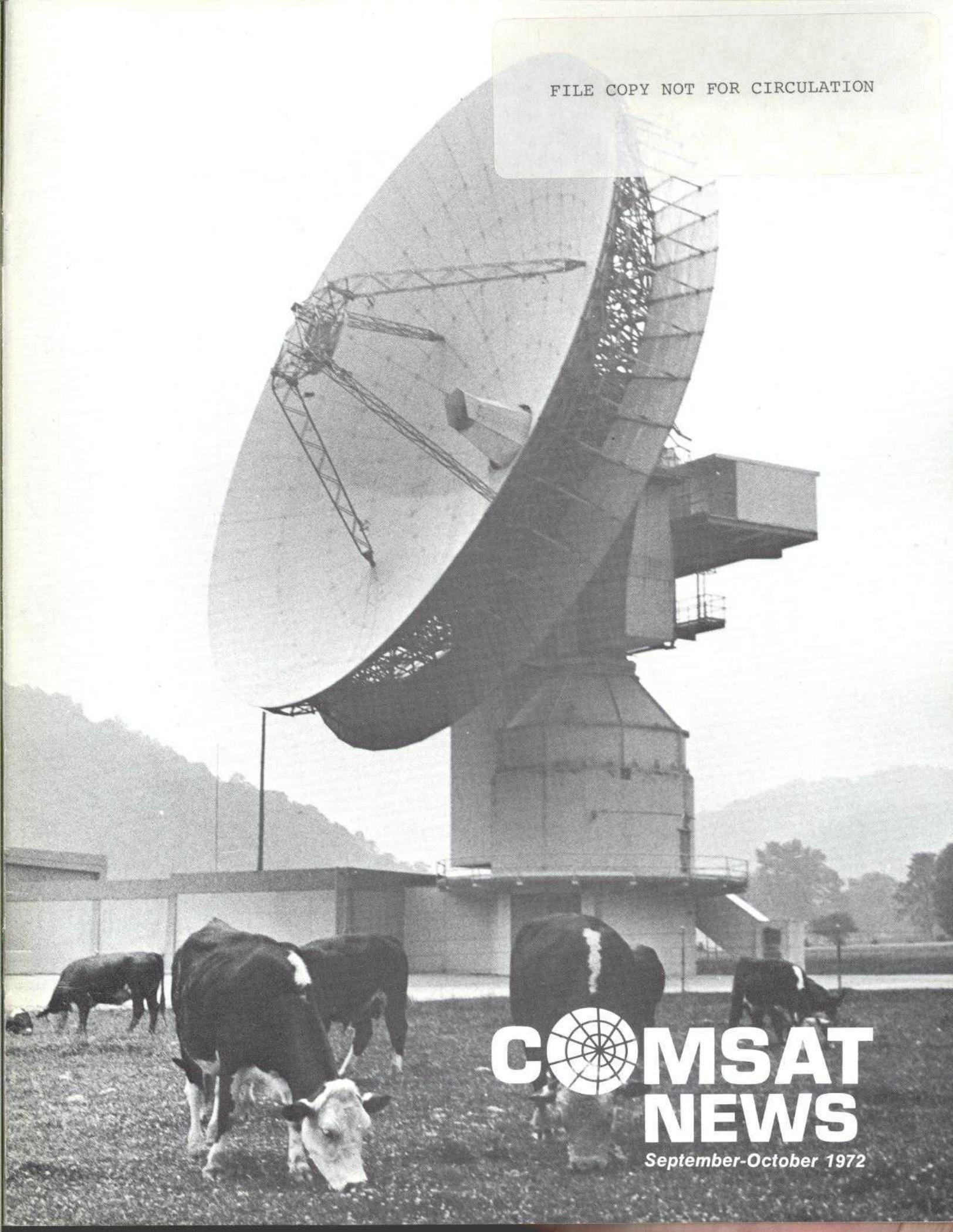


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**COMSAT  
NEWS**

September-October 1972

# COMSAT NEWS

COMSAT, MCI and Lockheed agree on joint corporate venture .....	1
McConnell, Charyk address analysts .....	2
Olympics seen in 33 countries	4
The Violet Cell—a COMSAT invention .....	8
The problems of frequency sharing .....	12
Nixon, Meir talk via satellite	16
Employee News .....	20-31
COMSAT sponsors commemorative medal .....	33

## On the Cover

Cows peacefully graze on Foster Funk's farm adjoining the Etam, West Va. Earth Station. Mr. Funk, a part-time COMSAT employee, lives nearby. He sold part of his land to COMSAT for the Etam site. *Photo by Allan Galfund.*

**Sept.-October 1972—7th Year, No. 5**

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**Matthew Gordon, Assistant Vice  
President for Public Information**

**James H. Kilcoyne, Jr., Editor**

# COMSAT, Lockheed, MCI agree on terms for jointly owned company

By HALE MONTGOMERY

COMSAT, Lockheed Aircraft Corporation and MCI Communications Corporation reached agreement this month on terms for a jointly owned company to provide nationwide satellite communication services.

The signed agreement was submitted to the Federal Communications Commission (FCC) for its approval on October 3. Each of the three corporations would have an equal one-third ownership share in the company.

The agreement came less than a month after the three corporations announced their intention in September to establish a jointly owned multipurpose satellite system to serve the domestic market.

The agreement set forth the basic structure of a jointly owned company and carried forward the intention of the parties announced in September. But the agreement remained subject to conditions spelled out in a Memorandum of Understanding filed with the FCC on September 8.

COMSAT agreed in that memorandum to withdraw its application for a multipurpose system, in favor of pressing for approval of a jointly owned multipurpose system with Lockheed and MCI, on the condition that FCC approval is granted for COMSAT's other application to lease satellite services under a long-term contract to AT&T. The parties also agreed to request the FCC to lift restrictions placed on COMSAT for services to Alaska, Hawaii and Puerto Rico.

These and other conditions would have to be met before the jointly owned company could come into being.

The agreement on terms of the joint endeavor was reached after detailed negotiations. It called for restructuring the existing MCI Lockheed Satellite Corporation (MCIL) to establish an independent corporate entity.

COMSAT would acquire a one-

■ *Mr. Montgomery is a COMSAT senior information officer.*

third interest with Lockheed and MCI in MCIL. The three stockholder corporations agreed to invest new capital totaling \$1,750,000 in the restructured corporation to finance initial costs and expenses. Additional financing could be raised later if the FCC gives a go-ahead on the proposals.

A new name, not yet chosen, would be given the restructured corporation. The company would have a 16-member board of directors. Each of the three stockholder corporations would nominate four directors, and together they would appoint four additional independent directors.

The FCC, meanwhile, was scheduled to consider filings pending before it in the domestic satellite case October 10 and 11.

Earlier, the FCC had set a new deadline—October 16—as the effective date of its June domestic satellite policy and order. It denied requests submitted by COMSAT and AT&T for a stay of the order pending release of a final FCC decision on their reconsideration petitions. These FCC actions came September 13.

Although the FCC had before it at that time the proposal by COMSAT, Lockheed and MCI for a joint venture (subsequently formalized in an agreement), the Commission did not rule on the proposal, nor did it rule at that time on COMSAT's pending reconsideration petition.

In setting the new October 16 deadline, the FCC gave applicants a variety of alternatives to follow in filing statements of their intentions by the new deadline, including whether they wish to defer their applications pending action on the petitions for reconsideration, or proceed on their applications at their own risk.

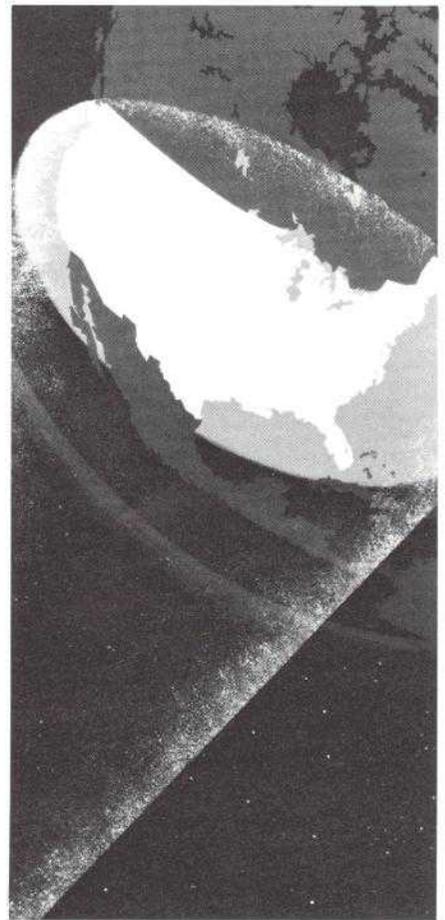
The Commission explained that "... COMSAT, AT&T, or any other applicant that desires to await a resolution of any of the questions raised in the various petitions for reconsideration is free to do so. Those that elect to pursue their applications in the interim will proceed at their own

risk and in accordance with the policies and constraints specified in our (June 16) second Report and Order. They will, of course, be fully subject to any action on reconsideration that might affect their interest, including any changes resulting from questions raised by petitioners who have not sought stay relief."

In denying a stay and setting a new deadline, the Commission said, "we believe that the public interest would be best served by processing those applicants who desire to proceed pending reconsideration.

"In the circumstances, it is our judgment that the desirability of making domestic facilities available to the public at an early date outweighs the considerations urged in support of an across-the-board delay."

As further filings in the protracted proceedings loomed, COMSAT continued to emphasize in its public statements that it plans to have a major role in the domestic satellite market.



An artist's rendering depicts a satellite beam illuminating the U.S.

## Analysts hear McConnell, Charyk discuss COMSAT

An overall review of COMSAT's past and present, as well as a look at the future, was given to security analysts on September 6 by Joseph H. McConnell, Chairman of the Board of Directors, and Joseph V. Charyk, President of COMSAT.

In a joint presentation to the New York Society of Security Analysts, they described present operations as generally favorable. But they emphasized that the outcome of the domestic services proceeding is of great importance to COMSAT's future.

The subject of each speaker was "COMSAT at the 10th Anniversary of the Satellite Act." Mr. McConnell discussed regulatory proceedings, international arrangements, and current financial results. Dr. Charyk discussed technical and operational programs, including the present level of services. (Copies of the speeches are available from the COMSAT Information office.)

An audience of about 250 persons filled the analysts meeting room in the Wall Street neighborhood for the luncheon meeting. As was true at the two previous COMSAT appearances before the society, attendance was unusually large.

Dr. Charyk said that COMSAT, 10 years after the Satellite Act, "has largely accomplished one major mission—the establishment and expansion of a global satellite system. In the 9½ years since COMSAT was established, we have opened a new communications era and succeeded in changing world communications. Yet, the United States still does not have domestic satellite services. This stands as our uppermost challenge today."



PHOTO BY J. T. McKENNA

### Mr. McConnell responds to a question about revenue requirements.

Reporting on current programs for new services, Dr. Charyk noted that beginning in December COMSAT will provide the satellite circuit for a new 50 kilobit data service between California and Hawaii. He said this service may be the harbinger of substantial data services in the near future.

Among his other topics, Mr. McConnell reported on the Memorandum of Understanding between COMSAT and MCI-Lockheed (MCIL) for a joint venture, multipurpose domestic satellite system. He noted that details of the agreement, which is subject to approval of the Federal Communications Commission (FCC), remain to be worked out. In a departure from his text, he emphasized that a necessary condition of the joint venture is FCC authorization of a COMSAT satellite system to provide leased service to American Telephone and Telegraph (AT&T). Without such a separate system, the COMSAT-MCIL arrangement will not stand, he said.

The understanding with MCIL had been announced from COMSAT Headquarters earlier in the day.

Questions from the analysts, whose members include influential investment advisers and managers, often

are aimed at such matters as capital spending ("Is there any possibility you will cancel the orders for the remaining INTELSAT IVs?"), regulatory philosophy ("Why should traditional rate-base approaches apply to COMSAT?"), and rate-making detail ("What is the estimated revenue requirement for satellite circuits vs cable circuits, assuming the same load factors for each?").

However, knowledgeable analysts also ask fundamental, topical questions:

Q—Where is the business to come from to meet domestic system revenue requirements?

A—(Mr. McConnell)—The services to AT&T would be provided under contract, so the revenues for that system are not a problem. As for the multipurpose system, I don't think anybody knows for sure. The market is estimated to be as high as \$1 billion. Other people estimate it to be a great deal smaller; sometimes I think the people who give the low estimates are the people who are more interested in COMSAT not getting the business than in getting it. Anyway, we will not go into a multipurpose system in any extensive way until we see what the market is and how much of it we can do. We will feel our way. We have never really been in commercial communications marketing in an extensive way. Most of the business we have had, the FCC has given us. We will have to go to see customers and do other things. In this, MCIL should be a help to us.

Q—What will be the effect on COMSAT of the loss of offshore traffic?

A—(Mr. McConnell)—First, we don't assume the loss. We would make an effort to keep some of it on the INTELSAT system. In any event, no change can occur until about 1975, and by then rates and traffic patterns will change. Although it looks like the loss might have a major effect, these are our least expensive circuits, and we think the effect will be quite small.

Q—How will the COMSAT rate base be affected by the Definitive Arrangements?



PHOTO BY J. T. McKENNA

**Dr. Charyk discusses COMSAT's technical and operational programs.**

A—(Mr. McConnell)—Obviously, it will be reduced. It is a very difficult computation, as I indicated in my talk. But we think the effect on net income will be relatively small.

In his prepared talk, Mr. McConnell had said that under the Definitive Arrangements, COMSAT's initial investment quota would be about 41 percent and that this would "trigger some rather complicated financial consequences: a return of capital from INTELSAT, a decrease in net revenues from INTELSAT, and, at the same time, reductions in depreciation, amortization, and operating expenses, as well as an increase in interest income."

The analysts asked some pointed questions about company expectations ("What kind of growth in rate base do you expect over the next three to five years?" "What are your alternate plans, to maintain earnings growth, in case you don't get what you are asking for in the rate case and you are turned down on your domestic applications?").

But in mutual awareness of disclosure requirements and the risks of prophecy, specific answers to such questions usually are not expected and usually are not given. To the question about alternate plans, for

example, Mr. McConnell replied, "We have some plans, but I think it would be a mistake to go into them at this time."

Seated at the head table with Mr. McConnell and Dr. Charyk were David C. Acheson, Vice President and General Counsel; James J. McTernan, Jr., Vice President-Finance; and Joseph H. O'Connor, Assistant Vice President-Financial and Economic Analysis. At the press table in the audience was Matthew Gordon, Assistant Vice President for Public Information.

Through the ritual of the daily luncheon meetings and despite the scatter-pattern of the questions, the analysts pick up current information about companies they are interested in. They also have a chance to inspect and judge the company's management.

Rare is the company that turns down an invitation from the Society's program chairmen. American businesses welcome the opportunity to present themselves and their programs to Wall Street. If professional investors don't understand a publicly-held company and its activities, who else can be expected to understand? Further, Wall Street assessments of a company's performance and potential directly affect the market value of the company's shares. The value and trading patterns of the shares has broad implications for the company's activities. Accordingly, periodic appearances before the Society are regarded as an essential part of efforts to keep professional investors—and through them, all shareholders—informed.

In the Society's plain offices two blocks from the New York Stock Exchange, the traditional daily luncheon meetings are held year after year. Only a fraction of the Society's 4000 members attends any given program, of course.

The meetings are work sessions, not social occasions. A tight format is scrupulously observed: Sit down for lunch at 12:30 p.m.; the speakers begin promptly at 1 p.m. and finish by 1:30, when 30 minutes of questions and answers begin. At 2 o'clock sharp, the audience hurries back to work at nearby brokerage houses, banks and funds.

## Olympics viewers see COMSAT TV commercial

The Summer Olympic Games and the 10th anniversary of the Communications Satellite Act of 1962 provided COMSAT with another opportunity to remind the public of the contributions we have made to improved worldwide communications.

The anniversary of the Act on August 31 coincided with the 16-day Olympics schedule in Munich from August 26 to September 10. This made it possible to use the anniversary of the Act as the introduction to a new 30-second TV commercial which related the telecasts from Munich to COMSAT'S advertising theme: "If it's via satellite, it's via COMSAT."

Since the American Broadcasting Companies had exclusive rights to TV coverage of the Olympic Games, the COMSAT commercial appeared frequently on the ABC affiliate in Washington, WMAL-TV, and on a more limited basis on ABC affiliates in New York, Chicago, Los Angeles and San Francisco.

The full-page newspaper advertisement entitled, "MANDATE, Ten years of achievement under the Communications Satellite Act of 1962," appeared on the last page of the first news section of the August 31 editions of *The New York Times*, *The Washington Post*, and the *Washington Star and Daily News*. The ad, in revised format, also appeared in the September 11 issue of *Broadcasting* magazine.

As usual, the newspaper advertisement offered the booklet, "Via Satellite, The COMSAT Story." As of the end of September, more than 300 individual requests for the booklet had been received, a satisfactory response to an institutional advertisement.

The TV and newspaper advertising program is directed by Senior Information Officer Stephen D. Smoke, under the supervision of Matthew Gordon, Assistant Vice President for Public Information, and Lucius D. Battle, Vice President-Corporate Affairs.



The Games of the XX Olympiad were seen by 33 countries.

PHOTOS BY ALLAN GOLFUND

## XX Olympiad sets new record as 33 countries watch

As athletes from 124 countries competed in Munich, an unofficial long-distance record was set at the Olympic Games for the volume of television relayed via the INTELSAT system.

Extensive TV coverage of the tragedy-marred XX Olympiad accounted for 1014:49 half-channel hours of satellite time for the 18-day period from August 26 through September 12, a record volume.

This was more than double the TV usage of satellites for any event since commercial INTELSAT satellite service began in 1965. It compares with about 450 half-channel hours of television via satellites for the previous Olympic Games in Mexico City in 1968.

The new record total of half-channel hours, which are the sum of the billed minutes used for all transmit and receive legs, is for the sports events. It does not include additional hours of TV via INTELSAT satellites for news coverage of the fatal Arab terrorists' assault on Israeli athletes.

The satellite service was provided with routine high quality and flexibility. Other conditions, however, led to some press criticism of the Games. *TIME* magazine had this to say in a September 25 issue:

"Yet even apart from the horrifying massacre, the XX Olympiad has to rank as one of the sorriest athletic spectacles in history. True, hundreds of athletes did their human best, breaking dozens of world records. Nonetheless, the impact of these extraordinary feats of strength, endurance, and grace was marred by the chauvinistic stockpiling of team points, power politics, inept and prejudiced officiating, flagrant commer-

cialism and oleaginous doses of carnival ballyhoo."

Although opinions on the merits of the Games varied, TV coverage by broadcasters of the international sports events enjoyed top viewer ratings in many countries, including the United States, where the ABC network had exclusive rights. It also involved an extremely complex communications network.

According to data maintained by COMSAT's Analysis and Traffic Division, a total of 277 separate transmissions of TV programs was handled via the global INTELSAT system during the Games.

Mexico received the greatest amount of telecasts via satellites (107:08 half-channel hours), followed by the U.S. (84:34) and Iran (72:05).

Unlike other events, such as an Apollo mission where many receiving stations take the same program picture, the Olympic Games involved many different program feeds high-



There was plenty of white water as this two-man team tried to beat the clock.



A favorite of the crowd was the Soviet Union's Olga Korbut.

lighting individual events at the Games of special interest to the receiving nation.

At one time, on September 10, seven separate TV programs were transmitted simultaneously via satellites to different receiving countries. Six transponders in the two INTELSAT IV Atlantic satellites were used, and one transponder was in use on the Indian Ocean INTELSAT IV.

"We sometimes had a tight squeeze," said Larry Covert, manager of the operations center where all TV bookings were handled systemwide. "We wore out several shoe horns fitting people in."

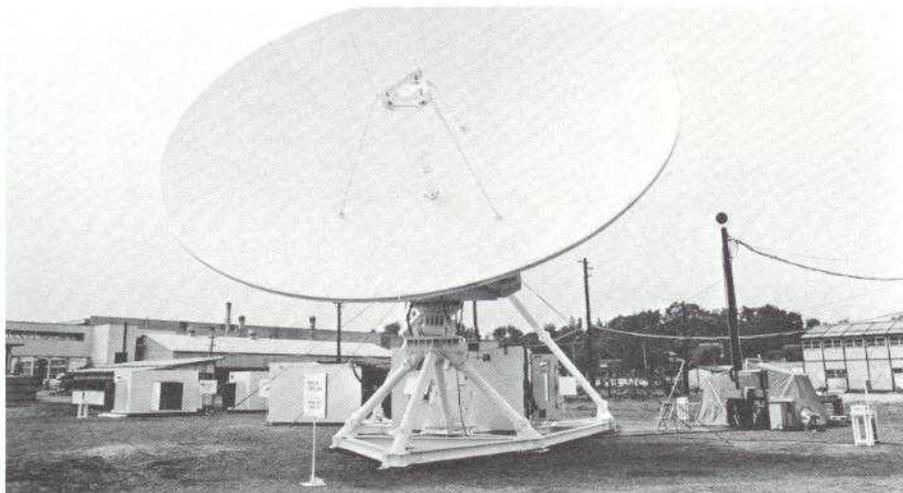
All four INTELSAT IV satellites were used at one time or another for Olympic TV. In all, 33 countries participated in either receiving and/or transmitting telecasts of the sports events, utilizing 39 antennas. The 33 countries were: Argentina, Colombia, Brazil, Ecuador, Hong Kong, Jamaica, Morocco, Peru, Trinidad, Mexico, Venezuela, Spain (two antennas), Iran, Jordan, Israel, Canada, U.S. Mainland and Puerto Rico (three antennas), Germany (three antennas), Republic of Zaire, Senegal, Nigeria, Philippines, Taiwan, Korea, Japan (two antennas), Australia, Indonesia, Kenya, Thailand, Kuwait and Malaysia.

Although television of the Olympic Games in Munich set satellite usage records, it is believed that the historic Apollo 11 mission in July of 1969, man's first step on the moon, was watched by more TV viewers than any other event transmitted via satellite to date.

## IIT Research awarded contract

A contract for the development and evaluation of flexible polymers for spacecraft applications has been awarded by COMSAT on behalf of INTELSAT to the IIT Research Institute of Chicago.

The \$99,554 fixed-price contract is to be completed in one year. The goal of this contract is the advancement of the state-of-the-art for thermal control coatings, second surface mirrors and solar cells for use on board a spacecraft at synchronous altitudes.



## Another historic TV transmission from China

Shown above is the Nippon Electric Company transportable earth station which was used during Prime Minister Tanaka's recent visit to Peking. More than 64 half-channel hours of television were transmitted to the Japanese mainland during the historic trip.

## Labs deliver prototype model for NASA experiment

By JAY LEVATICH

COMSAT Labs delivered a fully-qualified prototype model of the COMSAT Propagation Experiment to NASA in August.

The delivery of this unit was the culmination of a year and a half of intense effort to design and supply equipment for a millimeter-wave propagation experiment for use with NASA's Applications Technology Satellite, Model F (ATS-F) due to be launched in 1974.

Final acceptance of the unit took place at the Germantown, Md., plant of Fairchild Industries, the prime contractor for the spacecraft.

Now in progress is the assembly and testing of the flight model transponder, which will be delivered to NASA later this year.

This experiment will gather data on satellite signal attenuation, caused by "atmospheric hydrometeors" such as rain, at ground stations in different climate areas of the U.S. The data

■ *Mr. Levatich is manager of the propagation branch, Applied Sciences Division, COMSAT Labs, and project manager of the experiment.*

will be useful in determining parameters needed for future spacecraft communications systems operating at frequencies above 10 GHz.

Transmitting terminals, a spacecraft transponder, a receiving terminal, and data reduction equipment comprise the principal elements of the experiment.

The transmitting terminals will transmit a total of 39 randomly staggered carriers in the 13- and 18-GHz bands. The transponder will receive signals from the transmitting terminals, translate them to approximately 4 GHz, and then retransmit them. The receiving terminal and data reduction equipment will receive the 4-GHz signals, separate the individual carriers, and record the carrier powers for future analysis.

Tony Buige is the task manager for the transmitting terminals, which are being built by Raytheon and will be installed and operated by COMSAT Labs. There will be approximately 24 transmitting terminals (15 dual-frequency and nine diversity) located throughout the eastern half of the United States.

The dual-frequency terminals will be spaced at least 160 km (100 miles) apart and will transmit signals at about 13 and 18 GHz. The diversity terminals, three each of which will be located around three of the dual-frequency terminals, will be separated by less than 40 km (25 miles) and

will transmit signals at about 18 GHz.

The transmitting terminals consist of a small parabolic reflector-type antenna (positioned manually), a power amplifier, a frequency generator, a power-monitoring system, a rain gauge, a strip-chart recorder, and an auxiliary power system.

Chris Mahle is the task manager for the transponder, which included the design, construction and testing of the units. The transponder is a single-frequency conversion repeater with separate inputs at 13 and 18 GHz. Its combined outputs will be amplified and retransmitted at 4.150 GHz.

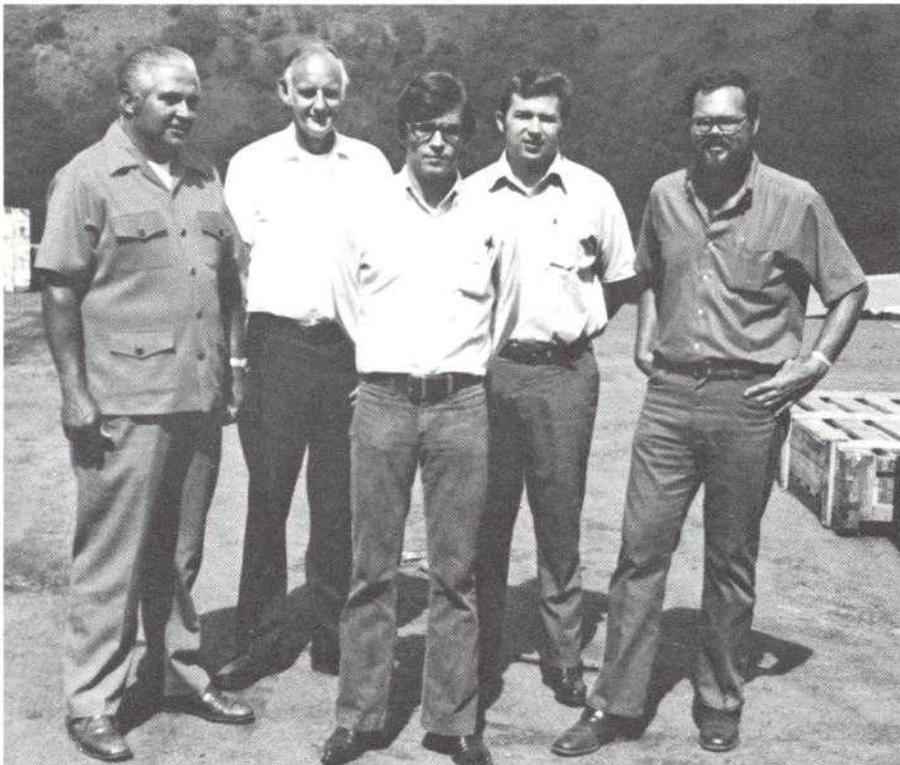
The transponder consists of a receiver and a transmitter unit. The 13- and 18-GHz signals are received by a dual-frequency antenna provided by Fairchild. The receiver consists of frequency translation units at 13 and 18 GHz, followed by three-stage tunnel diode amplifiers operating at 4 GHz. All of the subassemblies are redundant.

The transmitter unit consists of a three-stage tunnel diode amplifier followed by a traveling wave tube amplifier, and the telemetry, command and power supply unit. The TD and TWT amplifiers are redundant. The output of the TWT is fed to the 4-GHz horn antenna provided by Philco for the communications package.

Ernie Steinbrecher is the task manager for the receiving terminal, which consists of an antenna, a low-noise amplifier, a calibration unit, and a down-converter unit.

The receiving terminal will receive, amplify, and convert the signals to the 70-MHz range.

The converted signals will be processed and converted to DC voltages which are proportional to the input power of the received carrier signal. These signals will be scanned and applied to the data acquisition section which calculates the power of each carrier signal and records it on magnetic tape. These magnetic tape recordings can be processed on any large computer and displayed on a teletypewriter to permit a statistical comparison between the measured attenuation at a site and general meteorological parameters such as rainfall rate, number of thunderstorm days, and total precipitation.



COMSAT team members (left to right) are Juan Castanera, Paul Winchester, Jim Clark, Don Smith and Ramon Hashberger.

## COMSAT team trains Nicaraguan staff; NICATELSAT terminal nears completion

By JAMES H. KILCOYNE JR.

Seven kilometers southwest of Managua, the capital city of Nicaragua, lies a depression of volcanic origin known as "Caldera Nejapa." Caldera is the Spanish word for caldron or kettle and aptly describes the site of the Managua Earth Station now under construction. (Nejapa is an old Indian place name for the area.)

Scheduled to be in operation by late November, this new station is the result of an agreement reached by COMSAT and the Government of Nicaragua in 1971. This agreement established a new corporation, Nicaraguan Telecommunication by Satellite Company (NICATELSAT), whose purpose is to provide international telecommunications for Nicaragua, with the exception of traffic between Nicaragua and other Central American countries and Mexico and Panama. The Nicaraguan Govern-

■ *Mr. Kilcoyne is a COMSAT information officer.*

ment owns 51 percent of the NICATELSAT common stock while COMSAT owns 49 percent.

The bowl-like shape of the site offers excellent protection from potential sources of interference, thus allowing the station to be built only a short distance from Managua.

The station itself, now nearing completion, will be one of the most modern in existence, utilizing new concepts in antenna design and equipment configuration.

COMSAT is providing technical training and operational services for this venture. Already a team of Corporation employees under the supervision of Station Manager Juan R. Castanera has begun instructing the Nicaraguan technical personnel who will eventually man the station. Assisting Mr. Castanera are Jimmy L. Clark from Jamesburg, Ramon L. Hashberger from Brewster, Donald B. Smith from Andover and Paul M. Winchester from COMSAT Labs.

Training classes are conducted in

both English and Spanish because neither language is common to all of the personnel. While this does slow the learning process, the end result will be a truly bilingual staff.

It was anticipated that the station would be in service in October of this year, but a long dock strike in Japan delayed delivery of the electronic components provided by the Nippon Electric Company.

When this new earth station does become operative late this year, another region of the world which has generally lacked high-quality, direct communications links with the rest of the world will realize improved voice and record communications and share in the growing volume of international television via satellite.



The lower section of the antenna structure is put into place.

## Connecticut firm wins fuel cell award

COMSAT on behalf of INTELSAT has awarded a contract to the Energy Research Corporation of Bethel, Connecticut, to design, develop, fabricate and test regenerative hydrogen-oxygen fuel cells suitable for application in synchronous orbit communications satellites.

The \$200,000 fixed price contract is to advance the state-of-the-art of the high energy density secondary hydrogen-oxygen fuel cell. Two major objectives of the program will be to extend the cycle life of regenerative hydrogen-oxygen fuel cells, and to increase the usable energy density by developing a lightweight pressure vessel for the fuel cells. The contract is to be completed within 13 months.

## The Violet Cell — a COMSAT invention to improve solar cell efficiency

BY EDMUND S. RITTNER

*A significant improvement in the efficiency of solar cells has been accomplished through a series of related inventions at COMSAT Laboratories. COMSAT has named the improved solar cell the "Violet Cell." Unlike conventional solar cells which are sensitive to visible light, it also works efficiently at the short wave lengths of the solar spectrum—the violet and ultra-violet regions. It will improve solar cell efficiency by about 30 percent and end-of-life efficiency by 35 percent. COMSAT has filed patents on the violet cell, and is negotiating licensing agreements with solar cell manufacturers.*

The silicon solar cell, which provides the primary electrical power for our satellites, was invented at Bell Telephone Laboratories in 1954. Early units exhibited a conversion efficiency in sunlight of 6 percent, which was about a factor of 10 higher than that of the previously available selenium or copper oxide photovoltaic cells. After one year of further development, the average efficiency of the silicon cell increased to 8 percent.

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■ *Dr. Rittner is Director, Applied Sciences Division, COMSAT Laboratories.*

The writer conducted a theoretical study of the physics of the silicon solar cell soon after the announcement of the invention in the spring of 1954 and in the fall of that same year presented the optimum cell design principles at a specialty conference on "Photoconductivity." It was reported there that the theoretical upper limit on the conversion efficiency in silicon is 22 percent and that the possibility of substantially improving the efficiency of experimental units over that realized up till that time appeared promising. It therefore came as quite a surprise to the author on joining COMSAT in 1969 and on looking into the solar cell situation again to learn that the average efficiency of commercial solar cells for satellite use had reached only 10 percent after 15 additional years of worldwide development effort. While significant progress had been made in the interim in coping with problems arising from the hostile radiation environment in space, it appeared that the solar cell manufacturers had run into a ceiling imposed by nature considerably lower than the theoretical limit. There was apparently nothing wrong with the latter, as several later independent calculations had led to substantially the same result. Moreover, there was no real

paradox implied since the discrepancy is attributable to a collection of loss mechanisms within the real cell, some of which were identifiable.

The most important of these losses is associated with a "dead" layer at the surface of the cell. This arises from that portion of the conventional fabrication process in which phosphorous is diffused at high temperature in high concentration into the silicon wafer to form the n-p junction. The crystallographic perfection of the silicon lattice is thereby badly disrupted and the surface layer becomes nearly totally non-responsive in converting the shallowly penetrating portions of the incident sunlight to additional free charge carriers within the silicon. The optical absorption coefficient of silicon increases with decreasing wavelength; thus, conventional cells do not utilize the violet and ultraviolet components of the solar spectrum.

With the identification of this major source of loss, it was decided to mount a concerted research effort in the hope of substantially improving the efficiency of the silicon solar cell. The project was undertaken by the Solid State Physics Branch headed by Dr. Joseph Lindmayer (presently Director of the Physics Lab), whose group had an excellent background in semiconductor physics and devices although none of the members of this particular group had worked on solar cells prior to joining COMSAT. Thanks to the support of W. L. Pritchard, Director of COMSAT Labs, a complete and well-instru-

mented semiconductor device fabrication facility had already been built up.

The program was launched in January 1971 based upon an inventive concept of Dr. Lindmayer, who later also provided the majority of the patent disclosures generated in the course of the work. The concept was to reduce the dead layer thickness by reducing the penetration depth and solubility of the phosphorous dopant. This necessitated a simultaneous drastic alteration of the design of the metallic collection grid so as to prevent an increase in the lateral series resistance of the now-thinner n-surface layer. The new grid geometry consisted of a large number of closely-spaced very fine lines of about the same light obstructing area as the six coarse lines employed previously.

The idea was successfully reduced to practice by a team of technologists led by Jim Allison and consisting of Bob Dendall, Steve Szabo, and Floyd Bland, later augmented by Al Busch who emerged from retirement to join the group and by Dan Martin who was transferred from his previous non-technical position in Office Services.

The dead layer was eliminated; the response of the cell was extended sufficiently into the violet and ultraviolet regions of the solar spectrum to capture all the energy the sun has to offer (thus the designation "Violet Cell"); and the series resistance was not only kept from increasing but was actually decreased by a factor of five relative to that in conventional cells.

As happened repeatedly throughout the program, solution of one problem raised another of comparable difficulty. The extension of the spectral response to the ultraviolet prevented the use of any of the commercially employed anti-reflection coatings, as all of them absorb strongly in the blue and violet end of the spectrum.

It was therefore necessary to develop a new anti-reflection coating transparent to all the wave-lengths to which the Violet Cell was sensitive and with the proper matching refractive index between silicon and the coverslide. Here, inventive concepts were provided by Dr. Lindmayer, Dr. Akos Revesz, Jim Allison and Bob Dendall, aided by helpful scientific inputs from John Reynolds and Dr.

Richard Arndt. Again the inventions were reduced to practice and the technology developed and refined so that the full potential of the improved cell could be realized.

At this point the original program objectives were widened to include a comprehensive study of every facet of the solar cell structure and its fabrication. Numerous other improvements resulted, of which only a few will be highlighted here:

a) replacement of the moisture-sensitive titanium in the metal contacts by other less reactive but strongly adhering materials,

b) reduction in the silicon wafer thickness by at least 20 percent relative to INTELSAT IV cells,

c) reoptimization of the base region doping for the new conditions, and

d) improved bonding of leads to the cell to permit use in deployed arrays, the last item resulting from the work of Joe Haynos.

Space qualification testing of the finished cell was carried out by the Space Physics Branch of the Physics Laboratory and by the Electric Power Branch of the Spacecraft Laboratory. The cell successfully passed all of the tests.

The measured performance characteristics of the new cell exhibit substantial improvements in short circuit current, open-circuit voltage, and fill factor all adding up to a 30 percent improvement in initial efficiency relative to that of INTELSAT IV cells. Moreover, the improvement factor in the (seven year) end-of-life efficiency is 35 percent, since the incremental higher performance of the Violet Cell is resistant to the ionizing penetrating radiation encountered in space.

This highly significant advance in solar cell technology, carried out entirely under COMSAT corporate sponsorship, is being offered to solar cell manufacturers under COMSAT know-how and patent license agreements. When the cell is commercially available and is introduced into satellite use, it should permit either increased channel capacity for the same size of solar array if power is traded for bandwidth; or for the same power, a smaller, cheaper, and lighter solar array.



Mr. Ulans

## Ulans appointed director of new Far East office

John A. Johnson, Vice President-International, recently announced that Roman I. Ulans, International Development, has been appointed Director of COMSAT's newly authorized Far East Office. He will establish the office in Singapore shortly after the first of next year.

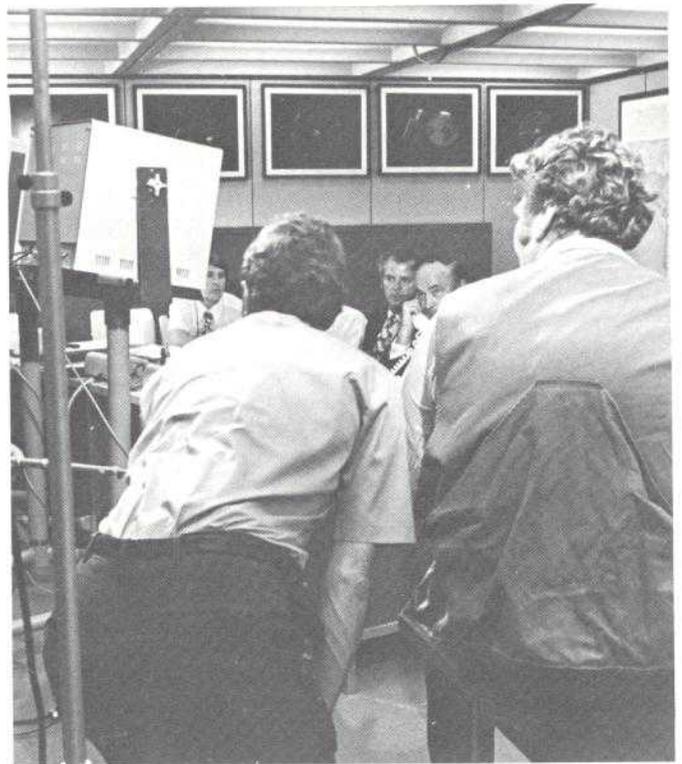
Mr. Ulans is a native of Pennsylvania and was graduated from Massachusetts Institute of Technology with a degree of Bachelor of Science in Electrical Engineering, and Harvard University with a degree of Master in Business Administration. He is a registered Professional Engineer in the State of Ohio. He is married to the former Morwenna Tellier and is the father of six children.

Prior to joining COMSAT Mr. Ulans served in the United States Army Signal Corps. Upon his retirement from the Army as a colonel, he joined COMSAT's International Development Division on September 1, 1966, as manager, Middle East.

## Contract awarded to Watkins-Johnson

A contract for the design, development and fabrication of gallium arsenide field effect transistor preamplifiers has been awarded to the Watkins-Johnson Company of Palo Alto, California by COMSAT on behalf of INTELSAT.

The preamplifiers developed under this contract will be used in satellite transponder applications. They could serve as replacements for tunnel diode amplifiers.



PHOTOS BY ALLAN GOLFUND

## Preparations begin for COMSAT's 10th anniversary celebration

In anticipation of the Corporation's 10th anniversary, which will occur on February 1, 1973, COMSAT has begun making a film to highlight accomplishments of the decade. In the left photo, Dennis V. Neill (glasses, seated behind console) and William H. Brauer (right) receive instructions from the producer. In the right photo, Donald E. Greer (left) and COMSAT President Dr. Joseph V. Charyk can be seen between two members of the film crew as cameras roll.

## Labs' Durrani named member of accreditation team

Dr. S. H. Durrani, currently on leave of absence from the COMSAT Labs, has been named a member of a national accreditation team whose function is to review university electrical engineering curricula. The appointment is for five years.

Accreditation teams visit specified campuses periodically for two days to evaluate new electrical engineering curricula and reevaluate established ones.

All professional engineering societies collaborate with the Engineers Council for Professional Development, which selects team members from nominees submitted by each society. The Council was familiar with Dr. Durrani's work as a consultant to the IEEE Educational Activities Board.

The Council tries to balance the accreditation teams with representatives from industry and the educational field. On the evaluation visits, the teams interview the teaching staff, inspect laboratories, and review examples of student examinations, as-

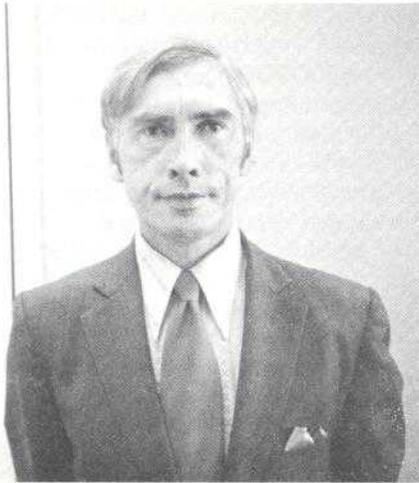
signments, and lab reports. The final report, which is sent to the Council, becomes the basis for granting or withholding accreditation of a university's curriculum for a bachelor's degree in electrical engineering.

Dr. Durrani spent two years each at RCA and GE after earning his doctorate at the University of New Mexico. He served as Professor and Chairman of the Electrical Engineering Department at the Engineering University at Lahore, Pakistan, where he had previously earned his undergraduate degrees in mathematics and engineering, and as an Associate Professor at Kansas State University.

In November 1968 Dr. Durrani joined COMSAT. He specializes in systems planning and design work at the Labs. He is a senior member of IEEE and an associate fellow of AIAA. He is also a member of the Editorial Review Board of *Telecommunications* and serves as an associate editor of the *IEEE Transactions on Aerospace and Electronic Systems*.



Dr. Durrani



Mr. Ours

## Ours appointed to new audit director's post

David S. Ours has been appointed to the newly-created position of Director, Internal Audit and Management, reporting to COMSAT Comptroller Joseph L. Mahran.

A native of West Virginia, Mr. Ours earned his B.S. degree from West Virginia Wesleyan College and an M.B.A. from the Wharton Graduate School. He was previously employed with the Celanese Corporation where he served as Manager, Financial Systems and Procedures.

In his new position Mr. Ours will be responsible for three major functions: Internal Audit, Administrative & Financial Systems and Management Applications.

Mr. Ours is married and the father of two teen-age daughters.

## TRW Systems wins solar array contract

A contract to analyze, design, fabricate and test a prototype solar array drive system has been awarded to TRW Systems Group of Redondo Beach, California. The contract was awarded by COMSAT on behalf of INTELSAT.

The 12-month, \$100,000 contract will define and test a single axis, one-revolution-per-day solar array drive system for use on body-stabilized, synchronous orbit communications satellites.



COMSAT Security Officer J. A. Fabian (right) reviews new security procedures with guard force personnel as Tina Bradshaw prepares a visitor's badge.

## Security system to provide greater employee safety

COMSAT recently instituted a new headquarters security system designed to provide greater employee safety and to lessen the possibility of theft, sabotage, and other misfortunes.

The new plan, announced by J. Robert Loftis Jr., Director, General Services, requires all employees, including INTELSAT members as well as other building tenants, to show identification cards to gain entry to the building. In addition, visitors are being registered and given visitor badges.

The guard force has been increased and is now on duty 24 hours a day in the main lobby. Two guards are stationed at the lobby elevator core entrance during rush hours to expedite entry.

After-hour, weekend and holiday entry is restricted to the escalator and revolving front plaza door to the lobby. As in the past, all personnel admitted to the building during non-work hours must be registered.

To increase garage security, the L'Enfant Plaza Corporation has re-

stricted transient's from using the garage as a pedestrian walkway. Garage surveillance has been increased by their guard force.

Any employee who leaves his car in the garage for 24 hours or longer may now request and obtain special vehicle surveillance. After-hours delivery of cars of female employees from the garages to the Plaza level by corporate chauffeurs is being continued on work-days.

Later this year, glass doors with alarms will be installed on all floors at each end of the elevator lobby to permit office areas to be locked after working hours, on weekends and holidays.

Mr. Loftis emphasized that these new security measures are designed to minimize the opportunity for unauthorized persons to gain access to the building, to establish a more secure working environment, and to reduce the opportunity for theft and improve safety in the garages.

He added, however, that they are not a substitute for personal vigilance on the part of each employee to protect himself and his own personal property and that the continued cooperation of all employees is necessary if these measures are to be successful.



Hans Weiss watches as staff members Dan Swearingen (center) and Hans Dodel discuss a possible earth station site.

PHOTO BY J. T. McKENNA

## Frequency sharing is here to stay as crowding grows

BY HANS J. WEISS

Have you ever wondered why we build our international earth stations in rural surroundings, tucked in between wooded hills, near quiet lakes and picturesque villages, among singing birds and under the baleful scrutiny of a cow or two? That is, in the boondocks and far from the cities where one could get to the stations easily?

Well, at a time when technology was just about ready for the first real satellite communications systems, all feasible radio frequencies were already in heavy use by terrestrial communications systems. The only way to accommodate satellite systems was by frequency sharing; that is, the use of the same frequencies by terrestrial radio systems and by satellite communications systems.

■ Mr. Weiss is manager, spectrum utilization, in the COMSAT Labs Systems Division.

COMSAT had to share the frequency bands allocated to its earth and space stations with several thousand (at latest count about 19,000) terrestrial radio links all over the United States, most of them concentrated in or near cities.

In view of the high sensitivity and the relatively high transmitter powers associated with our international earth stations, there was practically no "spectrum space" available close to most cities where interference from and into earth stations would not have been prohibitive. It was found necessary not only to put distance between earth and terrestrial stations by avoiding the cities, but also to put in radio "screens" in the form of hills or mountains—hence, our slightly alpine earth station environment.

Selecting suitable earth station sites was one of our first tasks in the spectrum utilization department. The International Telecommunication Union, which had promulgated the concept of frequency sharing, also developed through one of its organs, the International Radio Consultative Committee (CCIR), the technical conditions for sharing which were subsequently incorporated in the rules

and regulations of the U.S. Government's Federal Communications Commission (FCC).

We soon found that these sharing criteria were unnecessarily restrictive. We also found that their application by hand was cumbersome and time consuming. The department set to work deriving reasonable sharing criteria and developing a number of computer programs to reduce the site selection effort.

The results of this work were in disagreement with the CCIR-developed sharing criteria and "coordination" methods. It took several years of persuasion in international meetings before the CCIR accepted the COMSAT methods, but in 1971 the World Administrative Radio Conference for Space Telecommunications finally adopted them. Today, these methods are part of the International Radio Regulations and their adoption by the FCC is certain to follow.

In the process of dealing with ground interference problems, the spectrum utilization department perforce acquired a comprehensive expertise in solving general interference problems, like that encountered when geostationary satellites are placed close to each other and both use the same frequencies. The closer satellites with the same frequency assignments can be spaced to each other in orbit, the greater is the total communications capability of the orbit which, after all, has only 360 degrees available for the entire globe.

Frequency sharing, both domestically and internationally, continues to be the primary concern of the spectrum utilization department. Methods of increasing sharing are continually refined—by experiment as well as by analysis. New frequency bands are investigated for their sharing potential, latest information on wave propagation is translated into prediction methods to assess specific sharing problems, and agreement of the international communications community on new sharing applications and calculation methods continues to be sought through the CCIR.

Among the problems of current interest are the potential interference between INTELSAT and several

other communications satellite systems (e.g., the Canadian Domestic System and the Franco-German Symphonic System) and, of course, a host of problems expected to arise from the impending development of U.S. domestic satellite communications systems. Sharing is here to stay, and its problems are going to increase.

Recently the department came full circle and is, at least temporarily, again in the site selection business for our proposed domestic system. The technical characteristics of the domestic earth stations are different from those of the international stations; this fact, in conjunction with our refined site selection methods, permits us to locate these stations within an hour's drive of most major cities.

## COMSAT exhibit is featured at museum dedication

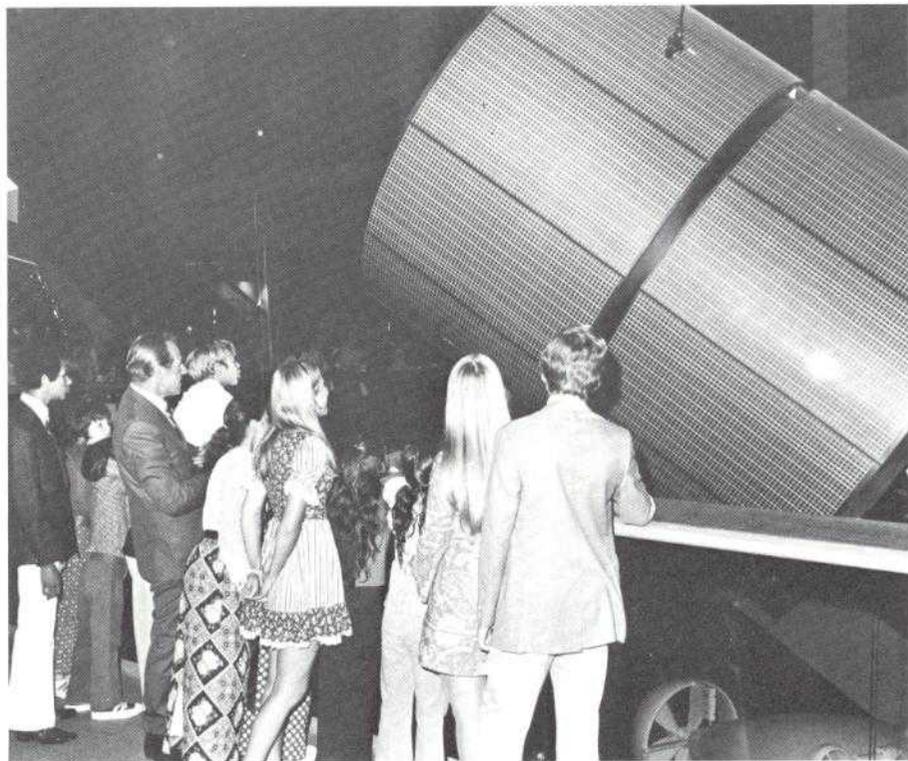
BY ALLAN GALFUND

The \$15 million new west wing of the Boston Museum of Science, where a COMSAT-donated exhibit is featured, was dedicated on August 3 at ceremonies before a large gathering of state and city dignitaries. The long-awaited event catapults this relatively small (though widely known and widely copied) institution into one of the nation's major popular science centers.

The new wing, a three-level structure with a floor area exceeding that of two football fields, triples the Museum's exhibit space. The flexibility of the wing, with its movable walls and a 55-foot high open gallery at its heart, provides room for exhibits that many museums would have to turn away for lack of space.

The COMSAT display was initially suggested by Boston Museum Director Bradford Washburn, an internationally known explorer, mountain climber, map maker and photographer, in a letter to James McCormack, former COMSAT Chairman and Chief Executive Officer and a mem-

■ *Mr. Galfund is a COMSAT senior information officer.*



Allan Galfund helps a young spectator get a better view of the INTELSAT IV model donated by COMSAT.

ber of the Board of Directors. The request was approved by Dr. Joseph V. Charyk, COMSAT President, and referred to the Information Office for action.

In a letter to Dr. Charyk, Mr. Washburn stated in part: ". . . As you probably know, we are the outstanding science museum in this part of the country, and we expect our 600,000 annual attendance will probably crowd 1,000,000 very soon after our big new addition is opened. Your participation in an exhibit will not only help us, but will give you very good exposure to our public, which includes all of New England, plus very heavy tourist traffic in vacation-time. We are very grateful for your help on this project which will be one of the high points in our major Space area in the new building. . . ."

Suspended from an unusual open central well rising three stories from the terrace floor, a full-scale INTELSAT IV model dominates the entire area, as it hovers over a tyrannosaurus rex, a telephone exhibit, a Rollins steam engine, a full scale Alvin submarine and other displays. The INTELSAT IV model as well as a multimedia slide presentation show-

ing the COMSAT story and a small model of the world, with three tiny satellites positioned in synchronous orbit over the oceans illustrating global coverage, were donated to the Museum by COMSAT.

Representing COMSAT at the dedication were Assistant Vice President for Public Information Matthew Gordon and Senior Information Officer Allan Galfund. Also participating in the ceremonies were 50 youngsters from the Inner-City Day Camp of Cambridge and the Christopher Columbus Community Center of Boston, who were visiting the Museum under the city's Project Eye-Opener Program.

Following the traditional ribbon-cutting and a preview by trustees, benefactors, exhibit sponsors, Museum staff and other invited guests, the doors were opened to the public.

Appropriately for an institution in which millions of children have discovered the wonders of science during the past 21 years, the young people were the first to cross the threshold into the new wing.

As the day went on, all the seats at the COMSAT multimedia presentation were filled, and it was playing to a standing-room-only audience.

Shown on these facing pages is the COMSAT advertisement which recently appeared in two-page ad format in *Broadcasting* magazine and in full-page ad format in *The New York Times*, *The Washington Post* and the *Washington Evening Star and Daily News*.

# MANDATE

## Ten years of achievement under the Communications Satellite Act of 1962

The Communications Satellite Act was passed by the Congress on August 27, 1962 and signed by the President on August 31.

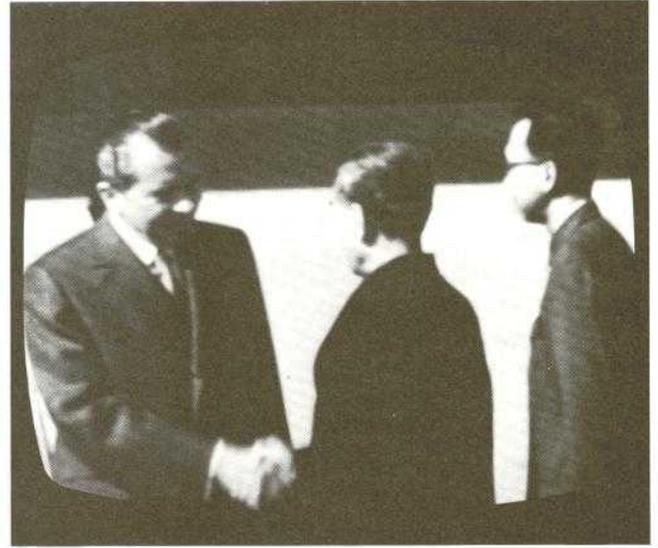
This unique piece of legislation called for the creation of a new private corporation to establish a commercial communications satellite system by itself, or in cooperation with other countries, as quickly as practical.

The Communications Satellite Corporation (COMSAT) was incorporated in Washington, D.C. on February 1, 1963, to carry out this mandate.

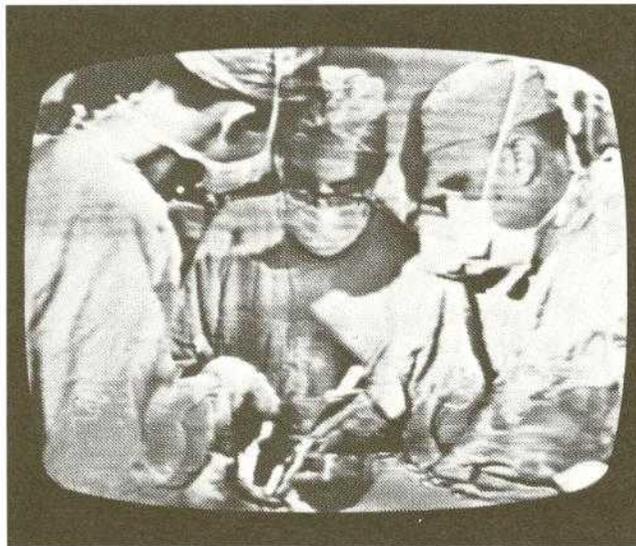
Here are some of the major achievements under the Act's "national pro-



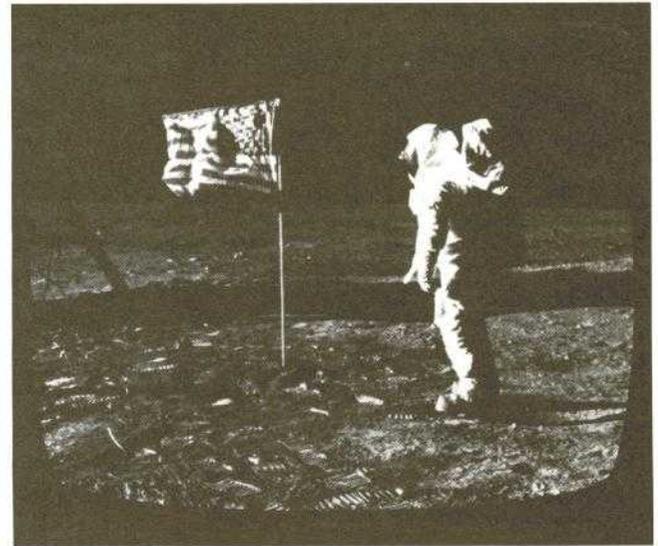
When he signed the Communications Satellite Act of 1962, President Kennedy said, "The ultimate result will be to encourage and facilitate world trade, education, entertainment and many kinds of professional, political and personal discourses which are essential to healthy human relationships and international understanding."



Earlier this year, the global satellite system made it possible for the world to focus attention on President Nixon's visit to the People's Republic of China for one brief week through facilities quickly erected at Peking. Since then, satellite service has been established between the two countries through a station at Shanghai.



Only about one out of every 100 people on earth saw open heart surgery performed "Live Via Satellite" during the Early Bird inaugural telecast on May 2, 1965, primarily because the initial satellite pathway was confined to the United States and Europe. Just four years later, however, global satellite coverage had been established.



Today, about 800 million people on six continents can see an important event as it happens "Live via Satellite." The sportscasts from Munich will set a new record for total hours of TV devoted to a single event. However, the Apollo 11 moonwalk may still remain the event most widely viewed around the world at one time.

gram" as reported by Comsat to the President and the Congress.

Comsat was capitalized at approximately \$200 million through a stock issue on June 2, 1964. Today, Comsat has 110,000 shareholders of record.

On August 20, 1964, Comsat became a major owner in an international joint venture to establish a global satellite system. This organization, known as the International Telecommunications Satellite Consortium (INTELSAT), now includes 83 nations.

In 1965, Comsat introduced a new communications era when Early Bird, the world's first commercial communications satellite, was launched successfully

on April 6 and placed in service over the Atlantic Ocean on June 28.

During 1967, a second series of advanced satellites was placed in service over the Atlantic and Pacific oceans to extend coverage to more than two thirds of the world.

During 1969, a third series of more advanced satellites over the Atlantic, Pacific and Indian oceans established the global system envisioned by the Congress.

By July 30, 1972, a fourth series of even higher capacity satellites had expanded the initial global system.

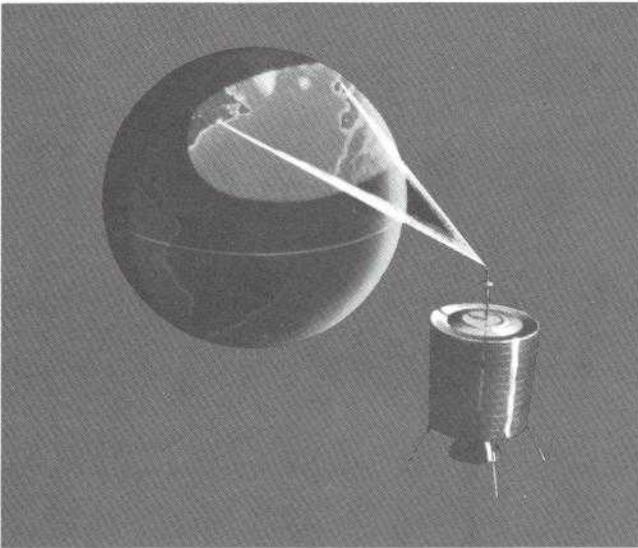
Today, more than 80 countries and territories have satellite service through the worldwide network of earth stations

for satellite communications.

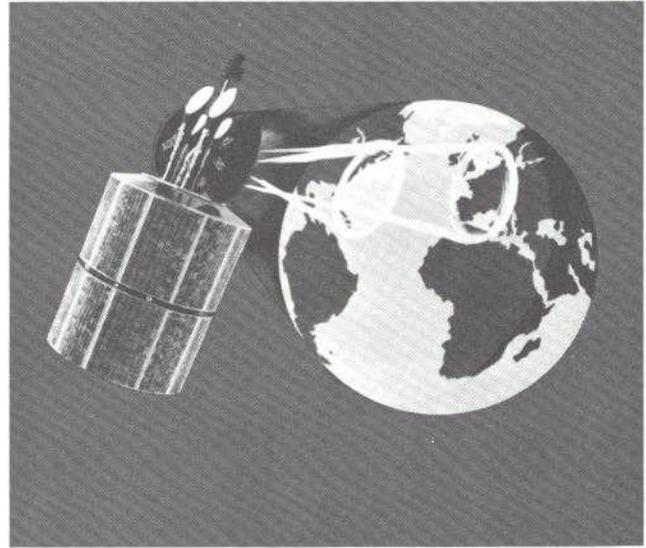
In the brief period since Early Bird, satellites have changed world communications. Comsat has pioneered new potentials for international telephone, television, data and facsimile communications. This has paved the way for U.S. domestic satellite services.

# COMSAT

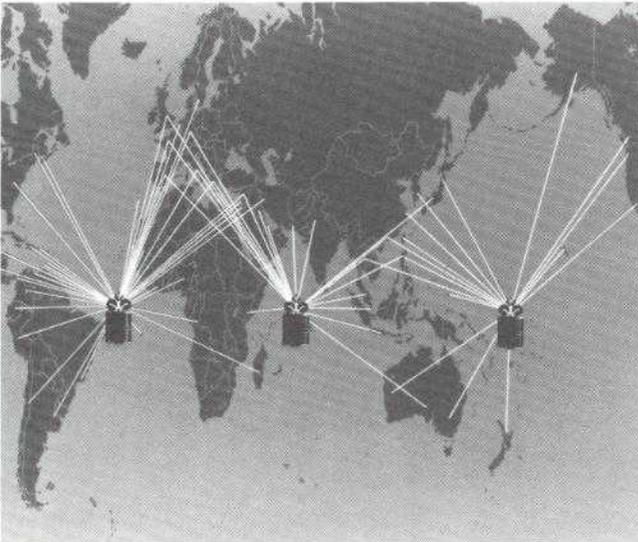
Communications Satellite Corporation  
950 L'Entant Plaza, S.W., Washington, D.C. 20024



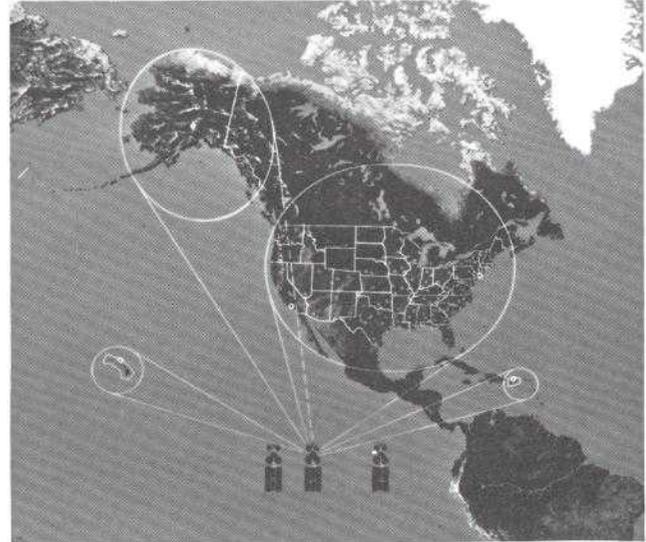
Early Bird established the first commercial communications satellite pathway when it went into service between North America and Europe on June 28, 1965. Early Bird weighed only 85 pounds. It was able to handle 240 telephone calls simultaneously, but had to relinquish phone service to provide one high quality color TV channel.



The present fourth generation satellites in the global system weigh 1,580 pounds. They can handle more than 5,000 telephone calls simultaneously plus TV. Each serves an area larger than one third of the world, but "spot beams" also permit power to be concentrated on areas with the heaviest communications requirements.



There are now more than 200 satellite pathways among the earth stations in some 45 countries served by the global system of satellites operating over the Atlantic, Pacific and Indian oceans. These pathways relay all forms of communications simultaneously . . . telephone, television, data and facsimile . . . among many nations.



The global satellite system, established in July 1969 and fully expanded in July 1972, has revolutionized international communications with a profound impact on people of the world. U. S. domestic satellite services, when authorized, will expand the volume, variety and flexibility of communications within the United States.



Carl Johnson visits a unique monument whose broken link symbolizes the "breaking of bonds" of the Jewish people in their fight for freedom.

## Nixon, Meir talk via satellite in Israeli dedication

BY CARL W. JOHNSON

If the battle between David and Goliath occurred today, the whole world could watch via satellite. Israel recently dedicated its first earth station in the valley where, according to the Bible, David felled the Philistine giant with a stone from his sling. Indeed, it could be that the earth station is on the very site of the battle.

In any event, satellite communications have come to this historic valley and today instantaneous telephone and television connections are being provided to the rest of the world.

The earth station at Emeq Ha'ela is located about 16 miles southwest of Jerusalem and about 14 miles west of Bethlehem in a peaceful valley that, with the exception of the modern

■ *Mr. Johnson is a member of the International Development Assistance Division. He attended the Israeli earth station dedication ceremonies.*

earth station structure, seems little changed from Biblical times. With a little imagination, one can even visualize the two armies on opposite hill-sides separated by the valley as they watch their champions fight to the death. These hills, several hundred feet high, surround the site and provide physical as well as electronic isolation to the earth station.

It was into this valley that some 2000 persons made their way on July 26, 1972, to the inauguration of one of the most recent earth stations operating in the INTELSAT system. Israel had become the 56th nation to build and operate an INTELSAT earth station.

Upon entering the earth station grounds through the main gate, I suddenly became aware of the festive air that permeated the scene. The huge antenna was clearly visible in the background, surrounded by a dozen or so large balloons lazily floating on their tethers. Together, the balloons and the antenna formed the backdrop for the inauguration ceremonies and the speakers' platform. Flags of the nations represented at the ceremonies fluttered in the breeze on a cluster of poles to the right of the speakers and beneath each of the tethered balloons.

A charming hostess presented each guest with a colorful earth station brochure in Hebrew and English and a first day cover commemorating the event. There was a band playing popular music as small groups of persons talked and old friends renewed acquaintances. Refreshments were also being served in a carnival-type tent stand at the rear of the seating area.

Closed circuit television sets were placed at prominent locations on the speakers' platform, in the aisles and between the rows of seats throughout the audience to enable all guests to see the televised portions of the program.

In contrast to these pleasant surroundings were the last-minute preparations of the technicians, as they checked and rechecked the TV sets, microphones, cabling, and in particular, the overseas telephone connection with the White House.

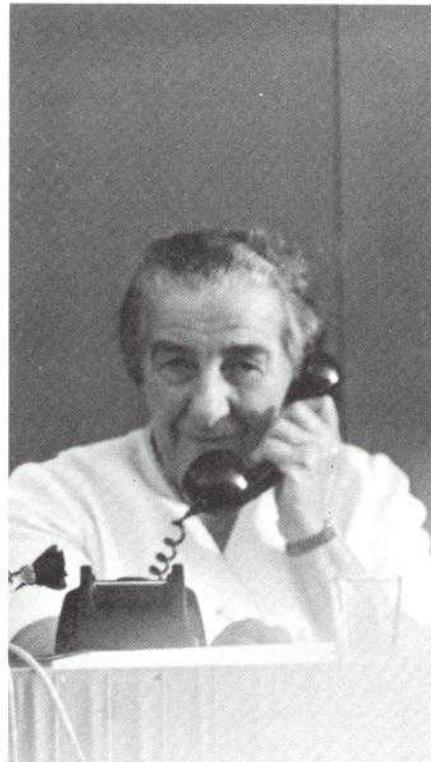
The inaugural ceremonies began with the arrival of a three-car procession bringing Premier Golda Meir to

the earth station. As she alighted from her automobile, the band began playing the Israeli national anthem. Among the officials present were Premier Meir, FCC Chairman Dean Burch, John A. Johnson, COMSAT Vice President-International, and Richard Couch, President of General Telephone and Electronics International, the earth station contractor.

After a number of speeches in Hebrew, Mrs. Meir officially opened the station as she signaled for the release of a flock of white doves. They made a beautiful sight as they fluttered overhead before melting into the distance.

Several live television pick-ups from foreign countries were received and shown at the earth station as well as on domestic television.

These included views of Jewish immigrants from Russia boarding an airplane in Vienna on the last leg of their journey to a new life in Israel, the preparations for the Olympic Games in Munich, as well as a view of Paris. Separate programs were telecast from the United States, and included three Space Shuttle astronauts at the beginning of a 64-day simulated



A telephone conversation between Premier Meir and President Nixon highlighted dedication ceremonies.



FCC Chairman Dean Burch (left) exchanges a smile with Premier Golda Meir during his congratulatory remarks,

PHOTOS BY C. W. JOHNSON



Israeli Communications Director General Soroker (standing) uses an INTEL-SAT system map as an aid during a briefing which was attended by FCC Chairman Burch (seated at left, wearing glasses).

space flight and violinist Isaac Stern who played a Haydn adagio.

The highlight of the program was the telephone conversation between Premier Meir and President Nixon. Mr. Nixon expressed regret that he had not been able to visit Israel while in office, but said the new means of communication would permit many Americans to see more of Israel with dividends in tourism for both countries. Mr. Nixon added, "You can be sure we will continue to work together for what you're interested in and what we're interested in—and that is a just peace in the Mideast which will protect the integrity of Israel, for which your people have suffered so much."

Mrs. Meir replied that she remembered the Oval Room in the White House "with gratitude for the time you gave me there and listened to my long stories of trouble." In closing, she referred to Mr. Nixon's remarks about tourism and said, "this was a commercial that would work both ways."

Later, Chairman Burch delivered a short address and observed that it was a difficult task to follow the President.

After the ceremonies were over Mr. Soroker, the Director General of the Ministry of Communications, briefed Mrs. Meir, Mr. Burch and others on the status and future of Israel's telecommunications. One of his briefing tools was an INTEL-SAT system map prepared by COMSAT.

The invited guests were then given a conducted tour of the earth station before departing. The lobby was spacious and attractive. A large staircase gave access to the second floor. A center hallway led to the office area, a conference room, and to a loading platform in the rear of the building. The technical and operations areas are to the left of the lobby, and the antenna itself is about 150 feet behind the technical area.

It was dark when we arrived back in Jerusalem that evening. The city was very picturesque, with its lights just beginning to show in the twilight and the outline of its buildings still visible on the skyline. It occurred to me that the time to traverse the many centuries from the relatively untouched Biblical valley to the twentieth century comforts of Jerusalem was a little less than an hour.



Mr. Jondahl

## Jondahl promoted to station manager

Lee E. Jondahl was promoted to Station Manager at the Cayey Earth Station on August 14. He replaced Juan R. Castanera who was named NICATELSAT Station Manager in February of this year.

Mr. Jondahl was born in California and received his BSEE degree from Oregon State University in 1958. He worked with General Dynamics Astronautics for a year, then became a field engineer for the Bendix Corporation, assisting in the development of the Mercury, Gemini and early Apollo space programs.

He joined COMSAT in January 1966 as an engineer at the Andover Earth Station. He subsequently transferred to Cayey as station engineer and served in this capacity until he was designated Acting Station Manager when Mr. Castanera joined NICATELSAT.

Mr. Jondahl and his wife have three children; the youngest, Francisco Esteban, was born in Puerto Rico two years ago.

## Highlights of ICSC action at 60th meeting

The Interim Communications Satellite Committee (ICSC), governing body of INTELSAT, held its 60th meeting from August 23 to 28 in Washington, D.C. Eighteen members, representing 48 of the 83 members, were present.

Among its actions, the Committee:

- Authorized COMSAT as manager to amend the contract with Hughes Aircraft Company to provide for required refurbishment and re-testing of the INTELSAT IV, F-1 spacecraft at a time to be designated, and at a cost not to exceed INTELSAT's total financial obligation under the fixed prices proposed by Hughes for the November 1, 1972, to April 1, 1974, time period.

- Established the terms under which COMSAT could use, in a study of its own, data obtained from an INTELSAT investigation of 200 to 500 megabit/second modular digital logic.

- Approved \$5.3 million as the approximate level on which the INTELSAT R&D program should be planned for 1973, with the same approximate level for 1974 and 1975, pending definition of a satisfactory program.

- Agreed to make a decision at its 61st meeting as to the reduction of the INTELSAT utilization charge which will be put into effect on January 1, 1973. This reduction will be the result of the continuing decline in revenue requirements per unit of satellite utilization.

- Requested the Advisory Subcommittee on Technical Matters to study various technical and operating

aspects of using spot beam transponders for long-term allotments. The Committee also asked the Advisory Committee on Finance to assess the potential costs of providing such service, and to recommend to the Committee a level of charges which might be appropriate.

- Granted formal approval to the earth stations at Emeq Ha'ela (Israel), Gandoul (Senegal), Matura Point (Trinidad & Tobago), Prospect Pen (Jamaica) and Raisting 2 (West Germany) to operate with INTELSAT IV satellites, and also granted initial approval of the Ivanjica (Yugoslavia) station for access to INTELSAT IV satellites.

- Approved a Japanese non-standard earth station for access to the Pacific INTELSAT IV satellite for a limited time to provide telecommunications services between Japan and the People's Republic of China during the visit of the Japanese Prime Minister to China.

- Arranged for visits by the ICSC to the West Coast facilities of Hughes Aircraft Corporation and Lockheed Space and Missile Division before the 61st meeting, and scheduled a briefing by Fairchild Industries during the course of the 61st meeting.

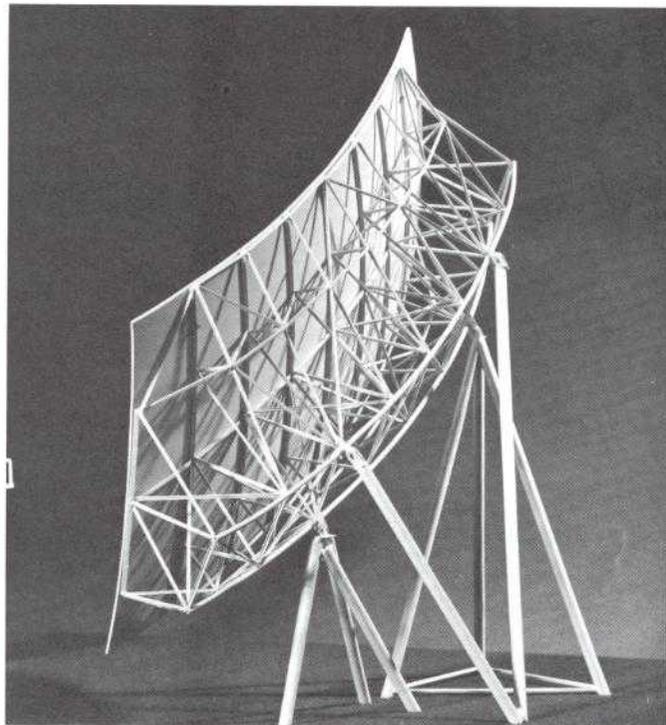
- Scheduled the 61st meeting to begin October 16; the 62nd meeting to begin December 6; and the 63rd meeting, tentatively, to begin January 24, 1973.

### Two stations dedicated

Earth station dedication ceremonies were recently held at Lessive, Belgium, and Lake Cowichan, Canada, as two more stations joined the INTELSAT system.

John A. Johnson, COMSAT Vice President-International, represented the Corporation at Lessive while COMSAT President Dr. Joseph V. Charyk and Mrs. Charyk were in attendance at Lake Cowichan.

Two additional countries also plan ceremonies this month; a new antenna at Quito, Ecuador, and a second antenna at Thermopylae, Greece, will be dedicated.



## Reliable Earth Terminal groundbreaking ceremonies held

In the left photo, Wilbur L. Pritchard, Vice President and Director, COMSAT Labs (right, with shovel), and antenna task manager R. W. Kreutel, break ground for the Reliable Earth Terminal, to be constructed on the grounds of the Labs, as Louis Pollack, Director, RF Transmission Lab, and other staff members look on. The right photo shows an artist's rendering of a scale model of the earth terminal antenna reflector. The Reliable Earth Terminal program's purpose is to develop and design unattended and automatic earth terminals.

## Needed quotas for new arrangements expected soon

The interim arrangements which have guided INTELSAT since August 20, 1963, may soon be superseded by permanent, or definitive, arrangements. The definitive arrangements were opened for signature on August 20, 1971. They will enter into force 60 days after 54 of the members of INTELSAT as of August 20, 1971, have completed all necessary action for final adherence.

The 54 members must also represent 66⅔ percent of the investment quotas held as of August 20, 1971.

At October 1, 1972, 40 INTELSAT members, representing approximately 79 percent of the investment quotas, had completed all necessary actions required for entry into force.

These members are: Australia; Canada; Chile; Republic of China; Dominican Republic; Ecuador; France;

Gabon; India; Indonesia; Ireland; Israel; Japan; Jordan; Kenya; Kuwait; Malaysia; Mauritania; Monaco; Morocco; New Zealand; Nicaragua; Norway; Pakistan; Portugal; Saudi Arabia; Singapore; South Africa; Sudan; Sweden; Switzerland; Syrian Arab Republic; Trinidad and Tobago; Uganda; United Kingdom; United States; Vatican City State; Yemen Arab Republic; Yugoslavia; and the Republic of Zaire.

The United States Government and COMSAT completed all necessary actions on August 20, 1971. One INTELSAT member, Costa Rica, not a member as of August 20, 1971, and whose ratification, therefore, will not be counted towards entry into force, has also completed the necessary action constituting final adherence. An additional 32 INTELSAT members have signed the definitive agreements subject to ratification, as have four countries which are not now members of INTELSAT, Burundi, Finland, Haiti, and Iceland.

Since the definitive arrangements

set a time limit by which entry into force must occur, 14 more members must complete all necessary action by December 22, 1972, if they are to enter into force by the deadline of February 20, 1973.

## Pritchard to give keynote speech

Wilbur L. Pritchard, Vice President and Director of COMSAT Labs, will be the keynote speaker at the Second International Conference on Digital Satellite Communications to be held in Paris, November 28-30.

Jointly sponsored by the Societe des Electriciens, des Electroniciens et des Radioelectriciens (S.E.E.) and INTELSAT, this conference will provide an international forum for the exchange of information on all aspects of digital communications by satellite.

Mr. Pritchard is also serving as a member of the steering committee. Dr. Burton I. Edelson, Assistant Director, COMSAT Labs, is the technical program committee co-chairman.



CEA President Jack Dicks (center) surrounded by party goers.



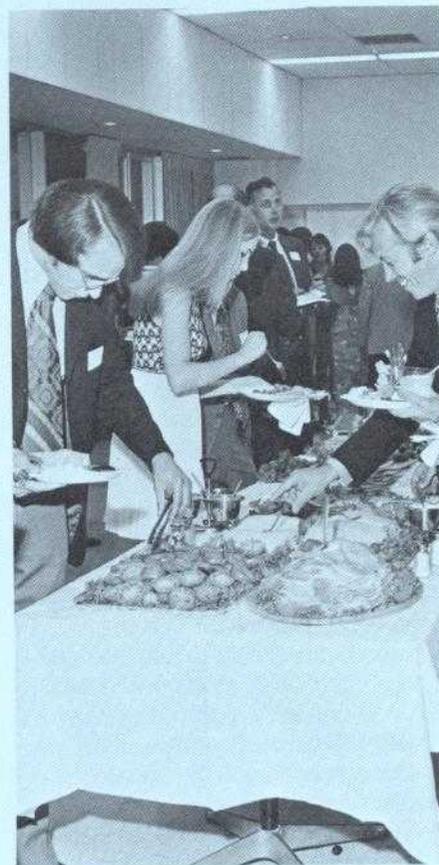
The dance floor saw lots of action.

## COMSAT EMPLOYEE NEWS

### Labs host fall cocktail party

CEA's fall cocktail party was held at the Labs on September 15.

More than 130 CEA members and their guests enjoyed an outstanding evening of music and cocktails, climaxed by a delicious buffet.



The buffet table was a popular spot.



Director Dr. Robert Barthle discusses a project with secretary Reta Long.

## U.S. Systems Management

The U.S. Systems Management Division under the supervision of Dr. Robert C. Barthle provides direction and management control to the seven COMSAT-managed U.S. earth stations located at Andover, Maine; Brewster, Washington; Cayey, Puerto Rico; Etam, West Virginia; Jamesburg, California; Paumalu, Hawaii, and Talkeetna, Alaska.

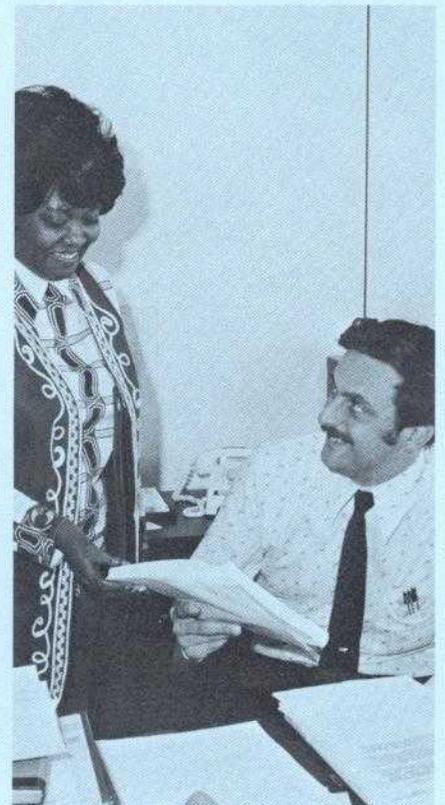
Operational management and logistical support are also furnished to the four U.S.-operated TT&C and monitoring stations. In addition, this division is responsible for the system management functions associated with the Guam earth station.



Richard McBride provides civil engineering advice to the division.



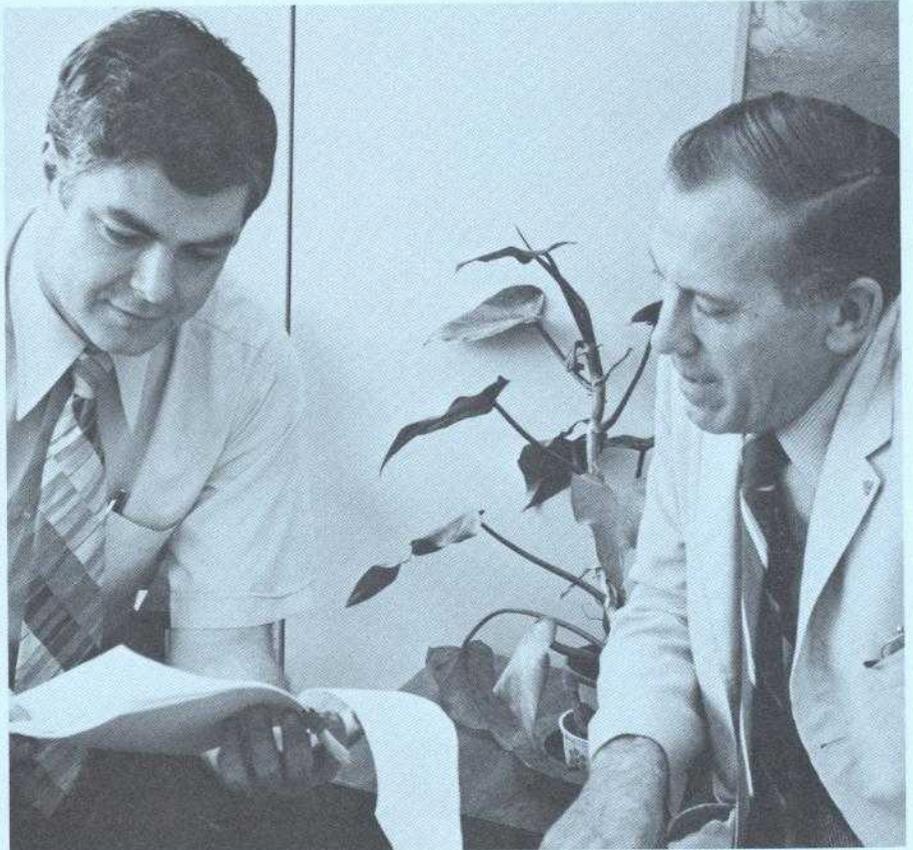
George Tellmann, manager, U.S. system's operations, reviews a plans manual with secretary Mary Svane.



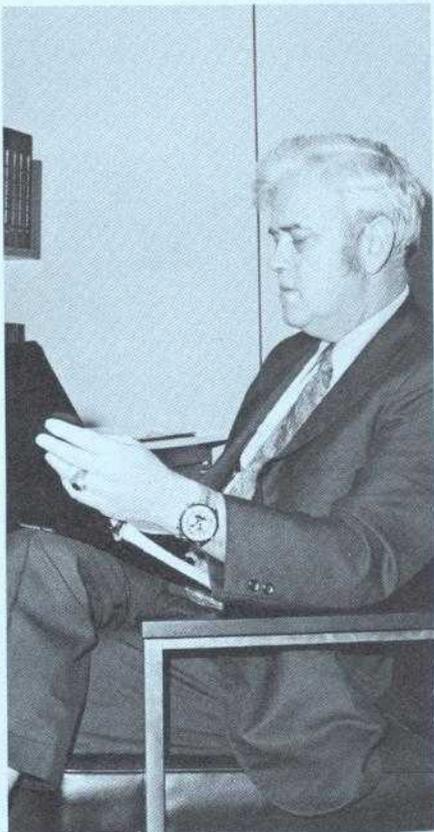
Secretary Janice Caracter reviews an assignment with Brian Williams, manager, U.S. systems plant.



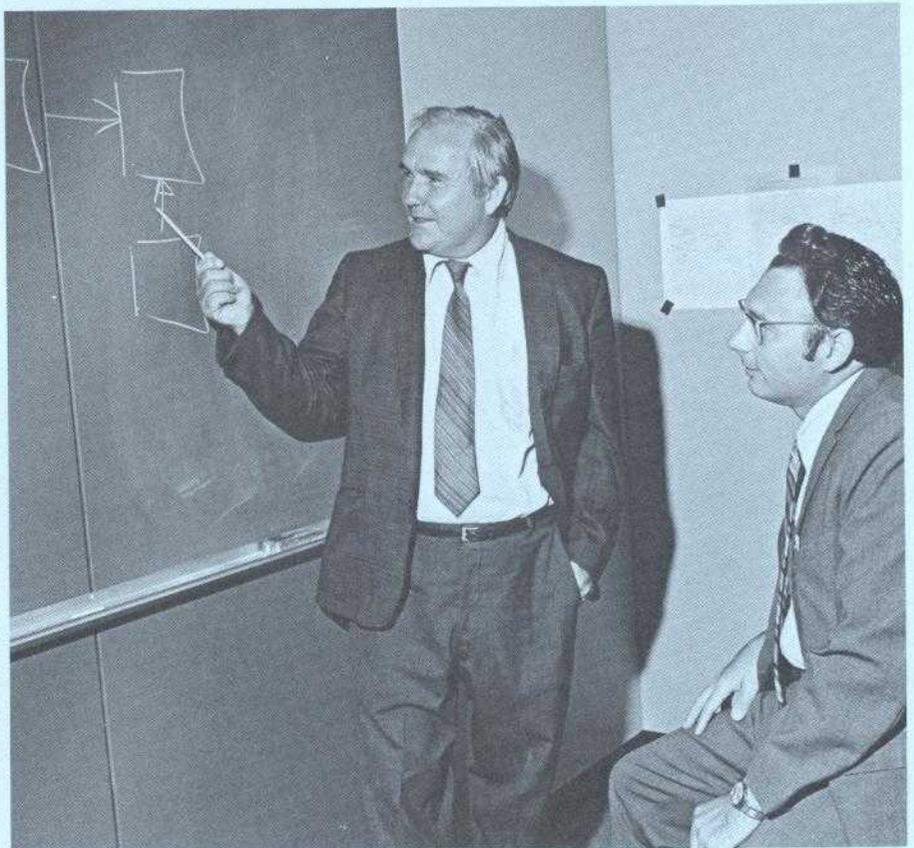
**Will Zarecor (left) and Ray Hill prepare a document.**



**Peter Hartwell (left) and Bob DeGoede verify a last minute correction.**

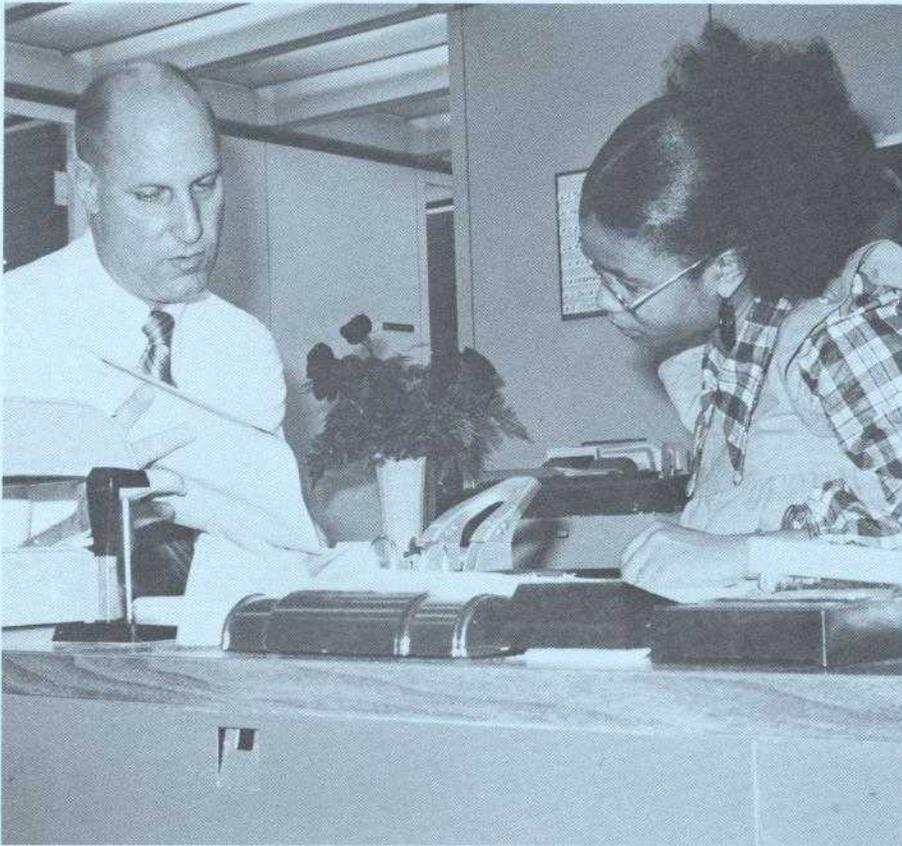


**Fred Jones studies a SSOP revision.**



**Ken Remington (left) and Joe Giafaglione discuss an equipment order block diagram at the blackboard.**

PHOTOS BY ALLAN GALFUND AND J. T. McKENNA



**A. J. Stotler checks a typing assignment with secretary Irma Burris.**



**Burt Falkofske confers informally.**



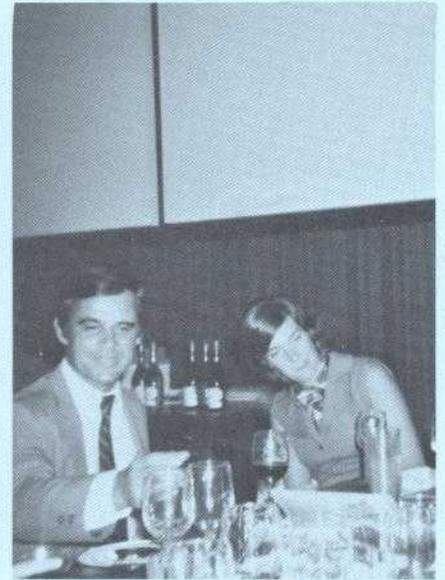
**Joe Kerns (left) watches as Gus Souris adjusts the angle of elevation on an earth station model.**



**Ivor Knight (left) and Carl Sederquist prepare for a CCITT meeting.**



Ed Wabnitz (right) and his son, Steve, display some of the beauties caught on their fishing trip in the Minnesota lake country.



Coleman Guthrie and Kay Van Hover enjoy the Wine and Cheese Party.

## The Plaza scene

BY HARRIET BIDDLE

The rush-hour traffic has resumed its usual frantic pace around the D.C. area as vacationers return from their end-of-summer weekend jaunts. COMSAT sojourners are also drifting in from all parts of the country and world.

Preparations are now being made for fall and winter activities while TV fans are scanning the newspaper guides for new programs.

A bright note is that the weather has ushered our neighboring office workers indoors and the takeout-lunch lines have diminished accordingly.

The European countries lured many of our employees across the Atlantic this summer. Mary Lane, Communications System Management, recently returned from a trip to Italy with her daughter. John DeCaro, Finance, returned from a honeymoon excursion to Germany, Italy and Sweden. Helen Baxter, also of Finance, recently toured the continent with her husband. Two of our secretaries, Ginny Oehler, Corporate Secretary's Office, and Jerie Connors, Domestic and Aeronautical, also roamed around Europe. Another world traveler is International's Carl Johnson who visited the

■ Miss Biddle is a secretary in Finance.

earth station in Israel this summer.

Administrative Services' Ed Wabnitz, a veteran camper and outdoorsman, along with his 16-year-old son, Steve, spent the last week of July in the backwoods canoe country of northern Minnesota. After a 1400 mile drive from their home in Silver Spring, Md., the two arrived at the edge of Moose Lake where they loaded their canoes with camping gear and pre-prepared frozen food packages such as "instant chicken and egg salad sandwiches," and headed deep into the wilderness of the Superior National Forest. Fortunately, they didn't need to rely entirely on their frozen food supply as the fishing was excellent and provided fresh fish menus of bass, walleyes, perch and northern pike. Mr. Wabnitz reports that he's ready to go again, but will enjoy the comforts of home until this time next year.

Wedding bells have been ringing this summer. Donna Dargitz, Finance, was married to Mr. Thomas Higgs on August 26. Ruth Peed, Legal, is now Mrs. Dennis Adams and Juanita Cellini, Information, became the bride of Mr. Anthony Campitelli.

Many of us had been wondering why John DeCaro was making numerous trips to the nurse's office until it was discovered that he and our visiting lady doctor were married on August 19. Now John continues to visit the nurse's office—to see his new wife!

## CEA news and notes

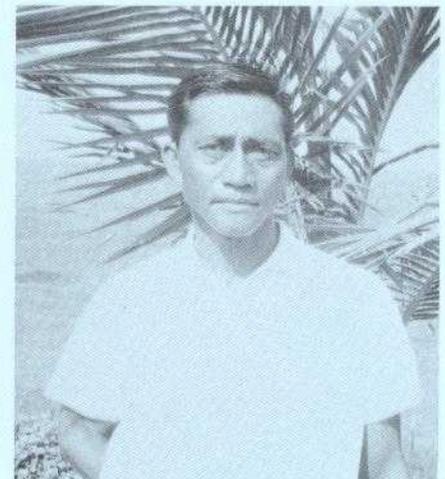
BY SHIRLEY A. OLIVER

Nearly 40 wine tasters turned out for the CEA-sponsored Wine and Cheese Party held in the COMSAT Theatre on Friday, September 1. Southern Division Manager Abe Goldbatt of Alexis Lichine Wines, served as host and introduced us to four distinct vintages of wine. Glasses of Beaujolais, a red wine; Pinot Chardonnay, a white wine; Sauternes and Roses D'Anjou were enjoyed by all attending. Between wines, imported cheeses and French bread were served to clear taste buds for the next type of wine.

With fall and winter fast approaching, minds turn to football, hayrides, Halloween parties, evenings by the fireplace, Thanksgiving dinner and finally Christmas. This year's Annual Christmas Dinner Dance is going to be the best ever. The date has been changed from December 5 to December 15, but the place remains the same—the Army Navy Country Club.

By the way, there is a great surprise in store for all you basketball fans! Plans are being finalized to obtain a block of season tickets for the Baltimore Bullets games being played at Cole Fieldhouse (University of Maryland campus) this year.

■ Miss Oliver is a secretary in Communications System Management.



## Paumalu golfers defend their team title

Shown in the left photo, are members of Paumalu No. 1 and No. 2 Golf Teams prior to teeing off for this year's Third Annual Communications System Management Golf Tournament. Team members played 18 holes at the Pearl Country Club, overlooking Pearl Harbor, on Saturday, September 9. The No. 1 Team has won the COMSAT team trophy the past two tournaments. Team members include (kneeling, left to right) Stan Holt, Eddie Miyatake and Ron Miyasato. Standing are (left to right) Paul Motoyama, Les Goya, Bob Thorpe and Gil Estores. In the right photo is Cass Corpuz the defending low gross champion for the last two years.

## Life at the Labs

BY CAROL LOUTHAN

Once again it seems that it's time to pull out the woolens and pack away all our fun in the sun clothes. Summers are just too short, with winter staying much longer than it's wanted.

The COMSAT Labs bowling league began its season on September 12 at the new Fairlanes in Gaithersburg, Maryland. It proved to be a very interesting evening for all eight teams and substitutes. Most of us ended up with terrific handicaps.

On Wednesday, August 30, the Labs Slo-Pitch League held its championship playoff. A very well-played game saw Bill Windell's Shop team coming out on top with the team captained by Hank Mueller taking the runner-up spot in the league. Afterwards, there was plenty of food and drink for everyone.

Congratulations are in order for the new bride and groom. Judy Calvo, personnel, and Ernie Martin, spacecraft, were married on August 5. Good luck and best wishes from your co-workers.

We have some new additions to the Labs' families. Ronald Matthew

■ Mrs. Louthan is a secretary at the COMSAT Laboratories.

Wallace, son of Mr. and Mrs. Ron Wallace, was born July 17 at George Washington University Hospital. Bob and Carolyn Rostron are also the parents of a new baby boy. Kirk Thomas, who weighed 9 pounds at birth, was born September 7.

Ruth Swart, secretary in design and drafting, left us in early August to await the birth of her first child. We all wish Ruth the best of luck.

## News and notes from Etam

BY DELORIS F. GOODWIN

The past two months have been busy ones for our vacationers. Mr. and Mrs. William Carroll toured Germany and Scandinavia; Mr. and Mrs. Jim Evans and family fished in Canada; Mr. and Mrs. John Formella visited relatives in Wisconsin; Mr. and Mrs. Leonard Gifford journeyed to Wyoming; and Mr. and Mrs. Spencer Everly and family, Mr. and Mrs. Paul Helfgott and family, and Mr. and Mrs. John Goodwin and son all enjoyed beautiful Myrtle Beach, South Carolina.

Victor Molek was promoted to senior technician, on July 31, 1972.

■ Mrs. Goodwin is accounting and personnel clerk at the Etam Earth Station.

Rupard Hobbs is now the proud owner of a mobile home in Parsons, West Virginia. He can now "relate" to those that say mobile home living is great.

Recent visitors to Etam included Messrs. Francisco Robledo and Esteban Medina, operations supervisors from Tulancingo, Mexico. Their visit was made possible through an ITU grant and during their stay with us they became familiar with the operations of a typical COMSAT earth station. They had an opportunity to work with our Blue Team on night shift, with the day operations team and our administrative people. They were particularly interested in the SPADE equipment.

Allan W. Galfund, Senior Information Officer, accompanied by Werner Schumann and Harry Muheim of Guggenheim Productions visited the station in connection with the preparation of the COMSAT 10th anniversary film now in production.

A course in first aid was recently given to our employees. Upon completion, everyone received American Red Cross first aid cards as well as Self-Help Training certificates and cards. This instruction was provided by the West Virginia Department of Health and concluded with additional instruction from the Preston County Civil Defense director's office.



An Engblom-designed silver chest.

## Station administrator makes own furniture

Andover's Sven Engblom enjoys designing and making his own furniture. When first married, he had no tools and knew nothing about the art of wood-working.

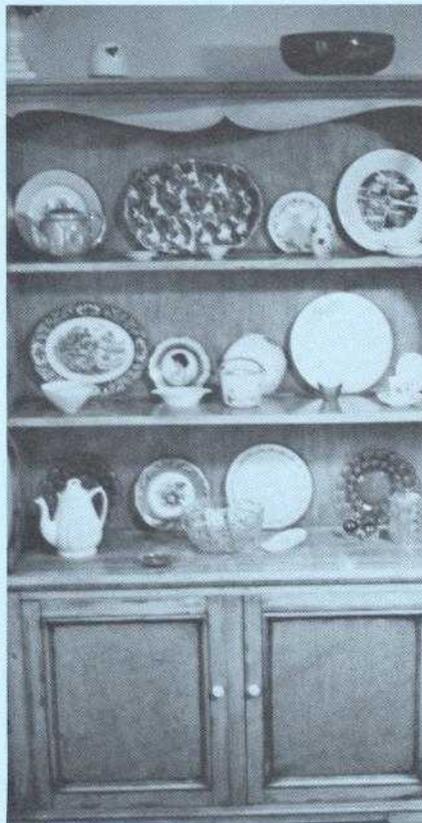
Today he is an accomplished craftsman and has literally furnished his home with the products of his own shop.



An Engblom-designed side table built from scrap pine in a natural finish.



A mahogany writing desk.



A china hutch built of pine and finished in antique stain.

## 5-year awards

The following personnel received five-year service awards during August, September and October:

**Administrative Services:** Carl Laney.

**Andover:** Richard L. Engblom, Donald Fifield, Wilfred T. Merrill, Gerard J. Michaud and Kusti W. Nuppula, Jr.

**Bartlett:** Michael G. Vaughan.

**Brewster:** Pete D. Vaughan.

**Communications System Management:** Phillip G. Avruch, Carl M. Backer, Doris Chadderton, Anthony J. Corio, Bruce D. Grayson, William D. Kinney, Robert S. Kotell, William P. Lawrence, Priscilla L. Martin, Viola Newhouse, Diana R. Pontti, Freeman E. Pryor, Donald S. Ross, Alonzo J. Stotler and Frederick W. Weber.

**Corporate Secretary:** Virginia A. Oehler.

**Finance:** Jim C. Lawson and Stanley L. Shubilla.

**General Counsel:** David A. Eggers.

**Information:** Allan W. Galfund.

**International:** Wanda M. Latta, Richard Mizrack, Robert B. Randle, Gloria E. Sapia-Bosch and Vasant N. Sawant.

**Jamesburg:** Jack H. Inman.

**Laboratories:** Anthony Buige, Howard W. Flieger, Neil R. Helm, George R. Huson, William F. Lowe, Chester J. Pentlicki, John F. Phiel, Alberto Ramos, Jeffrey L. Rubin, Judith A. Russell, Susan M. Stein and Chester J. Wolejsza.

**Nicaragua:** Juan R. Castanera.

**Paumalu:** Edward K. Clarke, Jr., Yoshiaki Daikoku, Robert F. Manske and Norman S. Murakami.

## Novgrod trophy again won by Labs in tennis sweep

For the third consecutive year, COMSAT Labs defeated Headquarters in the Annual Summer Tennis Tournament.

Played under sunny skies on August 5 at the Carter Barron courts, the Labs players continued their winning ways, sweeping eight of nine matches.

As a result of this impressive victory, "Laboratories 1972" will be inscribed on the Irving Novgrod trophy which will remain on display at the Labs for another year.

Results of all matches are as follows:

### Singles

Tom Throop, Labs, defeated Alan Kasper, Plaza, 6-1, 6-1.

Carl Wenrich, Labs, defeated Ed Jordan, Plaza, 6-1, 6-1.

George Szarvas, Labs, defeated Dick McBride, Plaza, 7-5, 6-2.

Jay Levatich, Labs, defeated Charle Baer, Plaza, 6-0, 6-2.

Bill Lowe, Labs, defeated Rich Colino, Plaza, 7-5, 7-6.

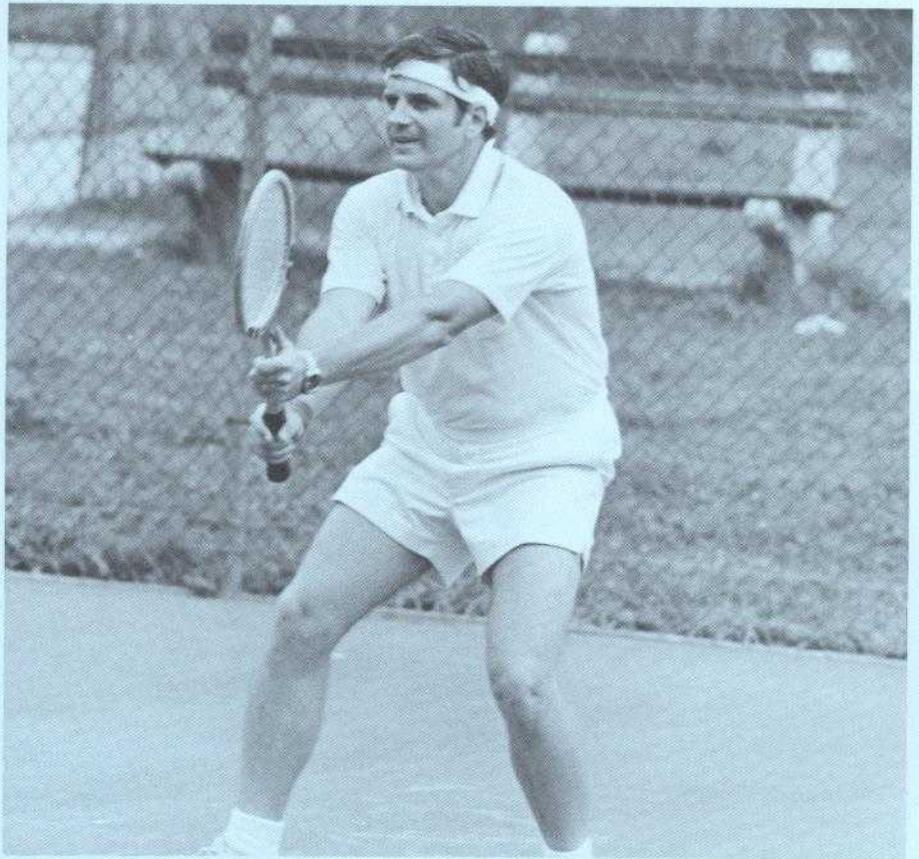
Henry Williams, Labs, defeated Bob Kinzie, Plaza, 7-6, 6-0.

### Doubles

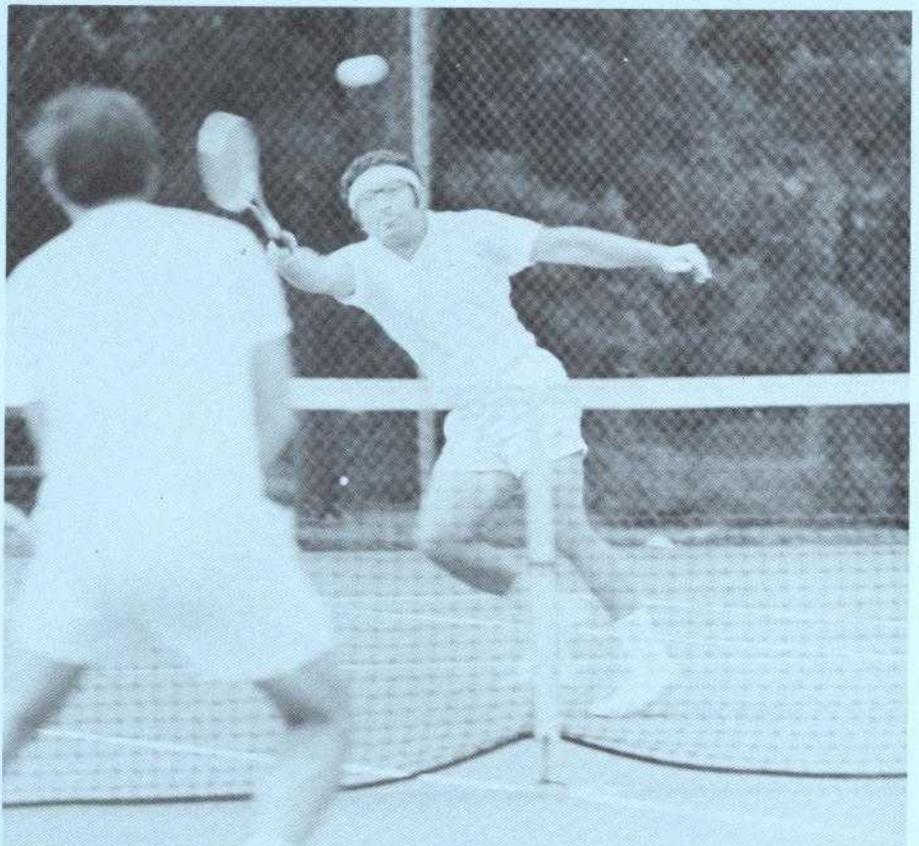
Huson and Myerehoff, Labs, defeated Bourne and Tuttle, Plaza, 5-7, 6-3, 6-2.

Bergere and Caughran, Plaza, defeated Chitre and Rubin, Labs, 6-2, 6-3.

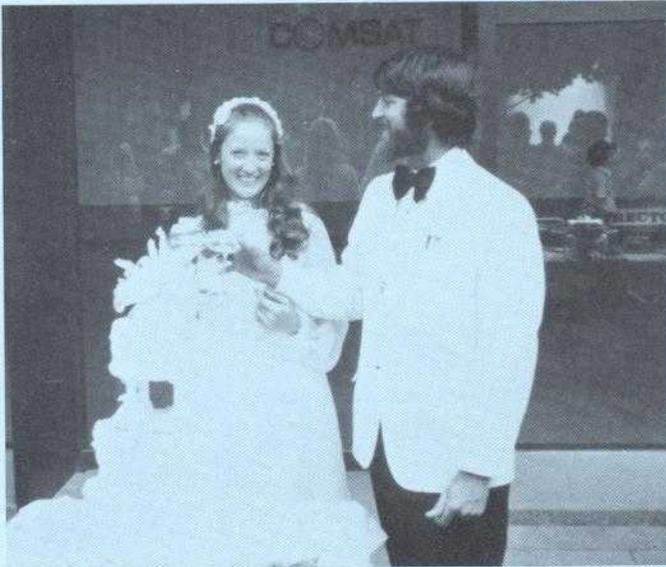
Dobyns and Sicotte, Labs, defeated Schachne and Troutman, Plaza, 4-6, 6-0, 6-4.



Dick McBride, Plaza, waits for opponent's serve.



Stan Schachne, Labs, makes a forehand return.



## COMSAT bride holds wedding reception at L'Enfant Plaza

The former Bambi Lynn and Jim Prigel came up with a "first" recently as they held their wedding reception on the promenade at L'Enfant Plaza. In the left photo, Bambi, an engineer in the Domestic Satellite Systems Division, exchanges a toast with her new husband. In the right photo, guests enjoy the reception.

### At Jamesburg

By M. LEE DORSEY

Laurence C. Cisneros, operations controller, is the newly-elected president of the Jamesburg CEA. Serving with Mr. Cisneros will be James J. Harding, as vice president, Albert R. Eleshio, as social-athletic vice president, with M. Lee Dorsey as treasurer, and Patricia A. Blatnik as secretary. The new officers have already planned a quarterly Pot-luck Dinner-Dance, the first of which was held earlier this month. Tentative plans also have been made for the annual Christmas Party.

The JCEA would like to welcome our new associate members from the Wackenhut Security Guard Service and hope the years of 1972-1973 will hold many pleasant and interesting times for all of our members.

The Third Annual Communications System Management Golf Tournament was held in September. This has always been popular here and while we didn't win the top prize, we'll be back again next year. After all, the Monterey Peninsula is known as the "Golf Capital of the World."

■ Mrs. Dorsey is finance-personnel clerk at Jamesburg earth station.

Captain Walt Robinson, son of facilities engineer Walter D. Robinson, has just returned from Vietnam. Walt has won three Distinguished Flying Crosses for his helicopter rescue missions and is up for his fourth for this last tour in Vietnam. After visiting his father at the "Lyons Den," Walt will go on to Texas and then on to a new assignment in Germany.

Gerald Speek, son of Joseph D. Speek, senior technician, graduated from U.S. Army basic training at Ft. Ord recently and has already left for Ft. Belvoir, Virginia, to train in diesel engine maintenance.

Jon D. Dorsey, son of M. Lee Dorsey, finance-personnel clerk, graduated from U.S. Navy basic training in San Diego. He will start his Medic training in September at the U.S. Naval Hospital, San Diego, California.

The highlight of utilityman Peter Roberts' summer was a family reunion. This was the first in 25 years for Peter and his four sisters. Peter and one sister, Mrs. Mary Brashears, who lives in nearby Hidden Hills were joined by sisters Mrs. Emily Waddle and Mrs. Pat Lindsay from Newcastle-upon-Tyne, England, and a fourth sister, Mrs. H. Bunker of Vancouver, Victoria, Canada. Tours of

Disneyland, San Francisco and Pebble Beach and of course lots of conversation made it an outstanding get-together.

William Culver, Jamesburg's security Sergeant of the Guards, suffered a stroke while on duty in mid-August. He was found lying unconscious on the floor of the guard house by Assistant Station Manager Michael J. Downey at about 9:20 a.m. and was admitted to the emergency room at the Carmel Community Hospital shortly after 10:30 a.m.

Considering we are 11 rugged, winding miles from the Carmel Valley Volunteer Fire Department and 26 miles from the hospital, the speed with which this tragedy was handled speaks well for the excellent first aid training our personnel have received and our always-alert fire department.

"Noah," as he is known here at the station, is now home recuperating and is greatly missed by all of us. We will be glad when the big blank space on our bulletin board is once again filled with "Noah's" daily weather forecast cartoons.

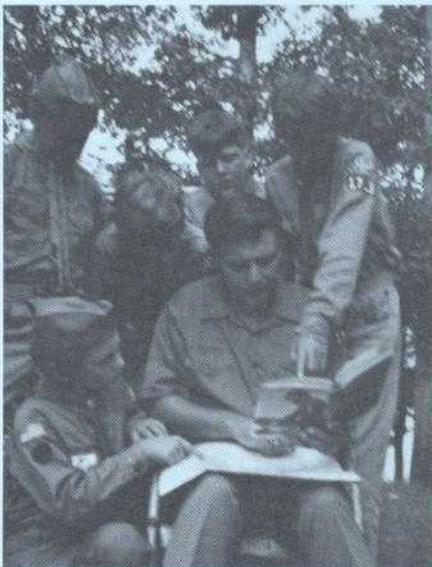
Hurry back!

## Scouts learn history as they follow 1812 path of British soldiers

BY GUS SOURIS

"Today, it is called the War of 1812. Then, it was often called the Second War of Independence."

So begins Walter Lord's book, *The Dawn's Early Light*, in which he vividly has the reader marching through the Maryland countryside as the British approach Washington,



Troop leader Souris discusses Mr. Lord's book with his scouts.

sitting with President Madison and his cabinet as they debate how to save the capital city, running with the frightened militiamen, seeing the White House go up in flames, and finally being with Francis Scott Key at the Battle of Fort McHenry.

"But above all," he says, "the book calls our attention to an America we often forget today; a small,

■ *Mr. Souris is a staff engineer in Communications System Management and Scoutmaster of a troop in Charles County and Assistant Scoutmaster of a troop in Prince Georges County, Maryland.*



Mr. Souris traces the British line of march with his troop.

young, and not always wise country struggling against the most powerful nation in the world. Things were dark at that time but in a sudden, dramatic turnabout a whole new sense of national identity emerged from the smoky haze on what Francis Scott Key so lyrically called the dawn's early light."

In a continuing effort to stress our national heritage to our youth, the Boy Scouts of America, in cooperation with the Jaycees of Prince Georges County, Maryland, have laid out a trail that closely follows the route taken by the British from Benedict, Maryland, the point at which they disembarked from their ships, to Washington, D.C.

Scouting offers an "Historic Trail" emblem and a special silver medal for those scouts who read a selected book on this subject, camp and hike on the trail and participate in a public ceremony commemorating this portion of our history.

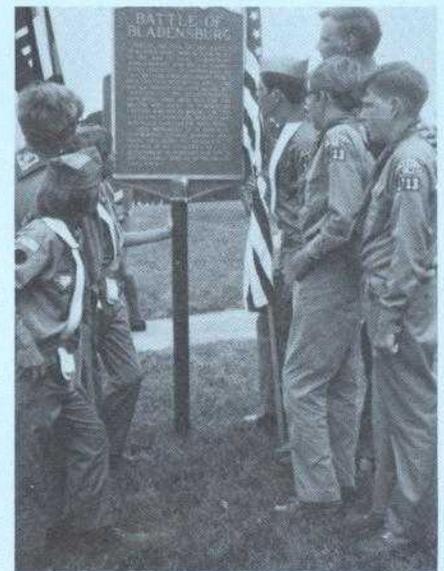
If you whet a young man's appetite for history by including a campout and a hike, you have a willing student. This became evident when the members of Troop 1713 of Accokeek, Maryland, and Troop 902 of Bryans Road, Maryland, elected to try for these awards in late August.

They set up their camp early on a Friday and immediately started reading Mr. Lord's book. They became so interested in it that they completely read it in group fashion, that

day. Saturday found them on the trail ready to "move out."

As the hike was being taken 158 years, almost to the day, after the British march and since the weather was virtually the same as described in the book—hot and humid, realism became part of the adventure. The scouts soon learned to understand and appreciate why the British discarded "excess" gear and cursed the climate of "Johnathan's" country. However, they did hike the 12 miles in approximately three hours and needed only a single five minute rest in the process.

While waiting at their rendezvous point for rides back to camp, the scouts began discussing their experiences. It became obvious to the leaders that the outing was a success and

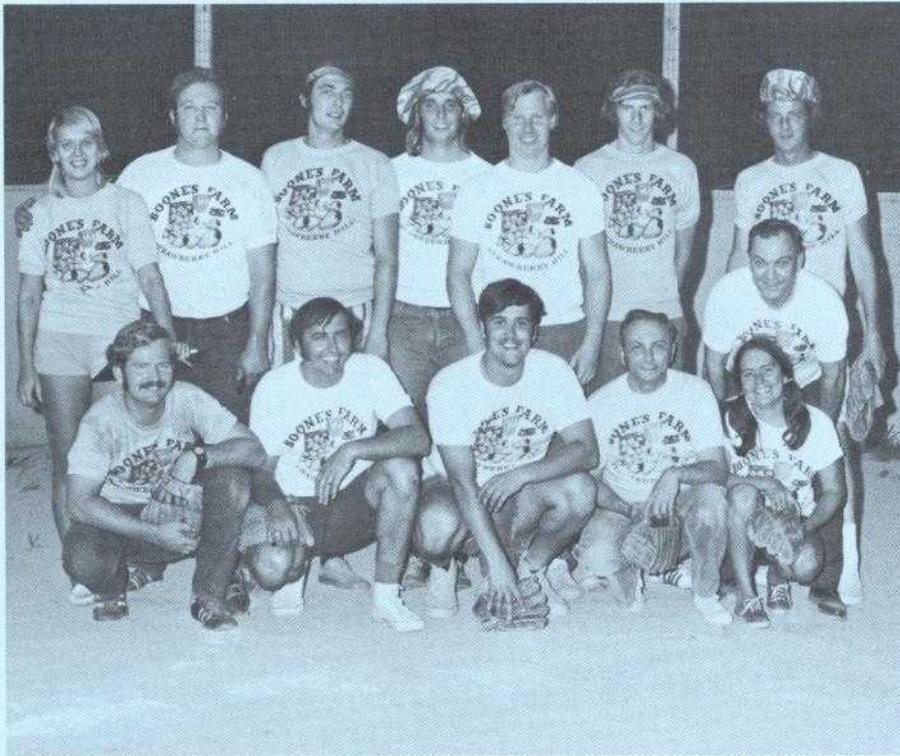


A bit of American history is reviewed.

PHOTOS BY GUS SOURIS

that everyone had learned a great deal about this part of American history.

On August 27 our troops met the last requirement for the Historic Trail award as they participated in a ceremony held at Ft. Lincoln Cemetery, the site of the Battle of Bladensburg, to dedicate the Boy Scouts "Historic Battle of Bladensburg—Star Spangled Banner Trail." With the U.S. Navy Band, a U.S. Marine Corps Color Guard, hundreds of scouts, and various local dignitaries in attendance, the Trail was dedicated in memory of the men who fought and died during this battle.



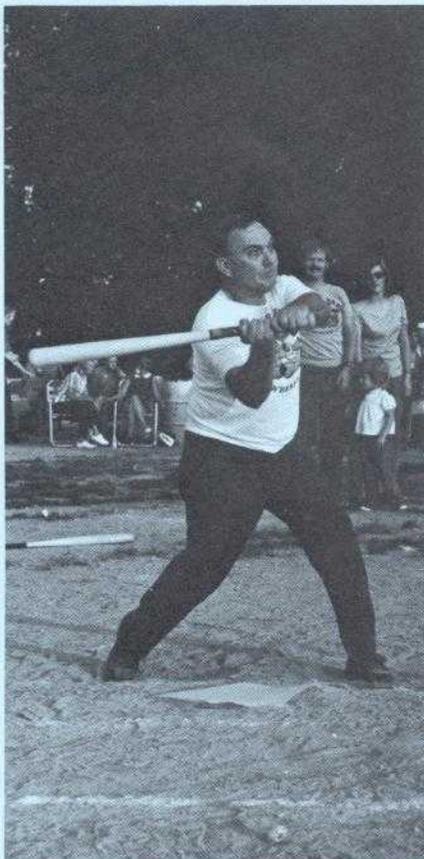
The winners are (left to right, back row) Edna Carlson, John Swart, Roger Carlson, Harold Meiklejohn, Tom Lloyd, Ray Appleby, Bill Windell; and (left to right, front row) Mike Eaton, Wayne Smith, Al Stapp, C. T. Bowman and Bettie Dorsey. Winning pitcher Fred Seaman is behind Ms. Dorsey.

## Seaman, Smith lead East to victory in Labs softball

A highly successful Labs Slo-Pitch softball season was climaxed recently when Bill Windell's East champions defeated Hank Mueller's West team by a score of 14-10.

Wayne Smith blasted three homers and batted in a total of six runs as he helped winning pitcher Fred Seaman celebrate his birthday with a victory in the season's wrapup.

PHOTOS BY DAVE REISER



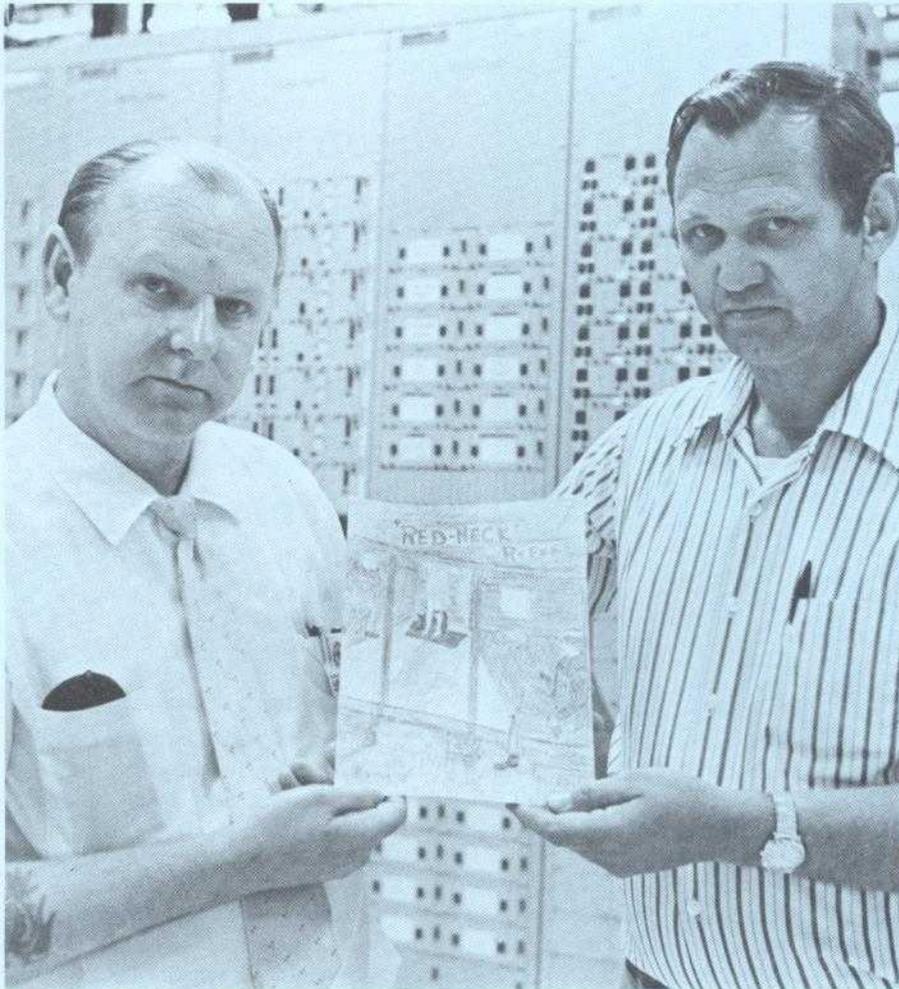
Pitcher Fred Seaman swings away.



Mike Eaton slides into third as Bob Dall'Acqua waits for the throw and Hank Mueller watches.



Wilbur L. Pritchard, COMSAT Vice President and Director of the Labs, presents the winners trophy to team captain Bill Windell.



Rupe Hobbs (left) discusses an illustration with Carl Cooper.

PHOTO BY ALLAN GALFUND

## Etam's Rupe Hobbs launches his literary career

BY ALLAN GALFUND

Rupard N. Hobbs, supervisor of the Grey Team at the Etam Earth Station, has written a novel about Appalachian life that is being published by Vantage Press in New York City.

The book took about 18 months to write, but Rupe began gathering material for the story long before that. One day Rupe showed some of his writings to Carl Cooper, a senior technician on his team, and Carl encouraged Rupe to put the material

■ *Mr. Galfund is a COMSAT senior information officer.*

into book form. Rupe acknowledges that Carl was the prime mover in convincing him that the story had the potential to be an interesting book. Not only was Carl a staunch supporter, but it turned out that he is a talented illustrator and did the 10 illustrations which accompany the story.

As the story progressed and was fleshed out, Carl took Rupe's drafts home for proofreading and typing by his wife, Sonja. The following day, Rupe and Carl would discuss the plot and Rupe would incorporate any changes into his story. The editing and typing of the final manuscript was done by Mrs. Edith Walker, the mother of senior technician Don Gaston and the third member of Rupe's team.

The setting for *Red Neck Rufus* is the Appalachian region of West Virginia, where the Etam Earth Station is located. It is a moving story about the hillfolk who populate the area

and traces the struggles of these mountain people to unravel a 100-year old mystery of the Three Sisters Cavern, ending in a dramatic climax.

*Red Neck Rufus*, 200 pages in length, will be available in mid-October for \$4.95.

Rupe, who started with COMSAT at the Brewster Earth Station in 1966 and was transferred to Etam in 1968, was born and raised in Marianna, Arkansas. After attending primary and secondary schools there, Rupe joined the Navy during World War II. It was while in the Navy that he was sent to electronics school, a career he pursued after his six years with the Navy.

Although Rupe never had any formal training in writing, it has a special appeal for him, and he has written many short stories as well as articles for company newspapers where he was employed. This fascination for writing culminated in the publication of *Red Neck Rufus*.

Carl Cooper is a Marion County, West Virginia, native and has lived there most of his life, with time out for two hitches in the Army. His talent for illustrating comes to him naturally, as he never has received any formal training as an artist. Carl has been with COMSAT for more than four years and lives with his wife, Sonja, and three children in Macomber, West Virginia.

## Ecoss de la Montana

BY LUIS R. RODRIGUEZ

June wedding bells rang for Bill Reece, our facilities engineer, and the former Miss Tula Delgado. The ceremony was held at the Las Piedras Catholic Church with the reception following at the Delgado home. Bill and Tula spent their honeymoon visiting with Bill's folks in California.

The stork visited the Ralph Camachos in June and brought a 9 lb. 2 oz. baby boy. Mother and son are doing fine!

Pepe Martin recently received his diploma in Electronic Engineering Technology from CREI.

■ *Mr. Rodriguez is administrator at the Cayey Earth Station.*



INTELSAT engineers gather at the main entrance of the Labs during their recent summer training session. COMSAT staff members are Henri Suyderhoud (left), Michael Onufry (fifth from left), Dr. S. J. Campanella (fourth from right) and Eric Kauffman (kneeling at left).

## Fall field test planned for echo cancelers

COMSAT Labs, under INTELSAT sponsorship, plans to test four newly developed, highly sophisticated electrical devices known as echo cancelers in fall field trials utilizing working circuits within the INTELSAT network.

As every telephone user knows, echoes are ever-present in long distance telephone connections. Today the audible effects created by echo are somewhat minimized by the use of echo suppressors.

However, since even the best suppressors are not always foolproof, long distance telephone callers often experience brief periods of dampened speech and chopping of initial syllables.

It is anticipated that the upcoming field trials will prove that the echo canceler will overcome the inherent shortcomings of today's echo suppressor and thus enhance the quality of satellite communications.

Two experimental cancelers have been designed and built by the Signal Processing Branch at the COMSAT Labs under the direction of Dr. S. J. Campanella, while two others were built by the Nippon Electric Company under an INTELSAT contract. It is these four units that will be tested this fall.

To prepare the participating countries for the trial, the Labs sponsored a two-week training seminar last summer at which INTELSAT engineers from Brazil, England, France, Germany and Japan were instructed in the operations and maintenance of the test units.

In addition, plans were developed to measure the effectiveness of this improved technique of echo control by means of call-back interviews.

While it is still too early to know how successful these field trials will be, the day is coming when the presence of echo in long distance circuits will be eliminated.

Much of the credit for this accomplishment will be due to Dr. Campanella and his associates, Henri G. Suyderhoud and Michael Onufry, for their work in this area.

## COMSAT asks FCC to approve experimental rate

COMSAT recently asked the Federal Communications Commission to approve its proposed \$1000 experimental rate for satellite communications between the U.S. Mainland and Hawaii.

On April 19, the Corporation proposed to reduce its monthly rate for leased channels via satellite from \$2700 to \$2500, effective June 3, and to further reduce rates from \$2500 to \$1000 for each carrier's new traffic which exceeded by more than 10 percent the number of channels being leased by that carrier as of April 18.

On July 19, the Commission approved an across-the-board reduction from \$2700 to \$2500 but suspended the \$1000 rate for growth traffic and called for a rate hearing on this aspect of the proposed tariff.

In its petition for reconsideration, COMSAT emphasized that the proposed \$1000 rate is clearly in the public interest, both as a means of providing lower rates and as an experiment that might justify even further rate reductions.

In urging approval of the \$1000 rate without a special hearing, it was noted that the Corporation is already deeply involved in an overall rate hearing which has been in progress ever since March and is expected to continue well into the fall.

As an alternative, if the Commission does not approve the \$1000 rate, COMSAT suggested that the Commission permit withdrawal of the entire tariff revision, including the reduction from \$2700 to \$2500, to permit a reexamination of the Mainland-Hawaii rate structure.

## Brion appointed to Virginia Water Control Board

Denis J. Brion, a general attorney for COMSAT, was recently appointed to the State Water Control Board by Virginia's Governor Linwood Holton.

Brion, a graduate of the University of Virginia Law School and a COMSAT employee since July 1970, will serve for four years. Earlier he had served as a member of the state's Wetland's Study Commission and has been interested in environmental activities for a number of years.

The board is charged with the overall planning responsibility for insuring that the state's water resources are properly used. Mr. Brion's area of direct responsibility will be in the long-range planning aspects of this task.

## New earth station to be constructed in Peking

RCA Globcom announced in August it had signed contracts for \$5.7 million with the People's Republic of China for the installation of new earth station facilities in Peking and Shanghai.

The contracts cover construction of a new standard station in Peking and expansion of an existing non-standard station now operating commercially in Shanghai with China-U.S. circuits via the Pacific INTEL-SAT IV satellite.

The present Shanghai facility was sold to the Chinese by RCA Globcom last January under a separate \$2.9 million contract. It was used during President Nixon's journey to China in February and subsequently began regular full-time service.

The new contract was signed in Peking by Howard R. Hawkins, RCA Executive Vice President and Chairman and Chief Executive Officer of RCA Globcom, and Li Chang Chin, Deputy Director General of China National Machinery Import and Export Corp., acting for the Telecommunications Administration.



Joseph N. Pelton

## Pelton earns PhD under COMSAT's assistance program

In September Joseph N. Pelton, manager, ICSC affairs, became the second COMSAT employee to receive a PhD under the COMSAT Educational Assistance Program.

Dr. Pelton has the varied educational background common among personnel in International. He received a B.S. in physics from the University of Tulsa in 1965 and was named the outstanding graduate in physics for that year by Sigma Pi Sigma Physics Honorary Society. Subsequently, he worked as an engineer with North American Rockwell and then went on to graduate school at New York University where he received a Master's degree in International Relations in September 1967.

He then came to Washington, D. C. as a National Defense Education Act fellow at Georgetown University where he completed course work for his PhD in Government and International Relations in January 1969. Under the COMSAT Educational Assistance Plan, he completed his dissertation and received his diploma in September.

Prior to joining COMSAT, he worked as an intern in the International Office of NASA and as a research associate for the Program of Poverty Studies in Science and Technology which is a non-profit research organization affiliated with George Washington University.

Dr. Pelton has been with COMSAT for more than three years.

## Private mint plans satellite medal

By JOHN C. HILL II

As one of a series of events celebrating the 10th anniversary of the Communications Satellite Act of 1962, COMSAT is sponsoring the design of a commemorative medal. The creation of this medal is also part of a year-long program commemorating February 1, 1963, the Corporation's 10th birthday.

The Franklin Mint, in December 1971, asked COMSAT to participate in the production of a medal to honor a decade of satellite communications achievement.

The medal, to be distributed later this year, will be sent to subscribers to the Mint's monthly "Special Commemorative" issues.

COMSAT as a sponsor has assisted the Mint in developing the theme and design and will have exclusive rights to the purchase of additional copies of the medal for its own use. Once the Corporation has no further need for additional copies of the medal, the dies will be destroyed to preserve the medal's value to collectors.

Once the 10th anniversary theme was chosen, background material was provided to the Mint. Their artists provided initial design sketches for COMSAT's review. Modifications were prepared by Larry Kopp's graphics shop, and a design was finally selected in June which was satisfactory both to COMSAT and to the Mint. The finished medal is expected to be available to COMSAT for distribution during October.

The Franklin Mint, located outside of Philadelphia, is one of the largest private mints in the world. Although it does some minting for foreign countries, most of its efforts are spent in producing over 600 specialized and commemorative medals each year, for its subscribers. Although a variety of alloys are used, most of the medals are produced in .999 "fine" silver, with "proof" finish, which produces a medal of sparkling quality.

■ Mr. Hill is Assistant to the Vice President, Corporate Affairs.

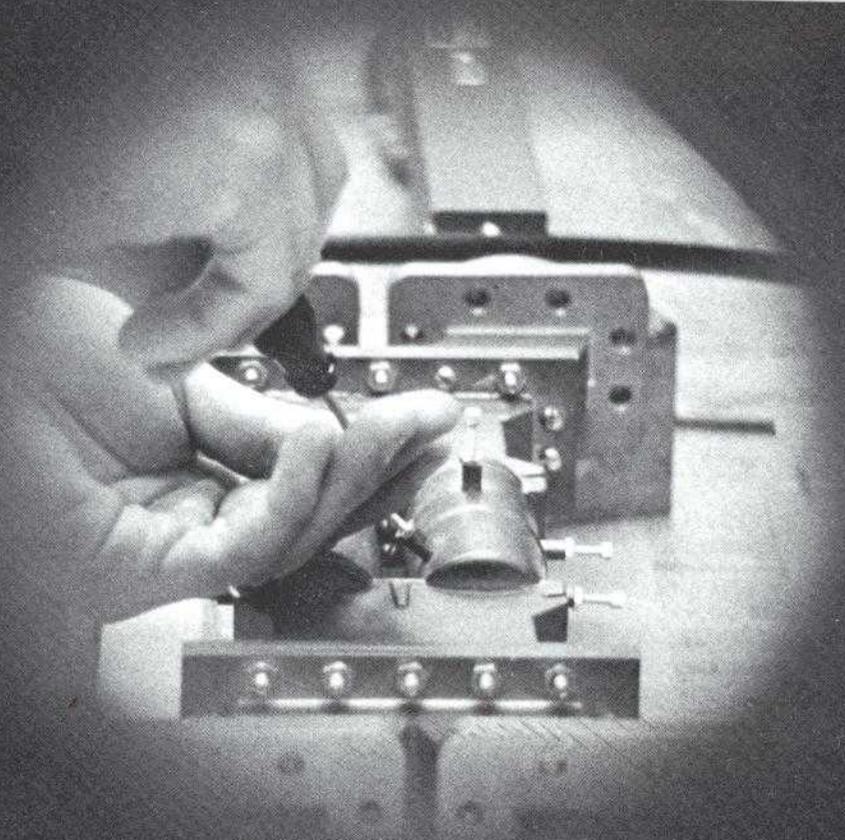
Shown here are the obverse and reverse of the COMSAT commemorative medal soon to be released in connection with the 10th anniversary of the Communications Satellite Act of 1962.



# COMSAT NEWS

November-December 1972

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**Improved efficiency,  
economy and reliability  
for unattended earth  
stations — page 2.**

# COMSAT NEWS

U.S. elections, football and news boost satellite TV....	1
Earth terminal program to provide unattended operation .....	2
Apollo 17 events on TV .....	7
Cable restorations via satellite .....	8
ANIK 1 successfully launched .....	10
Improved Atlas Centaur to be used for next launch ...	11
The COMSAT Visitors Center ..	17
Employee news .....	19-36

## On the Cover

An unusual view of an adjustment being made to a Reliable Earth Terminal (RET) multiplexer unit. The unit allows several transmitters to be connected to an antenna feed without loss in power or bandwidth. For details of the RET project, see page 2. *Photo by J. T. McKenna.*

### Nov.-December 1972—7th Year, No. 6

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**Matthew Gordon, Assistant Vice  
President for Public Information**  
**James H. Kilcoyne, Jr., Editor**

## U.S. elections, football, Apollo 17, French news boost satellite TV

The U.S. national elections, sports and news programs increased the usage of INTELSAT satellites for overseas telecasts in the last two months.

But while the U.S. was preoccupied in November with election contests and football conquests, little-noticed new TV viewing trends were beginning to emerge. (For the Apollo 17 TV schedule, see page 7.)

Larry Covert, manager of the Operations Center which processes all TV bookings, notes that France started last month, without fanfare, daily news telecasts via satellite, joining Spain as a continuous user of the INTELSAT system for overseas TV news broadcasts on a daily basis.

Spain has used satellites regularly since the spring of 1971 for telecasts to its Canary Islands possessions. It transmits 90 minutes of TV a day, seven days a week usually in three separate 30-minute feeds. On Sundays, the schedule is even more extensive, amounting to about three hours. In addition, Spain also operates the Iberoamerican service, consisting of a 10-minute news feed via satellite, five days a week, to multiple points in Latin America. Brazil, Colombia, Peru and Venezuela partici-

pate regularly, with other Latin American countries joining the network as events of special interest arise.

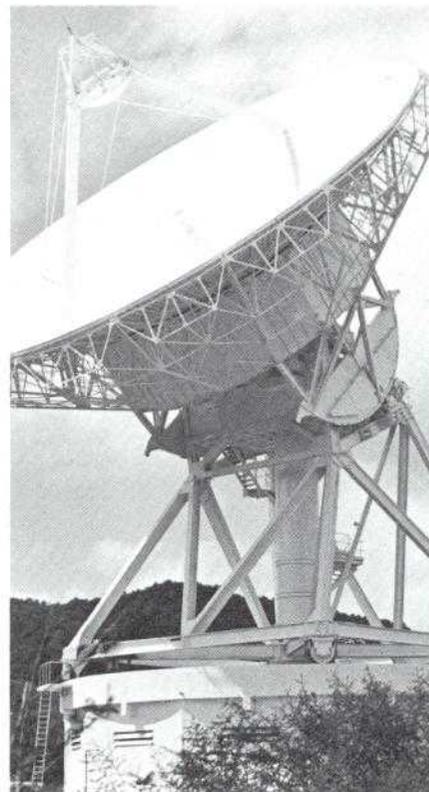
France's TV newscasts via satellite began as 30-minute programs, seven days a week, to Martinique in the Caribbean, where the French operate the Trois Ilet earth station. Subsequently, Jordan, Israel, Iran and Morocco joined the list of those receiving the same programming on a near-daily basis. Mr. Covert said France has submitted requests for satellite time for the service to continue until October of 1973.

Meanwhile, the U.S., which had for much of the year gradually diminished in its percentage usage of the system for TV, began to reverse the trend.

One reason: the U.S. elections.

Approximately 35½ transmit hours and more than 40 receive hours of satellite time was used by broadcasters for telecasts abroad via satellites of election results, accounting for a total of 76 half-channel hours during the three-day period November 6 through 8.

TV via satellites of the Nixon landslide and general election news was received by earth stations in Italy, England and Germany in Europe, and



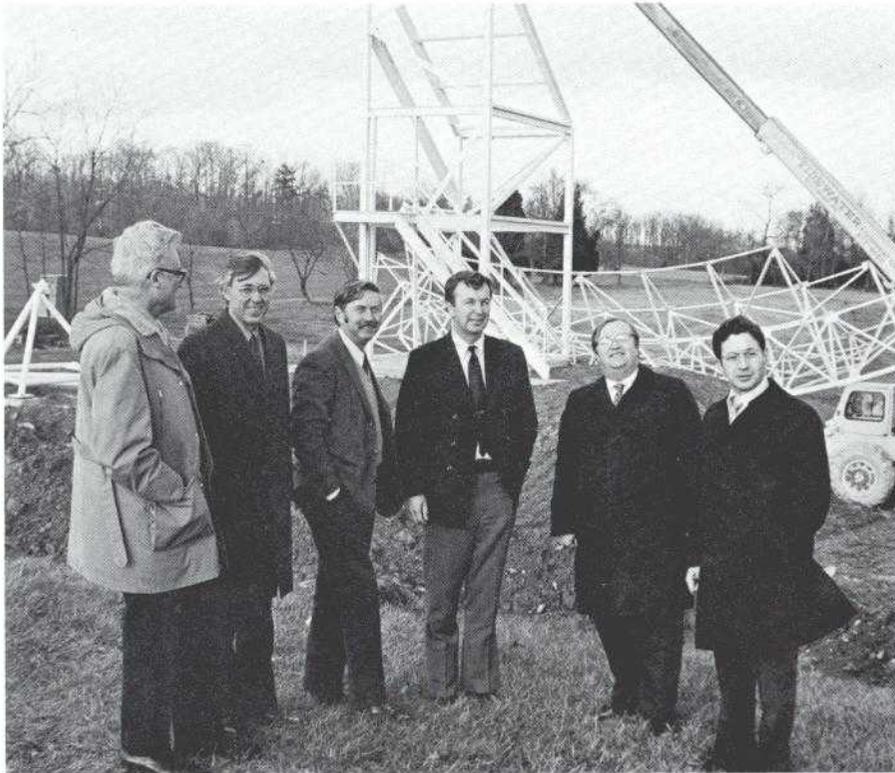
Martinique's new earth station is located at Trois Ilet.

by Israel, Brazil, Nicaragua, Australia, Japan, Thailand, as well as Alaska, Hawaii and Puerto Rico. The NICATELSAT station at Managua, Nicaragua, in which COMSAT has a major ownership share, participated in its first telecasts. It began full-time commercial service later.

Another reason: football, all to U.S. points.

Mr. Covert pointed out that in September and October 21 games were transmitted. Another 34 professional and college football games, each averaging about three hours of satellite time, are scheduled for transmission via the INTELSAT IV Pacific satellite to Hawaii during November and December, and more bookings are being made for the January bowl games and the professional playoff and championship games.

For the first time, Puerto Rico—long the recipient of professional baseball's Game of the Week telecast—also began placing orders for telecasts via satellite of football games. As of mid-November, Mr. Covert said a total of 60 football games had been booked for satellite transmission between the U.S. mainland, and Hawaii and Puerto Rico.



Lawrence Gray, William J. Getsinger, Lewis V. Smith, Randall W. Kreutel, Geoffrey Hyde and Louis Pollack (left to right), confer on the site of the RET.

PHOTOS BY J. T. MCKENNA

## Earth terminal program to provide reliable unattended operation

BY LOUIS POLLACK

*COMSAT Laboratories is developing an automatic earth terminal to meet the potential requirements of the INTELSAT system and for proposed U.S. domestic satellite services. The development program is directed at improving earth terminal technology for unattended operation over extended periods through designs emphasizing reliability, long life and remote operation from a central control.*

Communications satellite earth terminals have evolved from the experimental-operational designs of the early 1960s, as represented by the large radome-covered horn antenna at Andover, to the wideband designs now operating at Etam, West Virginia, and Andover 2. These terminals have been designed and built to commercial engineering standards, and their design is strongly influenced

by competitive bidding. Although long life has been specified, the verification of design margins and reliability often have been pre-empted by the demands of transmission performance and delivery schedule.

All U.S. stations have established an excellent record of service continuity—an average of 99.99 percent during 1972, with relatively few operating personnel (an average of 24 per station). If, however, station failures and the number of operating personnel are extrapolated to the greatly expanded systems projected

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■ Mr. Pollack is Director, R.F. Transmission Labs, COMSAT Laboratories and is responsible for the Reliable Earth Terminal project.



Alfred Barnes tests a modem.

for the late 1970s, such as a multi-purpose U.S. domestic system, it is clear that an automatic earth terminal, with demonstrated reliability sufficient for unattended operation, is necessary for economical high-quality service.

COMSAT management, therefore, initiated a Laboratories' program in 1971 to develop the needed technology and designs. The four-phase program started by establishing the system requirements and the reliability approach. This was followed by design and breadboarding the subsystems.

The second and current phase will be completed by the second quarter of 1973 with the testing, operation and evaluation of a full-scale engineering model earth terminal expected to meet U.S. domestic system requirements.

Phases Three and Four are scheduled to run through the fourth quarter of 1974 and 1975, respectively. Prototype models developed during Phase Three will be field and operationally tested during Phase Four.

The system model used in developing the design envisaged a domestic system having as many as 500 earth stations operating with three or more satellites. The initial frequency band implemented is the presently used satellite communications band nominally at 4 and 6 GHz. Modular additions for the 12-14 GHz and 20-30 GHz bands will be developed on a longer range schedule as the needs become firmer. The earth terminals will operate with spacecraft using 40 MHz channelized output amplifiers, similar to the INTELSAT IV series, but providing as many as 24 RF channels through dual-linear polarization. The general requirements are:

**Reliability.** Uninterrupted transmission through all stations for a period of 90 days. Any failed subsystems to be repaired or replaced within 48 hours without transmission interruption.

**Life.** Wearout time shall be greater than seven years with infrequent (12-month periods) maintenance.

**Automatic Operation.** All switch-

ing, sequencing and supervisory functions shall operate automatically and/or from a remote controlled center.

**Transmission Performance.** Meet INTELSAT and AT&T transmission standards.

**Modularity.** Basic subsystems shall accommodate a range of traffic requirements. Such subsystems as feeds, low-noise amplifiers, power amplifiers and local oscillators shall operate over the 500 MHz of the 4- and 6-GHz bands without tuning.

Engineering models of the major subsystems are now being incorporated into the earth terminal being constructed at the Labs. The entire system will be tested during the first quarter of 1973.

**P**erhaps the most dramatic subsystem is the fixed reflector, multiple beam torus antenna (MBTA). The parabolic torus reflector, parabolic in a vertical section and circular in the horizontal section, is illuminated by a corrugated feed horn in the equipment enclosure. The geometry of the system permits the feed-horn to be offset from the beam directed at the satellite in equatorial orbit. The COMSAT design (patent pending) developed by Dr. Geoffrey Hyde and



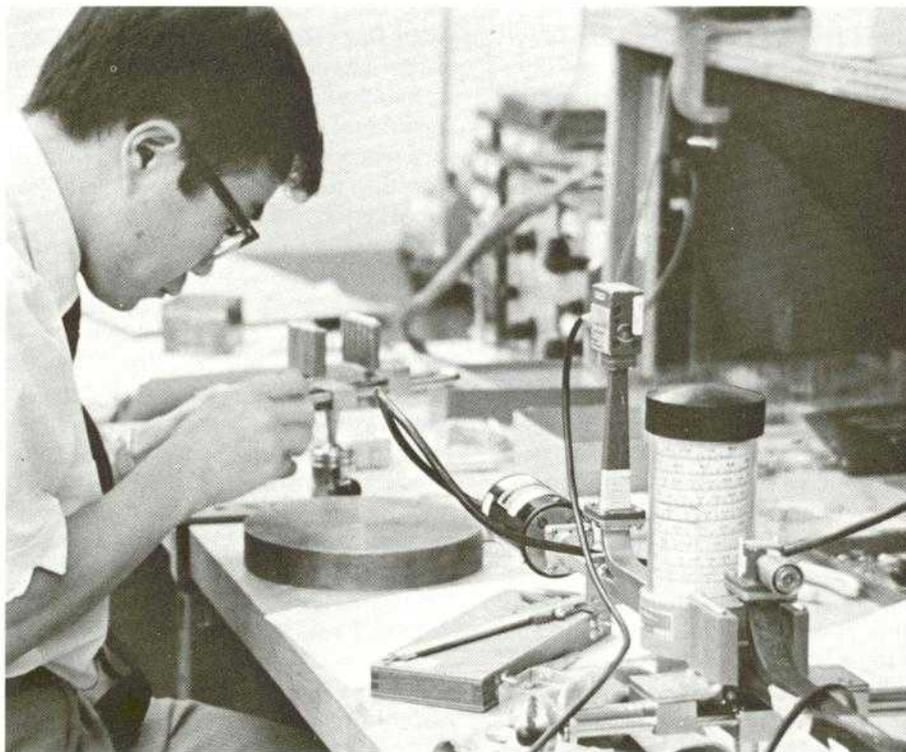
**Guillermo Arana checks a microwave integrated circuit.**

Randall W. Kreutel allows two or more beams to be formed with a single reflector so that a terminal may operate with two or more satellites stationed along a portion of the synchronous orbit. The reflector area is less than the equivalent area of two conventional reflector-antennas, resulting in considerable cost savings. In addition, it can provide instantaneous switching from one operating satellite to a spare.

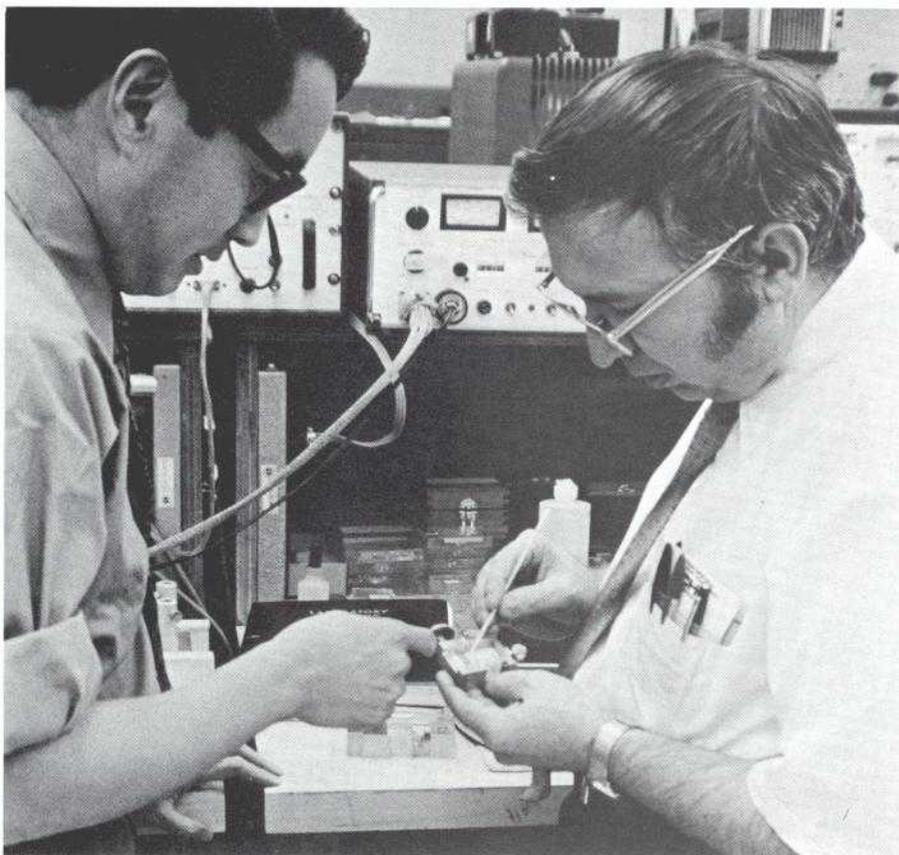
The fixed structure, firmly tied to a concrete foundation, will withstand wind and ice loading at less expense than the structure required for a steerable reflector. Lewis Smith, with the help of Paul Schrantz and Ali Abu-Taha, have developed a lightweight structure, about one-half the weight of older designs, that will meet the requirements of a U.S. domestic environment.

This full-scale engineering model, nearing completion at Clarksburg, is equivalent to a 32-foot diameter reflector in terms of gain for each beam.

An unusual feed, developed by Ronald Price, provides exceptionally low sidelobes, i.e., little unwanted



**Young Soo Lee checks a microwave amplifier circuit.**



**Dr. Su Min Chou (left) and Paul Koskos discuss a microstrip module.**

radiation. The feed can be moved precisely to follow small satellite motions if necessary. The feed connects to the receivers and transmitters through a polarizer/OMT designed by Robert Gruner and Ronald Price. Mr. Gruner has also designed the multiplexer which allows several transmitters to be connected to the antenna feed with little loss in power or bandwidth. Transmitters can be added or removed without disturbing the others on line.

Regarding antenna performance, G/T with our uncooled parametric amplifier is estimated to be greater than 30 dB/°K; transmit gain >53.5 dB and sidelobes decreasing at a more rapid rate than good conventional parabolas.

**E**ach radio channel carrying voice, data, or TV to the satellite includes a modulator, I.F. amplifier, band filter, frequency converter and power amplifier. To allow growth in information transmission capacity and convenient transition to digital transmission, a new intermediate frequency

of 855 MHz was chosen. This frequency is sufficiently high to permit full-band coverage (500 MHz), but not so high that filtering and amplification become difficult and expensive.

The frequency modulator and companion demodulator as well as the band-limiting filters, are being designed by Melvin Grossman and Khodadad Betaharon. These units will accommodate 24 to 1,800 voice channels or TV. The modulator output is amplified to a 10-mW level by an I.F. amplifier designed by Calvin Cotner. The design uses two transistors in each stage of amplification so arranged that a failure of one of the two only decreases the gain rather than interrupts the signal. This gain change can be automatically or remotely corrected by the control center. The tuned circuits and interconnections to transistors and other components are gold conductors 50 millionths of an inch thick, plated onto a ceramic wafer and photo-etched using a master template, thus assuring excellent reproducibility and lower cost than present machined circuits.

An unusual high level up-converter shifts the I.F. signal to the 6-GHz band and amplifies the 10-mW level to 30 mW. The circuit uses a varactor diode terminated by a filter triplexer circuit developed by Raymond Sicotte. The filters direct most of the energy in the I.F. signal and "pump" frequency, so that the I.F. plus pump (upper sideband) appears at the output. The upper sideband signal at the 30-mW level can drive the output power amplifier directly.

The mixer gives a constant output anywhere in the 5.9- to 6.4-GHz band simply by selecting the proper pump frequency—no tuning or adjustments are required.

The pump signal is obtained from a crystal-controlled oscillator multiplier chain developed by Ronald Stegens and Young Soo Lee. Parts of this chain were contributed by Dr. Michael Barrett and Raymond Sicotte. The local oscillator is unique in that the bandwidth is 500 MHz. All that is required to change frequency is a simple switching to another quartz crystal, yet this local oscillator is stable to 1 part in  $10^6$  over a temperature range of 40°C (72°F). Again photo-etched circuits yield excellent reproducibility.

The final unit in the transmitter is the power amplifier. Arthur Standing, with the assistance of Richard Mott, is designing the unit to achieve high reliability and automatic operation; no external knobs, meters or lights are required. The traveling wave tube for this unit is being developed for COMSAT by the Varian Company and is specified for a minimum life of 25,000 hours (about 3 years). It is forced-air cooled in contrast with liquid cooling required for high-power units.

The TWT beam is focused with integral permanent magnets. The tube will amplify the signal from the up-converter by about 50 dB and provide an output power exceeding 400 watts at saturation. The tube power supply operates directly from lead acid storage batteries, which isolate the earth terminal equipment from commercial power line fluctuations. The inverter type supply converts the battery D.C. to an A.C. at a frequency of 1,500 Hz prior to voltage step-up and rectification. This permits excellent fil-

tering with relatively small components and also reduces the size of the transformers.

Modularizing the output amplifier to 40-MHz bandwidth increments per 400 watt unit matches the frequency plan of the INTELSAT IV and proposed U.S. domestic satellites. This makes possible high efficiency, single-carrier operation of each tube. Each amplifier unit, coupled to our engineering model antenna, will properly illuminate a satellite for carrier capacities up to 1,800 channels or TV. A pair of units can be readily combined to transmit a TV carrier to an INTELSAT IV satellite. Reliability is enhanced with a redundant amplifier which is automatically switched into the system when output power fails but input drive is present.

In keeping with the emphasis on reliability, the parametric amplifier operates unrefrigerated. The low noise temperature of 75°K is achieved by using a low loss input circulator, a 250-MHz dynamic cutoff frequency diode and a pump frequency of 45 GHz.

The design, developed by Dr. Su Min Chou, William Getsinger, and Pau Koskos, incorporates an input filter, a two-resonator idler filter, and a pump coupler, all made of gold conductors etched on a 0.5" x 0.1" x 0.017" fused silica plate. The entire solid state paramp is enclosed in a 10" x 10" x 2" module that plugs into a 9-port circulator developed in the Labs.

A four-stage amplifier is used in the RET so that we can avoid a redundant paramp and an undesirable R.F. switch at the antenna input. The four stages amplify the signal more than 40 dB. Failure of any stage lowers the gain by about 10 dB, but the decreased gain is automatically corrected by the AGC in the I.F. amplifier. One or more stage failures does not cause a catastrophic break in communications; at worst, there is degradation of the noise temperature of less than 2 dB, if the first stage fails, which decreases to about 0.1 dB if the last stage fails.

Following the paramp, the signals are channelized into the appropriate 40-MHz slot with a suspended substrate filter-multiplexer. A low loss

mixer, operating with a local oscillator similar to the transmitter up-converter unit, but yielding 15 mW output rather than 400, is followed by an I.F. amplifier similar to the one mentioned in the transmitter section. Calvin Cotner, who is developing the mixer and filter multiplexer units, has emphasized simplicity and a large positive margin between achieved and required performance, thus designing the reliability into the circuits. This has been the design criterion for the entire team of this project.

The prime power to the terminal is taken from two battery banks, which are constantly being recharged by the commercial power line. One battery bank supplies three power amplifier modules, the second all the other equipment. All low power equipment can operate directly from the A.C. line in the event of a battery or charger failure, and the power amplifiers can operate from either battery bank. In the more likely situation of a commercial power failure, the station can operate for at least one hour on the batteries.

Since equipment is compact, all the R.F. equipment is located close to the antenna feeds in a 10' x 15' room. The feeds in this room are protected from the weather since only the aperture of the horn protrudes through a flexible membrane in the equipment room wall facing the reflector.

Batteries, power supplies and prime power entrance are in the lower 10' x 15' room.

Remote monitoring and control equipment is being designed by Richard McClure, and will be incorporated into the terminal during next year's development.

Clarence Crane has very ably carried through all aspects of site construction from obtaining County permits to supervising installation of foundations and prime power lines.

Robert Strauss and James Francis are the key men in monitoring reliability approaches and component selection. During the development of system concepts, subsystem specifications and interfaces, Dr. William Sones has kept a knowledgeable eye on potential system problems that may occur with the interplay of the many subsystems.

The implementation is proceeding rapidly toward completion of the full-scale engineering model under Laurence Gray's direction. The project fabrication information has been recorded by Don Rivera and the drafting department, and components have been accurately fabricated by Ronald Kessler's machine shop and Peter Varadi and Lawrence Sparrow's electrochemical processing group.

Throughout the project, reports and records have been prepared by our secretaries, Sheila Norton, Judy Ford, Barbara Scheele and B. J. Robertson.

We look forward to the engineering model test phase early next year culminating in a prototype during Phase Three. The program should provide COMSAT an integrated earth terminal design for reliable automatic operation and a number of subsystems that will prove useful in all future earth terminals.



## COMSAT official addresses American Society for Information Science panel

Dr. Burton I. Edelson, Assistant Director, COMSAT Labs, is shown at the podium in the right photo as he discussed "satellite communications for information networking" during the recent ASIS convention at the Shoreham Hotel in Washington, D. C. In the left photo, COMSAT Headquarters Librarian Sharyn Kilderry uses an input keyboard device to "talk" with a computer located in Darmstadt, Germany, via an INTELSAT IV satellite link in an associated demonstration of on-line computer file searching.

PHOTOS BY J. T. MCKENNA

## Earth station year-end total reaches 80

BY HALE MONTGOMERY

The satellites have all the glamour. But earth station facilities which comprise the less spectacular "other part" of the global INTELSAT system have grown steadily to form an enduring worldwide telecommunications network.

By the end of November, 79 earth station antennas were in commercial service systemwide. In the Atlantic area alone, a ground complex of 40 station antennas was operating through the two INTELSAT IV satellites serving that region—a remarkable growth when compared with the five stations that existed at the time commercial service began 7½ years ago.

The system boxscore at the end of November showed: 79 antennas, at

■ *Mr. Montgomery is a COMSAT senior information officer.*

65 earth station sites, operated by 49 different countries. Two new stations entered commercial service in November, both in the Atlantic area. They were Abidjan, Ivory Coast, and the NICATELSAT station at Managua, Nicaragua, in which COMSAT has an ownership interest.

One additional antenna forecast to enter commercial service this year will raise the year-end 1972 total to 80 antennas. It is a third antenna, scheduled for full-time service in December, at the Raisting, Germany, site, one of the initial stations that began service via Early Bird in mid-1965.

In dollar terms alone, the gross investment for today's widespread network of earth station facilities in the INTELSAT system represents a substantial long-term commitment, made individually by many different countries in a relatively new communications technology, within a comparatively short time.

If an average of \$3.5 million is assumed as the cost of an antenna and related facilities, today's network of 79 operating antennas amounts to a gross systemwide investment of

about \$275 million. This does not take into account the millions of dollars more spent by a number of developing countries on extensive improvements and expansion of their internal terrestrial facilities, sparked by the addition of earth stations giving them access for the first time to high-quality external communications.

Earth stations don't go in much for style changes. Unlike the more dynamic technological changes associated with satellites, the earth stations stand as more permanent system facilities. Antenna structures normally are depreciated over about 15 years, buildings and such fixed structures around 20 years, and some electronic components only one or two years, for an average composite depreciation of about a 9-to-10 year lifetime for a station. This varies, and many facilities will last long past depreciation lifetimes, but whatever figures are used, the worldwide network as it exists today represents a long-term investment in satellite communications.

The outlook is for sustained growth. An additional 12 antennas are scheduled to join the system in 1973, raising the total to 92.

## COMSAT staffers aid EASCON '72

Several COMSAT staff members played significant roles in the recent 1972 Electronic and Aerospace Systems Conference (EASCON '72) held at the Marriott Twin Bridges Hotel in Washington, D. C. Sponsored annually by its parent organization, The Institute of Electrical and Electronic Engineers, this year's conference theme was, "Engineers, Society, and Environment—Interacting for Survival."

Taking part in the three-day session were Robert D. Briskman, Director, Domestic Systems, who is EASCON's Board Chairman; Edward F. Lucia, Jr., Domestic Systems Office, who served as Registration Chairman, and Senior Information Officer Larry G. Hastings who acted as Publicity Chairman.

In addition, Dr. S. H. Durrani, currently on leave from the COMSAT Labs, served as a session organizer, while Dr. Pier L. Bargellini and Walter L. Morgan, both of the Labs, jointly delivered a paper.

Over 400 persons attended the meeting. Richard Gould, a former COMSAT employee and now with the Federal Communications Commission (FCC) was conference chairman.

### Televised Events

Date	Time (EST)	Event
Thur., Dec. 7	12:33 a.m.	Apollo 17 Liftoff
Thur., Dec. 7	4:30 a.m.	Transposition and Docking
Mon., Dec. 11	7:48 p.m.	EVA 1
Tues., Dec. 12	5:31 p.m.	EVA 2
Wed., Dec. 13	4:58 p.m.	EVA 3
Thur., Dec. 14	5:41 p.m.	Liftoff from the moon
	7:31 p.m.	Rendezvous
	7:54 p.m.	Docking
Sat., Dec. 16	6:46 p.m.	Transearth lunar view
Sun., Dec. 17	3:19 p.m.	Transearth EVA
Mon., Dec. 18	6:00 p.m.	Transearth Press Conference
Tues., Dec. 19	2:24 p.m.	Pacific Ocean Splashdown

## Highlights of Apollo 17 flight seen via satellite

On December 7, Apollo 17 carrying Astronauts Eugene Cernan, Ron Evans and Harrison H. Schmitt, was launched from Cape Kennedy, Florida, and began its 12½ day round trip space journey to the moon, climaxing the Apollo Program and concluding a space exploration venture begun more than a decade ago.

As during previous manned Apollo flights, INTELSAT satellites located over the Atlantic and Pacific Oceans play an important role in NASA mission support communications, making possible not only the return of scientific data but worldwide telecasts of the liftoff and the Pacific Ocean splashdown more than 300 hours later.

Present scheduling calls for TV coverage of certain phases of the flight to be transmitted via the global system of satellites and earth stations. These include the critical transposition and docking of the lunar and command modules prior to translunar insertion, EVA 1 (Extravehicular Activity); a departing view of the moon from the command module, and the Transearth EVA for the transfer of film during the spacecraft's return flight.

### Control Data to modify receiving terminal

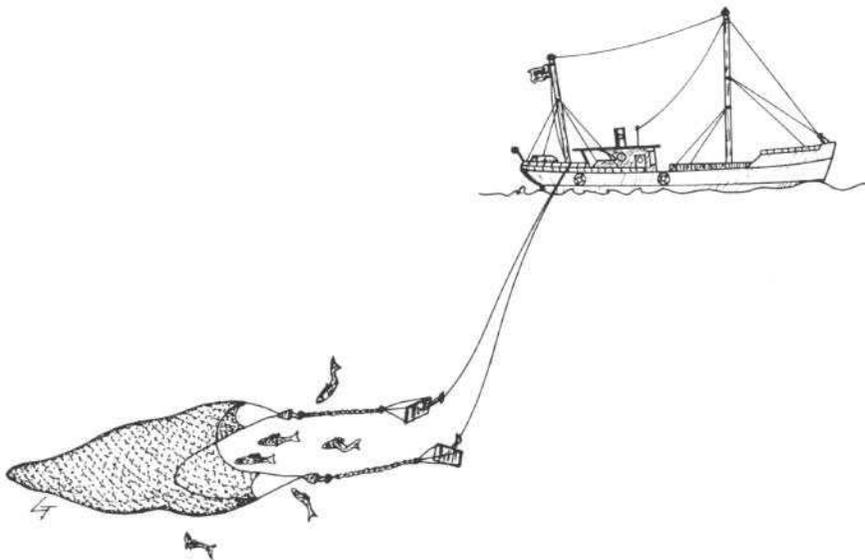
COMSAT on behalf of INTELSAT has awarded a contract to Control Data Corporation of East Boston, Massachusetts, to modify an existing 10-foot diameter receiving terminal now located at the COMSAT Labs for use with NASA's ATS-F and the proposed Italian SIRIO satellites, both of which are due to be launched in 1974.

## Antarctica service extended for a year

At its October meeting, the Interim Communications Satellite Committee (ICSC) granted approval to extend access to a Pacific INTELSAT III or IV satellite for the unmanned earth station presently located at McMurdo Station, Antarctica, through November of next year.

This terminal is owned by the National Science Foundation and is being used to assess the feasibility of using small unattended earth terminals for relaying scientific data from remote areas.

Since beginning service in mid-February 1972, the station has transmitted data continuously. The transmissions are received at the Jamesburg Earth Station and relayed over telephone lines to Stanford University where the data is reduced for analysis.



Trawlers drag huge nets held open by otter boards which often crush or rupture an underseas cable as they drag on the ocean bottom.

## International cooperation insures cable restorations via satellite

BY GEORGE TELLMANN

There is no doubt that continuity of today's international communications is vital to government, critical to the conduct of business and necessary to the advancement of world peace and understanding. Hence the rapid replacement of circuits in the event of a cable outage has been of the utmost importance since the first underseas voice cable went into service in 1956.

Most cable failures result from fishing trawler activity. Trawlers generally fish between 50 and 100 fathoms, but larger vessels often trawl at 200 fathoms or more. These deep-sea fishing ships drag huge nets which are buoyed at the bottom by "otter boards." These huge rudder-like devices, often weighing as much as

■ *Mr. Tellmann is manager, U.S. systems operations, in Communications System Management and serves as COMSAT's U.S. delegate to the plenary restoration committees.*

1,800 pounds and made of metal and wood, are pulled from an off-center point on the stern of a ship, making them tend to separate much as a paravane does in minesweeping. As they slide along the ocean bottom, the boards hold open the "mouth" of the trawl and can crush or rupture a cable, thus destroying its communications carrying capability.

Over the years, cable owners have tried in many ways to protect these underseas communications paths, but with only limited success. They have visited with trawler fleet owners, established air and sea patrols, used buoy markers and even furnished interested parties with cable route maps.

Before the introduction of high capacity satellites, emergency restoration of cable service was limited to what could be redistributed among surviving cables.

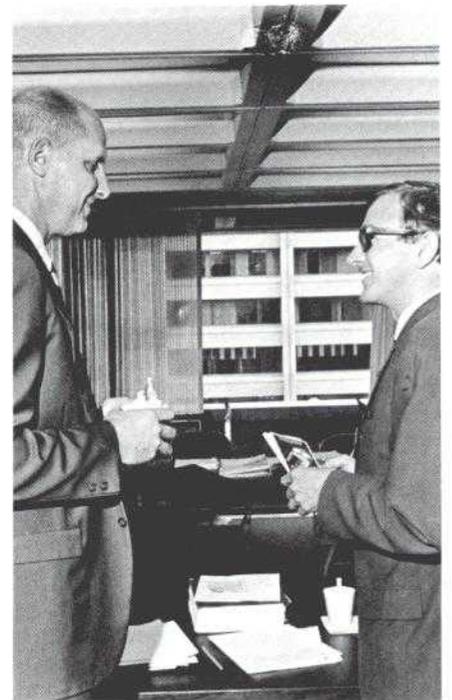
Fortunately, the situation today is very different as the use of satellite circuits to restore failed cable cir-

cuits has materially reduced the impact of cable outages on international communications.

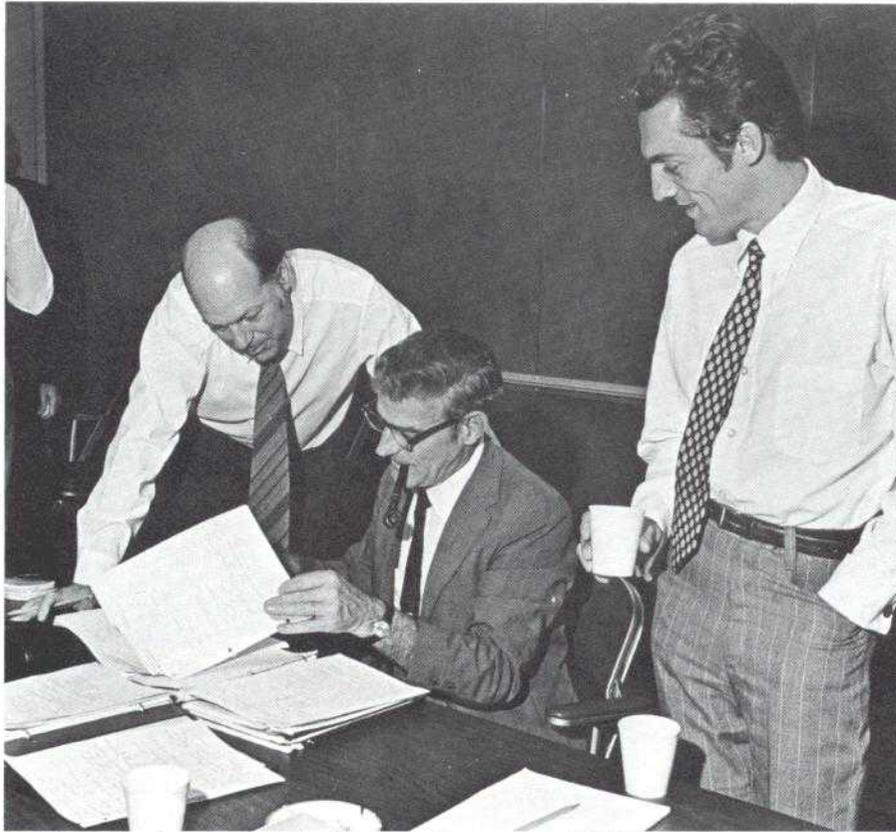
When a major cable such as TAT 5 fails, as it did on four occasions in 1971, only the satellite system offers the necessary spare capacity to provide emergency restoration of circuits while the cable is repaired. For one week in April of that year, during two simultaneous cable breaks, the satellite system restored 633 cable circuits. Another significant period came in February 1972 when the satellite system restored approximately 500 transatlantic cable circuits for two weeks.

To permit prompt cable service restoration via the satellite system, COMSAT has aided in the development of extensive regional plans with cable operators and with certain earth station operators in the satellite system. These plans enable the COMSAT Operations Center to coordinate the rapid establishment of earth-station-to-earth-station paths via satellite to accommodate out-of-service circuits.

There are three organizations whose purpose is to negotiate the agreements for these restoration plans. They are the Mutual Aid Committee (MAC) and its associated Mutual Aid Working Group (MAWG) in the Atlantic



COMSAT's MAWG representative, A. J. Stotler, consults with Paul Rohner, Radio Suisse.



MAWG Chairman F. W. Brown (center), AT&T, confers with D. G. Holland, U.K.P.O., as Pierre Godiniaux, French PTT, watches.



A MAWG session at work during its recent meeting held at L'Enfant Plaza. COMSAT's George Tellmann is third from the right.

region; the Pacific Restoration Committee (PRC) and its associated Pacific Restoration Working Party (PRWP) in the Pacific region; the CARIB-REST Plenary Committee and its associated CARIB-REST Working Group for the Caribbean and South America.

Historically, these groups have evolved from semi-formal meetings held among carrier representatives in the early '60s to negotiate restoration plans for the earlier transatlantic cables.

In mid-1966 planning began for the use of the Atlantic INTELSAT II satellite and in July of that year, a group, which in essence was a plenary session of interested parties, met in Munich, Germany. From this session came agreement to establish a permanent working group, its first meeting to be in New York in September. That plenary body has become today's MAC with its associated MAWG.

Planning for Pacific cable restoration by satellite began in 1968. Additional meetings held in June and July resulted in today's PRC.

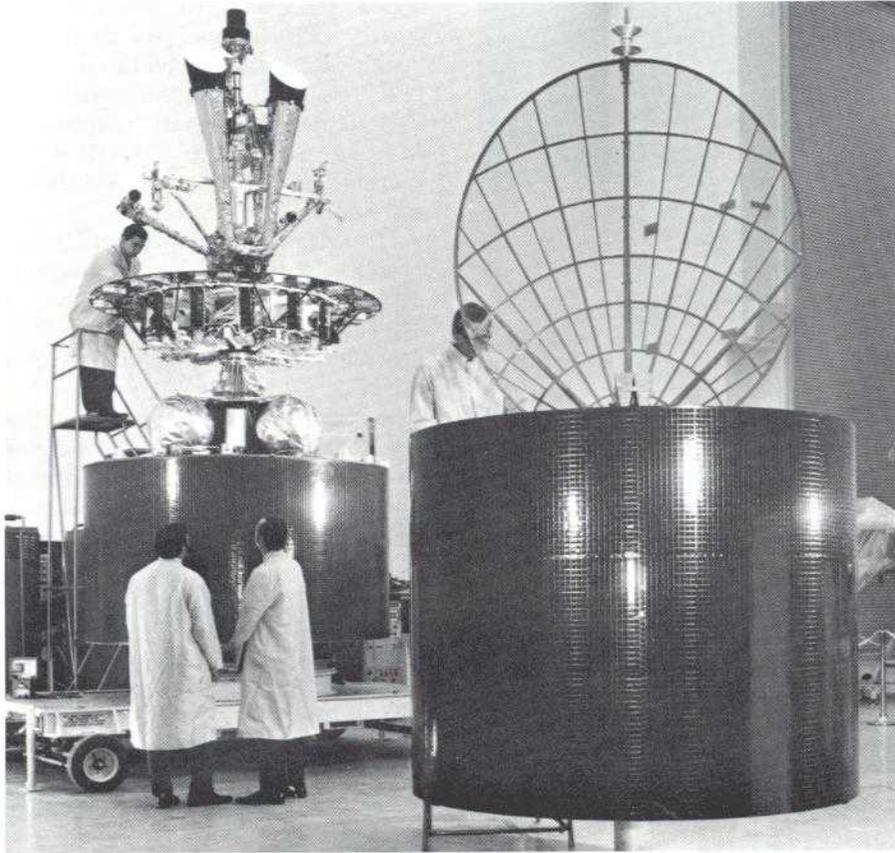
This was followed by a Caribbean restoration meeting held in San Juan, Puerto Rico, in March 1970. This session resulted in the formation of the CARIB-REST Working Group.

Today, membership in these restoration groups has grown and presently includes most of the major telecommunications entities in the world. By any yardstick, they have achieved their goals in that there are comprehensive cable restoration plans in effect today in all of the major ocean areas of the world, insuring continuity of communications.

### Japanese firm wins simulation study award

Fujitsu Ltd., of Tokyo, Japan, has been awarded a contract by COMSAT on behalf of INTELSAT to conduct a computer simulation study. The \$29,610 contract is to be completed within six months.

The objective of this study is to create analytical tools in the form of computer programs which can be used in the evaluation of the performance of various phase modulation systems for application to communications satellites.



Canada's ANIK 1 (right) and a partially completed INTELSAT IV satellite stand side by side at Hughes Aircraft Company.

## ANIK 1 will provide satellite services above Arctic Circle

BY SUSAN LAURITZEN

Eskimo and Indian high school students from Canada's remote north were among the visiting Canadians at Cape Kennedy the evening of November 9, 1972. They watched the successful launch of a satellite designed to bring up-to-the-second radio, telephone and television service to their remote villages in the vast northern wilderness.

Six of the students were selected in a nationwide competition sponsored by the Canadian Broadcasting Corporation. The students at the Cape for the launch also participated in a documentary film on the impact of the introduction of full-scale commu-

■ *Mrs. Lauritzen is an editorial assistant in the Information Office.*

nications to the small towns in the frozen north.

The satellite, ANIK 1, meaning "brother" in the Eskimo language, blazed a fiery trail in the sky at 8:14 p.m. EST to become the world's first synchronous-orbit, commercial communications satellite for domestic use. With appropriate earth stations it will greatly expand contact with the outside world for hundreds of remote northern communities which are now dependent on shortwave radio, airlifted videotape packages for limited TV service, and dog sleds which bring in weeks-old newspapers. Most of the 100,000 inhabitants in these communities are in the treeless wilderness north of the Arctic Circle.

ANIK 1 is now in circular stationary orbit some 22,300 miles above the equator nearing its station at 114 degrees West longitude, approximately the longitude of Calgary, Alberta. The see-through despun directional antenna which is covered with fine gold metal mesh to reduce solar pressure in orbit is designed to illuminate Canada coast to coast and from the

U.S. border almost to the North Pole. After testing, Telesat Canada, established by an Act of Parliament in 1969 to own and operate Canada's domestic satellite system, plans to begin commercial service with the new satellite January 1, 1973.

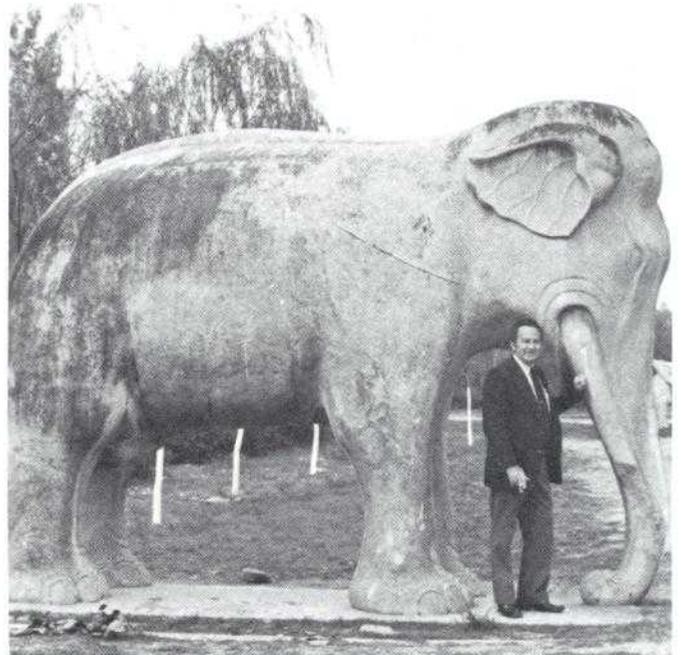
ANIK 1, the first in a planned series of Canadian domestic satellites, is said by Telesat officials, to represent a cost-effective and efficient satellite design. The spin stabilized geostationary ANIK was produced by Hughes Aircraft Company in conjunction with two Canadian subcontractors, North Electric and Spar Aerospace, who manufactured the spacecraft electronics and structure, respectively.

The spacecraft is about six feet in diameter and 11 feet high. At launch the weight was 1,250 pounds, while the orbiting weight is approximately 600 pounds. The electronics system is powered normally by about 23,000 solar cells, with sufficient on-board battery capability to provide power to maintain service at full capacity during eclipse periods when the satellite is in shadow. The eclipse periods occur during the summer and winter equinoxes and are fully predictable. The anticipated life of the satellite is seven years. Of the 12 transponders, 10 are for commercial service and two serve as back-up or reserve. Most of the electronics, guidance and power systems are duplicated for redundancy.

The spacecraft consists of an electronic communications system, literally a microwave receiving and transmitting station in space, and on-board propulsion systems to inject it into synchronous orbit and, once positioned there, to maintain the spacecraft on station.

Each transponder is capable of handling one color television channel or its equivalent in message traffic. This can be as high as 960 one-way voice channels.

ANIK 1 is scheduled to be joined by a second satellite, sometime next spring, which will act as an in-space back-up. A third satellite will be held as an on-the-ground spare as protection in case of space failure of the first two spacecraft. The third satellite, however, will be used ultimately to provide system expansion. The third satellite is tentatively planned for launch in 1975.



## COMSAT officials visit China to discuss use of INTELSAT system

George P. Sampson, COMSAT Vice President, Communications System Management, and Donald R. Owen, Director, International Development Assistance, recently met with representatives of the government of the People's Republic of China and the Peking Telephone Company to discuss China's use of the INTELSAT system. In the left photo, General Sampson visits the Great Wall. In the right photo, Mr. Owen stands by a stone elephant on the road to the Ming Tombs.

## Fifth INTELSAT IV planned for launch, improved Atlas Centaur to be used

BY LARRY G. HASTINGS

The fifth in the series of INTELSAT IV communications satellites is being readied for launch from pad 36-A at Cape Kennedy, Florida. The launch is tentatively planned for no earlier than mid-January.

The new satellite is planned for emplacement over the Pacific Ocean at 179° East longitude, near another INTELSAT IV satellite (launched January 22, 1972) and presently at 174° East longitude. The new INTELSAT IV, when on station and in operation, will make a total of five of these synchronous spacecraft in service around the earth.

The new Pacific INTELSAT IV has the same dimensions as its companions in orbit. It stands 208 inches in height and 93.7 inches in diameter. The solar panels which encircle the spacecraft make up 111 inches of its height with the antennas providing the addi-

■ *Mr. Hastings is a COMSAT senior information officer.*

tional 97 inches to give it the overall 208-inch height.

The IVs still hold the record as the world's largest commercial communications satellites. At lift-off from Complex 36, the bird will weigh 3,120 pounds. After its on-board apogee motor is fired to thrust it from transfer orbit to synchronous orbit, it will weigh 1,610 pounds. Atlas Centaur launch vehicles, which are 130 feet tall, are used to launch INTELSAT IV satellites. The rockets, together with the satellite payload, each weigh 323,000 pounds at lift-off. The Atlas stage engines develop 402,000 pounds of thrust. The upper or Centaur stage engines take over after burnout and separation to provide 30,000 pounds of thrust.

The new Pacific INTELSAT IV can carry a combination of telephone, data, teletype and television transmissions.

Under contract with COMSAT on behalf of INTELSAT, Hughes Aircraft

Company builds the spacecraft.

The design life of each INTELSAT IV satellite is seven years. The Convair Aerospace Division of General Dynamics builds the Atlas Centaur launch vehicle. The National Aeronautics and Space Administration launches the rockets on a costs reimbursable basis for COMSAT which is manager for the INTELSAT consortium.

With this launch, the rocket has undergone some modifications which are intended to provide greater reliability and performance.

The basic changes are in the avionics or air-borne electronics of the rocket. On previous vehicles, there were independent systems for the Atlas and the Centaur stages in areas such as the autopilot, guidance, telemetry, propellant utilization and other systems.

With the modifications, these systems, and to a lesser degree others, will be integrated and controlled by a centralized, on-board digital computer unit. By becoming the focal point for these systems, the computer's task is to reduce the possibility of component failure by eliminating a number of the previously independent control systems.



A view of Sydney harbor includes its new, but unfinished, Opera House.

## OTCA welcomes planning group to Sydney

BY JOE N. PELTON

Flying into Sydney on Sunday night, November 5, was an impressive sight. The Sydney harbor is one of the largest and most beautiful in the world. The millions of lights, the darkly silhouetted harbor and the impressive harbor bridge cannot help but create a favorable first impression of Australia's largest city.

Despite warnings to the contrary, Australian customs and immigrations went smoothly and I was not all tired by the time I reached the Chevron Hotel, particularly since I was arriving from Bangkok, Thailand, with the time difference in my advantage.

The Chevron Hotel, formerly a Hilton, is located in the somewhat notorious Kings Cross section of Sydney and served as the lodging place for almost all the attendees to the Ad

■ Mr. Pelton is manager, ICSC affairs, in International.

Hoc Group on Long Range Planning as well as the meeting place. From our meeting room we had a panoramic view of the harbor and bridge, the sail-like Opera House, still a year from completion, the botanical gardens and downtown Sydney.

Graham Gosewinckel of the Overseas Telecommunications Commission of Australia (OTCA) and Chairman of the Ad Hoc Group convened the first session of the group at 10 a.m. Monday, November 6, 1972 (or 6 p.m. Sunday, November 5, Washington time, if you prefer). He immediately introduced Frank Stanton, acting General Manager of OTCA, who welcomed the delegates.

In attendance were Messrs. Berzins and Johnson of Australia, Mr. Doran-Veevers of Canada, Mr. Binet of France, Mr. Weifelspuetz of Germany, Mr. Quaglione of Italy, Mr. Kawanabe of Japan, Mr. Hermsen of the Netherlands, Messrs. Mowatt and Slade of the United Kingdom, and Mr. Alegrett of Venezuela-Colombia-Chile.

Richard R. Colino, International's Assistant Vice-President, and I represented the U.S., while Emric Podraczky and Paul Troutman rep-

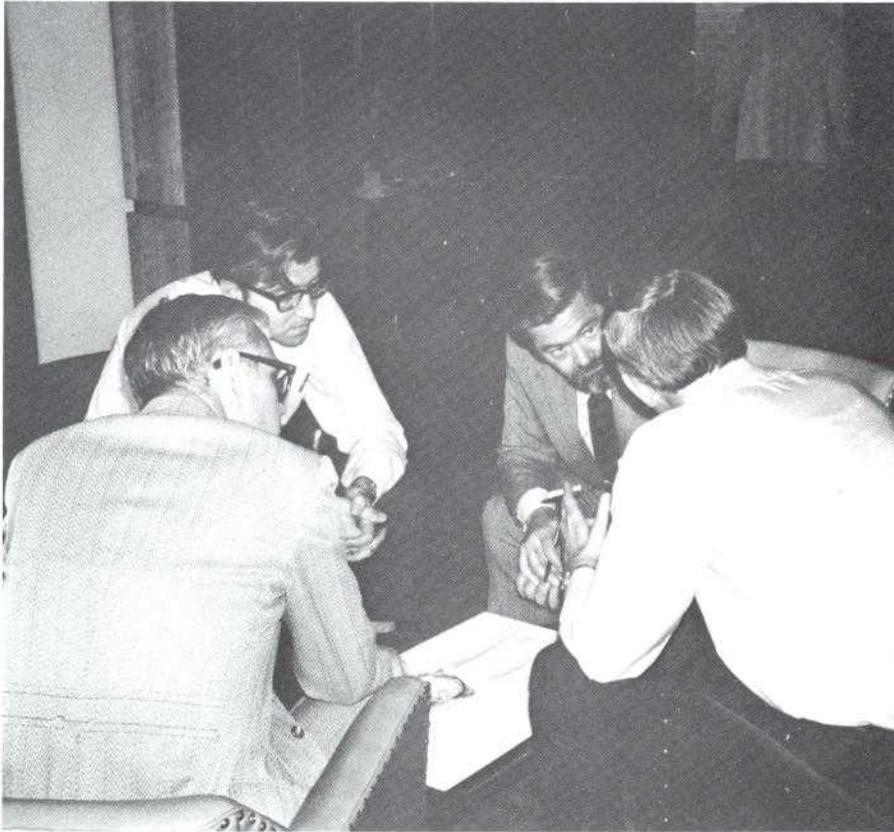
resented the Manager and Bob Brown served as secretary to the Group. Mrs. Kathie Rissland provided support for the entire COMSAT contingent and was busy throughout the conference typing documents, reports, memoranda, telexes, taking dictation, mailing documents and coordinating reproduction priorities.

Len Dooly of OTCA was in charge of arrangements and provided excellent support in every way. Other OTCA personnel who were most important in making the meeting so successful were Mr. Manning and Miss Melburn.

This third meeting of the Ad Hoc Group on Long Range Planning was by far the most important and productive to date, as the first two meetings were largely devoted to defining group objectives and developing the necessary traffic estimates essential to any studies which the group might wish to undertake. By the start of this meeting, based on the results of a questionnaire previously sent to all Signatories, the Manager had developed traffic matrices on a route-by-route basis for public telecommunication services to be carried on the INTELSAT system during the 1978-88 time period.

After a week of discussions, working sessions, and document drafting, the major accomplishments of the meeting were:

- (a) To note that the results of any preliminary studies approved by the ICSC to assess the potential for INTELSAT maritime services would be of interest and that these studies could be incorporated, as relevant, into the group's planning studies.
- (b) To note that, based upon its work to date including assessment of the questionnaire, the assumptions being utilized by the Manager and the ICST/T in the INTELSAT IV follow-on satellite studies (that is, assumptions as to high and low circuit growth rates and diversification requirements) are generally consistent with the traffic estimates acquired by the Ad Hoc Group. They



COMSAT's Paul Troutman (left) and Emric Podraezky (facing camera without glasses) discuss a problem with OTCA's Gus Berzins and Graham Gosewinckel (right).



A family of wallabies relaxes in the Sydney zoo. PHOTOS BY JOE PELTON

further noted that should the INTELSAT IV $\frac{1}{2}$  solution to follow-on procurement be chosen, provision should be made to provide service to Fiji in light of expected requirements there.

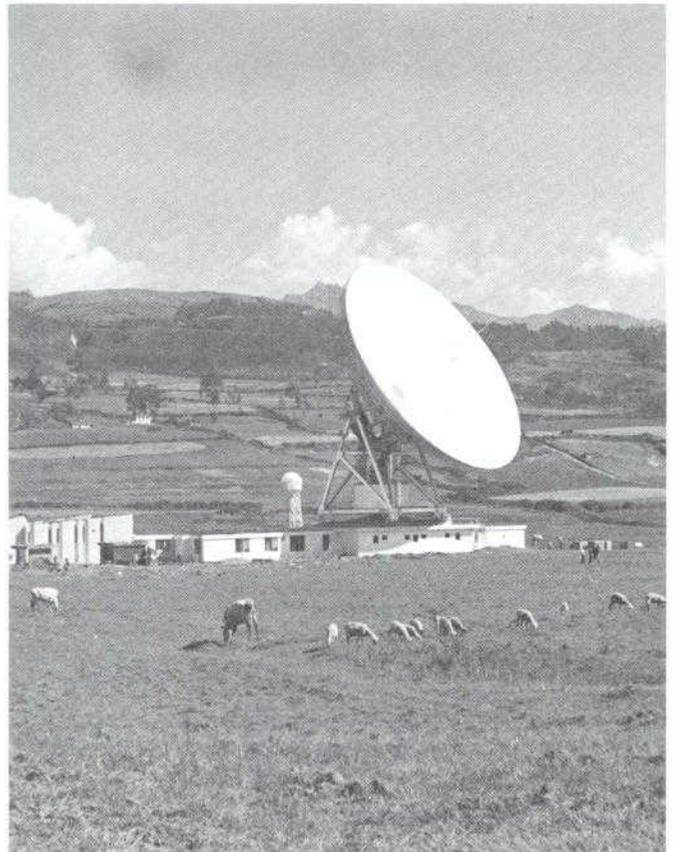
- (c) To provide a detailed list of financial, technical and operational objectives to INTELSAT for the purpose of conducting long-range planning studies.
- (d) Most importantly, to request the Manager to perform a series of studies aimed at testing basic system assumptions, in order to provide INTELSAT system planning guidelines for the 1978-88 time frame emphasizing continuity of service, spare satellite philosophy, earth station standards, multipurpose versus dedicated satellite concepts, and space segment charge incentives.

By the end of the second day's session, the attendees were ready for some diversion. This was provided in the form of a cocktail buffet hosted by OTCA at the Sebel Town House Hotel, in the Kings Cross area, a short walk from the Chevron.

Although a busy working schedule was maintained for the rest of the week, I did have time to see the Australian Ballet, starring Nureyev, at the Hordern Pavilion, the excellent New South Wales Art Gallery, the Botanical Gardens, the Sydney Opera House, Manly Beach, and the Taranga Zoo (complete with wallabies, bandicoots, platypus, wombats, koalas, and Tasmanian devils).

On our last night in Sydney, Mr. Gosewinckel hosted a marvelous barbeque at his home in the suburbs. Everyone there appreciated the opportunity to see a fine Australian home and its gardens, as well as to savor some excellent steaks and barbequed bananas and pineapples.

As I left the airport the following day the temperature was 80° F, there were a few clouds marring a perfectly clear blue sky and the local citizens were saying, "Wait a week or two and the weather will improve."



## Ecuador says thank you for COMSAT's technical assistance

In the left photo, Donald R. Owen, Director, International Development Assistance, shows his secretary, Mrs. Wanda Latta, a sheepskin certificate presented to him at the inauguration of the earth station at Quito, Ecuador. The citation expressed "gratitude of the National Government for COMSAT's contribution in carrying out this major project." The right photo shows the new earth station in its rural setting.

## Highlights of ICSC action at 61st meeting

The Interim Communications Satellite Committee (ICSC), governing body of INTELSAT, held its 61st meeting from October 16 to 24 in Washington, D. C. Eighteen members, representing 48 of the 83 members were present.

Among its actions, the Committee:

- Approved the launch of the next INTELSAT IV satellite in December 1972, as a spare in orbit over the Pacific region at 179° East longitude. This launch has recently been re-scheduled for sometime in January, 1973 at the earliest.

- Agreed, as a matter of principle, to provide a spare INTELSAT IV satellite in orbit over the Indian Ocean region in a time frame commensurate

with that region's needs and the needs of the global system as a whole.

- Requested COMSAT to complete the INTELSAT IV follow-on systems study in accordance with guidelines approved by the Committee with results having been sent to all ICSC and Advisory Subcommittee on Technical Matters members not later than the end of October. In conducting these studies, COMSAT and the ICSC/T were to study, as a matter of priority, the satellite models employing INTELSAT IV satellites, INTELSAT IV½ satellites, early INTELSAT V satellites and late INTELSAT V satellites.

- Adopted a charge of \$11,160 per annum for a unit of utilization for full-time service, and reduced occasional use charges other than for television and program channels by an amount proportionate to the reduction in the charge for full-time units of utilization, these charges to be effective January 1, 1973.

- Granted an extension of approval until November 1973, of the unmanned Antarctic non-standard earth station for access to a Pacific INTELSAT III or IV satellite, subject to the conditions that the station will be used only for the transmission of scientific data and that COMSAT as Manager will make no additional operational efforts, nor expend additional satellite hydrazine fuel, nor incur any additional financial expenditure for the Antarctic station.

- Granted an extension of approval, for one year, of the DICOM non-standard earth station to access INTELSAT IV satellites free of charge, for the purpose of conducting experiments and demonstrations.

- Referred the U.S. application for approval of the non-standard torus antenna earth station to be located at COMSAT Laboratories and review of that application by COMSAT as Manager to the Advisory Subcommittee on

Technical Matters for review and recommendation.

- Approved the nonstandard station in Peking for access to the Pacific INTELSAT IV, until it is replaced by the standard earth station now under construction.

- Approved the Kum San (Korea) and the Raisting 3 (Germany) earth stations for access to INTELSAT IV satellites and granted formal approval to operate with INTELSAT IV satellites to the Balcarce 1 (Argentina), Les-sive (Belgium) and Sehoul (Morocco) standard earth stations. The Committee also granted formal approval to the Si Racha 1 and 2 (Thailand) standard earth stations to operate with INTELSAT III satellites.

- Requested the Advisory Subcommittee on Technical Matters to review COMSAT's report on small earth stations in the INTELSAT system and any other studies on the use of small earth stations in the INTELSAT global system for the purpose of making appropriate recommendations to the Committee.

- Approved one-year assignments with the staff of COMSAT as Manager for the nominee of the Signatory of the United Kingdom as a communications engineer with the INTELSAT Systems Management Division and the nominee of the Spanish Signatory as a communications engineer with COMSAT Laboratories.

- Rescheduled the 62nd meeting to begin on December 13, 1972.

## **PHILCOMSAT names North American official**

The Philippines Overseas Telecommunications Corporation recently announced the appointment of Brigadier General Geoffrey Cheadle, USAF (Ret.) as its Vice-President, North America, with offices in Washington, D. C. General Cheadle will be responsible for all liaison activities in behalf of POTC, which acts as general manager of the Philippine Communications Satellite Corporation (PHILCOMSAT), the operating entity of the Republic of the Philippines and member of INTELSAT.

Born in Manila, Philippines, General Cheadle is a graduate of the U.S. Military Academy and brings 26 years' experience in communications to his new position.

## **Net income climbs, dividend declared**

COMSAT recently reported that net income for the third quarter of 1972 amounted to \$6,469,000 or 65 cents per share, as compared to \$4,978,000 or 50 cents per share for the third quarter of 1971.

For the first nine months of 1972, net income amounted to \$19,035,000 or \$1.90 per share, as compared to \$17,123,000 or \$1.71 per share for the first nine months of last year.

Revenues totaled \$26,907,000 for the third quarter of this year, as compared to \$21,276,000 for the third quarter of last year, and \$77,765,000 for the first nine months of this year, as compared to \$65,439,000 for the first nine months of last year.

The increases in revenues resulted primarily from growth in the number of full-time half circuits leased by COMSAT to its customers. At September 30, 1972, these totaled 2,751, as compared to 2,620 at June 30, 1972.

Operating expenses for the third quarter of this year amounted to \$21,593,000 as compared to \$17,710,000 for the third quarter of last year, while net operating income for the third quarter increased to a new high of \$5,314,000 or 53 cents per share as compared to \$3,566,000 or 36 cents per share for the third quarter of last year.

At its monthly meeting held October 20, 1972, the Board of Directors declared the regular quarterly dividend of 14 cents per share, payable on December 11, 1972, to all shareholders of record as of November 10, 1972. It is COMSAT's ninth consecutive quarterly dividend.

## **Operations Center updates its display map**

The global system display located in the Headquarters Operations Center is currently being updated to reflect today's worldwide satellite communications network.

Originally designed to depict the system as it was four years ago, the display had become confusing to some visitors and difficult to maintain.

As a result, Larry Covert and Don Ross of the Operations Center recommended that the entire unit be revised to incorporate several new visual display concepts.

The most important of these innovations will be the replacement of cumbersome blue fluorescent tubes, which represent transmission paths, with special nylon rope. This rope, impregnated with different colored material and responsive to black light, will allow easy color-coded identification of the transmission paths in each ocean area.

Plans also call for color-coding earth station name panels in the base of the display to match a specific cluster of rope transmission paths to further aid in identifying those earth stations served by a particular satellite.

Mr. Covert anticipates that the revised display will be back in operation by mid-December.

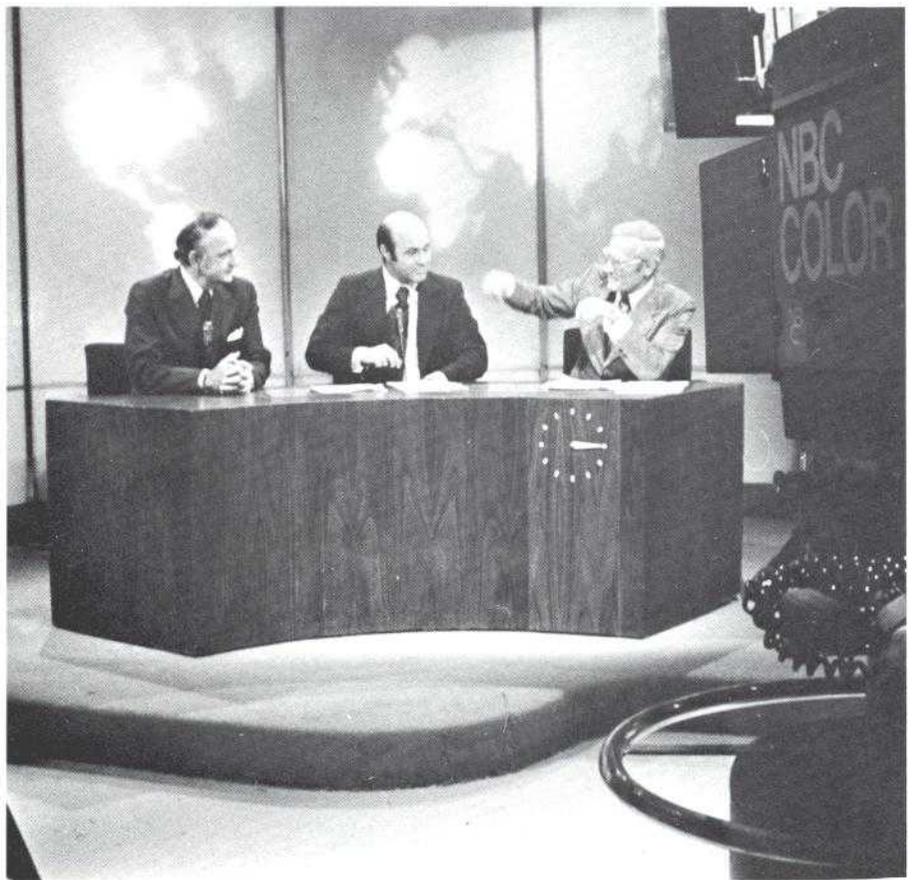
## INTELSAT reduces utilization charge for third time

For the third time in three years, the Interim Communications Satellite Committee (ICSC), the governing body of INTELSAT, approved a reduction in INTELSAT's charges for full-time satellite use. The new charge of \$11,160 per unit (half-circuit) per year will become effective on January 1, 1973. It represents a reduction of 14 percent from the present charge of \$13,000.

The INTELSAT consortium, presently consisting of 83 members, has made impressive strides toward its objective of providing world wide communications via satellite as economically as possible. In just over six years, INTELSAT's full-time unit charge has decreased by approximately 65 percent, from the initial charge of \$32,000 to the forthcoming charge of \$11,160.

## 14 GHz contract

COMSAT on behalf of INTELSAT has awarded a contract to Thomson-CSF of Paris, France, for development of a 14 GHz integrated mixer-preamplifier for use in satellite transponder applications. The \$70,000 contract is to be completed within 11 months.



## Dr. Charyk appears on the Today show

COMSAT President Dr. Joseph V. Charyk (left) discusses satellite communications with Joe Garagiola (center) and Frank McGee during his recent appearance on NBC Today Show in connection with the 10th anniversary of the Communications Satellite Act of 1962.

PHOTO BY ALLAN GALFUND

## Corporation aids self-help training program

As a result of an appeal from the Montgomery County, Maryland, Chamber of Commerce, COMSAT has contributed a \$500 check to help finance an Opportunities Industrialization Center (OIC).

Located in Rockville, Md., the Center is an independent, non-profit, self-help training program for the hard core unemployed and underemployed.

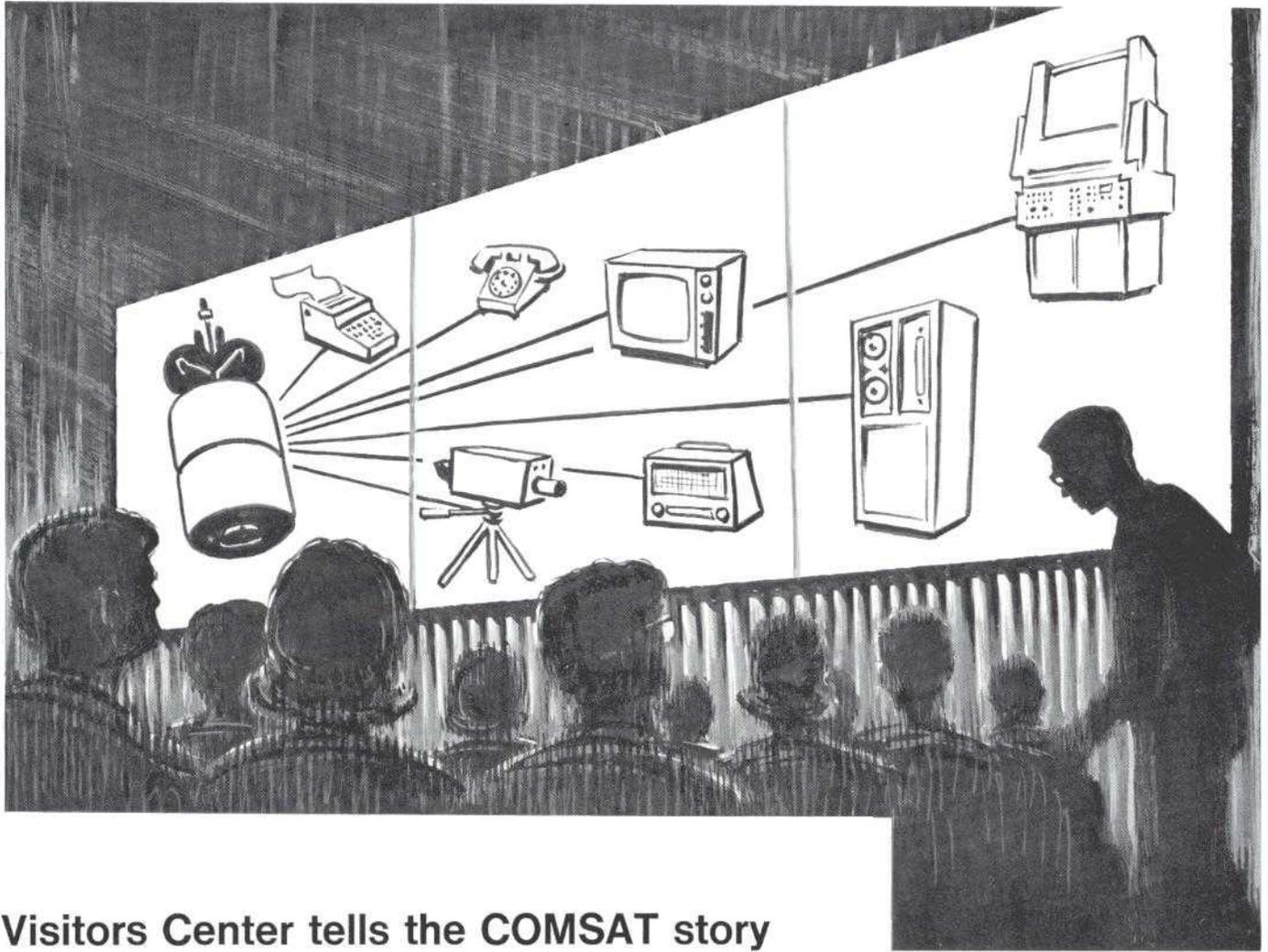
It is patterned after the successful OIC in Washington, D. C., where approximately 4,000 persons have been trained since 1966. Skills being taught include clerk-typing, keypunch and business machine operation, auto mechanics and printing.

Wilbur L. Pritchard, Vice President and Director, COMSAT Laboratories, in his letter accompanying the Corporation's contribution said in part, "we fully support the objectives of providing improved training to unskilled County residents."

## Battelle to evaluate lubricant systems

A contract to evaluate the principal bearing-lubricant systems in future INTELSAT satellites has been awarded to Battelle Memorial Institute through its Columbus Laboratories in Columbus, Ohio.

The award made by COMSAT on behalf of INTELSAT will isolate and define bearing lubrication system problem areas, devise and conduct tests on these systems to eliminate significant problems and to acquire data for use in any necessary modification design work.



## Visitors Center tells the COMSAT story

BY JAMES T. MCKENNA

"I never realized how small satellites have made the world."

This is just one comment from the thousands of U.S. and foreign visitors who have seen the COMSAT audio-visual presentation at L'Enfant Plaza.

Located off the main lobby, the Visitors Center 3-screen slide presentation shows the history of communications from a primitive megaphone to the sophisticated INTELSAT IV satellite. The audio-visual presentation emphasizes satellite technology and the rapid development of telecommunications services and capacity from Project SCORE in 1958 to the Indian Ocean INTELSAT IV satellite placed in service on July 30, 1972.

■ *Mr. McKenna is a COMSAT information officer.*

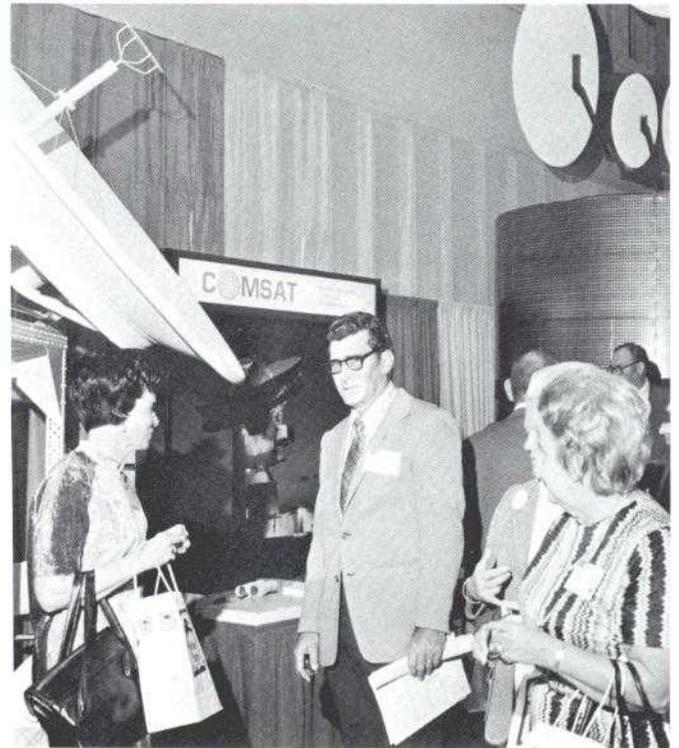
In addition to the audio-visual presentation, visitors view scale models of each of the four generations of INTELSAT satellites, including a full-scale model of the satellite that brought the first live TV transmission from the moon to over a half-billion viewers around the globe.

After the presentation in the theater, visitors tour the Operations Center, where coordination of all satellite traffic is handled. Before leaving COMSAT, each guest is given an information kit, describing the Corporation and its activities.

While there have been numerous individual comments on the Visitors

Center presentation, several made by a Virginia school group are worth repeating: "It made me understand more about communications in my science class" . . . "the trip was very interesting, I hope I can bring my mother and father," . . . "The show showed me how communicating has changed." Another comment from a grade school pupil mentioned that he was pleased to know how a satellite worked and wondered what happened when it stopped working!

Arrangements for group tours of the Visitors Center are under the direction of the Information Office and may be scheduled in advance.



## COMSAT exhibits at USITA Convention in Las Vegas

A display featuring a full scale INTELSAT IV model modified for domestic use and the antenna used for the Queen Elizabeth 2 demonstrations last spring highlighted COMSAT's exhibit at the U.S. Independent Telephone Association Convention held in Las Vegas, Nevada, in October. In the left photo, FCC Commissioner Charlotte Reid and a group of Association directors ride by COMSAT's booth in a preview tour of the exhibits. The right photo shows some of the 7,000 visitors as they viewed COMSAT's display.

PHOTOS BY ALLAN GALFUND

## COMSAT radio club active in AMSAT OSCAR 6 launch

By CAL COTNER

OSCAR 6, the sixth in a series of amateur radio communications satellites, was successfully launched into a polar orbit on October 15, 1972. Circling the earth every two hours, OSCAR 6 serves notice that the hiatus in amateur communications satellites is at an end.

Designed and built by AMSAT, the Radio Amateur Satellite Corporation, this latest amateur radio satellite was launched by NASA on a "hitchhiker" basis aboard a Thor-Delta rocket fired from the Western Test Range at Lompac, California.

■ *Mr. Cotner is a member of the technical staff in the COMSAT Labs Technology Division and a member of the COMSAT Amateur Radio Club.*

Hundreds of amateurs in over 30 countries around the world have already established contact via OSCAR 6 by single sideband voice, CW or code, and slow scan television. One German amateur reported hearing 25 countries via the OSCAR, of which 22 were contacted on a two-way basis. Signals from this new satellite have been also received at WA3LOS, the COMSAT Amateur Radio Club station located at the Labs.

In fact, members of the COMSAT Club have taken part in many phases of OSCAR 6 work. Dr. Perry Klein, K3JTE, a former COMSAT employee and president of AMSAT, has supplied much of the drive culminating in this successful amateur communications satellite. Dave Reiser, WN3TRS, designed a clever antenna mechanism for the spacecraft and worked on other mechanical aspects and the testing of the prototype transponder. Ronnie Kessler devoted time to fabricating special hardware items required in the spacecraft. Wally

Mercer, WA4RUD, developed and built the actual prototype transponder.

With the successful launch of OSCAR 6 and its anticipated life of a year, plans are under way to assure the most effective and efficient use of the satellite. Control stations have been established on the east and west coasts of the United States, in eastern and western Australia and New Zealand, with an additional station planned in Europe.

Looking to the future, construction of OSCAR 6's successor has started. The launch date is expected to coincide with the end of OSCAR 6's usefulness.

## Codex to develop error control equipment

COMSAT on behalf of INTELSAT has awarded a contract to Codex Corporation of Newton, Mass., for the development of error control equipment. The \$57,636 contract is to be completed within eight months.



John Gonzalez (right) talks with student pilot Jose Alverio.

## Ecos de la Montana

By Luis R. RODRIGUEZ

It has been a busy summer and fall at Cayey.

Among the many items of interest was the election of the CCEA officers for the coming year. Luis R. Rodriguez was elected president; Otto R. Irizarry is the new vice-president while Luis Medina and Arsenio Reyes were reelected as secretary and treasurer, respectively. Ada A. Gonzalez joins these officers to complete the five-person Board of Directors.

Immediately following our election meeting, a dinner consisting of *becerro asado* (roast young calf) and *guineos cocidos* (boiled bananas) was served to all CCEA members.

The stork has visited us again. This time the proud parents are Jimmie

■ *Mr. Rodriguez is administrator at the Cayey Earth Station.*



Luis Rodriguez (right) presents Pepe Martin (center) with a bon voyage gift as his fellow employees and Mrs. Martin look on.

and Julie Payne. Alexander Louis joined the Payne household on September 14.

Pepe Martin, one of our most senior technicians, has resigned to return to his native land, Spain, where he will work as a sales representative for Capitol Radio Engineering Institute (CREI). The CCEA presented him with an attache case as a bon voyage gift.

John Gonzalez, our operations controller, is very active in the Civil Air Patrol. A flier since 1967, he has logged more than 800 hours of flight time and holds the rank of captain in the Puerto Rican Wing of the Patrol. His group has won the "National Safety Award" for accident-free flying for the past two years.



Barbara and Al Eleshio enjoy a quiet moment on the dance floor.

## At Jamesburg

By M. LEE DORSEY

Our big social event of the autumn at Jamesburg was the JCEA "pot-luck" party.

Arranged by JCEA president Lawrence Cisneros and social vice-president Albert Eleshio, the dinner and dance took place at the Carmel Valley Community Center. More than 45 JCEA members and their wives attended the gala affair.

Everyone was dressed in country or western attire and danced until the wee hours to music especially taped for the party by facilities engineer W. D. "Robbie" Robinson.

■ *Mrs. Dorsey is finance-personnel clerk at Jamesburg Earth Station.*



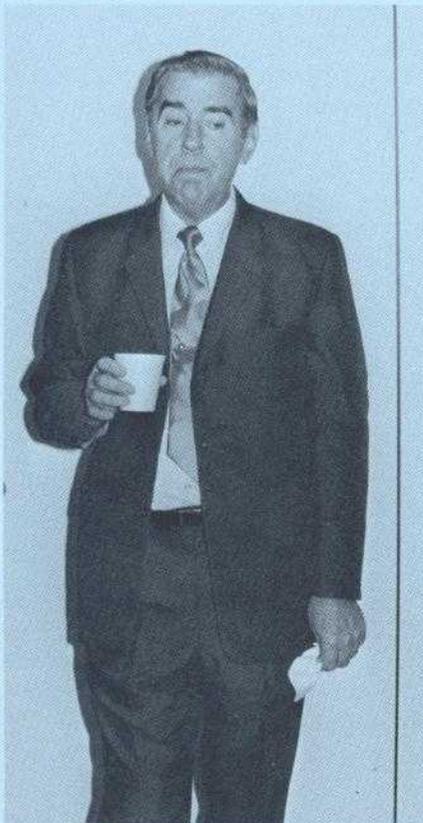
Juan Castanera (left), Managua; Bill Carroll (center), Etam; and Lee Jondahl, Cayey, are good listeners.

PHOTOS BY J. T. MCKENNA

## Earth station managers meet at Headquarters

George P. Sampson, COMSAT Vice President, Communications System Management, opened the annual COMSAT earth station managers' meeting, recently held at Headquarters.

The five-day meeting was attended by the managers from the seven COMSAT-managed U.S. earth stations at Andover, Maine; Brewster, Washington; Cayey, Puerto Rico; Etam, West Virginia; Jamesburg, California; Paumalu, Hawaii; Talkeetna, Alaska, and from the Managua, Nicaragua, Earth Station.



Paumalu's Glenn Vinquist ponders a question as he enjoys his coffee.



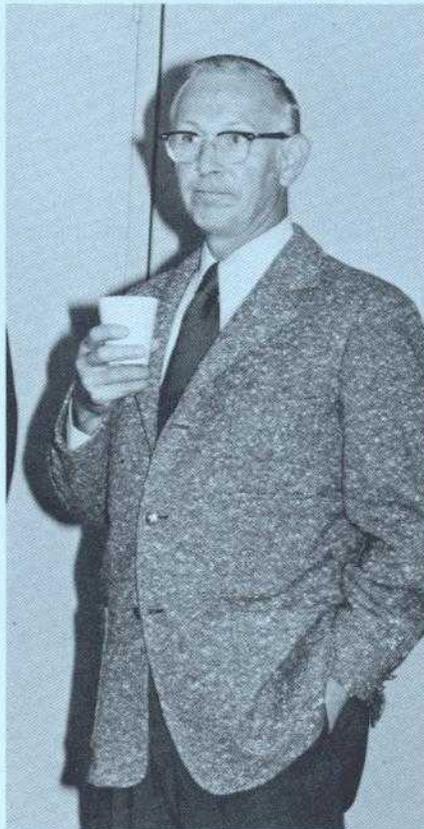
Harry Gross (right), Bartlett, talks with Larry Covert, Operations Center.



Brewster's Wally Lauterbach (left) and Ben Williams, U.S. systems plant, in a discussion.



Andover's Don Fifield makes a point during a coffee break.



John Scroggs, Jamesburg, enjoys a cup of coffee during a break.

## COMSAT secretary studies life styles in Guyana

BY LAVERNE E. MCINTOSH

On one of my recent trips to the nurse's office, Hazel Durant, the COMSAT nurse, asked if I knew about a trip to Guyana (formerly British Guiana and an independent nation since 1966) sponsored by Federal City College. As you know, Miss Durant is from Guyana, which is located on the northeastern coast of South America bordered by Venezuela, Brazil and Surinam or Dutch Guiana. I did not know about the trip, and Miss Durant quickly filled me in and suggested that I see about going. My vacation plans were geared toward a trip with my family to California, and I told her so. However Hazel persisted and after a week or so, I finally applied, mainly so that she would let me alone.

I learned that the purpose of the study project was to take an in-depth look at the life styles of Guyana, the only English-speaking country in South America. The five-week study project was open to social science majors at Federal City College. I submitted a written statement explaining why I wanted to make the trip and included a payment of \$150. On the basis of my stated interest and the payment of \$150, I was accepted, even though I am now a graduate student at FCC.

I am not sure what I expected to find at Georgetown's Timari Airport. However, I was impressed to see a rather large, contemporary structure encircled by flag poles, spot-lighted and with a beautiful mural on one whole wall depicting scenes of Guyana. As I walked toward the building, I remember first giving thanks to the Almighty for the safe landing and thinking what a magnificently beauti-

■ Mrs. McIntosh is a secretary in the International Development Assistance Division. She is a June graduate of Federal City College having been awarded a Bachelor of Arts degree in anthropology-sociology.

ful black, star-filled sky it was. The sky seemed very close to the earth and I felt that I could just reach up and touch a star.

There were no problems in getting through customs, but I was immediately aware of the very sober expression of the agents as they methodically examined our passports and luggage. Eventually, we boarded busses for the 30-mile drive to Georgetown.

The trip took about one hour and on arrival and a quick inspection of our quarters, I determined that my first business would be to secure other quarters. The following day, I moved to a home in a residential section of the city with a young family who had a nine-month old son.

This new living arrangement was perfect in terms of my interest in doing a comparative study of family life styles among American blacks and black Guyanese. It should be noted here that the population of Guyana consists of East Indians, Afro-Guyanese, Amerindians, Chinese and whites. Although Guyana has an East Indian majority, the Afro-Guyanese are in power. The Guyanese culture reflects its various racial components in modes of dress, food and values.

I had many informal conversations with neighbors and friends about their interests, goals, and day-to-day concerns. I learned a lot about what they value, their foods, courtship and marriage and child-discipline. During my stay, I participated in the life of the community in which I lived, including attending the local Baptist church whose minister was a white from South Carolina. I also did volunteer work for the local YMCA.

For three weeks, we attended seminars with guest speakers from various sectors of the Guyanese government. The first speaker was Forbes Burnham, the Prime Minister of Guyana. Each session was followed by a lively question and answer period. A particularly interesting session was conducted by a military representative who outlined the civil obligations of the military, such as rescue operations and road building.

There were many experiences that will be remembered; however, two are outstanding. One was an unforgettable journey through jungle terrain to a place called Rockstone, some 85



**Mrs. McIntosh (left) shows COMSAT nurse Hazel Durant an album of pictures taken during her visit to Guyana.**

PHOTO BY J. T. McKENNA

miles southwest of Georgetown. The outing was part of a weekend holiday that began in Mackenzie, about 60 miles from Georgetown.

We left Mackenzie for Rockstone in two Land Rovers carrying 12 people, most of whom were Guyanese. More than once during that drive, I was sure that I would never see the U.S. again, as we traveled at 40 miles per hour over the sandy and rough terrain.

Although it was hotter than hot, we were in a holiday mood; at least my companions were in a holiday mood. I was too busy worrying about my demise. About half way in our trip, the Land Rover behind us got stuck in the sand, because, I was told, the driver was driving too slowly. We, of course, stopped to help them. For all of 30 minutes, the men worked feverishly to free the vehicle. Then, to my astonishment, they stopped working, sat down and proceeded to eat, drink and be merry!

"Well," I said "when and how the h--- do we get out of here?"

I was told simply not to worry, we were in good company, had plenty of

food and drink, and nice weather. What more could I ask for? Civilization, was my answer. An hour or so later, a tractor did come along and freed the Land Rover and we were on our way.

All of this was quickly forgotten by the unfolding of such natural beauty as I have never seen. There were flowers and many species of birds I did not recognize, all in brilliant colors, with many kinds of weird sounds. We passed over a stream, in a very dense area, that appeared to be red. Deeper in the interior, Indian huts could be spotted on hillsides with bread baking in the sun on rooftops. Still further into the jungle we approached an area that was described as a humidity wall. As we entered this area, we could actually feel the difference in the moist, cool air, leaving behind the dry, hot air that we had driven in for about 15 miles.

When we arrived at Rockstone, I was surprised to see three very nice lodges equipped with cooking and sleeping facilities. There was an enormous river with small island group-

ings visible in the distance. Members of our group were convinced that the river contained man-eating fish. However, the local Indians assured us that they had gotten rid of them. I am still not convinced that they were not trying to get rid of us.

Seriously, though the Indians were beautiful people and very friendly. They spoke a kind of broken English that was easily understood. A little while after we arrived, I saw three small Indian children between the ages of six and eight years walking toward the dock with two covered dinner pails. They boarded a canoe, and paddled leisurely up the river. I was told that they were probably taking a meal to an elderly relative living in the next village.

The other significant experience was my appearance on Guyana's two radio stations. I did a taped interview for one station expressing my views on the differences in lifestyles of America. It was necessary at times to skillfully sidetrack several questions regarding certain political and social phenomena in America. Nonetheless, it was a good interview.

I also appeared in person on the second station for a women's talk show. The discussions centered around my interests in Guyana in general and on anthropology in particular.

I am sure that six months ago in my wildest dreams, I would not have conceived of a trip to Guyana. However, because of Miss Durant's prodding, I have had an educational and social experience of immeasurable value. It is difficult to pinpoint the factors that were most significant for me. However, two of the most important, impressive and meaningful were the opportunity to observe a black, developing nation, whose ideologies are radically different from those to which I am exposed, going about its business of progress on a well-defined and structured course, and the opportunity to experience the genuine warmth and friendship of the Guyanese people.

## 'Upward mobility' course completed by 1st candidate

Freddie W. Hunt was recently promoted to the position of communications operator and thus became the first COMSAT employee to successfully complete the newly-established Communications Operator Training Program.

This program, in conjunction with the COMSAT 1972 Affirmative Action Program, was established by the Personnel Office, in cooperation with the Office of Communications System Management. Its purpose is to provide advancement or "upward mobility" for employees currently assigned in lower level positions through on-the-job training. Mr. Hunt himself is also responsible for the original suggestion from which this program evolved.

Mr. Hunt joined COMSAT in September 1971 as a shipping and receiving clerk in General Services. During his training, he received six months instruction in the Operations Center learning teletype operation and maintenance procedures.



General Sampson (center) presents the winners' team trophy to Don Fietkiewicz, John Welch, Dave Burks and Paul Troutman (left to right). Each member also received an individual memento as well.



Freddie Hunt sends a message.

## Headquarters No. 3 wins team trophy, Corpuz shoots 75

Headquarters Team No. 3 won the Third Annual Communications System Management Golf Tournament with a net team score of 292. The winning foursome; Dave Burks, Don Fietkiewicz, Paul Troutman and John Welch finished one stroke ahead of Andover's team of Don Fifield, Ray Juhl, Chuck LaPage and Ralph Summerton.

Continuing their individual winning ways for the third year in a row, Paumalu's Castor Corpuz took low gross honors with a 75 while Dave Burks carded a low net round of 80-8-72.

Other teams participating in the tournament included Paumalu No. 2 (301), Headquarters No. 1 (304), COMSAT West Coast (305), Etam (308), Paumalu No. 1 (308), and Headquarters No. 2 (309).

George P. Sampson, Vice President, Communications System Management, presented the winners' trophies in ceremonies held in his office.

## Burks, Charyk win in CEA fall golf tournament

Dave Burks, Communications System Management, swept to his second CEA-golf win of the year as he shot a low gross score of 84 in the Annual Fall Tournament played at the Washingtonian Country Club in Gaithersburg, Md.

COMSAT President Dr. Joseph V. Charyk won low net honors for the day with his 88-15-73.

More than 75 golfers played the long 7,023-yard, par 70 National Course on a beautiful, sunny fall day.

Other first and second place winners were:

First Flight—Low Net: Bob Redick, COMSAT Labs; Leo Keane, Domestic and Aeronautical.

Second Flight—Low Net: Don Greer, Executive; Arnold Satterlee, Communications System Management.

Third Flight—Bernard Mills, COMSAT Labs; Arnold Sanchez, Communications System Management.

Fourth Flight—Bill Sones, COMSAT Labs; Joe Giafaglione, Communications System Management.

Longest drive on the 506-yard twelfth hole: Larry Weekley, Corporate Affairs.

Closest to the pin on the 178-yard eighth hole: Dave Burks, Communications System Management.

Raffle winners were Herb Hanson and Allan McCaskill, both of Communications System Management, and Frank Hess, COMSAT Labs.

Arrangements for the day were directed by Dave Burks and John Welch, both of Communications System Management, and Paul Fleming, COMSAT Labs.

PHOTOS BY WALLY MERCER



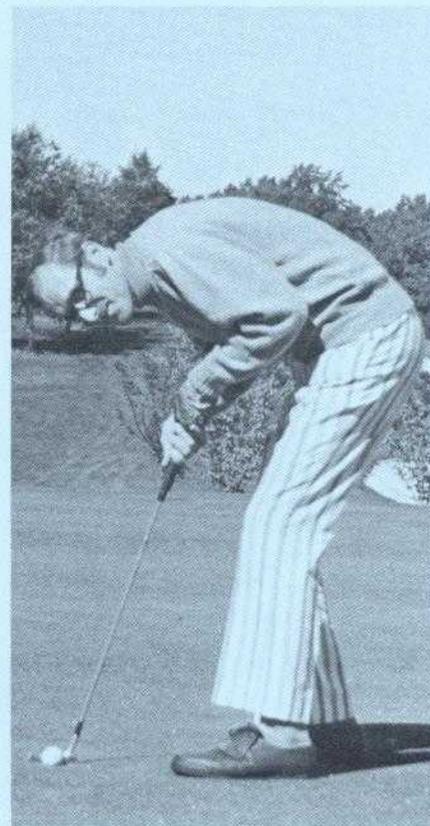
Gene Cacciamani, COMSAT Labs, watches his drive split the fairway.



General Services's Don Wagner watches his ball up the fairway.



Gus Souris, U.S. Systems, concentrates on his chip shot.



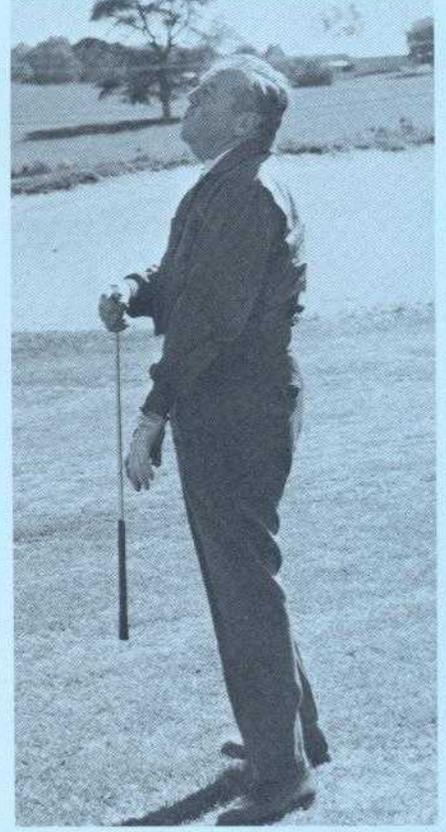
Dick Skroban, INTELSAT System Management, putts for a birdie.



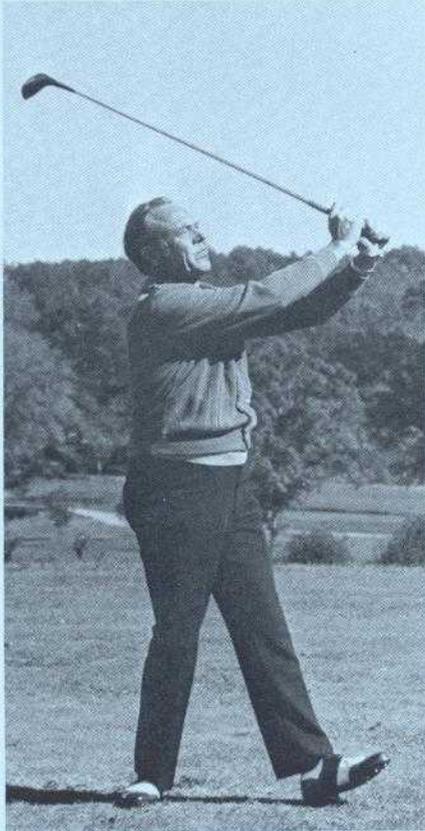
Ed Wabnitz, Procurement, wonders if his ball is in the water.



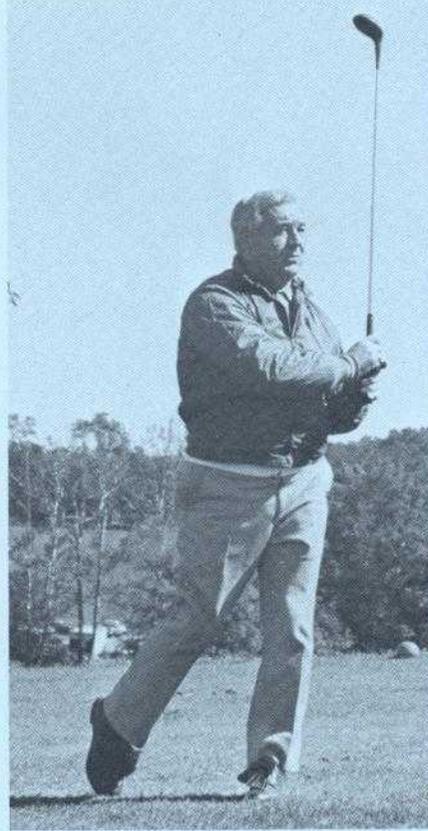
Splash—one that didn't make it.



Charlie Kelly, Procurement, also wonders if his ball is in the water.



Dennis Neill, System Control, follows through on a wood shot.



Paul Gaffney, Personnel, keeps his eye on his ball.



Finance's Nat Tonelson prepares to hit a fairway shot.



Crawford Booth is Etam's facilities maintenance supervisor.



Andy Thomson (left) and Bill Adams test power equipment.

## From Etam

BY RUPARD N. HOBBS

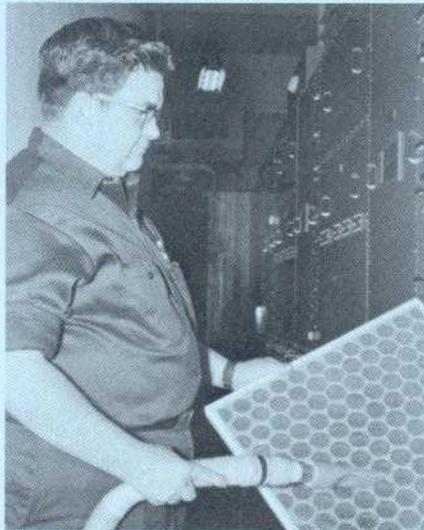
Supervising Etam's facilities group is facilities maintenance supervisor, Crawford Booth. A native of Duluth, Minnesota, and now living in Oakland, Maryland, with his wife, Kazuko, and daughter, Linda, Mr. Booth is responsible for the overall well-being of the physical plant at Etam.

Helping Crawford are senior facilities mechanics Andros Thomson and William Adams. Andy comes to us from Santa Cruz Island, just off Santa Barbara, California, where he worked at the Pacific missile range. He and his wife, Mary, live in Parsons in the Blackman Flats housing development.

Bill, another long-time West Virginian, lives on his farm with his wife, Sunny, and their three children.

Another long-time West Virginia resident and an important member of Crawford's team is utility man Richard Dean, who also owns his own farm, and has lived near Etam all of his life.

Completing the team is Harley Sanders, Etam's contract janitor and our answer to Mr. Clean. He is the one responsible for our sparkling floors. Harley lives near Tunnelton, West Virginia, on his farm with his wife, Helen, and two children.

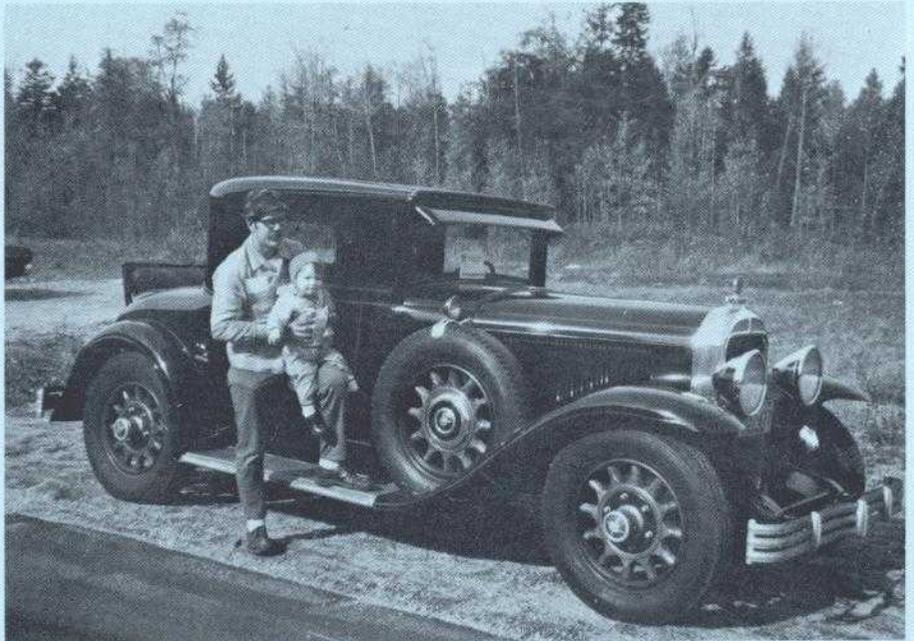


Dick Dean cleans a filter.



Harley Sanders is Etam's 'Mr. Clean.'

■ Mr. Hobbs is operations supervisor at the Etam Earth Station.



Bruce Simmons and his son display the blue ribbon awarded to his 1929 Buick during last summer's antique show.

## News and notes from Andover

BY JOANNE WITAS

Technician Bruce Simmons is a collector of antique autos. Bruce and his family travel all over Maine looking for that exclusive relic of yesteryear. Bruce found one of his dream cars a few years ago. It was a 1929 Buick, Model 46S, six-wheel, rumble-seat coupe. He displayed this relic at Boothbay Harbor, Maine, during the summer antique show and won a blue ribbon for his efforts.

Bruce, a member of the Maine Obsolete Automobile League, plans to rebuild the engine of his 1937 Buick, Model 60, four-door sedan and restore the undercarriage of his 1929 Buick during the coming winter.

Bruce's next project? Well, there is this 1917 Chevrolet, five-passenger touring car in an old barn, up-state. Only time will tell.

**W**ith the timing and precision of a seasoned ocean racing crew, our Andover facilities men recently hoisted and set our 1,620-square-foot transportable antenna cover. The light-

■ *Mrs. Witas is personnel accounting clerk at the Andover Earth Station.*

weight (1.9 oz. per yd.), coated nylon cover was designed to eliminate snow loading inside the antenna structure, thus allowing continuous tracker operation.

Although "stops" and "turtle bags" were not used, the "flying" set of the chartreuse spinnaker-like cover was completed without incident. It added a rather brilliant hue to our already colorful autumn foliage.

**C**ongratulations are in order for Mr. and Mrs. John Foster on the birth of their first son. Mr. and Mrs. Larry Wood also are the proud parents of a baby boy. Not to be outdone, Mr. and Mrs. Dick Plantier are displaying their new bundle of joy all wrapped in pink—a baby girl.

**A**ndover employees are building and moving. Paul DeShong and Phil Morales have built new homes in Andover and moved in recently. Don Bachelder and Art Haseltine are doing the same thing, and Don expects to be in his new home before the "snow flies." Art expects to be ready to move sometime in January. Jack Conner and Dan Grenier have just purchased new homes and are in the process of moving.

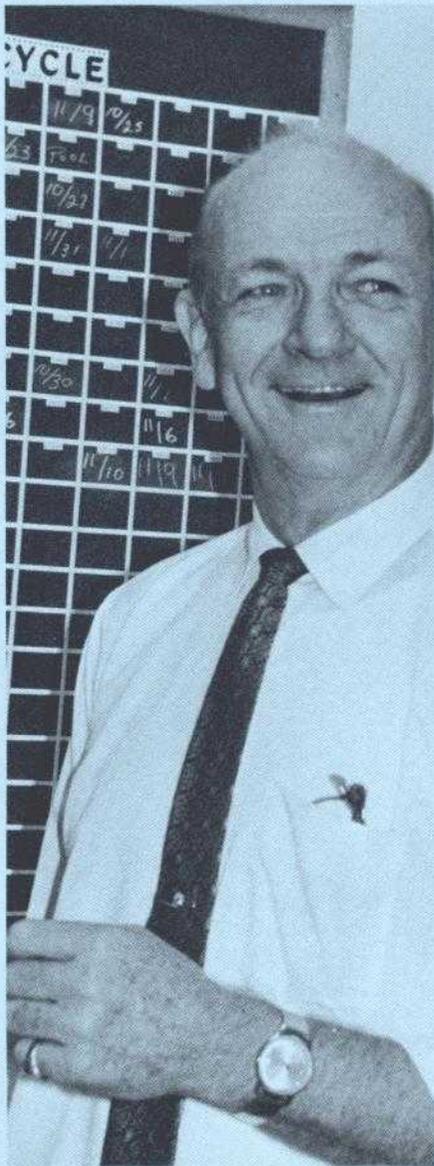
A quick survey indicates that out of the 41 employees at Andover, 38 own their own homes.

## Laboratories Equipment Branch

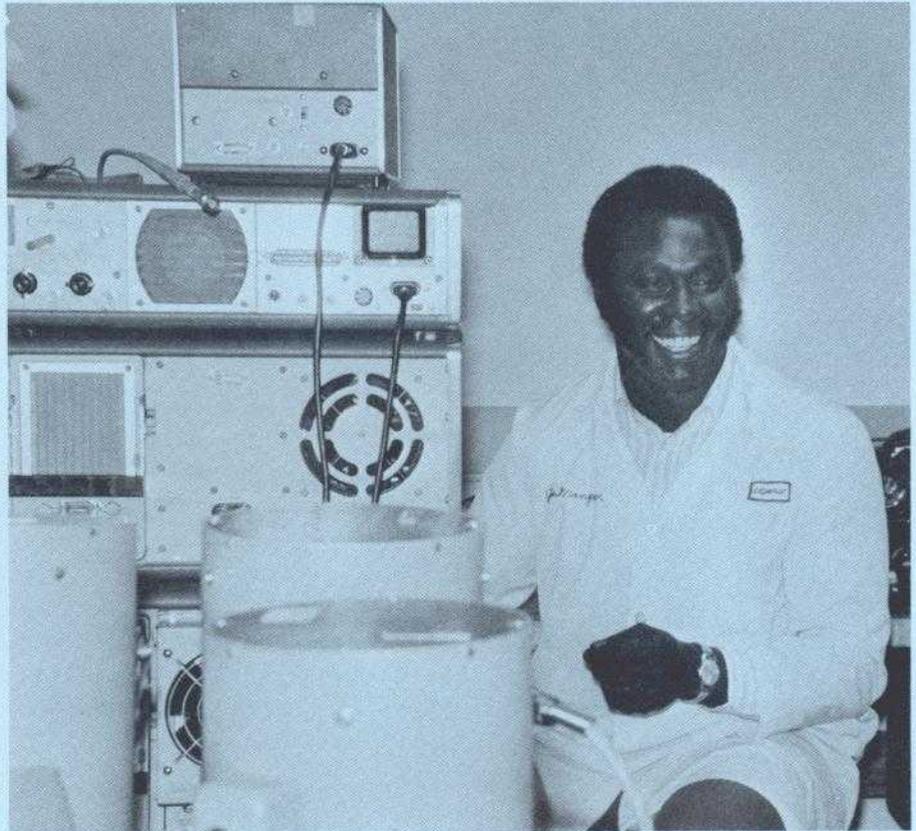
The Laboratories Equipment Branch under the supervision of J. P. "Pat" McCusker provides three vital services to all elements of COMSAT Laboratories.

Its major responsibilities include:

- Test equipment procurement, distribution, inventory control and storage.
- Calibration, preventive and corrective maintenance of all test equipment.
- Provision of a comprehensive stock of electronic components for experimental work.

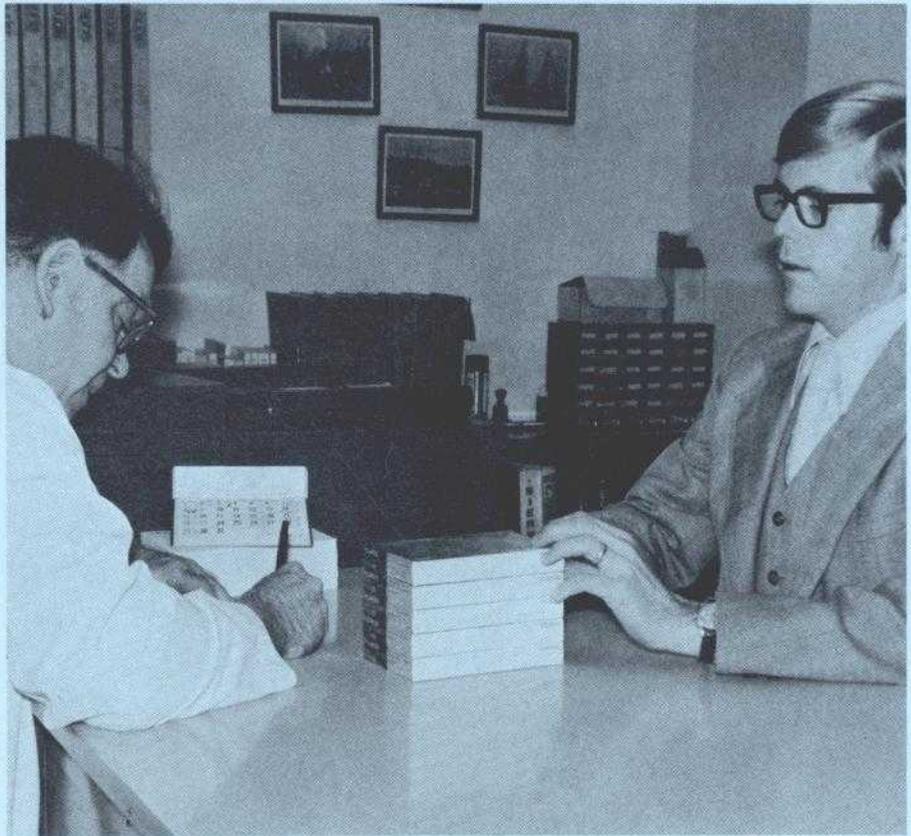


Pat McCusker corrects his inventory control status board.

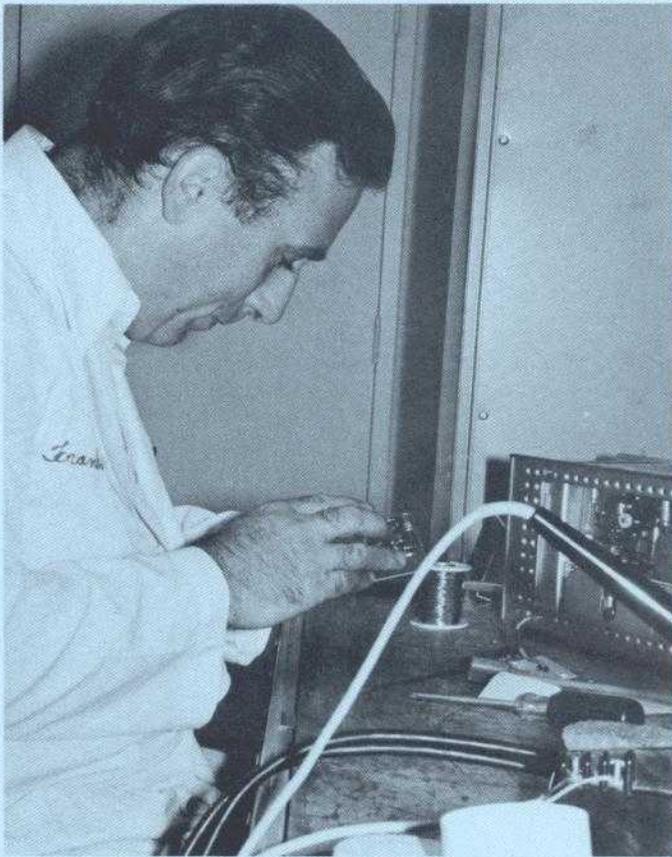


Joe Mangum prepares an equipment calibration test.

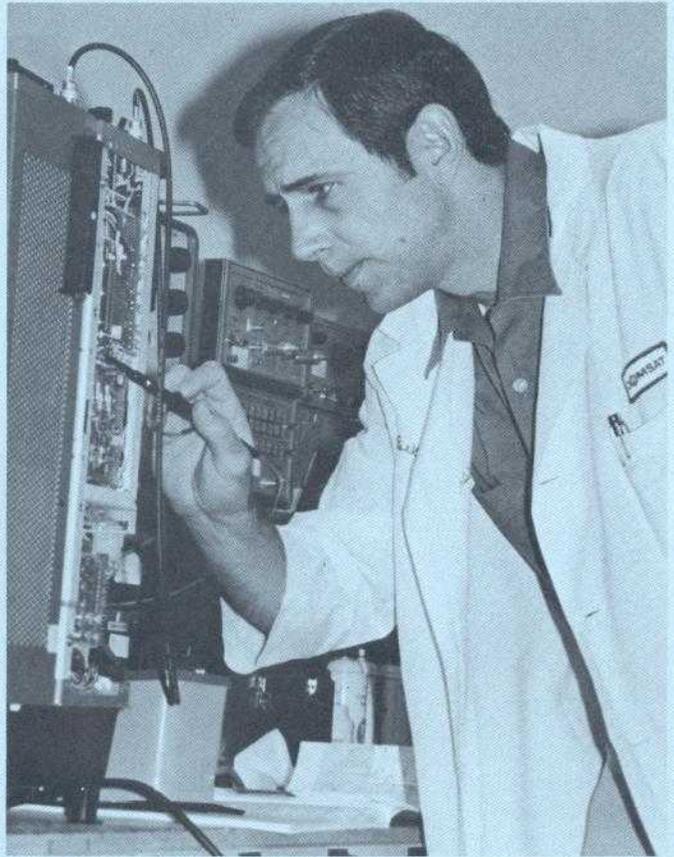
PHOTOS BY J. T. MCKENNA



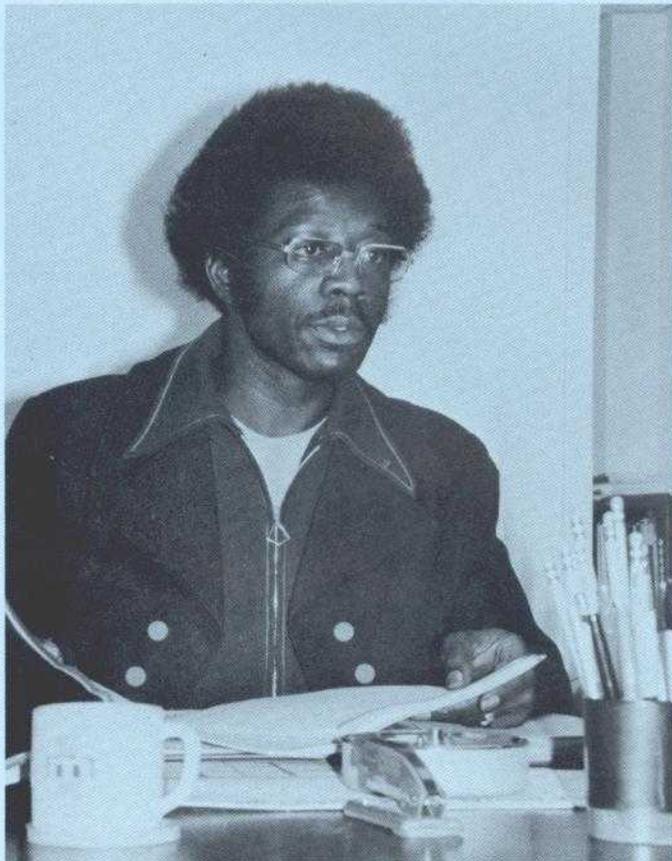
Bud Kennedy (right) watches as Al Ewing, quality control lab, signs for a supply of film.



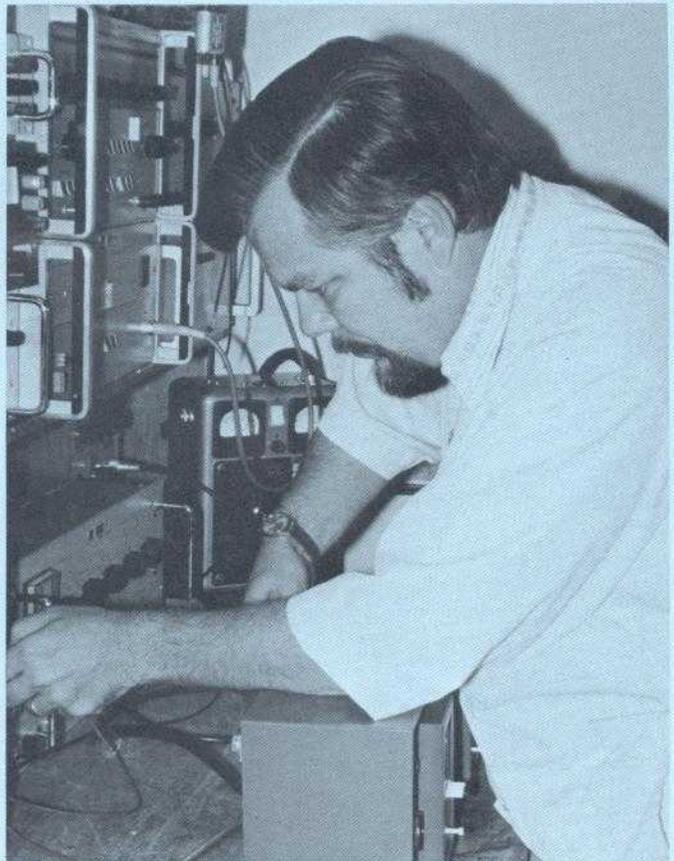
Frank Sandel replaces a voltmeter lamp.



Bill Roberts checks a connection in a scope.



Wilmer Phillips reviews his equipment log.



Bill McQuire tests a piece of new equipment.



## Welcome to beautiful downtown Talkeetna

BY PATTI MCKENNA

Most people from the "outside" have heard of the Alaskan cities of Anchorage, Fairbanks and Juneau. Except for COMSAT employees, not many know of the town of Talkeetna, though.

There is such a place and it is 114 miles north of Anchorage via the newly paved Anchorage-Fairbanks Highway. When you reach milepost No. 98, you turn right onto the Talkeetna spur road and continue for 14 miles into town.

Talkeetna is located at the confluence of the Talkeetna, Chulitna and Susitna Rivers. The town is serviced by the Alaska Railroad which runs north to Fairbanks and south to Anchorage daily during the summer, and twice weekly during the winter months—September to May. We have mail service daily in the summer, and daily except Thursday in the winter.

As you approach town, you crest "Ski-Hill" and encounter a breathtaking view of Mt. McKinley. Continuing down the hill, you cross the Alaska Railroad tracks, and pass the

■ Mrs. McKenna is a secretary at the Bartlett Earth Station.

State trooper's regional office on the left. A short distance further on the left is the Talkeetna School (grades 1 through 12). Then you are greeted by a log sign which proclaims: "Welcome to Beautiful Downtown Talkeetna."

In the town proper, you will find the B & K Trading Post and the Town Post Office. Continuing down the main street, you pass the Fairview Inn, one of Talkeetna's nightspots, then the home of Don Sheldon, our famous bush pilot, and finally the Talkeetna Roadhouse, where you eat home-style meals including freshly baked bread.

Down at the corner you'll see the

abandoned building that once housed the "Bucket of Blood Saloon." A left turn at the saloon takes you to the end of the pavement and to the Talkeetna Motel, run by our French cuisine expert, "Evil Alice."

Talkeetna contains many old buildings that are relics of an age long gone. The newly-formed Talkeetna Historical Society is actively trying to preserve these reminders of pioneer days.

Two churches serve the community's religious needs, and for entertainment there are movies every other Friday night and on alternate Sundays there is a Bingo game. The women of the community have a physical fitness class once a week during the winter months.

Relatively new to the Talkeetna scene are the COMSAT home sites located three miles east of town. The lack of any available housing in Talkeetna led COMSAT to construct nine two-level, three-bedroom houses and one duplex trailer. The homes are located in a natural wooded setting.

There are 23 COMSAT children attending school this year in Talkeetna with a total enrollment for all 12 grades of 191.

In December the new high school will open at the "Y" junction of the Anchorage-Fairbanks Highway and our Talkeetna road. Our children will then have a 15-mile ride to school which is still considerably less than some others who ride the bus at least an hour each way.



Evil Alice's restaurant serves some of the best French food north of Paris.

Alaska is truly the "Land of the Midnight Sun." During the summer months, it never really becomes dark. However, we make up for all that sunlight in the winter when it becomes dark at 2:30 o'clock in the afternoon and the sun does not rise until 9:30 a.m.

Life is indeed different for most of us in Talkeetna but few if any would trade places with those who live in the "south 48."

## Paumalu's Geer: 'a man who won't give up'

BY ROBERT N. KUMASAKA

In September 1971 Daniel D. Geer, Paumalu's assistant station manager, started on an ambitious educational program. His goal: A college degree within three years while continuing to work at his full-time job.

Dan is currently in the second year of his program, and assuming no further disruption of his educational schedule, he hopes to complete the requirements for a bachelor's degree in business administration in November 1974 at the University of Hawaii.

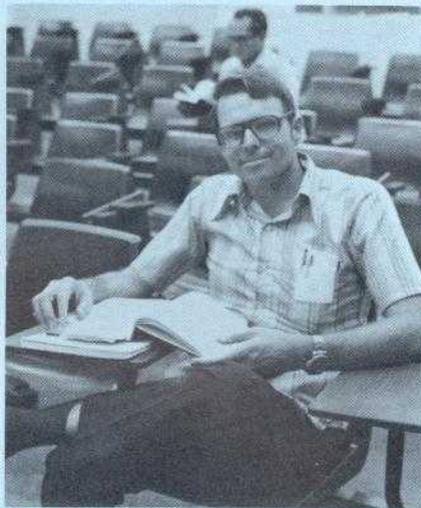
Dan's quest for a college education dates back to 1959 following his discharge from the U.S. Air Force when he enrolled at Clarinda, Iowa, Community College. However, because of financial problems, he was forced to drop out of school in 1960, and took a job with Bendix Engineering Corp.

By the end of 1962, having saved enough money, Dan resumed his studies at Missouri State College. That summer his education was again interrupted when he moved to California. There he entered night school at El Camino College while holding a full-time job with WEMS, Inc., an electronics spacecraft module manufacturer.

After a year as a part-time student, Dan resumed his college career on a full-time basis in the fall of 1964, and in January 1965 completed requirements for an A.A. degree in electron-

ics from El Camino. Not satisfied with an associate degree, Dan transferred to California State College in Long Beach for the 1965 spring semester. Again, lacking the finances, his college education was temporarily interrupted.

During the next several years, due to travel, living overseas, a heavy work load and raising his family, Dan was unable to resume his college education until fall of 1971 when he enrolled in evening classes at the University of Hawaii's College of Continuing Education. Since then Dan has been on a 12 to 14 hour work-study schedule which includes driving approximately 100 miles a day. He carries nine credit hours per quarter. This is equivalent to a full-time student load as the evening credit courses are divided into four accelerated terms a year. Dan has completed 33 credit hours and coupled with his previous 36 applicable transfer credits, he now has earned 69 credit hours toward his bachelor's degree.



Dan Geer at his studies.

Dan joined COMSAT as a technician at Paumalu in June 1966. In February 1967 he was transferred to the Tanay Earth Station in the Philippines and served as interim manager of the station. He returned to Paumalu in August 1968 and has served in his present job assignment since then.

He is an Air Force veteran, having spent four years in electronics maintenance work while in the service. A native of Clarinda, Iowa, Dan and his wife, Fumiko, have one child, and live in Kaneohe, some 30 miles from the station.

Dan Geer's pursuit of a college education while holding down a full-time job is not unique. What is unique, though, is his determination to earn his degree after years of frustration. The average person faced with the same problems would have probably "thrown in the towel" before this. However, at age 35, Dan feels that he can no longer defer his immense desire to complete his college education, a goal he considers most essential to his future.

## The Plaza scene

BY JEAN QUINN

Regardless of the season, the ever-popular European countries never fail to entice the American tourists, particularly those in the COMSAT Comptroller's Office. This fall, Calvin Copp spent four weeks venturing through Germany, Italy and Spain. Jim Lawson also spent a week touring Spain.

Satpal Chhabra, a bookkeeper in Accounting, recently returned from a trip to her home country of India. Satpal, known to her colleagues as "Rani," spent 2½ months visiting with her family in Amritsar, Punjab. She enjoyed her trip, but says she is happy to be back on the job.

Yes, there was a shower recently, but nary an umbrella was in sight. It was a bridal shower for Elaine Stott, who was married to James Prech on October 28. Elaine is secretary to the Comptroller. Our very best wishes to Mr. and Mrs. Prech.

Another newlywed at the Plaza is Georgia Jones of Communications System Management, who was married to John Seville on August 11, 1972. Mr. and Mrs. Seville spent their honeymoon in Florida and spent some time touring the Gulf States. Congratulations to the new bride and groom.

On November 8, 1972 Mr. and Mrs. Chuck Hatcher (he is in General Services) became the proud parents of an 8 lb. 6 oz. baby boy, Patrick Anthony. Congratulations to the proud parents.

■ Miss Quinn is a secretary in Finance.

■ Mr. Kumasaka is administrator of the Paumalu Earth Station.



Dual winner Tom Throop (right) and doubles victor George Svarvas, both of the Labs, review the results of the recent tennis play.

## Throop wins advanced singles crown, teams with Szarvas to take doubles

Tom Throop, Labs, became a double winner in this year's tennis play as he defeated Carl Wenrich, Labs, in three sets, 4-6, 6-0, and 7-5, in the advanced singles division of the CEA-sponsored tournament. He then joined forces with George Szarvas, Labs, to defeat Alan Kasper, Legal, and Dick McBride, Communications System Management, in straight sets, 6-4 and 6-3.

Bob Kinzie, International, won his first novice singles title as he licked Jeff Rubin, Labs, 7-5 and 7-5.

Results of all matches follow:

### Advanced Singles

#### First Round

Tom Throop, Labs, drew a bye.  
 Bob Bourne, Legal, defeated Marty Fliesler, Legal, 7-5, 0-6, 6-2.  
 Ed Jordan, Labs, drew a bye.  
 Henry Williams, Labs, drew a bye.  
 Nat Tonelson, Finance, drew a bye.  
 Rich Colino, International, drew a bye.  
 Alan Kasper, Legal, drew a bye.  
 Jay Levatic, Labs, drew a bye.  
 George Szarvas, Labs, drew a bye.

Bob Strauss, Labs, defeated Tom Tuttle, Legal, 6-2, 6-3.  
 Dick McBride, Communications System Management, drew a bye.  
 Del Bergere, Legal, defeated Charlie Baer, Executive, 6-1, 6-2.  
 Bill Lowe, Labs, drew a bye.  
 Nicole Andrews, International, defeated Paul Troutman, Communications System Management, 7-6, 6-4.  
 Carl Wenrich, Labs, drew a bye.  
 Jim Dunlop, Labs, defeated Jeff Rubin, Labs, 6-3, 6-3.

#### Second Round

Throop defeated Bourne, 6-0, 6-1.  
 Williams defeated Jordan, 6-4, 6-2.  
 Tonelson defeated Colino, 6-4, 6-1.  
 Levatic defeated Kasper, 7-6, 6-4.  
 Szarvas won by default over Strauss.  
 McBride defeated Bergere, 6-0, 6-0.  
 Lowe defeated Andrews, 7-6, 6-3.  
 Wenrich defeated Dunlop, 6-1, 6-3.

#### Quarterfinals

Throop defeated Williams, 6-0, 6-0.  
 Tonelson defeated Levatic, 6-7, 6-0, 6-2.  
 Szarvas defeated McBride, 7-5, 6-2.  
 Wenrich defeated Lowe, 6-3, 6-0.

#### Semifinals

Throop defeated Tonelson, 6-4, 7-6.  
 Wenrich defeated Szarvas, 6-4, 6-0.

#### Finals

Throop defeated Wenrich, 4-6, 6-0, 7-5.

### Novice Singles

#### First Round

Jeff Rubin, Labs, defeated Dave Lewis, Labs, 6-2, 6-4.  
 Harry Jones, Finance, drew a bye.  
 Jim Hall, Finance, drew a bye.  
 Charlie Baer, Executive, defeated Frank Klisch, Labs, 6-2, 6-3.  
 Tom Donahue, International, drew a bye.  
 Gene Cacciamani, Labs, drew a bye.  
 Phil Caughran, International, defeated Bob Swensen, Domestic and Aeronautical, 6-4, 6-1.  
 Al Ramos, Labs, drew a bye.  
 Ty Ricks, Administrative Services, drew a bye.  
 Mike Bond, Administrative Services, defeated Mel Harley, Administrative Services, 6-3, 6-2.  
 Bob Kinzie, International, defeated Toshi Satoh, Labs, 6-1, 6-4.  
 Kim Kaiser, Labs, drew a bye.  
 Henry Meyerhoff drew a bye.  
 Dennis Beaufort, Communications System Management, won by default over Fred Ormsby, Labs.  
 Bob Gruner, Labs, drew a bye.  
 Hale Montgomery, Corporate Affairs drew a bye.

#### Second Round

Rubin defeated Jones, 6-4, 2-6, 6-1.  
 Baer defeated Hall, 6-1, 6-2.  
 Donahue defeated Cacciamani, 3-6, 6-3, 7-6.  
 Caughran defeated Ramos, 6-2, 7-5.  
 Bond won by default over Ricks.  
 Kinzie defeated Kaiser, 3-6, 7-5, 6-0.  
 Meyerhoff defeated Beaufort, 6-2, 6-0.  
 Gruner defeated Montgomery, 3-6, 6-2, 6-1.



International's Bob Kinzie won his first novice singles title.

### Quarterfinals

Rubin defeated Baer, 3-6, 6-1, 6-4.  
Caughran defeated Donahue, 6-3, 4-6, 6-3.  
Kinzie defeated Bond, 6-0, 6-0.  
Meyerhoff defeated Gruner, 6-0, 6-0.

### Semifinals

Rubin defeated Caughran, 6-3, 4-6, 6-3.  
Kinzie defeated Meyerhoff, 7-6, 6-4.

### Finals

Kinzie defeated Rubin, 7-5, 7-5.

### Doubles

#### First Round

Kaiser and Lewis, Labs, defeated Chitre and Meyerhoff, Labs, 6-3, 6-1.  
Hutchens and Rubin, Labs, defeated Baer, Executive, and Caughran, International, 6-1, 6-2.  
Donahue and Kinzie, International, won by default over Fliesler and Tuttle, Legal.

#### Second Round

Szarvas and Throop, Labs, drew a bye.  
Dunlop and Lowe, Labs, won by default over Kaiser and Lewis, Labs.  
Gordon and Huson, Labs, won by default over Andrews, International and Biddle, Finance.  
Levatic and Williams, Labs, drew a bye.  
Kasper, Legal, and McBride, Communications System Management, drew a bye.  
Christie and Colino, International, defeated Bergere and Bourne, Legal, 6-4, 6-3.  
Hutchens and Rubin, Labs, defeated Donahue and Kinzie, International, 2-6, 6-2, 7-6.  
Jordan, Labs, and Tonelson, Finance, drew a bye.

### Quarterfinals

Szarvas and Throop defeated Dunlop and Lowe, 6-4, 6-2.  
Levatic and Williams defeated Gordon and Huson, 6-0, 6-3.  
Kasper and McBride defeated Christie and Colino, 6-3, 7-6.  
Jordan and Tonelson defeated Hutchens and Rubin, 6-1, 6-1.

### Finals

Szarvas and Throop defeated Kasper and McBride, 4-6, 6-4, 7-5.

## 5-year awards

The following personnel received five-year service awards during November and December:

**Administrative Services:** Joseph F. Donnelly and Joan D. Wright.

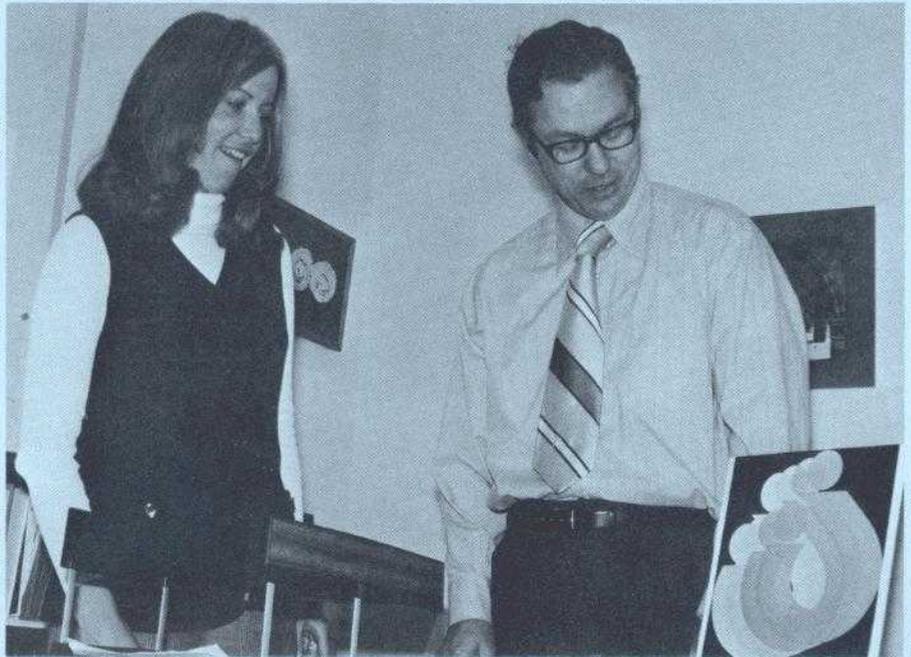
**Andover:** Raymond E. Juhl.

**Communications System Management:** Loretta A. Burgess, Herbert H. Chu, Richard E. Hunt and Mary Lane.

**Finance:** Martin Levine and Roman E. Rollins.

**International:** Ismael S. Dieguez.

**Laboratories:** Helen L. Caviston, Su M. Chow, Richard S. Cooperman, Burton I. Edelson, Donald D. Hart, Ruth A. Palmer, Peter H. Schultze, James Slane, and Arthur F. Standing.



## People helping people—thanks to you it's working

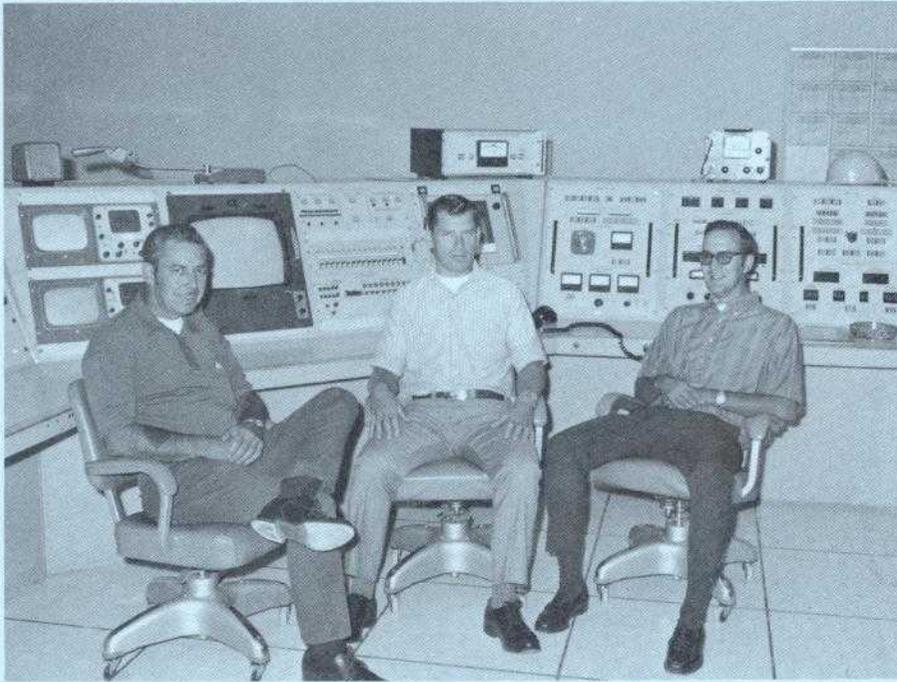
Personnel's Lyn Russell and his secretary Judy Martin agree that UGF's colorful poster helped make the recent campaign a success. Mr. Russell served as UGF coordinator for Headquarters and the Labs and reported that more than 14 percent of the employees contributed in excess of \$12,000 to this year's fund raising drive. In addition to contributions from individual employees, COMSAT made its annual corporate contribution to UGF amounting to approximately \$10.80 for each employee in the Washington area.



## Credit Union earns 1972 Thrift Honor Award

Federal Credit Union Examiner Richard Obidowski (left) presents Manager Ted Gottry with the National Credit Union Administration's 1972 Thrift Honor Award. This award is made to only the top 10 to 15 percent of all Federally-chartered credit unions and indicates that the COMSAT Federal Credit Union has encouraged thrift among its members by establishing an active thrift educational and counseling program; by providing facilities, hours and arrangements convenient to the membership; and by stimulating savings by a significant number of its members.

PHOTOS BY J. T. MCKENNA



Brewster's "A" team members are (left to right) Darold Browning, Tom Cheeseman and Jim Peasley.



## Silk screen art from launch photos

Vera Wilson, a program analyst in Communications System Management, is shown with her second original work of art based on recent INTELSAT launches. Her latest silk screen montage began with photographs taken during the INTELSAT, F-3, and F-4 launches. These were made into a photo silk screen stencil and printed on canvas. She then used oils and sand to achieve the textured appearance of the finished work.

PHOTO BY J. T. MCKENNA

## Meet the "A" team at Brewster

BY DOROTHY BUCKINGHAM

Brewster's "A" team is one reason why today's global system functions so effectively.

This experienced trio of communicators help insure that flawless service is routinely provided every day for the countries served by the Brewster Earth Station.

Team controller Tom Cheeseman joined us in April 1967. A three-year veteran of the Canadian Air Force, he worked for IBM in Vancouver before "coming south." He was promoted to his present position in August 1969. Married with four children, Tom enjoys a number of outdoor sports in his free time.

Team member Darold Browning, a native of Idaho, arrived at Brewster in March 1967 and was promoted to senior technician in September 1968. He spent four years in the Navy and was also employed by the Federal Electric Company before becoming a COMSAT employee. The father of three teenagers, Darold's hobbies include hunting, fishing and cycling.

Jim Peasley, the youngest member of "A" team, was born in Seattle. He too served in the Navy and earned his "communications spurs" with the Pacific Northwest Bell Telephone Company. A senior technician since January 1970, Jim and his wife Connie have two daughters.

The combined experience of three experts such as Tom, Darrel and Jim makes a station manager's life a little easier.

■ Mrs. Buckingham is a secretary at the Brewster Earth Station.

# COMSAT benefits provide major medical insurance

By DONALD J. CHONTOS

*This is the eighth in a series of articles prepared by the Personnel Office to explain COMSAT's employee benefits program.*

*The last article continued the discussion of COMSAT's medical insurance plan, explaining the surgical benefits.*

*This article outlines the benefits provided by major medical insurance and concludes the review of the Medical Insurance Plan benefits.*

In addition to the benefits provided by other parts of the Medical Insurance Plan, major medical insurance will pay:

- Without need to satisfy the deductible: 80 percent of all covered hospital and surgical charges in excess of those reimbursed under the hospital and surgical insurance coverages.
- After satisfaction of the required deductible: 80 percent of all other covered medical charges in excess of those reimbursed under the in-hospital physician, laboratory and X-ray, and/or emergency accident treatment insurance. Covered expenses will include those for family physician's fees, drugs, medicines and medical treatment appliances.

**EXCEPTION:** benefits for out-of-hospital treatment of nervous or mental conditions are limited to: (1) 50 percent of the actual charges per visit, or \$20 per visit, whichever is less; (2) one visit per day; and (3) \$2000 total benefit in any consecutive 12 month period.

The total major medical insurance benefits payable for all covered ex-

■ *Mr. Chontos is manager, employee benefits.*

penses incurred during the lifetime of an insured shall not exceed \$25,000 except to the extent that the aggregate maximum benefit has been reinstated in accordance with the provisions outlined below.

## Explanation of Deductible

As explained earlier, with the exception of covered hospital and surgical charges, you must pay a certain amount of your medical expenses each year before your major medical insurance benefits become effective. The amount of such expenses is known as the deductible.

The amount of your deductible each year depends upon your salary in the beginning of the year as follows:

Annual Salary	Individual Deductible
(1) Less than \$10,000	1% of salary
(2) \$10,000 and above	\$100

A separate individual deductible applies to you and each of your dependents receiving major medical insurance benefits. To help you avoid burdensome costs, however, a limitation of two deductibles per family has been established. When two members of any one family have satisfied their deductibles, the rest of the family is automatically eligible to receive major medical benefits without need to satisfy any further deductibles.

For the same reason, expenses incurred during the last three months of the year which are applied to the deductible for that year, will also apply against the individual's deductible for the following years.

## Covered Expenses

A complete list of those services and/or supplies which are "covered expenses" under major medical insurance is available in the employee information book, "Group Insurance." Since the list is somewhat lengthy, it will not be reprinted here.

## Common Accident

If you and one or more of your qualified dependents, or if two or more such dependents, while insured under this coverage, sustain injuries in the same accident and incur covered expenses as a result of such injuries, the largest of the deductible amounts applicable to the persons

sustaining injuries in that accident shall be applied only once with respect to the covered expenses which are incurred by such persons as a result of injuries.

## Automatic Restoration of Benefits

If, on January 1 of any year, while insured under the policy, the lifetime maximum benefit remaining for any individual is less than \$25,000:

- (1) By \$1000 or less, the full amount of lifetime maximum benefit shall be automatically restored, or
- (2) By more than \$1000, the lifetime benefit remaining shall be increased by 10 percent of the aggregate maximum benefit rounded to the next higher multiple of \$500 if not already an even multiple thereof, whichever is greater.

The automatic restoration shall not apply:

- (1) During any period of extended benefits following termination, or
- (2) When the total of all amounts automatically restored equals \$25,000 for an individual.

## Reinstatement of Aggregate Maximum Benefit

The aggregate maximum benefit is \$25,000 per insured individual. If benefits in an aggregate amount of \$1000 or more become payable for covered expenses incurred by an individual, the maximum benefit of \$25,000 may be reinstated if evidence of insurability satisfactory to the insurance company is submitted.

## Limitations and Exclusions

As in all insurance plans, COMSAT's medical and major medical insurance plans have certain benefit limitations and exclusions. They will not be enumerated in this article but they can be found in the "Group Insurance" book issued to all employees. If you have questions concerning the limitations or exclusions, please refer to your copy of the booklet. If you have misplaced your book, or have not received one, copies are available from your station administrator or the employee benefits department.

*The next article in this series will explain the Group Health Insurance Benefit Worksheet.*

## The Varian TWT helps Etam do its job

BY RUPARD N. HOBBS

A remarkable earth station component is the Varian traveling wave tube (TWT), one of which was installed initially in the high-power amplifier (HPA) transmitting unit at Etam. The HPA is the unit that takes the multifrequency 500-megahertz band of signals and amplifies them to the desired power level necessary to reach an INTELSAT IV satellite over the Atlantic.

Etam is now testing a more powerful tube of the same make and design, but capable of greater output. The number of countries accessing the INTELSAT Atlantic satellites and the increased volume of traffic impose a need for additional power at Etam because of lack of spectrum space and the subsequent need to reduce deviation and raise power on existing carriers.

In the past, wave tubes not in use or damaged have been sent from the station to places better suited for storage or repair. It is possible, in many cases, to repair a damaged tube. Unlike older model TWTs that had fragile glass portions in their structure, the Varian tube has many metallic subcomponents, welded into a composite body configuration, that are often not damaged in a normal failure.

■ Mr. Hobbs is operations supervisor at the Etam Earth Station.

Seated within an intense magnetic field focusing magnet with additional cooling fluid hoses attached, the Varian TWT is well concealed; few of its parts are visible.

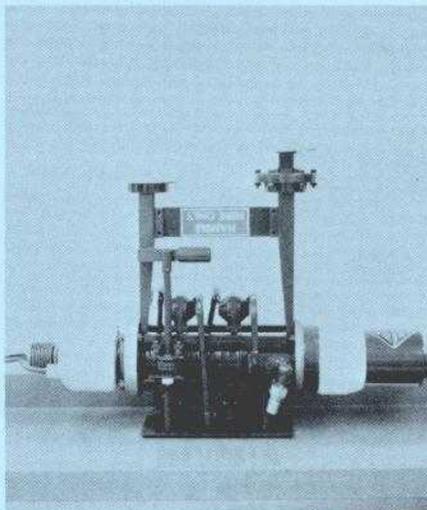
For a simplified understanding of a TWT, one can liken its operation to a wave on the sea.

Out on a dead calm sea, with the trade winds stilled, not a single wave is in motion. But suppose someone should drop a small pebble into the water and simultaneously a gentle breeze begins to blow. A ripple begins to move towards the distant shore. If, along the way, the wind increases to gale force, and tides come into play, the tiny ripple grows immensely and finally crashes onto the shore in the form of a gigantic wave.

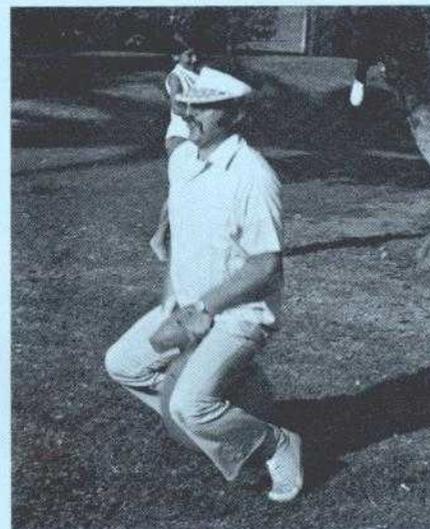
This is similar to what happens in the tube. Into one end there is introduced a small impulse that is acted upon by powerful electrical forces that increase its impetus as the wave passes through the tube. When it comes out the other end, it has grown to be immensely powerful as did the tiny ripple.

The Varian VTC 6660A1 tube has been extremely reliable at Etam, even though it is a new device.

In the accompanying photo, the input is on the left, the output on the right. Each of the pipes, bulges and knobs is critical. The device is hardly a thing that someone dreamed up overnight. The weight is 10 pounds, the length is 18 inches and the cost is \$1,500 a pound.



Although small in size, the TWT performs a huge task.



Irv Dostis heads for the finish line on his "hoppity horse."

## From COMSAT West

BY AL VERBIN

The second annual COMSAT-West family picnic took place on September 16. More than 90 employees, kids and guests filled the bright late-summer sky with softballs and their tummies with hamburgers, hot dogs, beer and pop.

Despite his generous, empty-the-bench, policy, Lu Rick's (Spendid Splinters) team revenged last year's defeat by Marty Vonnegut's gang (this year's Walloping Whales managed by Fred Weber) with a convincing 8-3 waltz in the annual family softball game. The win was made all the more savory by the surprise, but ineffectual appearance of Vonnegut himself, who jetted in from Salinas for the game.

Adults and kids alike joined in the fun, prizes, and sore muscles from the gunnysack and "hoppity horse" races and assorted other contests of speed and skill. Credit goes to Irv Dostis, Don Campbell, Suzanne Lee, and many others for planning this enjoyable affair.

Lu and Barbara Ricks hosted a farewell party November 4 for Fred Weber, who transferred to the Plaza. We all wish Fred much luck and will miss his ever-ready wit and sense of humor.

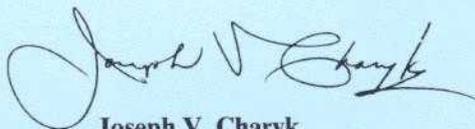
■ Mr. Verbin is a member of COMSAT's West Coast Space Support Implementation Office.

**A holiday message for COMSAT employees**

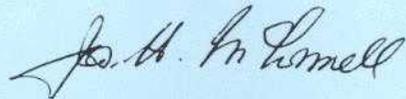
*As the happiest holiday season of the year approaches, we want to take this opportunity to wish for you and your families all the good things inherent in the spirit of Christmas—love, joy, peace and happiness.*

*And we want to express to each of you our deep appreciation for your sustained efforts throughout the past year in working with us for the continued development and success of COMSAT and its plans and programs. A small token of our gratitude is evidenced by the holiday gift which you will receive and which we hope will add to the pleasure you will experience during the holiday season.*

*A very Merry Christmas to each of you.*



**Joseph V. Charyk**  
President



**Joseph H. McConnell**  
Chairman of the Board