, and Grupo ICA, a large diversified Mexican company. The measurement and data collection are being carried out with ERT acting as a subcontractor to TECMA and providing technology transfer and formal training to Mexican nationals. In addition, a complete computerized data center as well as a maintenance and calibration laboratory are being established in the city. The idea, of course, is to make the city and its people independently able to handle air pollution problems and to embark on more ambitious programs of environmental management.

The current program involves 25 air monitoring sites at a variety of locations around the city. At most of these locations, a small concrete building, about the size of a storage shed, houses equipment to sample and measure pollutant gases and dust and other particles, to automatically record the measurements, and to send the information to a computerized data center in the city where scientists regularly will study and analyze the data. Data will be collected for at least two years from the date of commencement of the collection program.

Air monitoring buildings (called shelters) are located at such places as the roof of a public building, the courtyard of a school, adjacent to a busy metro station, on the curb of a busy street, on the roof of a fire station, adja-

cent to a car repair and body shop, in an open area near construction and farms, and in a field east of a refinery and a steel mill.

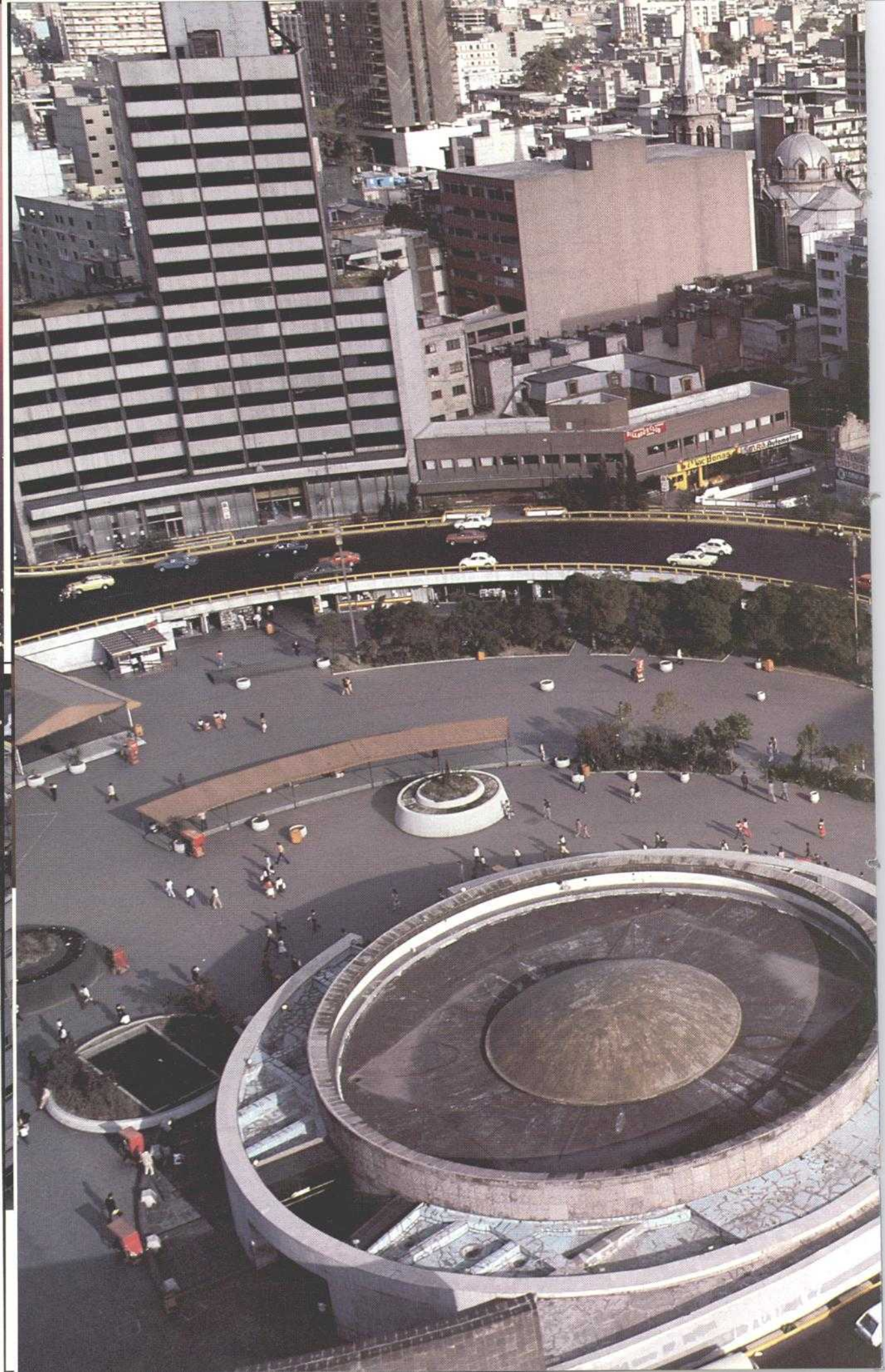
At some of these locations, meteorological towers are situated to measure and record temperature, wind speed and direction, and humidity. What is being measured and kept track of are the concentrations at some locations of sulfur dioxide gas, emitted primarily by burning fuel oil or coal, nitrogen oxides, emitted primarily from vehicle exhaust, and other pollutants, such as carbon monoxide, ozone, hydrocarbons, hydrogen sulfide, and particles. Other dangerous pollutants are thought to be in the Mexico City air but have never been measured. These include polychlorinated biphenyls (PCB), vinyl chloride, formaldehyde, and heavy metals, such as arsenic, lead and nickel.

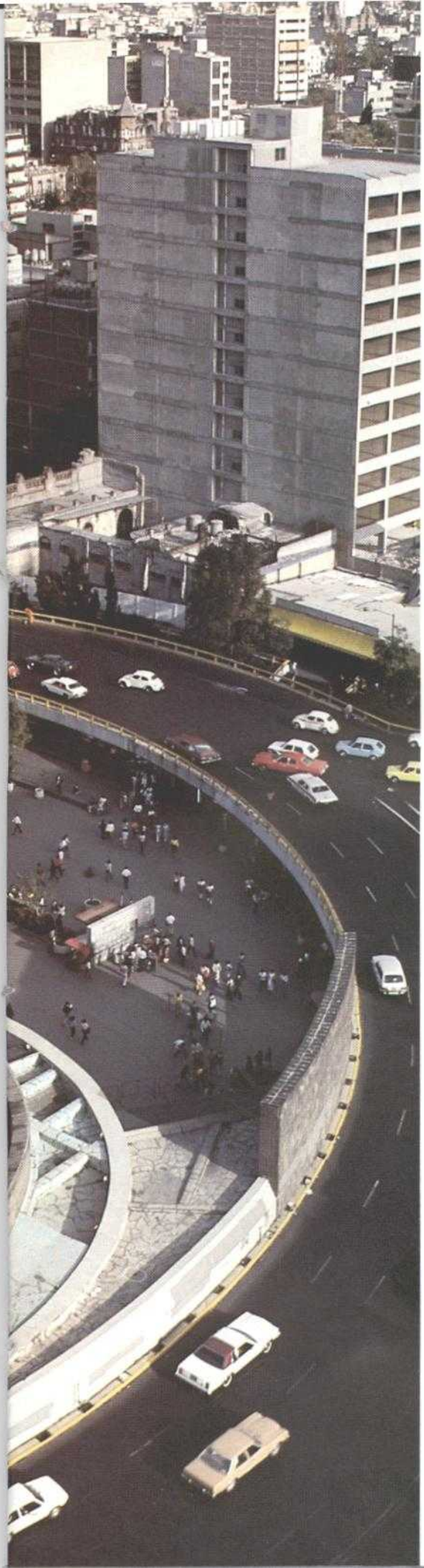
The air monitoring system is based, in part, on methods accepted by the United States Environmental Protection Agency (EPA) for programs run under its jurisdiction. TECMA and ERT are using these methods because they've proven reliable. A typical air monitoring shelter includes both mechanical and electronic equipment. Air is continuously sampled (once a minute) for pollutant gases; in this instance, sulfur dioxide, nitrogen dioxide, and carbon monoxide, and for dust and other particles, all measured in parts per million (ppm). Each sensor works slightly differently from the others:

- The particulate monitor automatically measures the amount of light reflected from dust particles in the air sample—more light means more dust.
- The sulfur dioxide analysis is based on the effect ultraviolet light has on the pollutant gas.
- The nitrogen dioxide analyzer performs complex tasks to measure a glow (chemiluminescence) given off by a nitrogen compound when it combines with ozone.
- The carbon monoxide analysis is based on the amount of infrared energy absorbed by the pollutant gas.

At many sites, meteorological data are collected as well by means of in-

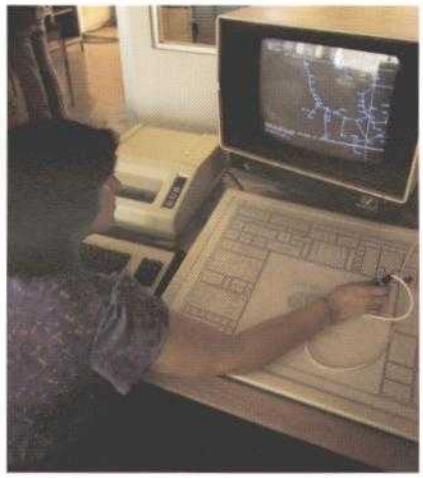
__Left__. Three men who make TECMA go, from left, David B Haswell, ERT/TECMA representative; Eduardo Luis Castillo, General Manager; and Umberto Sauri Duch, Program Manager. __Below__, Tower at this air monitoring site in southern part of the city supports weather sensors.





struments mounted on a shelter roof or on an adjacent tower. Information on wind speed and direction, temperature, and humidity is continually gathered and transmitted through the shelter microprocessor to a central computer. Comparable kinds of sensors measure these and other pollutants at selected locations around the city. Other automatic and manual tasks are performed to complete the system. For example, the sensors are tested once a day by an automatic device in each shelter and once every two weeks by a technician. In keeping with the concept that TECMA's air monitoring system is modeled on the EPA system, each month a data report is compiled to validate that all is working as expected.

All sensors are connected to a computerized data collector in each shelter. The data collector, a microprocessor, is connected by means of telephone lines

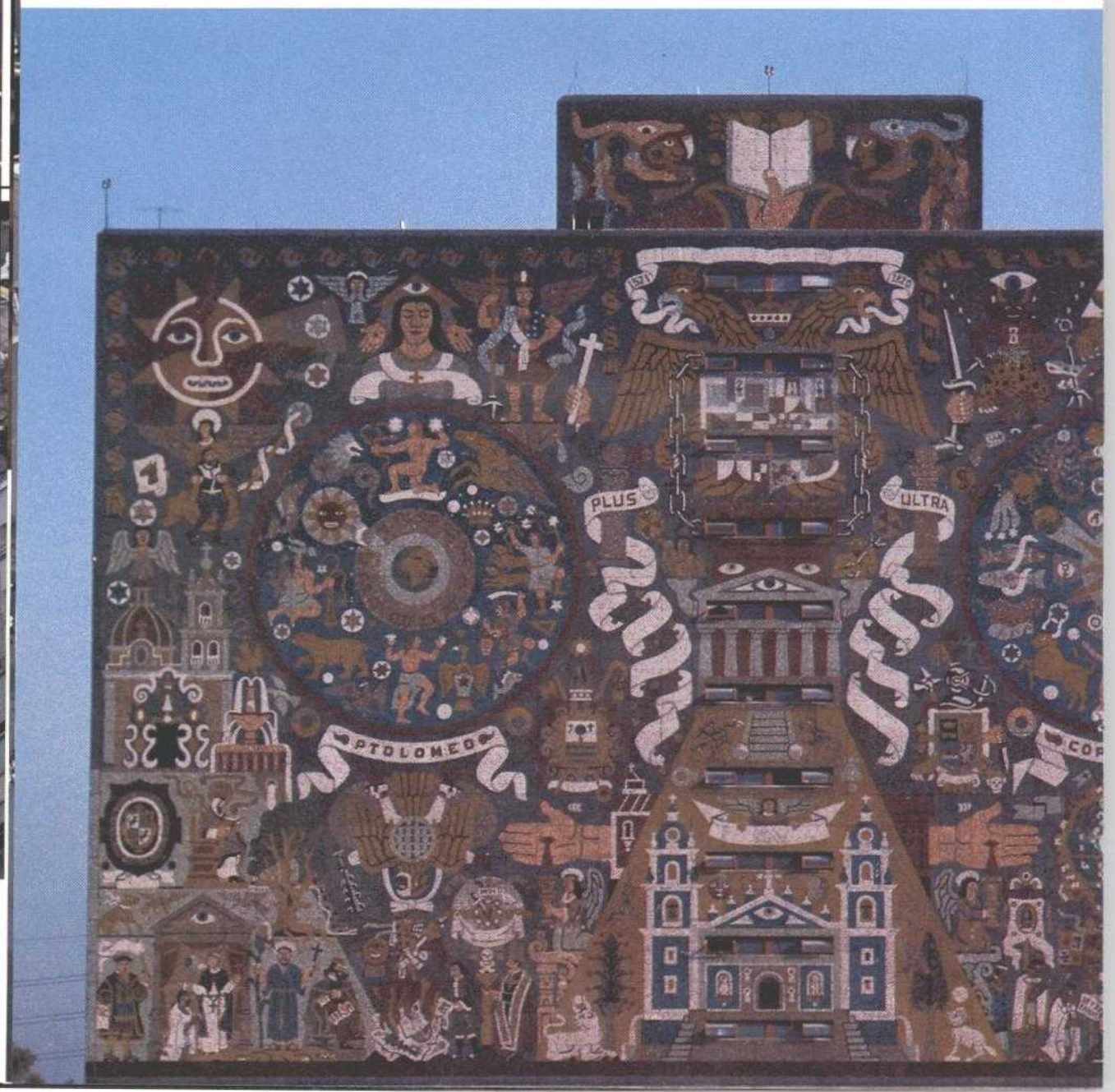


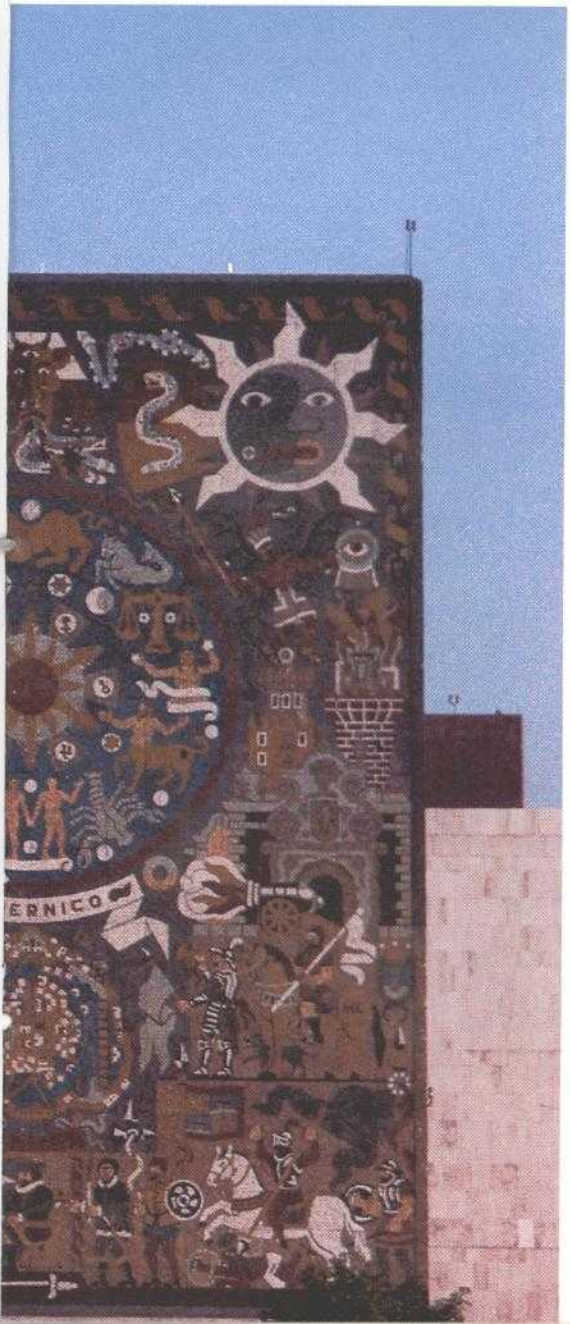
Left. *Insurgentes metro or subway station (large circular structure) in the Zona Rosa section of Mexico City. Air monitoring shelter, closeup below, is just to upper right of station.* ***Upper Right,*** *TECMA engineer Yolanda Casimiro programs computer used to analyze air monitoring data.*

to a central computer at a government office location. ERT is training Mexican engineers and technicians to operate the equipment and to organize and analyze the data. The central computer office and a maintenance and calibration laboratory have been established so that ERT can turn over to local staff the entire network operation after two years. It is anticipated that such technology transfer will be the nucleus from which more ambitious environmental measurement and management programs can proliferate.

Monitoring air pollutants is only the beginning, but it is the crucial first step toward solving the problem of Mexico City air pollution. Testing the air to find out what compounds it contains and in what quantities is analogous to sampling one's blood for a medical diagnosis. "Cure" is the ultimate goal but understanding the problem comes first. Data analysis is expected to confirm the suppositions about pollutant sources and amounts. For example, it's expected that heavy industry in the northern part of the city, including power plants, petroleum refineries, and metal processing plants, contribute to sulfur dioxide pollution, that automobiles and trucks contribute much of the nitrogen dioxide and carbon monoxide pollution, and that barren lands near the city are responsible for much of the dust. Weather information is expected to confirm the number of days of inversion (when the air remains stationary over the city), how windy it must be to create dust swirls over the city, and the interrelation of little rainfall and high pollution levels.

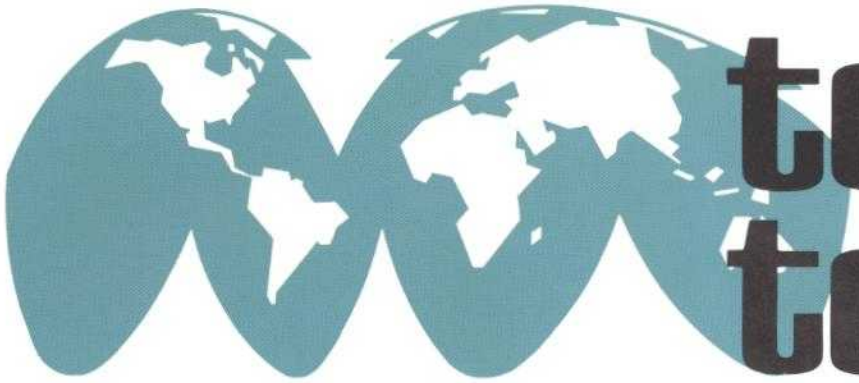
As the monitoring program progresses, it is expected that a plan of pollution control options will be worked out depending on the findings of the air monitoring system. For motor vehicles, plans may well include setting pollutant





emission standards and requiring exhaust control equipment on cars along with regular inspections. Although Mexico City has an excellent rapid transit system, even more emphasis may be placed on public transportation. Industries may be encouraged or required to burn low sulfur oil or coal and asked to put pollution control equipment on their facilities. Revegetation is likely to be an important requirement at barren land areas. Since no one can control the weather or change the bowl-like setting of Mexico City, it is probable that individuals, industry, and government will attempt a concerted effort to control and change the human practices that have led to an air pollution crisis.

***Below Left,** Diego Rivera mural on building at National Autonomous University of Mexico City. Sanitary Engineering Laboratory at the university is providing laboratory support to TECMA. **Left,** Dr. Raul Cueller, Director, Sanitary Engineering at university. **Right,** Statue of Tlaloc, Aztec rain god, at National Museum of Anthropology in the city.*



tech to th

The group within the Comsat family of companies charged with the responsibility of providing technical services to telecommunication entities seeking help with their satellite communications space and ground segments is Systems Technology Services (STS), Comsat General Corporation. Interested especially in the range of services STS is providing foreign entities, we spoke to the head of the group, William D. Houser, Vice President. The article that follows is an abridged version of the transcript that resulted from that tape-recorded interview. Mr. Houser, who joined Comsat General in 1979, is a retired Vice Admiral of the U.S. Navy and a retired Deputy Chief of Naval Operations for Air Warfare. As Deputy Chief of Naval Operations for Air Warfare, Houser was the Navy's most senior aviator.
Editor's Note

Q: How much of a staff effort is involved in Comsat General's Systems Technology Services (STS)?
HOUSER: We have a staff of just over a hundred people including about 80 engineers and technicians who provide technical assistance and services throughout the world. We have a number of both international and domestic customers such as the U.S. Postal Service whom we have been helping with the Intelpost system.

Q: The purpose of this interview is to make clear the scope of Comsat General services to telecommunication entities in foreign countries. However, since you mentioned your work with the U.S. Postal Service, perhaps you could cite for the record other services that STS is providing domestically.
HOUSER: For **SBS**, we are providing contract monitoring on SBS spacecraft production at the Hughes Aircraft facility in El Segundo, California. In addition, we assisted **SBS** with the relocation of their temporary video teleconferencing demonstration center in Reston, Virginia, to their permanent headquarters in McLean, Virginia, and we are on the SBS bidders list for SBS customers wishing to set up video teleconferencing centers. We are also providing extensive spacecraft contract monitoring services to AT&T for its new series of Telstar satellites and similar services to some of our foreign clients.

Q: On the subject of services overseas, I'd appreciate some insight into the scope of Comsat General activities.
HOUSER: Let me talk first about our largest contract, which is with Arabsat. We've been providing technical assistance as a principal consultant to Arabsat for more than four years. Arabsat is a consortium of 21 Arab nations who decided to work together to bring into being an Arab Telecommunications Satellite for exchange of information and programs between their countries. Our responsibilities have encompassed all aspects from the original design work to assisting the consortium on the requests for proposals and the analysis and evaluation of those received. We are now monitoring the production of the spacecraft.

Q: What are the time parameters of this project?
HOUSER: It will be a two-satellite system with a principal satellite and backup. The first satellite is planned to be launched in the first half of 1984, and the second satellite will be finished in the last half of 1984.

Q: How many earth stations do you anticipate will be part of the system?
HOUSER: The exact number is not known. Of course, the system will grow in time. But each of the 21 countries will have at least one earth station, and some will have a number of them.

nical services e world

An interview with Comsat General's William D. Houser

Q: That's the biggest project. What would you say would come second on your list?
HOUSER: We have a similar role with Colombia on its Satcol project. We have assisted Telecom of Colombia in design studies and in evaluating the proposals. The vendor will be selected within the next few months. We then hope to participate in the implementation phase, which is similar to that for Arabsat and which involves building the satellite and other control facilities and earth stations, and getting the system in complete operation.

Q: At this point do we know what the time schedule for Satcol is?
HOUSER: The time schedule, of course, will depend on the date that the Colombians decide on a vendor, and on which vendor, because the various vendors seeking the contract have slightly different time schedules for building the spacecraft. Another consideration is the availability of the launch vehicle. Roughly it would be about three years from the time that the Colombians select the vendor. The satellite could be built and launched in that period.

Q: We're doing work for the Indonesians. What are we doing for them exactly?
HOUSER: We have assisted the Indonesians with operations and maintenance of the Palapa system. They, of course, have had a domestic satellite system since 1976, and they asked us to assist them in the analysis of their system—that is, in making it more efficient—and it has been very gratifying to serve in this role. We also have been engaged in the implementation phase of their second-generation satellite, and we are providing spacecraft monitoring services to Indonesia at the Hughes Plant in El Segundo. I have visited the country recently. Indonesia is a very forward-looking nation, and, of course, as a nation of islands they derive many benefits from a communications system based on satellites.

Q: Comsat General is working with Italy too, isn't it?
HOUSER: Yes, on the design and development of its satellites, investigations into direct broadcasting and in general on many aspects of its telecommunications systems. The Italians have been very active in telecommunications and now they want to make greater use of satellites.

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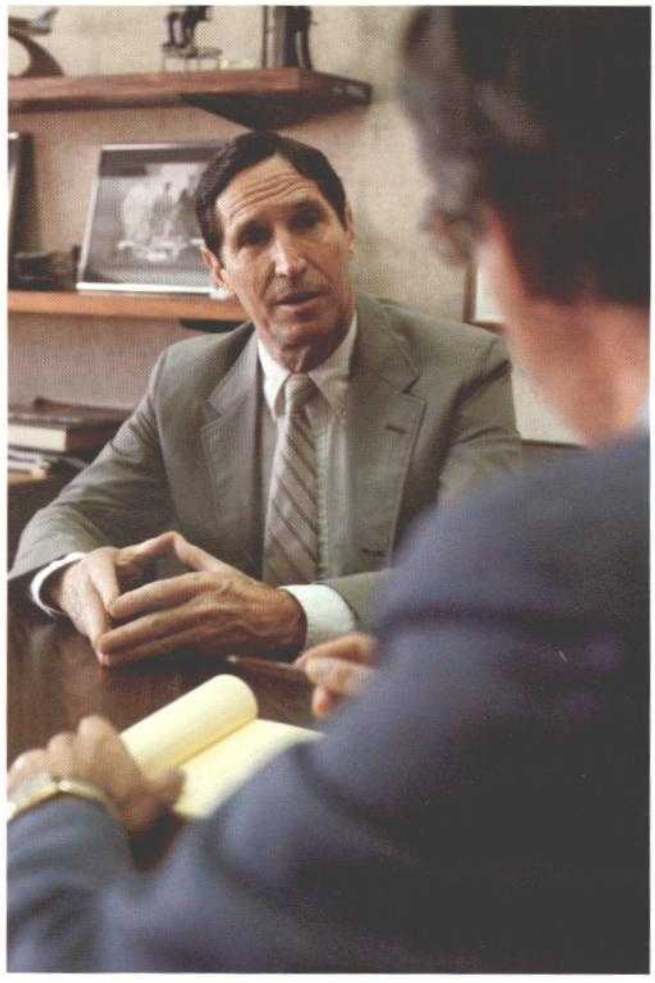


Q: Have they made a firm commitment to a domestic satellite system?
HOUSER: Yes. Of course, it could go beyond simply serving domestic system needs. And here we get into the sensitive situation that in Europe satellite beams cover much more than just a single country. At the moment, the principal example in Europe of transborder broadcasting is Luxembourg and its very successful radio station. Radio Luxembourg is going well beyond the borders of Luxembourg, and there is now talk about a satellite system for Luxembourg. Of course, such a system would have a range far beyond the borders of Luxembourg itself.

Q: Are there other projects that we would be remiss not to mention?
HOUSER: Yes, we have done work in Saudi Arabia, unrelated to the Arabsat project, and we anticipate that we will be getting more work there. The Saudi government is well into a program to obtain a direct broadcast satellite system for the country. We've been talking to them, providing them studies, and we hope that we can play a major role once they decide to build a satellite system. We have done work overseas and are continuing to do so in the context of Intelpost, the International Electronic Mail System. Under contract to the U.S. Postal Service, we designed the system and have helped build it, and now we have installed the Intelpost system in a number of countries overseas. Intelpost is a system that will provide either same-day or no-later-than-the-next-day high quality facsimile service to nations through their postal services.

Q: Have the problems bringing the benefits of Intelpost to the public in the United States been resolved yet?
HOUSER: Yes, they have, but only recently. The problems in the United States were really very discouraging in that they stemmed from jurisdictional differences between the Federal Communications Commission and the U.S. Postal Service. But those problems have been resolved, circuits are now available to the Postal Service, and we hope to see a substantial expansion of the Intelpost system. The Postal Service has Intelpost centers in New York and Washington and has just made a decision to have three more domestic Intelpost centers, one each in Houston, Chicago, and San Francisco to be installed before the end of the year.

. . . it is gratifying to know of the number of nations that hold Comsat General in such high esteem that they come to us to ask us for assistance . . .

Q. How many nations are now participating in the Intelpost system?
HOUSER: Six nations are in the system now, and there are proposals out to about eight more. We could see, even by the end of this year, two or three additional nations in the system. West Germany, Australia and Brazil are leading candidates to join. There are still others for whom we've had proposals out—Spain, Venezuela, Colombia, Italy, Saudi Arabia and Singapore. One of the reasons for the relative slowness in getting started is—besides the jurisdictional problem I mentioned earlier—the fact that there is a worldwide recession taking place. As a result, governments are being very conservative about spending for new projects.

Q: Do you think you've exhausted the subject of overseas contracts?
HOUSER: One of our most exciting projects is the joint venture of Inter-Continental Hotels and Comsat General to provide an international teleconferencing service. A pilot program between New York City and London will begin early in 1983. In other areas, we have had inquiries for technical assistance for domestic satellite systems from Pakistan and South Korea, and for other telecommunications systems from Liberia. We are doing work in the Cameroons aimed at creating a satellite receiving system using the Intelsat system. There are a number of exciting activities literally all over the world, and it really is a question of picking the ones where we can provide the most effective help.

Q: In selling the services of Systems Technology Services (STS), are there Comsat General people going around knocking on doors telling foreign commu-

nication entities what we can do for them, or is it a case that they know about us because of our reputation and they knock on our door?
HOUSER: Principally the latter. We do hear of opportunities on occasion, and, of course, we receive requests for proposals that are distributed widely and we respond to some of these, but it is gratifying to know of the number of nations that hold **Comsat General** in such high esteem that they come to us to ask us for assistance or to ask us for information—and we do provide information as well as technical assistance under contract. Many of the projects that we have now came to us because people needed assistance. I give as an example our services to the Palapa system of Indonesia. We did some work for Australia on that same basis. So our marketing efforts are fairly small in comparison to the amount of work that we do. We are being fairly aggressive in pursuing work in behalf of Intelpost and direct broadcasting, however.

Q: What message are we presenting to a prospective user of our services? What reasons do we give the foreign telecommunications entity for letting us provide services to them?

Comsat General is carrying the message to the four corners of the globe, so to speak, that Comsat was and remains the world leader in satellite communication services.

HOUSER: There is competition in this business, and why should a telecommunications entity come to **Comsat General** instead of someone else? Probably the best reason is the reputation that **Comsat** and **Comsat General** have developed since **Comsat**'s birth 20 years ago. We have, as we say in our correspondence, an unparalleled record of successes. We are technically very competent. We have a reputation for high standards and integrity which we maintain at all costs. We are not necessarily the least expensive, but our reputation for dependability and competence is well established.

Q: Are you encouraged that there will be more work in the future for Systems Technology Services than we have already had? Is this an area with unlimited growth potential or at least large growth potential?
HOUSER: I wouldn't call it unlimited. I would call it significant growth potential and on a continuous basis. As soon as one system is developed, people tend to sit back and say, "Well that's all there ever will be." But as I mentioned earlier there are a number of smaller countries now eyeing domestic systems. Satellites are an extremely efficient way to distribute electronic signals and particularly where you do not have a fully-developed terrestrial network. But even in this country, satellites have played a great part in providing lower cost distribution of electronic signals. Other countries are recognizing this fact, and therefore, a satellite system is not simply a matter of prestige. It is a matter of getting higher capacity at lower costs. Satellite systems have stimulated business and encouraged commerce simply by making communications capacity available.

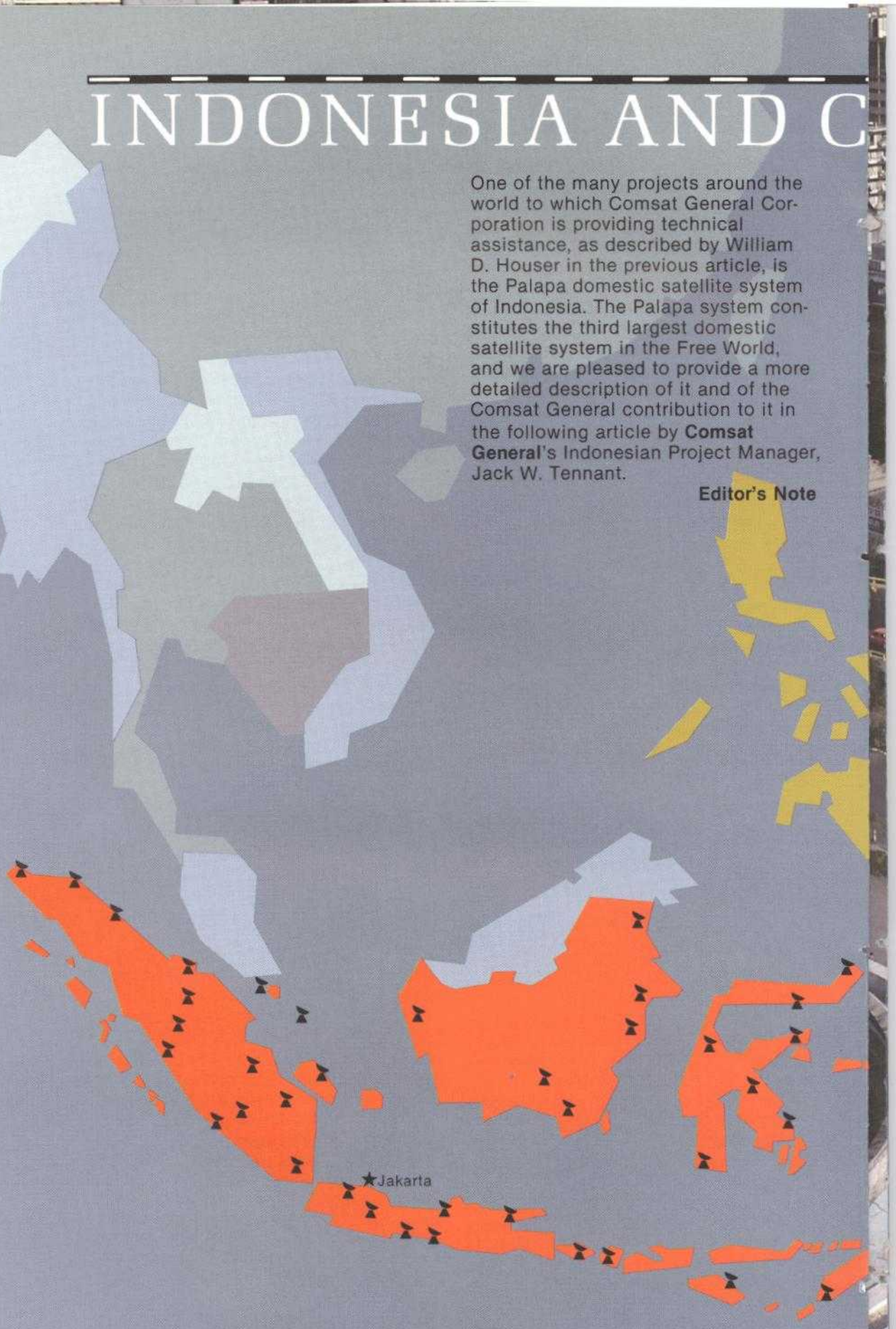
Q: Have you covered, do you feel, all the projects for STS? Have we left anybody out that it would be remiss to leave out?
HOUSER: Well, we've had smaller projects assisting countries in the development of Intelsat earth stations. We are presently acting as an advisor to Ireland, and we have had other projects of this type throughout the world over the past 10 years, but that is a diminishing part of our work. We are getting into larger projects and complete systems rather than isolated earth stations, even though the station itself might be fairly complex, such as a Standard A station for **Intelsat**.

Q: Is there anything else that you think we ought to get on the record pertaining to this activity?
HOUSER: I would just like to say that through the activities of Systems Technology Services we keep **Comsat** and **Comsat General** in the forefront of satellite telecommunications activities throughout the world. **Comsat General** is carrying the message to the four corners of the globe, so to speak, that **Comsat** was and remains the world leader in satellite communications services.

INDONESIA AND C

One of the many projects around the world to which Comsat General Corporation is providing technical assistance, as described by William D. Houser in the previous article, is the Palapa domestic satellite system of Indonesia. The Palapa system constitutes the third largest domestic satellite system in the Free World, and we are pleased to provide a more detailed description of it and of the Comsat General contribution to it in the following article by **Comsat General**'s Indonesian Project Manager, Jack W. Tennant.

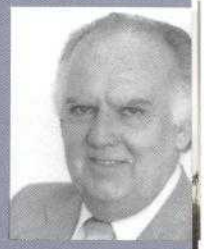
Editor's Note



Palapa system is bringing major benefits to this nation of islands

OMMUNICATIONS

by **Jack W. Tennant**
Indonesian Project Manager
Comsat General Corporation



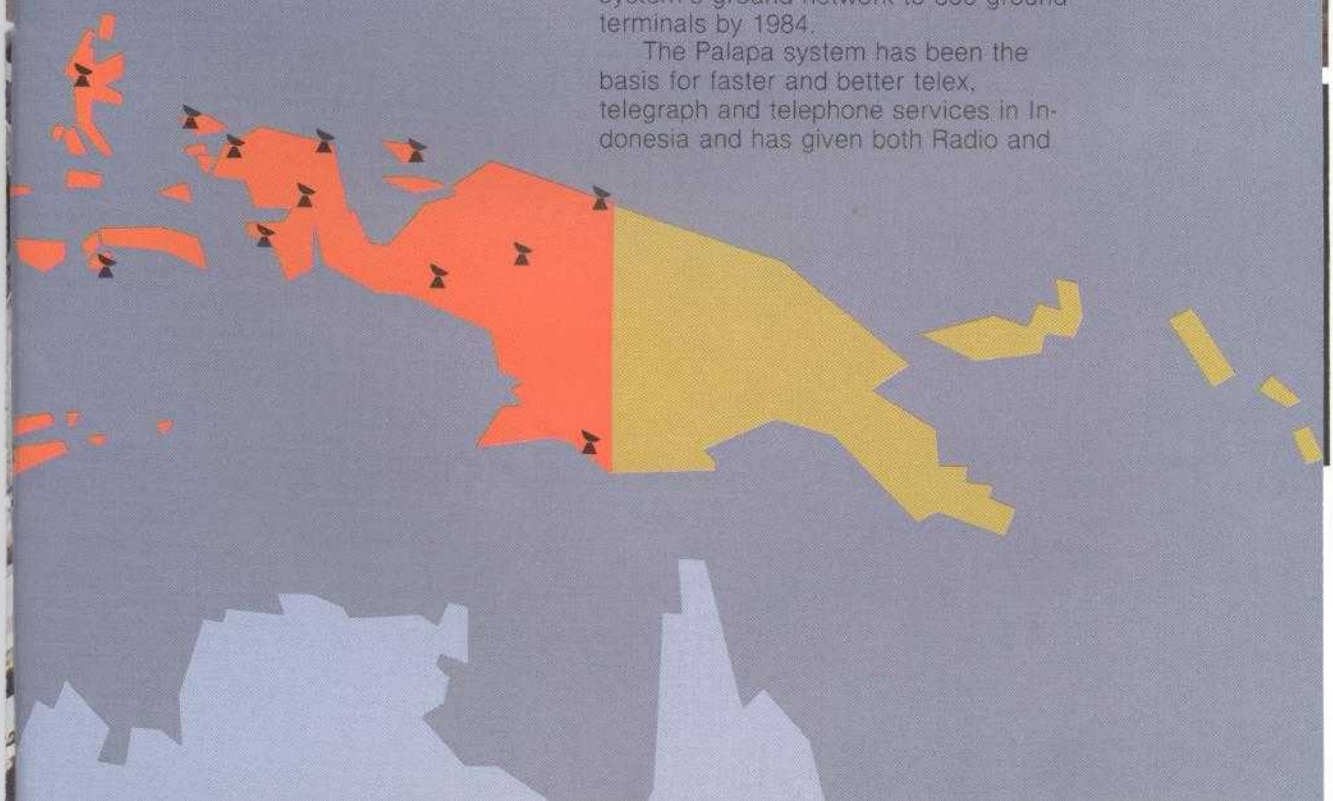
The Republic of Indonesia, a country composed of over 13,000 islands straddling the Equator, spreads for 3,200 miles from east to west. Inhabiting 6,000 of those islands are 152 million people, making the country the fifth largest by population in the world. Indonesia—a land of extreme contrast—where the rice paddies are tilled as they have been for centuries using a water buffalo pulling a wooden plow, and where adjacent to these paddies you can see the antennas of an earth station operating with the most modern of communication systems, the Palapa domestic communications satellite. Indonesia—where the land that is not cultivated is generally covered by thick tropical rain forests whose fertile soils are continuously replenished by the eruptions of the more than 100 active volcanoes.

Indonesia became an independent republic by proclamation on the 17th of August, 1945, three days after the Japanese surrendered to the Allies. The archipelago was previously called the Dutch East Indies and had been under Dutch rule for almost 350 years with the exception of the three and one-half years of Japanese occupation during the war.

The Indonesian people, who are predominantly of the Islamic religion, are very proud of their nation and support their government in its efforts to advance their education and develop agribusiness and industry within the country. That, in any event, is my impression from my several trips to the country. Supporting the people in their quest for development are many companies from around the world, including my own, Comsat General Corporation.

With the rapid and vast developments taking place in Indonesia, the need for communications is acute. Prior to 1976 the communications system in Indonesia was composed of an intra-island telephone system with long haul microwave between cities and inter-island high frequency and Troposcatter radio as well as some undersea cables to the islands nearest to Java, the most heavily populated island and location of Jakarta, the capital. The system was saturated by the communication demands of this developing nation. In 1976 the Palapa-A satellites were launched and the Indonesian nation made a quantum jump into modern communications. The system today is composed of the two Palapa-A satellites and 123 ground terminals. Perumtel, headquartered in Bandung, also on the island of Java, is the government-operated company responsible for the development and operations of the total Indonesian communications system. Perumtel's plans are to replace the two Palapa-A satellites, which have 12 transponders each, with two new Palapa-B satellites, which will have 24 transponders each, and to expand the system's ground network to 300 ground terminals by 1984.

The Palapa system has been the basis for faster and better telex, telegraph and telephone services in Indonesia and has given both Radio and



Television Indonesia the ability to extend broadcasting range to reach all corners of the nation. This fact is appreciated by all people in Indonesia but more by those living and working in areas which previously had only limited access (if any at all) to a telecommunications system.

The Directorate General for Postel of Indonesia recently asked several large companies and the provincial government offices to comment on how the improvement of the telecommunication system had affected them. From the offices of the Provincial Government of Aceh came this comment: "People from every level of society are aware of the usefulness of the Palapa system. The majority of the people of Aceh now have access to this system and through its services are linked to all provinces in Indonesia and areas outside the country as well." The management of P.T. International Nickel Indonesia (INCO), whose operation is located in the interior of South Sulawesi, had this to say: "The Palapa system has given a new dimension to our ability to communicate with the outside world. In terms of telex communication, which we used to send on what could only be said to be antiquated

Three of four astronauts slated to ride Space Shuttle Challenger on seventh Space Shuttle mission, one objective of which is launch of Hughes-built Palapa B-1, rendering on page 29. Astronauts were photographed at Hughes plant. From left, Dr. Sally Ride, Capt. Rick Hauck and Col. Jack Fabian. Photo by ***William J. Megna.***

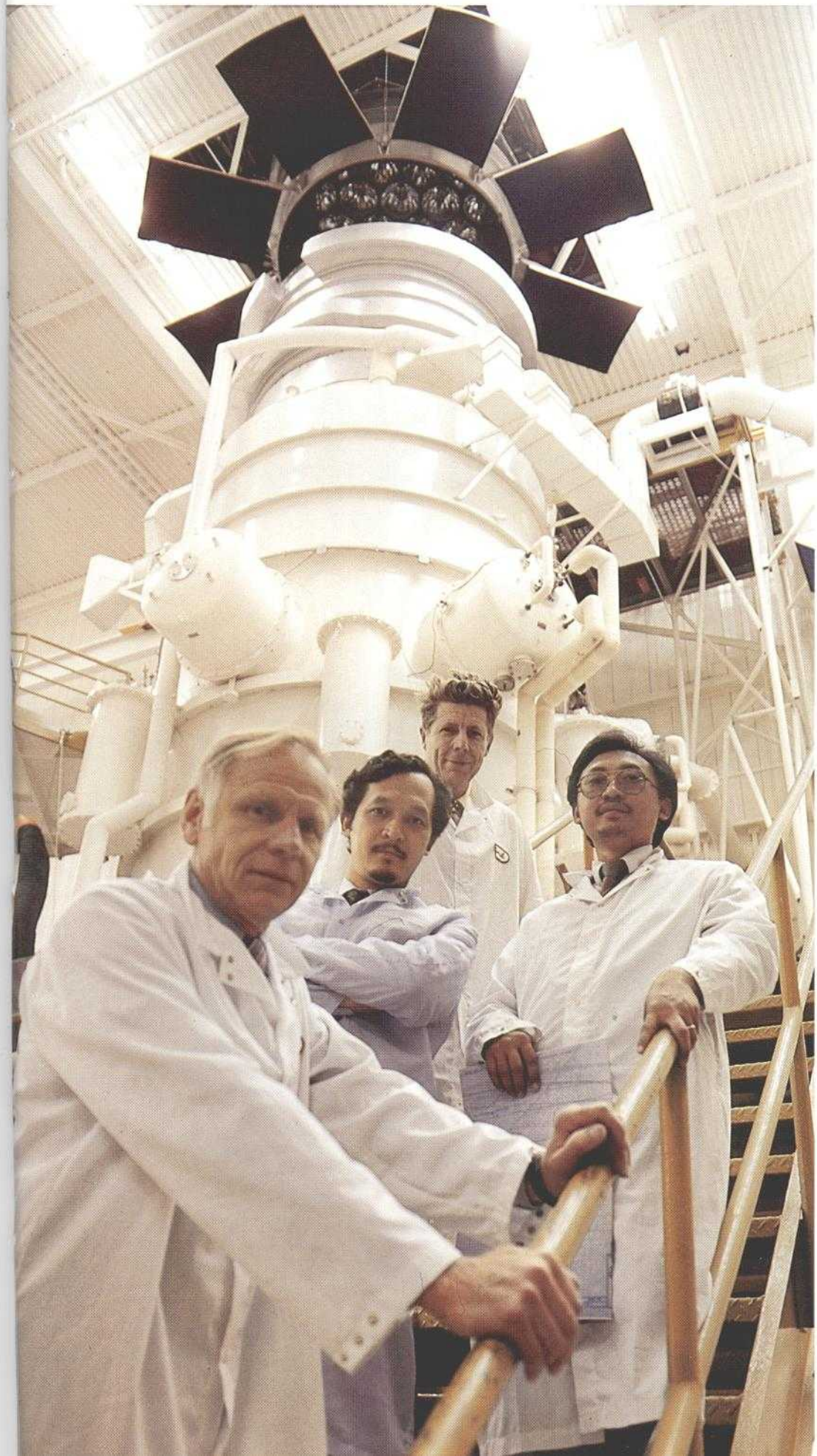
instruments, drastic changes can be seen. A place that previously we might be able to reach only after a few days can now, with Palapa, be reached in a matter of minutes or even seconds. Palapa has given us a private line that links our Soroako office with our offices in Ujung Pandang and Jakarta. Soon we will be linked to New York and Toronto too. With the automation of the telex system, we can reach and establish relations with people and offices in almost every corner of the world."

The Palapa-B satellites, which will have twice the capacity of the Palapa-A satellites, are currently being manufactured and tested by Hughes Aircraft Corp. in El Segundo, California. The first launch of the B-1 spacecraft, which is a variation of the HS 376 bus, is currently scheduled for April 1983 from the shuttle STS-7 mission. **Comsat General** currently is assisting Perumtel in monitoring the manufacture and test of the Palapa-B satellites at the Hughes facility. Mr. William Keck, the Palapa-B Project Manager in the West Coast office of **Comsat General**, and a team of technical experts are assisting the two Perumtel representatives, Iman Sudiharto and Taufik Akbar, in this task to provide assurance of a successful mission. **Comsat General** will also monitor the launch preparations at Cape Kennedy and the in-orbit test from the Palapa Master Control Station at Cibinong near Jakarta.

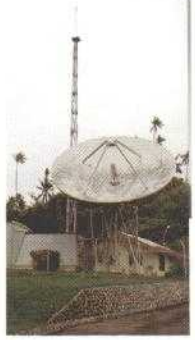
In addition to the Palapa-B monitoring effort, **Comsat General** performed an evaluation of the current Palapa-A ground stations and provided recommendations for the improvement of the system management and the operations and maintenance procedures of the earth stations. The operations and maintenance evaluation was made by a two-man team from **Comsat** and **Comsat General**, which travelled to 10 of the earth stations that represented each type of earth station provided by three different vendors. Transportation to these sites was by commercial airlines (including one leg by seaplane), helicopters, automobiles, and four-wheel-drive vehicles. One site visited by helicopter was on an oil rig out in the South China Sea. Communications for the oil industry in Indonesia is very important as it is the country's largest industry and provides revenues to the government to support its many projects. Indonesia is the fifth largest oil producer in the world.

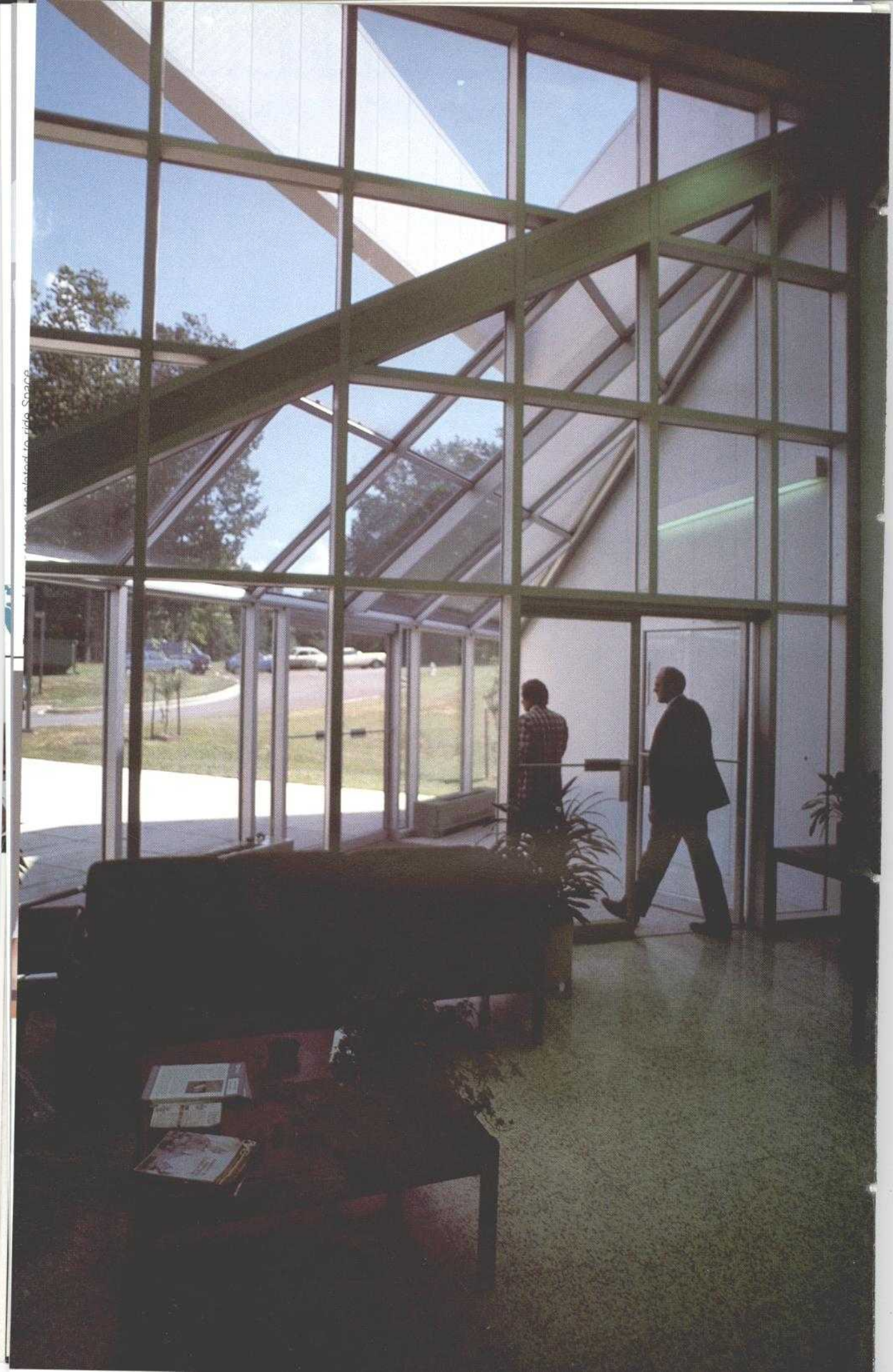
Comsat General will provide additional services to Perumtel in communications system engineering support including the Palapa-B transmission planning and assistance in the development of a computerized link analysis program for the Palapa system.

Indonesia—where a farmer carrying his wares to market in baskets suspended from a pole across his shoulder takes a brief rest from the heat in the shadow of a modern skyscraper in Jakarta. Indonesia—a land of extreme contrast.



William C. Keck, Comsat General's Palapa Program, West Coast Manager, left, at Hughes plant with Iman Sudiharto, Manager, Perumtel's office in El Segundo, right, and Taufik Akbar, Perumtel's El Segundo Deputy Manager, left center, and Larry R. Stumpf, Comsat General Senior Structural Engineer. Photo by ***William J. Megna. Below****, Palapa system earth station at Ledug, near Surabaya, northeastern section of Java. Photo by* ***George A. Robertson****.*





M&S CENTER

TRAINING THE WORLD'S EARTH STATION TECHNICIANS

Training, other programs of Comsat's M&S Center, to benefit from new building in Clarksburg, Maryland.

by **Scott Chase**, *Specialist, Public Relations*
Office of Corporate Affairs
Photography by ***William J. Megna***

The communications satellite technical training facility at Comsat World Systems Division's M&S Center in Clarksburg, Maryland, was born of an emergency, matured as an idea, and today is rapidly becoming the finest of such schools anywhere in the world. Many of the company's most significant corporate initiatives have begun with a need, a telephone call, and an effective Comsat response.

George A. Robertson, Manager of Training, remembers well the inauspicious birth of the section he heads today: "The M&S Technical Training Center was founded essentially in January 1980. We had a request from the Netherlands Antilles (an independent Caribbean island-nation) to provide them with training on earth station operations and maintenance. So off we went, Don Rounsaville, Chuck Anderson and myself, and provided them with a one-month training course."

One month, he recalls, wasn't long enough to teach everything, but it was long enough to give the earth station personnel "a good fundamental background to exactly what's happening." As it turned out, the staff of the Intelsat Standard B earth station in Netherlands Antilles needed further assistance, and less than half-a-year later, Robertson was back on another "emergency" rescue mission. This time it was realigning and calibrating "that whole station."

Such humble beginnings—and opportunities—reached an evolutionary plateau with the dedication of the new M&S Center building adjacent to **Comsat Laboratories** in Clarksburg this past October. The M&S Center, created over a decade ago to provide "total logistical and field engineering support" for the global communications satellite community, was previously housed in **Comsat Laboratories**. The new building contains 5,000 square feet of instructional space for the Technical Training division.

"That space is divided among four modern, spacious classrooms, each capable of handling up to 20 students," Robertson explains. "We also have three audiovisual self-study rooms, primarily for students who fail to score at least 50 percent in their pretests. The rooms are all soundproof and incorporate other features designed to enhance the learning environment. We did some very careful design work with both the architect and the builder on the innovative and practical side of things, getting the maximum value from our construction dollars."

The concept of providing communications satellite technical training also blended well with **Comsat**'s mandate as specified in the Communications Act of 1962. That legislation articulated a U.S. national policy of establishing "in conjunction and in cooperation with other countries . . . a commercial communications satellite system, as part of an improved global communications network. . . ." It further called for "care and attention" in providing "services to economically less developed countries and areas" in the creation and implementation of that global system.

"We had provided structured training in the past to ITU (International Telecommunication Union) students from Greece, Nigeria, and other countries on request," says Mr. William T. Patterson, General Manager, M&S Center. "On those occasions we had an opportunity to put together some materials and get a feel for what would be required to enter this market in a dynamic and competitive manner."

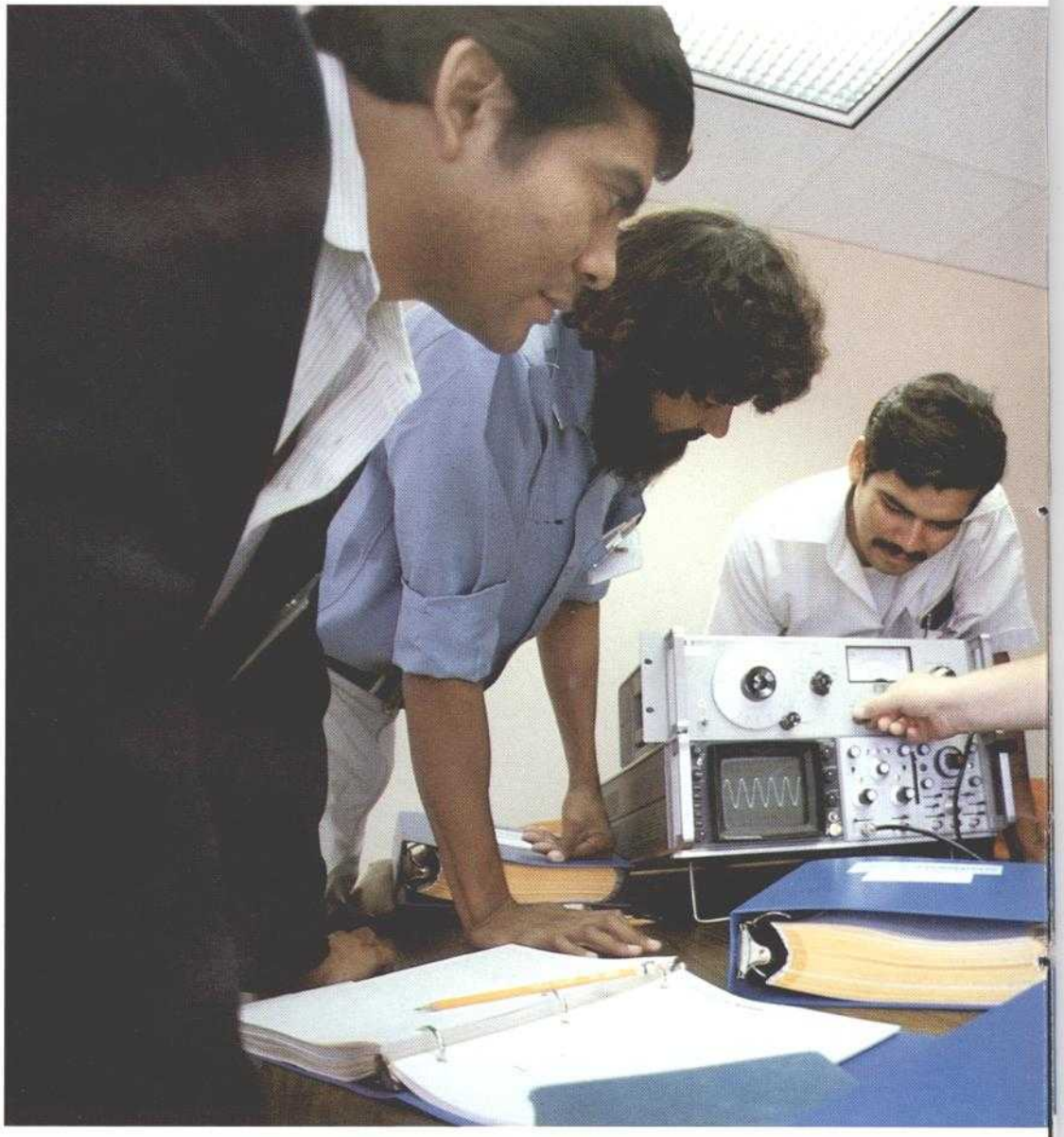
In sum, the M&S Technical Training Center is today a logical and necessary

outgrowth of the leadership role **Comsat** has always played in the development of worldwide satellite communications. And the flood of customers for the dozen classes now available—from domestic clients, from over a score of countries, and from within **Comsat** itself—is ample justification for the existence of this vital telecommunications service.

Among those customer nations from all corners of the globe have been Canada, West Germany, Nepal, Sudan, Italy, Nicaragua, Singapore, Thailand, Indonesia, Malaysia, Jamaica and Egypt. Most recently, Mr. Farouk Y. Amer, Under Secretary for Engineering Training of the Organization for Broadcasting and Television Federation (OBTF) in Egypt, traveled to Clarksburg, Maryland, to examine first-hand the "marvelous" facility his own employees had told him so much about. The trip, he says, was "well worth it."

In Egypt, explains Mr. Amer, "our engineers are always faced with 'new' equipment and techniques" that often precede technical and operational instruction in their use. "Our engineers don't have the experience to switch systems or procedures as fast as the changes dictated by technological advances in satellite communications. Reading in books is not enough; troubleshooters who attempt to explain new systems as they repair them are not enough. We need direct, hands-on interaction with these developments as they occur."

Amer's visit was precipitated by the enthusiasm of Asmhan Abdel Azim Abdel Fadel, a remarkable Egyptian engineer known fondly by M&S employees as "Nancy" during her four-month stay in Clarksburg last year to attend a customized Satellite Communications course. In many ways, Nancy's experi-



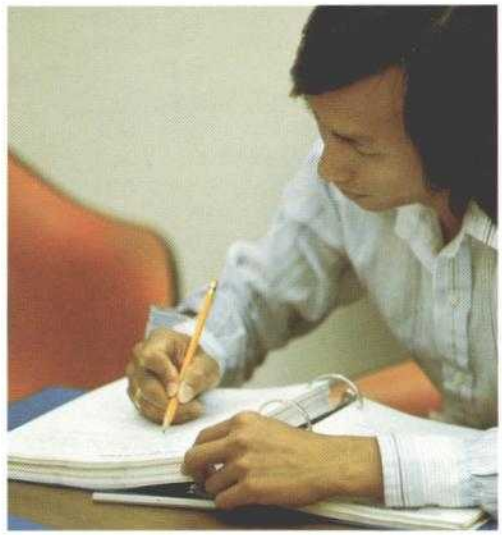
Opening Page. *Impressive lobby of attractive new M&S Center building adjacent to Comsat Laboratories in Clarksburg, Maryland.* ***Below,*** *William T. Patterson is General Manager of the M&S Center.*

ences here at **Comsat** and, subsequently back in Egypt, epitomize the successes sought by the center as it offers advanced telecommunications instruction to international students. Nancy, Mr. Patterson says, "was instrumental in compiling the material for the course, particularly as it applies to the needs and problems of students from Third World nations."

But back in Egypt, she faced cultural barriers that to some extent lessened her ability to convey valuable technical information to her colleagues at home.

Mr. Amer recalls: "Nancy is now an instructor in the field of digital communications. But she cannot teach anything to our senior engineers because they won't accept training from a younger person, especially a woman. So she does her best dealing with new employees."

That theme—and variations thereof—is one that was noticed early on by



George Robertson. It represents, in his opinion, a major stumbling block in the trickle-down of technical information to colleagues in the field from engineers and specialists fortunate enough to attend courses at the M&S Center. "We are not trying to aim our training seminars at the sophisticated cream-of-the-crop international student. Our intention, to be most effective, is to get down to the grass roots, to the technician who needs the training and will use it to bring both himself and his earth station way up in serviceability and operations.

"We're trying to convince, and not too successfully, I might add, foreign administrations that the grass roots technician—the man who conducts the SSOG tests at the earth station—is the person who should be coming to these courses. But all too often we get the administrator or manager assigned to the home office who in a lot of cases has left the day-to-day operations of the earth station. Instead of going back and disseminating this information to earth station personnel, he or she goes back into the planning office and forwards a report to the superiors, and the technicians in the field are deprived of the experience and knowledge attained."

Another aspect of the problems faced by communications satellite engineers and technicians in Third World nations was sounded by Neil Scott, a recent visitor from New Zealand. Scott is the

Left. *M&S Center instructor Clifford Bosley, right, with class of earth station technicians from Nicaragua.* ***Above Right.*** *Comsat employees also take courses given by M&S Center training staff.*

head of Wellington Polytechnic Institute's School of Physics, Electronics, Telecommunications & Electrical Engineering and is involved in conceptualizing a series of computer-assisted training courses in electronics that could be distributed by satellite in and around the countries of the Pacific Ocean area.

"One of the things we have to face up to," says Mr. Scott, "is the question, 'Where are we going to get capable and sophisticated training for our engineers and who's going to train them?' Right now in New Zealand our fishing companies are accepting delivery of commercial fishing vessels that come factory-equipped with communications satellite and navigational equipment bolted right onto the bulkhead. What's commonly available in some areas of the world as standard equipment is years ahead of other areas in application."

Moving on down to the bottom line, however, Mr. Scott remarks on the one item that comes into focus for all technical training candidates: Cost. "It costs us on the order of $2,000 a week to put a student in front of a tutor," Mr. Scott relates. "What we're looking for is something that will give us a good return on our investment in an educational sense. We're working in a lot of poor countries, you know."

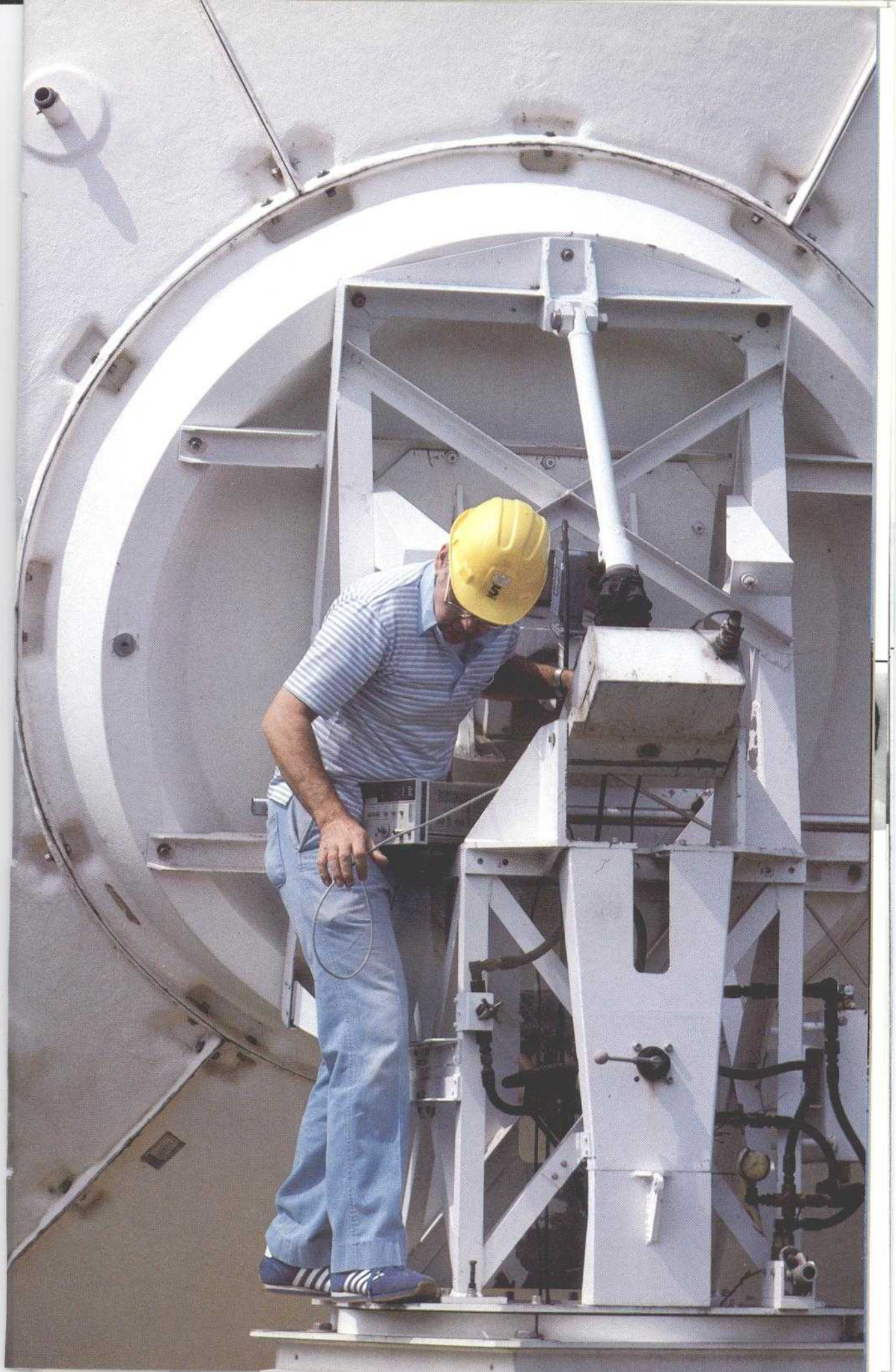
That point is not lost on Patterson or Robertson. "When it comes to satellite communications, we think we have a lot to offer," says Mr. Patterson. "Just as manufacturers are becoming more sensitive to meeting the requirements of the users, so are we striving to fulfill the technical training needs of the global communications satellite community."

Just a few weeks ago, the M&S Center officially inaugurated its $2.5 million training facility dedicated to telecommunications needs. That wasn't a moment too soon, as Robertson notes, because the school's dozen standard course offerings are being scheduled repeatedly throughout the upcoming year.

So, after nearly two years of what Robertson described as "basically random movement somewhat like electrons," the M&S Technical Training Center has become an operational reality. All the benefits of being located adjacent to **Comsat Laboratories**—in-house experts, sophisticated equipment, active research and development—will still be available to the students. But instructional disruptions of the past—"in one room one day and down the hall the next"—will now cease and the students will not only have a first-rate classroom environment but also hands-on experience will be available.

"The hardest part was getting established," remembers Robertson. "I think it took a long time, but we've managed to get ourselves firmly entrenched in the business. The whole basic idea of training seems to be catching on. But you have to convince people that you know what you're doing and you also have to convince other people not to expect miracles. The expression 'Rome wasn't built in a day' is very true and it applies to everything of quality."

***Below**, George A. Robertson, M&S Center Manager of Training, standing center, with students from Greece. **Right**, Full view of attractive new M&S Center building. **Facing Page**, M&S Center employee doing maintenance work on five-meter antenna.*



MICRONESIA,

With addition of earth stations at seven locations, the people of these geographically separated Pacific islands will experience vastly improved communications.

by **George A. Lawler**, *Vice President Marketing, Comsat World Systems Division*

The Communications Satellite Act of 1962 mandated the Communications Satellite Corporation to bring the benefits of satellite communications to all areas of the world including emerging nations and developing areas. It is this directive which has led the Comsat World Systems Division to introduce the benefits of satellite communications to people in geographically isolated regions.

Few places in the world are more sparsely inhabited and geographically separated than the islands of Micronesia in the central Pacific. Later this year and throughout 1983, the World Systems Division will substantially expand satellite communications service to the islands through the installation of a series of 13-meter earth stations at seven locations.

Micronesia comprises some 2,100 small islands whose eastern edge is found approximately 2,500 miles southwest of Hawaii. East to west, the region includes the Marshall Islands, the Federated States of Micronesia (FSM), the Northern Marianas and the Republic of Palau in the western Caroline Islands.

A NEW ERA

The Federated States of Micronesia has state capitals on Ponape, Yap, Kosrae and Truk. While the geographical area of Micronesia approximates that of the contiguous United States, the combined land mass is about one half that of the state of Rhode Island.

The area has been under the rule of many countries. Originally, Spain controlled the islands to protect trade routes between Mexico and the Philippines. In the late 19th century (after the Spanish-American War) Germany acquired the islands and showed interest in their value for commercial trade. Japan controlled them from 1914 until World War II. Since 1947, the U.S. has administered the area, which is known as the Trust Territory of the Pacific Islands, through arrangements with the U.N. Trusteeship Council. Today, the Department of the Interior in Washington, D.C., through the Office of Territorial and International Affairs, provides the governmental link between Washington and Micronesia.

Micronesians have lived through many stressful conditions, including the ravages of World War II. The area is geographically strategic to the defense of the Western World, but the existing communications systems serving the Republic of Palau, the Federated States of

Micronesia and the Marshall Islands do not permit high quality international services between islands or with other Pacific points. The antiquated high-frequency radio and tropospheric communications systems of The Trust Territory is a vast network spread over three million square miles. Routine calls require high frequency radio relay links that must be arranged in advance through one of the area's communications centers and involve manual operator coordination. Traffic routing and signal transmission constraints cause communications services to be awkward and cumbersome.

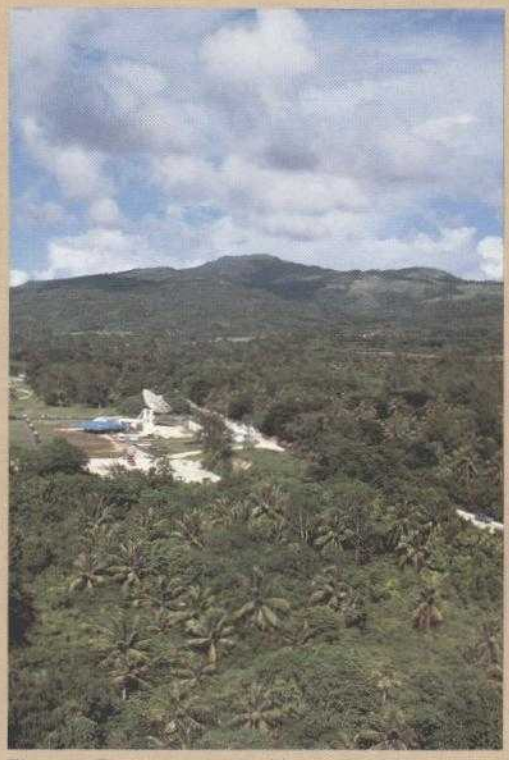
Realizing the need to improve the international communications capability of the Pacific islands, **Comsat** proposed to Pacific region officials in the late 1970s a plan whereby the Corporation would construct satellite earth stations in American Samoa and in Micronesia to provide high quality communications services to Pacific points. The first installation began operations in American Samoa in 1979. A year later, the first Micronesian station became operational on Saipan in the Northern Mariana Islands.

As the economic benefits of satellite communications services became a reality, additional Micronesian earth stations were planned for Koror in the Republic of Palau; at Ponape, Yap, Truk and Kosrae in the Federated States of Micronesia, and at Majuro and Ebeye in the Marshall Islands.

The next station to be operational in Micronesia will be on the island of Koror in the Palau chain. This Comsat World Systems satellite facility is scheduled to begin service later this year through a Pacific satellite. Koror is a growing commercial center with hotels, restaurants and shops. Fishing and tourism have firm footholds in Palau today, and chances are good the area will become one of the most rapidly developed in the Micronesian region.

In 1983, additional Micronesian earth stations will become operational in Ponape, Yap, Truk, Kosrae, Majuro and

Opening Page. Truk Lagoon, Truk, part of the Federated States of Micronesia, is largest atoll in the world. Photo by ***Robert N. Yamazaki. Left****, Palau woodcarver at work. Palau is known for beautiful wood carvings. Photo by* ***Joan Abramson. Right****, Comsat earth station at Susupe, Saipan, Northern Mariana Islands. Photo by* ***James T. McKenna.***



Ebeye. Each station will work with an Intelsat communications satellite capable of relaying more than 4,000 simultaneous telephone calls and two television transmissions. It is this satellite, working with the island's earth station, that can relay information on farming, fishing, and other trades to aid the expansion of the Micronesian economy.

Each earth station will have a 13-meter dish antenna and related elec-

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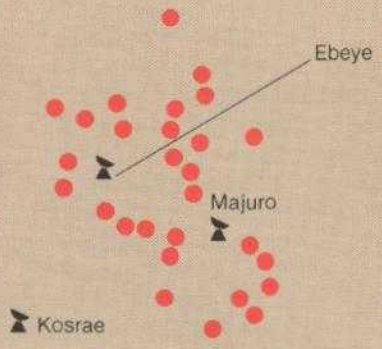


Location of World Systems Division earth stations in Micronesia.

Marshall Islands

Majuro—Approximately 7 degrees north of the Equator; low coral island. District center for the Marshall Islands.

Ebeye—Approximately 9 degrees north of the Equator on the Kwajalein Atoll.

Federated States of Micronesia (FSM)

Ponape—Approximately 7 degrees north of the Equator at the Eastern Carolines and southwest of Guam. Known to have the best pepper in the world, also is the site of the ancient ruins of Nan Madol. The earth station is at Kolonia.

Truk—Approximately 8 degrees north of the Equator and the largest atoll in the world. Main Japanese base in the southeastern Pacific prior to World War II. A celebrated diverse paradise. The earth station is on Moen Island.

Yap—Approximately 9 degrees north of the Equator and southeast of the Philippines. Known for its stone money. The district center is Colonia and also the site of the earth station.

Kosrae—Approximately 5 degrees north of the Equator. Produces some of the best citrus fruits known.

Northern Mariana Islands

Susupe—Approximately 15 degrees north of the Equator on the island of Saipan. Known for beautiful sandy beaches and strategic importance to both the United States and Japan during World War II.

Republic of Palau

Koror—Approximately 8 degrees north of the Equator. Consists of hundreds of beautiful islands, known as the Rock Islands. Koror, where the earth station is located, is the district center. Palau is known for wood carvings and excellent fishing.

American Samoa

tronic equipment similar to those used in other areas of the Pacific. The stations offer high quality and reliable facilities for relaying voice, data, and television communications to virtually any region of the world. Today, the Intelsat global system in the Pacific, utilizing a single satellite, serves more than 30 earth stations, from Thailand to the West Coast of the United States.

Over the years, **Comsat** has helped spread the benefits of satellite communications to many areas of the world. Today more than 155 earth stations are connected to the Intelsat global communications satellite system through more than 40,000 leased circuits. It is access to this system, and the resulting benefits, which **Comsat** brings to Micronesia. All state capitals within the Federated States of Micronesia will be interconnected via satellite. The system will help unite the islands, while providing high quality communications with the rest of the world. These satellite facilities will not only foster the islands' growth but also strengthen relations with the U.S. and other Pacific points.

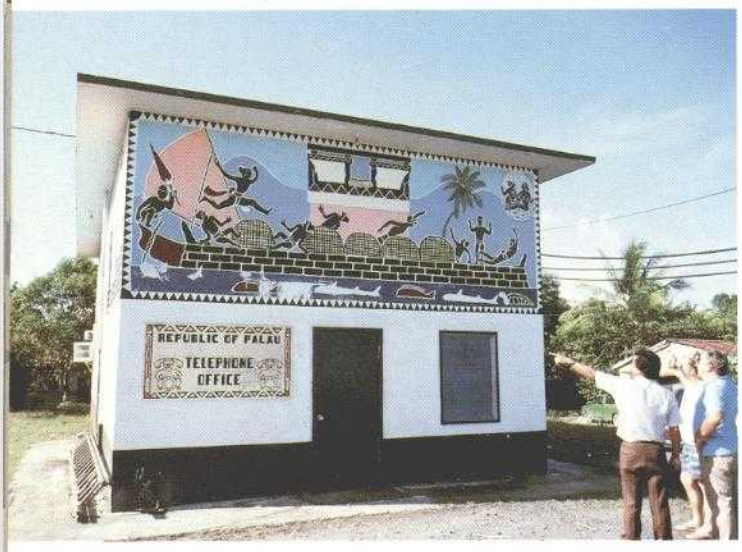
Among the benefits offered by an improved international communications system are the preservation of family ties and improved business opportunities from better contacts with suppliers and customers. Local telephone systems often are upgraded, and a chain reaction within the system occurs, meaning added services and flexibility.

Satellite communications traffic in the Pacific has increased steadily. Nine months after **Comsat** inaugurated service at American Samoa, the earth station was relaying more satellite circuits than were projected for the first five years. And the Saipan station today handles nearly twice the number of circuits originally projected for this period.

Such demand warrants investment in new facilities and, we believe, given the means to communicate efficiently, people will use the system and continue its steady growth. At **Comsat** we use the analogy of two towns connected by a poor road and therefore with little traffic between them. Once a good road is built, traffic is established between the communities and each town thrives and realizes tremendous social and economic growth. Such is often the case with a new communications facility which can act as a catalyst for progress, creating a further increase in demand for communications services.

As the political status of The Trust Territory entities changes, the communications capability provided by the system will continue to grow. Comsat World Systems Division's agreements with each local government considered the present and future of this region from all points—technical, operational, business and political.

Comsat also plans future satellite facilities using advanced technology to serve other islands; ones which may only need a handful of channels. Many isolated Pacific communities may be linked via satellite within the next decade as **Comsat** continues its mandate to offer the benefits of satellite communications to the entire world. We look forward to a prolonged business relationship with the people of Micronesia and believe that satellite communications is the bridge to that region's progress and prosperity.



__Below,__ Palau telephone switching center in Koror. Artwork on wall is an excellent example of the talent of the people of Palau. __Below Right,__ Closeup of Comsat's earth station at Susupe, Saipan, Northern Mariana Islands. Photography by __David R. Gourley.__

N O T E S

continued from page 4.

States and the United Kingdom and points beyond.

SBS applied for the international carrier status early this year, shortly after it reached agreement with British Telecom International (BTI) for the joint provision of advanced communications services between the two countries. The authorization permits the implementation of that agreement, and the two companies plan to start operational services in 1983.

ERT to conduct major study at Alaska's Beluga coalfield

A major contract has been awarded to Environmental Research & Technology, Inc. (**ERT**), to conduct baseline studies for the Diamond Chuitna Project in Alaska's Beluga coalfield. The Beluga field is located about 50 miles west of Anchorage. The Diamond Chuitna Joint Venture, through its venture manager, Diamond Alaska Coal Co., is planning the development of a major coal mine designed to produce up to a maximum of 15 million tons of coal a year for export. New support facilities that are part of the project include housing, transport system, a network of access roads, a coal terminal facility, and a deep water port.

The prime contractor for the project is Bechtel Civil and Minerals, Inc., of San Francisco. **ERT**, which was awarded the contract by Bechtel, will conduct major environmental baseline programs in aquatic/terrestrial biology and surface hydrology/water quality. Data will support state and federal permits and approvals. **ERT** will manage the Diamond Chuitna Project from its Fort Collins, Colorado, operation through a special project office in Anchorage.

E.J. Martin made Chairman at Inmarsat eleventh session

The eleventh session of the Inmarsat Council was hosted by the Norwegian Telecommunications Administration in Stavanger, Norway, July 7-14, 1982. The highlights of the session were:

- E.J. Martin of the U.S. and Y.S. Atserov of the U.S.S.R. were elected Chairman and Vice Chairman, respectively, of the Council for the next year. Mr. Martin is Vice President, Maritime Services, in the Comsat World Systems Division. Mr. Atserov is President of Morsviazsputnik. They will hold their positions for the next 12 months.
- The Council approved one-year extensions of the lease contracts with the Marisat Joint Venture for the Atlantic Ocean and Indian Ocean Region Marisat satellites. Both contracts provide that **Inmarsat** may terminate with 60 days' notice, and the Director General is expected to terminate them when operational Intelsat V MCS satellites become available in those ocean regions.
- The Council approved amendments to the Network Coordination Services (NCS) contracts with **Comsat** and Kokusai Denshin Denwa (KDD) to provide for distress alarms at each NCS station when distress messages addressed to other stations receive no response. A change to **Comsat**'s contract also was approved to provide for a response to a distress message that contains an invalid coast earth station identity.
- The Council revised, and then adopted, its previous provisionally established policy concerning short-term access to the Inmarsat system by land ship earth stations being used for tests and demonstrations at rescue coordination centers and in training and marketing programs.
- The Council adopted a policy that authorizes the Director General to make Inmarsat space segment available for emergency relief operations on land.
- The next Council session will take place at **Inmarsat**'s new Headquarters in London, November 10-19, 1982, and an Inmarsat Traffic Planning meeting was held in London on September 22-24, 1982.

Intelsat Board of Governors addresses needs of business

To facilitate the provision of international digital communications services for the global business community, the Intelsat Board of Governors took a number of actions at its September meeting. The

E.J. Martin, Vice President, Maritime Services, Comsat World Systems Division, has been elected Chairman of the Inmarsat Council.

N O T E S

Board decided in principle that **Intelsat** would provide new business services as part of its system, and, to this end, authorized certain modifications to the last three of the six Intelsat V-A spacecraft already ordered. The Board also pursued development of information on further modifications in order to expedite availability of space segment capacity tailored to provide such services.

In actions to implement 64 Kbps digital transmission using Time-Division Multiple-Access (TDMA) techniques throughout the Intelsat system, the Board contracted with selected Signatories to provide TDMA Reference and Monitor Station Services. **Comsat** has been awarded contracts for such services out of Etam and Andover; the reference stations will coordinate traffic of all earth stations using TDMA/DSI, to be introduced in the Intelsat system beginning in 1984. The Board also approved the award of contracts for Tracking, Telemetry, Command and Monitoring, In-orbit Test and Communications System Monitoring services for the period 1985-1989, including contracts to **Comsat** for services at Andover, Etam and Paumalu.

As the term of office of Director General Santiago Astrain, Chile, will expire in 1984, the Board initiated the process of soliciting nominations from signatories for a successor.

Intelsat V including maritime system successfully launched

The fifth Intelsat V—the first to be specially equipped for maritime communications—was successfully launched on September 28. Intelsat V (F-5) will provide telecommunications services as part of the Intelsat Global System, and under a lease agreement to the International Maritime Satellite Organization (**Inmarsat**), will also provide maritime services.

The Intelsat V (F-5) is one of fifteen Intelsat V and V-A spacecraft procured by **Intelsat** and manufactured by Ford Aerospace and Communications Corp; Intelsat V F-5 through F-9 will carry the maritime packages. The Intelsat Vs are each capable of transmitting 12,000 telephone circuits plus television; the maritime packages can carry the equivalent of 30 telephone calls, receiving from and transmitting to ships in the L Band (1.5-1.6 GHz) and providing connections to Inmarsat shore stations through **Intelsat**'s normal 6/4 frequencies.

Under current arrangements with **Inmarsat**, one maritime package will be placed over the Atlantic Ocean and two over the Indian Ocean. Should a fourth become available, it will be leased for service in the Pacific Ocean region.

M&S Center to have role in new USTTI training effort

A newly created U.S. Telecommunications Training Institute (USTTI), sponsored by Comsat World Systems Division with several other U.S. telecommunications companies and the Federal government, has been established in connection with the Plenipotentiary Conference of the International Telecommunication Union in Nairobi, Kenya. The USTTI will provide instruction at no cost to more than 300 participating students from developing nations.

Instruction, equipment, and funding for USTTI will be provided by participating companies, and some manpower will be provided by various agencies of the Federal government. Comsat World Systems plans to utilize the technical training facilities of its recently expanded Maintenance and Supply Center, which has previously trained ITU fellowship students from many countries. The Center is located in Clarksburg, Maryland.

International meeting set for 1984, topic: teleconferencing

Comsat as well as AT&T, ITT World Communications Inc., RCA Global Communications, Inc., TRT Telecommunications Corp. and Western Union International (WUI) are cosponsoring domestic participation in an international teleconferencing symposium, scheduled for April 3-5, 1984, at locations in Australia, Japan, the United Kingdom, Canada and the United States. The economies of international teleconferencing, both in time and money, have excited involved segments of the business world. Over the next year-and-a-half, applications of and markets for teleconferencing services are expected to expand dramatically as

awareness of these capabilities matures. The other sponsors of the symposium are the Overseas Telecommunications Commission of Australia (OTCA), Teleglobe Canada, KDD (Japan), British Telecom International (BTI) and **Intelsat**.

At the U.S. conference site in Philadelphia, the symposium will highlight the potential applications, techniques, capabilities and benefits of international teleconferencing. These topics will be considered under five general topic areas: Service Objectives, Service Demand, User Applications, Benefits/Economies and Hardware & Network Developments. A number of original papers and panel sessions relating to these topic areas will be presented at the symposium's five international locations.

The international teleconference symposium was originally proposed by **Intelsat** to its member signatories, and was subsequently approved by the Intelsat Board of Governors. **Comsat**, as the U.S. representative to **Intelsat**, accepted responsibility for arranging the U.S. portion of the symposium, and invited the international carriers to cosponsor the U.S. participation. Working within the policy and program established by the International Steering Committee and the International Program Committee, a U.S. Steering Committee has been established to formulate general policy governing the logistics of national participation.

The first "Call for Papers" to be presented at the symposium will be issued shortly by the U.S. Steering Committee. Additional information on the content and agenda of the symposium can be obtained from the Conference Administrator, Mr. Howard Briley, **Comsat**, 950 L'Enfant Plaza, S.W., Washington, D.C. 20024. Mr. Briley can be reached at (202) 863-6248.

World Systems given okay on Australian TV earth station

Comsat World Systems Division has received approval from the Federal Communications Commission (FCC) to construct, own and operate an earth station facility in Santa Paula, California, for 24-hour-a-day satellite television transmissions to Australia. Service is scheduled to begin in November. The full-period satellite television service will be the first of its kind from the United States to a commercial broadcaster in an overseas country.

The Australian portion of the satellite service will be provided by the Overseas Telecommunications Commission of Australia (OTCA), that nation's international communications carrier and representative to **Intelsat**. Transmissions will originate from an operations center in Hollywood, California, maintained by Channel 9 Australia, Inc., a Los Angeles-based subsidiary of Publishing and Broadcasting Limited of Sydney, Australia.

AUTOART aids microwave integrated circuit design task

Comsat General Integrated Systems (**CGIS**) has introduced a new computer-aided design (CAD) software package for microwave integrated circuit (MIC) designers. Its new AUTOART program translates microwave circuit models to the mask layouts used in the fabrication of hybrid integrated circuits.

Dr. Stephen A. Szygenda, CGIS President, explained that the AUTOART program "speeds the design process by automating the microwave circuit layout, a task that otherwise requires substantial time and significantly delays the specification-to-fabrication process. With the AUTOART program and an inexpensive CRT, microwave engineers can have immediate, real-time results without the usual long drafting-time delays."

The AUTOART program can operate as a stand-alone system or in conjunction with the SUPER-COMPACT software program, a CGIS product for circuit analysis, optimization and synthesis. Used with the SUPER-COMPACT program, AUTOART can accept a circuit file and provide automatic translation of electrical and physical parameters into an actual circuit layout. The program handles all standard SUPER-COMPACT microstrip transmission-line elements, including compensators for junction discontinuity effects.

The AUTOART program also provides sophisticated interactive editing and modification features for the geometry of complex circuits through a cursor-control

mode on the CRT screen. Design engineers can achieve better designs with the AUTOART program because the design work is immediately displayed. After a satisfactory layout is reached, the AUTOART post-processor can provide a high-resolution plot. Mask-making hardware can be interfaced to AUTOART software to provide a more comprehensive CAD capability, Szygenda says. The AUTOART package is available for licensing on several computer systems including Digital Equipment Corporation's Vax and IBM's 370.

UN-Unispace hookup permits teleconferenced translations

Comsat World Systems Division, in collaboration with DFVLF of the Federal Republic of Germany, provided live television coverage of the second United Nations Conference on the Peaceful Uses of Outer Space (Unispace '82) from the conference site in Vienna, Austria. In addition to demonstrating the capabilities of the international satellite system to provide remote conferencing services, the coverage also allowed almost instantaneous translation of the conference's proceedings into six major languages for the benefit of all delegates to Unispace '82.

Using an Intelsat V satellite positioned 22,240 miles above the Atlantic Ocean, Comsat World Systems transmitted video and associated audio of the Conference proceedings from a 3.3-meter antenna provided by DFVLR and located at the Conference Hall in Vienna to a 2.4-meter dish mounted on a Comsat mobile receiving station at the United Nations Plaza in New York City. U.N. translators in New York provided simultaneous voice translation of the proceedings in Vienna into the six working languages of the U.N for immediate transmission back to the delegates in Vienna. The transmissions were sent using the 14/11 gigahertz frequency bands.

TeleSystems starts maritime division, signs on Racal-Decca

Comsat General TeleSystems has established a new Maritime Terminal Division under Byron L. (Pete) Brooks. Mr. Brooks, previously Director of Customer Requirements, has been elected Vice President, Maritime Terminal Division, and Edward J. Bender, formerly of the United States Maritime Administration, has joined TeleSystems as Manager, Maritime Planning and Development.

The Division is responsible for the manufacture of the TeleSystems MCS-9000 shipboard terminal, the most advanced and cost-effective maritime terminal available today. In addition, the new Division assumes responsibility for the worldwide servicing and maintenance of all shipboard terminals that Comsat General Corporation and **TeleSystems** have successfully provided for several years.

In addition, **TeleSystems** has reached an agreement with Racal-Decca Marine Radar, Ltd., of Surrey, England, who will become a major distributor for the TeleSystems MCS-9000 maritime satellite communications system. In addition, Racal-Decca Service, Ltd., will perform service and maintenance of the terminals. The agreement is viewed by **TeleSystems** as a critical element in the development of its distribution and service network for the terminal.

ERT's Clean Water Act study completed for The Roundtable

A major study conducted by Environmental Research & Technology, Inc. (**ERT**), on water quality data has been completed for The Business Roundtable. The report, entitled *Analysis of Technical Issues Related to Reauthorization of the Clean Water Act*, has been submitted to the Congress and also is available to the public from The Business Roundtable. The study reaches these conclusions:

- industry is the source of 10 percent or less of the priority pollutants discharged to surface waters;
- current control technology achieves high levels of pollutant removal and more stringent controls might not significantly improve water quality;
- required pretreatment programs might not be the best tools for improving water quality; and
- the list of priority pollutants should be reviewed, because data indicate some compounds could be removed from the list.

Corporate Locations

Comsat

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

STC

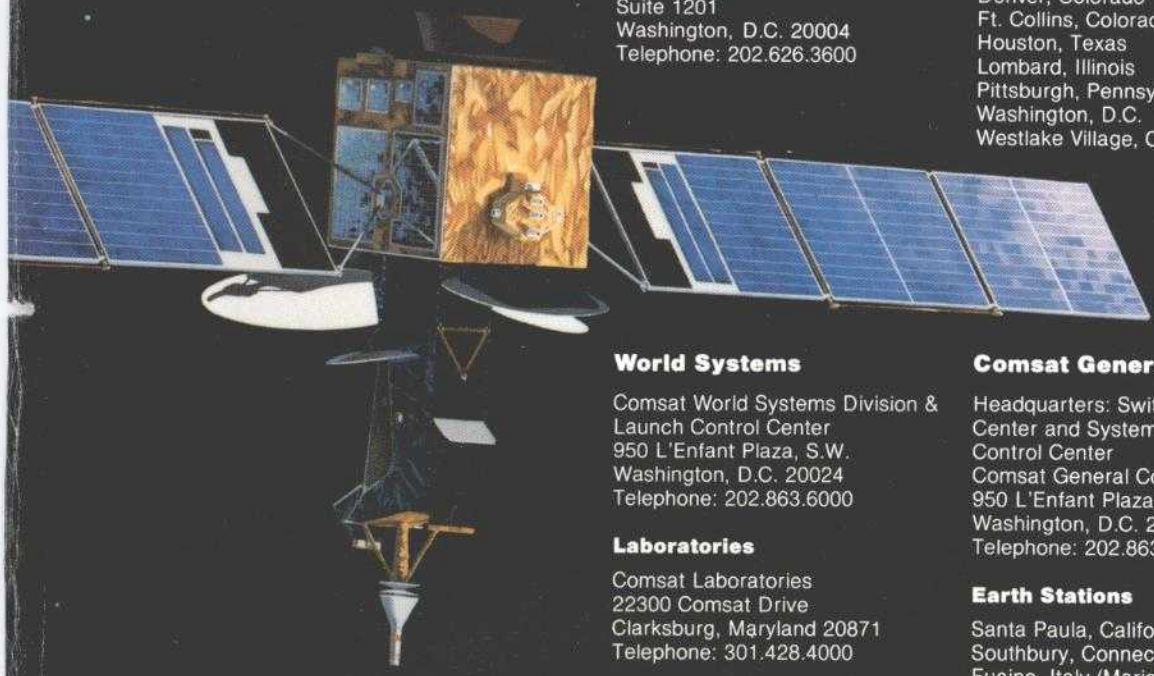
Satellite Television Corporation
1301 Pennsylvania Avenue, N.W.
Suite 1201
Washington, D.C. 20004
Telephone: 202.626.3600

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
Pittsburgh, Pennsylvania
Washington, D.C.
Westlake Village, California



World Systems

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

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
Etam, West Virginia
Jamesburg, California
Pago Pago, American Samoa
Paumalu, Hawaii
Pulantat, Guam
Susupe, Northern Mariana Islands

Comsat General

Headquarters: Switching Center and 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)

Amplica

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

CGIS

Comsat General Integrated Systems
7801 North Lamar Boulevard
Suite F-40
Austin, Texas 78752
Telephone: 512.451.7938

Comsat General Integrated Systems
1131 San Antonio Road
Palo Alto, California 94303
Telephone: 415.966.8440

TeleSystems

Comsat General 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

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COMSAT