COMSAT NEWS

July-August 1969
Vol. IX No. 4

Late COMSAT News

COMSAT receives INTELSAT Management Services contract

Communications Satellite Corporation (COMSAT) has announced the signing of a contract under which it will provide technical and operational management for the global commercial satellite system owned by the International Telecommunications Satellite Organization (INTELSAT) (See Board of Governors Story page 5).

The contract, which will run through February 11, 1979, calls for INTELSAT to reimburse COMSAT for all direct and indirect contract costs it incurs in addition to an annual fee.

The contract was signed by Secretary General Santiago Astrain on behalf of INTELSAT and by Senior Vice President George P. Sampson, International System Division, representing COMSAT.

Major contract functions to be performed by COMSAT, include:

—recommend and implement INTELSAT research and development programs.

—advise on the need to procure space segment facilities for INTELSAT's space segment.

—negotiate, place and administer all contracts on behalf of INTELSAT for space segments.

—arrange for satellite launch services and necessary support activities, and cooperate in launches.

—prepare and coordinate system operations plans (including network configuration studies and contingency plans), procedures, guides, practices and standards for adoption by INTELSAT's Board of Governors.

—prepare, coordinate and distribute frequency plans for assignment to earth stations having access to INTELSAT's space segment.

The contract for management services with COMSAT was called for in the INTELSAT definitive agreements, which entered into force in February, 1973.

Dow Jones—COMSAT test newspaper publication by satellite

Dow Jones & Co., Inc., and COMSAT are printing pages of the Wall Street Journal via satellite as part of a joint test program using a communications satellite system for plant-to-plant transmission of high-resolution facsimile pages of the Journal under actual production conditions.

From a small earth station set up at Dow Jones' regional composition plant in Chicopee, Mass., the facsimile data is transmitted over an Atlantic Ocean INTELSAT IV to a receive-only earth station erected at Dow Jones' production facility in South Brunswick, N.J., with the reproduced facsimile used to produce press plates for production of the paper. The present test, which follows preliminary ones conducted at COMSAT Labs by COMSAT and Dow Jones engineers, represents the first time the entire process, from composition to the actual printing, is being conducted via satellite transmission.

Following implementation of the Chicopee-to-South Brunswick tests, an international test is planned to transmit the Wall Street Journal, via satellite, to England.

The test program is demonstrating that daily newspapers can be produced and delivered accurately, swiftly and efficiently across the nation or even around the world, via satellite.

Under the COMSAT-Dow Jones satellite test program, specific information is being collected, such as bit error rates, effects of varying propagation conditions and data transmission speeds under actual operating conditions.

Senior VP and General Counsel to leave COMSAT for private practice

COMSAT President Joseph V. Charyk has announced that Mr. David C. Acheson, Senior Vice President and General Counsel, will leave the corporation at the end of September to enter private practice as a partner of the Washington law firm of Reavis, Pogue, Neal and Rose.

Dr. Charyk stated in his announcement, "We will miss him at COMSAT but extend our very best wishes for every success in his new undertaking."

Mr. Acheson joined COMSAT as Vice President and General Counsel in February, 1967. Previously, he was Special Assistant to the Secretary of the Treasury for Enforcement, having joined the Treasury Department in September, 1965 as a Special Assistant to the Secretary. He was U.S. Attorney for the District of Columbia from 1961 to 1965.

From 1950 to 1958 Mr. Acheson was an associate, and from 1958 to 1961 a partner, in the Washington law firm of Covington & Burling. He served as an attorney with the U.S. Atomic Energy Commission in 1948-49.

COMSAT General picked by ESRO as U.S. partner in aeronautical satellite program

COMSAT General Corporation has announced its selection by the European Space Research Organization (ESRO) as the U.S. partner in an aeronautical satellite program to be developed jointly by ESRO, the Canadian Government and COMSAT General.

The selection of COMSAT General concludes a competition over the past year and a half among all interested U.S. companies to determine which company would be the U.S. participant in the joint undertaking.

The joint venture is part of the overall AEROSAT program to be established under the memorandum of understanding and involves the deployment of two spacecraft over the Atlantic Ocean and construction of a satellite control facility.

The first spacecraft will be launched in the 1977-78 time frame with the second to follow at a later date. It is expected that the joint program will represent a total investment of approximately $90 million. Ownership of the venture will be shared 47 percent by ESRO, 6 percent by Canada and 47 percent by COMSAT General.

News in Brief

Employees get salary increase

A general salary adjustment for employees earning less than $25,000 annually announced by COMSAT President Charyk.

Live TV reaches the Amazon

World Cup Soccer Matches are brought live for the first time into the Amazon region of Brazil.

ComGen earth stations near completion

COMSAT General's East and West Coast maritime/domestic satellite earth stations projected for completion early in 1975.

Tenth Board of Governors meeting

Business conducted at tenth meeting includes instructions to Secretary General to sign Management Services Contract and assume remaining responsibilities.

Second quarter earnings reported

Consolidated net income for the second quarter of 1974 equal to $1.01 per share compared to 82 cents per share for second quarter of 1973. Board of Directors increase quarterly dividend from 20 to 25 cents per share.

COMSAT and SOLAREX reach agreement

COMSAT enters settlement agreement with SOLAREX Corp. on civil suit filed earlier this year by COMSAT.

Potts gets new post

Earth Station Engineering Division's Potts named U.S. Member of the Advisory Committee on Technical Matters, INTELSAT Board of Governors/Technical.

ComGen opens New York office

A Maritime Satellite Communications Sales Office headed by Edward G. Dooley opens in New York City.

NBC appreciates COMSAT assist

COMSAT gets words of appreciation from NBC TV pool covering Presidential visit to Cairo.

Special features

A. *Cultures and Customs of Hawaii by Lisa Cook.*
B. *Man on the Moon Anniversary by John J. Peterson.*
C. *Women in Profile by Donna Higgs.*
D. *Books Worth Reading by Eileen Barrett.*
E. *People and Events by field correspondents.*

Cover
Artist Frank Krasyk's concept illustrates transmission of the first live television into the Amazon region of Brazil during the recent World Cup Soccer Matches in Germany.

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Satellites bring live "Futebol" to western Brazil

By JOHN GONZALEZ

The Brazilian Government was faced with a tremendous problem. Its telephone communication network was effective only in the eastern portion of the country where the land was generally flat and suitable to microwave use.

However, the western part of the country was dominated by mountainous terrain, timber, swampy soil, thick foliage and a considerable amount of rainfall all of which rendered use of microwave unsuitable. Consequently, for years, communication throughout this part of the country was via Tropo Scatter.

Since this part of Brazil was experiencing a population growth at an unexpected rate, a more reliable communications system with greater capacity was needed.

As an example of the problem, live television from outside the local areas was impossible, with the inhabitants dependent upon taped programs.

The Department of International Communications of EMBRATEL (Empresa Brasileira de Telecommunicacoes) suggested to the government the use of satellite communications as the most inexpensive and reliable means of communication.

Recognizing the promise of such a system of communications, the Brazilian Government seized the opportunity of the World Cup Soccer Games to test its potential.

To COMSAT GENERAL went the task of providing the system integration as well as the technical assistance necessary to lift the live coverage of the games from the Tangua Earth Station, on the eastern coast of Brazil near Rio de Janeiro, to the populations to the west.

Two 33-foot relocatable antennas, transported in by C-130 aircraft, were set up at Manaus, capital of the State of Amazonas, near the juncture of the Negro and Solimoes (Amazonas) Rivers, and at Cuiaba, capital of the State of Mato Grosso, near the eastern border of Bolivia.

The job of overseeing and supporting the "test" went to COMSAT's Senior Technicians Wayne Colpitts from Brewster, Stanley Morse from Andover and John Gonzalez from Cayey.

Before leaving for Brazil, all available technical information had to be gathered, most of which was "similar to" or "preliminary" in nature. Message equipment was to be single channel per carrier and would be employed at the low frequency end of the transponder and all three men had to acquaint themselves with equipment new to them.

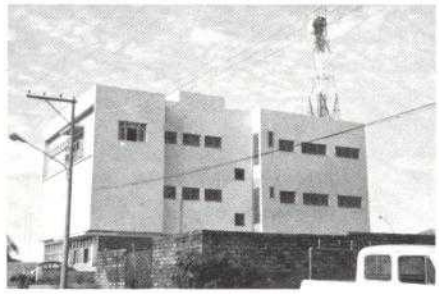
Arriving in Rio de Janeiro the first week of May it was determined Colpitts would go to Manaus and Morse to Cuiaba with Gonzalez remaining at Tangua. But the technicians ran into a major problem. Expecting to clear needed equipment through Brazilian Customs with a minimum of delay, they found there had been a sizeable turnover of Customs personnel with new officials unfamiliar with the project agreement. As the result, most of the equipment spent more time in Customs waiting to be released than anticipated.

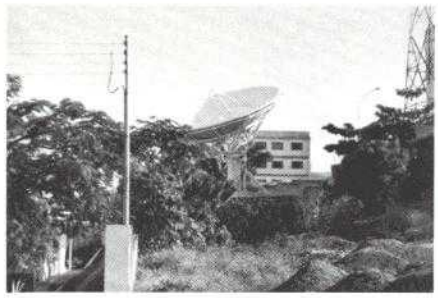
Following a hasty meeting between EMBRATEL and Customs officials, agreement was reached and the needed equipment began moving. Time had been lost, however, and the question then posed was whether or not there was time to get equipment into position and integrated into the system to cover the games.

Since the project had been approached with a "can do" spirit since its inception, round-the-clock performance by all involved found the system ready to operate and, on June 13, Brazil's first domestic system carried live TV of the games from Tangua into the States of Mato Grosso and Amazonas.

It was a day of rejoicing for Brazil's inhabitants to the west who were able to see live television from the "outside world" for the first time. The woman director of communications at Cuiaba found the results almost too much to take—live television, and in color.

According to John Gonzalez, the project was a resounding success and thanks to the cooperative effort of COMSAT GENERAL, COMSAT and EMBRATEL, communication "via Satellite", domestic as well as international, was in Brazil to stay.

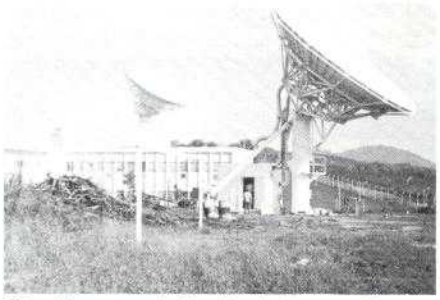




Empresa Brasileira de Telecommunicacoes (EMBRATEL), through a 33-foot COMSAT transportable antenna emplaced atop Cuiaba Mountain, brought live television for the first time into the City of Cuiaba, Brazil.

Before leaving for Brazil, technical personnel involved in the test were requested to keep the COMSAT *News informed of the test's progress. Mr. Gonzalez of the Puerto Rico Earth Station forwarded the preceding story and photos from Rio de Janeiro.*—Ed.

Located about 20 miles northeast of Rio de Janeiro stands the Brazilian Earth Station Tangua. From this station the World Cup Soccer Games were boosted by satellite into the previously unreachable western States of Mato Grosso and Amazonas.



Standing symbolically between Tangua 1 in the background and the almost completed Tangua 3, a soccer field's goal post can be seen. The new antenna utilized part of the soccer field but the station personnel, not to be deprived of their major form of recreation, merely shortened the field and still go at it every Friday afternoon.

Scheduled to become operational in 1975, the construction of Tangua 2 proceeds behind Tangua 3.

Live TV reaches into the Amazon Jungles

By Wayne K. Colpitts

On June 13, 1974, the World Cup Soccer Games came to Manaus, in the state of Amazonas, Brazil, on color television "live by satellite". The three local television stations carried the live series in color made possible by installation of a ten-meter earth station in Manaus for Embratel by Comsat General. For Manaus, a city of 350,000 in the heart of the Amazon Jungle, previous World Cup Soccer Games were carried by radio and shown hours later by video tapes flown in from Rio de Janeiro.

Sixty minutes before the beginning of the game between Brazil and Yugoslavia, broadcasting service via satellite to Manaus was inaugurated in a simple ceremony in the Rio Negro Palace, in the presence of the governor João Walter de Andrade, the vice president of Embratel, and other civil and military authorities. The governor of Amazonas and the vice president of Embratel each said a few words to the assembled guests during a 20-minute ceremony which inaugurated satellite service, calling it a service "literally beyond value."

Reaction in Manaus to the broadcast of the live games was immediate. The normally crowded downtown streets were nearly empty during the Brazilian games. Shoppers gathered around television sets many of the merchants had on display in their stores. Restaurants and hotels also had many avid fans enjoying the games. In one city park, groups of fans gathered around eight television sets mounted in an octagon and sponsored by local merchants for "Copa do Mundo" (World Cup Matches).

Interest in Brazil's fortunes in the games continued high in Manaus. Throughout the games, cars flew streamers in Brazil's colors of green and yellow from their radio antennas. Crowds watched Brazil play at the city-sponsored viewing center and in local business establishments. Following Brazil's 2-1 victory over Argentina on June 30, caravans formed on the main street flying Brazilian flags and banners. Horns honked and people chanted "Brazil, Brazil, Brazil!" Firecrackers exploded all over the city. The three city newspapers carried pages of coverage of the games themselves and of the fans' reactions to the games. Before the World Cup Series ended Manaus received 36 games broadcast "live via satellite."

Mr. Colpitts is Manaus Earth Station Manager.

Soccer games almost set record for satellite coverage

Only the Olympics played in Germany in 1972 exceeded the World Cup Soccer Games of June and July, also played in Germany, in total half-channel hours carried by Intelsat communications satellites.

Sandwiched between the '72 Olympics with 1,232 half-channel hours, and the Israel-Arab War in 1973 with 1,012, the soccer games became a close contender for first place with 1,139 half-channel hours.

Since several matches were also transmitted by Spain via a leased half transponder arrangement, total television usage of the satellite system undoubtedly surpassed the record '72 Olympics, according to Lawrence Covert, Comsat Operations.

Leading the countries in Receive Time was Brazil with 62:46 hours exclusive of transmissions to the two transportable antennas located in cities in the Amazon region. In order of Receive Time following Brazil were: Argentina, 57:48 hours; U.S., 57:28 hours; Mexico, 54:30 hours, Colombia, 51:39 hours; Iran, 41:47 hours; Haiti, 37:50 hours; Israel 37:38 hours; Ivory Coast, 29:10 hours; and Chile, 27:24 hours.

Due to heavy scheduling of the European terrestrial network, there were two instances where the United Kingdom had to use satellite routing to receive specific games live. In one instance the transmission was from Germany to the U.K. and in the other it involved transmission by Italy.

In addition to the above recorded Receive Time Brazil also retransmitted games from a transportable antenna located in Tangua and received at transportable antennas at Cuiaba and Manaus. This configuration accounted for an additional 206:21 half-channel hours.

Staffers supporting Meeting of Governors learn of cultures and customs

Representatives and staffers visit the Paumalu Earth Station . . .

By Lisa Cook

When someone mentions Waikiki many visions come to mind: golden sands where sunbathing begins early in the morning and goes on all day; world-noted bazaars and glittering nightlife; beautiful Polynesian women in grass skirts dancing the hula; endless aquamarine waves curling over reefs to slide glistening across a moonlit beach; Plumeria, bird-of-paradise, hibiscus; gardenia blooming in colorful abundance. . . .

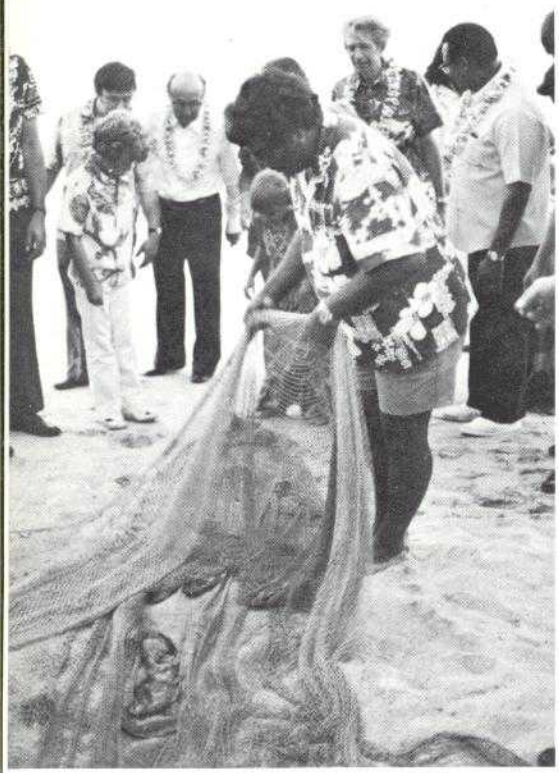
Features such as these provided the setting for the Ninth Meeting of the Intelsat Board of Governors hosted in Honolulu by Comsat. To the ladies, wearing flowers became a manner of dress. Governors and staff donned bright aloha shirts, with magenta the favorite over conservative gray or blue.

To help ease the rigorous work schedule, Comsat arranged many events to entertain the delegates, their families and staff to relieve the pressures after the daily sessions adjourned. An excursion the day prior to the start of the meeting included a tour of the Dole pineapple fields, where we ate freshly-picked pineapple, a visit to the Paumalu Earth Station, lunch at the new Kuilima Hotel, and a tour of the Polynesian Cultural Center.

The Center is aimed at helping to perpetuate Polynesian cultures. It consists of minature villages of six island countries of Polynesia—Samoa, Tahiti, New Zealand, Fiji, Hawaii, and Tonga. The students who work in the villages are natives of these islands, and describe their histories and demonstrate some of their skills and customs. In the Tahitian village, for example, we learned that men do all the cooking, and were shown how to husk a coconut and crack it easily in half, preserving all the milk inside.

The highlight of the tour of the Center was viewing the Pageant of the Long Canoes. Students performed the dances of their islands on a floating platform supported between two parallel canoes.

While the Board met during the day, wives and families were escorted around Oahu on tours which included visits to Sea Life Park, the Hawaiian version of Marineland; Paradise Park,



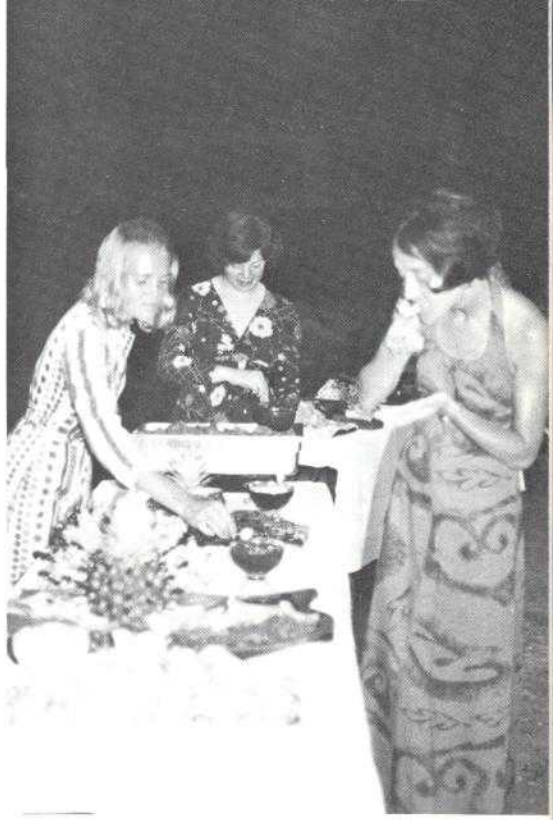
Examine the pre-dinner catch . . .

Enjoy a lunch in the Hawaiian sun . . .

which incorporates a full-grown bamboo forest and where trained tropical birds performed; and a ride around Waikiki and Honolulu harbor in a glass-bottomed boat.

After the meetings, evenings were a time to relax and to discover the exciting nightlife of Hawaii. Fine restaurants such as Benihana (Japanese), Trader Vic's (Polynesian), Little George's (seafood), the House of Hong (Chinese), and Chez Michel (French), were all nearby to satisfy any palate with items from broiled mahimahi to steak teryaki to crepes St. Jacques.

Learn of the customs and ways of the Tahitians . . .



Sample Polynesian delicacies . . .

COMSAT hosted a reception under multicolored paper lanterns on the lawn of the Royal Hawaiian Hotel on the opening day of the meeting. Cable and Wireless invited everyone to dinner aboard the submarine cable repair ship "Recorder" where roast suckling pig, broiled salmon, and a spicy Indian curry were among the delicacies offered.

On a weekend tour to the island of Kauai we cruised up the beautiful Wailua River to the Fern Grotto, and ate a picnic lunch on the beach.

Perhaps the event most eagerly awaited was the luau. Guests were received by Hawaiians who extended the traditional aloha greeting—a kiss and flower lei. Also in keeping with tradition we participated in a Hukilau, in which a net cast into the sea in the early morning is retrieved. The fish are then prepared and eaten.

Entertainment during the luau was provided by a young high school group, the Aiea Swinging Singers. Featured were Polynesian songs and dances, including the fast-paced, hip-vibrating, Tahitian tamore.

Back at my desk in The COMSAT Building, surrounded by dusty brown walls and business suits, it was hard to believe that I had truly been in Hawaii, where the sky was an unpolluted blue and the people appeared to be so happy.

Board of Governors instructs Secretary General to sign management services contract

The Tenth Meeting of the INTELSAT Board of Governors was held from July 17 to 24. This was the first meeting held in INTELSAT's new headquarters on the seventh floor at 490 L'Enfant Plaza East. Twenty Governors representing 55 of the 86 signatories were present.

Among its actions the Board of Governors:

• Decided the Secretary General should sign the Management Services Contract with COMSAT on August 1, and on the same day assume the rest of his responsibilities under Annex A of the INTELSAT Agreement.

• Approved the budget as proposed by the Manager for the Management Services Contractor in the last five months of 1974. The budget includes $42,312,000 for capital expenditures and $4,925,000 for operating expenses cash (excluding R&D contracts and study and development costs).

• Approved a task list for use by the Management Services Contractor in reporting costs incurred under the Contract.

• Approved a 1974 budget for the INTELSAT Executive Organ of $2,491,000.

• Approved execution of a contract with Page for INTELSAT IV-A satellite system monitoring equipment to be installed in the two existing and two new monitoring stations, at a total price not to exceed $1,594,908, as recommended by the Manager.

• Requested the Manager to discuss with NASA the possibility of expediting the schedule for obtaining new computers for launch vehicles, in order to reduce the period of six

International System Division's Senior Vice President George P. Sampson (left) signs the Management Services Contract for COMSAT as Mr. Jose Alegrett, Chairman of the INTELSAT Board of Governors (center) and INTELSAT Secretary General Santiago Astrain look on.

months which had been quoted for obtaining replacements.

• Approved a United States request that the RCA Astro Electronics Division be allowed to use the INTELSAT TT&C facilities in connection with launches of RCA domestic satellites. The same terms and conditions as were established for the previously approved COMSAT GENERAL request will be applied, except that the INTELSAT charge of $100,000 per launch may be reviewed by INTELSAT after the end of 1977, instead of being valid until the end of 1979. The Manager was authorized to conclude an agreement with RCA AED. The first launch is planned for December, 1975.

• Noted that the terms and conditions approved for RCA AED will be applied to any similar requests for use of INTELSAT TT&C facilities which may be presented to the Board through its January, 1975 meeting.

• Requested the Advisory Committee on Planning to reassess the traffic growth rates of 19% for the Atlantic, 17% for the Pacific and 15% for the Indian region, which were adopted in 1973 to extend the Traffic Data Base beyond the five year period covered by agreement between Administrations. The Committee is to review these percentages in light of the 1974 Global Traffic Meeting results, taking into account the responses to the planning questionnaire. This review was requested after such questions as whether the Indian Ocean growth rate should still be lower than that for the Pacific.

• Requested the Secretary General, in consultation with the Management Services Contractor on technical and operational aspects, to review and report on Zaire's application for lease of a full transponder in the Indian or Atlantic region on a preemptible basis to meet domestic telecommunications requirements under terms and conditions similar to those applied to Algeria.

• Noted the Manager's presentations on progress in: refining the INTELSAT V RFP; developing new communications specifications for the Indian Ocean service; studying alternatives for achieving higher INTELSAT V capacities; and in negotiating with Hughes for an amendment to the INTELSAT IV-A contract to procure additional INTELSAT IV-A satellites.

• Maintained the space segment charge for SPADE at 15¢ per minute of holding time as recommended jointly by the Manager and Secretary General, because insufficient operational experience is available to establish a definitive charge, and decided to review this charge in January, 1975.

• Adopted the United States suggestion that the Advisory Committee on Finance be reactivated under new terms of reference and appointed Mr. Langlois of Canada as Chairman and Mr. Binet of France, Vice-Chairman.

• Decided INTELSAT should co-sponsor with Japan a Third International Conference on Digital Satellite Communications, to be held in Kyoto during October or November, 1975.

• Approved transmittal of a letter to the Intergovernmental Maritime Consultative Organization, explaining the bases on which INTELSAT would consider it appropriate to apportion overall multipurpose system costs between fixed and maritime services, should INTELSAT decide to provide such services.

• Approved a one year extension of the term of Mr. Perillan, a nominee of the Spanish Signatory, to work on the Manager's staff at the Laboratories.

• Granted initial approval to the Asadabad 2 (Iran) and Mwembeshi (Zambia) standard earth stations for access to INTELSAT IV satellites, and formal approval to the Saint Denis de la Reunion (France) nonstandard station.

• Approved a request for extension of a non-standard earth station and an identical companion station for access to the space segment, without charge, to explore the capability for transmitting and receiving high-speed facsimile data (full-size newspaper pages) by a series of tests and experiments between a Dow Jones composing site at Chicopee Falls, Mass., and the newspaper production site at South Brunswick, N.J., with reception of the transmissions also at Westminster Press, Uxbridge, located on the outskirts of London.

• Extended until 1 August, 1975 its approval of the 3-meter antenna at Clarksburg access to the space segment without charge. The station will be used for further polarization measurements.

• Granted access to the space segment without charge to a Norwegian nonstandard station, to be located at the Ekofisk oil production complex in the North Sea, to conduct demonstrations during September-November, 1974 with the Tanum standard station in Sweden.

• Accepted the invitation of the Signatory of Thailand to hold the Board's Thirteenth meeting in Bangkok, Thailand from January 8 to 16, 1975.

• Accepted in principle the invitation of the Signatory of the Netherlands to hold a meeting in the Netherlands during 1976.

• The next meeting will be held from September 25 to October 2, 1974, in Washington, D.C.

The preceding report was prepared by Ellen Hoff of The International Affairs Division.

Potts named U.S. member of BG/T

James B. Potts, Director of the Earth Station Engineering Division, has been named as the United States member of the Advisory Committee on Technical Matters to the INTELSAT Board of Governors (BG/T). This committee is responsible for all technical aspects of the INTELSAT system including space system development, earth station standards and ITELSAT R&D in an advisory capacity to the Board of Governors.

Mr. Potts is a long-time COMSAT employee, having started in September 1963, and was a member of the "Washington Committee," which dealt with the technical planning of Early Bird prior to the formation of INTELSAT, this committee being the informal predecessor of the International Communications Satellite Committee/Technical (ICSC/T) and the BG/T. He has also been continuously involved with the U.S. earth station programs since 1963, and has been in his present position since 1969.

The BG/T plays a key role in the decisions of the Board of Governors with respect to system implementation, presently dealing with the problems of providing adequate space segment for the latter part of the 1970's and early 1980's. Alternatives under consideration include the next generation of satellites and the widespread introduction of digital transmission in the system.

COMSAT reports second quarter earnings; quarterly dividend increased

COMSAT reported consolidated net income of $10,122,000 for the second quarter of 1974, equal to $1.01 per share, compared to $8,157,000 or 82 cents per share for the second quarter of 1973.

However, net income for the second quarter 1974 was $769,000 less than that for the first quarter of 1974. The decrease was due primarily to lower revenue from U.S. Mainland-Hawaii traffic following a reduction in the charge for services on this path effective February 15, 1974.

For the first six months of 1974 net income was $21,013,000 or $2.10 per share, compared to $15,223,000 or $1.52 per share for the first six months of last year.

Net operating income for the second quarter of 1974 amounted to $8,126,000 or 81 cents per share, compared to $6,789,000 or 68 cents per share for the second quarter of 1973. For the first six months of this year net operating income amounted to $16,951,000 or $1.70 per share, compared to $12,466,000 or $1.25 per share for the first six months of last year.

Operating revenues were $30,942,000 for the second quarter and $63,322,000 for the first six months of this year, compared to $28,800,000 for the second quarter and $55,902,000 for the first six months of last year.

The increased operating revenues resulted largely from a gain in the number of half-circuits leased by COMSAT to its carrier customers for overseas communications via satellites. Excluding U.S. Mainland-Hawaii half-circuits, which are provided on a bulk basis at a fixed monthly charge, the number of full-time half-circuits leased by COMSAT as of June 30 of this year totaled 3,009, compared to 2,715 leased at the same time a year ago.

Operating expenses (including income taxes) were $22,816,000 for the second quarter and $46,371,000 for the first six months of 1974, compared to $22,011,000 for the second quarter and $43,436,000 for the first six months of 1973.

Other income after provision for income taxes amounted to $1,996,000 for the second quarter of this year, compared to $1,368,000 for the second quarter of last year. For the first six months of this year other income amounted to $4,062,000, compared to $2,757,000 for the first six months of last year.

The Board of Directors of COMSAT at its monthly meeting increased the quarterly dividend from 20 cents per share to 25 cents per share. The dividend, COMSAT's 16th consecutive quarterly dividend, is payable September 9, 1974 to all shareholders of record as of the close of business on August 9, 1974. The amount of COMSAT's dividends had been limited by federal government restraints upon corporate dividend rates. These restraints were lifted in April of this year.

IEEE conducts one-day seminars

The Continuing Education Committee of the Institute of Electrical and Electronics Engineers, Inc. (IEEE) has scheduled a series of one-day seminars September through November, according to Robert B. Bishop, committee chairman.

Conducted on Saturdays in the Metropolitan Washington area, the three seminars will be held September 7, October 19 and November 16. Subjects to be discussed at each of the meetings will include: Self-Management of Dynamic Career Planning, Communication—The Management Imperative, and New Technology.

The fee for the one-day seminar is $40 for IEEE members and government employees; $25 for IEEE student members, spouses and unemployed; and $60 for non-members.

Further information may be obtained by contacting Mr. Bishop, 9008 Braeburn Drive, Annandale, Va. 22003 or by calling 978-5675 after working hours.

An aerial view of the Santa Paula Station shows the three "troughs" leading out from the control building that will house the electric wiring and waveguide equipment for the three dish antennas. The cement structure in the foreground is the base for the station's 34-foot tracking, command and monitoring antenna.

The control building at Santa Paula is surrounded by lemon groves. The station is located in Ventura County, noted as the citrus capital of the world.

COMSAT General earth stations aim toward early 1975 completion

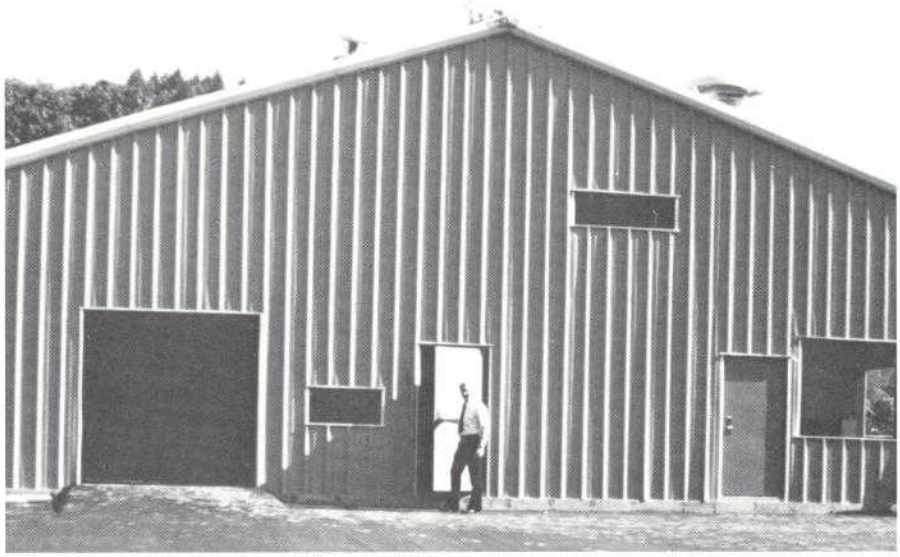
Photos and story by J. T. McKenna

Construction is proceeding toward an early '75 completion date for the East and West Coast earth terminals for Comsat General's maritime and domestic satellite programs. The Corporation will use the stations to relay satellite communications services to commercial ships at sea in the Atlantic and Pacific regions of the world. Each station will also be equipped to track, monitor and command Comsat General's U.S. domestic communications satellites.

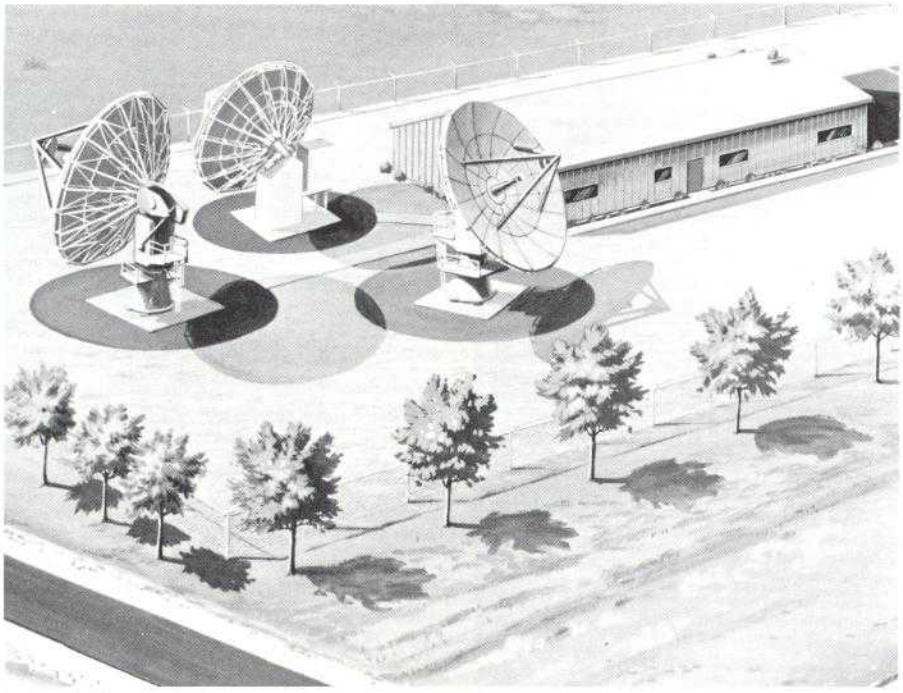
The West Coast station nestles in the midst of a lemon grove in Santa Paula, California, about 50 miles north of Los Angeles. At this date most of the civil works projects at Santa Paula, including the control building, access roads and the parking area, have been completed.

Looking out the south end of the control building, one sees the 15-foot high cement structure that will support the 34-foot tracking and command antenna for domestic and maritime satellites. To the right of this structure are two cement troughs that will house electronic wiring and waveguide equipment for the two 42-foot antennas, each with the capability to communicate with a Pacific maritime satellite.

Dan Geer from Paumalu, Hawaii, has been selected as station manager



Dave Durand inspects his future office at the Southbury, Connecticut, earth station. Southbury is identical to its sister station on the West Coast.



An artist's rendering of earth stations at Southbury and Santa Paula which are scheduled for completion early next year.

of the Santa Paula site and is now residing with his family in that area. Gordon Johnson, formerly located at headquarters in Washington, D.C., will be the station engineer and lives in Santa Paula with his family.

A sister station, being built simultaneously on the East Coast, is located in Southbury, Connecticut, about 90 miles north of New York City. Known for its beautiful residential and recreational areas, Southbury was selected as the East Coast terminal because of its proximity to a large metropolitan area (New York City), and because it sits in a natural bowl, surrounded by hills, preventing interference with existing local microwave and other terrestrial communications facilities.

Construction at Southbury is at the same stage as Santa Paula. Local contractors at both sites are to complete civil works, prior to the installation of antennas and electronic equipment by the general contractor, Philco Ford.

Southbury station manager David Durand, formerly of Andover, is now residing in the area with his family. M.C. "Bart" Bartlett, station engineer, was formerly located at the Talkeetna, Alaska, earth station.

Mr. McKenna is a COMSAT Information Officer.

COMSAT General opens N.Y. Office

A Maritime Satellite Communications Sales Office has been opened in New York aimed at providing complete maritime satellite communications marketing services to marine interests in the New York City area.

According to David W. King, Maritime Satellite Communications Sales Manager for COMSAT GENERAL, the office, located at 630 Fifth Avenue will be managed by Edward G. Dooley, recently named Eastern Region Maritime Sales Manager, assisted by Maritime Sales Representative Stephen P. Keller.

COMSAT GENERAL is the major participant in the establishment of the world's first commercial maritime satellite communications system. A full complement of maritime services is planned beginning in the early months of 1975.

AFL-CIO's Meany Addresses National Press Club

Following a recent luncheon at the National Press Club in Washington at which AFL-CIO President and COMSAT Director George Meany (left) was guest speaker, COMSAT's President Joseph V. Charyk (right) and Asst. V.P. for Public Information Matthew Gordon talk with Mr. Meany. Press Club V.P. Kenneth Scheibel is also in the picture.

From recipes in Germany to a Presidential visit "via satellite"

Photos and story by Senior Information Officer ALLAN GALFUND

COMSAT participated in the Armed Forces Communications and Electronics Association (AFCEA) Convention held in June at the Sheraton-Park Hotel in Washington, D.C., with a demonstration of SPADE. For the demonstration, CCITT No. 5 signalling equipment was connected directly to the SPADE terminal at the Etam, W.Va., earth station via landlines. Telephone calls from the COMSAT booth at the Sheraton-Park were made through this equipment and an INTELSAT IV satellite to public service listings in countries in the Atlantic area also equipped with SPADE equipment. Above, COMSAT President Joseph V. Charyk places a call to find out "what's cooking," from the German Cooking Expert in Frankfurt, Germany, one of the public service listings available. De De Runfola (L), and Linda Kortbawi, COMSAT hostesses at the exhibit, listen to the recipe over the speaker.

The AFCEA Convention just happened to coincide with President Nixon's visit to the Middle East. At Dr. Charyk's suggestion, COMSAT set up a television set where visitors to the COMSAT exhibit could see, via satellite, President Nixon's arrival in Cairo, Egypt. A video tape recorder at the booth also made it possible for the telecast to be recorded and played back throughout the day. The telecasts drew many visitors to the COMSAT booth where they were treated to a classic demonstration of how satellite communications makes it possible to "see it as it happens".

NBC thanks COMSAT For Cairo assist

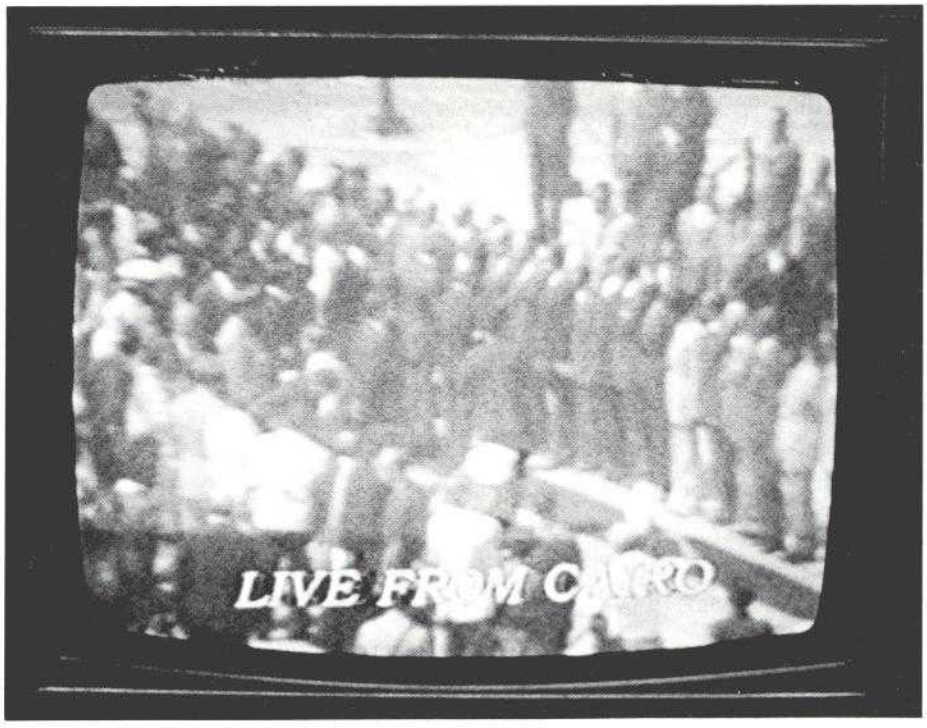
Donald Kivell of NBC's U.S. television network pool in New York has forwarded a telegram of appreciation to COMSAT for its assistance during the Presidential visit to Egypt. The telegram read as follows:

"NBC, on behalf of the U.S. television network pool, greatly appreciates the assistance you (George Lawler, Director of Service Development) and Dan Karasik gave, to make possible the television transmissions from the transportable ground station in Cairo during President Nixon's visit to the Middle East.

"Through your efforts and guidance, the pool, having first inquired for the use of the G.E. transportable ground station on June 6, was able to transmit first pictures from Cairo via IV (F-7) to Andover on June 11, 5 days later, almost to the hour.

"The pool members also appreciate the technical coordination efforts of Larry Covert and the COMSAT Operations Center Personnel in acquiring the ground station, on and off schedule, and providing communications to it when all else had failed in Cairo.

"The Cairo experience should remind us all in the future how quickly world-wide communications can be accomplished by satellite."



ISD-Personnel conduct Supervisory Workshop

The ISD Supervisory Orientation Workshop attendees were, seated, left to right: Kenneth G. Remington, Plaza; Imogene L. Cook, Brewster; Brenda Lister, Workshop Coordinator, Plaza; John F. Gray, Plaza; and Andros X. Thompson, Etam. Standing, left to right: Earl J. Jones, Jamesburg; Gerald L. Reeves, Etam; Joseph O. Speek, Jamesburg; Donald A. Verrill, Andover; James R. Fogg, Andover; Darrell B. Nelson, Brewster; Fred Jones, Plaza; Stanley T. Holt, Paumalu; Charles K. H. Wong, Paumalu; Charles Franklin, Labs; and Michael C. Hrinko, Plaza.

It was "back to school" again for earth station and Plaza personnel of the International System Division who attended the week-long Supervisory Orientation Workshop held in Loew's Plaza Hotel.

Sponsored by ISD in conjunction with the Personnel Division's EEO & Human Resources Development Office, the workshop was conducted to familiarize attendees with management and interpersonal skills needed for effective supervision. Subjects covered included: effective leadership through organizing, planning and scheduling; communications for effective leadership; motivation of subordinates; and human relations.

An afternoon was set aside for participants interested in selecting other instructional events, touring the COMSAT Labs and for a familiarization tour of the Operations Center.

Photos by ALLAN GALFUND

The workshop was broken down into working groups in which students were given problems to solve.

Brenda Lister of Personnel discusses a problem with James Fogg and Donald Verrill from Andover.

INTELSAT Contract Awards

To Page Communications Engineers, Inc., of Vienna, Virginia, an 18-month, $1,594,908 contract for development of Satellite System Monitoring Equipment.

To Lockheed Missiles and Space Company, Inc., of Sunnyvale, California, a 16-month, $349,479 contract for a Shaped Beam Satellite Antenna System.

COMSAT-SOLAREX reach settlement agreement

COMSAT has entered into a Settlement Agreement with Solarex Corporation concerning a civil action which COMSAT had filed against Solarex in March of this year.

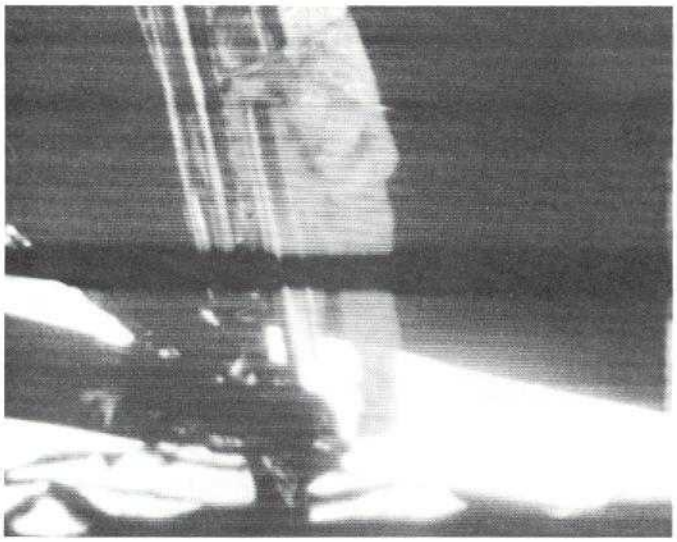
Solarex had denied the allegations in COMSAT's complaint and filed a counterclaim against COMSAT on April 8, 1974. COMSAT subsequently denied the allegations in the counterclaim.

A joint stipulation dismissing both actions, pending before the United States District Court for the State of Maryland, has been filed by the parties pursuant to the Settlement Agreement. Under the terms of the Settlement Agreement, Solarex would take a royalty-bearing, non-exclusive license to manufacture in the United States, and to market world-wide, the COMSAT violet solar cell technology developed at COMSAT Laboratories and which formed the basis of COMSAT's initial claims against Solarex. The detailed terms and conditions of the license are to be negotiated between the parties and are to become effective on or before January 1, 1975.

Solarex has agreed not to utilize or disclose COMSAT's Confidential and Proprietary Information without license. Solarex further agreed that it would refrain from contacting COMSAT employees with regard to technical and confidential business information. In addition, both parties have agreed not to disclose confidential and proprietary information of the other obtained during the course of discovery in the law suit and to refrain from attempting to hire employees of the other for five years.

The Agreement also establishes an arbitration mechanism for resolving past and future disputes, including those concerning patent rights and COMSAT's Confidential and Proprietary Information.

The parties expressed confidence that, with the resolution of their respective grievances, they could each move forward without further dispute.



As Astronaut Neil A. Armstrong descends the lunar ladder to become the first human being to set foot on the moon's surface, the big "dish" in Australia documents the event prior to its worldwide distribution over the INTELSAT system of satellites and earth stations.

Man on the moon —A worldwide story by satellite

by JOHN J. PETERSON

Shortly before midnight, Sunday, July 20, 1969, man first stepped on the moon. Since the last issue of the COMSAT NEWS, *commemorations of the event have been celebrated at the space centers in Houston, Texas, Cape Kennedy, Florida, and Washington, D.C. The following is a brief summation of the manned lunar flights and the role played by the* INTELSAT *system of satellites and earth stations in the successful completion of these missions.*

Apollo 11

The voice, firm but encased in a shell of radio static, made the quarter-of-a-million-mile leap from the surface of the moon to the Deep Space Network Station in Australia in less than two seconds. In another three-tenths of a second, it hurtled the distance from "Down Under" to the United States Mainland, then to The Johnson Space Center in Houston in a breath.

"That's one small step for man, one giant leap for mankind," came the voice of America's Astronaut Neil Armstrong, standing in a fraction of an inch of lunar dust he described as similar to powdered charcoal.

As he shifted his weight at the foot of the lunar ladder, testing the strength of the finely-grained, powdery surface, the signals, carrying not only his voice but his live televised image, traversed oceans and continents carrying, via communications satellites, man's conquest of the moon to a worldwide audience estimated at a half-billion people in more than 40 countries. Not in the history of mankind had a single event been viewed by so many.

At 10:56 p.m., EDT, Sunday, July 20, 1969, the age-old dream of centuries of explorers and adventurers in science was realized as man's investigation of the moon began, in full public view, carried across oceans to continents in fractions of seconds over INTELSAT satellites poised above the three oceans in their 22,300-mile equatorial orbits.

For the next two and one-half hours, Armstrong, joined by Astronaut Edwin E. "Buzz" Aldrin, walked, hopped, collected samples and deployed scientific experiments and the American flag, in full public view as live, televised accounts of the history-making event were received in Houston and simultaneously routed to the COMSAT earth stations at Etam, West Virginia, and Jamesburg, California, for transmission "via satellite" to the waiting global audience.

This same audience would continue to watch with breathless concern as Astronaut Michael Collins maintained his lonely vigil in the Command Module "Columbia" in lunar orbit and delicately maneuvered his ship into position to welcome the returning moon explorers.

Television coverage of the first mission to the moon was not to be exceeded by any of the succeeding lunar missions. During the slightly more than eight-day mission, the satellites carried 91.24 hours of Transmit Time with Receive Time totaling 208 hours and 44 minutes.

Apollo 12

Four months later, almost to the day, Apollo 12 Astronauts Charles "Pete" Conrad, Richard F. Gordon and Alan L. Bean, in their spacecraft "Yankee Clipper" hurtled toward the moon to repeat the performance of the Apollo 11 crew.

Twice during their stay on the planet's surface, Conrad and Bean emerged from their Lunar Landing Vehicle "Intrepid" for periods totaling almost eight hours to explore the Ocean of Storms and to implant the first Lunar Surface Experiments package.

As they carried out their explorations, the 85-foot "dishes" of the Manned Space Flight Network at sites in California, Spain and Australia, spaced across the earth's surface at 120-degree intervals, carried data between the two-million-mile hookup of communications satellites, radio circuits, landlines and underseas cables constituting NASCOM (NASA Communications Network), linking "Houston Control" with the astronauts and their space ships.

During the flight of Apollo 12, COMSAT earth stations fed 41.43 hours of live television to the waiting satellites poised over the Atlantic and Pacific Oceans while the global system of earth stations booked more than 80 hours of Receive Time.

Apollo 13

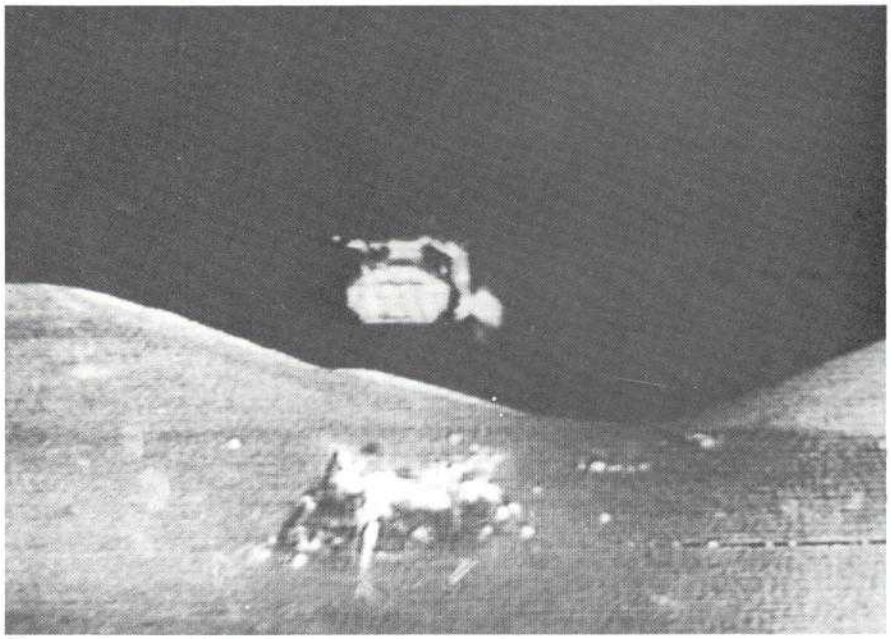
What began as a "routine" mission with only moderate news media par-

ticipation at both Cape Kennedy and the Houston Space Center covering Apollo 13 turned into a near catastrophe the third day into the flight when backup command module pilot Astronaut John L. Swigert, Jr., reported an explosion on board the spacecraft 200,000 miles in space.

The flight became a ground controllers "battle" to retrieve Astronauts Swigert, James A. Lovell, Jr., and Fred W. Haise, Jr., from space and stimulated world interest. Overnight, the number of newsmen at Houston almost doubled. Live television coverage initially scheduled for 12 to 15 hours of transmission was increased more than two-fold. Actual Transmit Time reached more than 32 hours with 53 hours Receive Time taken from the satellites.

According to network estimates, more than 125 million Americans watched on sets in homes, offices, television showrooms and giant screens such as the one in New York's Grand Central Terminal as engineers and technicians at the Johnson Space Center pitted their skills against the unyielding demand of space.

Live coverage was carried over the INTELSAT satellites through Britain to the Soviet Union and 22 other countries throughout the European Continent and North Africa. Japanese TV stations extended their programs into the early morning hours to cover the Astronauts' return to earth.



Almost three and one-half years later, and just as a worldwide audience had viewed man landing on the moon *live by satellite*, the world witnessed his final departure from the lunar surface as the ascent stage of the Lunar Module "Challenger" separated itself from its base and lifted off to rejoin the Command Module "America" waiting in orbit above the moon.

Pooled TV coverage of the splashdown and recovery in the Pacific Ocean by the carrier U.S.S. Iwo Jima was seen by an estimated 40 million viewers and, as the command module floated gently under its three giant parachutes toward the water, the Houston Post headlined, "Cheers go up all over the world".

Apollo 14

"Thus the spacecraft TV system, which had been scoffed at as a public relations 'gimmick' played a practical role," wrote Walter Sullivan of the New York Times.

For the first time, NASA used television to help solve a crisis in space. It was during early February 1971 and the Apollo 14 spacecraft commanded by America's first man in space, Alan B. Shepard, Jr., with fellow crew members Stuart A. Roosa and Edgar D. Mitchell aboard, were on the first 24-hour leg of their journey to the moon.

Don Kirkman wrote for the Washington Daily News: "Reaching across thousands of miles, the color TV camera in Apollo 14's 'Kitty Hawk' command module allowed NASA engineers to make a closeup study of the docking probe that failed five times to let Stuart A. Roosa link 'Kitty Hawk' with the 'Antares' lunar lander. It worked the sixth time."

On Sunday, Jan. 31 and again on Monday, Feb. 1, the INTELSAT system of satellites and earth stations in support of NASCOM, allowed engineers in Houston a first-hand look at Roosa's attempts to join Kitty Hawk and Antares and provided the capability to conduct a technical examination of the docking system which was crucial to the continuation or termination of the flight.

Sports enthusiasts who were also followers of manned space flight were to be particularly impressed with the Apollo 14 mission. It was during this visit to the moon that the first golf ball was driven and the first javelin throw made—both seen live by a world-wide viewing audience.

Not only were sports enthusiasts rewarded during the flight of Apollo 14, but so were Astronomy Clubbers, they witnessed an eclipse of the moon which lasted more than an hour.

Almost two-thirds of the video communications required by NASA during Apollo 14 utilized the INTELSAT system and COMSAT-operated earth

Frequently, it was the newsmen's sense of humor that helped them get through the pressures of trying to keep up with what was happening at the Space Centers and at the same time keep their editors "back home" happy. Sitting at his desk in the Press Center at the Johnson Space Center in Houston is "Scoop," the unflappable news type (actually a dummy propped up by newsmen for laughs).

stations. Commercially, Transmit Time for the mission was in excess of 55 hours while Receive Time exceeded 100 hours.

Apollo 15

Four years and 10 days after Armstrong first set foot on the moon, Apollo 15 Astronauts David R. Scott and James B. Irwin landed at the Hadley Apennine site to begin a stay of almost 67 hours on the moon during which they would spend approximately 19 hours retrieving surface samples, deploying geophysical instruments and describing geological features.

Because of the extensive exploration carried out by the crew, Apollo 15 was second only to the lunar landing in the number of live televised hours. During the return trip to earth, a worldwide audience witnessed, for the first time, the retrieval of film from the service module by command module pilot Alfred M. Worden.

During the more than 12-day flight the INTELSAT satellites transmitted close to 70 hours while more than 106 hours were taken from the satellites by global earth stations.

Apollo 16

For the flight of Apollo 16, manned by Astronauts John W. Young, Charles M. Duke and Thomas K. Mattingly in April 1972, INTELSAT IV satellites were used over the Atlantic and Pacific Oceans for the return of voice and data transmissions and live televised crew activities to the Johnson Space Center in Houston and for global commercial distribution.

For the Pacific Ocean INTELSAT IV, support of Apollo 16 was to be the second history-making event in which it would participate in the few months it had been in service—the first, President Nixon's visit to China.

Astronauts Young and Duke spent more than three days on the moon and more than 21 hours exploring its rugged surface. Of the 10 Apollo missions (including Apollos 9 and 10 not programmed to land on the lunar surface) TV coverage of the mission rated third in the number of Transmit Hours with more than 64 and in an excess of 100 hours Receive Time.

Apollo 17

On December 7, 1972, the final mission of the Apollo series was launched, carrying Astronauts Eugene Cerman, Ron Evans and Harrison H. Schmitt, during which global viewers would look on while many records would be established: the longest stay on the surface of the moon, the longest surface EVA (Extra Vehicular Activity), the longest distance traveled with the Lunar Roving Vehicle, the longest Apollo mission, the longest time in lunar orbit, and the return to earth with the most lunar samples.

Apollo 17 established a record at launch. Never before had an Apollo launch taken place on two separate days. By Central Standard Time the liftoff took place at 11:33 p.m., Wednesday. For those in the Eastern Standard Time Zone, the launch took place at 12:33 a.m., Thursday.

Except for minor problems such as the makeshift fender repair work on the lunar rover, the flight was a "textbook" flight. Even the colorful televised splashdown 350 miles southeast of Samoa, took place at the precisely predicted time of 2:25 p.m., EST, December 19, within sight of the recovery vessel U.S.S. Ticonderoga. Of the 10 Apollo missions, Apollo 17 rated third on a "Receive Time" scale with 101.20 hours taken off the satellites.

By coincidence, the splashdown of Apollo 17 took place 69 years to the day after Wilbur and Orville Wright made the first powered flight in an airplane.

Tracy's a girl

Our apology for having identified young Tracy Weaver as a boy in the last issue. Tracy's a girl.

"That" road no longer.

Although the main road through COMSAT Labs property need no longer be identified as "that" road, Kittina Mekhayarajjananonth, a math aide in the Propagation Studies Department, searches in vain for COMSAT Drive on her road map. COMSAT Drive has become one of the most recently designated roads in Montgomery County. Forming a backdrop for the new sign is the Unattended Earth Terminal. The new address of the Labs is, COMSAT Laboratories, COMSAT Drive, Clarksburg, Maryland 20734.

COMSAT exhibit unveiled at Texas space center

Close to a million visitors a year to the Johnson Space Center in Houston, Texas, now have an additional attraction in the Visitors Center with the recent unveiling of the new COMSAT exhibit. The exhibit features communications satellite support of the Apollo and Skylab missions and the upcoming American-Russian manned flight as well as telling the COMSAT story. Standing at the entrance to the exhibit are, left to right, John A. King, Center Public Affairs Officer; Charles A. Biggs, Chief, Special Events Office; and Allan W. Galfund, COMSAT Senior Public Information Officer.

COMSAT women in profile: Audree Coutry

by DONNA HIGGS

Our spotlight for this issue focuses on Ms. Audree J. Coutry, Research Assistant, Rates and Tariffs Department, Finance Division, a COMSAT employee since 1966. Under the direction of Mr. Joseph O. Wellington, Manager, Rates and Tariffs, Audree's work, in brief, includes preparing tariffs and related material for filing with the FCC and engaging in special research projects and studies related to rate and tariff matters for COMSAT and INTELSAT financial decision reports from the Board of Governors.

Prior to her assignment to Research Assistant, Audree was COMSAT's assistant cashier from 1966 to 1969. For the 12 years prior to joining COMSAT, she had been a professional photographer.

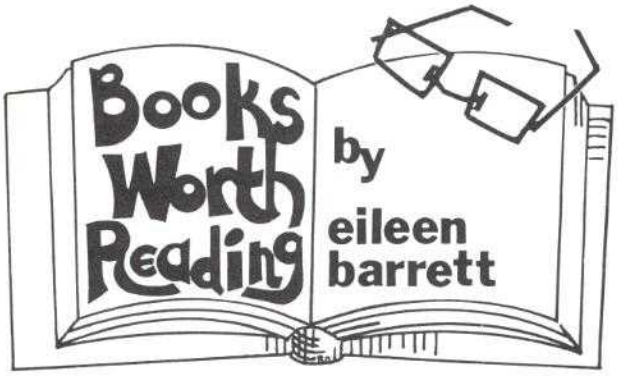
Audree resides in Alexandria with her mother and German Shepherd, "Muffin". An avid dog lover, she enjoys spending a good deal of time with Muffin. In her spare time, being an enthusiast of the outdoors, Audree enjoys bicycling, beachcombing, swimming in the ocean, and driving her new "Blazer" (she hopes to find sand tires in order that it might be usable on the beach).

Garage offers after-hour parking security

The Diplomat Parking Corporation, operator of the COMSAT Building's underground garage, is now offering special security for cars left overnight in the parking facility.

Available to all employees issued corporate parking permits, Diplomat offers, at no charge, surveillance of contract-parked cars left overnight or for extended periods of time. The added precautionary measure provides for the placement of such cars in the public parking area where they can be observed continually by garage attendants. Cars parked for extended periods in other sections of the garage are checked periodically by roving patrols.

Employees desirous of taking advantage of this new service should contact Mr. Melvin Samuels at 554-3969.



Systems Analysis for Data Transmission, by JAMES MARTIN (Prentice-Hall, 1972). Data transmission, the most rapidly growing use of the world's telecommunication links, is explained by James Martin, an author with years of practical experience in systems design. Although the subject is complex, he explains with the utmost clarity the technical and psychological considerations and the complex interrelations between them. The book analyzes, compares and contrasts the array of design alterations.

Presented in six sections, the first deals with the factors affecting the design of communication systems; the second, with user considerations, i.e. separate systems using data transmission that have been separately designed; the third, with terminal considerations; the fourth and fifth deal with the network and software; and the sixth and last section deals with design calculations. The final section occupies more than half the book and contains many worked examples.

The solution to many of the problems in the field are counter-intuitive and it is only by detailed calculation that the best methods can be found. Many organizations with data transmission networks could halve their cost if all of the design alternatives were considered and appropriate computations were performed to select the best. With this in mind, the book lists alternative systems for data transmission and provides programmed algorithms for comparing them and for optimizing network layouts.

Some special features of this book are: (1) it contains detailed checklists for various aspects of design; (2) it includes many charts, graphs, tables and lists of formulae to assist in teleprocessing design; (3) it details all important alternatives in designing and implementing a data transmission system; (4) it weaves a variety of case studies and examples into the text; (5) it contains a large and unusually interesting set of class questions which include "thought-provokers" for class discussion, and detailed case-study questions based on practical experience.

It is Martin's intention to make the reader familiar with the questions that should be asked about data transmission systems and to survey the types of answers that are possible.

Selected Papers On Frequency Modulation, JACOB KLAPPER, Ed. (Dover, 1970). There is a growing interest in Frequency Modulation (FM) radio for entertainment, the transmittal of sound in television is via FM, commercial and military communication systems favor FM, artificial satellites, our newest path of communication, use FM, and the growing volume of digital intelligence transmission is largely via digital FM.

The papers represent a collection of many of the classics in FM development, divided into four sections: (1) General FM Theory and Basic Experiments; (2) FM Circuit Theory; (3) FM Threshold Reduction; and (4) Digital FM. The papers are arranged chronologically in each section, with a few exceptions made for the sake of better continuity or pedagogical reasons. Following the papers is an annotated Selected Bibliography for Further Reading. The collection opens with the now famous paper of Armstrong in which he for the first time announced to the world the successful utilization of FM. Section 2 presents methods for dealing with the effect of circuitry on frequency modulated signals. Several useful approximate methods are given, including that of the recent paper of Bedrosian and Rice (paper 12). Section 3 is devoted to the topic of phase-locked and FM-feedback loops. Viterbi (paper 15) gives an exact nonlinear analysis for the first-order phase-locked loop in the presence of white Gaussian noise interference. The last section deals with digital FM. This area is already prominent and is gaining further impetus from the trend toward digitalization of information. The paper by Bennett and Salz is a comprehensive treatment of system performance for cases where postdemodulation filtering can be ignored. Concluding the collection is the paper by Pelchat on the power spectrum of PCM/FM.

Together, the 18 papers, collected and introduced by Jacob Klapper, constitute the first review of this increasingly vital method of transmission. The book is intended as a reference work for the practitioner, as a guide for those interested in entering the field, and as a textbook in FM principles.

Significant Phased Array Papers, R.C. HANSEN, Ed. (Artech House, 1973). Phased array hardware and theory was at a primitive stage in the World War II era. Then came the rapid developments at Hughes Aircraft in the early fifties. Since that time the technology has reached a significant level of maturity. Sophisticated theory has explained blind spot phenomena which were undiscovered and unexpected as late as 1955. Impedance matching techniques supported by analysis allow excellent performance over a wide range of scan angles. Near simultaneous search, track, discrimination, and designation of many high velocity targets is achievable. Perhaps the ultimate indicator of technical development is the serious consideration now being given to phased arrays for fire control radar in jet interceptor aircraft.

The most important and classic contributions to the development

of electronic scanning antennas have been compiled by Dr. Hansen in Significant Phased Array Papers. The book covers the World War II era through the breakthroughs of the fifties to state-of-the-art technology. The papers are grouped into six areas covering array analysis and synthesis, multual coupling effects, blind spots, impedance matching and simulation, conformal arrays, and whole systems.

The author has also included a bibliography of other classic papers which for reasons of space could not be included in this volume. This list includes articles which were not published in English and books on phased arrays. The classic papers on electronic scanning assembled here will be a source of information to array designers, to systems engineers, and to those who are increasing their knowledge of scanning arrays.

Norman appointed Director of R&E Post

Lewis S. Norman, Jr. has been appointed Director, Plans and Programs, Research and Engineering, according to an announcement by John V. Harrington, Vice President, Research and Engineering.

He will be responsible for the management of long range technical planning studies generally concerned with the adaptation of new technology to possible revenue producing systems for the Corporation.

In the conduct of his responsibility he will be assisted by C.A. Blackwell, L.B. Early and E.J. Habib, all of whom have recently been assigned to the Technical Planning Organization.

Mr. Norman has had considerable experience in the aerospace and communications field and comes to the Corporation from the Defense Communications Agency where he served as the Deputy Director. Prior to that he was the Commander of the Air Force Satellite Control Facility in California. Mr. Norman holds a M.S.E.E. from the University of Michigan and a B.S. from the U.S. Military Academy, and is a retired Air Force Brigadier General.

COMSAT employees get salary increase

A general salary adjustment for employees earning less than $25,000 a year, retroactive until July 1, 1974, was announced recently by COMSAT President Joseph V. Charyk.

The increase applies to all employees on the COMSAT payroll on July 1 and ranges from five percent for those earning $17,000 a year or less to four percent for those earning between $17,000 and $25,000.

Salaries of employees not affected by the general adjustment will be subject to individual reviews under revised and updated salary administration guidelines.

COMSAT "Hams" join in amateur radio field day

Amateur Radio Field Day-1974 found COMSAT and IBM Amateur Radio Clubs from Hyattstown, Maryland, joined this year by amateurs from CML, again participating. Field Day is an annual North American event combining simulated emergency operation, camping, and picnicking, but is also a contest among radio clubs throughout the United States and Canada.

COMSAT Labs' Cal Cotner (K4JSI) served as chairman assisted by many amateurs in the preparations. Bob McKenzie (WA3PKS) of IBM practically rebuilt the two war-surplus generators used for power. Nils Jespersen (WA3NDU), Joe Kasser (G3ZCZ), and Dave Weinreich (WA2VUJ) of COMSAT, prepared the necessary equipment for communication via the amateur OSCAR satellite. Gene Mertz (W3OEP) and Gene Marden (WA3RZH) of IBM checked out most of the receivers and transmitters.

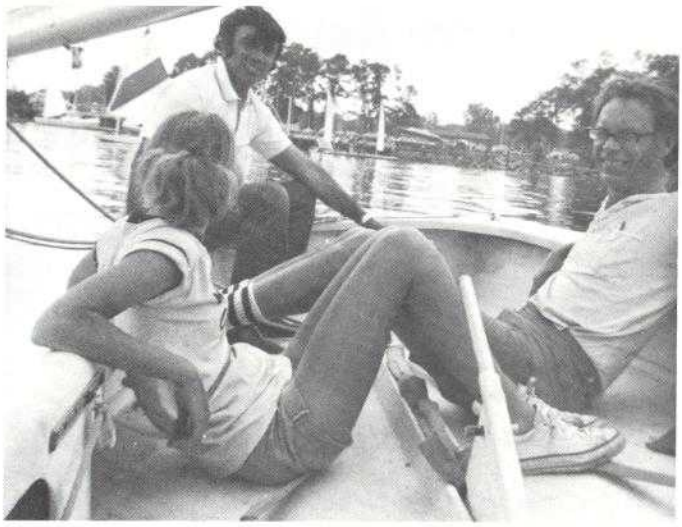
Setting up equipment proceeded smoothly: directional antennas were supported on extension ladders guyed with rope while wire antennas for the longer wavelengths were secured high in the trees with a slingshot carrying the lines aloft. In past years a bow and arrow was used for this and one New York State group is reported to use a homemade mortar.

All went smoothly until the rain began. The OSCAR satellite station was particularly drenched. One item of equipment refused to operate again until it was "charcoal broiled." Luckily, Chuck Dorian (W3JPT) of COMSAT had brought a powerful amplifier "just in case" which enabled the clubbers to make four contacts via the satellite adding a special bonus to the club's score.

The club's four stations, and an attached beginners' station operated by Explorer Scouts, made 990 contacts in various parts of the world. All amateur bands in the medium and high frequency regions were used as well as the 144-mHz very high frequency band.

Special recognition goes to COMSAT's Norm Miller and Norm Heck (WA3IKV) of IBM for providing food and drink. Eggs, French toast, orange juice, and coffee made up the breakfasts, charcoal grilled steaks were served for Saturday supper and a chicken dinner on Sunday. Chili was served at night and coffee was available at all hours.

Gene Mertz of IBM (left) and CML's Ed Bondurant operate the Continuous Wave (International Morse) position during Amateur Radio Field Day.



George Huson and his daughter relax as Shaul Kopyto navigates the Mobjack.

An aircraft approaching National Airport seems attached to the mast of The Mobjack.

Boat handling and water safety classes offered by COMSAT Club

The 25-member COMSAT Boating Club is now the owner of two 17-foot sailboats according to Club President Dan Swearingen. A Daysailer Class II kept at the Washington Marina, a 10-minute walk from the Plaza, and the Mobjack class, "Early Bird", which is docked at the Washington Sailing Marina near the National Airport.

Swearingen recommends the Daysailer for stable sailing and the Mobjack for speed and full sailing in brisk winds.

In May, the Boating Club held an outing at the Washington Sailing Marina with members encouraged to bring guests. Subsequently, several new names were added to club's membership.

To encourage boating safety, the club runs proficiency classes of both the chalkboard and the "hands-on" type with Bill Billerback conducting the chalkboard classes at the Labs and Marty Votaw at the Plaza. Included in the classes are the fundamentals of boating safety, the "rules of the road", and basic sailing techniques. The "hands-on" classes are held Saturday mornings and weekday evenings, on boats, with experienced Boating Club members acting as instructors.

Membership in the Boating Club is open to all COMSAT Employees Association (CEA) members. Information can be obtained from the following officers: Dan Swearingen, President; Norm Schroder, Vice President; Joyce Oseth, Secretary; and Ernst Steinbrecher, Treasurer.

Neil Helm with his family serving as crew set sail from the Washington Marina in the Daysailer.

Marty Votaw serves as helmsman with a crew consisting of Jack Hannon and his son and Dick McBride's two boys.

Angela Croom completes Junior Fellowship Program at COMSAT

Ms. Angela Croom, a 1974 graduate of Ballou High School, has completed her temporary summer employment at COMSAT as the result of COMSAT's participation in the Department of Commerce developed Junior Fellowship Program. She will pursue her studies at the Carnegie-Mellon University in Pittsburgh, Pennsylvania, in engineering.

COMSAT, in conjunction with other private companies and government agencies, participated in the program designed to provide on-the-job experience, career guidance and financial assistance to students in the upper 10 percent of their high school graduating classes. The program assists such students who plan and are eligible to attend college but for reasons such as economic conditions require assistance in pursuing their careers.

While at COMSAT, Ms. Croom worked under the supervision of Mr. Hans Weiss, Director of Engineering Studies Division, Research and Engineering, as a math aide. The Junior Fellow performed computations related to the preparation of a Planning Committee document on the implementation of financial incentives to encourage the construction of additional earth station facilities.

People and Events

JAMESBURG. This is the first year this Station has participated in the Summer Employment Program. Authorization was received from Headquarters for the temporary employment of one Monterey Peninsula College student. Several students applied and after due consideration, **Ronald Jones** was selected.

Ronald resides with his grandparents in Pacific Grove, approximately 30 miles from the station. A graduate of Pacific Grove High School, he has completed his first semester at Monterey Peninsula College, where he is enrolled in the electronics course. He plans to continue his education toward an Electronics Engineering degree.

Ron likes to play basketball, baseball, and enjoys swimming. During the school term he works weekends with a plumbing and electrical supply dealer. As time permits, he also repairs radios, televisions, and stereo equipments.

He is the son of Sgt. E-7 William Jones, who is assigned to the U.S. Army Strategic Communications Command and travels throughout the world assisting in the installation and maintenance of communications equipment. As of this writing he is in Korea. **—W. E. Neu**

LABS. In our continuing effort to conserve energy, most employees are taking vacations to less distant points; **Virginia Hott** spent five days over the July 4th holiday with friends in Ocean City, Maryland; the **Bill Fallons** spent a week at the New Jersey seashore; **Claudette Tucker,** son **Jeff,** and Jeff's grandmother took 12 days to visit with relatives in South Carolina, with a final stop in Myrtle Beach; the **Norman Millers** packed up their trailer and spent two weeks camping on the Virginia and North Carolina seashores; **Marie Curtis,** son **Frankie,** and **Bettie Linthicum** recently returned from their Florida vacation with fantastic photographs of Disney World, exciting stories and great tans from their stop-over in Myrtle Beach.

This columnist and son **Christopher** also spent seven days at Myrtle Beach where son Chris received a permanent souvenir, three stitches in his head due to a minor fall, afterwards, it was a three-day visit to Virginia Beach, Virginia, for mother to recuperate; **Terry Morgan** spent the weekend of July 4th fishing (?) in Canada; received a lovely postcard from **Sheila Norton,** who spent two weeks visiting with her mother in Wyoming; it was a three-day tour for **Marie Curtis** and **Anne Speare**—they started off in Wildwood, New Jersey, found rain and moved on down the coast to Ocean City then on to Virginia Beach for a day.

COMSAT Labs Slo-Pitch Softball League recently completed regular season intramural games. The first-half winner was Coach **Marie Curtis'** Model Shop Team. The second-half winner (decided in a 13-12 game) was the CPL Team coached by this writer. The Model Shop Team has won the championship for the past two years. It will be interesting to see if it can be defeated in the coming championship game.

George Hunt's first Melody Inn Slo-Pitch Tournament of 1974 was held July 13 and 14. COMSAT had a very fine 15-player team which, after the dust had settled, came home with a new trophy. COMSAT placed third behind National Bureau of Standards which won the first place spot. COMSAT is scheduled to play in the second Melody Inn Tournament in late August.

In the Gaithersburg Recreation Department Men's Slo-Pitch Softball League, COMSAT and Bish Thompsons, who were rivals in the Winter Basketball League, won by COMSAT, ended the season tied for the League title (Gray Division) with a 9-1 record (COMSAT's only loss was to Bish Thompson and Bish's only loss was to COMSAT). The tie-breaker game was held on July 29th for the League Crown. COMSAT prevailed 16-7. The playoff homeruns were hit by **Bob Ridings** and **Bud Swanger,** with Ridings and **Terry Morgan** leading the hitting with 4 for 4 and **George Meadows** 3 for 4.

Next month, details on the play-off games for the "B" League Championship Crown, and the Annual Post Season Invitational Softball Tournament, sponsored by the City of Gaithersburg Department of Parks and Recreation, to which our very fine COMSAT team has been invited.

The COMSAT Mixed League's 1973-74 Bowling Banquet was held May 31 at the Hyattstown Fire Hall, Hyattstown, Maryland. The food was prepared for League members by the Fire Hall's Women's Auxiliary. All agree that the dinner could not have been better. Music was provided by the "Saints and Sinners."

The highlight of the evening was the presentation of trophies climaxing 35 hard, long weeks of bowling. Not pictured is the third place team, the "Write-ons," captained by **George Brown.** Individual awards went to **"Rookie" Morgan** and **Maxine Buige,** high average; **Pattie Woodruff** and **Bob Redick,** high game; **Chuck Johnson** and **Leslie Bell,** high series; **Marie Curtis** and **Jay Ballentine,** high game with handicap; and **Bettie Wentworth** and **Bud Swanger,** high series with handicap. Most improved bowlers for the season were **Edna Carlson** and **Wayne Moore.**

Just a reminder to everyone that we have a lovely Nature Walk at the Laboratories. Why not enjoy the beautiful countryside around the Labs this Summer?

Our COMSAT Garden Club is interested in increasing its membership for 1975. This year has been a good one for COMSAT "gardners" as the picture story in the next issue will show. Anyone interested in joining the Club should call me at the Labs on extension 4426. **—Carol Louthan**

Members of the first place "Project Office" team receive trophies (left to right): Bill Gaunt, Helen Gaunt, League VP George Brown, Team Capt. Fred Esch, Leslie Bell, League Pres. Hank Mueller, and Woody Davis.

Second place trophies went to members of the "Lucky Five" (left to right): Norman "Grandpa" Miller; Wayne Moore; Carol Louthan; League VP George Brown; League Pres. Hank Mueller; and Terry "Rookie" Morgan. Team Capt. Bud Swanger is not in photo.

Most improved bowlers for the '73-'74 season were Edna Carlson (second from left) and Wayne Moore (second from right). Presenting the awards are Carol Louthan and George Brown.

PAUMALU. Thousands of vacationers are flocking to Hawaii and the Hawaiians are in turn going off island for their vacations. Among Paumalu's travelers are **Charlie Ogata,** Operations Controller and family who went to Michigan to visit Charlie's brother and family, to Baltimore to visit friends, then to Pennsylvania and Virginia with a stopover at COMSAT headquarters.

Tom Kaneshiro and **Eddie Miyatake** and their families spent their vacations on the Big Island of Hawaii visiting with their parents. **Bob Makizuru** and family were on Kauai for a family reunion celebrating Bob's mother's 75th birthday. **Howard Bunch** made a flying weekend trip to Hilo on a visit with family members. **Cas Corpuz,** being an ardent golfer, spent his vacation with fellow golfing enthusiasts vying in tournaments in Kona and on Kauai.

Following the presentation of awards, Labs bowlers and partners took to the floor to dance to the music of the Saints and Sinners.

Paul Motoyama and family spent their time touring the West Coast while **Ron Miyasato,** with his wife and two daughters, after a visit to Expo 74 in Spokane, travelled through Canada, from Vancouver to Montreal, then down to Miami via New York, D.C., and Orlando, then to San Francisco via New Orleans (with a stopover at Las Vegas in an unsuccessful attempt to break the banks there), then to Los Angeles. **Joe Chow** left on the 25th of July for an extended visit with his parents in Toronto.

Charlie Wong and **Stan Holt** attended the Supervisor's Workshop at Headquarters in late June. Stan's family joined him after the workshop then enjoyed a jaunt to Las Vegas and Los Angeles.

Bob Kumasaka, Station Administrator, is hopeful of being home some time in mid-August when a temporary assignment at headquarters is completed. **Hank Schutzbier** has accepted a position with the M&S Service Center and was bid "aloha" with a stag party at the Natsunoya Tea House. All were present for duty the following morning in spite of the very gala time enjoyed by all the celebrants. "Welcome aboard" to **Thomas Akimoto** and **Donald Stribling,** Electronic Technicians, who are the latest additions to Paumalu.

—Bob Kumasaka

Ed Note: *The* COMSAT *News was treated to a visit by Mr. Kumasaka during his stay at headquarters.*

PLAZA. Peter Tellmann, son of **George Tellmann,** Manager, U. S. Systems Operation, has received an

appointment to the United States Military Academy at West Point and reported there in July.

Gene Christensen, Facilities, was honored with a small party planned by his secretary, **Wanda Mills,** and fellow employees on August 2 to celebrate his 10th Anniversary of employment with COMSAT.

The current move of INTELSAT to new quarters on the 7th floor of the Loew's L'Enfant Plaza Hotel has been completed.

A baby boy was born to **Dave** and **Joan Durand** on June 10. This is the sixth child for the Durands, who have five other boys.

Response to the Hawaii trip has been tremendous. As of this writing, 41 persons will be basking in the Hawaiian sunshine in February. It's still not too late, so if anyone who has not already made reservations is interested, please let me know.

My family and I recently returned from Chincoteague Island, Virginia, which is located across the channel from Assateague Island, home of the famous wild ponies. For those of you who may not know, during the last week of July every year, the wild ponies are rounded up on Assateague and then are made to swim the channel to Chincoteague. After a brief rest, they are driven through the city's main streets to the carnival grounds where the yearlings are auctioned off on the following day. Following the auction is a rodeo which features local riders who are brave enough to attempt riding these wild creatures. Aside from these festivities, one may be content to swim in the ocean, fish, tour the island on bicycles or by boat, or visit any one of a number of gift shops. Sightseers are pleased with the Miniature Pony Farm and the Beebe's Ranch, original home of the famous Misty of Chincoteague. Children, of course, are especially delighted with the horses and the excitement, but everyone can appreciate the uninhibited beauty of the natural surroundings.

—**Donna Higgs**

SINGAPORE. The Asia Office was host to Mr. **Richard R. Colino,** Assistant Vice President, International Relations and Corporate Planning, during a trip which he made to Southeast Asia in June. This was the first visit by an Officer of the Corporation to the Asia Office, and hence represented something of a milestone. **Roman Ulans,** Director of the Office, and **Miles Merians,** Assistant Director, accompanied Mr. Colino on visits to government officials and telecommunications organizations in various Southeast Asian countries. The timing of Mr. Colino's trip was particularly fortunate since everybody was "at home" for once, and the entire Asia Office staff was able to get together with our visitor one evening for dinner on the top of the Shangrila Hotel.

Administrative Assistant **Lucy Kwok** entered the hospital and gave birth to her third child, and first daughter, **Mei Yu.** The birth was a bit premature and, as a precaution, the baby was kept in an incubator for the first couple of weeks. Mother and daughter are home now, however, and doing beautifully. During Lucy's absence, **Patricia Chen,** the Asia Office Secretary, is doing yeoman (or should it be yeoperson?) work carrying the administrative load which normally falls on Lucy's shoulders. Additional support is provided by Mrs. **Lee Ee Fong,** who is working on a temporary basis to bridge the gap.

Carl Schmitt, Hans Dodel and **Phil Caughran** stopped by the Asia Office on their way to and from Jakarta in connection with study contracts which COMSAT GENERAL has in Indonesia. These studies cover a system concept, and selection of 10 sites, for a domestic satellite communications network providing urgently required service to Indonesia's rapidly expanding oil industry. This ties in with one of the most interesting developments in the region, since the equipment selected to meet this immediate requirement must also be designed for easy integration into a much larger domestic satellite system which Indonesia plans to have in operation in three to four years. Asia Office personnel will be keeping close watch on this project, and expect to meet shortly with Indonesian Government officials in order to discuss the relationship between the Indonesian domestic system and the INTELSAT system.

—**Miles L. Merians**

Asian Office Administrative Assistant Lucy Kwok at home with new daughter Mei Yu.

Roman Ulans, Director of the Asia Office (right), and Assistant Director Miles Merians pitch in to help Secretary Pat Chen with office administration during the absence of Mrs. Kwok.

Your gift last fall makes it work... all year

Seasonal planting by

mentally retarded teenagers learning a

trade, a summer camping trip

for handicapped scouts, a Merry Christmas

for underprivileged youngsters,

a springtime outing for inner city kids . . .

all are ways of saying it's

working the United Way—year-round.

United Way of the National Capital Area

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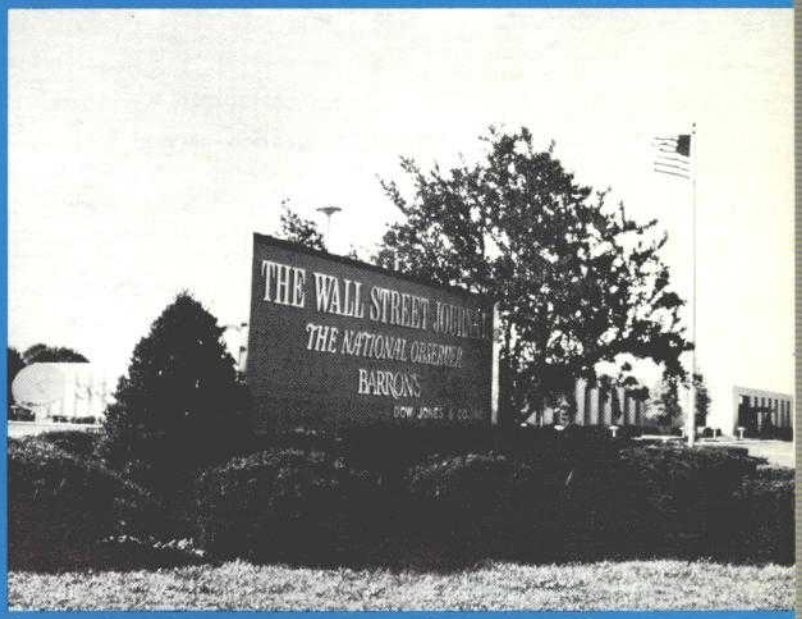
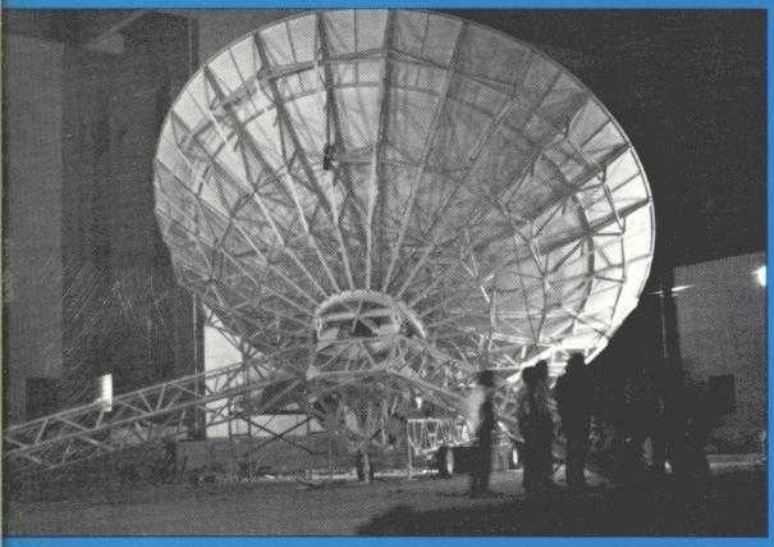
Award winners Pickering, Pierce and Charyk, left to right, stand beneath a bust of Marconi.



An experiment in newspaper transmission from Massachusetts to New Jersey by satellite (antenna at left).



The COMSAT General team works on the Saudi Arabia earth station through the night.

Melvin Laird is welcomed to the COMSAT Board of Directors by Chairman McConnell.

News in Brief

Melvin Laird elected to Board

Former Secretary of Defense Melvin R. Laird has been elected to fill the vacancy on the Board of Directors resulting from the assumption of a White House post by former Board member Philip W. Buchen.

INTELSAT reaches 87 members

Haiti became the 87th member of INTELSAT at the eleventh meeting of the Board of Governors.

Labs improves solar cell

New cell exhibits conversion efficiency of 15% for space use and 20% for terrestrial use.

COMSAT President receives award

Dr. Joseph V. Charyk was one of three American scientists receiving Marconi International Awards in Bologna, Italy.

Satellite monitoring services arranged

Agreement has been reached with EMBRATEL of Brazil and INTELCAM of Cameroon for monitoring services of new INTELSAT IV-A.

Corporate financial report

Third quarter earnings show net income and share worth up over similar 1974 quarter. Board of Directors declare 17th consecutive quarterly dividend.

Annual Report gets magazine award

COMSAT receives Merit Award from business magazine Financial World for 1973 Annual Report.

"Victory" gardens reappear

Labs' Garden Clubbers plant, grow, pick and set own vegetables on the table as World War II-type "Victory Gardens" are revived.

Special features

Cover

Photos on the cover represent a montage of some of the news events occurring since the last issue. Accompanying stories may be found in this issue.

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Dr. Charyk receives Marconi award at ceremony in Italy

Dr. Charyk stands in window from which Marconi sent the first radio signal in 1895.

COMSAT President Joseph V. Charyk joined Dr. John R. Pierce of the California Institute of Technology and Dr. William H. Pickering of the Jet Propulsion Laboratory, Pasadena, Calif., in accepting the Guglielmo Marconi International Award at the Marconi Centennial celebrations in Pontecchio Marconi, Bologna, Italy.

The presentation, made on "Marconi's Day," October 14, honoring the 100th anniversary of Marconi's birth, was the result of the selection of Drs. Pierce, Charyk and Pickering by a group of eminent Italian scientists, "on the high recognition of important scientific achievements in the fields of electronic devices, satellite communications and deep space exploration."

In accepting the award, Dr. Charyk stated, "I feel proud to accept an award which, beyond the limits of personal recognition, honors all men who have dedicated their efforts to make the world united and at peace through free communication."

Drs. Charyk, Pierce and Pickering also received the honorary doctorate degree, *Laurea Honoris Causa,* in Electronic Engineering from the University of Bologna.

The scientific award was presented by the Marconi Foundation at the Villa Marconi outside Bologna in the presence of a large group of notables which included the widow and the daughter of the great Italian inventor. Earlier this year, the initiative for these awards had been taken by the National Academy dei Lincei, which was founded in Rome in 1605 by four young men interested in science and experiments. The membership in the Academy included many famous men, among them Galileo, who was enrolled on April 24, 1610.

Dr. Charyk was accompanied by COMSAT Laboratories' Senior Scientist Dr. Pier L. Bargellini who had been invited by the Italian National Research Council of Florence, Italy, to speak at its Symposium on Radio Propagation in Natural Media which was attended by scientists from various countries. Dr. Bargellini's subject was entitled, "Radio Communications from Early Days to Satellites."

Under a plaque commemorating Marconi's birth, Dr. Charyk accepts the Guglielmo Marconi International Award.

Dr. and Mrs. Charyk visit Villa Marconi at Pontecchio (Bologna).

Grouped together, left to right, Dr. Pierce; Marconi's widow, the Marchesa Marconi; his daughter Elettra; and Drs. Charyk and Pickering.

Haiti becomes 87th INTELSAT member at 11th Board of Governors meeting

With the ratifications of Agreements by the Governments of Haiti and Turkey, Haiti became the 87th member of INTELSAT as the result of action taken at the eleventh meeting of the Board of Governors concluded in Washington October 3 with 22 Governors in attendance.

The following actions were among those taken by the Board.

INTELSAT IV-A and V

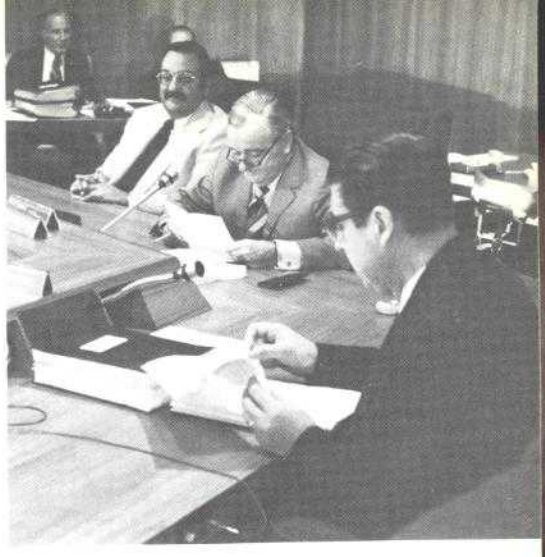
- Established a timetable for further studies and actions on the question of INTELSAT space segment needs, under which: the November Board meeting will consider a negotiated amendment to the INTELSAT IV-A contract for procurement of three additional INTELSAT IV-A satellites with options valid until the end of 1976 for up to three more, as well as recommendations on plans for the full operational use of INTELSAT IV and IV-A's.

Left to right: P. Ng'Oma, Africa Group I; B. L. Aka, Africa Group II; and A. Bairi of the Arab Group.

The January Board will consider the INTELSAT V RFP after it has been revised in six specified areas and reviewed by the Technical Committee, and the March Board will consider alternative INTELSAT V designs and detailed study of INTELSAT IV-A/V tradeoffs for 1979-1988.

The alternative INTELSAT V designs to be studied include a 30,000 channel satellite operating only in the 6/4 GHz band, and an INTELSAT V with 6/4 GHz capacity sufficiently in excess of 13,000 channels to permit time for the introduction of the required 14/11 GHz stations.

- Requested the Management Services Contractor to inform Hughes than an intersatellite link will not be required.
- Authorized the Management Services Contractor to negotiate an amendment to the INTELSAT IV-A contract for inclusion of a dual polarization experiment on two satellites, and present a complete program plan to the November Board meeting.
- Decided that technical specifications for any INTELSAT V shall be compatible with the efficient use of TDMA/DSI, and that plans for the operational introduction of TDMA/DSI in each satellite configuration should be prepared by the Management Services Contractor.

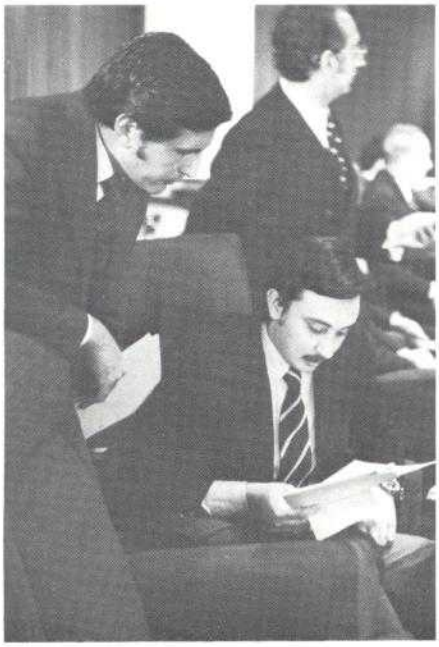


Left to right at table: Jose Alegrett, Chairman, INTELSAT Board of Governors; W. G. Geddes, Vice Chairman; and Santiago Astrain, Secretary General.

Technical and Operational Matters

- Approved the recommendation of the Management Services Contractor that vibration accelerometers be added to the INTELSAT IV (F-8) and (F-6) at a total cost not to exceed $121,200.
- Reaffirmed the urgency of INTELSAT IV launches and requested the Management Services Contractor, in continuing his efforts to obtain a December launch date for the INTELSAT IV (F-8), to draw the Board's concern to the attention of NASA.
- Approved the lease agreements

Left to right: George P. Sampson, Senior Vice President, International System Division; J. Mtz.-Villarejo of Spain; Richard R. Colino, Asst. Vice President, International Affairs and Corporate Planning; Ellen Hoff, International Affairs Division; Irving Goldstein, Director, International Affairs Division and J. Aepli of Venezuela.



Left to right: A. L. Daverede and J. Mazzanti of Argentina and J. Mtz.-Villarejo of Spain.

under which Algeria and Norway will lease spare space segment capacity from INTELSAT for domestic telecommunications on a preemptible basis and at a rate of one million dollars per year.

Left to right: Dr. John V. Harrington, Vice President for Research and Engineering; H. William Wood, Asst. Vice President for International Systems Operations; and Lewis C. Meyer, Asst. Vice President, Administrative Services.

• Approved the lease agreements with EMBRATEL (Brazil) and INTELCAM (Cameroon), under which the two entities will provide satellite system monitoring in the southwest and southeast coverage beams of the Atlantic INTELSAT IV-A, and authorized the Management Services Contractor to execute the agreements. EMBRATEL's facilities are expected to be operational within 15 months from execution of contract, and INTELCAM's within 14 months.

• Approved the INTELSAT IV-A earth station performance characteristics, and requested the Secretary General to distribute them, with the caution that modifications will probably be required as time passes.

• Agreed to delete an acoustic wave filter study from the approved R&D program, as no further action appeared advisable.

• Noted that Indonesia plans to establish its own domestic system, and will initiate the requisite coordination with INTELSAT at a later time.

• Requested the Management Services Contractor to advise CNES of France that INTELSAT does not wish to participate with CNES in continued development of a lightweight solar array.

• Approved procedures under which earth stations shall apply for access to the space segment.

• Approved the U.S. application for approval of a non-standard station at Kwajalein, subject to a rate adjustment factor of 2.5 verification of the station's characteristics, and to access only for provision of service via the Japanese TT&C station on Kwajalein. The non-standard station will be used to provide communications support to the Japanese National Space Program TT&C station on Kwajalein during limited checkout and operation of the launch system for two Japanese satellites, the Engineering Test Satellite I and the Ionosphere Sounding Satellite.

• Approved applications from Algeria for approval of fourteen non-standard earth stations. These stations will be used in the domestic network to provide television, telephony and telegraphy services under the Algerian lease of INTELSAT spare space segment capacity for domestic services. The stations were approved subject to verification of the performance characteristics, and application of a rate adjustment factor of 2.5 if used for services other than those of the lease.

Administrative Matters

• Selected management consultants to be invited to undertake studies on the organization and procedures adopted by telecommunications entities throughout the world and by multinational ventures for implementing advanced technologies, and experience gained in INTELSAT management. These studies will fulfill the requirement of the Agreement that the Board of Governors, in preparing its overall study on permanent management arrangements for INTELSAT, give due regard to reports from at least three management consultants.

• Selected Mr. Andrea Caruso to serve as acting Secretary General whenever Mr. Astrain is absent or is unable to discharge his duties.

• Noted the designation of persons selected by COMSAT to be responsible for key functions under the provisions of the Management Services Contract, namely: George P. Sampson, for carrying out and supervising the functions of COMSAT; Martin J. Votaw for technical system implementation; William H. Wood for system operations; and Lewis C. Meyer for space segment procurement.

• Agreed that the Secretary General could grant interim cost of living increases to INTELSAT staff effective October 1, pending the results of a personnel study to be undertaken by personnel consultants, and adoption by the Board of Governors at a later meeting of an overall compensation program for INTELSAT.

• Approved terms of reference for the Operations Representatives.

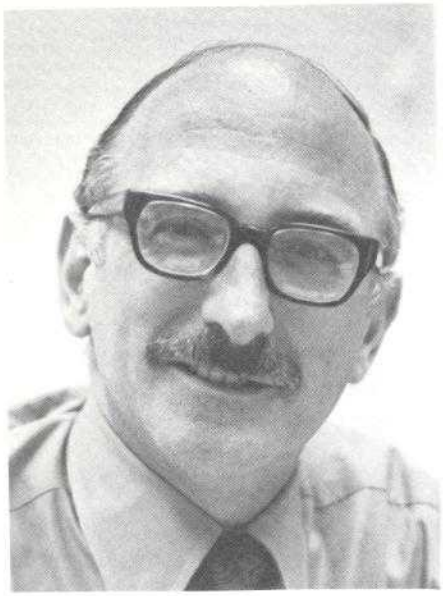
• Approved a one year extension of the term of D.W.E. Rees, a nominee of the U.K. Signatory, on the Management Services Contractor's Operations staff.

• Approved a one-year extension of the term of Dr. Takuro Muratani, a nominee of the Japanese Signatory, to work on the Management Services Contractor's staff at the Laboratories.

Scheduled the next meeting for November 20 in Washington, D.C.

The preceding report was prepared by Ellen Hoff of The International Affairs Division.

New R&QA director for Labs



Robert Strauss has been appointed Director, Reliability and Quality Assurance for COMSAT Laboratories. Reporting to Louis Pollack, Assistant Director-Technical, Mr. Strauss will be responsible for specific R&QA functions on various Labs projects and the general development, coordination and establishment of Labs reliability standardization and testing procedures and practices. He will also be assigned certain development and test functions related to R&QA.

Melvin R. Laird elected to COMSAT Board of Directors

Melvin R. Laird, former Secretary of Defense and Presidential Counsellor for Domestic Affairs, has been elected to the COMSAT Board of Directors. Mr. Laird fills a vacancy on the Board created by the resignation last month of Philip W. Buchen, now Counsel to President Gerald R. Ford.

COMSAT Chairman Joseph H. McConnell said that "Mr. Laird has a long and distinguished career in public service. He will have a great deal to contribute as a member of the COMSAT Board to the growth and further development of satellite communications."

Mr. Laird, 52, now is Senior Counsellor for National and International Affairs, Reader's Digest. He was Secretary of Defense 1969-1973, Counsellor to the President for Domestic Affairs 1973-1974, and a member of the U.S. House of Representatives from Wisconsin 1952-1969. While in Congress Mr. Laird was Chairman of the House Republican Minority and a member of the Republican Coordinating Committee. He was Chairman of the Republican National Platform Committee in 1964, and Vice-Chairman in 1960.

Mr. Laird presently serves on the boards of several corporations. He is Chairman of the National Energy Project, a two-year study being conducted under the auspices of the American Enterprise Institute for Public Policy Research.

Mr. Laird was elected by Board members to serve until the next COMSAT annual meeting of shareholders in May 1975, when the corporation's shareholders will vote on nominees for directors.

Under the 1962 Act, the COMSAT Board of Directors consists of 15 directors. Twelve are elected by shareholders and three are appointed by the President of the United States with the advice and consent of the U.S. Senate.

Corporate staff adds planning advisor

Michael S. Alpert, formerly Director, Corporate Development, Pan American World Airways, has joined the Corporate Planning and Analysis staff as Senior Planning Advisor according to an announcement by Richard R. Colino, Assistant Vice President, International Relations and Corporate Planning.

Prior to joining Pan Am and COMSAT, Mr. Alpert had held the position of Chief Executive Officer of Northeast Helicopters in New York.

Mr. Alpert received his MBA from Harvard Business School and his AB in Economics from Cornell University.

Kasper becomes Assistant General Counsel

Alan J. Kasper, Esq., has been appointed to the position of Assistant General Counsel for Patent, Data and Trademark Matters within COMSAT's Office of the General Counsel. Mr. Kasper has been serving as counsel of that Division since August 1971.

A graduate of the Georgetown University Law School and formerly an Examiner in the U.S. Patent Office, Mr. Kasper joined the Office late in 1968 as a Patent Attorney.

INTELSAT contract awards

To **TRW Systems, Redondo Beach, California,** a 14-month $99,800 contract for the development of a high-speed multiplier element.

To **GTE Telecommunicazioni S.p.A., Milan, Italy,** a 12-month $67,130 contract for a 14-GHz parametric amplifier.

To **RCA Ltd., Montreal, Canada,** a 12-month $66,752 contract for an 11-GHz solid state medium power amplifier.

COMSAT reports third quarter earnings

COMSAT has reported consolidated net income of $11,588,000 for the third quarter of 1974, equal to $1.16 per share, compared to $9,832,000 or 98 cents per share for the third quarter of 1973.

For the first nine months of 1974 net income was $32,601,000 or $3.26 per share, compared to $25,055,000 or $2.51 per share for the first nine months of last year.

Net operating income for the third quarter of 1974 amounted to $9,428,000 or 94 cents per share, compared to $7,778,000 or 78 cents per share for the third quarter of 1973. For the first nine months of this year net operating income amounted to $26,379,000 or $2.64 per share, compared to $20,244,000 or $2.02 per share for the first nine months of last year.

Operating revenues were $34,220,000 for the third quarter this year, compared to $30,747,000 for the third quarter of 1973. The increase in operating revenues resulted almost equally from (1) a gain in the number of full-time half-circuits leased by COMSAT to its carrier customers, (2) higher net revenues from INTELSAT and (3) an increase in all other revenues.

For the first nine months of 1974 operating revenues amounted to $97,542,000, compared to $86,649,000 for the first nine months of last year. The increase in operating revenues over the previous nine-month period is attributable primarily to a gain in the number of full-time half-circuits leased by COMSAT.

Excluding that part of U.S. mainland-Hawaii service which is provided on a bulk basis at a fixed monthly charge, the number of full-time half-circuits leased by COMSAT as of September 30 of this year totaled 3,123, compared to 2,766 leased at the same time a year ago.

Operating expenses (including income taxes) were $24,792,000 for the third quarter and $71,163,000 for the first nine months of 1974, compared to $22,969,000 for the third quarter and $66,405,000 for the first nine months of 1973.

Other income after provision for income taxes amounted to $2,160,000 for the third quarter of this year, compared to $2,054,000 for the third quarter of last year. For the first nine months of this year other income amounted to $6,222,000, compared to $4,811,000 for the first nine months of last year.

Regular quarterly dividend declared

The Board of Directors of COMSAT at its monthly meeting declared a regular quarterly dividend of 25 cents per share. The dividend, COMSAT's 17th consecutive quarterly dividend, is payable on December 9, 1974, to all shareholders of record as of the close of business on November 8, 1974.

Zimmer moves to COMSAT General

Thomas M. Zimmer, formerly with the International Division of COMSAT, has joined the COMSAT GENERAL Office of General Counsel according to an announcement by William D. English, Vice President and General Counsel.

Prior to joining COMSAT in 1972, Mr. Zimmer was in the Judge Advocate General's Corps of the U.S. Army. His duties with COMSAT were related to COMSAT representation in INTELSAT as well as the development of policies relating to COMSAT's participation in INTELSAT. In his new position, he will assist the Office of the General Counsel in providing legal counsel and representation to management and operating elements of COMSAT GENERAL.

Mr. Zimmer is a member of the District of Columbia Bar, a graduate of the University of Illinois (B.S.E.E. and A.B.) and the George Washington University Law School.

Five-year awards presented at Labs

Five-year award pins were presented recently to three employees of the Maintenance and Supply Center at COMSAT Labs by Dr. Robert C. Barthle, Director, U.S. Systems Management, International System Division. Pictured receiving awards are, left to right, Mrs. Barbara C. Hutchens, Dr. Barthle, Mrs. Darleen L. Jones and Pierce C. Stine.

EMBRATEL and INTELCAM to provide monitoring services

INTELSAT, through COMSAT as its Management Services Contractor, has reached agreement on arrangements with EMBRATEL of Brazil and INTELCAM of Cameroon for Satellite System Monitoring (SSM) services in support of the new INTELSAT IV-A communications satellites which INTELSAT plans to launch beginning the latter part of 1975.

Satellite System Monitoring (SSM) consists of the measurement through earth terminals of satellite performance characteristics such as communications carrier power, carrier frequencies, carrier deviation, saturation flux and noise levels.

The new INTELSAT IV-A satellite, with almost double the capacity of the present INTELSAT IV satellite in the global system, will have spot beams serving four quadrants of the Atlantic Ocean Region: The Northwest, Northeast, Southwest and Southeast quadrants.

Brazil will provide the SSM services in the Southwest quadrant through a 51-foot antenna and associated equipment to be installed at the present Tangua earth station site 30 miles north of Rio de Janeiro. The contract requires EMBRATEL (Empresa Brasileira de Telecommunicacoes S.A.) to place an earth station in satisfactory operating condition for use as a satellite system monitoring facility by December 1, 1975. The Agreement provides for satellite system monitoring services for the period of December 1, 1975, through November 30, 1978, with an option for additional one-year periods up to a total period of five years.

Cameroon will provide SSM services in the Southeast quadrant through a 48-foot antenna and associated equipment to be installed at the present Zamengoe earth station site eight miles northwest of the capital city of Yaounde. The contract requires INTELCAM (Societa des Telecommunications Internationales du Cameroun) to place an earth station in satisfactory operating condition for use as a satellite system monitoring facility by December 1, 1975. The Agreement provides for satellite system monitoring services for the period ending November 30, 1978, with an option for additional one-year periods up to a total of five years.

Both contracts are for approximately $1 million per year for the first three years, and for lesser annual amounts for the additional two years.

SSM services in the Northwest and Northeast quadrants will continue to be provided by the stations at Andover, Maine, and Fucino, Italy, respectively, which are monitoring INTELSAT IV spot beam services in those quadrants. Other earth stations with SSM facilities are located at Carnarvon, Australia, and Paumalu, Hawaii.

Foreman/Ali fight carried to more than 30 countries by satellite

Earth stations in more than 30 countries received a live account of the world heavyweight bout between George Foreman and contender Muhammad Ali over Atlantic, Pacific and Indian Ocean satellites from the Republic of Zaire.

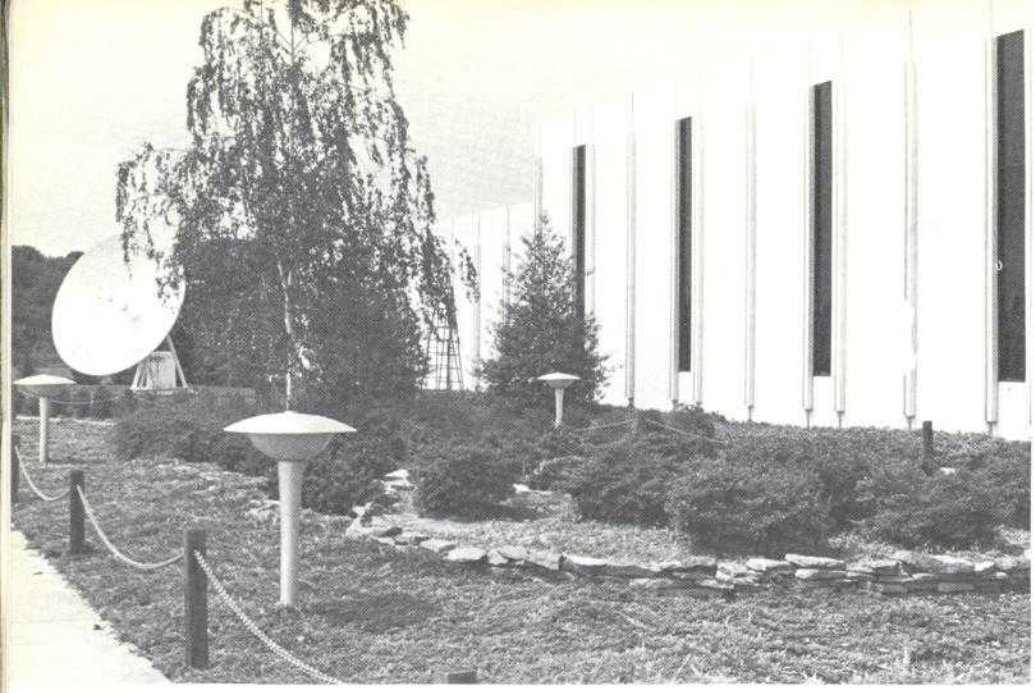
Countries and territories receiving live transmissions of the championship match included: (Atlantic Ocean Region) U.S. Mainland, Puerto Rico, Colombia, Venezuela, United Kingdom, Argentina, Jamaica, Trinidad, Barbados, Nicaragua, Mexico, Nigeria, Panama, Brazil, Ecuador, Chile, Peru, Senegal, Iran and the Ivory Coast; (Pacific Ocean Region) Hawaii, New Zealand, Australia, Japan, Guam and the Philippines; (Indian Ocean Region) Malaysia, Zambia, Indonesia, Kenya, Pakistan, Thailand and Kuwait.

Labs' Haynos heart attack victim

Joseph G. Haynos, 48, a member of the COMSAT Laboratories Technical Staff for the past six years, succumbed to a heart attack Saturday, October 19.

Mr. Haynos service at the Labs included work in the Spacecraft Laboratory and more recently in the Applied Sciences Laboratory. He had earned recognition for his outstanding work in spacecraft electrical power systems and particularly in the development of improved solar cells.

He is survived by his wife, Ann, and eight children. Funeral services were held at St. Raphael's Catholic Church in Rockville with interment at Gate of Heaven Cemetery. The family has requested that any contributions be made to The Alumni Fund of Catholic University of America by contacting James Allison, Ext. 4377.



The Wall Street Journal's printing plant at South Brunswick, New Jersey, with COMSAT's 15-foot receiving antenna at left (additional photo on cover).

Dow Jones Communications Chief Glen Jenkins briefs visitors on equipment used in the demonstration.

Newspaper printing by satellite demonstrated in COMSAT/ Dow-Jones test

By Allan Galfund and Jay Levatich

Photos by Allan Galfund

Page 22 of the September 24th edition of the *Wall Street Journal* may not have appeared to be of unusual significance to *Journal* readers, but to a group of visitors to the Dow-Jones, South Brunswick printing plant, it was scanned with somewhat more than routine interest.

The visitors were witnessing the printing of a page of the New York edition of the Wall Street Journal transmitted over the Atlantic Ocean INTELSAT IV satellite.

This highly successful demonstration was part of a Dow-Jones/Comsat joint test program using a communications satellite system for plant-to-plant transmission of high-resolution facsimile pages of the *Wall Street Journal* under actual production conditions. On-site eyewitnesses to the demonstration included Comsat President Joseph V. Charyk; Dow-Jones President Warren Phillips; Robert Evans, Vice President of IBM; Don McVay, Executive V.P., American Newspaper Publishers Association; Matthew Gordon, Comsat Asst. V.P. for Public Information; and representatives from the Federal Communications Commission, CML, Dow-Jones and IBM.

In implementing the test program, a small earth station was set up in late August at Dow-Jones' regional composition plant in Chicopee, Mass. Transmissions from the small station went to an INTELSAT IV communications satellite in synchronous equatorial orbit 22,300 miles over the Atlantic Ocean. The relayed facsimile data was then retransmitted by the satellite to a receive-only earth station erected at Dow-Jones' production facility in South Brunswick, New Jersey. The reproduced facsimile was used to produce press plates for production of pages in South Brunswick.

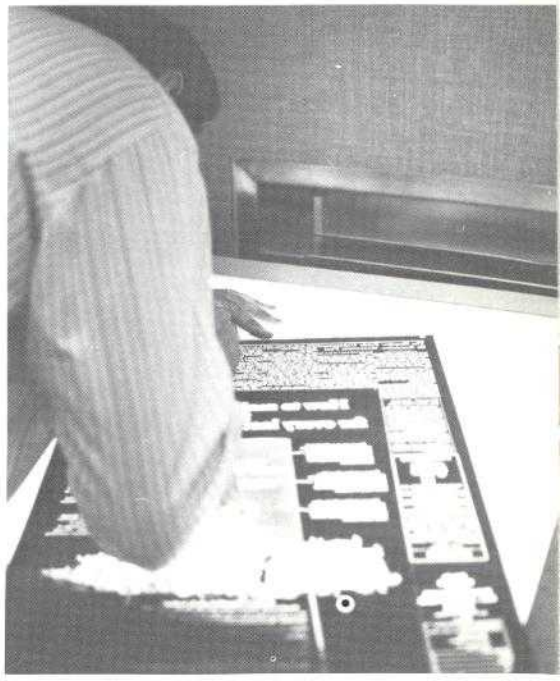
This program followed preliminary tests conducted by Comsat and Dow-Jones engineers at Comsat Laboratories at Clarksburg, Md., in the fall of 1973. The present test, however, represented the first time that the entire process from composition to the actual printing was being conducted via satellite transmission.

Conventionally, Dow-Jones' South Brunswick plant receives facsimile transmissions of each Journal page by terrestrial microwave system. The pages are received on photographic film which then is used to make lithographic plates for the newspaper press. Transmission of data by satellite could substantially improve the technology and economics of newspaper's production and distribution.

Ground equipment used in the satellite transmission program included the high resolution scanners and recorders, data compression units and digital communication (DICOM) channel units.

Under the Comsat/Dow-Jones satellite test program, specific information has been collected, such as bit

Each sheet of film is developed and checked for clarity of transmission.



The group is shown a reproduction proof which has just been transmitted by satellite from the composition plant in Chicopee, Mass. Each sheet of film contains one complete page of the next day's issue of the Wall Street Journal.

Page 22 of the September 24 issue of the Wall Street Journal, transmitted by satellite as part of the demonstration.

error rates, effects of varying propagation conditions and data transmission speeds under actual operating conditions.

After implementation of the Chicopee-to-South Brunswick tests, an international test is planned to transmit the Wall Street Journal, via satellite, to England.

The test program has demonstrated that daily newspapers can be produced and delivered accurately, swiftly and efficiently across the nation or even around the world by satellite.

Upon arrival at the South Brunswick print plant, Dr. Charyk, Mr. Phillips and about 30 other invited guests were briefed on the demonstration by William Dunn and Glenn Jenkins of Dow-Jones, and Dr. Burton I. Edelson, director of COMSAT Labs. Later that evening they were able to observe the press run of the September 24th edition.

Although the demonstration was highly successful, it was not without its obstacles which, at times, seemed to cast a shadow over the September 23rd presentation. The major difficulty was caused by a sudden cable break in TAT-5, which prevented the use of transponder 5, the transponder in use during prior testing in preparation for the demonstration.

Since no available location could be found in another transponder connected to the west spot beam, it was decided to reconfigure the ground transmit and receive terminals to operate in the global beam mode. This required changing the operating frequency, obtaining FCC authorization for these changes, increasing the transmitter power tenfold and adjusting every sub-system for peak performance.

Resolving the difficulties brought about by the unexpected failure of TAT-5 tested the ingenuity and technical expertise of the COMSAT personnel involved in the demonstration, and its success was due to the efforts of many individuals within COMSAT.

The initial experiment was laid out by George Dill, Labs; together with Jenkins and Dunn of Dow-Jones; Jerry Lucas, Labs, planned the details of the test; Carl Schmitt, Research and Engineering, performed the coordination with the terrestrial carriers; Attorneys Jack Hannon and William Culter, Legal, obtained the necessary FCC licenses; Kim Kaiser, William Surber, Dave Reiser and Fred Seidel, Labs, reconfigured the system during the cable break.

The COMSAT DICOM units used in the experiment were built by Richard McClure and Chester Wolejsza, Labs. A. J. Stotler and Burt Falkofske, International System Division, coordinated the use of the spacecraft.

Dow-Jones President Warren Phillips, left, and COMSAT President Joseph V. Charyk appear pleased with the results of the demonstration as they check the Journal after its press run.

Engineers' prestige rises

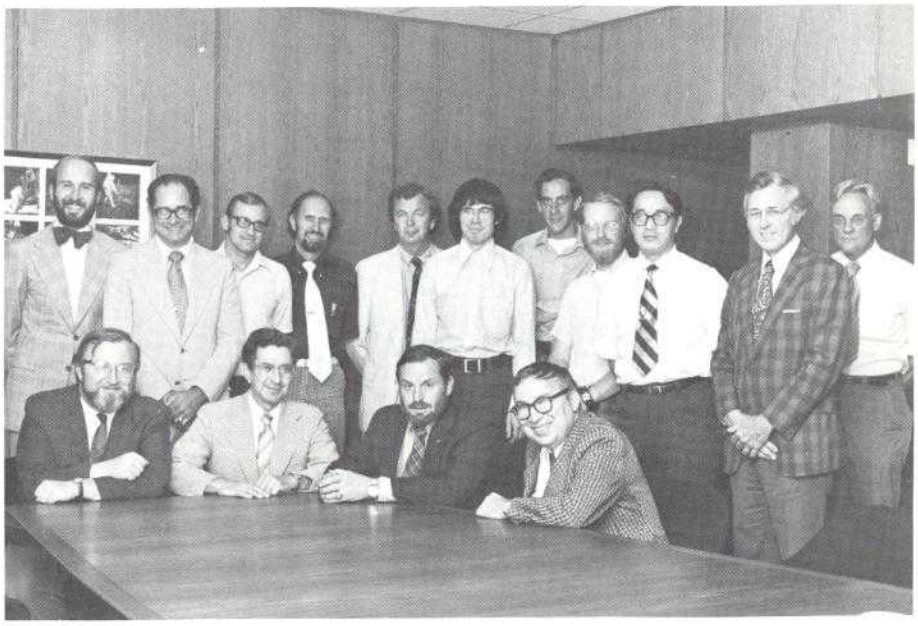
Results of a survey conducted by the National Science Foundation which appeared in an issue of Machine Design showed the prestige of engineers ranked fourth behind physicians, doctors and ministers. Engineers' prestige ranked ahead of lawyers, architects, bankers, accountants and businessmen.

This same group of professions was surveyed in 1947 and engineers were seventh. By 1963, they were fifth in line. In weighing the scores developed by the survey, engineers have maintained approximately the same prestige factor in all surveys, but other professions have seen a marked decline.

Staff attorney added to Office of General Counsel

Ms. Cynthia R. Clarke, Esq., has joined the COMSAT's Office of the General Counsel as a Staff Attorney. The holder of a Juris Doctorate from George Washington University, Ms. Clarke also has a Bachelor of Arts Degree in International Relations from Sweet Briar College, Sweet Briar, Virginia.

Patent incentive awards



COMSAT Labs recipients of Patent Incentive Awards shown above include, seated, left to right: Geoffrey Hyde, Louis Pollack, Labs Director Dr. B. I. Edelson (presented awards) and Paul Koskos; standing, left to right: Alan Kasper (Assistant General Counsel attending presentation), S. J. Campanella, Robert Gruner, Henri Suyderhoud, Randall Kreutel, Gerrit Van Ommering, Martin Earl, Ronald Stegens, Su Min Chou, William Getsinger and Laurence Gray. Also receiving awards but not appearing in the photo were Clarence Blackwell, James Dunlop, Joseph Haynos, Michael Onufry, Perry Klein, Paul Lutz, Joseph Sciulli and William Sones.

COMSAT continues participation in national scholarship program

High school children of employees of COMSAT and its subsidiaries who plan to complete high school and enter college in the 1976 Fall term are eligible to compete for a COMSAT scholarship. Each year COMSAT sponsors a number of college scholarships in cooperation with the National Merit Scholarship Corporation.

The requirements for participation and the benefits of selection for participation are spelled out in a recent memorandum distributed by Director of Personnel David S. Nye. The memorandum has been distributed to all employees and is also available through the office of EEO & Human Resources Development.

The National Merit Scholarship Corporation is an independent, non-profit organization established to aid able young people in obtaining a college education, and to provide business enterprises and other organizations a vehicle by which they might contribute more effectively to the support of higher education through scholarship grants.

Candidates for the scholarships, to include the children of retired and deceased company employees, must have completed the Preliminary Scholastic Aptitude Test/National Merit Scholarship Qualifying Test (PSAT/NMSQT) given at their high schools in late October. The results of these tests provide the basis on which the Scholarship Corporation selects its candidates.

Scholarship winners will be selected according to merit on a competitive basis and without regard to financial need. An impartial NMSC committee of professionals will choose the winners who will, in most cases, be notified of their awards in March 1976.

Stipends accompanying COMSAT Scholarships will vary between $250 per year (a minimum amount in cases where no financial help is believed to be necessary) to an upper limit of $1,500 a year.

Candidates should direct questions to the Assistant Director of Personnel for EEO & Human Resources Development. Winners should direct their questions to the National Merit Scholarship Corporation, 990 Grove Street, Evanston, Illinois 60201.

A mosque and the Jeddah skyline form the backdrop for the new antenna.

The men who build earth stations—engineers and ambassadors of good will

By Richard McBride
as told to John Peterson. Photos by William Ferguson

Often overlooked in the conduct of technical operations is the part personnel of Comsat *and* Comsat General *play as emissaries of good will to the many countries they visit. While the people in another part of the world may be awed as an earth station antenna rises in its midst, it is the day-to-day involvement with these communications specialists on which the understanding of Americans and other nationalities is based. This is an important role our corporate people play because it is through them and their actions that other peoples of other worlds learn about us.* —Ed. Note

The land of the Arabs—visions of Lawrence of Arabia and the twilight of the British Empire: of sheikhs, sheikhdoms, lush oases and Arabian Nights; of horizons of wind-swept sand dunes plodded patiently through the centuries by hump-backed "ships of the desert" . . .

The land of the Arabs—the realities of a modern, industrialized world: oil wells, sea-going tankers, high-rise skylines and communication satellite earth stations . . .

Saudi Arabia—encompassing about four-fifths of the Arabian Peninsula, nearly the size of Texas and California combined, populated by approximately five million people, less than that of the State of North Carolina . . .

In the summer of 1974, the capital city Riyadh, population 350,000 deep inside Saudi Arabia, and Jeddah, the bustling seaport city of 300,000 on the Red Sea, are a far cry from the land of the legendary Lawrence of Arabia.

Riyadah is a bustling metropolis, rapidly catching up with the 20th century with swarms of cars racing through its streets at breakneck speeds preceded only by blaring horns. Except for the flowing robes, and veiled women walking modestly two or three steps behind their husbands, one would almost think he was in any medium-sized, modern city.

Only when the call for prayers sounds over the loudspeakers of the many mosques dotting the crowded areas of the city do you become aware that you are in another land, a land of devout people, committed to the Moslem religion. And in case any of the faithful might feel like skipping Friday prayers there are the religious police to remind them of their obligations.

In some ways the Saudi people are very modern, with the latest automobiles, modern construction equipment and the strong desire for technical advancement. But when it comes to religion they dig deep into their heritage and preserve the old ways and codes of morality.

A visitor, as well as a Saudi citizen, is prohibited from bringing alcohol or pork products of any type into the country. Reading material which in any way displays the female body is quickly confiscated by the customs officials. Going through customs at Jeddah for the first time I was in line behind a man who had a mystery paperback, the kind you buy at any airport newsstand. The customs agent noticed the partly disrobed woman on the cover, thumbed through its pages, then casually ripped off the cover and handed the book back to its owner.

As in most other countries, one finds people at different levels of the economic ladder: the very wealthy, the middle class, and the poor. Even though some of the people are economically poor by our standards, they didn't appear to be doing without the

Water to be used in mixing cement is delivered by donkey cart from a nearby well.

Mr. Peterson is Editor of The COMSAT News.

basic necessities of life.

A visitor to the Kingdom quickly becomes aware that thievery is noticeable by its absence. When you consider the penalty, that the thief could lose his hand in a public amputation, this is understandable. We found that on the earth station sites we could leave tools and material lie out and not have to worry about losing anything. I can honestly state that there wasn't one item of equipment or personal property lost through theft. And there are not many other places in this world where that would happen.

An international complexion extends into many aspects of the Saudi economy and one notices that many airline employees such as ticket agents and counter people are from Pakistan; pilots are Saudis, Americans, and an occasional Britisher; and stewardesses seemed to be predominately from Lebanon, with a few from the United States and the United Kingdom.

One becomes aware that much of the labor force in Saudi seemed to be drawn from other countries. Many of the laborers were from Yeman and wore a distinctive type of cartridge belt around their waists. Much of the restaurant help, cooks and waiters, tended to be from the Sudan.

Characteristically different from the western world, clerical help is mostly male, generally Pakistani. It was most unusual to see male secretaries, in flowing robes, sitting at desks typing in Arabic with the typewriter going "backwards."

Noticing the absence of camels we raised the question with a Saudi and was told that "It is a lot less expensive to feed a Japanese automobile. Besides, you can get where you want to go a lot faster."

The transportable antenna to be erected by COMSAT GENERAL arrives at Jeddah in Saudi Arabia.

Accustomed to flying over the United States casually taking pictures out of the windows, we were surprised to find it was prohibited to take pictures from an airplane or at an airport. We did find, however, that when we asked people if we could take personal pictures they generally obliged us.

Flying between Riyadah and Jeddah we found almost nothing in between but desert. You might see some dirt roads and, occasionally, little trails, but not villages, vegetation or rivers, nothing but barren desert land. You couln't help wondering how long you would survive if your plane was forced down.

We were told that there are places in the north where rice, corn and cotton were being grown as the country struggles for agricultural efficiency. There are also some stands of forests for the production of wood pulp.

Although it is possible to drive on a paved road rom Riyadh to Jeddah it is a long trip and most people prefer to fly. Consequently, you seldom see a plane which is not completely filled, leave either city, making it difficult to get a seat.

The Saudis have a great deal of respect for authority which seems to be returned by the King and other government officials. The people have respect for the police, the Army and others of the kingdom officials.

The Saudis are a proud people, proud of their country and proud of the advancements they are making. They have a very strong desire to see advancement in their country, to see such technological advances as an earth station enter their lives. And there is the strong desire to obtain the type of life, or at least the benefits, of the more advanced western countries. But it is equally apparent that they wish to retain their own cultures and values.

The Saudis are conscious that their country is the one to which other Arab countries turn for help, and a leader among Arab nations. As a result of the energy crisis you can sense that they are aware of their role as the leading oil producing nation and the effect their position has on the world.

In early April 1974 a letter of intent was received from His Excellency Fakieh, Deputy Minister, Ministry of Communications, advising COMSAT GENERAL to proceed with the procurement of two satellite communications earth stations, the first to be installed by July 5, 1974 in Riyadh, and the second by August 4

The electronic equipment shelter is off-loaded at the Jeddah site.

Dick McBride positions antenna base plate during alignment.

in Jeddah. The letter of intent was the result of extensive negotiations held in Saudi Arabia by Donald R. Owen, Director of COMSAT GENERAL's Technical Services Division; John B. C. Jenkins, Manager of the Project Engineering Department; and John B. Thaler, Director of Procurement Contracts for COMSAT GENERAL. The contract was later signed in Washington.

The Saudis wanted two non-standard earth stations to give them an interim capability through 1974 and part of 1975 until two standard earth stations could be built. They were primarily interested in having stations which were reasonably transportable and which could be moved to other cities in Saudi Arabia when the standard stations were completed. In addition to furnishing and installing the stations, the Saudis wanted COMSAT GENERAL to provide operation and maintenance services and to provide the interface to allow for the switching of telephone traffic on a semi-automatic basis.

Early in April a project team assembled consisting of William F. Ferguson, Louis A. McKeague, John E. Hewitt, John B. C. Jenkins, Alan R. Coburn, Morris Atwell and myself. We were later joined by Paul Winchester and 10 technicians from Chile. With the help of procurement, the COMSAT Labs, and contractors we were able to arrange for all our long-lead delivery items. Working out of the Systems Technology Associates facility near Dulles International Airport we were able to perform considerable work here prior to shipment.

The disassembled earth stations were shipped by a chartered aircraft, a modified Lockheed C130 operated by Saturn Airways of Oakland, Calif., the first in mid-June and the second in mid-July.

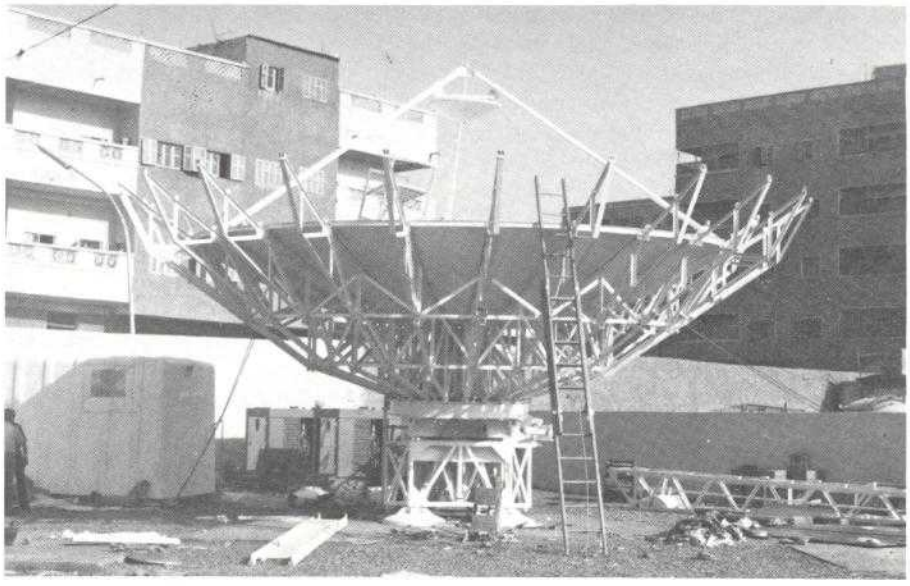
Tired, hot and thirsty, Paul M. Winchester and Jurgen Rauch landed in Riyadh. They had accompanied the plane to make sure it didn't go astray. The plane was off-loaded in about four hours and the equipment moved through the streets of Riyadh to the site. Approximately eight hours later the station was being installed. From that time on, the minimum work day was about 12 hours with a maximum frequently of 24. Because of daylight temperatures ranging up to 120 degrees, we tried to do most of the outside plant and antenna erection work during the nighttime hours.

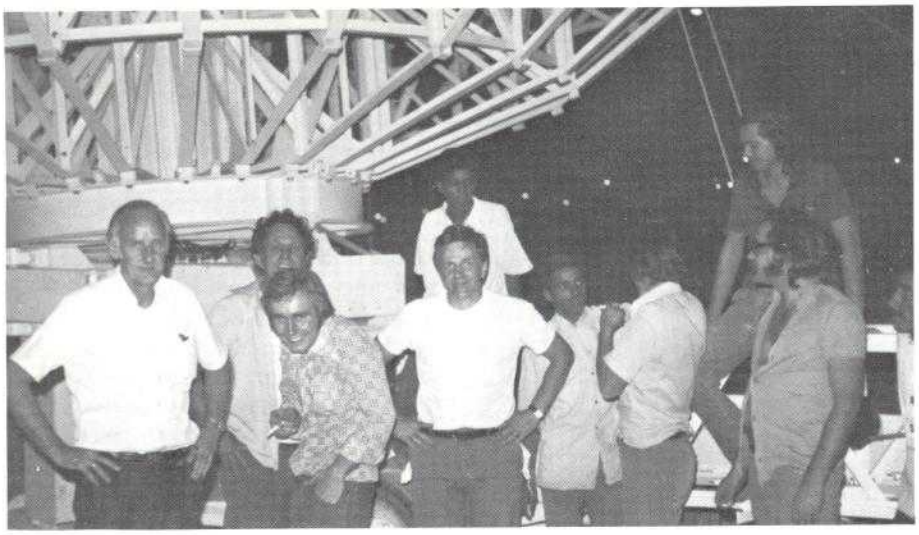
The work team was an international effort. In addition to the Saudis and the Americans of COMSAT GENERAL, we had two engineers and eight technicians from Chile, who would remain to operate the stations for COMSAT GENERAL, an Italian from Fucino overseeing the installation of some multiplex and other telephone equipment, and two consultants from ITU retained by the Saudi Arabian Government, one from Switzerland and the other from Sweden. So, we had very much of an international flavor to the project.

The Saudis were quite amazed at the speed with which the station was created and went on the air. Although we were committed to meet a deadline there was probably some feeling that it just wouldn't happen. Needless to say it did happen and I think the Saudis were quite pleased that the station went on the air on schedule.

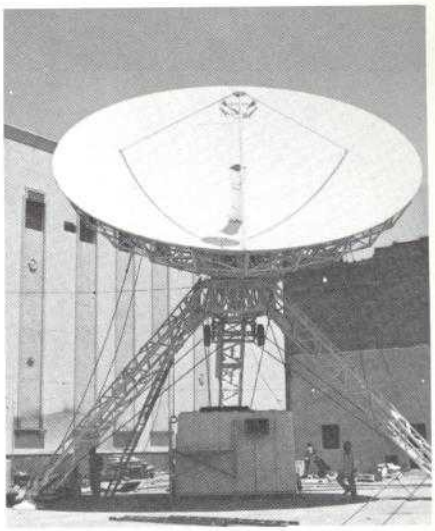
No sooner did we get the Riyadh station operating than we moved to the Jeddah site. Using basically the same crew, and with the experience of Riyadh behind us, Paul Winchester and I left the crew in Jeddah and re-

The Jeddah antenna after the first night's work. Electrical power is supplied by diesel generators at the back of the antenna base.





An antenna is also erected at Riyadh in Saudi Arabia. Shown above are (left to right): Paul Winchester, manager of operations; Richard Hurley, Radiation Systems, Inc., McLean, Virginia; Paul Jurgens, Riyadh Station Manager; COMSAT GENERAL's Dick McBride; and members of the erection crew.



Riyadh's antenna in position and "latched on to the bird."

turned to the U.S. to iron out some of the earlier problems. For example, before the first plane arrived in Riyadh, I received a message saying it had been impossible to get everything on the aircraft and that some things were left behind. Fortunately, all the major pieces of electronic equipment had been shipped but many of the convenience items had not. We found when we came back that, with repackaging and a few changes in loading, we were able to get the necessary equipment on the plane for Jeddah.

The cooperation of the customs officials and the Ministry of Communications in eliminating unnecessary steps and expediting the movement of our equipment made meeting the deadlines possible.

Of historical interest was the visit to the home of Lawrence of Arabia in Jeddah. Although it probably was not more than 60 or 70 years old, it looked more like it was 100 or 150 years old. In this part of the world buildings seem to age more quickly, probably because of the heat and the type of block construction giving the buildings the appearance of being a lot older than they really are.

Riyadh and Jeddah are considerably different in appearance and environment. The temperature in Riyadh gets up to 120 degrees in the summer and down to freezing in the winter. It's also very dusty and windy. It has an elevation of about 2,000 feet and has a very low humidity, dry desert-like climate. It is an environment similar to that found around the Mojave Desert in Southern California.

Jeddah, on the other hand, is at sea level on the Red Sea. It is very humid but the temperature extremes are not as great as at Riyadh. Riyadh is more modern and seemingly a newer city, with most streets wide boulevards compared to Jeddah's narrow winding streets.

The cooperation and effort of everyone involved in the Saudi Arabian project was outstanding. The field crew performed a herculean task in getting each station on the air within three weeks of our arrival in Saudi, working long hours in a trying environment. The end feeling is one of tremendous satisfaction making all our labors well worth the effort.

Another solar cell advance by Labs

The first major improvement in many years in the efficiency of silicon solar cells for space applications was announced by COMSAT in May, 1972. The new solar cell, called the "violet cell," because of its extension of the sensitivity into the violet region of the solar spectrum, represented about a 30% improvement relative to state-of-the-art cells.

Now another advance of similar importance has been announced by Joseph G. Haynos, a member of COMSAT Laboratories staff, at an International Conference in Hamburg, Germany, on Photovoltaic Power Generation.

The technical paper presented at the conference was entitled "The COMSAT Non-Reflective Silicon Solar Cell: A Second Generation Improved Cell." Co-authors of the paper were James F. Allison, Richard A. Arndt and Andrew Meulenberg, Jr.

The new cell suppresses light reflection losses from the front surface, reduces transmission losses, and decreases degradation caused by the hostile space radiation environment. The cell exhibits a conversion efficiency of 15% for space use and 20% for terrestrial use.

The solar cell development was carried out in the COMSAT Labs Applied Sciences Laboratory, headed by Dr. E. S. Rittner.

Dooley joins COMSAT's Management Services Division

Leonard S. Dooley, formerly International Relations Officer in the International Division of the Overseas Telecommunications Commission, Australia, has joined the International Management Services Division of the International System Division, according to an announcement by Robert W. Kinzie, Division Director.

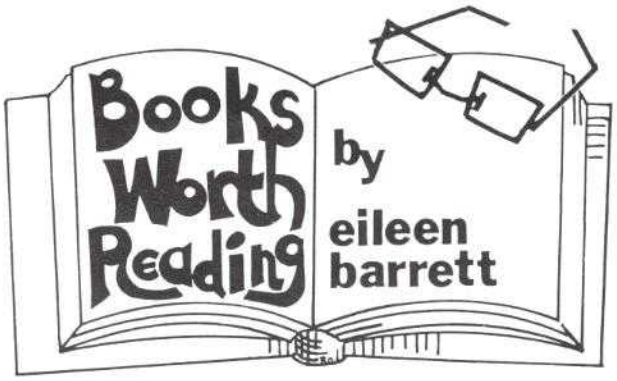
A graduate of Sydney University in Australia with a B.Ec. degree in Economics/Government, Mr. Dooley will act in the capacity of Assistant to the Director.

Mr. Dooley has been associated with Australia's involvement in INTELSAT since 1965. He was a member of the Australian delegation to five of the nine meetings concerned with the negotiation of Definitive Arrangements for INTELSAT and has represented Australia on the Board of Governors and the Meeting of Signatories in an Alternate capacity.

COMSAT 1974 United Way drive tops record

G.J. "Gus" Rauschenbach, Chairman of COMSAT's United Way drive presents a check for $13,000 to UW representative Richard Herson representing COMSAT's contribution. At right is Al Salmi, United Way coordinator for COMSAT. According to Rauschenbach, the 1974 campaign was the most successful thus far with employees contributions amounting to $20,926; company participation, $13,000; plus a company matching contribution of $1,199; for a total COMSAT contribution of $35,125.

Ali M. Abu-Taha of COMSAT Laboratories won the additional two vacation days from among those eligible, having contributed $26 or more or pledged one dollar or more per pay period. Mr. Abu-Taha, in lieu of accepting the two days vacation, authorized COMSAT to contribute the dollar value to the 1975 Campaign.



Switching Systems, American Telephone and Telegraph Company, 1961. Intended as a text for the switching section of the Communications Engineering Course of the Bell Telephone Laboratories, the purpose of this book is to present the philosophical concepts which underlie all telephone switching systems. Its aim is to present the similarity between all forms of switching systems rather than the technical details of a single system. Telephone switching, the means by which a communication channel capable of carrying analogue or digital information between any two subscribers is established and maintained, is so large a field that it cannot be covered by any one text. Therefore, no specific material on electronic switching is included in this text. As noted in the Appendix to the first part of the book, the details of this subject are covered in the companion volume to *Switching Systems: Fundamental Principles of Switching Circuits and Systems,* as well as in the other listed references included in *Switching Systems.*

A conceptual view of switching is essential for a firm understanding of present and future switching systems. The principles of telephone switching have not changed since the first manual board. The design of switching circuits is still primarily an exercise in rigorous logic. In switching design the problem is one of producing logical effects in response to certain causes. Yet the devices and techniques have changed; new devices and techniques which were unknown 10 years ago are now being fashioned into electronic switching systems. Because these systems appear to be radically different from electromechanical systems, their operation can best be understood in the light of the basic switching functions which are presented in this book.

The organization of the text material in the first seven chapters, which deal with the *what* and *why* of switching systems, is as follows: The first two chapters provide background information of a fundamental nature on the general switching problem and basic switching concepts. The next chapter defines eight general functions common to all switching systems: the interconnecting network and the control means. The last chapter on control is restricted to electromechanical common control.

The second section of the book presents some fundamental traffic theory. The general traffic problem is introduced in the first chapter. Chapter 2 describes a traffic system which relates input demands and facility characteristics to service objectives. The final chapter presents the mathematical models of the traffic system and illustrates the use of blocking and delay theories.

The whole of *Switching Systems,* and in particular this second section of the book, aims to acquaint the engineer with some of the assumptions which underlie existing mathematical solutions of traffic problems that relate to switching systems.

Telecommunications, by J. Brown and E. V. D. Glazier (Science Paperbacks, Revised 1974 by J. Brown). Telecommunications, all forms of communications by electrical or radio means and all forms of radiolocation and radio navigation, have expanded at a rapid rate in recent years. Telecommunications and electronics have been combined in course material. Therefore, the need has arisen for a textbook covering the basic principles of the subject of telecommunications at an undergraduate level.

This book is designed to meet the needs of students of electronic and electrical engineering in universities, polytechnics and colleges of technology. It should also prove a good foundation for more advanced students and research workers involved in particular specialized branches of the subject, and a worthwhile reference tool on basic problems of the practicing engineer.

The changes in the Second Edition consist mainly of additions to the statements made in the First Edition. It has been thought desirable to leave the last two chapters able to leave the last two chapters substantially unchanged due to the death of their author, Dr. Glazier. The original edition contained a list of references at the end of each chapter. These have been replaced in the new edition by a Bibliographical Note, which will, it is hoped, provide an introduction to the extensive literature available to those who wish to continue their studies of this subject. The new edition pays particular attention to the recent developments that have occured in telecommunications in relation to digital systems, and there is a completely new chapter (Chapter 7) entitled "Digital Communications". The first chapter has been rewritten, and throughout the book appropriate modifications have been made in order to bring the work as a whole up to date.

The Introductory Chapter outlines the topics that are covered in the body of the book. Chapter 2 discusses the types of baseband signals to be handled, the simple modulation process is discussed in Chapter 3 and the way in which the resulting modulated waveforms are modified during their passage through typical channels is discussed qualitatively in Chapter 4 and mathematically in Chapter 5.

The properties of noise waveforms and their effect on communication are examined in Chapter 6. Digital communications are covered in Chapter 7 and the first half of Chapter 8. The remainder of Chapter 8 provides a brief introduction to what may be described as the central problem in communications, that is, the effective detection of a desired signal in the presence of a noise background. The final two chapters survey the wide range of communication systems currently in use and draw attention to the relevance of the theory presented to the design of such systems.

A valuable key to the information contained in the body of the book is presented in the three Appendices to Telecommunications. Appendix A gives an account of the basic mathematics relevant to chapters 2 through 5, the mathematics relevant to chapters 2 through 5, the mathematical results set forth according to the Fourier analysis. Appendix B is a guide to Bessel Functions and Appendix C deals with FM thresholds.

Writing Communications in Business and Industry, by NELDA R. LAWRENCE (Prentice-Hall, 1974). The purpose of this book is to provide instruction and practice for people with writing responsibilities in business and industry, and to show that the messages such people write have a significant human value.

The book contains many comparisons between poorly written original passages or whole letters and more effective revisions of the messages. Every point of good writing is well illustrated and clearly explained so as to develop a sense of discernment in the business writer. It contains practice and problem exercises which have been tried out in the classroom. Most of the practice and problem material was taken directly from actual communications of various types being sent by communicators in companies throughout the country. For this reason, the reader will find the practice assignments realistic and interesting. Much of the material is based on in-service experience with the writing problems of actual companies.

Writing Communications in Business and industry is intended to be helpful to all those who handle writing duties for their firms.

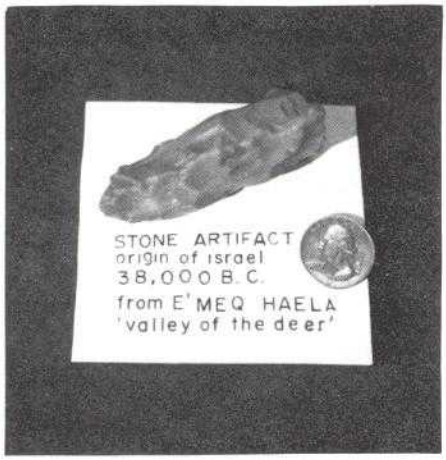
Chapter 1, entitled "Spokesmen in Writing," deals with the writer of any business communication as a spokesman for his position, his company and as a public relations agent. Chapter 1 is followed by Work Project 1, a pretest of communication ability. Chapter 2 deals with making the best appearance through a written communication and Chapter 3 is concerned with choosing the right words for a business message. These chapters are followed by Work Project 2. "Using the Right Words." Chapter 4 gives hints on making clear, complete sentences. This is followed by Work Project 3 on the same subject.

Chapter 5 deals with the developing and arranging of paragraphs. It is followed by Work Project 4. Chapter 6, "Writing Less To Say More," is followed by Work Project 5. Chapter 7, "Creating an Appealing Tone," is helpful, since it gives many hints on public relations through business communications. It is followed by Work Project 6. Chapter 8, which is concerned with giving a pleasant touch to routine or even difficult letters, is followed by Work Project 7. Chapter 9, on the proper planning and writing of reports and proposals, is followed by Work Project 8. Chapter 10 deals with the planning and communication of other messages, such as telex and cable messages, press releases, etc. It is followed by Work Project 9. Chapter 11, the last chapter of the book, is concerned about "Dictating with Ease and Confidence."

A Bibliography is provided at the end of the text for further study of the subjects covered in the book.

Relic from the past

By R. N. Hobbs



The stone artifact taken from the Israeli Earth Station site near Tel Aviv dating back to 38,000 B.C.

Sometime ago we at Etam voiced our interest in establishing a museum in our lobby to add to our effectiveness in giving visitors a better understanding of the scope of world-wide commercial communications. It is not easy for the casual visitor to grasp the effectiveness with which satellite communications have spanned the world allowing man to communicate with his fellow man over great distances.

Our Station Manager William B. Carroll, when approached with the idea, welcomed it with enthusiasm, gave us his unlimited support, and we were off to at least a beginning. Through his efforts we were able to acquire display items from AT&T and move into the artifact-collecting business. So far, he has given us a free hand in cultivating our (Etam's) concept and we expect to grow as time goes on. . . .

Our museum was set up to do just this. We thought, by collecting artifacts from widely separated points of the globe the viewer could identify with, he would then be better able to visualize the distances which satellites span. Our museum has grown and we are most happy to report that one of our most sought after artifacts has been received—a relic from the Holy Land.

When we learned the Israeli earth station was located at the site of the battle between David and Goliath, we set out to get five smooth stones from the scene of the fight for display, with the symbolic inference that the stones could have been one, or all, of those used by David. By coincidence, Mr. Chaim Davidi, the appointed Manager for the Israeli earth station then under construction, visited Etam at the time to familiarize himself with station operations.

Operations Supervisor Rupe Hobbs and Carl Cooper, Senior Technician, presented their idea to Mr. Davidi who offered to do what he could in return for a copy of *Redneck Rufus*, the book Cooper and I were collaborating in writing. Sometime later one of the Israeli staff members called and asked if he could substitute an artifact uncovered on the station grounds for the stones, indicating he thought this item would interest us more than the stones. We received the token soon after and, upon opening the package, found a handmade flint spear point of very old origin. What was most interesting was the fact that it was fashioned much like our own Indian flint arrow heads so common in the United States, except it was three-sided, instead of flat as are Indian arrow heads.

It was by coincidence that, at the time we received the spear point, our station library also received an issue of SCIENTIFIC AMERICAN, a magazine which covers historic artifacts as well as scientific breakthroughs in modern technology. The issue included an article covering just such subjects as these early tools and war implements. We found we were able to identify our new addition with one pictured in the magazine. In the article the stones were broken down into two classes—war implements and tools apparently used for scraping hides. Our stone fits very well into the "scraper" class which is three-sided with a dulled edge making it less hazardous to the worker scraping a slippery skin. However, its classification as a "scraper" does not rule out the possibility that it could have been used as a spear point.

The magazine article charts the time periods during which man first developed fire and attempted to design an implement more effective than that provided by nature. Such design efforts, scientists say, indicated the development of man's mind as it rejected what was naturally available and what he could construct to improve life.

Measuring five feet in diameter and standing a little over six feet high, the Etam museum display contains documents and artifacts to include letters of certification, a section of the Dover Cliffs of England and the stone from Israel.

Placing our stone on the charts it appeared to match up with the Mousterian and upper Paleolithic periods—the periods in which man changed markedly enough to show additional skills in carving out more finely constructed implements. The time period covers from ten thousand to one hundred thousand years ago. Our stone has characteristics of the thirty-eight thousand year period because of overlapping of the two periods.

The next most interesting thing, and one that makes it even more indicative of the time period, is that excavation of the antenna pedestal at Emeq H'aela dealt with depths around ten meters (about thirty-three feet). The magazine article states that this is the normal depth stones are being uncovered for that particular time period.

We would like to suggest that if you are ever out Etam way, drop by and take a look at our small but interesting museum.

Manager for Marisat offshore sales announced

The appointment of Robert L. Eichberg as Manager, Offshore Sales, Maritime Satellite Communications Program (MARISAT) was announced recently by COMSAT GENERAL.

Formerly Managecof Government Relations for J. Ray McDermott and Company, Inc., and Director, International Marketing, for Alpine Geophysical Associates, Mr. Eichberg will specialize in the design and implementation of satellite communications applications tailored to the needs of offshore industry.

A graduate of the University of Maryland, Mr. Eichberg has an extensive background as a marine scientist and has participated in numerous U.S. Navy oceanographic projects concerned with the development of energy and mineral resources from the ocean.

New engineer to be active in Marisat program

Eli Wachsberg, RF equipment engineer, has joined COMSAT GENERAL, reporting to Ivor N. Knight, Director, Communications Equipment Implementation. The addition of Mr. Wachsberg is part of the expansion to meet staffing requirements associated with the MARISAT Program.

Weiss marks decade with COMSAT

Hans J. Weiss, Director of Systems Studies, Research and Engineering Division, has joined the ranks of COMSAT employees accumulating ten years of service with the corporation.

Instrumental in developing much of COMSAT's expertise in earth station siting, Mr. Weiss has earned an international reputation for his efforts in establishing standards and procedures for frequency sharing and interference prediction, with ample evidence of these efforts reflected in the International Radio Regulations and FCC Rules and Regulations.

COMSAT women in profile: *Judie Elnicki*

BY DONNA HIGGS

This issue features Ms. Judith Shannon Elnicki, Assistant for Shareholder Relations, Office of the Secretary/General Counsel's Office and a COMSAT employee since August, 1968. Under the direction of Mr. Robert B. Schwartz, Secretary and Assistant General Counsel-Corporate Matters, Judie's work, in brief, includes the handling of shareholder relations (calls, letters, visits), supervising transfer agents and dividend disbursing agent, participating in preparation and conduct of The Annual Meeting of Shareholders, and writing and designing certain shareholder publications.

Judie is an associate from the University of Detroit; she currently is in her last year of studies at the American University and, in 1975, will receive a BSBA with a major in Personnel Management. She is also a member of the University of Detroit Alumni Club of Washington.

Residing in Brandywine, Maryland, with her husband, Alexander, Judie's spare time activities include reading, gourmet cooking and horticulture.

Labs' Billerbeck chairs session, presents paper at Energy Conversion Conference

W. J. Billerbeck, Manager, Electric Power, COMSAT Laboratories, recently chaired a session and presented a paper at the 9th Intersociety Energy Conversion Engineering Conference held in San Francisco and jointly sponsored by the American Society of Mechanical Engineers.

The session dealt with Aerospace Battery Systems and included representatives from Philco Ford, Energy Research Corporation, Lockheed, Eagle Picher Industries, Hughes Aircraft and Jet Propulsion Laboratory.

At a session dealing with Aerospace-Solar Photovoltaic subjects, Mr. Billerbeck presented a paper entitled "Flexible Solar Array Applications in Communications Satellites." D. J. Curtin was the paper's co-author.

According to Mr. Billerbeck, the 1975 Conference was particularly relevant to the present energy crisis. The Conference theme as stated by Conference Chairman A. Duane Tonelli was, "To present the new developments and unique concepts for solving the basic and related problems of power generation and energy conversion."

During the week-long program, delegates were given opportunities to visit such activities as the Laser Fusion Facility at The Lawrence Livermore Laboratory and to observe a hydrogen-fueled Post Office delivery van.

Typifying "farmpersons suburbia," Carol Louthan, left, and Claudette Tucker prepare to tend their plots.

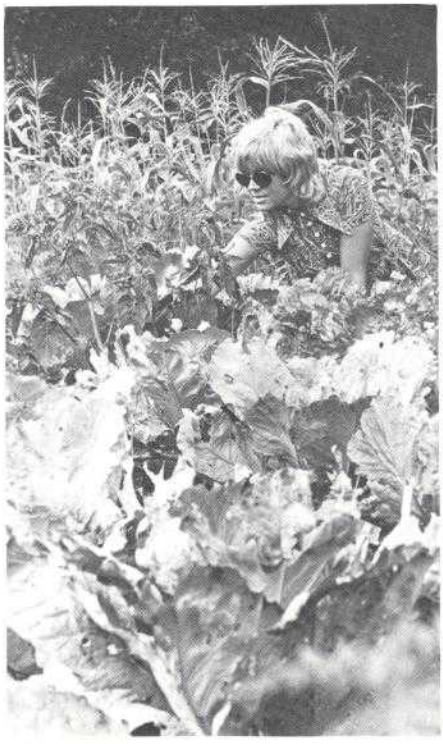
One of the better yields came from Don Lee's garden.

Garden Clubbers

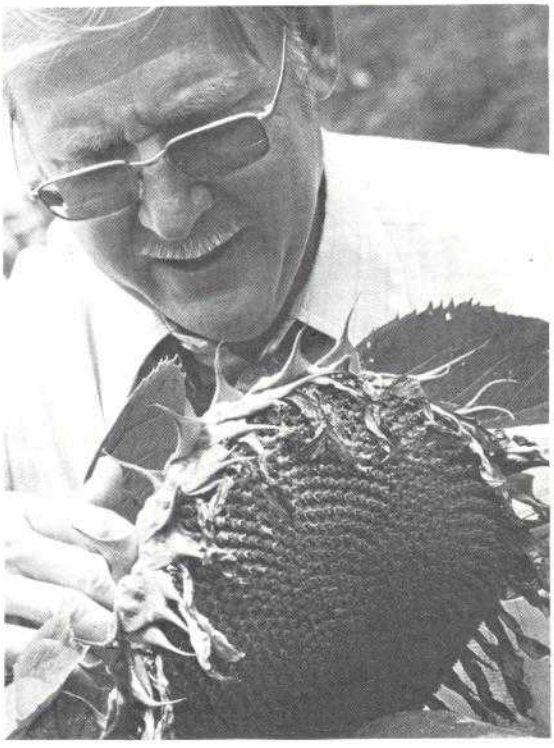
By Carol Louthan

Garden Clubbers at the Labs are doing wonders with the grounds at Comsat Laboratories, or is it vice-versa? Lovely marigolds, zinnas, cucumber blooms and corn silk (and Japanese Beetles) are found everywhere. Admittedly hard work, a few of our gardeners have learned lessons which will stand them in good stead next year. Traveling from garden to garden one can hear, "Never again," "Now, next year, I'll do this. . .".

Joe Stockel, left, and Don Lee prepare the ground for planting.



Carol "Mrs. Wiggs" Louthan checks her cabbage patch.



Bob Redick uncovers a sunflower his son Pete slipped in amongst the corn.

Sheila Norton waters her newly planted tomato plants.

Chet Wolejsza carries water by hand to his plot during dry spells.

till the soil

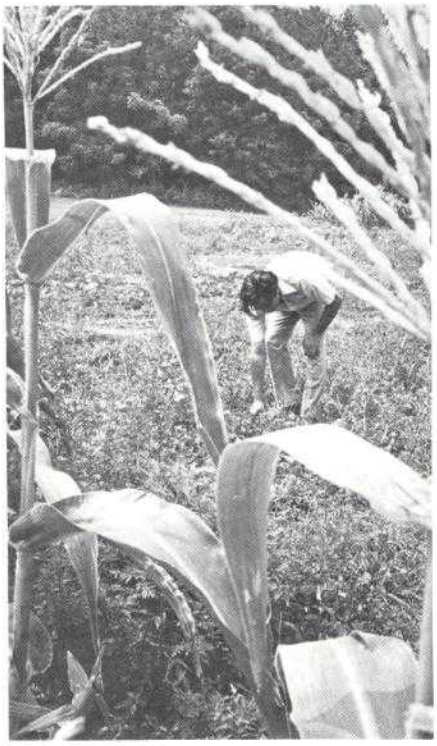
Nevertheless, our labors are providing enjoyment, exercise, and even, for a few, the satisfaction of a good-yield of fresh vegetables.

With the long days, there's plenty of time in the cool evening hours to weed, water your tomato plants, and even pick a few beans. All it takes to join the COMSAT Garden Club for 1975 is to give me a call at the Labs, extension 4426.

PHOTOS BY BILL MEGNA

Even weeding yields nature's beauty as Claudette Tucker discovers.

As Kris Sharma will verify, gardening is not all fun—weeds have to be cleared out.



"It was a good year. Now, let's see, at ten cents an ear . . ."

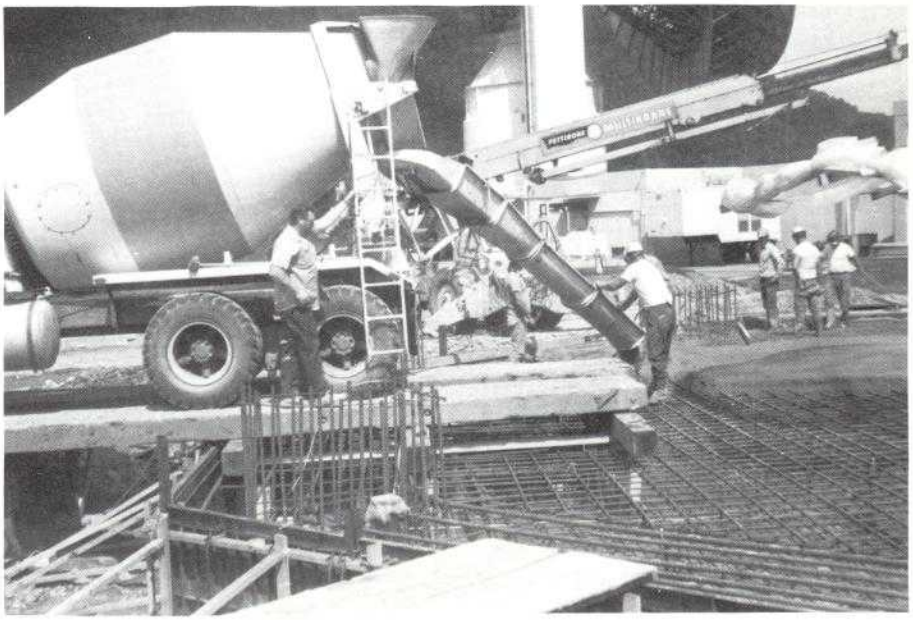
Senior planning administrator joins corporate staff

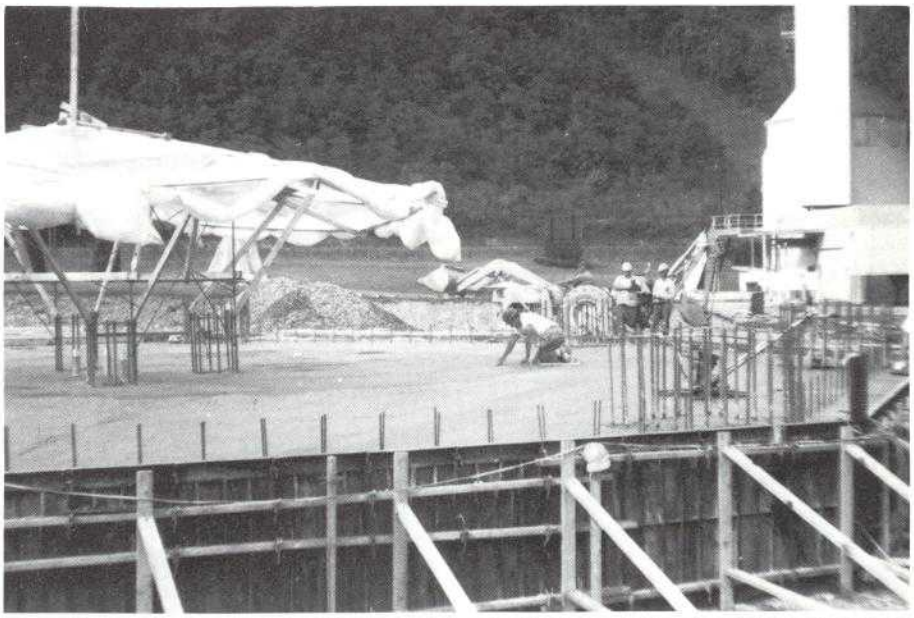
John A. Haaren has joined the Corporate Planning and Analysis staff as Senior Planning Administrator, according to an announcement by Richard R. Colino, Assistant Vice President, International Relations and Corporate Planning.

A retired Colonel, Mr. Haaren supervised a variety of functions within the U.S. Air Force, primarily in the strategic planning area. In his most recent assignment, he was responsible for major Air Force command control and communication systems. His last assignment in the Air Force was Chief of the Command Control and Communications Division at Air Force Systems Command Headquarters.

Mr. Haaren received his M.S. in Business Administration from The George Washington University and his B.S. in Electrical Engineering from the U.S. Naval Academy.

Work begins on new antenna sites





Cement mixers pour 267 cubic yards of mixed concrete for the 105-foot antenna site at Etam. A similar site is being constructed at Andover. The antennas are scheduled for completion by mid-1975.

Reber, Barr to INTELSAT committee

Carl J. Reber, Director of Financial Administration, and Thomas M. Barr, Senior Analyst, International Economic and Commercial Matters, International Affairs Division, have been designated U.S. Representative and Alternate Representative, respectively, to the INTELSAT Board of Governors Advisory Committee on Finance.

People and Events

ETAM. Paul Mauzy, Jr., Junior Technician at Etam, was married August 17, 1974 at the First Baptist Church in Parsons, W. Va. Paul and

his wife, **Connie,** are now living in Parsons where they plan to make their home.

With ground breaking behind us work is now under way on Etam's new 105-foot-diameter antenna to be located on the west side of the station. The antenna base is now under construction by E Systems, Inc., of Dallas, Texas. Completion of the new antenna is scheduled for early spring in 1975.

Not to be outdone by the COMSAT Labs Garden Club, Etam's **Bill** and **Betty Bell** proudly display their own grown 43-inch, 42-pound Mexican Banana Squash which they are convinced is the largest one grown in the Etam area (Photo above).

The 33rd annual Preston County Buckwheat Festival, held in September in Kingwood, was once again enjoyed by station personnel. Several Etam employees were involved this year in preparing, as well as enjoying, homemade buckwheat cakes and sausage at the Fair. Entertainment at the Fair included square dances, an antique car show and the annual Firemen's parade. **—William Carroll**

Squash, anyone?

FUCINO. The station has a new engineer with the arrival of **Lee Jondahl** and his family. He replaces **Mike Hoehne** who has returned to Headquarters as Manager, Spacecraft Technical Control Center. **Don** and **Irene Pavlach** are parents of a new-born, nine-and-one-half-pound baby girl. The family and I visited the States on vacation and admit to a wonderful time to include spending some time with friends at the Etam Earth Station. **—Dorothy Riddle**

JAMESBURG. Cambrel Marshall has joined the Station as our new Material Control Specialist/Accounts Clerk. He resides in Marina with his wife, **Francetta,** and daughter, **Francine.** His son, **Khambrel,** is a student at Arizona State University, on an ROTC scholarship. A daughter, Juanda, is a teacher at Fitch Junior High School at nearby Fort Ord.

Jamesburg's Cambrel Marshall

A retired First Sergeant, Cambrel enlisted in the U.S. Army in 1942, and saw service in North Africa and Italy. He retired in 1973 at Fort Ord, Calif. Cambrel has an AS Degree in Administration of Justice from Monterey Peninsula College and is now pursuing his BA Degree at Golden Gate College. No stranger to Jamesburg Personnel, he had been one of our Wackenhut Corporation security guards. **—W. E. Neu**

PAUMALU. The station offers congratulations to **Kenneth Yamashita,** TT&C Supervisor, recently promoted to Station Engineer. Ken is one of the pioneers with Paumalu having joined the station in 1966. Prior to joining COMSAT he was employed with Lockheed Missles and Space Company as an Electronic Systems Technician. He was one of the original group of technicians on station during the construction, installation and testing period. Ken was promoted to Applications Engineer in 1967 and in 1969 to the position of TT&C Supervisor with responsibility for the operational requirements associated with the Tracking, Telemetry and Command and SSM Subsystems at Paumalu, which function he will continue to supervise.

Ken Yamashita

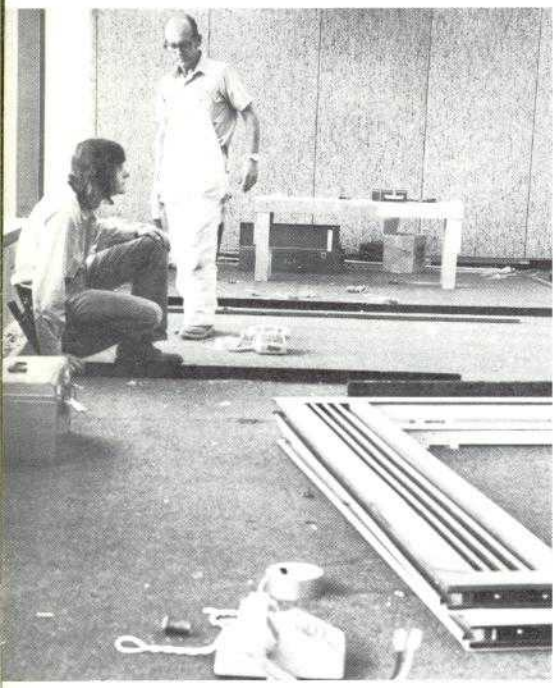
With his wife **Imi** and daughter **Gail,** Ken resides in Kaneohe, on the Windward side of the island. Besides his full schedule of work at the station, he is enrolled in evening classes at a local college and in a correspondence course. He manages to squeeze in some recreational activities on weekends. An avid "jogger", Ken is joined by his pet beagle and often his daughter on his daily, evening jogs around the neighborhood.

Leonard M. Nagashima has joined the staff as a Technician. The **Paul Koike**'s have a new daughter **Karen.** The 1974-1975 panel of CEA officers has been elected to include **Joe Chow,** President; **Bob Makizuru,** Assistant Vice President; **Bob Kumaska,** Secretary; and **Charles Wong,** Treasurer.

PLAZA. To those who have gone looking for some of our recently relocated COMSAT facilities unaware that they have been moved we would like to point out that the Library, formerly located in the east wing on the fourth floor, is now in new quarters in the west wing behind the Employees Lounge with the library entrance across the hall from the Dispensary. Printing and Reproduction is now housed in the area vacated by the Library.

Cindy Watson of the Personnel Office has resigned from COMSAT and will move to Charlotte, N.C. with her husband who has accepted a position

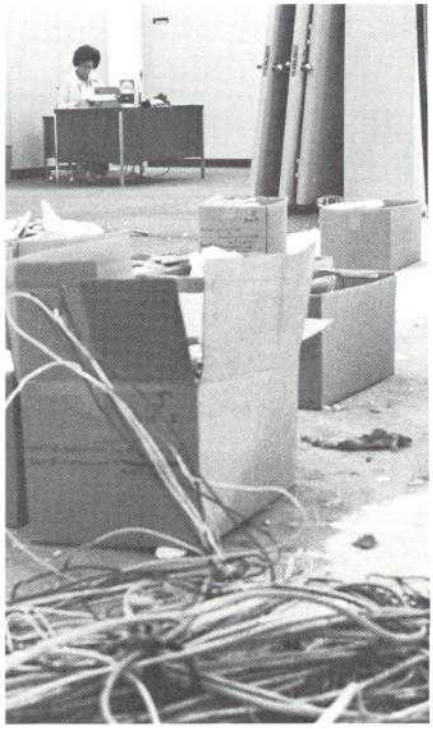
Clarence Holloman of Administrative Services (left) and Robert B. Randle of COMSAT GENERAL Personnel go over floor plans for movement of offices.



William Mahler, construction foreman for the Fred J. Corbett Construction Company (standing) and Jeff Barrows, an electrician with the Kimbrell Electric Company, realign office partitions and power supplies.

there. Cindy had been with COMSAT for more than five years. **Mike Waldman,** formerly Manager, Support Services, International Management Services, and recently departed from COMSAT to make his home in Florida, models the swimming trunks presented him at his retirement party and sends his best wishes to all of his friends at COMSAT (photo below).

Charles M. Baer, assistant to the Chief Scientist for International Telecommunications Union Matters, has retired from COMSAT effective the end of October. Prior to joining COMSAT, Mr. Baer had a long and distinguished career, holding positions in the office of the Assistant Secretary



Margaret Conkling, Executive Secretary, Corporate Planning, finds herself backed into a corner "as the walls came tumbling down" around her.

of State, General Telephone & Electronics' Sylvania Electronics Systems Division, and with the U.S. Army. Prior to graduating from the United States Military Academy in 1932, he was a candidate for B.S., M.S. and PhD. degrees from the school of advanced learning at Johns Hopkins University. He retired from the Army in 1962 in the grade of Brigadier General.

According to our Corporate Nurse **Hazel Durant** approximately 200

Mike Waldman in retirement.

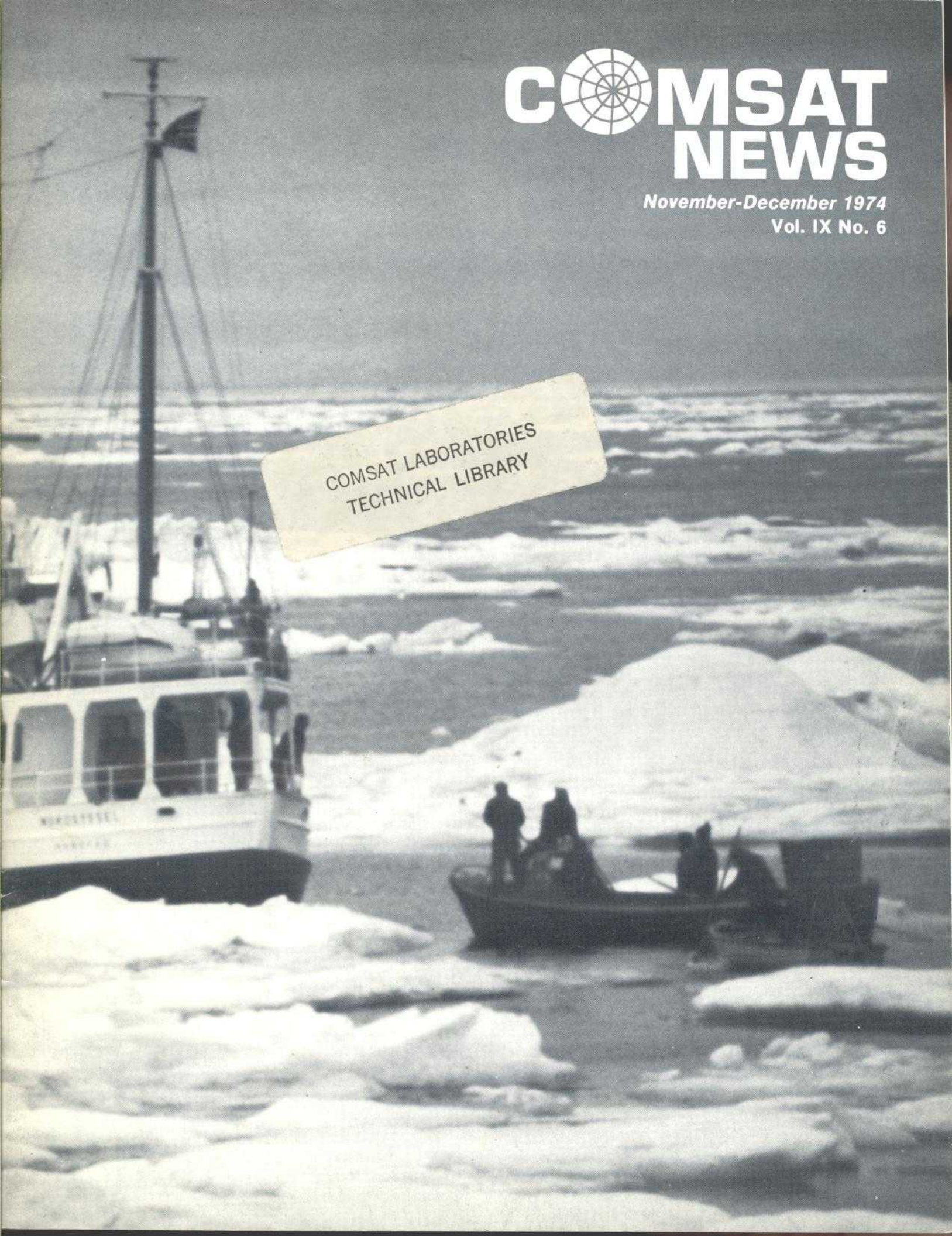
COMSAT employees took the flu shots given recently in the dispensary. Nurse Durant said this was an increase over the preceding year, attributing one of the reasons for the increase being the requirement of only one inoculation instead of three.

Second Lt. Larry G. Hastings, Jr., and relative.

Senior Information Officer **Larry G. Hastings** and family recently visited Craig Air Force Base, Alabama, to see son **Larry** get his wings as an Air Force jet pilot. Larry, Jr., has been assigned to the Strategic Air Command where he will fly the Boeing 707/KC-135 refueling aircraft. In the accompanying photograph, father and son stand by the T-38 jet used during training.

—JJP

Rays of sunlight appear to zero in on the COMSAT antenna temporarily located at the Dow-Jones printing plant in New Jersey. Photo by Allan Galfund.



COMSAT NEWS

November-December 1974
Vol. IX No. 6

Contract signed for three additional IV-A satellites

Total cost of satellite and launch services placed at $260 million

COMSAT, acting as Management Services Contractor for INTELSAT, has signed a contract amendment in excess of $40 million with the Hughes Aircraft Company of El Segundo, California, for three additional INTELSAT IV-A communications satellites.

This includes costs of launch support services to be provided by Hughes Aircraft Company, but does not reflect possible performance incentive payments or cost adjustments which could result from changes in specific economic indexes. If all three spacecraft meet design life and performance specifications, incentive payments could add approximately $7,000,000 to the cost.

Under the terms of the original contract signed in 1973, Hughes will deliver three spacecraft, the first of which is due in the third quarter of 1975. The first of the three additional IV-A satellites to be constructed under terms of the contract amendment just signed will be delivered in early 1977.

With the addition of three more satellites, the total cost of the entire INTELSAT IV-A program is approximately $260 million. This includes full incentive payments and launch support service payments to Hughes, Atlas-Centaur launch vehicles, and launch support services provided by the National Aeronautics and Space Administration (NASA) on a cost-reimbursement basis.

The new satellites, a derivation of the INTELSAT IV satellites, will have almost twice the communications capability of the present global system of INTELSAT IV satellites operating over the Atlantic, Pacific and Indian Oceans.

Where the INTELSAT IV satellites, which introduced the spot beam concept, are designed to use a maximum of eight transponders in spot beam mode, the INTELSAT IV-A satellites are designed with the capability of using a maximum of 16 transponders in spot beam mode. As with the IV's, the remaining transponders in the IV-A's could be used in global mode coverage, that is, focused on an area a little larger than one-third of the world. Spot beams concentrate a satellite's power on smaller, selected areas within the satellite's area of coverage.

In addition, the INTELSAT IV-A satellites will employ frequency reuse through spot beam separation, a concept that was not embodied in the INTELSAT IV spot beam capability. Beam separation permits communications to go in different directions on the same frequencies by using different antenna beams, thereby re-using, or making double use of, the same frequency.

The contract amendment includes a dual polarization modification to the INTELSAT IV-A F-2 and F-3 spacecraft.

This modification will provide for the connection of the redundant receiver and output travelling wave amplifier to a new global antenna to permit simultaneous reception and transmission in channels 2 and 4 of both right- and left-hand circularly polarized signals. These two signals, with their high polarization purity, will permit measurements of the polarization isolation of existing earth stations in the Atlantic region.

The data obtained by these measurements will be used to evaluate the desirability of obtaining greater effective bandwidth in future satellites through dual polarization techniques.

Operations Center coordinates Ali/Foreman bout

Forty earth stations were involved in the world-wide coverage of the recent Ali/Foreman World Championship Fight, establishing a record second only to the final game of the 1974 World Cup Matches, according to data compiled by L. W. Covert, Operations Center Manager.

COMSAT's Operations Center provided overall coordination with the earth stations involved and the television authorities of the participating countries.

Approximately 65 percent of the earth stations in the Atlantic Ocean area participated in carrying the fight *(COMSAT NEWS, Sept./Oct. issue)*. Quality reports of reception at the earth stations were universally good, said Covert, with many stations and television customers reporting excellent audio and video reception. No reports of objectionable impairment were received during the transmissions.

Earth station configuration for the fight involved the original transmission by N'Sele, Zaire, with retransmission by the United Kingdom's Goonhilly, the United States' Andover and Jamesburg, and Tangua in Brazil. Converted retransmissions were transmitted by Goonhilly over one satellite path to Indian Ocean earth stations and by the Atlantic Primary Path Satellite to the Ivory Coast. Brazil also converted for retransmission to Manaus in the Brazilian Amazon region.

News in Brief

INTELSAT IV launched successfully

The INTELSAT IV (F-8) was launched successfully from Cape Canaveral Thursday, November 21. An apogee motor fire placed the new satellite in its operating orbit Saturday evening, November 23.

Corporate executive changes announced

Battle rejoins COMSAT as Senior Vice President—Corporate Affairs. Berman elected to top corporate legal position.

Operations Center coordinates Ali-Foreman fight

Forty earth stations involved in worldwide coverage of championship bout second only to 1974 World Cup Matches.

COMSAT General/INTERCOMSA sign agreement

Signs agreement acquiring 40 percent interest in Panamanian corporation providing satellite service to Republic of Panama.

COMSAT/Charyk receive TV award

National Academy of Television Arts and Sciences award cites contribution to the advancement of international satellite television.

Board of Governors concludes 12th meeting

Authorization for the purchase of three additional INTELSAT IV-A's and approval of the 1975 budget were among agenda items finalized at the Board's twelfth meeting.

Earth Station Managers meet

Managers of COMSAT Earth Stations meet in Washington to discuss operational and management procedures and future programs.

Alternate to Board of Governors named

Goldstein designated Alternate U.S. Governor, Representative to Board of Governors' Advisory Committee on Planning, and Special Committee on Permanent Arrangements.

Special features

Cover

In the "land of the midnight sun" the COMSAT Labs experiment crew had to resort to small boats and the small coastal steamer *Nordsyssel* to make their way through the ice floes off the Norwegian Island of Svalbard.

November-December 1974 **Vol. IX, No. 6**

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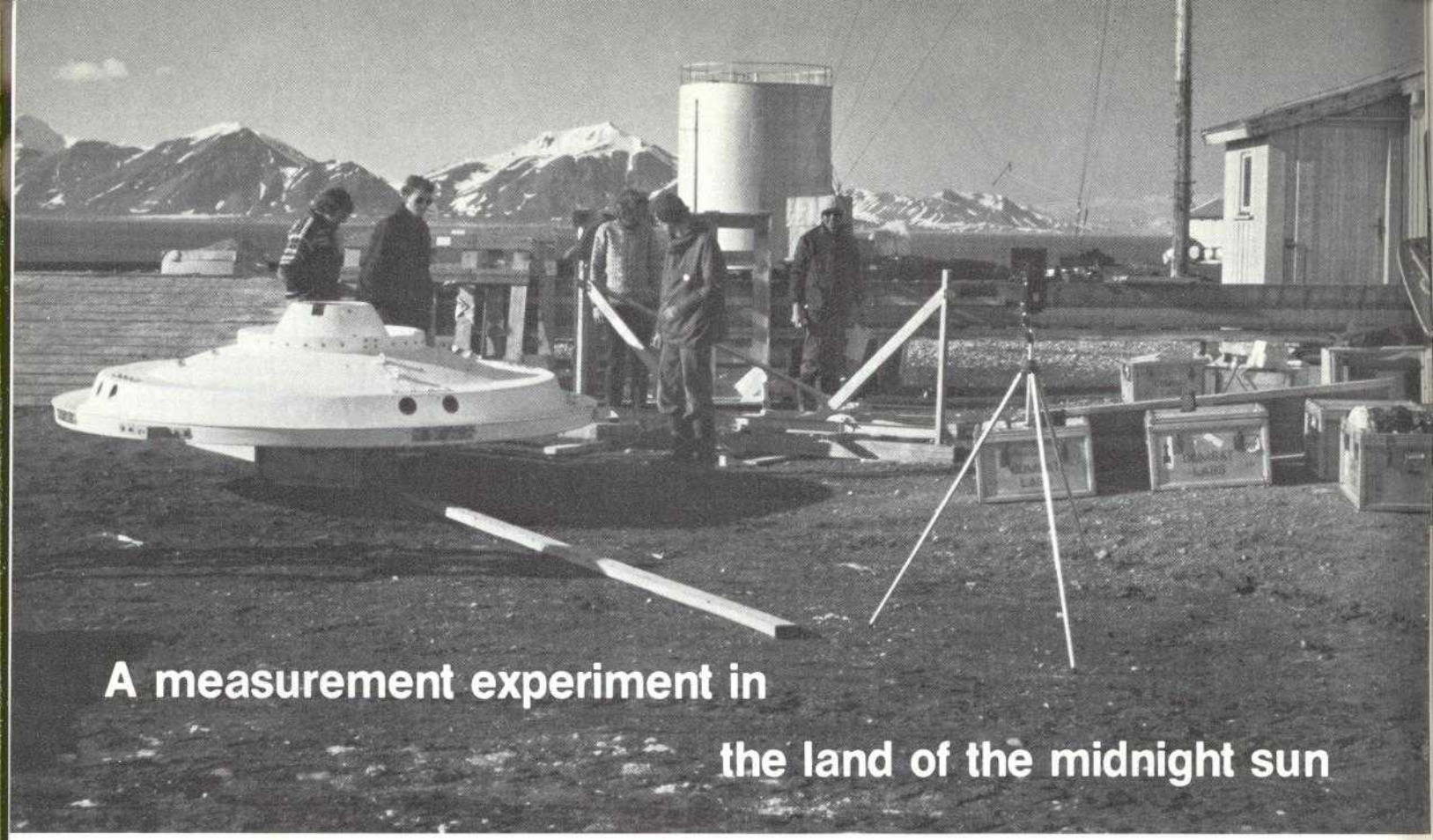


A measurement experiment in the land of the midnight sun

PHOTOS BY J. KAISER AND D. J. REISER.

By Joachim Kaiser

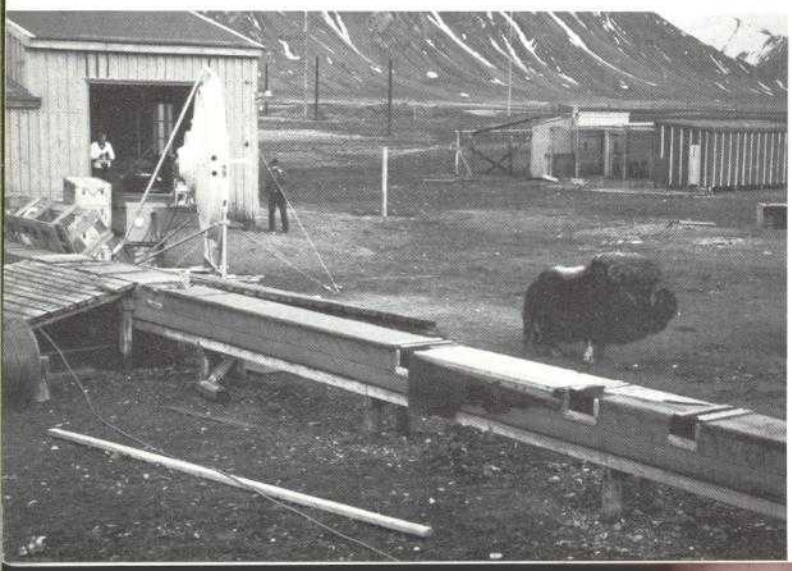
Our task was a challenge from the very beginning. The Norwegian Telecommunications Agency had been moving toward the use of satellites for domestic purposes and the Labs was under contract to explore the feasibility of satellite communications between the Island of Svalbard (Spitzbergen) and the standard station at Tanum, Sweden. The object of the experiment was to conduct communications and propagation measurements between the two locations.

Interesting stories concerning the Corporation frequently go unnoticed due to the pressure of time and new challenges waiting those involved. Several months ago, Comsat *Labs conducted an experiment and Senior Staff Scientist Joachim Kaiser files this report.* —Ed. note.

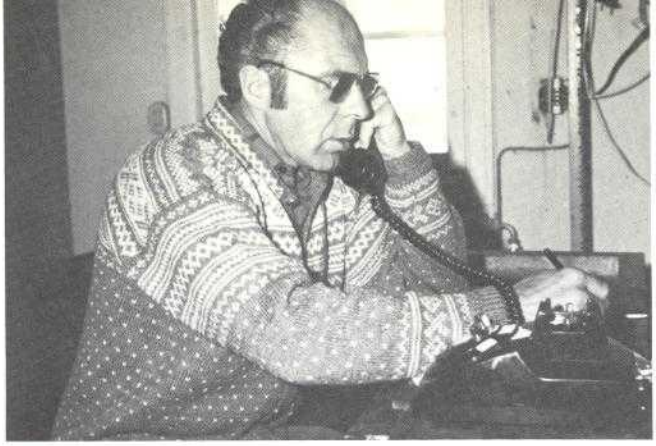
In early June Dave Reiser and I found ourselves on an accelerated day and night work schedule to get our equipment assembled, working, packed and shipped. Our beloved eight-foot antenna was replaced with a hastily bought 10-foot reflector, built in five pieces for ease of shipping. We modified a feed to fit the new reflector, put a 300-watt Sperry HPA into a wooden box for shipment and later operation, and packed our well-worn metal boxes with paramp, FM receivers, modulators, test equipment, transformers, and whatever else we thought we might need.

Our logistic timetable was a nightmare. Svalbard can be reached only by ship, once a week, from Norway. To allow time for propagation meas-

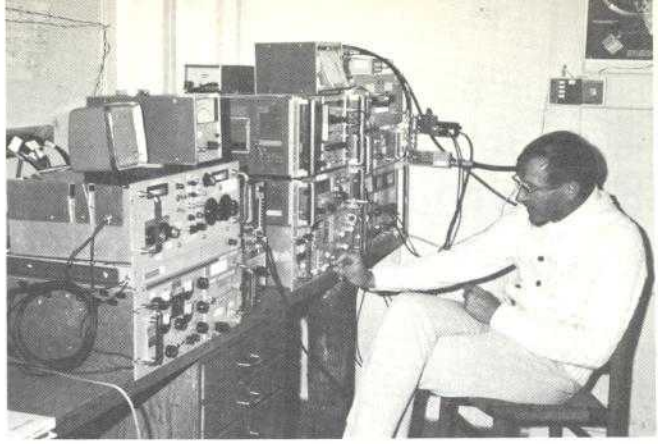
A musk-ox visits the site and pauses for a moment to pose for the camera buffs.



Having allotted photographers their time, the musk-ox concludes the filming session by going on the attack (note fleeing figure behind antenna).



John Veastadt of the Norwegian Telecommunications Administration uses the link between the Isfjord Radio Station site and Oslo, Norway.



COMSAT Labs' Joachim "Kim" Kaiser checks out equipment at the Isfjord Radio Station on Svalbard. The crew christened its experimental site "Station Iceberg."

urements before the last ship left the island on September 15, we had to get to Bergen, Norway, by June 29, to arrive at the Isfjord Radio Station on July 4. We also had to install equipment, test our link and arrange for connections from Tanum to the commercial long distance telephone system in Oslo, Norway. Paper work was expedited, thanks to Ed Wabnitz, John Heck, Ed Wright and many others at the Plaza. Bill Kerns and Pete Ackerman saw to it that our gear was delivered to New York and properly shipped to Norway and Sweden.

Dave and I caught up with just the right things at the right time at Tanum. But there we also suffered our first setback. Our solid state power converters (from 220 volts to 110), which had worked at the Labs, blew three power supplies and fuses in all the equipment, and although the very able station operators at Tanum got everything going again, tests showed that we would have very bad intermodulation products on our transponder. Thanks to our ancient tunable FM receivers, we were able to move Tanum's uplink frequency and clear the problem.

On June 29th we arrived in Bergen, as scheduled, for a memorable trip on the coastal steamer *Kong Olaf* to Svalbard. It has become routine that any ship I get on runs into a storm. This trip was no exception. We ran into it between Hammerfest, Norway, and Bear Island, about halfway to Svalbard. Recovering quickly, we were ready for our spectacular transfer from the *Kong Olaf* to a styrofoam raft towed to shore by an ancient, one-lung diesel boat dubbed "Black Label." At Isfjord, on Svalbard, we began assembling our station with the help of Odd Gutteberg, the Norwegian Project Manager, Magne Osmundsen and Havard Herikstad who would remain at Isfjord for two months to take data. We got the antenna assembled and pointed when I discovered that it was 3:30 in the morning. We had just been introduced to the land of the midnight sun. We rarely slept for the next weeks since it seemed to be always day, sunny but cold, usually in the upper 30's, and downright nasty when the wind blew.

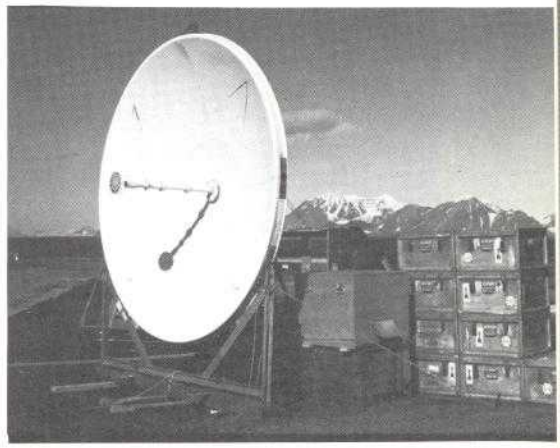
Three days after our arrival, our small station went on the air after overcoming some very obstinate difficulties with our 220 volt prime power supply for the HPA, and unforeseen transmitter noise that got into our receiver at 4 GHz. The very low elevation angle of a little over one degree, together with our "ocean view", produced severe fades—a phenomenon we had come to study and measure. However, with a little extra margin from our equipment, we established a good quality channel for telephone and Xerox telecopier facsimile.

For entertainment Dave and I became the godfathers of two abandoned eider ducklings, established a friendship with the three husky dogs at the station, went on an overnight hike to a small cabin in the valley between snow-capped mountains, sat on a glacier, and were harassed by a renegade musk ox that wandered into our station to have a look around. Dave Reiser missed the ornery beast's horns only by his lightening speed, something I didn't know he possessed until then.

John Veastadt and A. Lingaas, from the Norwegian Telecommunications Administration, and Matt Neilsen from COMSAT Geneva, came to participate in our demonstration. We had some anxious moments when ice closed in on Isfjord the day of our departure and the coastal steamer refused to pick us up. Rescue came in the form of a small wooden-hulled steamer, the *Nordsyssel*, whose casually clad captain braved the ice floes to get us to Longyearbyen where our big ship picked us up.

Our three-meter antenna with a G/T of about 16 dB/K provided one useful two-way voice channel between Isfjord Radio at 74° North and the rest of the world by way of an Atlantic INTELSAT IV and the station at Tanum, demonstrating once again that satellite communications can successfully bridge vast distances even in Arctic areas with very low elevation angles.

Near the Arctic Circle the experimental station stands assembled and ready for business. A backdrop is formed by the waters of the Greenland Sea and the snow-capped mountains of the Island of Svalbard.



Battle rejoins COMSAT, Berman elected General Counsel

Lucius D. Battle has rejoined COMSAT as Senior Vice President-Corporate Affairs. Mr. Battle was elected to that post by the COMSAT Board of Directors at its November monthly meeting.

The Board of Directors also elected William H. Berman as General Counsel of the Corporation, the Corporation's chief legal position.

As Senior Vice President-Corporate Affairs, Mr. Battle will head that part of the Corporation which includes the functions concerned with United States representation in INTELSAT, corporate planning, corporate relations, government and congressional relations, public information and legal matters.

Mr. Battle had been Vice President, Corporate Affairs at COMSAT from September 1968, until June 1973, when he became President of the Middle East Institute. Before joining the Corporation in 1968, he had been Assistant Secretary of State for Near East and South Asian Affairs.

Mr. Battle joined the Foreign Service in 1946, resigning in 1956 to become Vice President of Colonial Williamsburg and Williamsburg Restoration, Inc. He returned to the State Department in 1961 as Executive

Mr. Battle

Secretary of the Department of State and Special Assistant to the Secretary of State. He then became Assistant Secretary of State for Educational and Cultural Affairs in 1962. He was appointed Ambassador to Egypt in 1964 and in 1967 returned to the United States to become Assistant Secretary for Near East and South Asian Affairs.

Mr. Battle has served as trustee of the John F. Kennedy Center for the Performing Arts, trustee of the Washington Gallery of Modern Art and President of the American Foreign Service Association. He is a member of the Board of the National Cathedral, and Chairman of the Board of the St. Albans School.

Mr. Battle has a Bachelor of Arts degree from the University of Florida, and the degree of Doctor of Jurisprudence from the University of Florida Law School.

Mr. Berman joined COMSAT in 1964, was appointed Assistant General Counsel in 1965 and became Associate General Counsel of the Corporation in 1966. He had been Deputy General Counsel for the U.S. Arms Control and Disarmament Agency from 1961 until 1964. Before his federal service, Mr. Berman had been a partner in the law firm of Sharlett, Hydeman and Berman. His legal experience includes three years as Director of the University of Michigan Law School's Atomic Energy Research Project, and service as a trial attorney with the Antitrust Division of the Department of Justice and as Counsel for the Division of Reactor Development of the U.S. Atomic Energy Commission. He is a graduate of Harvard College, received his juris doctorate from Harvard Law School and served on its faculty.

Ten-year awards presented

Awards were presented recently to COMSAT employees completing 10 years of service with the Corporation. Pictured, left to right: William H. Berman, General Counsel; Frederic M. Mead, Treasurer; Richard Smith, Manager, Computer Center, Labs; Frank M. Mann, Operations Manager, Labs; COMSAT President Joseph V. Charyk making the presentations; Patricia T. Kiernan, Senior Executive Secretary, International System Division; Paul E. Troutman, Manager, Traffic; Allan M. McCaskill, Manager, Launch Vehicle Systems; and Laurence F. Gray, Manager, Earth Terminals, Labs.

COMSAT GENERAL, Canada and ESRO sign AEROSAT Agreement

The Aerosat Agreement is signed by representatives of the European Space Research Organization (ESRO), COMSAT GENERAL and the Government of Canada. Signing the Agreement are, seated, left to right: Roy Gibson, Acting Director General of ESRO; John A. Johnson, President of COMSAT GENERAL; and Dr. John H. Chapman, Assistant Deputy Minister, Department of Communications, Government of Canada. Witnessing the signing are, standing, left to right: Julie Loranger, Canadian Department of Communications; W. D. English, Vice President and General Counsel, COMSAT GENERAL; and J. B. Gantt, General Attorney, COMSAT GENERAL

An agreement to establish an aeronautical satellite capability (Aerosat Space Segment Program) for use in an intergovernmental aeronautical satellite experimentation and evaluation program was signed in Washington, December 2, by the European Space Research Organization (ESRO), COMSAT GENERAL Corporation and the Government of Canada.

The agreement was signed by Roy Gibson, Acting Director General of ESRO; John A. Johnson, President of COMSAT GENERAL; and Dr. John H. Chapman, Assistant Deputy Minister, Department of Communications, Government of Canada.

The Aerosat Space Segment Program covers the design, development, procurement and operation of two satellites over the Atlantic Ocean. The first satellite is planned for launch in 1978 by a Delta 3914 vehicle.

A Memorandum of Understanding covering the intergovernmental aeronautical satellite program was signed earlier this year by ESRO, the U.S. Department of Transportation/Federal Aviation Agency (DOT/FAA) and the Government of Canada. In addition to calling for the establishment of a space segment capability, the Memorandum of Understanding includes a coordinated program comprising the design, manufacture and operation of user ground facilities, avionics, the preparation of the test program and the operation of suitably equipped aircraft. These activities are the responsibility of ESRO, DOT/FAA and Canada.

Under the agreement, ESRO, COMSAT GENERAL and Canada will furnish the space segment capability for the intergovernmental program. In the case of COMSAT GENERAL, its share of the space segment capability will be leased to the FAA.

MS Degree in Telecommunications offered by George Washington U.

The George Washington University has announced the establishment of a new cycle of the Master of Science in Special Studies, with a concentration in Telecommunication Operations. This is an interdisciplinary program offered by The George Washington University's Graduate School of Arts and Sciences, and provides the opportunity to combine work in the traditional areas of the Arts and Sciences with courses from such other areas as engineering and management.

The program is especially appropriate for the student preparing for broader responsibilities in his career field, or whose interests and responsibilities cut across several of the academic disciplines.

The University is offering this program starting in Spring 1975, with classes meeting in the District of Columbia at a location and hour convenient to the student body.

Previous student bodies have been comprised of individuals working in all sectors of the telecommunications industry including military telecommunications. COMSAT employees from the Labs, U.S. Systems Plant, Procurement, and Program Management are currently enrolled in these courses.

The courses are sequenced and offered on an open enrollment basis with all class sizes limited. Some courses are technical in nature while others take on the broader perspective of telecommunications principles, practice and policy. They include Telecommunications System Concepts, Microeconomics, Macroeconomics, Telecommunications Policy and Regulations, Linear Programming, Mathematics for Management, to list a few.

COMSAT people interested in enrollment and registration procedures should contact Mr. Bud Paul at 676-7062, at The George Washington University.

Latest INTELSAT IV launch a success

By Larry G. Hastings

"Success is always worth the wait . . ." Comsat launch crew member, Nov. 21, 1974.

It seemed as though we had gone this route before—the long wait.

The Atlas-Centaur No. 32 which launched the INTELSAT IV (F-8) into orbit the evening of Thursday, November 21, had indeed been on the pad for a long time. The F-8 was first scheduled for launch in late January, 1974. Then a series of problems began cropping up.

New batteries

The Spacecraft Technical Control data indicated potential problems had developed. But this one was detected in space, not on the spacecraft awaiting launch. Two of the INTELSAT IV satellites in orbit had been telemetering data back to Spacecraft Technical Control which indicated that the normal procedure of overcharging batteries might create a problem.

Engineers and technicians at Comsat and Hughes Aircraft Company (the spacecraft manufacturer), by reviewing and analyzing data from the satellites in question and recreating the same situation in identical batteries on the ground, developed another procedure for the battery charging whereby the possibility of overcharge would be avoided. In the revised procedure, only electrical energy which had been used during an eclipse would be replaced in the recharge cycle.

During the time when this analysis was taking place and procedures were being worked out, new batteries under development for the upcoming series of IV-A satellites became available. These advanced batteries were manufactured with a built-in safeguard so that overcharge would not create a problem. The decision was made to replace the earlier model batteries in the F-8 with the new IV-A batteries.

Things were beginning to look optimistic for an early launch. But January had slipped into June and right along with it, the planned launch slipped again. In the meantime, the new IV-A batteries had been tested and accepted for flight use.

Vehicle readied

The next situation which caused concern was the result of a Titan-Centaur launch in early February which encountered a problem causing the mission to fail. The Centaur, or upper stage of the Titan-Centaur, experienced a malfunction in the boost pump used to force liquid oxygen to the engines for combustion. By July launch vehicle specialists had corrected the boost pump situation, but in the meantime, a third problem—more unique—surfaced.

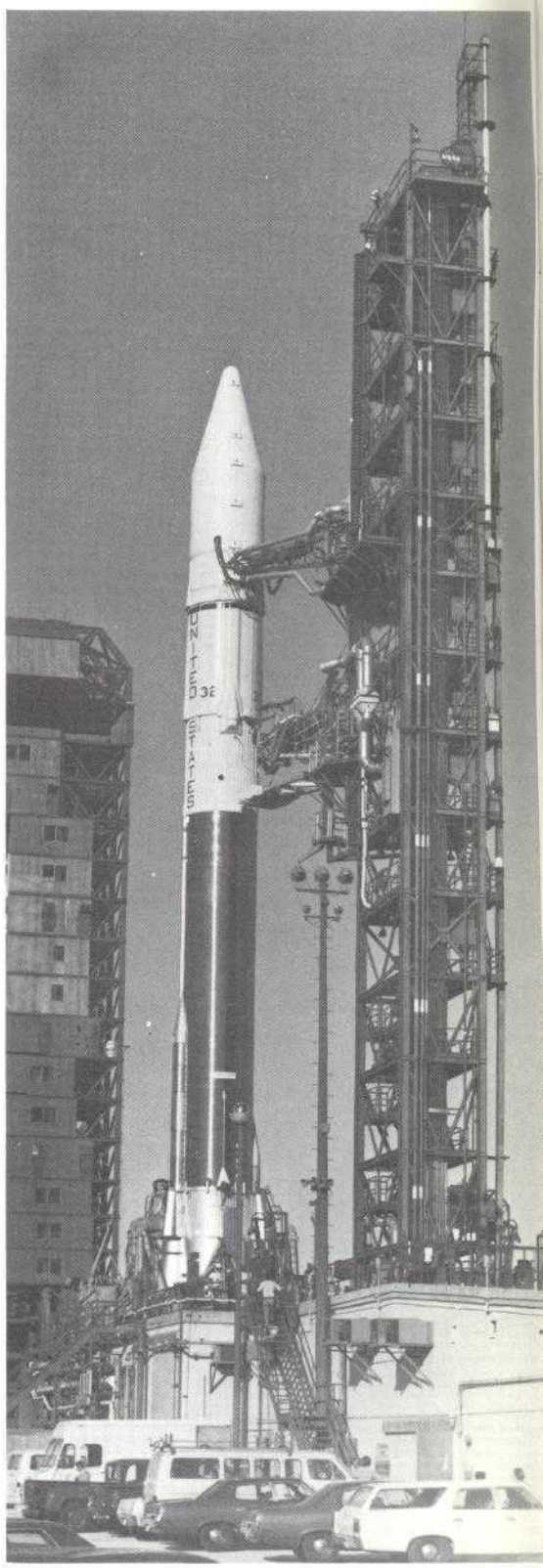
In May, during acceptance vibration tests of a Centaur digital computer, a micro-miniature circuit in the on-board computer failed.

This electronic computer system automatically monitors many functions of the Centaur and directs its performance in flight. Manufacturing steps were retraced and resulted in several theories as to the cause and the required corrective action. For a brief period, one of the prevailing opinions was that this particular production run of micro-circuits contained the same defect. Followup investigations indicated that the situation was much worse. All of the micro-circuits were suspect. New micro-circuits had to be built, tested, flight-qualified and installed in Atlas-Centaur 32 so that it could launch the INTELSAT IV (F-8).

Finally, the painstaking task was completed, tests conducted, results accepted and the rocket declared ready. The F-8 spacecraft had been waiting patiently for its mating to the Atlas-Centaur and finally the wedding took place, about a week prior to the planned launch.

Unlike an earlier launch when problems had precipitated a long wait

Mr. Hastings is a Comsat Senior Information Officer.



The INTELSAT IV (F-8) poised for launch prior to liftoff Thursday, November 21. The new satellite will provide service in the Pacific Ocean Region. The Pacific INTELSAT IV (F-4) will serve as a spare in orbit.

before the bird took flight, this time there were no wisecracks about the vehicle having "taken root to the ground" or other such thighslappers.

As a matter of fact, not much at all was said. The COMSAT, NASA, Hughes and General Dynamics crews went about their tasks in an orderly, quiet way. Yet there was in no way an apprehensive air at COMSAT's Hangar nor on Pad 36. The crews' approach to pre-launch tests and procedures was more reminiscent of veteran aircraft commanders performing necessary pre-flight checks before take-off.

A weather briefing on launch day was good—almost unbelievable. Surface winds 15-20 knots; winds aloft at 40 thousand feet about 70 knots; visibility seven miles at ground level and no clouds aloft.

At 3:24 p.m. EST, the huge tower, which surrounds the Atlas-Centaur and serves as a work scaffold while the launch vehicle bearing the satellite is being readied, was rolled back on its railroad tracks. Lift-off time was to be 6:44 p.m. EST. At T minus 100 minutes the countdown entered into a planned one-hour hold. This allowed the huge tower to be secured and gave the launch crews an opportunity to perform final checks before liquid oxygen was pumped into the Centaur, or upper stage, and then into the Atlas.

T minus 50

Shortly thereafter—T minus 50 minutes—liquid hydrogen was taken aboard the Centaur in readiness to play its role as a part of the highly volatile liquid propellant fuel.

At one hour and 20 minutes before lift-off, the solid propellant apogee motor was armed—ready to receive its firing command some 50 hours later when the satellite was at fifth apogee.

Canaveral Range Safety began its final tests and the spacecraft was placed on internal power.

Once more—a last look—a 10-minute hold and the count resumed.

T minus 90 seconds and over the headset came the words, "You have range clearance to launch."

T minus 35 seconds—engines reported ready. For the following 30 seconds, status checks, propellants, pneumatics and finally, in a rather matter-of-fact manner the launch director's voice rasped over the headset, "You have a go for launch."

"You have a launch"

At T minus 5 seconds the engines started with a "whump!" A tremendous gush of bright orange flame and huge billows of smoke thrust horizontally from the launch pad by the force of the engines. One second later umbilical cords disconnected and swung away from the rocket; it was on its own power and, barring a last-minute abort signal, the mission was to begin. At T minus one second, the holddown arms were released and the Atlas-Centaur began an agonizingly slow climb upward past the umbilical tower.

After eleven months of gestation the birth begins. Up into the blue-black velvet Florida skies moves the roaring white needle, trailing particles of ice and a white plume of smoke.

The plot board showed green: trajectory on track, velocity normal. In the clear night sky the unaided eye could follow the vehicle for almost five minutes as it headed in its east-southeasterly track—from brilliant sun to diminishing star, finally it disappeared.

Back in the Mission Director's Center, the countdown clock and plot boards replaced visual contact. Down range, stations reported all was well. Then came the words, "Ascension had acquired." All performance nominal and on time. Beautiful!

The critical point had been reached: T plus 28 minutes and 32.7 seconds, and right on schedule, the spacecraft separated from the Centaur stage. F-8 had an orbit, but the real confirmation came when the earth station at Carnarvon, Australia, "saw" the satellite. And, again on schedule, the event took place at its programmed T plus 44 minutes.

Then, and only then, professional, business-like attitudes of the launch and spacecraft crews from COMSAT, NASA, Hughes and General Dynamics could be put aside for the balance of the highly successful evening. (AUTHOR'S NOTE: generally, this allows an opportunity for group singing, corn-popping and taffy-pulling, of course.)

Achieves orbit

Once in transfer orbit, the INTELSAT IV (F-8) became the responsibility of the Spacecraft Technical Control Center in Washington, D.C. At that center, a battery of engineers, technicians and mathematicians determined precise orbital data and reoriented the satellite for apogee motor firing. Executing the commands of the Spacecraft Technical Control Center was the COMSAT-operated earth station at Paumalu, Hawaii.

The on-board apogee motor of the INTELSAT IV (F-8) was fired on fifth apogee. Again, all went well. At 6:48 p.m. EST, Saturday, the new satellite was thrust into a nearly circular orbit by a 34-second burn of the solid propellant apogee motor.

The official news release summed it up: "A second Pacific Ocean INTELSAT IV commercial communications satellite has been placed in synchronous orbit with the successful firing of the apogee motor aboard the sixth satellite of the series Saturday, November 23, at 6:48 p.m. EST. The new satellite had been launched from Cape Canaveral, Florida, on Thursday, November 21."

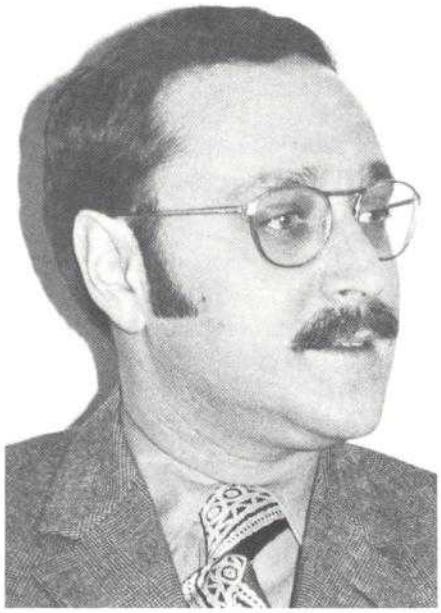
Tests satisfactory

On Monday, November 25, the spacecraft test team made up of technicians from COMSAT Headquarters, COMSAT Labs, and COMSAT West Coast personnel, left for Hawaii to conduct complete tests of spacecraft performance parameters. The test group, assisted by Paumalu earth station technicians, would use site antenna number one for the tests.

The spacecraft tests were completed by December 3 and all results reported satisfactory. In mid-December the new satellite became "visible" to all Pacific earth stations as its controlled drift brought it on station at 174 degrees east longitude. Next, the orderly transfer of traffic from the INTELSAT IV (F-4) (which had been launched January 22, 1972) to the new F-8 began. The older F-4 then assumed the role of the Pacific spare-in-orbit at 179 degrees east longitude.

The Thanksgiving and Christmas holidays would only provide a short period of rest, for back at Cape Canaveral in COMSAT Hanger AM, another electronic giant was taking shape—the INTELSAT IV (F-6)—waiting its turn to be pointed into the night skies over Florida on a huge finger of flame.

Goldstein named Alternate Governor



Irving Goldstein has been named Alternate U.S. Governor on the INTELSAT Board of Governors, as well as U.S. Representative to the Advisory Committee on Planning of the Board of Governors, and U.S. Representative to the Board's Special Committee on Permanent Arrangements.

Mr. Goldstein returned to Washington in July of this year to assume the position of Director, International Affairs Division. He was the Director of the COMSAT European Office in Geneva from 1972 to mid 1974. Prior to that time he was a member of the Corporation's legal staff working on Regulatory matters.

The Planning Committee was established by the Board to provide advice on questions of planning for INTELSAT, including growth opportunities, plans for governing access to the space segment, development of future systems, long range investment plans and system operating philosophies for the international organization.

The Special Committee on Permanent Management Arrangements was created to assist the Board in fulfilling its task under the INTELSAT Agreement of studying INTELSAT management and to provide information necessary to determine the most efficient and effective permanent management arrangements for the Organization.

COMSAT General acquires interest in Panama's INTERCOMSA

COMSAT GENERAL President John A. Johnson, seated left, and Juan David Morgan, seated right, Counsel and Secretary for INTERCOMSA, sign agreement in which COMSAT GENERAL acquires 40 percent interest in Panamanian Company. Standing, left to right, are Marshall Hornblower, outside counsel, and COMSAT GENERAL's William D. English and John B. Gantt.

COMSAT GENERAL Corporation has signed agreements to acquire a 40 percent interest in INTERCOMSA, a Panamanian corporation which provides satellite communications services for the Republic of Panama and operates the earth station at Utibe.

The agreements between COMSAT GENERAL and Intercontinental de Comunicaciones por Satelite (INTERCOMSA) were formally signed at COMSAT Headquarters in October.

COMSAT GENERAL acquired a 40 percent interest for $2.5 million. The acquisition was reported in the last quarterly report mailed to shareholders in November. The report noted that, "COMSAT GENERAL believes that INTERCOMSA has a promising future in view of the rapidly expanding telecommunications market which it serves."

COMSAT GENERAL also has held an interest, since 1971, in a private company called NICATELSAT, which owns and operates an earth station and related interconnection facilities in Managua, Nicaragua. The Government of Nicaragua owns 51 percent and COMSAT GENERAL owns 49 percent of the shares of Compania Nicaraguense de Telecomunicaciones por Satelite (NICATELSAT).

COMSAT GENERAL's technical services:

a worldwide communications assistance program.

By A. R. Coburn

With more than 100 countries, territories and possessions now leasing satellite services on a full-time basis, Comsat General's Technical Services Division continues to help countries enter into the mainstream of modern world communications using the satellites for domestic communications.

Since 1966, when technical assistance was first made available, Comsat has provided such services to more than 30 of the 58 countries which now operate in excess of 100 antennas at 80 earth station sites.

Seven of these assistance programs have been initiated in other countries the first nine months of this year: Brazil, Saudi Arabia, Norway, Indonesia, Ethiopia, Upper Volta and Jordan.

Under a contract with Embratel (Empresa Brasileira de Telecomunicacoes), three transportable earth stations were flown to Brazil, installed, and operated by Comsat General during June and July to televise the World Cup Soccer Matches into the interior as a demonstration of the potentials of domestic satellite service (COMSAT News, July/August 1974 issue).

The stations were located at Tangua, about 30 miles north of Rio de Janeiro; at Cuiaba, capital of the State of Mato Grasso near the Bolivian border; and at Manaus, capital of the State of Amazonas.

Since then, Embratel has announced that it will exercise its option under a contract with Comsat General to purchase the three stations for retention as the initial step in the development of a domestic satellite system. Embratel had previously concluded arrangements with Intelsat to lease a transponder in an Atlantic Intelsat IV satellite to work with the new earth stations beginning later this year.

The installation of 36-foot transportable earth stations at Riyadh in July and at Jeddah in August as part of a contract signed in April has brought Saudi Arabia rapidly into the Intelsat system on an interim basis. A TV capability is now being added at Jeddah under a new contract. Meanwhile, the provision of technical advisory assistance to Saudi Arabia in the construction of their first two standard earth stations continues to be explored.

Assistance is being provided under contract to Norway in connection with an initial four-station system which may ultimately become the nucleus of a Norwegian domestic system. One station will be located on the Norwegian mainland, with the other three located on oil production platforms in the North Sea. Specifications have been developed, and proposals from industry evaluated, with TSD's advisory assistance.

Two studies begun and completed earlier this year by TSD have brought Indonesia closer to its planned domestic satellite system. One study defined the country's near- and long-term communications requirements. The other identified a number of potential sites for the construction of an initial network of earth stations which would start to pull this nation of islands closer together through improved domestic communications.

Advisory assistance is being provided to Ethiopia in its program for construction of a standard earth station at a site in Sululta, Ethiopia, recommended by Comsat General.

Work has begun under a contract with Upper Volta for assistance in the construction of a standard earth station. Feasibility studies and site selection have been completed.

A somewhat different type of technical service is now being provided to the Hashemite Kingdom of Jordan. The Jordanian earth station at Baqa was originally constructed under a program for which TSD provided its conventional advisory services. Earlier this year, however, TSD personnel returned to Baqa to begin a two-year program aimed at developing within the Baqa earth station organization the technical and management skills to permit their assumption, in-house, of responsibility for maintenance of the station equipment.

With 1975 approaching, Technical Services has no reason to anticipate any diminishing of assistance requests as an increasing number of countries recognize the value of satellite communications and call on the expertise of Comsat General in establishing satellite/earth station systems.

Mr. Coburn is Assistant to the Director, Technical Services Division.

INTELSAT Contract Awards

To **Adcole Corporation** of **Waltham, Massachusetts,** a seven-and-one-half-month $75,000 contract for the development of a wide-angle digital sun sensor.

To **TRW Systems, Redondo Beach, California,** a nine-month $125,000 contract for an electric propulsion/spacecraft integration study.

To **Hughes Research Laboratory, Hughes Aircraft Company, Malibu, California,** a 15-month $147,716 contract for a mercury ion chamber "sputtering" investigation.

To **TELEDIX GmbH, Heidelberg, Federal Republic of Germany,** an 18-month $120,000 contract for a magnetic bearing momentum wheel.

INTELSAT Board of Governors (official photo)

Board of Governors authorizes three more IV-A satellites; approves budget for 1975

Authorization for the procurement of three additional INTELSAT IV-A's, the approval of a budget for 1975, and the development of a long-range planning computer model of the INTELSAT System were agenda items at the recently concluded twelfth meeting of the Board of Governors.

Twenty-one Governors representing 52 of the 87 Signatories were present. The following actions were among those taken by the Board:

Technical and operational matters

• Authorized the Management Services to execute an amendment to the INTELSAT IV-A contract, for the procurement of three additional INTELSAT IV-A's, with options valid until end-1976 for up to three more satellites.

• Noted the Management Services Contractor's recommendation for a three-satellite configuration, and additional information leading to the conclusion that the Board could consider the choice of INTELSAT IV/IV-A configuration with other information on future programs being developed for the February meeting of the Board.

• Decided that, if performance tests indicate the INTELSAT IV (F-8) meets specifications, the (F-8) will become the Pacific operational satellite at a nominal location of 174°E (See INTELSAT IV (F-8) Launch Story). The INTELSAT IV (F-4) will then be relocated to a nominal position of 179°E, for service as the Pacific Region spare.

• Approved the INTELSAT IV-A dual polarization measurement program in principle, but requested the Advisory Committee on Technical Matters to review the proposed program at its next meeting, especially the detailed planning schedules for the experimental program, and to report its findings to the next Board meeting. The Board also authorized the Management Services Contractor to execute an amendment to the INTELSAT IV-A contract, for inclusion of the dual polarization experiment package in the IV-A (F-2) and (F-3) at a fixed price of $883,000.

• Adopted the recommendation of the Advisory Committee on Planning on annual growth factors to be used for the period beyond that covered in the Traffic Data Base, namely:

	1979-1983	*1984-1988*
Atlantic	18%	16%
Pacific	17%	17%
Indian	18%	16%

However, the Management Services Contractor's studies of INTELSAT IV/IV-A alternative configurations for the Atlantic Region will continue to use a 19% growth factor for the years 1979-1983.

• Decided that the Management Services Contractor should, as recommended by the Advisory Committee on Planning, proceed with the development of a long-range planning computer model of the total INTELSAT system.

• Authorized the Management Services Contractor to conclude an agreement with COMSAT GENERAL Corporation for use of INTELSAT TT&C facilities in connection with U.S. domestic satellite launches. The services requested and the applicable terms and conditions are the same as those approved in the case of an earlier request from RCA.

• Approved the recommendation of the Advisory Committee on Planning, that the Management Services Contractor summarize currently available material on the demand for new services using small earth stations, and in consultation with the Executive Organ provide proposals on methods by which further information, if needed, could be gathered.

• Approved the Danish application for access to the INTELSAT space segment by the non-standard station at Thule, Greeland, subject to: receipt from Denmark of a confirmation of the additional information provided by the earth station operator; the Management Services Contractor's ensuring that the station will not result in harmful interference to INTELSAT system operation; a rate adjustment factor of eight; and verification of the technical characteristics by the Advisory Committee on Technical Matters.

Financial and legal matters

• Approved the INTELSAT budget for 1975 subject to decisions at a later meeting on the 1975 space segment charges and the 1975 R&D budget. The approved budget includes: $104.7 million in capital expenditures, $119.8 million in revenue, $67.3 million in total operating expenses, and $52.6 million in compensation for the use of capital.

• Requested the Secretary General and the Management Services Contractor to endeavor to implement whatever economies are possible without affecting the performance of their essential functions.

• Decided to hold in abeyance the consideration of any new invitations to hold meetings away from INTELSAT Headquarters, pending consideration at the February meeting of guidelines to govern the division of costs for such meetings between INTELSAT and the host.

• Requested the Advisory Committee on Finance, as part of its terms of reference, to review the space segment charges for 1975. The Advisory Committee on Finance will also consider whether the 1975 charge should be applied prospectively or retroactively. In the latter case it will examine any difficulties in making the 1975 space segment charge retroactive to January 1975, or to such other date as the Board may decide.

• Approved the recommendation of the Advisory Committee on Planning, that the Management Services Contractor conduct certain further studies of possible financial incentives to stimulate construction of earth station facilities which may be needed by INTELSAT; and decided that the Board will discuss such incentives when it has determined a space segment facility plan for the INTELSAT IV-A/V period.

• Approved minor revisions to the INTELSAT procurement regulations, to reflect the entry into force of the Management Services Contract.

• Adopted language requested by the U.S. which will give COMSAT the requisite authority under U.S. tax law to make certain elections on its own income tax returns without affecting the existing tax exemptions of either INTELSAT or the other Signatories.

Administrative matters

• Unanimously agreed to the selection of Peter Meulman of Australia as Chairman of the Advisory Committee on Planning, to succeed Mr. Graham Gosewinckel, who resigned as a result of other commitments. Mr. Douglas Doran-Veevers of Canada will continue as Vice Chairman of the Committee.

• Noted the Secretary General's report on INTELSAT's attendance as an observer at the North Atlantic Planning Meeting held in Munich, October 28-30, 1974.

• Authorized the Secretary General to accept the invitation from IMCO, to be represented by an observer at the International Conference of Governments on the Establishment of an International Maritime Satellite System, to be held in London from 23 April to 9 May 1975. INTELSAT's role will be limited to supplying information concerning the Organization, its Agreements, and its programs concerning the space segment as approved by the Board of Governors.

• Noted the first report submitted by the Secretary General on the performance of the Management Services Contractor, indicating that financial arrangements under the Management Services Contract are proceeding satisfactorily, the Atlantic frequency and transition plan have been successfully completed, and commenting on negotiations of the amendment to the INTELSAT IV-A contract for procurement of additional spacecraft.

• Noted the Management Services Contractor's report on the status of discussions with Hughes Aircraft Company on the use by Hughes of INTELSAT data for non-INTELSAT satellites.

• Decided that after additional experience has been gained it would be useful to formulate precise guidelines for the type of information which should usefully be contained in future reports by the Secretary General.

• Adopted permanent rules of procedure as developed by the Board's Chairman.

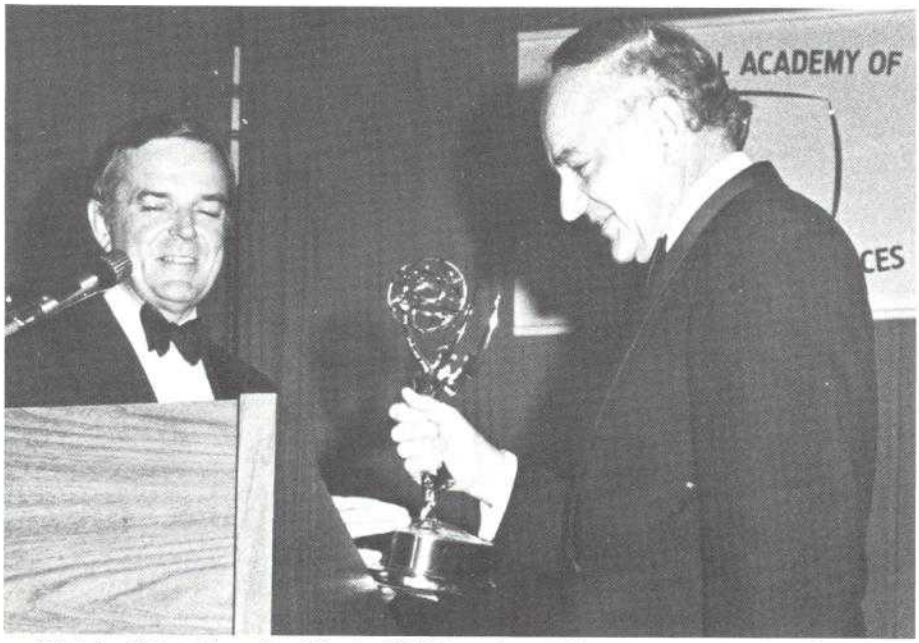
• Approved maximum costs for use in negotiations with the three management consultants selected by the Board at its last meeting, who will be conducting studies in support of the Board's overall study on INTELSAT management. The Special Committee on Permanent Management Arrangements will discuss the proposed consultant studies with the three firms, and draft contracts will be presented to the Board at its next meeting.

• Approved a one-year assignment for Dr. M. Sugiyama, a nominee of the Japanese Signatory, to work on the Management Services Contractor's Laboratories staff.

In closing, the Board confirmed Bangkok, Thailand, as the site of the thirteenth meeting in January.

The preceding report was prepared by Ellen Hoff of the International Affairs Division.

COMSAT/Charyk receive Television Academy Award



John A. Schneider, President, CBS Broadcast Group, presents the 1974 International Directorate Award of the National Academy of Television Arts and Sciences to COMSAT President Joseph V. Charyk.

The National Academy of Television Arts and Sciences honored COMSAT and Dr. Joseph V. Charyk as its president at the Annual Awards Dinner of the Academy's International Council on November 25.

The Council's 1974 International Directorate Award was presented to Dr. Charyk in recognition of COMSAT's contribution to the advancement of international satellite television.

Broadcasters from countries around the world assembled for the event in the Grand Ball Room of the Plaza Hotel in New York City.

In making the presentation to Dr. Charyk, John A. Schneider, President of the CBS Broadcast Group, said that the most important development of the past decade in international television has been the ability to send television signals on a worldwide basis via satellite.

"Since the Early Bird program in April 1965," he said, "television transmissions have increased steadily. Audiences all over the world have seen U.S. space shots, presidential visits to China and the Soviet Union and sporting events from Mexico, Germany, Japan and most recently Zaire. The 1972 Olympics and the 1974 World Cup Soccer Championships each represent thousands of hours of international television."

In concluding his introduction, Mr. Schneider said, "It is most fitting that this year, the tenth anniversary of INTELSAT, we honor COMSAT and Dr. Charyk, its president, who has contributed so much to the establishment and continuing growth of satellite television."

In his acceptance remarks, Dr. Charyk said that the award held a special significance since it symbolized the translation of a dream of ten years into reality.

"Today," he said, "the network of satellites and earth stations that transmit voice, data and video images between all parts of the world on a sound commercial basis is accepted as routine.

"Ten years ago, our little handful of people at COMSAT who made a decision to build an Early Bird satellite had a dream, but in 1963 the world by and large accepted it as an objective which suffered from technical optimism and economic unreality."

Dr. Charyk also paid tribute to those who, through the Communications satellite Act of 1962, formulated the national policy of establishing a global commercial communications satellite system in cooperation with other countries as quickly as practical; to those in science and industry, who helped to develop and build the hardware; and to those in the 87-nation INTELSAT organization who worked to give the concept a global dimension.

He added, however, "We have yet to truly tap and utilize this global resource with its enormous potential. Primarily," he said, "we move an electronic image from one place to another—a news report, an athletic contest, a ceremonial event. And yet the system of over 100 antennas in 58 countries can interconnect and interact in a completely flexible action. We have very few examples, if any, of interactive programming among multiple earth stations."

In looking to the future, Dr. Charyk envisioned satellites which will focus their energy through multiple narrow antenna beams and operate at frequencies which are not shared with other services.

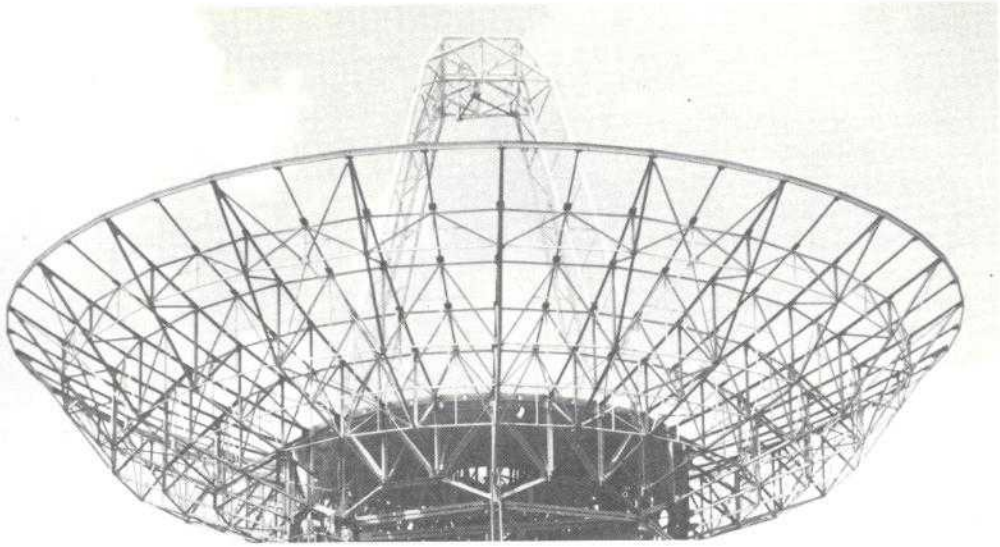
"This will permit small earth stations," he said, "to communicate directly to the satellite from any location. It could also permit jeep-mounted stations (including camera and radio transmitter) which can transmit directly to the satellite.

"By using digital techniques," he added, "we can send two TV pictures simultaneously utilizing the same satellite capacity we now require for one. And the rapidly reducing cost of storing bits of information has led more recently to a method in our laboratory that shows promise of increasing this ratio from 2-1 to 4-1.

"Looking even further down the road, we can conceive of generating a digital signal directly from the camera, and an all-digital system which would eliminate the standards conversion problem."

In concluding, Dr. Charyk said, "All this technology, of course, is for naught if people do not truly achieve communication and, through communication, understanding."

Attending the awards dinner with Dr. Charyk were Matthew Gordon, Assistant Vice President for Public Information, Donald E. Greer, Headquarters Executive Officer, and Daniel D. Karasik, Manager for Customer Relations.



MARISAT

The Wave of the Future in High Seas communications

By Hale Montgomery

Steel ribs of antenna structures are visible at new earth station sites in Connecticut and Southern California. A fully assembled spacecraft is undergoing a series of critical in-plant preoperational tests. A worldwide sales and service organization is being set up. Launch services have been negotiated. A new control center is being installed at the Plaza. In short, Marisat is coming.

The two-ocean maritime satellite communications system (Marisat) being developed by Comsat General and its three carrier-partners is scheduled to be in commercial operation by the summer of next year. Fortuitously, that will be just 10 years from the time commercial satellite communications became available to commercial users through Early Bird, or Intelsat I.

Work has been underway since May 1973 at Hughes Aircraft Company in California on the spacecraft for the Marisat System. Three multifrequency satellites are being constructed, two for in-orbit use and the third for an on-the-ground spare. A series of tests involving components and the fully integrated spacecraft itself, some requiring a few days and some up to four weeks of rigorous testing, are being conducted at the Hughes plant in California. The results of these tests will be a major factor in the future timing of the program, including the scheduling of launch dates.

Mr. Montgomery is a Comsat Senior Information Officer.

Earth station facilities which will serve the Marisat System are being built at Southbury, Connecticut, and Santa Paula, California. As of early December, the control buildings were completed and antenna structures at each site were being erected.

Navy and commercial users

The system has been designed to serve two major users with distinctly different requirements—the U.S. Navy and the commercial shipping industry. Service to the Navy will be provided in government channels in the UHF (225 to 400 MHz) bands. The Navy plans to use the service for its fleet forces in the Atlantic and Pacific areas for an interim period or until its own FleetSatCom system is in operation. Service to commercial shipping will use channels in the L band (1535 to 1660 MHz) for ship-to-satellite links and in the C-band (4 and 6 GHz) for satellite-to-shore links.

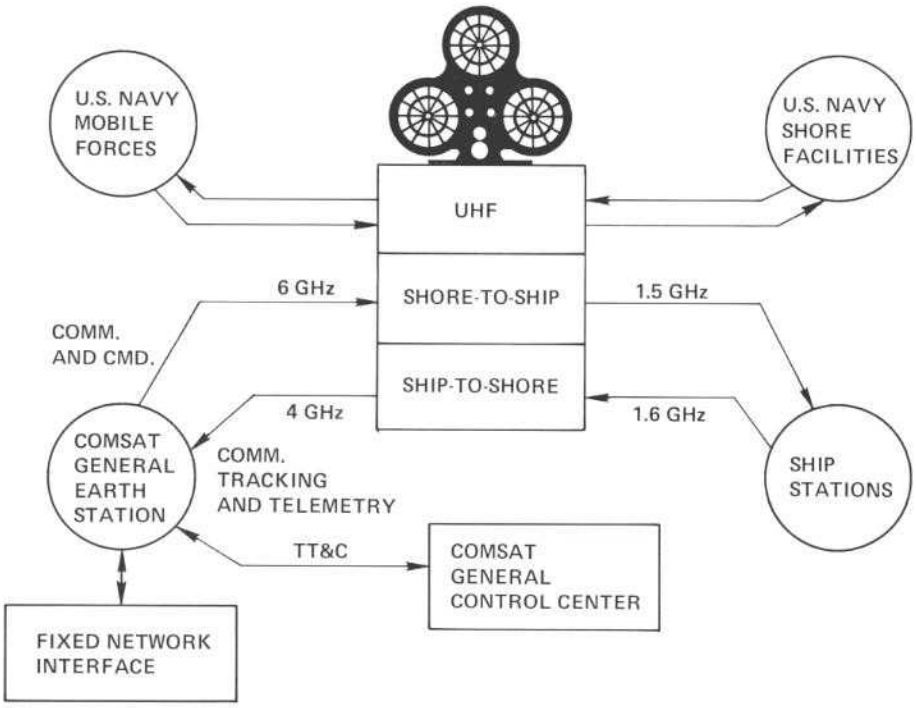
This unique shared-use design will permit (1) the U.S. Navy, which will use the bulk of the system capacity in the early years, to economically satisfy its requirements for reliable fleet communications until its own system is in operation, and (2) at the same time provide new and expanded communications services to the commercial maritime industry on an economical basis while this latter market develops. As Navy requirements diminish or terminate, added power and capacity in the system will be made available to commercial users.

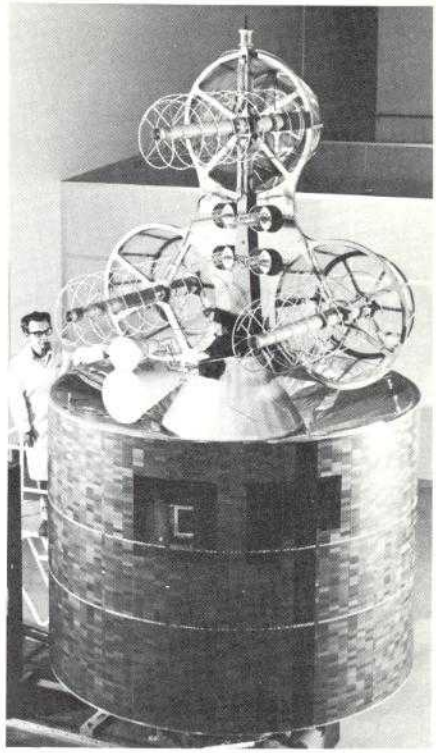
One voice channel and up to 44 teletype channels will be available for service to commercial users in each satellite during the early years of the program, assuming the Navy makes full use of the entire UHF capacity for fleet communications. When the Navy terminates use of the UHF repeater in each satellite, capacity for commercial service can be expanded to about 14 voice channels, or a combination of voice and data channels, in each ocean area.

A growing market

The maritime industry, faced with steady growth in shipping traffic, has long been concerned with the problem of improving marine communications. The American Institute of Merchant Shipping (AIMS) estimates there were 10,000 ships of over 1,600 gross tons on the high seas at any one time during 1969, and the number of these vessels is expected to jump to 14,000 by 1980. Ship-to-shore and shore-to-ship communications serving these merchant vessels over

SYSTEM CONFIGURATION





MARISAT structural model

thousands of square miles of ocean waters now rely primarily on HF radio transmissions, which are subject to fading and interference.

More than 90 percent of all marine communications are transmitted at an average speed of eight words a minute, using century-old Morse Code radio-telegraph techniques, according to AIMS. Delays of four to 24 hours in delivery of messages are common.

MARISAT will introduce improvements in marine communications. For the first time, satellite technology will be employed to bring dependable, high-quality communications, 24 hours a day, to ships at sea, as well as to offshore installations. COMSAT GENERAL plans to offer a wide range of services—telex, teletype, telephone, alternate voice/data, facsimile and high-speed data.

The service doesn't stop at the water's edge. COMSAT GENERAL plans to offer service on a lease basis through its own terminals installed aboard ships, or sell shipboard terminals to customers who prefer to own their own shipboard equipment.

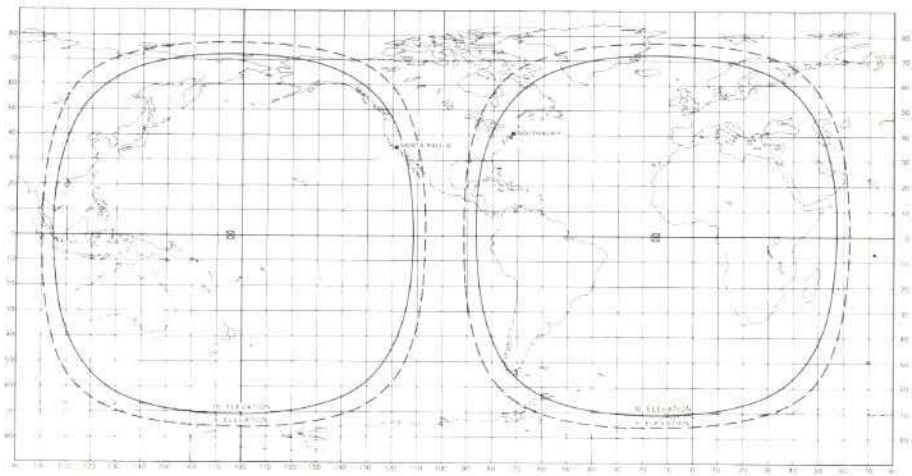
Shipboard terminals

COMSAT GENERAL recently ordered 200 shipboard terminals from Scientific-Atlanta to be used with the MARISAT system. The ship terminals include solid-state receivers and transmitters, radome-protected four-foot diameter antennas mounted on stabilized platforms, as well as below-deck communications consoles complete with teletype and telephone outlets.

This procurement of 200 shipboard terminals is believed to be the largest single order ever placed for mobile terminals to be used with a commercial satellite communications system.

A sales and service organization is being established to sell, install and service these shipboard facilities in most of the major ports of the world. The first sales and service arrangement established was with Standard Telephone and Cable Manufacturing Company (Standard Telefon og Kabelfabrik) a leading marine electronics company which will provide service in Norway, Sweden and Denmark.

To maintain system control, a new COMSAT GENERAL Systems Control center will be located on the first floor of Plaza Headquarters adjacent to the existing INTELSAT Spacecraft Control Center.



Ownership Consortium

The space segment for the MARISAT System together with certain facilities at the COMSAT GENERAL earth stations on the U.S. east and west coasts—as distinct from the shipboard facilities—are to be owned and operated under a consortium arrangement currently being negotiated among four carrier companies. COMSAT GENERAL will have an interest of approximately 80 percent in the consortium; RCA Global Communications, ITT World Communications and Western Union International are expected to participate as joint owners with a total interest of about 20 percent.

Technical description of spacecraft

The November/December issue of Signal Magazine features a cover story co-authored by COMSAT GENERAL's Edward J. Martin and Leo M. Kean. The following description of the MARISAT spacecraft is excerpted from this article:

The planned positions for the two satellites to be placed in geostationary orbits at 22,300 statute miles altitude are 15° West longitude over the Atlantic and 176.5° East longitude for the Pacific region.

Each satellite contains three communications repeaters. One of these operates in the UHF bands and contains one wideband and two narrowband channels exclusively for use by the U.S. Navy. Each of these channels may be activated or deactivated by ground command. In this manner, satellite prime power released from the UHF service is made available to the other communications repeaters. The Navy has contracted for the use of the wideband channel in both satellites for a period of two years and has firm options to lease all UHF channels on a yearly basis continuously throughout a three-year period.

Two other repeaters are included for shore-to-ship and ship-to-shore civil maritime communications, respectively. The shore-to-ship repeater translates C-band transmissions received from the earth station at frequencies near 6 GHz to L-band frequencies near 1.5 GHz for relay to commercial ship stations. The L-band output power level can be controlled by ground command consistent with the level of activation of the UHF repeater.

The ship-to-shore repeater performs the reverse process by translating transmissions received near 1.6 GHz from the ship station back to frequencies near 4 GHz for relay to the earth stations. The 6- and 4-GHz bands also are used for tracking, telemetry and command functions.

The earth stations will provide a link to COMSAT GENERAL's Systems Control Center in Washington, D.C., as well as the interface for the terrestrial terminals of the commercial communications. General spacecraft maintenance and telemetry monitoring will be performed and command instructions will be issued from the COMSAT GENERAL Systems Control Center.

The F-1 MARISAT spacecraft is scheduled for launch in the first half of 1975 by a Thor-Delta 2914 launch vehicle. Selection of the first ocean for service will be made by the Navy four months in advance of the first launch.

The design of the MARISAT spacecraft borrows heavily from flight-proven technology of the INTELSAT IV and TELESAT communications satellites. MARISAT employs conventional spin stabilization with a despun antenna farm coupled to three spinning repeaters through a non-contacting coaxial rotary joint. The same apogee motor used for the earlier TELESAT launches is employed in MARISAT. These motors are undersized, however for the increased spacecraft weight permissible with the Thor-Delta 2914 and must be augmented by the spacecraft hydrazine propulsion system during transfer orbit to achieve synchronous orbit injection.

The spinning portion of the satellite is approximately 85 inches in diameter by 63 inches in length, with an overall length of about 148 inches including the antenna farm.

Electrical power will be derived from fixed solar panels mounted on the cylindrical portion of the spacecraft. The panels are somewhat larger (63 inches by 85 inches) than the TELESAT panels to take full advantage of the eight-foot Delta shroud. Spacecraft power also has been enhanced somewhat through the use of 6.2 cm x 2.2 cm solar cells. Approximately 300 watts of DC prime power will be available at the end of a five-year lifetime. The design includes nickel-cadmium batteries with sufficient capacity to power all satellite subsystems through eclipse.

Donald Wagner and Milton Van Slyke (backs to camera) discuss safety and security procedures with earth station managers. Shown in photo, left to right: George Tellman, Manager, Systems Operations; John P. Scroggs, Manager, Jamesburg; Donald Fifield, Manager, Andover; Luiz Rodriguez, Manager, Cayey; and Systems Operations' Burton Falkofske. Attending the meetings but not appearing in photos was Dr. R. C. Barthle, Director, U.S. Systems Management.

Earth Station Managers confer with U.S. Systems and Labs representatives. Appearing in photo, left to right: Burton Falkofske, Systems Operations; James R. Warren, Manager, Maintenance and Supply Center, COMSAT Labs; Glenn Vinquist, Manager, Paumalu; William Carroll, Manager, Etam; Wallace Lauterbach, Manager, Brewster; and Brian Williams, Systems Plant.

Earth Station Managers meet to discuss questions, procedures and programs

By Joyce Oseth

Managers of each of the Comsat Earth Stations gathered in Washington recently for their week-long annual meeting. The meetings are conducted to bring the managers up to date on operational and management procedures and to brief them on future programs.

Attending the meeting were Wallace M. Lauterbach of Brewster, John P. Scroggs of Jamesburg, William B. Carroll of Etam, Donald Fifield of Andover, Luiz Rodiguez of Cayey, and Glenn M. Vinquist of Paumalu.

At the opening session Senior Vice President of the International System Division George P. Sampson, Assistant Vice President for Operations H. W. Wood, and Dr. R. C. Barthle, Director, U.S. Systems Management, presented an overall review of ISD operations. This was followed by a discussion with U.S. Systems Operations, George Tellmann of plans for the restoration of the Andover and Etam Earth Stations and for the INTELSAT IV transition, the status of Federal Communications Commission (FCC) applications as they relate to U.S. earth stations, and information received at International Telegraph and Telephone Consultative Committee meetings (CCITT).

Comsat General Vice President John L. Martin spoke on the company's proposed programs and future objectives. Harry G. Gross and Donald R. Owen provided details on the Domestic Satellite, Marisat and Aerosat Programs and Comsat General's foreign assistance programs. George A. Lawler, Director of Service Development, and ISD's Neil R. Benedict spoke on Digisat.

Dr. Ronald L. Letteney briefed the managers on the Comsat Management Services Contract with Intelsat after which the group discussed with Brian J. Williams the operation and maintenance of equipment and construction programs. Francis J. Burkitt of Intelsat Plans gave a descriptive briefing of the INTELSAT IV-A system and the transition from the IV to the IV-A.

Howard L. Reagan reviewed earth station support in Documentation and Procedures; James A. Amdur, Office of the General Counsel, and John J. Lehan, Finance Office, discussed the legal and accounting aspects of tax matters related to earth stations; while the Finance Office's David S. Ours and George L. Skinner, and ISD administration's Burton O. Lewis briefed the managers on items, including revised payroll and reporting procedures, and responded to questions on financial matters.

Jim C. Lawson, Administrative Procedures, explained use of the new Standard Practice Instructions (SPI). Safety's Milton R. Van Slyke led a discussion on safety standards and procedures at the stations. Other topics discussed included salary programs, personnel interview procedures, affirmative action programs, employee benefits and station personnel policies.

During their stay in Washington the managers were guests at a reception and luncheon, toured Comsat Labs and the Maintenance and Supply Center and visited the site of the Torus Antenna.

Ms. Oseth is in the office of U.S. Systems Operation.

IEEE schedules one-day seminars

The Continuing Education Committee of the Institute of Electrical and Electronics Engineers, Inc., (IEEE), has scheduled two one-day seminars in January.

On Friday, January 17, the day-long series of courses will cover topics dealing with the mechanics of setting up a business under the general heading, "How to Convert Your Ideas into Dollars". The Saturday, January 18 sessions will treat areas touching on financing a new business entitled "How to Start and Finance a New Business."

Both sessions will be conducted at the Center of Adult Education on the University of Maryland's College Park Campus from 9 a.m. until 4:30 p.m. Additional information may be obtained from V. J. Giardiana, IEEE, Telephone 752-6800.

Information's Montgomery to COMSAT GENERAL beat

By joint announcement of COMSAT GENERAL President John A. Johnson and COMSAT's Assistant Vice President for Public Information Matthew Gordon, Senior Information Officer Hale Montgomery has been designated Assistant for Public Information to the President of COMSAT GENERAL. In that capacity he will be responsible to Mr. Johnson for the conduct of all public information and advertising programs and activities in COMSAT GENERAL.

All news media relationships will continue to be centralized in the Information Office of COMSAT and all news releases will be issued through the facilities of that office in the normal manner. Mr. Montgomery will continue, as Senior Information Officer, to be available to assist the COMSAT Information Office as appropriate.

COMSAT women in profile: *Viola Newhouse*

By DONNA HIGGS

Our profile this issue focuses on Mrs. Viola Newhouse, Traffic Analyst III, who is in her eighth year of employment in the Traffic Department of the Analysis and Traffic Division headed by Mr. Walter N. Temple. Under the direction of Mr. Paul Troutman, Manager, Traffic Department, Viola's work, in brief, includes processing, maintaining and analyzing communications traffic data in terms of current and projected circuit availability; performing forecast and trend analyses to estimate traffic patterns for use in deriving the COMSAT budget; and summarizing traffic forecasts and other data for the Advisory Committee on Planning. Viola has a B.A. in Mathematics/Economics and has done graduate work in statistics.

It is interesting to note that Viola's oldest daughter, JoAnn Landesberg, was an employee of COMSAT as a clerk-typist for R. W. Kinzie for three consecutive summers during the years 1971 through 1973, prior to her obtaining a degree in English.

Residing in Silver Spring, Maryland, with her husband, Stanley, Viola has adopted several hobbies and spare time activities which include gourmet cooking, "people" analysis and psychological evaluation, playing gin rummy and periodically helping her husband (evenings or weekends) in his pharmacy as a "drug clerk" and/or cosmetician.

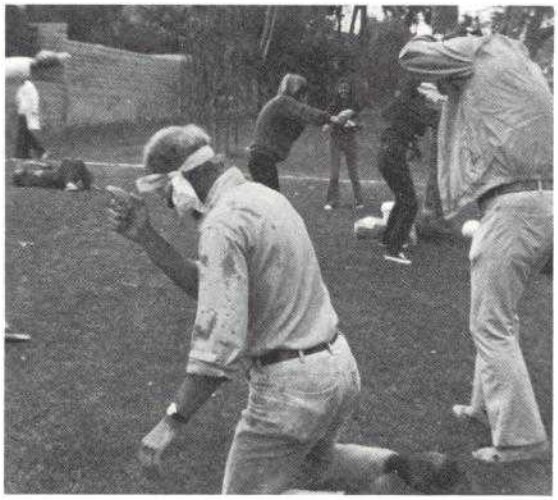
The employees of COMSAT, COMSAT GENERAL and INTELSAT offer their deepest sympathies to Mrs. Ruth O'Donnell, Secretary to the President, on the death of her husband Bernard I. O'Donnell.

People and Events

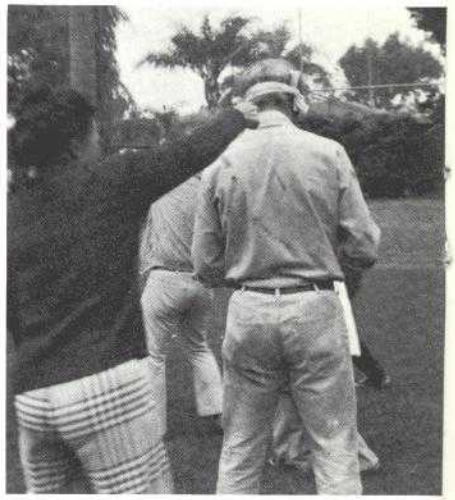
It was an enjoyable time for all at the Bull Roast held recently at the Labs. PHOTOS BY BILL MEGNA

EL SEGUNDO. COMSAT West held its Fourth Annual Family Picnic at Redondo Beach. It was a huge success with almost 90 CEA members, families and friends attending. The festivities began with a softball game with **Luin Ricks'** "Lamers" matched against **Irv Dostis'** "Idiots" with the "Idiots" winning after seven innings by 14 to 13. Spectators were convinced the keg of beer located near home plate had something to do with the high number of runs. Head Chef **Gene Jilg** supervised a platoon of cooks including **Charlie Johnson, Al Verbin, Marv Herzig** and **Susie Powell**.

Field events were conducted for children and adults. The most enthusiastically received event of the day

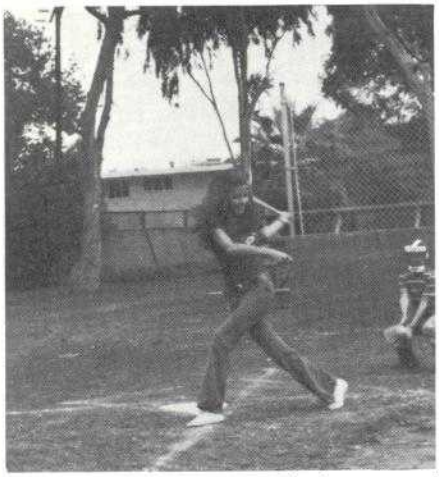


Gene Jilg and Irv Dostis wage a losing fight during the water gun "shootout" with their wives.



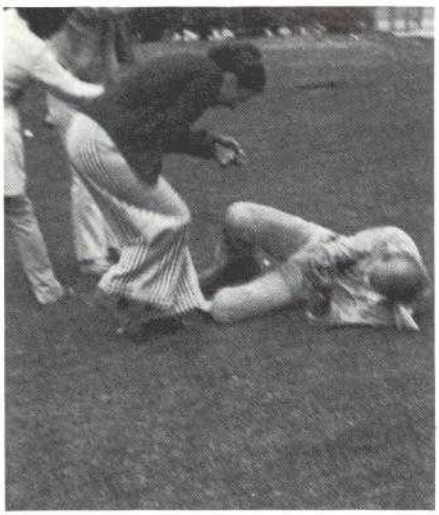
Ann Jilg delivers the coup de grace to husband Gene not once . . .

was the water pistol fight between Jilg and Department Managers Ricks, Dostis and Verbin, and their wives. The ladies had the advantage, however—the games coordinator **Jeff Robinson** decreed the men would have to fight blindfolded.

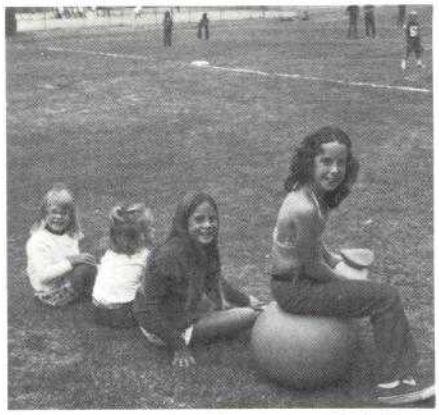


Secretary Suzanne Powell shows good form even when missing the ball.

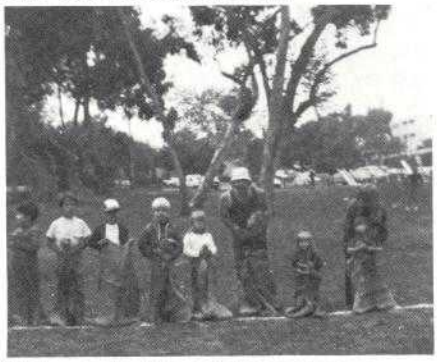
For the first time COMSAT West had softball competition organized by CEA President **Johnson**. The Peninsula Packers lineup was made up of employees living in the Palos Verdes Peninsula area. Employees residing in the beach cities made up the Bay Cities Batters. The Batters won the first annual event when Robinson broke the seventh inning tie with a home run—Batters 17, Packers 16. Batters second baseman **Harry Waight** was selected Most Valuable Player for tripling in the sixth inning with two outs, bringing in three runs.



. . . but twice.



Julie Ely, Kendahl Boughton, Kelly Robinson, and Cathy Boughton root for their favorite softball team.



Lining up for the potato sack race.

Although Harry had not played softball before he had played cricket in Australia.

New additions to El Segundo include **James P. O'Donnell,** Manager, Spacecraft Engineering; **John E. Duckworth,** Thermal Engineer, Spacecraft Engineering; and **Brian R. Loo,** Digital Systems Engineer, Electronics. **—Toni Boughton**

ETAM. Fred Purdy, representative of Structural Systems Technology, Inc., was made an official member of the "Etam family" with the presentation of a satellite tie pin. In the accompanying photo, Station Manager **Bill Carroll,** center, presents the symbol to Mr. Purdy as **Mike Moore** of E Systems looks on. Fred has been been at Etam for more than four months overseeing the ground work for our second antenna.

With the Beer and Pizza Party sponsored by the Employees Association past history, station personnel are planning for the annual adult Christmas Party being held this year at the home of **Spencer Everly** of Kingwood. **Mike Britner** will be the

Purdy, Carroll and Moore

Jih and Schroeder

Santa Claus at the annual children's celebration and present gifts to the youngsters.

Thanks to **J. Jih** and **N. Schroeder** the Data Recording Terminal is working again. The accompanying photo shows Jih and Schroeder at work on the DRT. **—William Carroll**

JAMESBURG. Gay H. M. (Havens-Monteagle) **Powers** is our newest employee here at Jamesburg. With an AS Degree in Electronics, she has been assigned as an electronics technician to one of our operating teams. A native of Los Angeles, Gay, and her twin sister Joy, moved to the Monterey Peninsula with her parents who were in the restaurant business. Graduating from Monterey High School she then earned an AA Degree in Sociology from the Monterey Peninsula College. Deciding that this was not to be her primary field of endeavor, Gay tried her hand at various occupations including house painting, wallpaper hanging and even as a licensed bartender.

With the death of her father in 1970, Gay decided to return to school and graduated with an AS in Electronics as the only female among 25 students. She recognized electronics as her field of work. Initially finding employment on a production line, she quickly determined that this was not

Jamesburg's Gay Powers

very challenging and went on to join the drafting department with the Bell Corporation. In addition to her on-the-job training here at the station, she is working to complete her studies to obtain an FCC license qualifying her for advancement from her present grade of Junior Electronic Technician. **—W. E. Neu**

LABS. Two of our employees are back at work after brief hospital stays. **Jo Ann Wagner** spent a week in the Montgomery General Hospital and **George Hannah** a week in a Baltimore Hospital. Ex-COMSAT employee **Judy Ford,** daughter of **Edith Ford,** was married on December 14. Susie McCaa, daughter of the **Russell McCaas,** became engaged to Ken Downer of Howard County, Maryland. A Spring wedding is planned after which the couple will reside in Arizona where Ken is serving a tour with the military. **Pete** and **Arlene Carlton** finally had the vacation they had been planning for months. With their two children they spent a week in Florida enjoying good weather and Disney World.

COMSAT's first Bull Roast held recently was a complete success with no complaints of hunger—only sore feet—music was provided by the very excellent "Saints and Sinners."

The Labs held its first Invitational Slo-Pitch Softball Tournament with eight teams participating including the Labs' team. After two days of battling in the mud, and sometimes the dust, George Hunt's MELODY INN team came out on top with shortstop Bobby Saddler declared most valuable player. A major portion of the tournament proceeds go to the continuing support of recreational activities in the Clarksburg community. **Carol Louthan** and **Jo Ann Wagner,** representing the COMSAT Softball Team, presented a check to Mr. Wilson Wims, President of the Clarksburg Civic Association, to be used for continuing support of softball and baseball in the community. Before leaving the subject of softball, the Labs' Intramural Slow-Pitch champs, the Shop Team, did it again for the third time in a row.

Beginning in January, Labs "Basketeers" take to the basketball courts with games played on Monday evenings. Rooters are needed to cheer the teams on to a repeat of last year's championship performance.

From Labs personnel to their friends throughout COMSAT, COMSAT GENERAL and INTELSAT—a very merry holiday season. **—Carol Louthan**

PLAZA. Sy Lynn and **Nick Marzella,** Terminal Equipment Engineering Department, are presently at the Ivory Coast for the purpose of loading and checkout of the SPADE operational program recently implemented by the Abidjan Earth Station.

Plans are now underway for the annual Christmas Dinner Dance to be held at Loew's L'Enfant Plaza Hotel and the Childrens' Christmas Party. These two special events are most enjoyable, and the CEA is hopeful that everyone will attend.

A farewell party was held in the Fourth Floor Auditorium for Mr. **Charles M. Baer,** Assistant to the Chief Scientist (ITU), upon the occasion of his retirement from COMSAT on October 24. Mr. Baer was "showered" with gifts from Mr. **James B. Potts'** department, such gifts being a megaphone with the COMSAT logo on it, a Flipper Dinger and a "Good Luck on Your Retirement" statue. It should be noted that Capt. **Charles Dorian,** COMSAT GENERAL, has been designated to replace Mr. Baer in CCIR matters of interest to COMSAT/ COMSAT GENERAL.

Beth Corry, Earth Station Engineering Division, recently spent two weeks touring Seattle, Washington; Colorado Springs, Colorado; and British Vancouver, Canada, with her husband, Jeff. Beth concludes that the highlights of their trip were riding to the top of the space needle in Seattle, as well as visiting the "city under the city" which has been excavated to a degree but remains as it was before the present city of Seattle was built; climbing Mt. Rainier (as Beth puts it)

The Labs' Slo-Pitch softball champs are shown above (left to right, kneeling) Chris Bruchie, Artie Binnix, Jesse Thompson, Jay Cox, Dave Bayne and Rocky Lee; standing, Garry Weider, Roger Carlson, Bert Collins, Marie Curtis, Bob Gruner, Bob Redick and Jerry Creamer.

"three quarters the way up in our tennis shoes and sliding all the way down the glaciers on our rear ends;" climbing Pike's Peak in Colorado and visiting the Garden of the Gods and the Air Force Academy.

A baby girl, **Pamela Ashlyn,** was born to **James** and **Pat Irby** on October 1 at Prince William Hospital. Pamela came into the world weighing in at 9 lbs. 6 oz.

If anyone planning to take the trip to Hawaii has not yet sent in the balance payment for the trip, please do so as soon as possible.

Ted Gottry, Manager of the COMSAT Credit Union, has transferred to the International Systems Division reporting to **W. N. Temple,** Director of Analysis and Traffic. Mr. Gottry will continue with the Credit Union as a consultant to the Membership and the Board of Directors. **—Donna Higgs**

"Triking"—the only way to go

In the name of economy, various means of transportation are used these days to go back and forth to work. COMSAT's Ken Brooks, service center operator, frequently uses his "Trike Bike" which has a capacity for carrying three passengers and the driver. Ken says his bike is custom-made using a 1969 Volkswagen engine mounted in the rear and a Harley-Davidson front end, and gets almost 30 miles to the gallon. Actually, Ken uses the bike mostly for pleasure driving and Shriners' parades.

PAUMALU. Seven Paumalu employees recently responded to a Blood Drive in the North Shore area. The Blood Bank of Hawaii dispatched its mobile blood unit to Waialua, a neighboring community located 10 miles from the station, to give the North Shore residents an opportunity to donate blood without traveling into Honolulu. The donors were **Eddie Miyatake, Howard Bunch, Robert Manske, Robert Makizuru, Richard Senones, Ken Yamashita** and **Bob Kumasaka.**

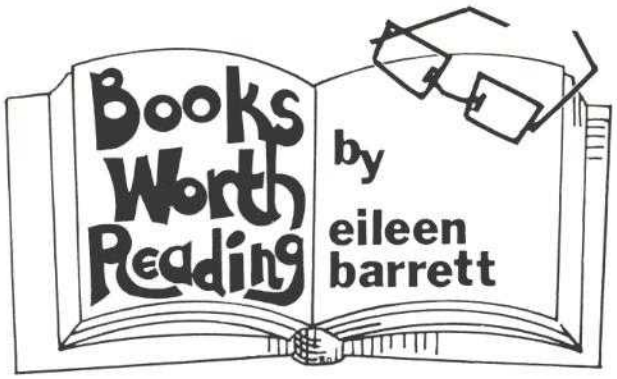
The annual Paumalu CEA holiday party for employees, their wives and guests was held on November 23rd and December 7th. **Joe Chow,** Paumalu CEA President, made the arrangements and selected the Oceania Floating Restaurant in Honolulu. The two dates made it possible for all shift employees to enjoy the festivities. The Oceania, a unique floating restaurant and night club, is docked in Honolulu Harbor near the famous Aloha Tower landmark. It was built in Hong Kong and towed to Honolulu in 1972.

Jeff Gnass departed Paumalu for the Santa Paula Station in mid-Deber. **Eddie Clarke** and **BW** spent their vacation in the State of Washington visiting relatives and friends in Portland and Seattle, then to San Jose, Burbank and Disneyland in California. Comment on their return was, "Oh, it was very very nice, but, brrr, 30° in Portland!! Give me Hawaii anytime!!"

November-December Headquarters Staff visitors to Paumalu station included Dr. **D. Chakraborty** and **Jim Buzzelli** of COMSAT Labs and **Mike Hrinko** and **John Van Alstyne** of U.S. Systems Management who worked on the TDMA, Tests and Pam-II Performance Characteristics Test. The INTELSAT IV, F-8 Spacecraft Test team consisted of **I. Dostis** from the West Coast Technical Office; **F. Weber** and **M. Brown,** Headquarters, ISD; **J. Phiel** of Headquarters Domestic Systems; **C. Mahle, D. Atahoun** and **W. Childs** from the Labs conducted in-orbit testing of the new satellite during Thanksgiving week.

Joe Chow, Facilities Maintenance Supervisor, and **Richard Senones,** Operations Controller, attended the Supervisory Orientation Workshop at headquarters in early December. After the meeting, Joe travelled North to visit his parents in Toronto and Rick to Pennsylvania to spend a few days with his parents and relatives.

—Bob Kumasaka



How to Cut Costs and Improve Service of Your Telephone, Telex, TWX and other Telecommunications. FRANK K. GRIESINGER, 1974, New York, McGraw-Hill, 310 pp.

This book is a consumer's guide to the services and equipment provided by the communications utilities and by private vendors.

How to Cut Costs and Improve Service of your Telephone, Telex, TWX and Other Telecommunications provides the reader with clearly written instruction which will help him reduce costs of telecommunications, improve service to his company, effectively determine his own needs in telecommunications and train others to efficiently use the telecommunications at their disposal.

Griesinger's book is one of the very few volumes on telecommunications that has been prepared independently and not under the sponsorship of the telephone company. Consequently, it can be more objective than a publication of a service/sales-oriented company. The book is written for managers who wish to learn more about administrative communications, members of the interconnect industry and utility executives, and as a helpful tool for the experienced telecommunications professional. The book places heavy emphasis, as its title suggests, on reducing telecommunications' cost, coupled with suggested ways of selling cost reduction techniques to department heads and station users.

In *How to Cut Costs and Improve Service of Your Telephone, Telex, TWX and Other Telecommunications,* Griesinger poses and answers some questions like: Can costs be substantially reduced by using modern written message services such as Telex, TWX and Mailgram?. . . Should you be investigating the possibility of installing telephone equipment which can be purchased or rented from a private vendor and interconnected to your utility's network facilities?. . . How can you use international communications services such as Telex, cablegrams and overseas telephone calls most economically?

Griesinger's book covers the full range of administrative telecommunications services. The author explains each phase of telecommunications simply and non-technically. He starts by defining his subject-content as he explores such subjects as: managing long distance tool expense, wide area telecommunications service and how it can reduce costs while improving service, foreign exchange service, Centrex telephone systems, interconnected telephone systems and apparatus, using the postal service to supplement telecommunications, Western Union domestic services, international telecommunications (a special-interest chapter) and organizing and managing the telecommunications service.

Many of Griesinger's suggestions on reducing company expenditures on telecommunications are the results of organized common sense, such as the suggestion to dial long distance calls rather than place them through the telephone company operator, to call when telephone rates are lowest and to minimize the use of telephone credit cards. Some suggestions are, however, more ingenious, such as Griesinger's suggestion to use a measured time Inward WATS line only for the operator to take requests for call back and his suggestion not to use a measured WATS line after 5:00 P.M.

Griesinger has certain reservations concerning WATS and Centrex service. His comments regarding these popular services are particularly useful.

The book's largest section is devoted to interconnection, its definition, history and the evaluation of interconnect systems today. Griesinger's comments suggest that he finds interconnection an attractive alternative for the telecommunications user, because of the protection it affords against rate increases, its adaptability to changing conditions, the reduced cost of space rental and superior operating features.

The availability of Griesinger's book, *How to Cut Costs and Improve Service of Your Telephone, Telex, TWX and Other Telecommunications,* was advertised by a special announcement in Telecommunications Reports, May 6, 1974. Business Communications Review Magazine, which reviewed this book in their July-August issue (p. 43-44), commented that three major topics were not covered adequately. They remarked on the virtual omission of any discussion of the specialized common carriers, the lack of more detailed information on traffic engineering and the purposeful omission of any discussion of data communication. However, they recommended the book highly as a whole and hailed it as "A valuable contribution to the field" (v. 4, no. 4, p. 44).

How to Cut Costs and Improve Service of Your Telephone, Telex, TWX and Other Telecommunications, by Frank Griesinger, is acknowledged to be the first book which provides unbiased, clearly-written instructions which will help reduce costs, improve service to users, and enhance the public relations of organizations through better use of their telecommunications facilities.

The Broadcast Communications Dictionary, edited by Lincoln Diamant, 1974, New York, Hastings House, 128 pp.

In an age of 9,000-channel satellites, one should at least have at one's fingertips all the communications words that mean the same thing in English-speaking countries around the world. This handy quick reference book presents that overview. The Broadcast Communications Dictionary gives some 2,000 technical, common and slang words that mean the same thing (together with supplying the **same** words that mean **different** things) on both sides of the Atlantic Ocean.

The Corporate Bill Hudgins:

communications engineer, elder statesman and ambassador of good will

As told to John Peterson by WILLIAM HUDGINS with photos by The Hudgins

"If I had to pick out one experience or one event to stand out above all others during my years with COMSAT and COMSAT GENERAL, I don't think I could," reflected Bill Hudgins. "A couple of things, maybe yes."

"One, for example, in looking back it seemed that I was always getting messages from the home office congratulating me on safely getting out of one sticky situation after another, like a civil war in Pakistan or a revolution in Africa. Another was the constant feeling of satisfaction in doing something worthwhile for the people of other countries who tried so hard in so many ways to express their appreciation for what we were doing."

William D. Hudgins, retired Navy commander, former RCA staff engineer and worldwide communications network troubleshooter, had become COMSAT GENERAL's first retiree, Technical Advisor "emeritus" and COMSAT elder statesman. In a three-hour taped interview, in a small office cluttered with the mementoes of his world travels, the tall and soft-spoken engineer was reflecting on what he considered the highlights of his civilian communications career.

"I had retired from the Navy in 1960 and gone to work for RCA," recalled Hudgins, "and it was during my RCA employment that I became involved with COMSAT, working on RCA's proposal for the construction of COMSAT's first two earth stations, and met Don (Donald R. Owen, Director of COMSAT GENERAL's Technical Services Division) who, at the time, was getting his Technical Advisor Division started."

Hudgins joined COMSAT on October 1, 1968. By this time, COMSAT had successfully completed work on the Longovilo, Chile, earth station and had entered into technical advisory contracts to assist the Governments of Peru, Taiwan and Colombia in the construction of earth stations.

"I would like the record to show at this point and not at the end of the story," Hudgins said, "that, if anyone is deserving of a five-year pin from COMSAT, it's my wife Leona. After many years of separations, the

In Peru the rented house came complete with pets.

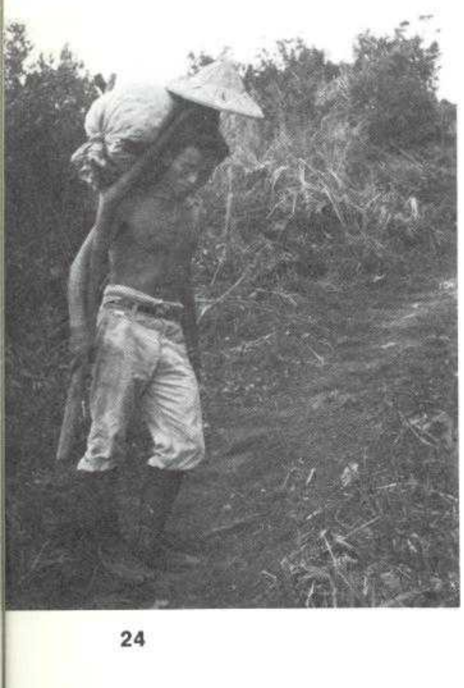
Mr. Peterson is Editor of the COMSAT News.

result of service with the Navy and RCA, we both agreed to another career providing we could spend it together and we did. So I must admit to my association with COMSAT and COMSAT GENERAL as being the most enjoyable and rewarding years of my careers and Leona agrees."

Hudgins' first assignment was with Sy Lynn getting the Lurin, Peru, earth station on the air. The station was located on a sandy strip of Pacific Ocean beach a few miles south of Lima. Although the governments had changed, the new one wanted the station completed and Lynn and Hudgins were committed to its completion and getting it on the air. They would, during that time, make close friends who would remain so through the years; Commandant Colina of the Peruvian Navy, later to become Director of Communications Systems Projects in Peru; and Carlos Chiang, then earth station manager, presently Peru's Operational Representative to INTELSAT, to name a few.

"These were the early days," Hudgins recalled, "and I must admit to some shaky moments. Just as the station was being checked out to go on the air, the Atlantic Ocean INTELSAT III developed antenna trouble and you could read the concern in the faces of those whose careers were tied to the station's success, concern whether or not a communications satellite system would really work. The immediate transfer of traffic to another satellite by COMSAT engineers quickly dis-

The staff of Technical Operations gather to wish the Hudgins well on their retirement (Bill Hudgins at center, Mrs. Hudgins seated).



On Taipei a "hod carrier" carries cement and sand to the tower site. The load weight probably exceeds his own.

CITIES IN SEMI-BLACKOUT

West Pakistan Girds for War ---but Life Goes On as Usual

BY WILLIAM J. COUGHLIN

RAWALPINDI—West Pakistan is preparing for war.

Gun emplacements and bunkers are being dug around the airport ... mimeographed directions to a shelter in the event of air raids ... cities pass each night in a semi-blackout.

Dear Guest,

We have placed candles in the drawers, but will prefer if you kindly use the corridors light by keeping the door of your room open.

MANAGEMENT

While in Pakistan Hudgins found himself on a war footing as the above newspaper clipping and notice from the hotel management testifies.

The Taroka Gorge on Taiwan. Boulders in riverbed and bridge rail are of four-colored marble of the type used in earth station construction.

Colombian President Carlos Lleras, seated at center, receives a memento from Dr. Boris Plazas during a visit to the earth station. Dr. F. L. Balcarce, in white coat, is Director and President of TELECOM.

pelled those doubts and the station went on the air as scheduled."

With the Peruvian station operational Hudgins was sent to Taiwan to help with the earth station to go up in Taipei. Although the prime contractor for the stations in both Lima and Taipei was the same, Nippon Electric Company (NEC), the specifications for the new station had some unusual characteristics which had to be considered.

"We found the new station site located in a beautiful valley named Yang Ming Shan (Grass Mountain) about 1,500 feet above the City of Taipei, Hudgins said. "The specifications called for the use of native marble, in four colors, for floors, walls and general finish of the station building.

"The antenna structure had extra strength built into it to withstand the battering of seasonal typhoons. As it happened, we survived two typhoons while we were there, one flooding the streets of Taipei and another blocking the roads leading away from our house in Tien Mou.

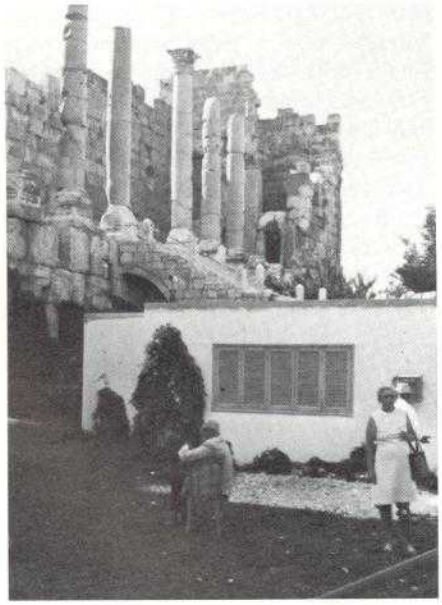
"Usually we were able to keep the office, our friends and relatives back home informed of our well-being by means of a small HF tranceiver we carried with us. Leona and I are both 'hams' of many years standing and found the use of the amateur network a major, and frequently necessary, convenience. However, because of the technical 'state of war' prevailing between Taiwan and the Chinese Mainland, we were unable to use our equipment during our stay.

"In most countries", continued Hudgins, "we were usually licensed to put our portable station on the air as we did in Peru, and later in Colombia, Nicaragua, Portugal and Mozambique. For example, in Peru we were permitted to use our Federal Communications Commission call letters with a Peruvian suffix /OA4.

"I often wonder if the layman really understands the high degree of professionalization that goes into being a licensed amateur radio operator, you know, the so-called 'ham'. Leona and I took it up as a hobby back in 1929 when we were dating as freshmen. I was a student at the University of California at Berkley and Leona was attending Whittier College. I was licensed by the FCC, or the Department of Commerce in those days, in 1930.

"And I don't believe that most people are aware that the worldwide fraternity of amateur radio operators numbers around one-half million men and women. Now I don't mean 'CB' operators or 'handy-talky' operators, I mean operators who have taken rather stiff examinations to qualify as authorized experimentors on internationally assigned frequencies, from HF to microwave. These operators often serve as the only means of communications in crises. They also serve as the medium by which world travellers often keep in touch with their friends and relatives back home.

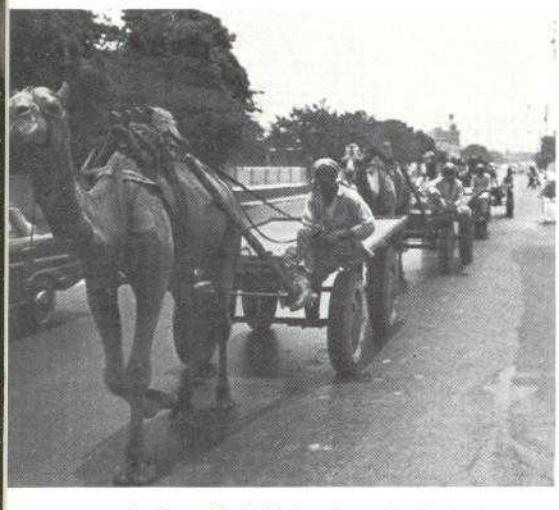
"In 1960 and 1961 I was on board the RCA/Army Instrumentation ship American Mariner in the South Atlantic Ocean. We had the usual tropical weather with the rolling ship with one added attraction, we were at the impact point of a missile range measuring reentry phenomena and trajectory characteristics of bodies reentering the atmosphere after having traveled several thousand miles of space. Meanwhile, Leona and our two boys were back in New Jersey. Since she also has a license, K6TTT (Tango, Tango, Tango), issued in California, I was able to tell her about the tropical weather in the South Atlantic while she and the boys could tell me about the snow drifts outside the house and read the latest stateside news from the newspapers. Sometimes, from other ham operators we would learn that a missile had landed about 15 miles from our ship carrying a live monkey or a mouse."



Roman ruins are visited by the Hudgins in the Lebanon farmland country north of Amman, Jordan.

Christmas 1969 found Hudgins installing an earth station facility at Choconta, about 80 kilometers from

In Managua, Nicarauga, Bill managed to get this close-up of a wild boar and noted that the "females were prettier."



In Karachi, Pakistan, four-wheeled rubber-tired carts head downtown for a day's work .

Bogota, Colombia, along with William Ferguson, E. C. Perez, and V. A. Sawant. Additional members of the Technical Division would come in to assist in the testing. At the request of TELECOM, the communications entity in Colombia, the group remained at Choconta through its "going on the air" and its early months of operation. Hudgins' stay in this South American country totaled eight and one-half months.

"Each assignment was an experience," remembered Hudgins, "not just because of the job challenge but because of the different nationalities and cultures involved. At each site we would find a locally selected crew which had usually been partially trained by the prime contractor with final training on the planned site with our people. It was in our day-to-day contacts with these people that our stay in these countries turned into pleasant experiences during which we were to make many lifelong friends.

"We would get the feeling after awhile that we were serving in these countries not only as technicians in communications but as ambassadors of good will representing our country. In many instances, our relationship with the local population was really the first they had had with 'outsiders' and it was through us that they would build an image of what our country was all about.

"The real satisfaction one got, though," Hudgins continued, "was on dedication day and the pride of accomplishment one witnessed. I suppose the proudest of all men in Colombia that day was Dr. Boris Plazas, a professor with the Colombian Government and director of the project, who had stayed with it since its inception. The inauguration of the station was literally a national event with Colombia President Lleras and 1,500 guests present. The guests arrived by train, bus and car from all over. A free picnic lunch was served to everybody there.

"To prove to the Colombian people that the new station was a matter of national pride and service, what we thought to be a rather ambitious program was scheduled for the station's first week of operation. The Pope, who had visited Colombia previously, sent his blessings live from Rome. There was a live broadcast from Japan with scenes from the World's Fair in progress at the time, folk dancing and music from Chile and a 15-minute film on COMSAT and the American and Colombian Embassies.

"But there was also one instance in which I thought we might have to start counting heart attack victims. The President of Colombia was being interviewed live when there was an interruption in the broadcast. At first we thought it was our station causing the trouble but it turned out not to be our fault. Incidentally, the interruption was quickly corrected. Everybody pitched in to make Colombia's entry into the INTELSAT system a success: the crew at Choconta, Colombian and COMSAT, and the marketing and operations people back in Washington."

Bill and Leona could reflect on only one category of events with regret—the departures from their various assignments. In his six years with COMSAT and COMSAT GENERAL, the Hudgins had spent about 70 percent of the time outside the United States. As Hudgins put it, "Than's a lot of friends made and left behind." Departures were always with a degree of sadness with farewell parties and trips to the airport often turning into tearful, emotional events. Through the years, however, these friendships have been maintained and the exchange of correspondence and Christmas cards consumes a significant portion of the Hudgins' time.

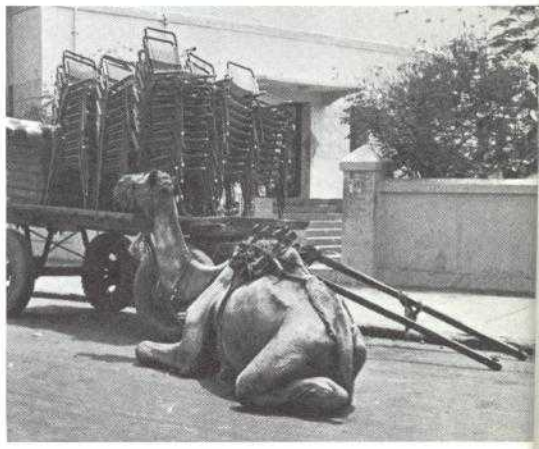
Following a sidetrip to London, England, and Beirut, Lebanon, where they visited the Lebanon Earth Station and the ancient archeological ruins of Baalbek dating back to the days of the Roman Empire, the Hudgins found themselves at the new Jordanian Earth Station site at Baqa, about 12 miles northwest of Amman.

The assignment to Amman turned out to be a temporary one. Arriving in mid-August of 1970, Hudgins found himself caught up in the "Black September" uprising and was one of the last Americans to be evacuated. H. H. J. Hansen would return to Amman after things quieted down to finish the project.

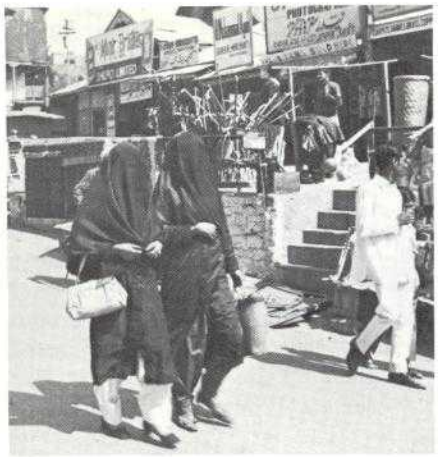
"While the rest of the world watched and waited to see what would happen to the three hijacked airplanes outside the city and the prisoners in the Intercontinental Hotel, we had a ringside seat to the main event," Hudgins said, "We were lodged in the hotel. Actually, there were daily shootings in the streets before the 'ten-day civil war' broke out in full scale. The Royal Suite on the top floor of the hotel was smashed by rockets or some type of heavy fire while we were in a basement shelter. On one occasion we returned to our hotel room to find a spent bullet which we still keep as a memento. On one occasion, our taxi, parked at the front entrance, was riddled with bullets.

"By this time things had deteriorated to the point where we felt a real danger existed and besides, I was no longer able to make it to the site. Despite assurances that everything

At tea time a camel rests with complete lack of concern for traffic .



A flat tire on a three-wheeled taxi is fixed the easy way .



Pakistani women with faces covered shop in the resort city of Murree.

And the old generation and the new come together at the Deh Mandro earth station gate—a camel brings supplies to the station.

would be all right, we decided to get out while we could. We managed to get on an unscheduled Royal Jordanian Airline flight out of the country the same day the passengers of the hijacked planes and the members of the press were interned in the hotel and the planes blown up. We had to leave most of our luggage and personnel effects with our Jordanian friends. Three days later, the street violence turned into all-out civil war.

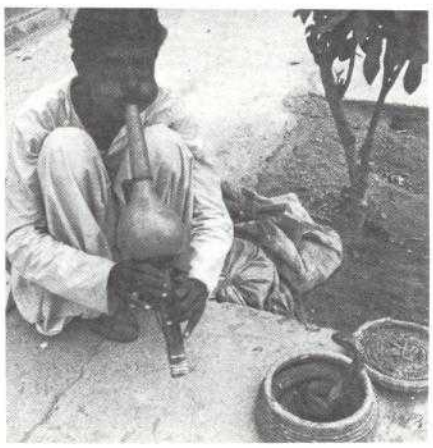
"Just as in Peru and Colombia, we found the people appreciative of what we were doing and, later, at the inauguration, King Hussein presented a gold medal to Don Owen to show his appreciation for the work done by COMSAT. Later we were to find out that recognition would have been given us as radio 'hams' and we would have been licensed to operate in Jordan if it had not been for the civil war. We learned that the King was an amateur radio operator also and was assigned radio call letters JY-1."

Arriving in Beirut, Hudgins found what was to become routine during his travels, messages from Johnson and Owen congratulating the Hudgins on "getting out safely". Returning to the United States, Hudgins received his next assignment, the NICATELSAT Project, a joint venture between COMSAT and the Nicaraguan Government to build an earth station in Nicaragua. A site selection team which included Owen, Sawant and Hudgins, after viewing several suggested sites recommended one about five miles southwest of the capital of Managua.

The site, considered ideal, had been created by some natural event resulting in a cavity some 500 feet deep, roughly three-quarters of a mile wide, approximately a mile long with a small lake at the bottom. It was known locally as Laguna Nejapa. The site was investigated thoroughly, to include seismology checks by government and university experts in earthquake history in that part of the country. The wisdom of the selection team and the seismologists and historians was later to be validated when a severe earthquake occurred destroying almost the entire City of Managua but leaving the station operational and intact.

"For a few days," Hudgins reconstructed the chain of events, "amateur radio operators and COMSAT people in the capital city were the only communications channels reporting the devastation of Managua to the world. Special communications equipment flown into Nicaragua from the United States was utilized in

A "cobra vs mongoose" show is offered tourists near the Intercontinental Hotel .



support of earth station equipment and together with this provided much of the outside contact for relief operations."

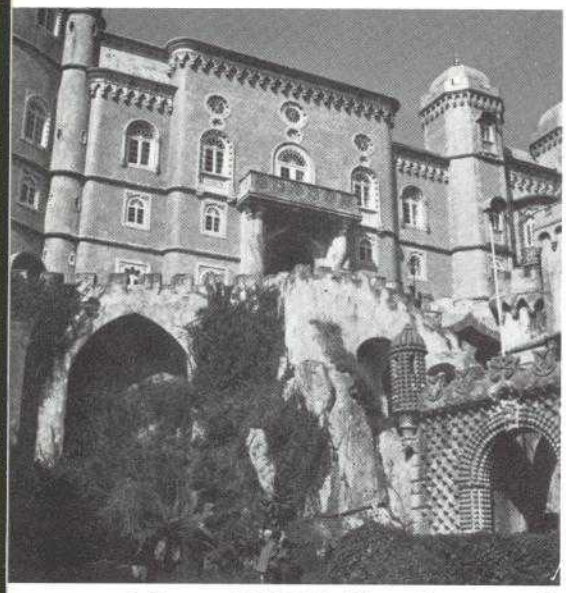
The next stop for Hudgins was Karachi, Pakistan. Initially two earth stations were scheduled to be built, one each in West Pakistan and the other in East Pakistan (later to become Bangladesh). The Pakistan Government had intended to improve communications between the two parts of the country, separated by thousands of miles, with India in between.

"We arrived in Karachi in October, 1971," said Hudgins, "and although most of the equipment had arrived on site, not much progress had been made in construction. We had only completed preliminary survey work and some planning before the war broke out between India and Pakistan and again we found ourselves in the role of evacuees. From our hotel we could hear the Indian planes passing overhead and the bombs dropping on the oil depots and in the harbor, evidently aimed at destroying oil supplies and shipping, but there did not seem to be any attempt to bomb the city.

"Thankfully, through the intercession of the American Consulate General, Mr. Hobart Luppi, arrangements were made to evacuate some 500 people, mostly Americans, Germans and Canadians, from Karachi to Tehran, Iran, during a four-hour cease fire."

Hudgins, on arrival in Tehran, again received one of his now familiar "Glad you're safe" wires from Johnson and Owen back in Washington.

Following a stay of a few months in the United States, Hudgins returned to Karachi to find the station



Built around 1,500 AD, this castle was considered for a time for use as the Sintra boresight antenna location.

undamaged but camouflaged with a mixture of mud composed of water, desert clay and sand to screen it from air attack. It took a few man-weeks to remove the coating. In November, 1972, the Karachi station went on the air and the crew returned to the United States.

"My next assignment was the three stations to be built for the Portuguese Government," according to Hudgins, "one at Sintra near Lisbon, one at Angola on the west coast of Africa, and the third at Mozambique at the southeast corner of Africa. The Sintra station had a completion date of November, 1973, but, due to contractor complications, was not finished until June 1974. This delay, of course, affected the schedules of the other two stations. With Sintra on the air we proceeded to Mozambique while Hans Hansen took over the technical advisor work in Angola. Before leaving Sintra, we had the sorrowful task of returning Dr. John Loutit's body and the members of his family to the United States. Dr. Loutit had died while representing COMSAT GENERAL in Lisbon.

"This assignment was to be our longest. Leona and I were out of the country for about 13 months. In Mozambique we again learned to appreciate our amateur radio equipment. There was the period before the Boane Earth Station went on the

In Sintra, Portugal, a Portuguese military guard provides security at the earth station site.

air when there were no outside communications available. The microwave link to South Africa and the cable to Lisbon were out and also the HF communications stations links. As far as everybody back in the states was concerned, we had been caught up in the rebellion sweeping the Portuguese colonies. Eventually, I was able to get through to a 'ham' in Florida who forwarded the message that although we couldn't get to the site, we were in no personal danger."

Again, the Hudgins found the kinship of amateur radio operators without bounds. Mr. Humberto Leite, Director of the Portuguese project, was a licensed operator as was his wife, Ilda. She had been the subject of an article in an international radio magazine. The Hudgins were invited to join the Mozambique club there. The call letters assigned in Lisbon were CTIPC. While in Lorenzo Marques, Mozambique, they found their initials affixed to their call letters, CR7WD.

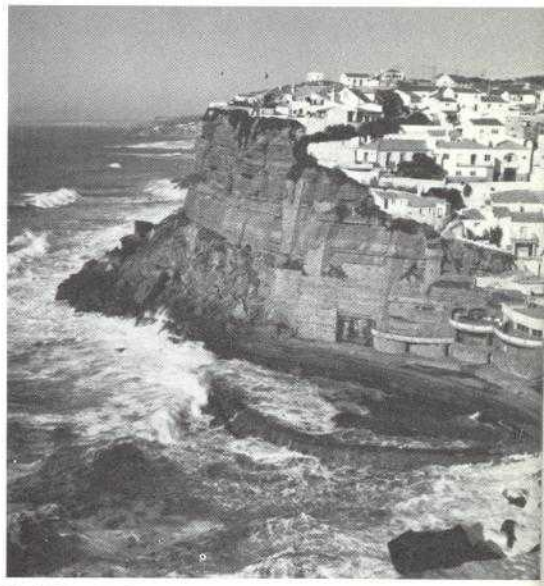
"One experience factor we built up in our travels was that of taking unusual precautions in the selection of living quarters," related Hudgins. "It might be nice to have a room in a hotel with a balcony overlooking the city, but you had to keep in mind that if trouble broke out you could become a pretty good target from the street or from other buildings nearby. Consequently, you got the feeling of more security if, let's say, your room was in the back facing a river.

"Another consideration was height. For example, it's hard for anyone to throw a hand grenade into a room on the fourteenth floor of a hotel. As we moved through those countries suffering turmoil—Pakistan, Jordan, Mazambique—we developed this defensive pattern. We also lost any enthusiasm for hastily unpacking once we arrived in a city. In Amman, we stayed in the Intercontinental Hotel for about two months. When the level of fighting in the city would pick up we would pile our suitcases and mattresses up against the windows in the feeble attempt to prevent shattering glass from flying around the room. On returning from the dining room one evening, following an outbreak of firing throughout the city, we found our homemade barricade penetrated by a bullet. This was the bullet I mentioned earlier we retain as a souvenir. It had gone through the window, the barricade, ricocheted off a couple of walls and finally came to rest next to our bed."

Although the customs of the different countries differed from one part of the world to the next, Hudgins re-

A flock of sheep pass through the Portuguese city.

While, for sheer beauty, the Hudgins' offer this view of one of the most western points on the Atlantic Ocean near Sintra.



called that occasionally something would happen that would make him think he was back in almost any major American city. Arriving in Taipei, the Hudgins found no familiar faces at the airport. Some confusion had developed because of typhoons approaching off the coast and disrupting airline schedules. They made their way through customs and knew the name of the hotel at which reservations had been made but in attempting to use the telephone to call the hotel found the books all printed in Chinese.

"We were approached by a man who asked in English if we needed transportation to our hotel," Hudgins related. "He offered to call our hotel for us. For some curious reason I jotted down the numbers as he dialed. He then told us the hotel where we were expected could not accomodate us and suggested another hotel he was familiar with. Arriving at the hotel, after navigating a rain storm and a flat tire, we found ourselves in what seemed to be a pretty 'active' establishment, lots of military coming and going and an abundance of attractive Taiwanese girls. Our escort invited us into the dining room for coffee while we waited for our rooms to be prepared and gave me one of his cards in the event we should require his services again. On reading the card I realized we had been taken. The telephone number on the card was the same as the one I had jotted down as he dialed back at the airport. It was not the number of the President Hotel where we were expected. A few words with the manager of the hotel and a telephone call and we were soon on our way to the President Hotel where we found Mr. Daniel Van of the Chinese Government Radio Administration and accomodations waiting for us.

"Oddly enough, there were no hard feelings in the entire transaction. As a matter of fact, three years later we received a letter from the manager of the first hotel, the "Swinger Hotel", informing us that he had started a new establishment and inviting us to stay there if we returned."

The Hudgins tried to live on the local economy enjoying local customs. Getting a place to live seemed a minor inconvenience. An advertisement to the effect, "American COMSAT engineer and wife looking for a fully furnished apartment or house," in an evening paper would have the telephone ringing at 6 a.m. the following day.

"In one instance," recalled Huggins, "on Taiwan, we rented a fully furnished house, complete with two Chinese maids who took care of all the household chores including shopping and cooking. In addition to the maids we got their families, a canary and a watchdog.

"And to prove what a small place this world really is, the gentlemen we rented the house from turned out to be a personal friend of COMSAT GENERAL President Johnson.

"In another country we rented a house that came complete with two maids (both pregnant) and house pets to include a dog and a monkey. There were places where we slept on the floor. Not because there were no beds, but because the beds were made for five-by-five people, not for six-by-two foreigners. We found it easier to spread the mattresses on the floor instead of trying to squeeze ourselves into the small beds."

When it came to food, the Hudgins preferred to experiment with the local dishes, remembering particularly a native dish in Peru called Saviche consisting of raw fish bits soaked in lemon juice. For transportation they mostly used taxis and rented cars, finding little difficulty adapting to driving on the left side of the street in such places as Mozambique or learning to adjust to the four-wheeled camel carts in Karachi.

"As I said at the beginning of this interview one of my most satisfying recollections was the expressions of gratitude we received from peoples of all walks of life for what we were doing in their countries," concluded Hudgins. "From the most senior officials to those at the bottom of the economic ladder who struggled to master the few words of English needed to say 'thank you' we were made welcome and at home.

"Both Leona and I agree that if we had to enter the twilight of our professional career, our association with COMSAT and COMSAT GENERAL has been one for which there is no price tag."

In Portuguese Mozambique, Hudgins becomes the typical tourist and stops at the Game Warden's station on the road to Boane to look at elephant tusks . . .

Observes a practical transportation system for an exploding population . . .

Is stopped for an "arms check" by a joint FRELIMO/Portuguese Army roadblock near the Boane earth station, and . . .

Poses with Leona for a final picture with Lourenzo Marques harbor, Mozambique, on the Indian Ocean providing the setting.