

# COMSAT NEWS

November, 1970



# Directors Declare 12.5 Cent Dividend In Recognition of Growth in Income

The Board of Directors has declared COMSAT's initial quarterly dividend of 12 1/2 cents per share, in recognition of steady growth in operating income. The dividend is payable on December 14 to all shareholders of record at the close of business on November 13.

The dividend was declared at the regular Board meeting on October 16. Dividend checks will be mailed to the approximately 120,000 shareholders of record by Continental Illinois National Bank and Trust Co. of Chicago, COMSAT's principal transfer agent.

COMSAT also reported that in the third quarter of 1970 it had net income of \$4,271,000 or 43 cents per share as compared with \$1,446,000 or 14 cents per share in the third quarter of 1969.

The increase in net income in the third quarter of 1970 over that in the third quarter of 1969 was attributed primarily to increased communications satellite traffic. To a lesser extent, the favorable comparison between the two quarters resulted from a reduction in operating income in the third quarter of 1969 due to a temporary interruption of service, during that quarter, through the INTELSAT III, F-2 satellite over the Atlantic Ocean.

Third quarter 1970 revenues totaled \$17,709,000 as compared with \$11,760,000 in the 1969 period, and operating expenses totaled \$15,165,000 as compared with \$11,632,000 in the corresponding quarter of 1969. Resultant net operating income totaled \$2,544,-

000 in the 1970 third quarter as compared with \$128,000 in the prior year period.

Other income, consisting principally of interest on temporary cash investments (net of income taxes), amounted to \$1,727,000 in the third quarter of this year as compared with \$1,318,000 in the corresponding 1969 quarter.

In the first nine months of 1970 COMSAT had net income of \$11,590,000 or \$1.16 cents per share as compared with \$4,947,000 or 49 cents per share in the first nine months of 1969. Revenues in the first nine months of 1970 totaled \$49,937,000 as compared with \$33,528,000 in the corresponding 1969 period.

Operating expenses in the first nine months of 1970 amounted to \$43,119,000 as compared with \$32,685,000 in the first nine months of last year. Other income in this period aggregated \$4,772,000 as compared with \$4,104,000 in the 1969 period.

The improvement in revenues in the third quarter and first nine months of 1970 results from continued growth in the number of equivalent full time half-circuits leased by COMSAT to its customers and has been additionally influenced by a relatively greater growth in the use of longer distance circuits which result in higher average revenue per circuit. The number of leased half-circuits was 1,784 at September 30, 1970, as compared with 1,364 at September 30, 1969.

## Over 700 Join Thrift-Savings Plan

Over 700 COMSAT employees took advantage of the Thrift and Savings Plan during the initial enrollment period, which closed on October 19. Those who joined the plan will have their first deduction taken out of their November 20 paycheck.

The numbers of employees selecting each of the three investment plans will not be available until later in November.

The next enrollment date will be January 1, 1971. All employees who were employed prior to July 1, 1970, are eligible to join the plan during this period. Applications for the January period must be completed and filed with the Personnel benefits office by December 1.

The December 1 filing date also is the time for active plan participants to make account changes if they desire. During this period, account holders may elect to change the percent of payroll deduction, change investment directions or transfer monies from one fund to another. Memos from the benefits office will be published in advance of December 1, giving information on options and enrollment requirements.

Anyone desiring additional information on the Plan should contact the Personnel benefits office at Headquarters, the Personnel office at the Laboratories, or the administrators at the field activities.

## News at a Glance

• COMSAT proposes use of advanced high capacity satellites in FCC filing to provide domestic satellite communications services (Page 3).

• First dividend declared by COMSAT (Page 2).

• INTELSAT IV satellites being prepared for launch, while launch vehicles are being readied, tentative schedules arranged (Pages 4-5).

• SPADE system will be put in use with Intelsat IV satellites (Page 6).

• Focus on the accounts payable section gives insight into getting the corporation's bills paid (Pages 10-11).

• Phase II of Project SOC to begin at COMSAT on November 16 with arrival of 20 young trainees (Page 13).

• Larry Weekley, Bill Wood are title winners in the 5th Annual Headquarters Golf Tournament (Page 17).

• Thrift-Savings Plan draws over 700 applications; second sign-up period open until December 1 (Page 2).

• Cayey station continues to operate as heavy rain storms flood Puerto Rico (Page 14).

• Unidentified flying object" spotted by Operations team at Etam, but fears quieted after news from outside world (Page 12).

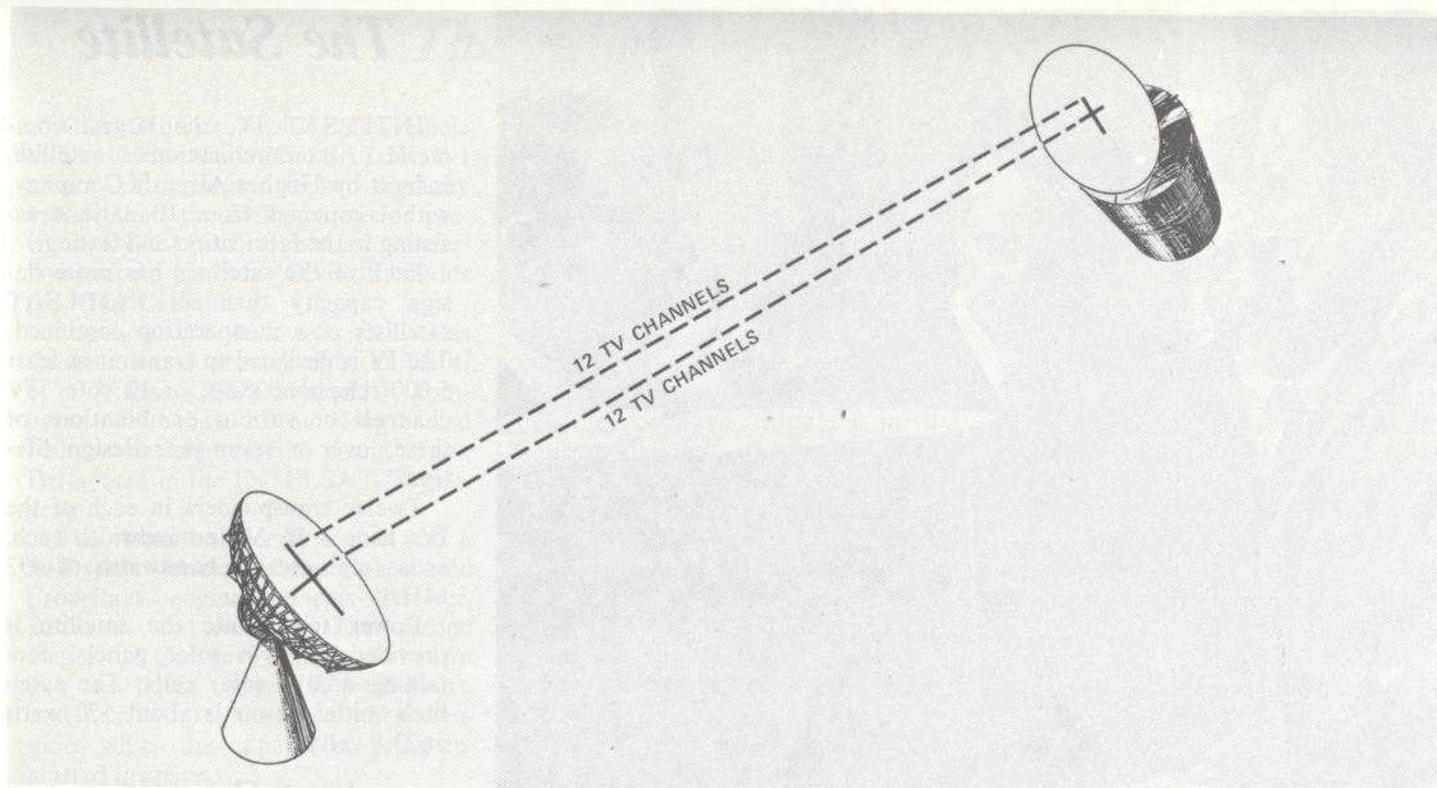
## On the Cover

*An artist's concept of COMSAT satellites and AT&T ground stations which would provide a U.S. domestic satellite service. In addition, COMSAT intends to file a proposal for a second system for use by all other interested parties. See details, Page 3.*

November 1970 - Year 5, No. 8

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A.V.P. for Public Information  
Matthew Gordon  
Editor: Kay Smith



Cross polarization permits a doubling satellite communications capacity by sending 12 channels, covering a given bandwidth, between horizontal antennas in the satellite and earth stations, and an additional 12 channels on the same bandwidth between vertical antennas in the satellite and earth stations to avoid interference between the two groups of channels. The effect of employing cross polarization is to double the frequency utilization in the four to six gigahertz bands presently allocated to satellites.

## COMSAT Proposes Advanced High-Capacity Satellites In Filing to Provide Domestic Communications Services

COMSAT filed on October 19 to provide advanced high-capacity satellites for domestic U. S. communications, employing techniques to double capacity by doubling the use of limited frequency spectrum.

In applications filed with the FCC, COMSAT said that its initial plan is for two in-orbit satellites, plus two specialized ground tracking and control facilities, designed to meet the requirements of AT&T.

Additionally, COMSAT said it would file in the near future for a separate multiservice system to provide services to other customers, large and small.

In a transmittal letter to FCC Chairman Dean Burch, President Joseph V. Charyk said that COMSAT has discussed communications needs with TV networks, common carriers, the data industry, news media, cable TV and others. Dr. Charyk said:

"In the very near future, we expect to make concrete proposals to those entities and to seek authority from the Commission to furnish comprehensive services and facilities which will meet their needs and provide the economic

advantage of a multiservice system. Such a system will accommodate the communications requirements of all users who wish to avail themselves of our services, and, together with today's application, will represent a major milestone in domestic communications, and will powerfully serve the public interest."

AT&T filed at the same time on October 19 for domestic satellite services. At a press conference that afternoon, Long Lines President Richard Hough explained that the satellite service would be integrated into, and supplement, the nationwide Bell switched system.

### COMSAT Filing

Last March 20, the FCC issued guidelines for interested parties wishing to apply for licenses to provide domestic commercial satellite communications. The COMSAT filing was the Corporation's initial response.

In this filing COMSAT called for

construction and procurement of three satellites, two to be placed in orbit and the third for spare or backup, plus a request for authority to construct a fourth satellite later, if required.

COMSAT said that AT&T is the first, and thus far the only, company or entity to have completed firm arrangements with COMSAT for satellite services.

Under an agreement made a part of the filing, COMSAT said that it would provide to AT&T the capacity of two satellites in orbit for approximately \$205 million over seven years; separate applications were made concurrently by AT&T for ownership and operation of five earth stations to send and receive the communications signals.

The COMSAT proposal called for the satellites to be positioned in geostationary orbits at 22,300 miles altitude above the equator, with antennas focused on the United States.

They would share frequencies now assigned in the 4 and 6 gigahertz range, a portion of the spectrum now

(See Domestic Service, Page 6)

## The Satellite



During October communications representatives of Yugoslavia toured COMSAT/INTELSAT facilities. Seen with the Early Bird satellite model are M. Josimovic, S. Yurekovic, M. Papovic, N. Radali and COMSAT's International Assistant Vice President R. Colino.

## The INTELSAT IV Program

The first satellite (F-1) in the INTELSAT IV series, planned for launch from Cape Kennedy in the near future, may provide more capacity than the combined total for all satellites now operating in the global system.

While positioning and operational details have not yet been formally approved by the ICSC, COMSAT as manager has recommended that the F-1 be positioned over the mid-Atlantic Ocean at 24.5 degrees west longitude to serve as the primary Atlantic operational satellite.

If successful, and after appropriate checkouts, the F-1 would assume a major portion of the Atlantic traffic.

One of the two IIIs now providing Atlantic service will become available as a spare for repositioning wherever it might be required. The other Atlantic III will continue to provide Atlantic service, supplementing the IV until replaced by a second IV.

As on previous INTELSAT missions, the launch will be conducted by the National Aeronautics and Space Administration (NASA) under a costs-reimbursable contract with COMSAT as manager for INTELSAT. Like their predecessors, the IVs are intended for synchronous equatorial orbits.

### Other IV Launches

Other Series IV launchings are tentatively planned as follows:

F-2 for Pacific service in the third quarter of 1971; F-3 as a second Atlantic satellite, fourth quarter 1971; F-4 as a Pacific spare, second quarter 1972; F-5 as an Atlantic spare, last half of 1972, and F-6 for Indian Ocean service, 1973.

Launch schedules for these and other satellites in the series will be determined later by anticipated traffic requirements and the operational status of earlier satellites.

The large, advanced INTELSAT IV series will vastly increase satellite system capacity to meet anticipated global traffic growth through most of this decade.

Depending on how the satellite transponders are configured for various service requirements each of the IVs is expected to have a capacity of between 4,000

INTELSAT IV, the largest commercial communications satellite, is built by Hughes Aircraft Company, with companies from 10 nations assisting in the fabrication and testing.

Each of the satellites has more design capacity than all INTELSAT satellites now in operation combined. The IV is designed to transmit at least 5,000 telephone calls, or 12 color TV channels or various combinations of these, over a seven-year design lifetime.

Twelve transponders in each of the IVs have a 36 MHz bandwidth each, or a total useable bandwidth of 432 MHz.

Power to operate the satellite is provided by twin solar panels, containing 45,012 solar cells. The satellite's initial power is about 570 watts at 23.8 volts.

### Antenna Characteristics

Six communications antennas, comprising what is referred to as the satellite's "antenna farm", include two global transmit antennas, two global receive antennas and two spot-beam transmit antennas. The latter, a unique feature of the satellite, are fully steerable, and each has a 50-inch diameter dish for focusing power on selected spots where communications requirements are greatest. The reflector positions can be reoriented in orbit on command from the ground.

The IV is a rotor-stabilized satellite, with a spin-speed range of 45 to 75 revolutions per minute. One section of the satellite spins and another section is despun—that is, it is given a motor-driven spin in the opposite direction.

The despun platform contains the communications repeaters, the antennas, which remain pointed to the desired areas of the earth below, and most of the telemetry and command systems. In the spinning section are the solar cell arrays, positioning and orientation subsystems and the apogee motor.

Nutation dampers will minimize nutation (wobble) effects during transfer and synchronous orbit. The dampers consist of passive and active devices. The passive dampers (two of which are installed) are mounted on the despun platform. Active damping can be achieved through an automatic feature which fires the axial jets to work against nutational forces.

Redundant axial, radial and spin jets using hydrazine fuel will maintain the satellite's position and orientation,

## The Atlas Centaur Vehicle

Atlas Centaur No. 25, the vehicle to be used for the INTELSAT IV, F-1 launch is a larger, higher capacity vehicle than the Deltas used for previous INTELSAT launches. General Dynamics' Convair Division builds the Atlas Centaur.

Standing 132 feet tall, the Atlas Centaur has a gross weight at liftoff of 163 tons (326,000 pounds), compared with the 115-foot length and 100-ton weight of the Long Tank Delta used in the INTELSAT III program.

The Atlas booster is a one and a half stage vehicle and has three liquid propellant engine systems—booster, sustainer and vernier. The second stage, the Centaur, uses liquid hydrogen and liquid oxygen as propellants, and has two 15,000-pound thrust engines which are capable of being restarted in space.

Preparations at the launch site for an Atlas Centaur launch begin about two months in advance with the erection of the Atlas stage on the launch pad. The satellite is mated atop the Centaur about a week before launch.

Greatly simplified, a typical launch sequence would be:

At liftoff all three engine systems in the Atlas ignite, developing together about 403,000 pounds of thrust. About 2½ minutes later the booster engines are cut off by command from the inertial guidance system and separate from the launch vehicle.

About 4 minutes after liftoff, the Atlas sustainer and vernier engines shut down when the propellants are depleted. Two seconds later the Atlas

is separated by an explosive charge, and the firing of eight retrorockets causes the Atlas to back away.

Next the Centaur's two main engines are started, and 12 seconds later the 10-foot diameter fiberglass fairing protecting the satellite is jettisoned.

After firing for about six minutes, the Centaur main engines are shut-down by command from the inertial guidance system when the velocity required to achieve the parking orbit is obtained. The vehicle then coasts for about 15 minutes in its parking orbit.

Near the equator the Centaur engines are restarted for a second burn of about 1¼ minutes duration. Between the two firings, small hydrogen peroxide engines are fired to settle and retain the propellants in preparation for the second firing.

### Spacecraft Separation

Spacecraft separation comes about 29 minutes after liftoff in response to a Centaur programmer signal. Separation is accomplished by firing two explosive bolts which release a clamp, and eight springs then separate the spacecraft from the Centaur stage.

After separation the Centaur's attitude is altered by 90 degrees and a retromaneuver is performed to increase the separation distance from the spacecraft.

The satellite is then in a transfer orbit with a perigee of about 296 nautical miles and an apogee of about 19,324 nautical miles with an inclina-

tion to the equator of about 28.23 degrees.

At spacecraft separation, all control of the satellite becomes the responsibility of COMSAT. After any necessary touchups to the transfer orbit and reorientation to the proper attitude, the satellite's on-board apogee motor firing is commanded at an appropriate apogee by the Spacecraft Technical Control Center at COMSAT headquarters. The signal firing the motor can be transmitted from any of the four INTELSAT TT&C stations, which are situated at Paumalu, Andover, Fucino and Carnarvon.

A satisfactory apogee motor firing, of course, places the satellite in a near-synchronous orbit, which is then refined in preparation for commercial service.

## Apogee Motor

The apogee motor in the INTELSAT IV series satellite is a conventional space motor, similar to, but much larger than, the INTELSAT II and III apogee motors and developed and built by the same company, Aerojet Solid Propulsion Co.

The motor chamber is a fiberglass and aluminum structure about 3 feet in diameter and about 5 feet long. It contains the same type of solid propellant used in the INTELSAT II and III motors.

Before firing, control of motor temperatures within the required range of 40 to 90 degrees F. is accomplished by a 30-watt heater and an insulation blanket.

The motor has a maximum burn time of 37.4 seconds.

The motor has a weight of 1,559 pounds, of which all except 125 pounds—the weight of the empty case—is expended during burn.

### From Page 4

## INTELSAT IV

including orbital inclination, longitude, attitude and spin speed.

### Satellite Size

The diameter of the IV is almost 8 feet and the height is 17 feet, six inches. The weight at lift-off is 3,090 pounds and in orbit after separation and apogee motor firing, the weight will be 1,583 pounds.

## INTELSAT TT&C Stations

INTELSAT's four tracking, telemetry and command (TT&C) stations are being modified to operate in the IV program. The stations are located at Andover, Maine; Paumalu, Hawaii; Carnarvon, Australia and Fucino, Italy. Locations are such that synchronous satellites over each major ocean are in view of two stations at all times.

They perform specialized duties associated with the precise orbital tracking and positioning of the satellites during critical stages in the launch sequence. During launches and throughout the life of the satellite, the stations also maintain a constant check on the performance of the satellites and transmit command signals under direction of the Spacecraft Technical Control Center.

Each of the four stations, and the Spacecraft Technical Control Center at COMSAT headquarters, has been equipped with new TT&C sets to handle the IV program at a cost of approximately \$1.8 million. This was a part of the Hughes satellite contract.

The INTELSAT IV spacecraft telemetry system, along with the new ground equipment, provides the capability for engineers to receive and monitor much more information in a given period of time. For example, it required a full minute to receive 63 channels of telemetry information from the INTELSAT III spacecraft; it will require only one-half second to receive 63 channels of

From Page 3

## Domestic Service

used by satellite communications, land microwave systems, and others. Based on orbital positions proposed by AT&T, beams from the satellite antennas would provide coverage of the 48 contiguous states and the heavily populated parts of Alaska.

Each satellite, designed for a seven-year lifetime, would have 24 transponders. Working with large stations on the ground, each satellite would have a capacity for handling the equivalent of approximately 10,800 voice-grade circuits, or 24 color TV channels, or combinations of these.

Each satellite also would carry a millimeter wave experimental package, permitting tests and development of higher frequencies at 20 to 30 gigahertz for possible future commercial satellite applications.

### Cross Polarization

A major COMSAT design feature was the proposed re-use through cross polarization of the commercial microwave frequencies in the 4 and 6 gigahertz range. This design would be the first commercial satellite application of its kind. It resulted from extensive COMSAT technical measurements and studies.

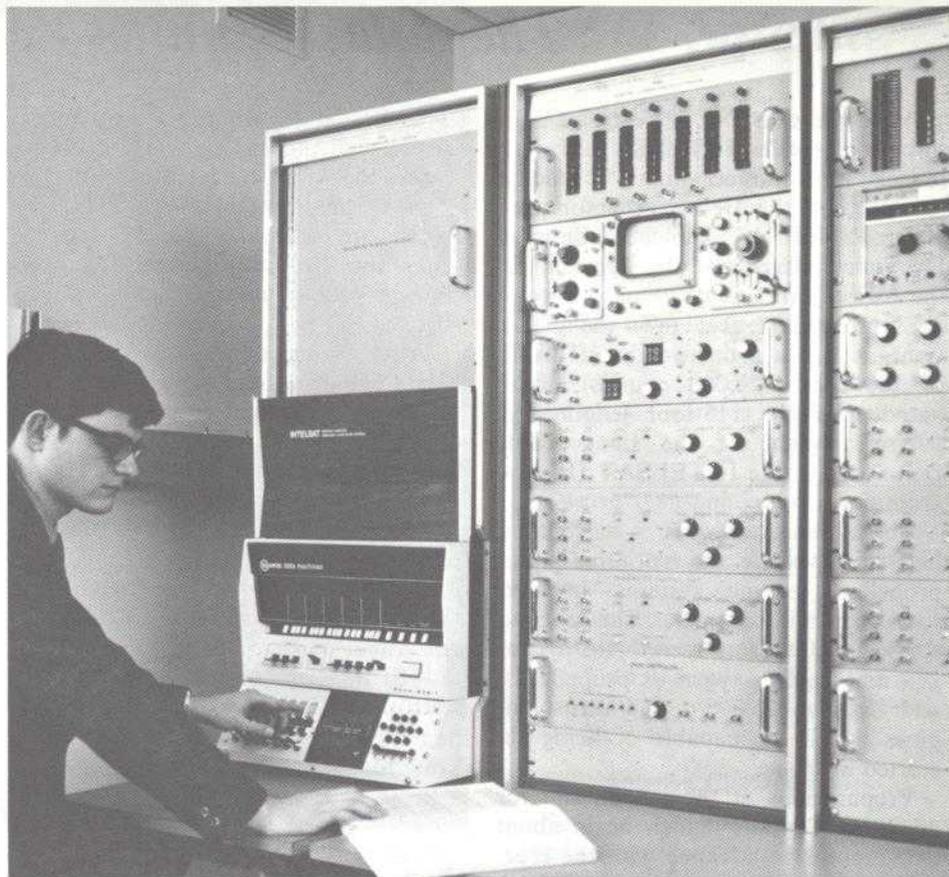
The effect of employing different polarizations of the signals would be that the limited 4 and 6 gigahertz bands now allocated could be used twice by each satellite—doubling the use of scarce spectrum space.

In addition to conserving the frequency spectrum, the use of the technique also doubles communications capacity of the limited space positions available for synchronous satellites. This is of key concern in the orbital arc from 70 degrees West to 120 degrees West Longitude—the area most desirable for satellites serving North America.

The spacecraft would be about 18 feet high overall, 10-feet in diameter, weighing 3,200 pounds at liftoff. They would be sent into orbit by Atlas-Centaurs or similar launch vehicles. COMSAT said the first domestic satellite could be launched 30 months after the grant of the application.

### Capital Investment

COMSAT estimated that its capital investment for this satellite program would be about \$114 million; COMSAT would charge AT&T an estimated average annual rate of approxi-



One unit of the SPADE system is contained in three vertical racks and operated through a keyboard, as demonstrated by co-op student John Moffett, above.

## Spade Program Planned for IVs Will Provide Circuits 'on Demand'

Communication satellite circuits will be available for the first time on an "as-needed" or "demand assignment" basis when the INTELSAT IV series satellites become operational early in 1971. The technological advance is es-

pecially important to nations who are relatively small overseas communications users.

Currently such users arrange for "pre-assigned" circuits, sometimes leaving users short of circuits during peak demand hours. Contrastingly, assignment of circuits on an as-needed basis will provide a more efficient use of satellite system capacity with resultant cost savings to communications users.

These capital costs include purchase and launching of three satellites (assuming one failure and two successes), two specialized tracking, telemetry and command (TT&C) stations with small antennas to track and maintain control of the satellites, associated research and development costs and interest expenses.

In this program, one of the COMSAT TT&C stations would be located on the East Coast, the other on the West Coast, to assure maximum station-keeping precision and operational reliability.

COMSAT said it will outline in detail a separate multiservice system in subsequent filings, following continu-

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From Page 6

## How SPADE Works

By enabling users to share a large, dedicated pool of satellite frequencies on demand, SPADE will encourage direct communications among more nations. SPADE will also contribute to wiser utilization of the radio frequency spectrum, a precious and finite natural resource.

Relatively small communications users will not be the only beneficiaries. Large users will be able to supplement their full-time leased circuits by calling up demand-assigned circuits from the SPADE pool during peak periods.

Even low traffic requirements of a private line nature could be satisfied with the SPADE single-channel-per-carrier PCM/PSK\* circuits.

In addition, SPADE techniques will be uniquely applicable for serving time-shared computer networks.

In the SPADE system, a dedicated RF band is divided into a large number of single-channel-per-carrier frequency pairs. All subscribers using the same satellite draw on this pool of frequencies. Any one of the 12 transponders in an INTELSAT IV satellite will have enough capacity for a pool of 800 channels or 400 two-way telephone circuits.

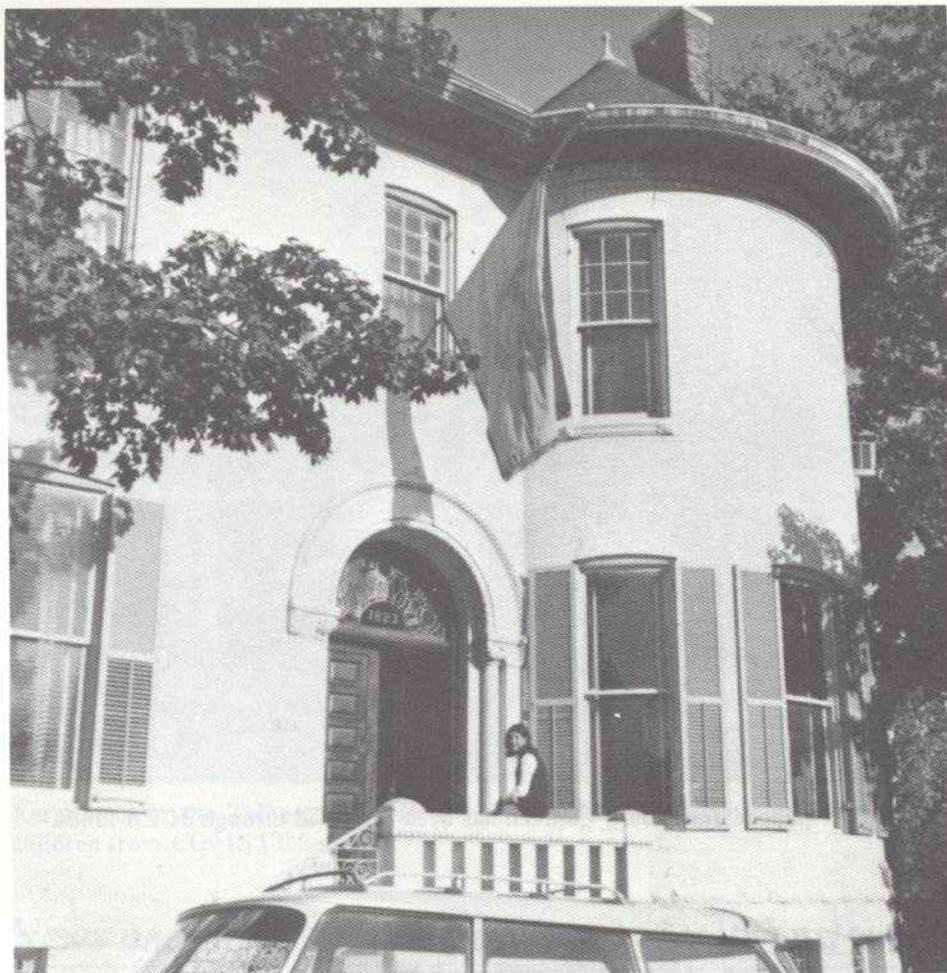
### DASS Replaces Central Control

No central control will be needed in the SPADE system. Each subscribing earth station will have at least one Demand Assignment Signalling and Switching (DASS) unit for self-assigning channels from the pool. The originating DASS unit will select a pair of frequencies based on availability information received from a Common Signalling Channel (CSC).

A SPADE "family" of subscribing earth stations may include up to 49 DASS units, and each DASS unit can handle up to 60 separate channels.

Once a circuit pair has been selected for a communications path, the DASS unit checks both incoming and outgoing frequency continuity. The SPADE system will use PCM through the satellite to take advantage of PCM's savings in satellite electrical power. Also, a voice detector will be incorporated in the system to conserve satellite power by switching off either channel in an active circuit when it is not in use.

Through its unique ability to match capacity with demand at any moment, SPADE will provide a highly efficient and flexible communications system.



Dream house of COMSAT employee was once the Embassy of Sudan.

## News of People At Headquarters

By Judy Holmes

Tony Corio, Technical, and wife Maria are the proud parents of their first child, a son, Tony, Jr., born September 22.

Betty Glazer, Corporate Relations, has just returned to COMSAT after spending one year in Japan where her husband was a visiting professor at Sophia University in Tokyo. While away from the office, Betty maintained her secretarial skills by working for her husband, who was in the process of writing two books.

Jacki Runfola, personnel, married John McGill on October 10 in Georgetown's Holy Trinity Church. The newlyweds honeymooned in Williamsburg, Va.

Brenda Stalworth, information, is engaged to Captain Henry W. Persons, Jr., who is stationed at Fort McPherson, Ga. A January wedding is planned.

Susi Lei transferred from COMSAT's Geneva office and is now working in INTELSAT affairs.

Mary Lane, Technical, recently spent two weeks vacationing in Russia where she and her daughter visited

Moscow, Kiev, Yalta and Leningrad. She found the country to be very beautiful and the people friendly and helpful. The Russian Ballet and the Moscow Circus were but two highlights of her visit.

### Dream House

Kitty Montie, Technical, and seven roommates have moved into a fabulous three-story house which four years ago was the British Residence and one year ago was the Embassy of Sudan. The house has ten bedrooms, five bathrooms, nine fire places, formal dining room and beautiful chandeliers throughout. The girls call their new home the Embassy of Peace and a peace flag flies over the entrance. For neighbors they have the Embassies of Italy, Nepal, Pakistan and Ireland.

The rent on a place like this for one person would be astronomical; divided among eight it is not so bad. And besides, how often does a single girl have the opportunity to live in a \$400,000 house with an address on Embassy Row?

# News From COMSAT West

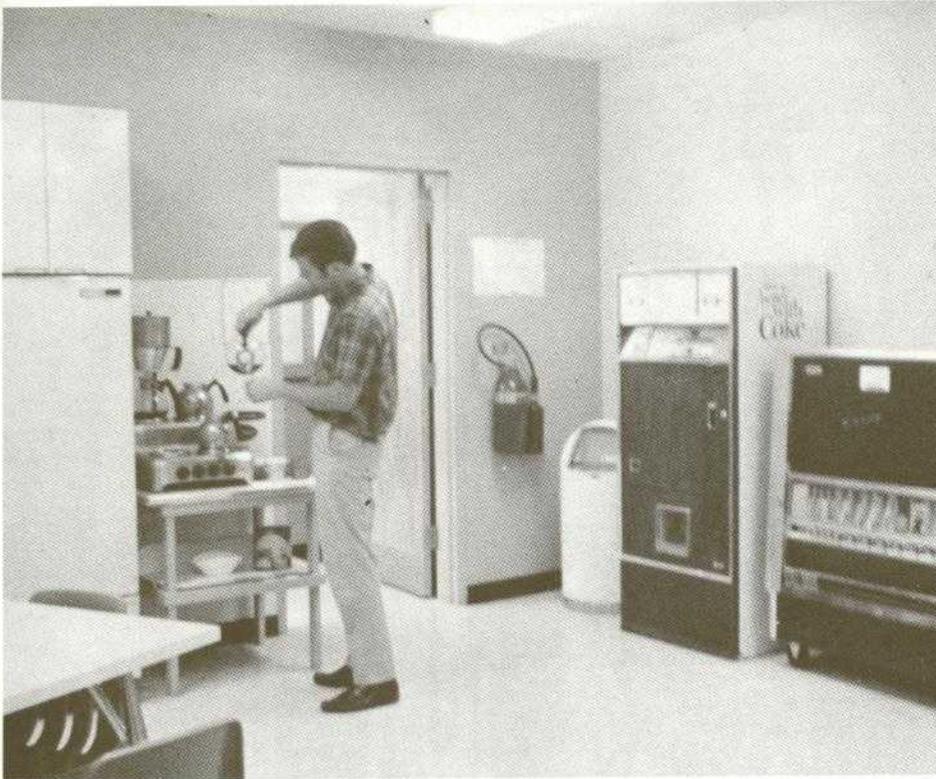
By Dee Wallace

During a visit to Washington, Director Marty Votaw and his wife, Merna, joined Clarence Blackwell in sailing at the Maryland Annual Clam Festival at Annapolis, Maryland. The weather was great and the clams were delicious!

COMSAT West employees were all fortunate in that none of us was affected by the southern California fires. The fires have been recurring in the mountains west of Los Angeles for more than a month.

Marilyn Mitchler's home was the gathering place for the COMSAT West party held in late September.

Sue Martin Pilcher, who left the Corporation recently, gave birth to her second child, Robert Walker, on October 5. Both mother and son are doing fine.



Newly equipped Jamesburg Canteen has been furnished through JCEA funds.

## News and Notes from Jamesburg

### Forest Fires Cause Power Outage

By M. Lee Dorsey

Brush fires on the Los Laureles Grade about 15 miles from the Jamesburg Station caused a 12-hour commercial power outage. The diesel generator performed perfectly on the take-over on power for this outage, according to Facilities Engineer Walter Robinson, permitting operations to be carried out as usual.

Forest fires in California have been a major concern for all of us at Jamesburg. This is a very dry area during the months of May through November and the lack of rain usually promotes forest fires.

#### Founder's Descendent Visits

Walter Chew, who is 85 years young and the grandson of the founder of Jamesburg, John James, visited our station with his son. Mr. Chew was very impressed by COMSAT's modern method of communications.

Up to a few years ago, there was only one telephone in Jamesburg, owned by Mr. Chew's family because they operated the local post office and library. The old crank-type phone is still hanging in the old Jamesburg Post Office, but has been replaced with a more modern desk type

Don Tucker and Larry Baley, senior technicians, attended the Hewlett-Packard week-long Basic Microwave Measurements Seminar.

#### Visitors

Bob Huber, AT&T, and guests, Bob Timothy, President of Mountain Bell; Zane Barnes, President of Pacific Northwest Bell; and George Ford, Vice President of Pacific Northwest Bell toured the station.

Professor Cooper of the Naval Postgraduate School, Monterey, California brought 35 students, who are working on their master degrees, to the station.

A large executive group toured Jamesburg recently including the Associate Warden of San Quentin; City Councilmen of Sausalito and Larkspur; the Director of Information, Commanding Officer First Fighter Wing, and Base Commander from Hamilton Air Force Base; GSA Communications Center Chief for the Greater Bay Area, and the Editor-Owner of Mill Valley Record.

We are getting ready for winter with flu immunization shots, preparing our defense against that old man "flu bug".

#### Visitors from Korea

Don Stackhouse, RCA, brought as his guests Nam Jin Cho, Assistant International Operations Officer of Communications, Seoul, Korea; and Pill Byung Youn, Ministry of Communications Engineering Bureau, Seoul, Korea.

#### Special Events

The first fall luncheon was hosted by Thelma Neu and Ruby Downey at the Rancho Del Monte Country Club. Attending the luncheon were: Sandee Cisneros, Pam Clark, Kazuko French, Sally Fredricks, Barbara Hartke, Imd Inman, Louise Scroggs and Ruth Stauffer. Special guests were Mrs. Law, Mrs. Woodcox of Del Rey Oaks, and Mrs. Jennerson from the State of Washington.

Swimming, tennis and bridge were planned, but the luncheon turned out to be more a lets-get-acquainted-again-meeting-after-summer.

#### JCEA

The JCEA recently purchased its own equipment for the Canteen. Purchased was a coffee maker and a soft drink machine. This new equipment, added to the candy machine the JCEA purchased in 1969, will enable the JCEA to carry less inventory and eliminates paying rent to outside companies.

Hopefully, we will be able to sponsor more JCEA activities for the members.

# CEA Headliners

By Beverly Nitkowski

The Photography Club elected new officers. Heading the club now are President, Alan Coburn; Vice President and Treasurer, Bob Kotell; Secretary, Linda Kortbawi.

## New Softball Field

COMSAT Labs has allocated property to be used as a softball field. This field will also be used for football and soccer. Volunteers are needed to help grade the field and lay out a back-stop. Labs and Plaza volunteers are invited. Contact Tony Buige or George Domurot for further details.

## AFI Expands Program

In addition to its regular evening performances, the American Film Institute is now showing lunchtime movies. These movies are open to the public and admission is 40¢ at the door. Quality shorts, animated films and excerpts from famous silent movies will be included in the AFI Theatre's Friday lunchtime series. Each program in the L'Enfant Theatre will run twice: 12:15 - 12:45, 1:15 - 1:45 p.m.

Bring your sandwiches to the Theatre—but, please, no drinks in the auditorium. All 800 seats are unreserved. Full program details will be posted in the Theatre lobby. For further details, call 554-1000.

United Buying Service is your key to great discounts on cars, furs, furniture, carpeting, appliances. Call 657-1920.

Order your satellite jewelry now. You won't want to be short a stocking stuffer! See Paula Hayes, Credit Union or Linda Fariello, Room 2133, Labs, for satellite jewelry orders.

CEA members should start thinking about nominating members for the board. Ballots for the CEA board elections will be distributed the first week of December.

Looks like the guys are going to have some stiff athletic competition this year—from the girls. Powder puff football and basketball leagues are being organized.

## Holiday Party Plans

CEA's biggest event of the year is the Christmas Dinner Dance. The date is December 5 and the place is the Washington Hilton. Watch for flyers with details soon.

The children's Christmas Party will be held December 19 at the American Legion in Bethesda, Maryland. Children up to and including 10 years of age are invited.



Enrollment in the Talkeetna School (above) has been boosted by addition of the children from COMSAT families.

## News and Notes From Bartlett

# Settling Into a Long Winter's Night

By Jim Shaff and Larry McKenna

Winter has made its arrival here in Talkeetna. Four inches of it, in fact, fell on Monday, October 5. The snow came just as the last families were moving into their permanent homes at Bartlett Park.

George Furford is the first employee to get a moose this year. He brought the bull down with a single shot using a 30/06 Remington and hand loaded ammo. George divided the animal with a friend who was hunting with him and he still ended up with nearly 300 pounds of meat.

The kids kept hoping it wouldn't happen, but school started in Talkeetna anyway. Now there are an additional 16 children from the COMSAT families, and the school bus has a new route through Bartlett Park.

On September 18, the Alaska Telephone Association held its annual convention in Palmer, Alaska, approximately 85 miles from Talkeetna. William Mille from Washington was one of the guest speakers. Bartlett was represented by Jim Shaff.

The Sousas played host at a house warming party Saturday night, September 30. The party, the first of many we all hope, was held in the Sousa's new Bartlett home.

On September 30, Bill Patterson was the guest speaker before the Alaska Chapter of the Armed Forces Communications and Electronics Association (AFCEA) meeting at the Captain Cook Hotel in Anchorage. His subject was, "The First Half Decade of Satellite Communications."

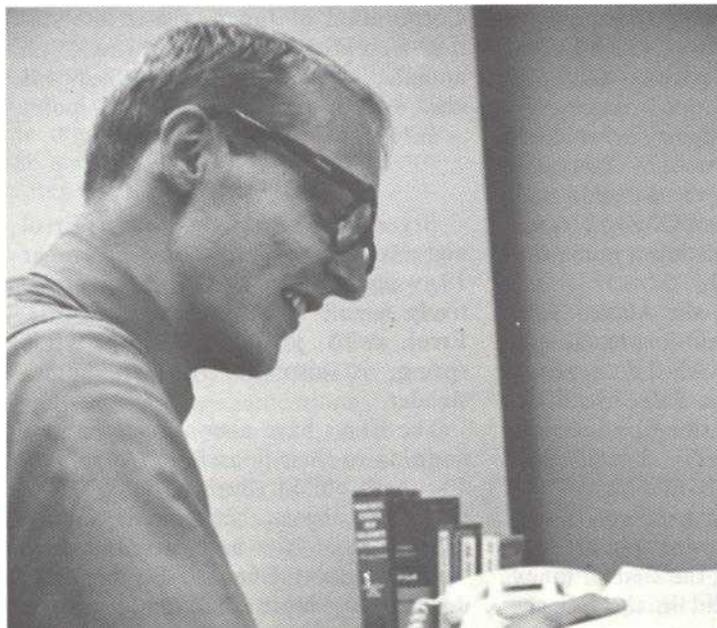
Dr. Kitsuregawa, Assistant General Manager for R&D for the Mitsubishi Corporation of Japan, visited the station recently. Dr. Kitsuregawa, an antenna specialist, summarized his visit with a comment: "The key point — only 16 people. Very interesting."

## Can Anyone Top These?

Bryan McElroy, a son born to Errol and Ronnie McElroy on September 18, weighed in at 11 lbs. 8 oz.—relatively small by Alaskan standards. Errol, who joined COMSAT this spring, is also an Alaskan homesteader.

The Clays have also acquired a new addition to their household. Angel is a 10-month old St. Bernard puppy. She tips the scales at 126 pounds, is still growing, and eats and eats and eats.

On a recent Sunday, Bartlett was deluged by more than 250 visitors. Hectic? You bet.



## 'Getting the Bills Paid'

Office equipment, office supplies, storage fees, hardware, component parts, outside services, short-time rentals, and on and on and on. Many of us request purchases of one kind or another, but do we ever stop to think of who pays the bills?

Here at COMSAT the bill payers are the people in accounts payable, who eventually process and act on all debts incurred on behalf of the corporation.

The man overseeing the corporation's accounting system is Ronald C. Mitchell, (above left) director of accounting and assistant comptroller.

James P. Malarkey (center left), manager, general accounting, works with Mr. Mitchell in several areas. In addition to responsibility for the accounts payable section, Mr. Marlarkey also has charge of the payroll and general ledger sections.

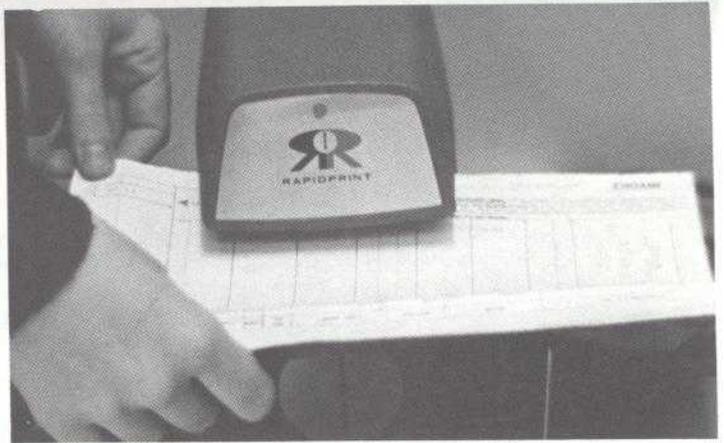
Supervising the accounts payable section is F. Nelson Slye, who is in charge of its day-to-day operations. In addition, he also supervises the corporation's payroll.

## Processing Accounts

Before processing begins, the file clerk opens, timestamps and distributes all incoming mail. At right, the day's mail is being timestamped.

Processing accounts begins with the property clerk, who checks the coding on the purchase requisition (the initial request made by an employee to purchase materials or services).

Elaine Luther, (lower right) property accounting clerk, logs in a purchase requisition, which she will later check against the purchase order (the commitment issued by purchasing on behalf of the corporation to deal in materials or services). The property clerk then files the purchase requisition and passes the purchase order to the accounts payable clerks.



Accounts payable clerks have the responsibility of coordinating three basic documents to insure that the materials or services ordered match those delivered and at the price agreed upon. In performing this function, the clerks audit each invoice (the bill from the vendor for goods or services), and check it for conformity with the purchase order and the receiving report issued by shipping and receiving.

Accounts payable clerks Bonnie Arthur, seated, Mary Huggett (left) and Charlotte Barlow check an invoice.

All papers processed by the accounts payable clerks are passed to Helen Ryan, senior accounts clerk, (center left), who reviews the work. She also handles any special problems that may arise during processing.

After all processing has been completed, the documents go to Dorothy Rice, (lower left), typist, who prepares the vendors' checks. Tabulation of the dollar amount paid by the corporation is maintained at this point. In addition, Miss Rice prepares check detail for keypunch and records.

From the typists, the checks are given to Mr. Slye for review before they are forwarded to the Treasurer's office for verification, signature and mailing. Copies of the transactions are filed by the file clerk for permanent record.





"Unidentified flying object" was spotted by employees at 5:40 a.m. on October 5 in skies east of Etam.

## News and Notes from Etam

# 'Unidentified Flying Object' Appears, Employees Capture It in Pictures

By Deloris Goodwin

The operations team working "mids" on October 5 had their routine interrupted by the presence of an unidentified flying object. About 5:30 a.m. the security guard advised the operations supervisor on duty, Jim Evans, of a strange object or light in the sky. An investigation team was immediately dispatched to the parking lot where they observed a very bright glow streaking across the night sky due east of Etam. The phenomenon was photographed using a polaroid camera with a two minute exposure.

Several theories were developed and discussed, but the mystery was solved with the arrival of the day workers bringing news from the outside world. Seems as though NASA had launched a probe from Wallops Island, Virginia, which released a barium cloud into the upper atmosphere for scientific study. Maybe our next unidentified object will be from Mars, who knows....

Plans are now under way for a Thanksgiving dinner to be held on Sunday afternoon, November 22. Andy Thomson is chairman of this particular event and will formulate further plans.

### Visitors

A. Ulloa, station manager of Longovilo Station, visited Etam in September. He was accompanied by Al Churchwell from Headquarters.

John Scroggs, station manager at Jamesburg, also visited during September after the station managers' meeting at Headquarters.

Members of the Kingwood Rotary Club, escorted by William Carroll, were given a tour of our control room and the facilities area. Also, they were shown the movie, "Anatomy of Success."

Carl Johnson of Headquarters and D. Srirangan of Indian PT&T visited recently.

### Training Classes

Herbert Emholtz from Tele-Signal Corporation conducted a two-week training class at Etam, September 21 through October 2. Classes consisted of operation and maintenance of the Tele-Signal Telephone and Telegraph Orderwire Switching System.

Gerald Reeves, William Mayes, Leonard Gifford and Victor Molek of Etam attended as well as Jim Williams of the Service Center.

### Potpourri

Victor Molek has been promoted from junior technician to technician.

Several employees at Etam celebrated birthdays during September, including Victor Molek, Paul Helfgott, Carl Cooper, Chester Randolph and Roger Parsons.

Station personnel recently lent a "helping hand" to the 1970 Preston County Buckwheat Festival held in Kingwood, West Virginia. William Carroll, station manager, was busily engaged with the bingo players, while Paul Helfgott and Spencer Everly performed a good deed for the Preston County Jaycees by barbecuing chicken.

Station Engineer Roger Parson's six-year-old daughter, Diane, participated in the Buckwheat Festival parade. She is an active dancer with the Karen Wolfe Dance Studio of Morgantown.

Another parade participant was Diane Helfgott. She rode the City of Kingwood float while her son, David, also took part in the festivities. He entered his dog "Snoopy" in the pet show and won first place for the cutest dressed dog.



Sgt. Roscoe Hill, security guard (left), and William Hopeck, AT&T, installed a safety reminder for drivers leaving the station.

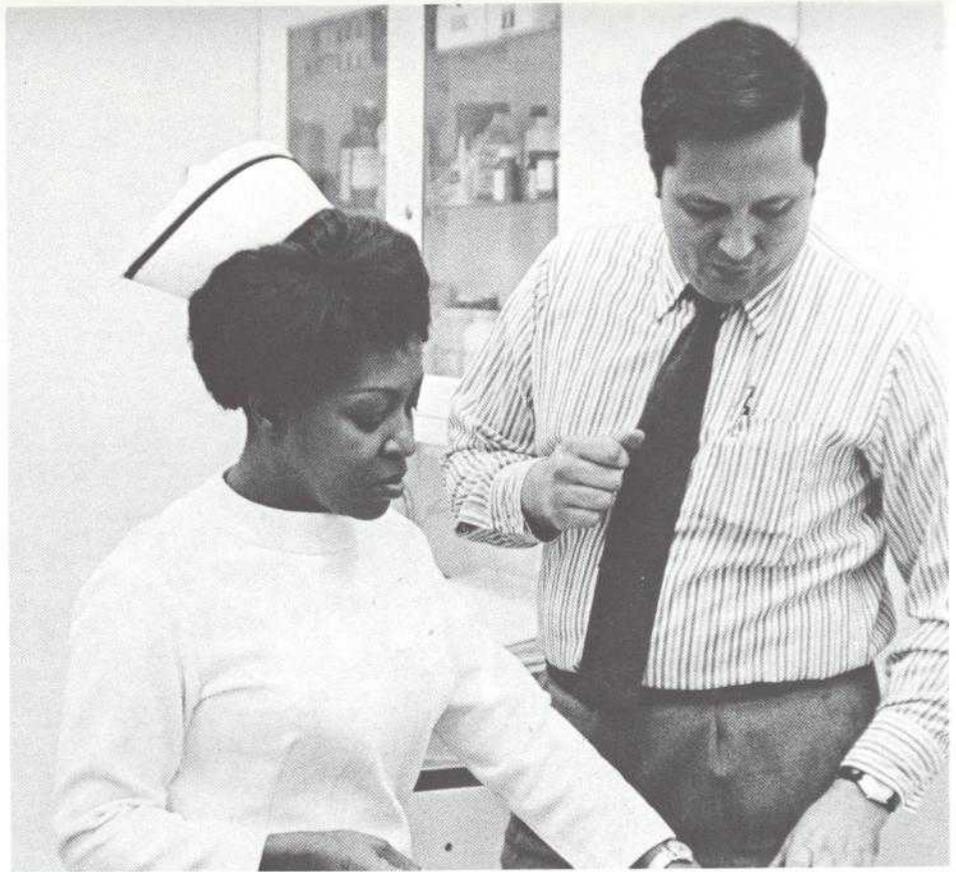
## Meet Dr. Vlalukin

The new face seen in and around the Headquarter's fourth floor Health Unit is that of Dr. Boris G. Vlalukin, who comes to the corporation in an advisory capacity. His services are in addition to those of Hazeline Durant, R.N., who is with the corporation on a full time basis.

Dr. Vlalukin has been in the Washington area since 1963, when he arrived from his native Novisah, Yugoslavia, a city about 50 miles from Belgrade. In addition to being a member of the George Washington Medical Faculty, he is in private practice at 1726 Eye Street, N.W., specializing in internal medicine.

As a part of his supervisory duties, Dr. Vlalukin will help restructure the Health Unit, provide advice during emergencies, and help establish continuing medical education programs in cooperation with Miss Durant.

**Dr. Vlalukin and nurse Hazeline Durant check equipment at the Headquarters fourth floor Health Unit.**



## 20 Young Women Will Train Here In Phase II of Project SOC Program

COMSAT will participate again this year in Project SOC, a specialized clerical training program for women between the ages of 16 and 24. About 20 young women in the program will begin at COMSAT on November 16.

The purpose of the program is to provide one year of intensive, specialized clerical training to help trainees develop marketable job skills leading to full-time employment.

This year's program is financed and operated jointly by COMSAT and Project SOC (Secretarial Opportunities Consortium), a delegate agency of the Department of Health, Education and Welfare.

Last year's program met with considerable success, with 90 percent of the participants now successfully employed in full-time clerical or secretarial positions. As a result of last year's success, this year's program will be conducted along the same guide lines.

The year-long program is to be divided into three phases, as it was in its initial year:

- 1) Phase I: classroom training conducted by Project SOC over a period of 26 weeks;
- 2) Phase II: Practical or on-the-job training financed and conducted by COMSAT; COMSAT's Phase

II Program lasted 26 weeks in 1969, and will be an 18-week program in 1970;

3) Phase III: Full-time employment.

Following the completion of last year's program, COMSAT was cited by HEW for its outstanding participation in Project SOC.

In a letter to the Corporation, Timothy Halnon, HEW manpower program specialist said:

"Project SOC and COMSAT have been cited at length for their accomplishment in recent speeches, and in several events to come. We are using the program as a model for cooperative training, and as an example of government-business partnership."

One of the important opportunities given trainees in the program is that of trying out on the job and still being able to return to the classroom to strengthen needed skills.

COMSAT's participation in Phase II is under the guidance of Paul G. Gaffney, manager of the staffing department.

Direct coordination and administration of Phase II will be handled by William Lockett, staffing; Walter Kutrip, employee relations, and Eugene McCarthy, personnel development.

## Microcircuit Contract Awarded to Fujitsu

COMSAT, on behalf of the INSAT recently awarded a \$21,908 contract to Fujitsu, Ltd., Tokyo, to design and fabricate two engineering models of an integrated microcircuit up-converter. The contract is to be completed in seven months.

Up-converters are used in certain satellite transponders to raise a signal from intermediate frequency (IF) to radio frequency (RF) for transmission through space. Fujitsu, Ltd.'s design will combine the functions of driver amplifier, mixer, and output filter into a single integrated microcircuit, providing high reliability with savings in size and weight.

The 20 trainees expected at COMSAT will each receive a half-day of on-the-job-training daily during the 18-week Phase II period. At any time participants may request to take the program's final exam, advancing to Phase III or full-time employment if they successfully pass the examination.

COMSAT plans to employ some of the participants as positions for which they qualify become available. Other participants will be guided towards employment with other companies or government agencies.



Head Groundskeeper at Brewster turns out to be Station Manager Wallace Lauterback, who sort of enjoys his new responsibility.

## *Ecós de la Montana*

# Puerto Rico Suffers Severe Flooding; 33-Inch Rainfall Washes Out Roads

By Luis Rodriguez

Caguas, Puerto Rico, a village not far from the Cayey station, was inundated by the worst floods in the island's history. More than 33 inches of rain fell the week of October 4, flooding roadways, washing out mountain roads and causing the Caguas-San Lorenzo bridge to collapse.

According to Ramon F. Calderon, head of Puerto Rican Civil Defense, island property and damage losses amounted to more than \$63 million. Several deaths and injuries were also attributed to the storm.

### Station Nearly Flooded

A stream lying about 200 yards outside the station property overflowed so heavily that its waters reached the chain-link fence surrounding the station. Fortunately no one at the station reported any serious personal harm during the storm. However, the mountain roads leading to Cayey and the station were left in deplorable condition along with most other roads on the island.

On Saturday night, October 10, WAPA-TV had a telemarathon which lasted from 4:00 p.m. until 2:00 a.m., Sunday, for the purpose of raising emergency funds. Most popular local stars participated in the effort, which raised almost a half million dollars to be distributed to the flood victims.

Senior Technician Otto Irizarry of Cayey was seen collecting and distributing food and clothes among the needy people during his off-duty hours. He was among the several persons from the station who contributed to the relief efforts during the recent crisis. Even though the crisis was grave, unity among the people of the island was very strong.

### Training

Agustin Ferrer, technician, attended a four-week course on TTY (teletype) equipment sponsored by the ITT World Communications at San Juan. Also attending courses on TTY equipment was Efrain Flores, senior technician. His course work was taken at Chicago, Illinois.

## The Latest Banter From Brewster

Brewster recently acquired a new tractor with snow blower and sickle bar attachments. The grounds should really be kept in great condition—that is if we can keep the "Head Groundskeeper" working.

### Big Game Hunters

The big game hunters at Brewster have taken out their guns, oiled and cleaned them, and taken to the war-path. Hunting season opened October 10, and the tall stories about the ones that got away are already being told at the station. Just about all wild life in this part of the country is fair game now. If we're lucky, we'll even see some evidence of the ones that didn't get away.

### Personals

Mark Winston of the earth station design department and Tim Kolb, Paumalu, were at Brewster to test and debug a new computer program for antenna pointing. We really enjoyed the case of delicious pineapples Tim brought. Hope that he and his friends are enjoying the box of Washington apples that he took back to Paumalu.

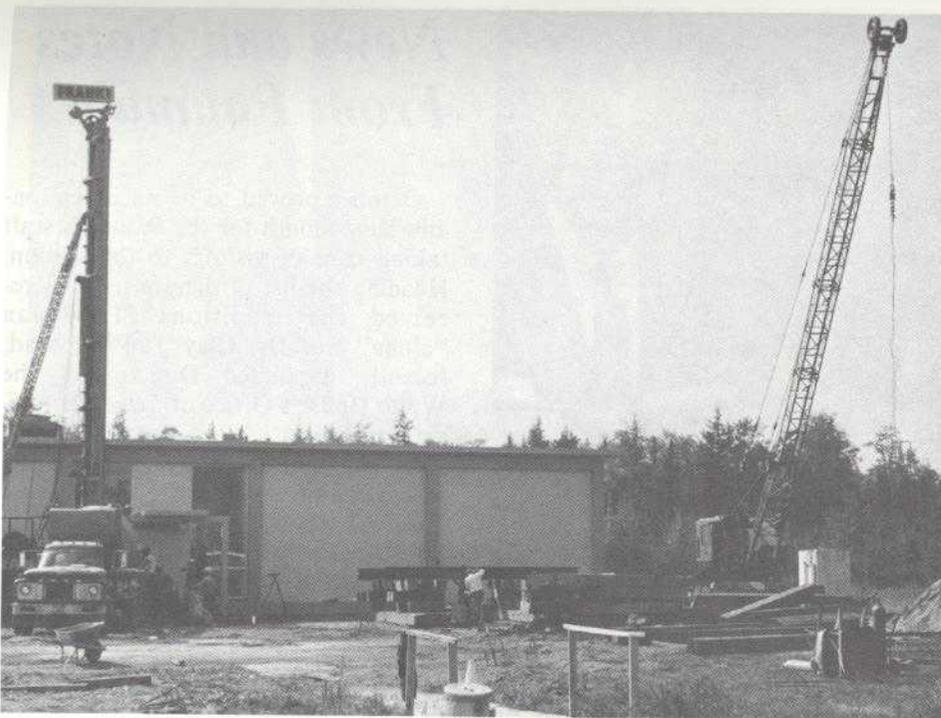
Vince Westover, senior site mechanic, recently resigned to accept employment on the Coast. M. Tate, mechanic from Paumalu has transferred to Brewster to take Mr. Westover's place.

Now that Imogene Cook can walk without limping perhaps she will tell us what really happened on a recent week-end trip to Canada. We know it was quite an expensive trip—duty on items purchased, plus bills for X-rays, doctors, etc. Imogene are you sure it was only two steps you missed?

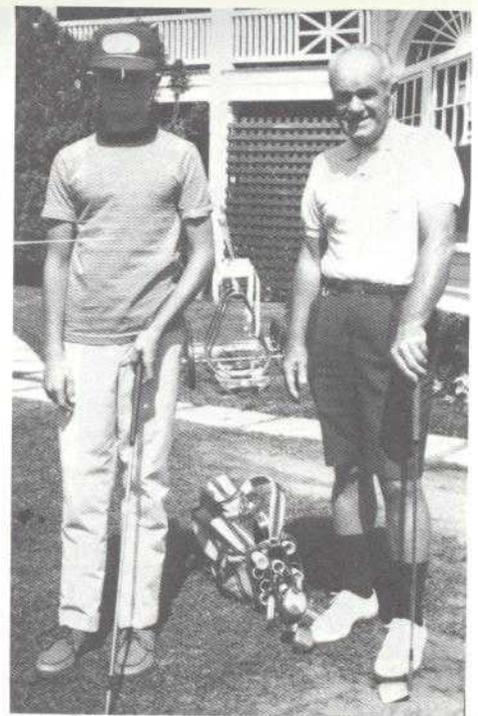
### Personals

Members of the Cayey staff extend deepest sympathy to the Jose Martins on the death of his mother-in-law, Mrs. M. Sarraga, who died on October 2.

Jose M. Negron, senior technician, left COMSAT on September 27 to begin studies toward a science degree. A farewell party was given for him by his fellow employees, who presented him with a gift along with their good luck wishes.



Construction for the new antenna has already made some inroads at Andover.



Raymond Juhl, golf champ (left) and Pro Joe Balnis, take to the golf course.

## News and Notes from Andover

# Installation of New Antenna Begins

By Joanne Witas

The installation of the new antenna has gotten under way. Andover's front yard has been dug up by subcontractors working for Philco-Ford Corporation. The piles for the antenna base have already been put into place, and the pedestal work is expected to be completed in late autumn.

More work is being done out and around the Andover station. Repainting is completed on the outside of the control building, transportable antenna and visitors building. Also, Andover personnel painted a portion of the radome cement base.

### Visitors

Vice President-Corporate Relations Lucius Battle and his wife visited Andover. They were given a tour by Station Manager Donald Fifield.

### Five-Year Award

Dave Durand, chief engineer, was presented his five-year pin by Station Manager Donald Fifield. We congratulate Mr. Durand on his fine service.

Four special visitors stopped at the station recently, but no one had the courtesy to offer them a tour. The first three were beautiful moose, large, somewhat imposing, but nonetheless graceful. The fourth was a huge black bear, which was large and definitely imposing.

Raymond Knight, senior technician, left Andover to operate his own FM radio station in Norway, Maine. He informed us that his station should be operational by early November.

### Potpourri

Young Raymond Juhl, makes his father, Raymond, Sr., material control specialist, proud of him. The 14-year-old scored an ace on a 125-yard par 3 hole at the Bethel Inn Golf Course in Bethel, Maine. He used a two wood to hole the shot, completing the round with a 39.

This is the younger Juhl's second year as a golfer. He is also active in baseball, basketball, and skiing in between attending classes at Telstar Regional High School.



The Vice President-Corporate Relations, Lucius Battle, and his wife tour Andover with Station Manager Donald Fifield (right).

## News and Notes From Paumalu



FCC Chairman Dean Burch writes 'around the world', while looking on are COMSAT VP-Operations George P. Sampson (behind Mr. Burch), and (left to right) Bernard Strassburg (partially hidden), Chief, FCC Common Carrier Bureau, Matthew Gordon, COMSAT AVP for Public Information and Pres. Joseph Charyk.

### Write 'Round the World Via Satellite

The COMSAT exhibit at the Electronic and Aerospace Systems Convention and Exposition (EASCON 70) held at the Sheraton Park Hotel in Washington, D.C., October 26-28, highlighted a demonstration in which a written message was transmitted "Around the World Via Satellite".

Using Electrowriter equipment provided by the Victor Comptometer Corporation messages sent from a transmitting unit in the exhibit traveled at the speed of light via a network of INTELSAT III satellites and earth stations located in Italy, Japan and the United States and was received at a second unit also in the exhibit in less than a second.

Although these units were located on tables only several feet apart they were actually separated by more than 145,000 miles of circuitry. The messages sent and received were projected on two screens at the rear of the booth thus allowing visitors to view both copies during the actual transmission.

Folders with the messages mounted in them were presented as souvenirs to the many persons who visited the COMSAT booth during the three-day exposition.



Students at MacFarland Junior High School and their teacher were among the visitors to the COMSAT exhibit.

October proved to be an exceptionally busy month for the Paumalu staff taking care of visitors to the station. Heading the list of dignitaries who received the traditional Hawaiian "aloha" was Dr. Clay T. Whitehead, recently appointed Director of the White House's Office of Telecommunications Policy.

Eight members of the Hawaii State Public Utilities Commission were given an extensive tour and briefing on October 2. This was the first visit of the regulatory agency, which has the responsibility of overseeing the activities and establishing and approving rates charged by the local public utility companies.

Over 150 members of the U.S. Independent Telephone Association attending the 73rd annual convention in Honolulu visited the station during the week of October 12. This was the first visit to the Aloha State for many of the conventioners and also a first visit to an earth station.

As one visitor explained it, "Amidst the sun, the sands, the blue sea and the colorful green hillside is this electronic marvel". Another added, "We had to travel all the way to Hawaii to see an operating satellite station."

#### Building Changes

Paumalu personnel are deeply involved in TT&C activities presently with the relocation of the antenna console and assorted equipment in the main building, with computer training, and with testing of the INTELSAT IV console. Upon completion of the console relocation, the three vans, initially installed over four years ago, will be removed from the station. The relocation will allow the station to utilize personnel in a more effective manner in addition to adding new and better equipment to the station to work with the INTELSAT IV series satellite.

Here from Headquarters technical staff to assist in the modification and relocation of the TT&C equipment are Brian J. Williams and Robert E. Hess.

Instructing a three-week computer training course is Wilbert Zarecor from the operations training staff. Paumalu personnel enrolled in the training program include John Gray, Eddie Miyatake, Jack Vollrath, Yoshiaki Daikoku, John Stanko and Kent Hunter.



Members of the European staff gather for a farewell party for Susi Lei, third from left. Others are (left to right) Dr. Matt Nilson, Erika Hofmann, Ruth Schmid, Marian Grob, Miles Merians and Director Sidney Mellen.

From Page 4

## The INTELSAT IV Program

and 7,000 telephone circuits, or 12 television channels, or certain combinations of these.

The average communications configuration of the IVs in operation is expected to yield a capacity of about 5,000 telephone circuits, which is more than four times the design capacity of the preceding generation, the INTELSAT III series. Four of the latter are now in full-time operation, each having a design capacity of 1,200 telephone circuits or an aggregate of 4,800. In operation, however, it has been possible to derive somewhat more than 1,200 circuits from the IIIs when necessary and provide a dedicated TV capability in addition.

Eight satellites in the IV series are being procured from the manufacturer, Hughes Aircraft Company, for a total price, including incentives for successful operation, of about \$108 million, or an average of \$13.5 million each. These are expected to meet INTELSAT requirements for operational satellites and spares through most of this decade.

Launch costs, including the costs of the Atlas Centaur vehicle and launch services, will approximate \$16 million each, resulting in an average investment per launch of about \$29.5 million. Of this sum, slightly more than half will be COMSAT's share as a 53 percent investor in INTELSAT, and slightly less than half will be the share of the other 76 participants in INTELSAT.

The aggregate cost obligation for the INTELSAT IV program so far is about \$235 million for satellites, launch vehicles and launch services. Thus the IV program is by far the most ambitious and most costly program yet undertaken by COMSAT and INTELSAT.

### Launch Procedures

For the launches, NASA will use complex 36 at the Eastern Test Range at Cape Kennedy. This complex comprises two launch pads, 36A and 36B, with one blockhouse serving both pads.

The launch trajectory (or flight path) is eastward, with injection into the transfer orbit planned to occur near the Equator. Beyond that, however, details of an Atlas Centaur launch differ in almost every respect from details of a Delta launch.

## Geneva Notes

By Erika Hofmann

A farewell party was given for Susi Lei, who left the Geneva Office recently in order to live in the United States. She had been with the European office for almost two years, and although she is leaving her native Switzerland, she is not leaving COMSAT. Miss Lei joined the International staff at Headquarters, and now her friends in Geneva are waiting to hear what life is like on the other side of the Atlantic.

Dr. Matt Nilson has joined the Geneva staff as liaison officer, bringing the staff back to its former size. Dr. Nilson and his family moved to Geneva from Washington, where he was previously assigned. Miss Marian Grob joined the European staff as his secretary.

The European Office now has a total of three American, one British and three Swiss employees providing support for the corporation in its relationships with the European business and government communities.

From Page 16

## Paumalu Notes

Melvin B. Tate, facilities mechanic, accepted a transfer to the Brewster station. Mel, his wife Beverly and two children left Hawaii on October 9. The station's facilities personnel bade "aloha" to him with a luncheon on his last day at the site.

A new homeowner and property taxpayer to the Hawaii government is Dan Geer, assistant station manager. He and his wife Fumiko, along with daughter Naomi, departed the sunset beach area to take up residence in their recently completed home in Windward Oahu near Kaneohe, approximately 25 miles from the station.

## IEEE Tours Labs After Chapter Meeting

More than 160 members of the Washington Chapter of the IEEE attended a meeting held at COMSAT Labs on Monday, October 12. About 70 persons attended the dinner held in the Labs cafeteria, which was followed by a speech given by Labs Director Wilbur L. Pritchard on the functions of COMSAT Labs.

Following the discussion, the IEEE members were given a tour of Lab facilities by a number of COMSAT employees.



## *Weekley, Wood, Sephton Win Titles In CEA's Biggest Golf Tournament*

Larry Weekley, senior information officer, shot a six-over par 76 to win low gross honors in the fifth annual CEA-sponsored COMSAT golf tournament on September 30 over a sunny, breezy Washingtonian Country Club course.

H. William Wood, Assistant Vice President-Operations, won the low net title with a score of 81-13-68.

Jean Sephton, secretary to the Vice President-Finance and Administration, won the low net title among the three women players.

Seventy-five players from Headquarters and the Labs participated in the afternoon tournament, the largest field yet for the annual outing.

As low gross winner, Weekley succeeds George P. Sampson, Vice President-Operations. Other winners included:

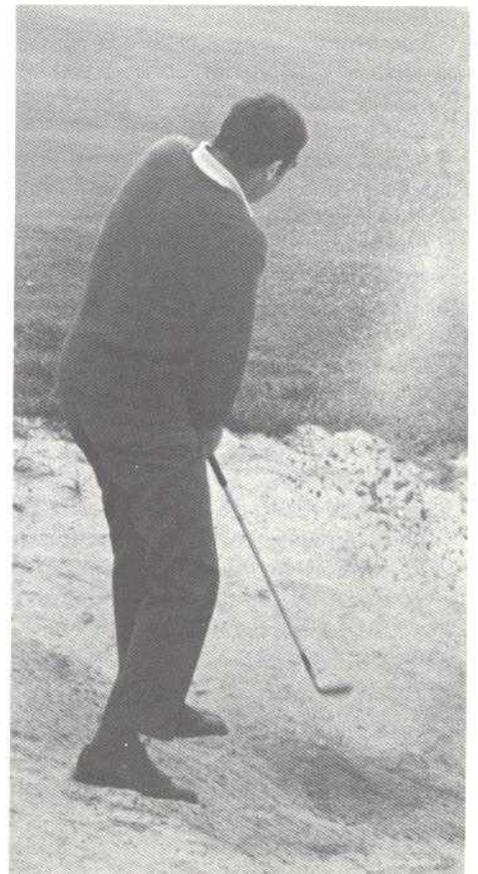
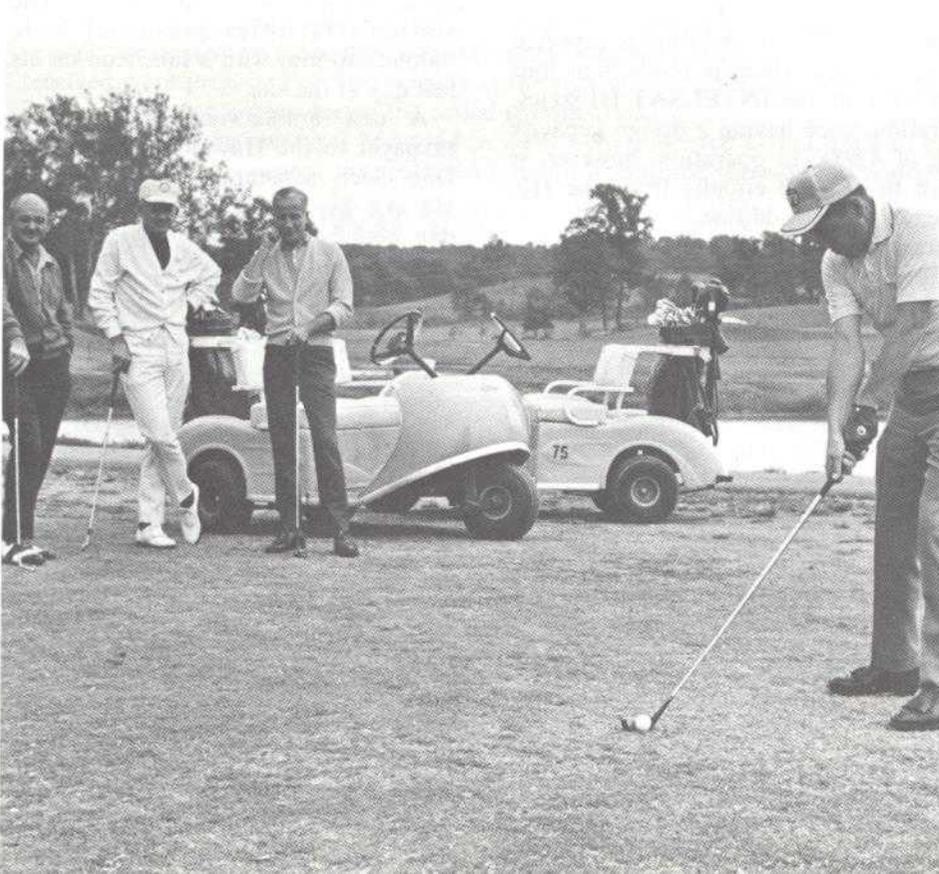
Drew Walker, Labs: longest drive on the par 4 sixth hole (250 yards).

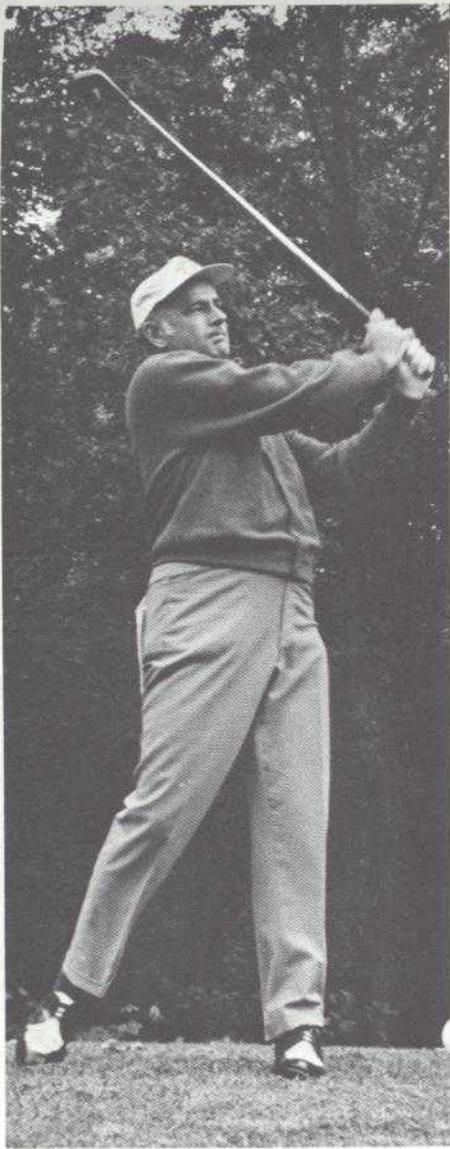
Gene Christensen, office services: closest to the pin on the 180-yard fifth hole (nine feet).

A total of 17 prizes—golf sweaters and golf shirts—were presented to winners of various events, including flight awards.

Flight winners, runners-up and third places were determined for four flights, set up by tournament officials on the basis of gross scores.

George Domurot, General Services, and Tony Buige, Labs, directed tournament arrangements.





### *Previous Golf Champs*

**1966**

Medalist—Dr. Joseph Charyk, President  
Handicap—Drew Walker, Labs

**1967**

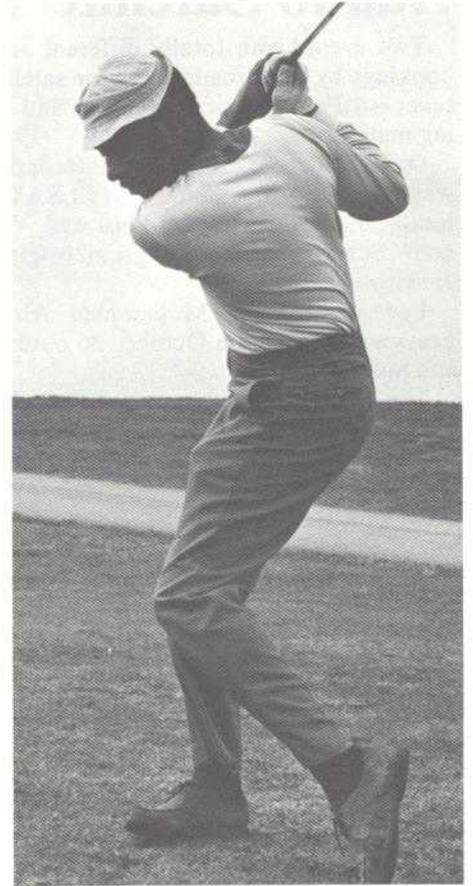
Medalist—Marvin Bowser, Field Operations  
Handicap—Jim Owens, Labs

**1968**

Medalist—Dave Burks, Operations  
Handicap—John Gerstner, Marketing

**1969**

Medalist—George P. Sampson, Operations  
Handicap—Dave Burks, Operations



# Mrs. Bingham, Koplovitz Win Tennis Round Robin

It's often said that "if you can't win it yourself then at least keep it in the family," and the maxim might well describe COMSAT's new mixed doubles tennis winners.

The newly-crowned champions are Bill Koplovitz and Anne Bingham, a friend and wife of employees, who had to defeat Anne's husband, Tony Bingham, manager, African section-International, and Virginia Hollis, a Labs employee, in a divisional playoff match before reaching the finals.

In the final match, Mrs. Bingham and Koplovitz defeated Bill Lowe of the Labs and Mrs. Betty Edelson, who then finished in second place. Miss Hollis and Bingham ended with a third place ranking.

The champions won the doubles crown in the CEA-sponsored tournament at Hains Point courts on October 3, topping a field of 30 entries. The winners were determined in the one-day tournament on the basis of their won-loss record rather than by elimination victories.

The mixed tourney was the second sponsored by the CEA this year. In the spring, the crown was claimed by Lowe and Margaret Pocock of Operations.

Dick McBride, Technical, served as tournament director.

**Tennis champs Anne Bingham (top photo, left) and partner Bill Koplovitz (second from left) are congratulated by opponents Betty Edelson and Bill Lowe following the final match of the mixed doubles tournament.**

**Most of the crew who turned out for the tournament found the morning well spent (photos center, bottom).**

# Songfest, Boxing Match Add to Satellite TV Time

Two events with totally different audiences highlighted bookings by TV broadcasters for satellite time during October—a Pan American songfest and a heavyweight boxing match.

On October 25, the Fifth International Song Festival was televised via Atlantic INTELSAT satellite to Argentina, Colombia, Mexico, Peru and Venezuela. The two-hour Sunday evening program originated from Rio de Janeiro.

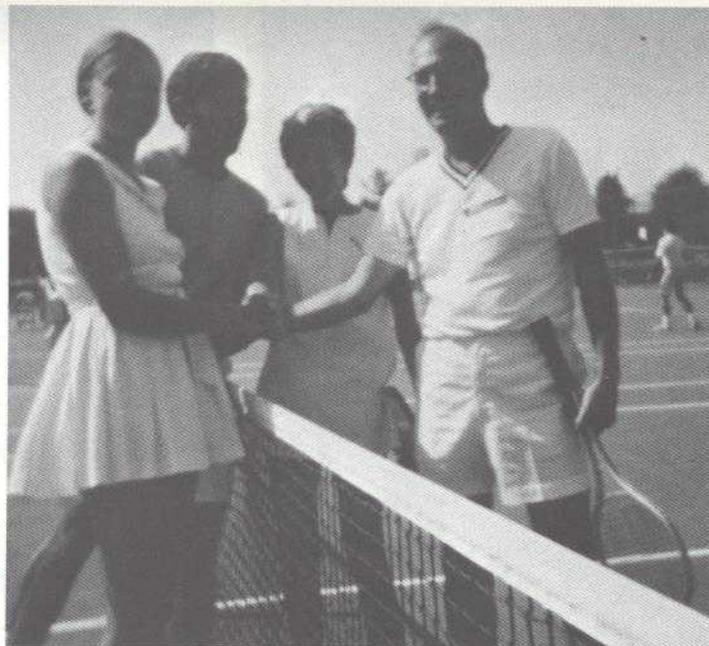
For ratings, the Muhammed Ali vs. Jerry Quarry heavyweight fight on October 26 outdrew the Pan American musical event.

The boxing match, seen only on closed-circuit theatre TV in the continental U.S., was televised live from Atlanta, Georgia, via both Atlantic and Pacific satellites to a wide-spread audience. Those receiving the fight via satellite TV included Argentina, Puerto Rico, Colombia, Panama and Venezuela in the Atlantic area; Australia, Hawaii, Japan, Korea, The Philippines and Thailand via Pacific satellite.

A delayed transmission of the fight was sent to the BBC on the following day at a time more suitable for broadcast in the United Kingdom.

## Classified Ads

*For Sale: 1968 Chevelle 2-door hard-top, silver/blue with black vinyl interior. Bucket Seats, console radio, 4-speed, 327 CU. inches, 350 HP. Call G. Domurot, Ext. 6614.*



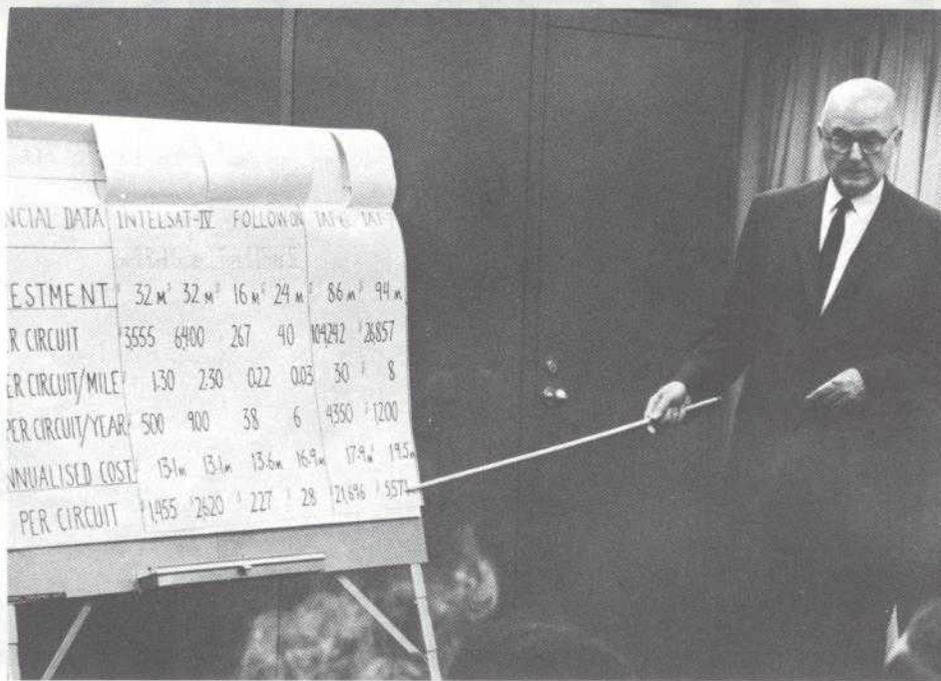
# COMSAT NEWS

LIBRARY RECORDS

DEC 18 1970

December 1970





Carl Reber, director, financial projects, compares estimated per circuit costs of the INTELSAT IV satellite with those of the TAT-6 cable in one of a series of lectures for COMSAT employees held Wednesday evenings in the fourth floor auditorium. The management information series, sponsored by personnel, serves to familiarize employees with the different aspects of satellite communications.

## Domestic Communications Service Filing Date Extended to March 1

The Federal Communications Commission has extended until March 1 the deadline for applications to provide domestic U.S. satellite communication services.

The Commission granted the three-month extension on November 25, the day before Thanksgiving and just six days before the December 1 cutoff set earlier.

One publication (Telecommunications Reports) commented that by extending the time, it seemed clear now that the FCC "will have the benefits of the outcome of the 1971 World Administrative Radio Conference."

That Conference, opening in June next year in Geneva, will consider, among other things, the allocation of higher frequencies and additional bands for the operation of satellite communications.

In addition to the March 1 new deadline (a Monday), the Commission also set March 30 for comments by parties on the applications, and comments on the rulemaking portions of the Inquiry; it set April 26 (1971) for reply comments.

The Commission also required the three commercial TV networks to submit statements as to their intent to apply for domestic satellite services by March 15.

To date, the only parties who have

filed applications are Western Union Telegraph Co., AT&T and COMSAT. At the time it filed concurrently with AT&T, COMSAT said it would submit plans later for a separate system to provide services to other customers, large and small, outside of AT&T. That COMSAT filing now has been delayed, with the new deadline of March 1.

## Former Board Member Harold M. Botkin Dies

Harold M. Botkin, former member of the COMSAT Board of Directors and Vice President-International of AT&T Long Lines Department, died at his home in Red Bank, New Jersey, on November 8.

Mr. Botkin became a Series II director when COMSAT was organized in 1964, and remained one until his resignation in May this year. He was replaced on the Board by Richard R. Hough, President, Long Lines Department, AT&T.

Having joined the Long Lines Department of AT&T in 1928, Mr. Botkin rose to the position of Assistant Vice President before taking charge of AT&T international services early in 1958.

## News at a Glance

- COMSAT's Board elects Martin J. Votaw Assistant Vice President, Space Segment Implementation Division (Page 6).

- The FCC extends filing date for domestic communications service applications to March 1, 1971 (Page 2).

- INTELSAT IV is shipped to Cape Kennedy, where preparations for launch are under way (Page 3).

- INTELSAT III satellites are photographed in synchronous orbit with the aid of reflecting telescope (Pages 4-5).

- Spacecraft Technical Control Center—what it is and how it works (Pages 8-9).

- Tunnel diode amplifiers—the tiny crystal disk that makes a big difference (Pages 10-12).

- Former employee begins operation of FM station in Norway, Maine (Page 13).

- CEA amateur photography is on display (Page 15).

- Engineer Ivor Knight shines light on rugby, an old time British sport that is gaining popularity in the U.S. (Page 19).

- CEA sponsors Christmas dinner dance at the Washington Hilton where Sandie Brown is crowned Miss CEA (Pages 16-17).

## On the Cover

*Decorations on display in COMSAT Headquarter's Lobby mark the approaching holiday season.*

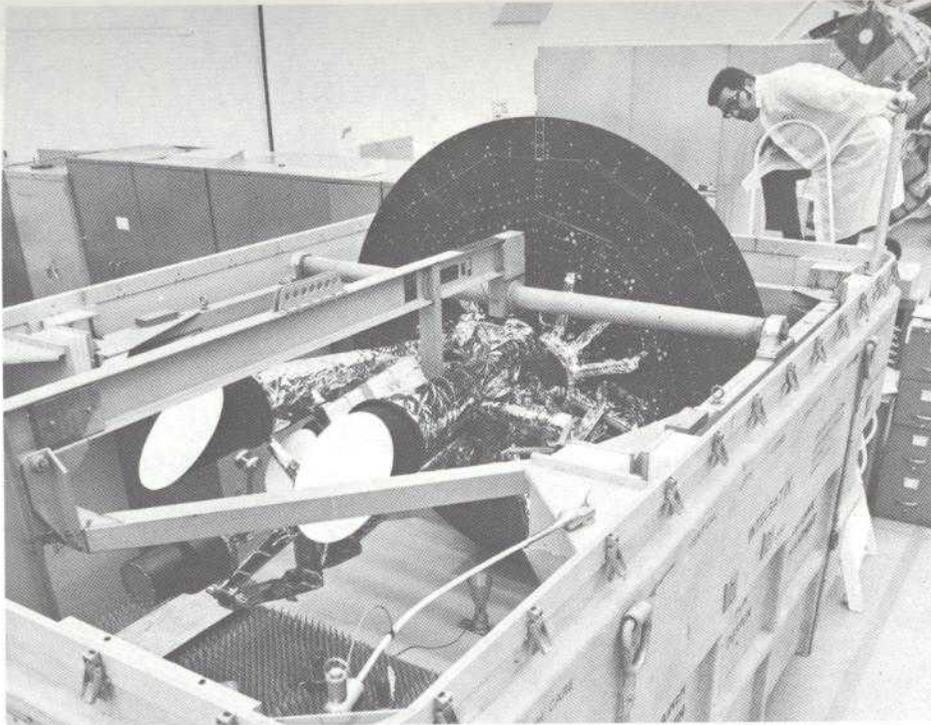
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A.V.P. for Public Information

Matthew Gordon

Editor: Kay Smith



The antenna for the INTELSAT IV is packaged securely before shipping from the Hughes Aircraft Company, El Segundo, California, to Cape Kennedy.

## *First IV Satellite Shipped to Cape For Launch Soon*

Preparations for the launch of the first satellite in the INTELSAT IV series are under way at Cape Kennedy.

The satellite was air-shipped from the manufacturer, Hughes Aircraft Company, El Segundo, California, on December 1. The satellite is undergoing pre-launch tests and preparations on the assumption that the launch can be attempted early next year.

The first satellite in the series is planned for commercial service over the Atlantic Ocean.

In a related event, NASA experienced a failure in its attempt to place an Orbiting Astronomical Observatory (OAO) into earth orbit on November 30. The rocket used for this launch was the Atlas-Centaur, which had a configuration almost identical to that of the vehicle to be used in the first INTELSAT IV launch.

The protective shroud which surrounded the payload failed to separate as intended, causing the satellite and Centaur stage to plunge back into the atmosphere and burn up.

NASA has appointed a failure review board which will try to determine the cause of the failure. The date of the INTELSAT IV launch will depend partly upon the finding of the board.

## **Earth Station Development**

The number of earth station antennas in operation by the end of this year increased to 51, a ground network providing links for satellite communications to every major continent.

The last station to inaugurate commercial service was a new facility at Camatagua, Venezuela. It was formally dedicated October 29.

The Venezuelan station also served to underscore the changes in communications patterns that satellites have brought about.

In mid-1968, there were no satellite communications services to Latin America; today, eight Latin American stations are in commercial operation handling a substantial portion of that area's international communications.

With the addition of a new station this year in Alaska, there also are eight operating U.S. stations, including those on Guam and Puerto Rico. The Bartlett earth station at Talkeetna, about 90 miles north of Anchorage, opened for service on July 1.

By the end of next year (1971), some 70 earth station antennas are expected to be in operation.

The Interim Communications Satellite Committee held its Forty-ninth meeting in Washington November 10-19 with John A. Johnson of the United States and COMSAT as Chairman and Yves Fargette of France-Monaco as Vice Chairman.

At the time of the meeting, 77 countries were members of INTELSAT. Five additional countries (Bolivia, Costa Rica, El Salvador, Honduras and Paraguay) with approved quotas have not yet acceded to the Agreements.

Among its actions, the Committee:

- Programmed the first INTELSAT IV satellite for launch during January 1971 and emplacement over the Atlantic Ocean at 24.5 degrees West longitude.

- Authorized the Manager to place third party liability insurance on behalf of INTELSAT for the INTELSAT IV series of satellites, but decided it did not desire storage and transportation coverage, and continued its past practice of not obtaining flight series insurance.

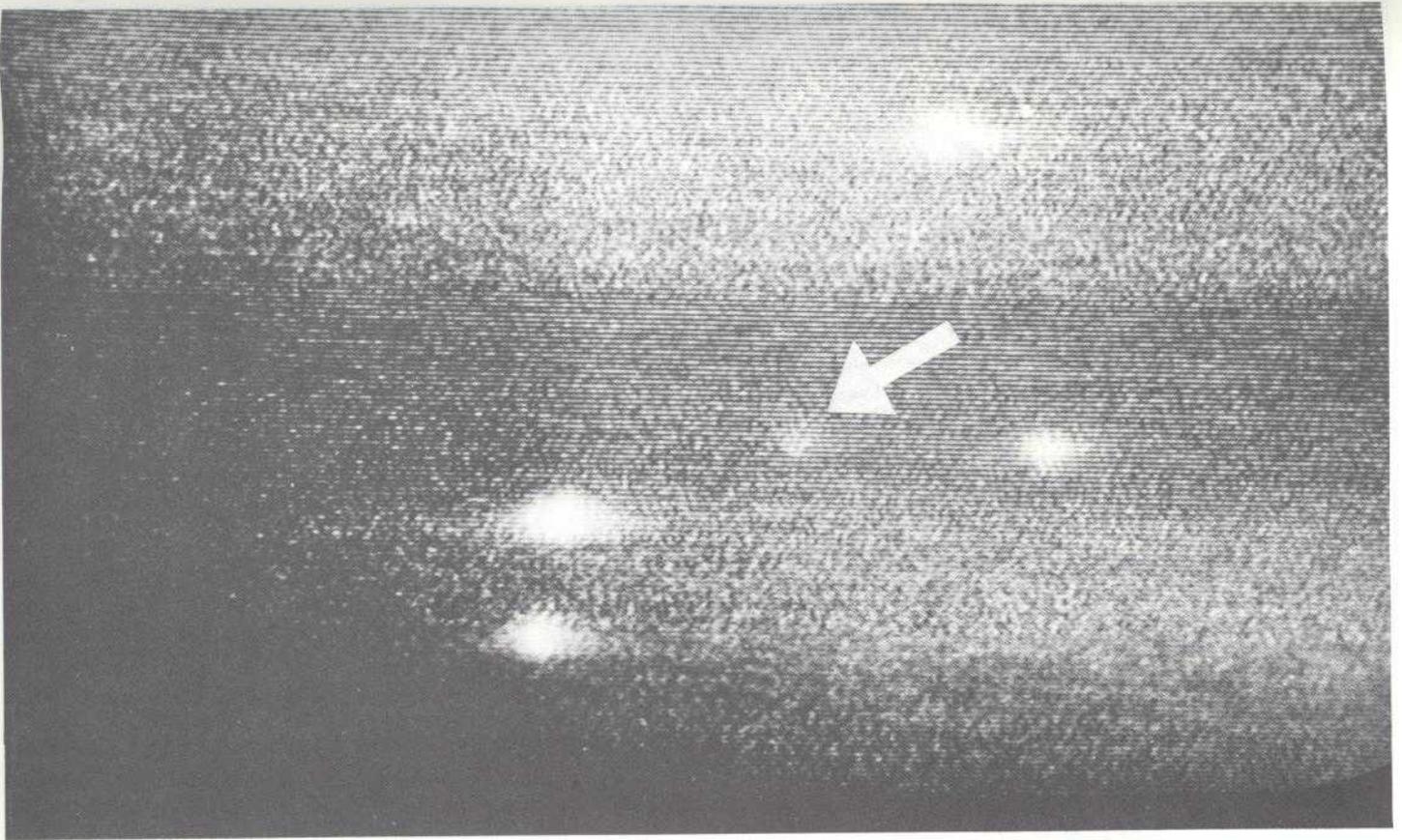
- Instructed the Manager to advise the National Aeronautics and Space Administration that it does not intend to exercise its option to launch the INTELSAT II, F-5 satellite.

- Approved a reduction in the rate paid by receiving earth stations for multidestination television programs to 50 percent of the basic rate.

- Authorized the commitment of up to \$90,000 in 1970 for a Central Data Recording Facility for the SPADE Demand Assignment System.

- Authorized the Chairman to inform the Secretary General of the International Telecommunication Union that INTELSAT is applying for admission as an international organization to the World Administrative Radio Conference in June and July 1971, and approved the Manager's recommendation for an INTELSAT exhibit to be displayed at the Conference.

- Appointed the Australian nominee, Mr. Ellcott, to the panel of legal experts from which presidents of arbitral tribunals are chosen. He replaces Mr. Ramani of Malaysia, who died recently.



An INTELSAT III satellite passing through a Milky Way star field is surrounded by four brighter spots, all stars.

## *Photographing the INTELSAT IIIs in Synchronous Orbit*

By Dr. Victor J. Slabinski

The INTELSAT communications satellites in orbit ordinarily are very difficult objects to see or photograph, even with large telescopes, because of their great distance from earth, 22,300 miles. But optical tracking can provide some information on these satellites which radio cannot.

For instance, when a satellite is lost because its radio signals cease, as happened during the launch of INTELSAT III, F-8 last July, an optical search with a telescope might locate the missing satellite and at least deter-

mine if the spacecraft is still in one piece.

Optical tracking of known satellites can also give an independent check on the overall accuracy of the radio tracking system. For these reasons, the COMSAT celestial mechanics division decided to demonstrate whether optical tracking of INTELSAT satellites in synchronous orbit is possible.

Since such a satellite is so distant, it appears in a telescope as only a point of light which is indistinguishable from the stars except for the fact that the satellite appears to move slowly with respect to the stars. To simplify the task of initially identifying the satellite among the stars, we looked for the satellite at a time when it appeared at its brightest.

### **Specular Reflection**

Each solar cell mounted on the side of the satellite has a smooth, shiny surface which acts as a mirror and reflects part of the sunlight reaching the satellite in a preferred direction, a process called specular reflection. The solar cells thus concentrate a large

part of the reflected sunlight in certain directions. If an observer happens to be within this beam of specularly-reflected sunlight, the satellite appears to be much brighter than usual.

A familiar example of such specular reflection is the sequins on a dancer's dress. A given sequin is usually invisible to someone in the audience until it is oriented properly with respect to a spotlight, at which time it sparkles. To observe such specular reflection from an INTELSAT satellite still requires a medium-sized telescope, however.

Because the satellite spins about an axis that is parallel to the earth's axis, and because the satellites are kept over the earth's equator, specularly reflected light reaches the earth only at certain times of the year. Such times when the satellite is brightest occur about the beginning of spring and about the beginning of autumn (the times of the equinoxes). For an observer in the continental United States, the favorable times are near the beginning of March and near the beginning of October.

(See **Optical Tracking, Page 5**)

*Dr. Victor J. Slabinski is a member of the technical staff of the COMSAT celestial mechanics division. In October, he conducted research on photographing INTELSAT III satellites in orbit. Relying on statistical data, Dr. Slabinski, along with several other scientists, successfully photographed the INTELSAT IIIs using the available equipment at the Fernbank Science Center, DeKalb County, Georgia.*

## Optical Tracking Proves Feasible In Demonstration

The Smithsonian Astrophysical Observatory has a world-wide network of satellite tracking cameras set up as part of the International Geophysical Year 1957-58. Each Baker-Nunn camera has a large 20-inch diameter objective lens. Our calculations indicated that these cameras could photograph INTELSAT III satellites by specular reflection. The Smithsonian agreed to attempt photographs on clear, moonless nights using our predictions for the occurrence of specular reflection.

On nights between September 24 and 29, the tracking station in Natal, Brazil, obtained 70 photographs of INTELSAT III, F-2, F-6 and F-7, the three satellites of the INTELSAT III series visible from that part of the world. The cameras used time exposures of 5 and 10 seconds.

### Fernbank Science Center

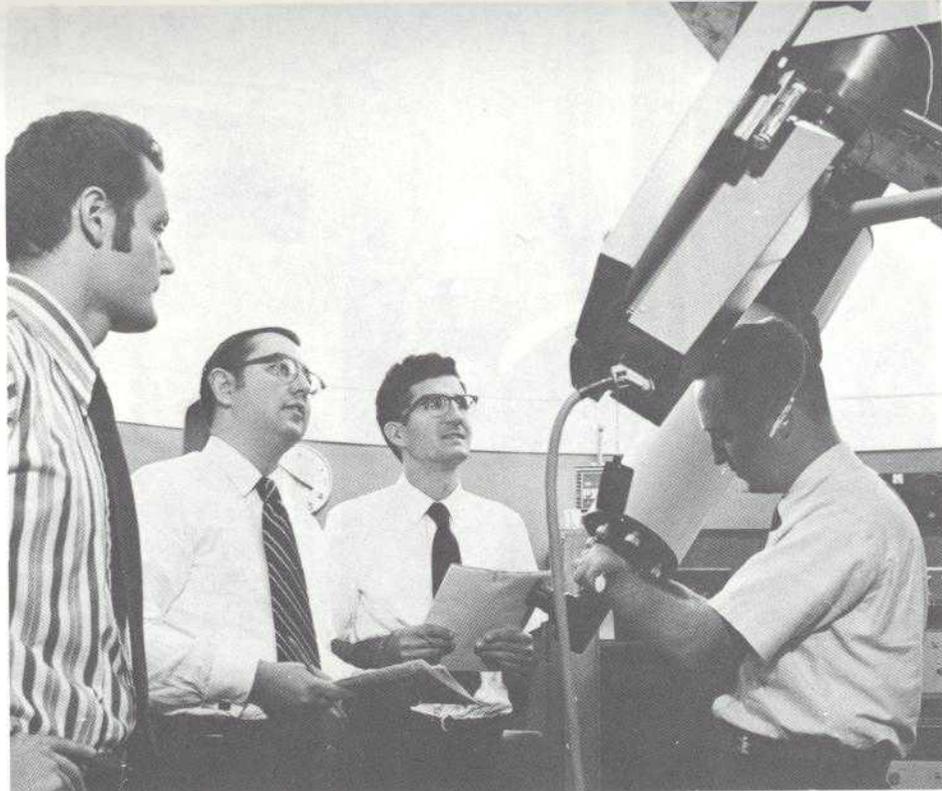
The Fernbank Science Center in Atlanta, Georgia, also has an observatory interested in spacecraft tracking via telescope. Fernbank is part of the DeKalb County public school system, and uses its telescope, planetarium, electron microscope, and forest preserve primarily for student instruction.

A large reflecting telescope with a 36-inch diameter primary mirror is included in the Fernbank equipment. An electronic image-intensifier and television camera system attached to the telescope allows images of very faint astronomical objects to be displayed on a television screen in real time and to be recorded on video tape.

Fernbank succeeded in tracking an Apollo spacecraft all the way out to the moon with its telescope. Since an Apollo spacecraft, at the moon's distance, is no fainter than the normal brightness (no specular reflection) of INTELSAT III satellites in synchronous orbit, Dr. Paul Knappenberger, the head astronomer at Fernbank, agreed that an attempt at telescopic observation of the satellites might yield successful results.

### Spotting the INTELSAT IIIs

On three nights from September 30 through October 3, a team of astronomers consisting of Dr. Paul Knappenberger, Mike Sanders, and



Inspecting the 36-inch reflecting telescope used to photograph the satellite are (left to right) Dr. Paul Knappenberger, Ralph Brice, Jr., Dr. Victor Slabinski and Robert Haywood.

Robert Haywood of Fernbank, Ralph Buice, Jr., a graduate student at Georgia Tech, Virgil Baker, a graduate student at Emory University, and myself observed INTELSAT III, F-2, F-6 and F-7.

One time I saw the satellite by putting my eye to the telescope, but the measurements of satellite brightness, and the precise measurements of the satellite position with respect to the background stars, were made with the image-intensifier, television system.

### Separating Satellites from Stars

If you are wondering how anybody can tell which dot in the photograph is the satellite, remember that the photograph printed here is a still photograph. On the television screen (either live or on playback of the video tape obtained from Fernbank), one sees the satellite moving with respect to the stars. The telescope is kept fixed so the satellite, which is in synchronous orbit, has only a very slow motion on the television screen. In contrast, the stars keep streaming across the field of view because of the earth's rotation. The stars take only 22 seconds to cross the screen which pictures a part of the sky only 0.1 degrees across. The "snow" in the still picture printed here is not so noticeable on a live TV picture.

The tracking feat is more amazing when one considers such unfavorable

conditions as these: the observatory is located within the Atlanta city limits, there are mercury vapor street lamps in the neighborhood, and lighted high-rise apartments are on the horizon in the direction we were looking.

One surprise came when we looked at INTELSAT III, F-2 by specular reflection and found that its brightness fluctuated with a period of 0.7 seconds, the spin period of this particular satellite. The other satellites always showed a constant brightness, except for ordinary "twinkling" caused by the atmosphere.

The brightness fluctuation of the F-2 indicates this satellite is not spinning about its cylindrical axis, but about an axis inclined perhaps one degree from the cylindrical axis. As a result, the side of the satellite facing the earth tips back and forth as the satellite rotates, and specularly-reflected sunlight is directed toward the observer during only part of the spin cycle. The spin-axis tilt is somehow connected with the fact that the satellite's mechanically despun antenna, which is supposed to keep pointed toward the earth, is now "locked" to the satellite and rotates with it.

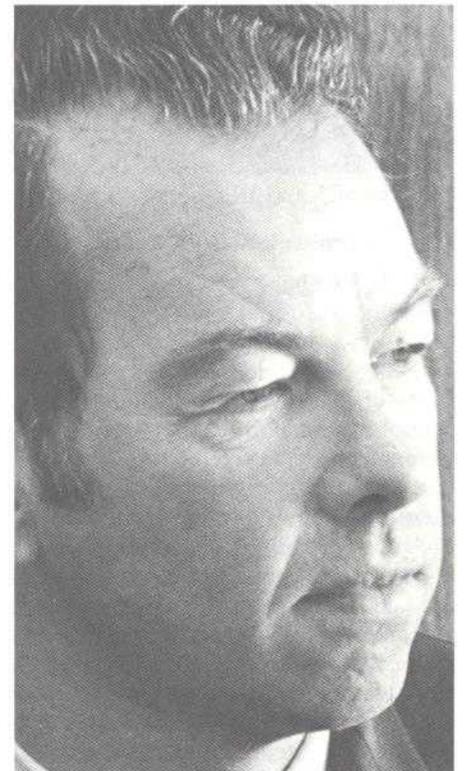
These tracking experiments demonstrate that optical tracking of INTELSAT satellites is very feasible. Analysis of the data obtained continues.

## Martin J. Votaw Elected by Board To AVP Post

The Board of Directors has elected Martin J. Votaw, Director of the Space Segment Implementation Division, as an Assistant Vice President.

Mr. Votaw is responsible for the development, launch and operation in orbit of the satellites in the INTELSAT system. He carries out these duties from an office in the plant of Hughes Aircraft Company, El Segundo, California, where the series of eight INTELSAT IV satellites are being fabricated.

Mr. Votaw joined COMSAT in 1965 as a project engineer on the Early Bird program.

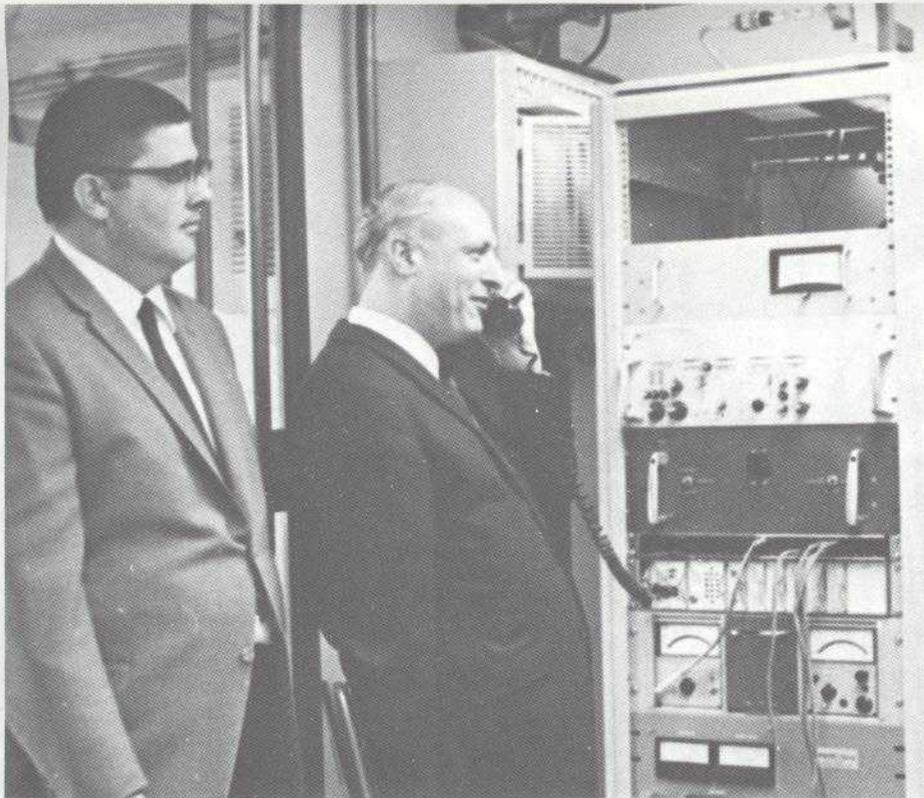


Martin J. Votaw

Prior to 1965 he worked at the U.S. Naval Research Laboratory on projects including development of radar equipment, sounding rockets and satellites. He received the Navy's Distinguished Service Award for his contribution to the NRL satellite programs.

Mr. Votaw is from St. Louis, Missouri, and Washington, D. C. He graduated from Central High School in Washington and in 1947 received a bachelor's degree in electrical engineering-communications option from the University of Virginia.

Mr. Votaw and his wife, Merna, have six children and have lived in Palos Verdes Estates, California, since 1968.



During a recent visit, Mohamed Mili, Secretary-General of the International Telecommunication Union, participated in a communications experiment using the small antenna at Headquarters.

## *Bartletteers Talk Big Game Hunting*

By Jim Shaff and Larry McKenna

Activity has been frantic on the hunting scene here in Talkeetna during the past weeks. Al Sousa and Larry McKenna have tramped through "them thar hills" on foot nearly every day. Net result has been 4 blisters, 2 corns, 1 bunion and no moose.

However, when it comes to showing the long-time Alaskans how it's done, Dewey Clay goes to the head of the class. Dewey drove up to Eureka, hired a bush pilot and went out and got a moose. Dewey's comment? "Sighted moose—sank same." Now that the beast has come back from the butcher shop all nicely cut up and wrapped, Dewey and Margaret have been bumming freezer space from everyone at Bartlett Park.

### Bartlett CEA

The Bartlett CEA recently received initial funding from the home office. A Dinner Dance and Cocktail party is being planned for the big kids, and since Santa Claus is just a few miles away, the little ones will be treated with unusual treats and eats.

Now that the snow is here to stay, and the cold weather has set in, ice skating has become a popular pastime for the Bartlett personnel. There is a small lake just across the street from Bartlett Park, and you can see some strange sights there nearly every afternoon. Carolyn and Bill Patterson have been practicing diligently. Bill's comment? "I didn't even know I had those muscles."

### Mild Earthquake Startles Newcomers

At approximately 4:37 p.m. on November 2 some of the COMSAT personnel experienced their first earthquake. It registered 5.4 on the Richter scale. No damage was reported, other than a few shattered nerves.

Merle Albert has established consistent operation of his "ham" rig at 20 meters. He has been running 4 db more power now with a flat top beam oriented towards the northeastern part of the United States. He ran a successful contact to New Hampshire via a phone patch from Limestone, Maine through the help of KLVYF. Merle is usually on at 0330 GMT around 14.300 Mhz. He also checks into the YL International System quite regularly.

Well, that's about it for this time. Bartlett wishes all a Merry Christmas and the best of New Years.

# Notes From Etam

By Deloris Goodwin

Don Chontos, manager, employee benefits, visited Etam to brief employees on the new COMSAT Thrift and Savings Plan. Nineteen, or 70 percent, of the Etam employees are currently participating in this plan.

## Personal Notes

Crawford Booth opened the deer season early this year. While he was on his way to work one morning, it seems that a deer wanted to ride along. However, Crawford couldn't stop in time to accommodate the deer and came in second best. (The deer kept on running, but Crawford's car was out of running commission for a couple of days.)

The beef producer is at it again this year and having a great demand for his top quality beef. Several station personnel are somehow on Roger Parsons' beef list. They are anxiously awaiting the delivery of those tasty, juicy steaks, hamburgers and roasts.

## Thanksgiving Feast

The Etam CEA held its Thanksgiving Dinner on Sunday, November 22, at the Community Building in Kingwood. Approximately 35 adults and 25 children attended. Thanks to the planning done by Andy Thompson, the feast consisting of turkey, ham, dressing, salads, and desserts was a delicious treat for everyone.

## Notes From COMSAT West

By Dee Wallace

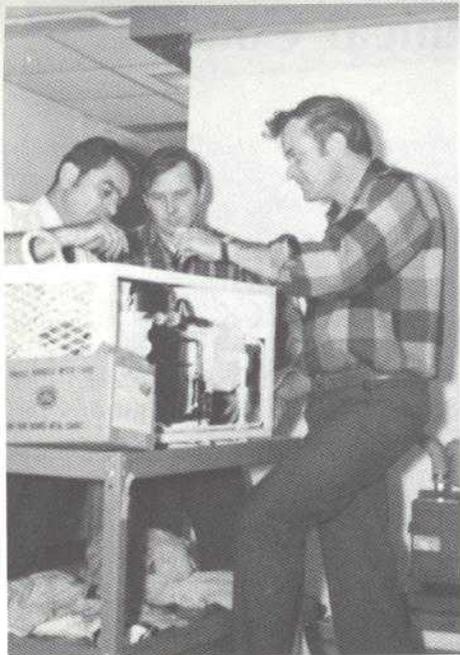
Gene and Ann Jilg and children and Jeff and Marie Robinson spent a weekend 26 miles across the sea in Catalina. The sailing was good and the weather gorgeous.

Irv Dostis received an incentive award, a part of the Patent Incentive Award Program, for his invention of a broadband RF Mixer.

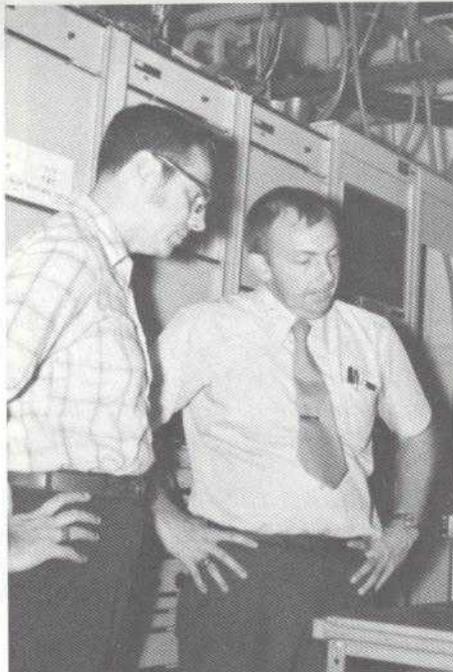
Sy Bennett was presented by other members of the COMSAT West handball team with an acknowledgement of his verbal alacrity and agility on the handball court.

COMSAT West secretaries Marilyn Mitchler and Dee Wallace were guests of TWA on a "Girl Friday Flight" November 14. The flight was scheduled to demonstrate service.

A party was held on November 24 in honor of Marty Votaw, newly elected Assistant Vice President.



Discussing the installation of a cryogenic cooler are Dave Coombs (left), William Reece (right), both of the Operations Maintenance Service and Supply Center, and Jerry Reeves of Etam.



David Lipke (left), Headquarters, and Roger Parsons, Etam engineer, take sun noise temperature measurements.

## News and Notes From Jamesburg

### Staff Donates to Family Blood Bank

By M. Lee Dorsey

Sixteen units of blood were donated by Jamesburg personnel to establish a family blood bank, available to all personnel and their families. It is anticipated that our credit with the local blood bank will grow as we give periodic donations in the future. Arrangements were made through the local Red Cross Chapter.

#### Thrift-Savings Participation

Thomas W. Harrington, Jr., personnel director, and Walter J. Kutrip, manager, employee relations, discussed details of the COMSAT Thrift and Savings Plan with Jamesburg personnel. They received plaudits from the staff for their presentation.

#### Kiwanis Members Visit

Twenty-six members of the Carmel Valley Kiwanis Club visited and toured the Station on October 27. Station Manager John Scroggs conducted the tour. An impressive demonstration of satellite communications, by order-wire greetings from Station Managers Glenn Vinquist, Paumalu; Wally Lauterbach, Brewster; and Bill Patterson of the Bartlett station, was held for our visitors. The participation by these station managers was greatly appreciated and made the visit of the local businessmen more memorable.

Mrs. Ruth Reel, Special Assistant to the Chief of the Common Carrier Bureau, FCC, and Mr. Rick Gould, Office of Telecommunications Policy, Executive Office of the President, toured the station recently.

Hiraku Kuroki of Osaka International Telegraph and Telephone Service of Japan visited the station.

Allan Kirkpatrick of RCA and Edward Barlow of ACA Teamsters Union were given a tour of the station by Assistant Manager Michael Downey.

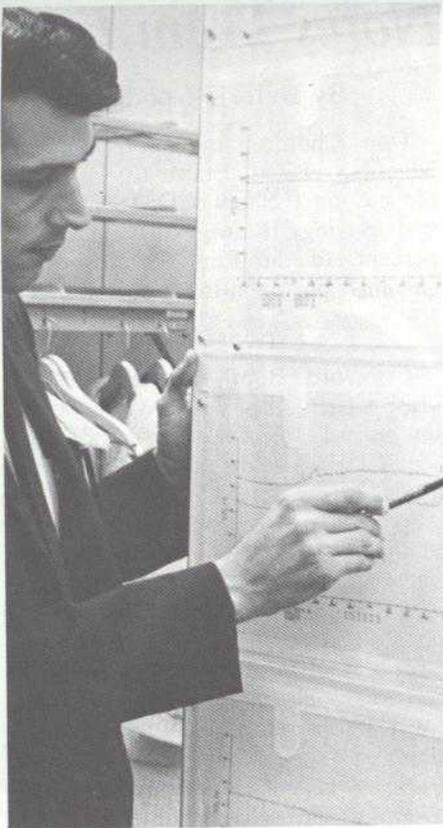
Len Wood of WUI and twelve men from FAA also toured the station.

Rod Gray of the Australian Overseas Telecommunications Commission visited Jamesburg and exchanged information on handling TV transmission to Australia. Mr. Gray was particularly interested in our methods of maintaining records for baseband arrangements and multiplex equipment.

#### Personal Notes

The station secretary, Mrs. Patricia Blatnik, gives us all reason to be very proud of her. Pat has given up smoking. We have been looking for an "I QUIT" button for Pat so she can tell everyone of her good fortune.

# Spacecraft Technical Control



Roderick White, a member of the technical staff, compares current telemetry data with data collected in the same period in the previous year.

The Spacecraft Technical Control Center at COMSAT Headquarters reviews telemetry data from all INTELSAT satellites in orbit and generates, when necessary, command instructions to permit the four telemetry and command stations to execute command signals to maintain proper position and status of the satellites in orbit.

The Control Center is operated by a 16-member staff 24 hours a day, 7 days a week. Telephone lines link the Control Center to telemetry and command (TT&C) stations at Andover, Maine; Fucino, Italy; Carnarvon, Australia, and Paumalu, Hawaii. These lines bring telemetry data into the Control Center and carry command messages out to the TT&C stations. Control is exercised over the attitude, location, and operational conditions of nine satellites that are now in orbit.

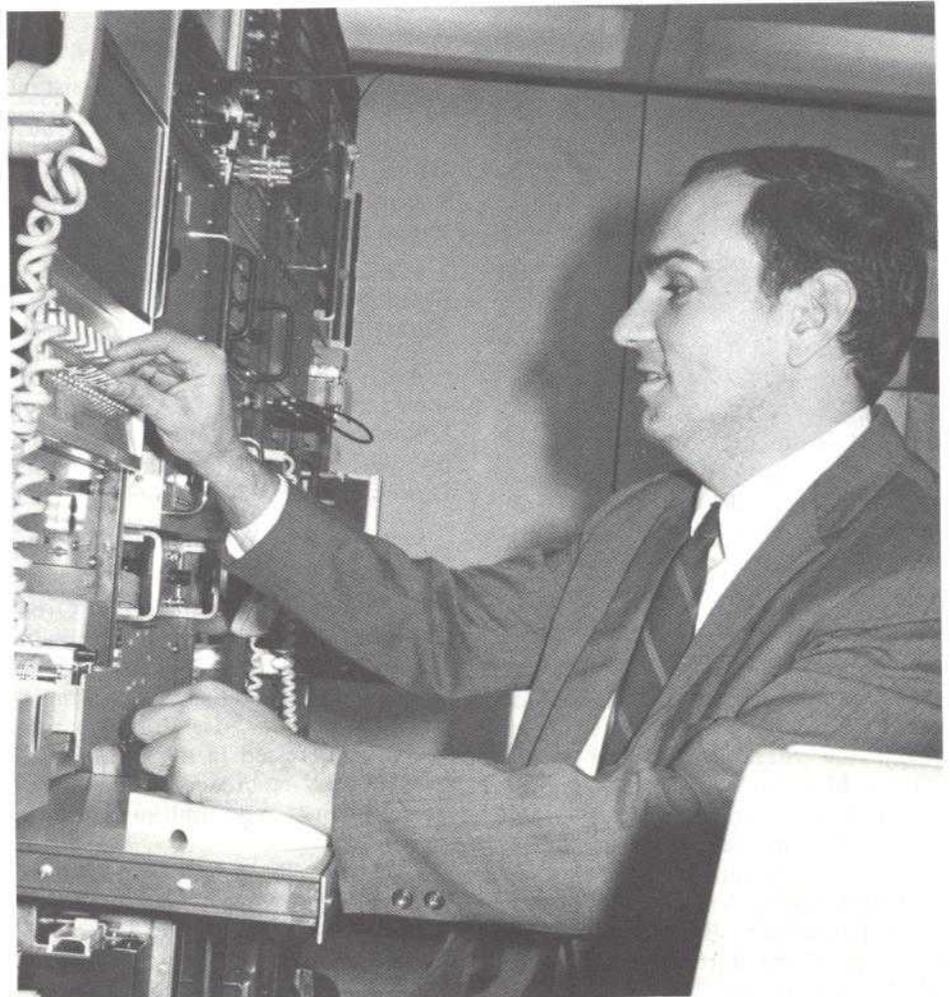
In addition to these duties, Control Center personnel are preparing for the tasks associated with the first INTELSAT IV launch. Approximately one-hour after launch from Cape Kennedy, Florida, telemetry signals from the spacecraft are expected from the Carnarvon TT&C station. These signals, transmitted by phone line to the Control Center, will permit spacecraft personnel to evaluate characteristics of INTELSAT IV performance and to determine when the re-orientation of the spacecraft should be accomplished and when the apogee motor should be fired.

Extensive computations on the COMSAT computer will provide data on the characteristics of the transfer orbit and the proper spacecraft attitude for apogee motor firing. Shortly after the apogee motor fire, the spacecraft will be reoriented to the proper operating attitude and then slowly drift into the precise operating location in the Atlantic area.

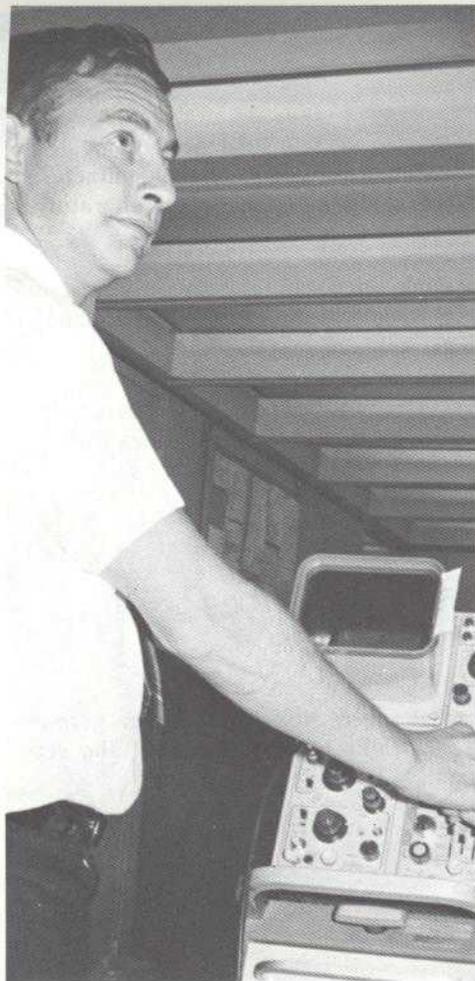
The staff of the Control Center and the COMSAT computer will be in continual contact with the spacecraft from one hour after launch until operation in synchronous orbit.



Behind Rosemary Davis, senior secretary, is the INTELSAT III status board.



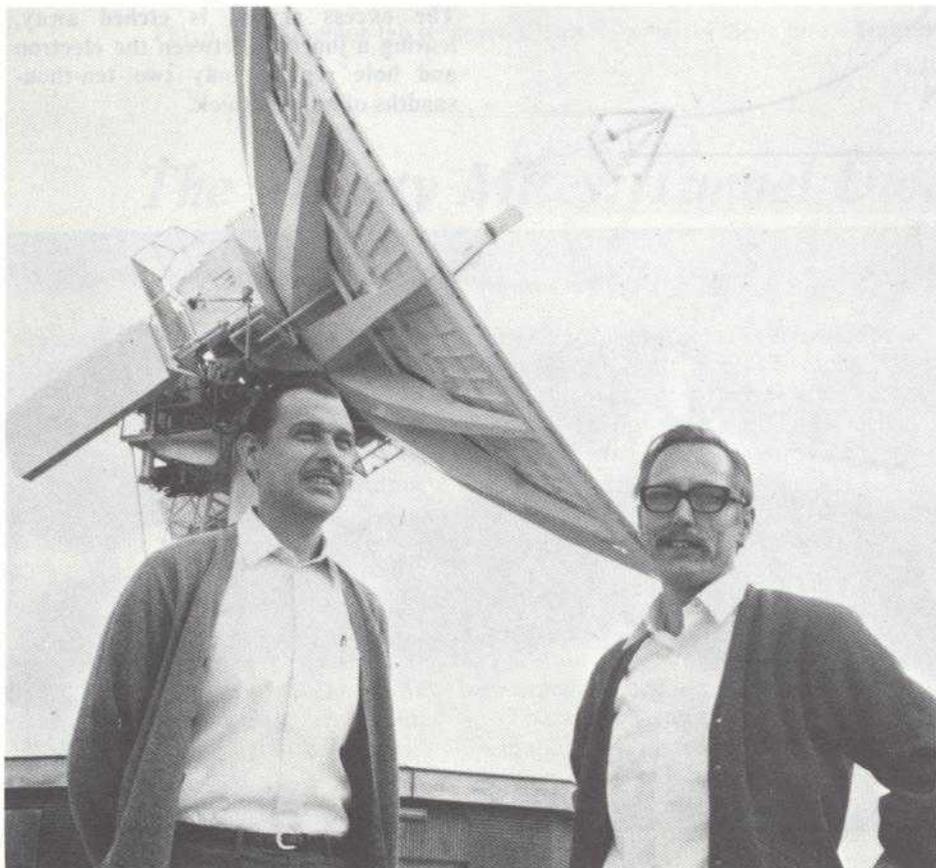
Walt Gribbin, technical staff, prepares INTELSAT IV data processing system for use in analyzing spacecraft performance after separation from the launch vehicle.



Operating the oscilloscope, which displays telemetry data, is Senior Technician Dennis Cooper.



Satellite commands are given by Dennis Neill, center, manager, spacecraft technical control department, who is assisted by Bill Brauer, left, manager of the Center, and Walter McKee, manager of the tracking, telemetry and command equipment branch. They are seated at the director's console, which will be used during the INTELSAT IV orbital placements.

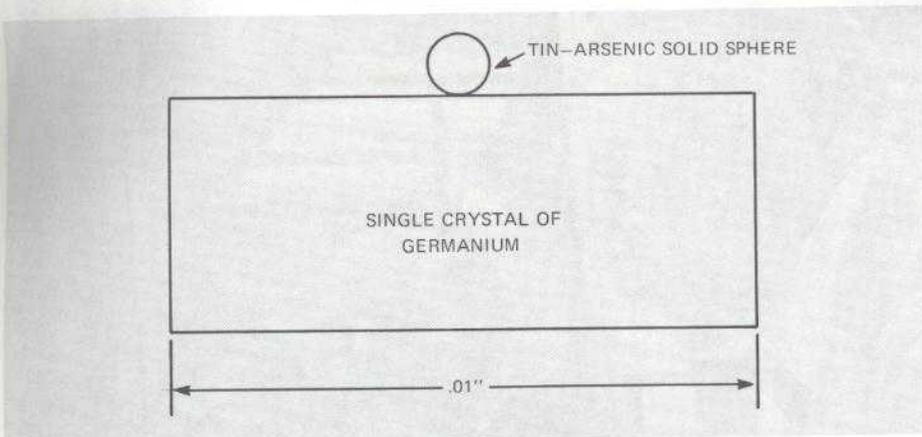


Henry Schutzbier (left), member of the technical staff, and Michael Hoehne, TT&C station supervisor, work with control center through their base at Fucino, Italy. The TT&C antenna is in the background.



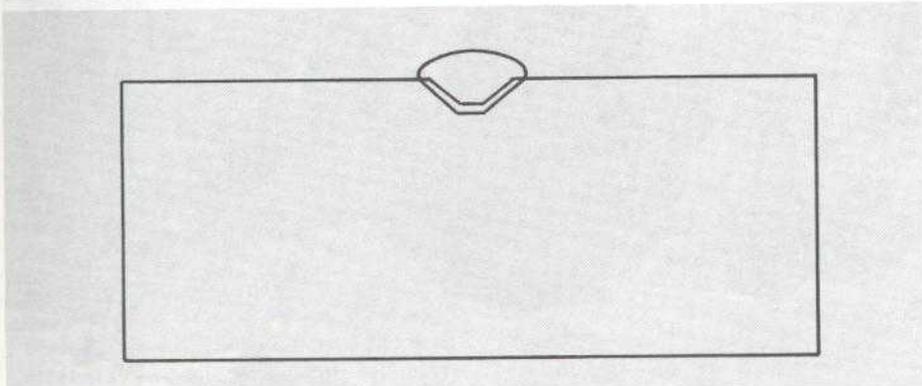
Senior Technician Bill Everts telephones Andover for a data check. Behind him are communications racks.

## Typical Steps in the Alloyed-Etched Tunnel Diode Process.

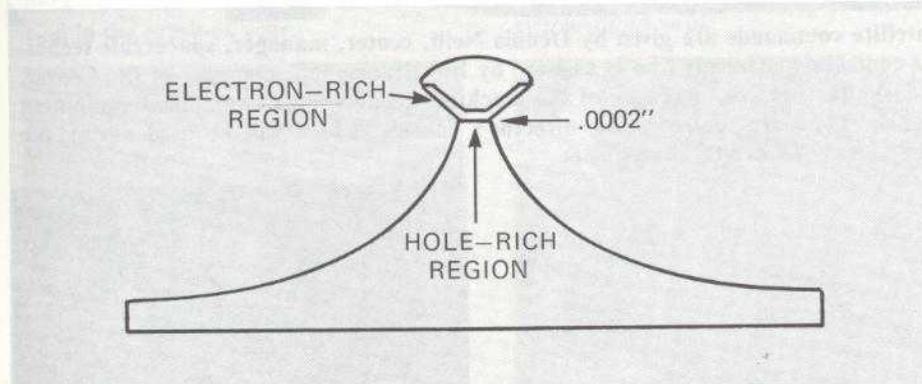


Diodes of this kind are among those supplied by commercial manufacturers for study in COMSAT Laboratories.

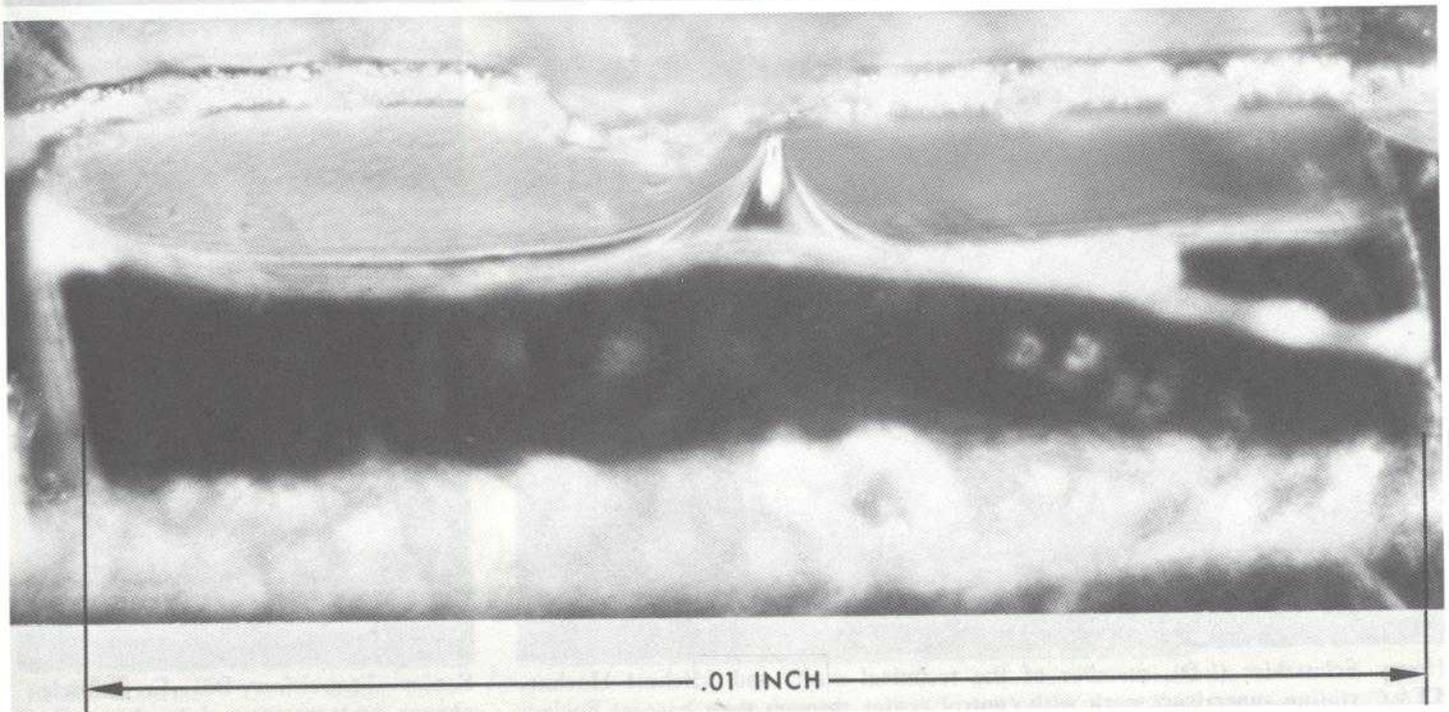
High temperature is applied to a microscopic ball of tin-arsenic and a germanium crystal.



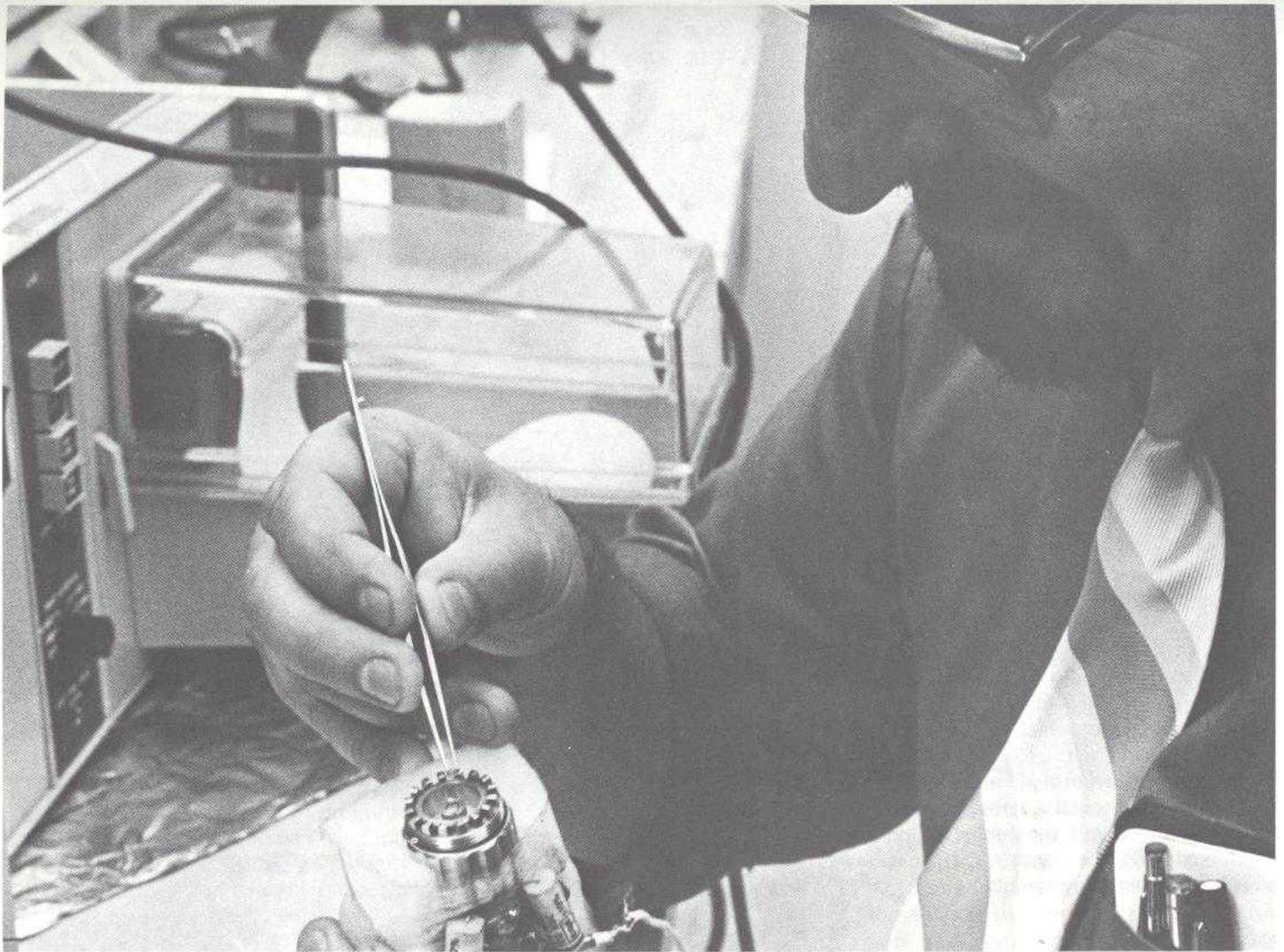
The sphere dissolves into the germanium following the planes of the crystal.



The excess crystal is etched away, leaving a junction between the electron and hole regions only two ten-thousandths of an inch thick.



Photomicrograph of the heart or "pinnacle" of an etched germanium tunnel diode, similar to those used in INTELSAT satellites.



Floyd Bland, senior lab technician, inserts a tunnel diode into a transmission line for measurement.

## *The Mighty Mites: Tunnel Diode Amplifiers*

A tiny crystal disk not much bigger than the period at the end of this sentence is at the heart of the satellite transponder.

It's called a tunnel diode, and it amplifies the transponder's output about 50 times.

A device so small yet so powerful must have some unique characteristics. The tunnel diode does.

For one thing, the crystal is by no means simple, nor easy to make. Extreme purity is necessary to keep the crystal, subjected as it is to heat, cold, shock and vibration, from developing

flaws and microscopic cracks. Once a flaw begins, it "creeps" along the crystalline lattice structure like a run in a stocking. The diode's electrical characteristics go haywire and its ability to amplify is lost.

But a pure crystal of semiconductor material like silicon or germanium is not particularly useful by itself. It must be enriched to give it useful electrical properties. Here the delicate operation which makes these elements so expensive begins.

The crystal must be "doped" systematically with infinitesimally small amounts of selected impurities—related elements which will not weaken the crystal's structure, but which will drastically alter its electrical properties.

Imagine a crystal the size and shape of a penny. Imagine it split through

the middle so that there are now two thin disks back to back. If you could impregnate the Lincoln side of the penny with a small amount of some substance having surplus electrons, and the Memorial side of the penny with some substance deficient in electrons, you would have a pretty fair giant-sized model of a working semiconductor diode. Then if you were to keep on adding more and more of the same impurities, building up more and more extra electrons in one disk and "holes" (deficiencies) in the other, you would have a tunnel diode model.

### **Strange Properties**

The crystal, loaded with electrons on one side and holes on the other, is like a gun cocked and ready to fire. The trigger is applied voltage.

(See **Tunnel Diodes**, Page 12)

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*The accompanying article is another in a COMSAT News series on technical subjects by Information Officer Gerald H. Bidlack.*

From Page 11

## Tunnel Diodes

The heavily doped tunnel diode has so many free electrons on one side that a small amount of electrical energy will start them "tunneling" through into the opposite hole-rich region at about the speed of light. Conventional semiconductor diodes, which are less heavily doped, operate at much lower speeds.

The tunnel diode has another property, however, of unique value in satellite communications. It is called negative resistance.

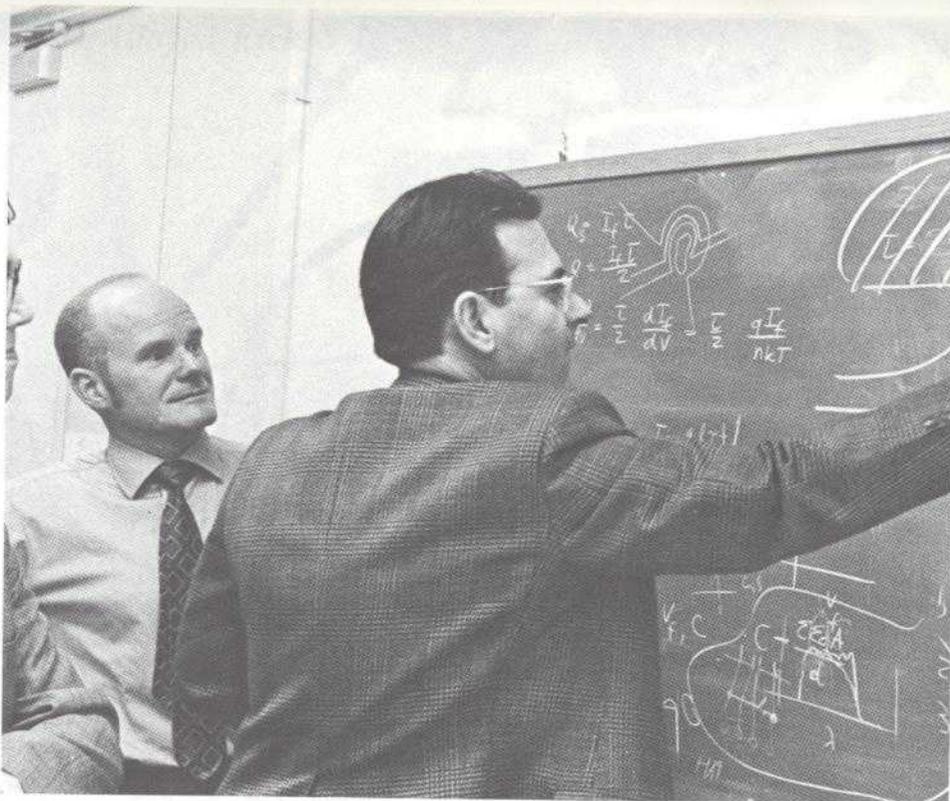
In conventional diodes, both tube and solid state, an increase in voltage causes a gradual rise in output current. But in the tunnel diode, there is a voltage range through which more voltage input yields less current—like a valve automatically closing against higher pressure through a pipe. It is this characteristic which allows the tunnel diode to act as an amplifier when it is incorporated in a radio circuit. As the signal voltage rises, the current through the tunnel diode is choked off: the excess energy is added to the outgoing signal.

### Rapid Development

The phenomenon of tunneling in heavily doped semiconductor crystals was discovered by Dr. Leo Esaki in 1958. By 1966, a germanium tunnel diode was available for use as a low-level amplifier in the INTELSAT II series satellites.

Negative resistance as a way to amplify radio signals had been known for years, but no practical application had ever been developed until the tunnel diode. The diode's miniature size and wideband operation made it irresistibly attractive for use in satellites, and it was quickly incorporated in the transponder design of INTELSAT spacecraft.

Research into the performance and problems of tunnel diodes is a continuing program in the Physics Lab at COMSAT Laboratories. According to Dr. Joseph Lindmayer, recent studies in his Solid State Physics Branch have made great strides toward understanding the physical and electrical dynamics of the tiny devices. The Device Applications and Reliability Branch, under Robert Strauss, will use this new information in the development of improved diode selection and measurement techniques.



John Reynolds, Dr. Akos Revesz and Dr. Joseph Lindmayer discuss the internal stresses of a diode.



Dick Porter, Paul Fleming, Larry Foltzer and Robert Strauss in a special shielded room used for low-noise measurements.

## Former Andover Technician Now Runs FM Station

In June, Oxford Hills Radio Communications, Inc. was granted a construction permit for an FM commercial broadcast station to be located in the Norway-South Paris area of Maine. The station, whose call letters are WNWY-FM, began operation in November.

The station is owned and operated by Raymond and Arlene Knight and sons. Mr. Knight, a former senior technician at the Andover station, is acting as general manager and chief engineer. Mrs. Knight, corporation president, is teaching home economics in the local school system and helping with various station activities. Kenneth, age 13, plans to get his third class license. Peter, age 10, will serve as station handyman.

The station, operating at 105.5 MHz, will have a power of 2000 watts in vertical field and 2000 watts in horizontal field and has an estimated 25 mile-radius coverage. The programming will consist of easy listening, middle of the road music, community events, and news and weather reports.

### Transmitter Nearby

The transmitter is located about one-half mile from the studio and will be controlled by a unit designed and constructed by Dick Cushman, South Paris. The remote control operates on a single telephone pair. The unit incorporates power supplies, relays, amplifiers, and other surplus parts purchased from the Andover station on a bid basis.

The unit has a potential of 100 functions, including turning the transmitter on and off, increasing and decreasing power, metering of nine different circuits, overload reset, controlling antenna deicing, monitoring and controlling the audio level of a remote receiver and switching audio from the studio program to remote receiver. The remote control has an intercom facility between the studio and transmitter.

Other equipment purchased by bid includes racks, power supplies, relays and miscellaneous components.

The Knight family is participating in all phases of construction from erection of the 150-foot tower to painting of studio walls.

The station will be staffed by a secretary-receptionist, one full-time announcer, two part-time announcers and the general manager-chief engineer.



COMSAT President Dr. Joseph V. Charyk gives a brief talk on the global satellite system in front of the Mainichi Broadcasting System camera. The Osaka, Japan, television crew spent several days at COMSAT filming activities around the headquarters. The broadcasters also shot some footage of the Labs and paid a visit to the Etam, West Va., earth station to film the happenings at that site. The footage shot by the crew is to be part of a network documentary entitled "The World in the Information Age" scheduled to be released throughout Japan sometime in January, 1971. In producing this program teams of producers, reporters and cameramen were sent to twenty-five countries to report first hand on various aspects of the communications industry.

## Five-Year Awards

*The following persons have received five-year service awards during November or are scheduled to receive them during December:*

### Finance and Administration:

Harvey Sturghill, bonding equipment operator, reproduction

### International:

William F. Ferguson, technical advisor

### Management Review and Coordination:

Peter A. Ferrandino, member of the staff

### Operations:

William L. Miller, director, domestic services

Russon L. Poulsen, manager, domestic systems organization

### Technical:

Alfred H. Donahue, director, technical advisory division

Fred H. Esch, manager, spacecraft lab

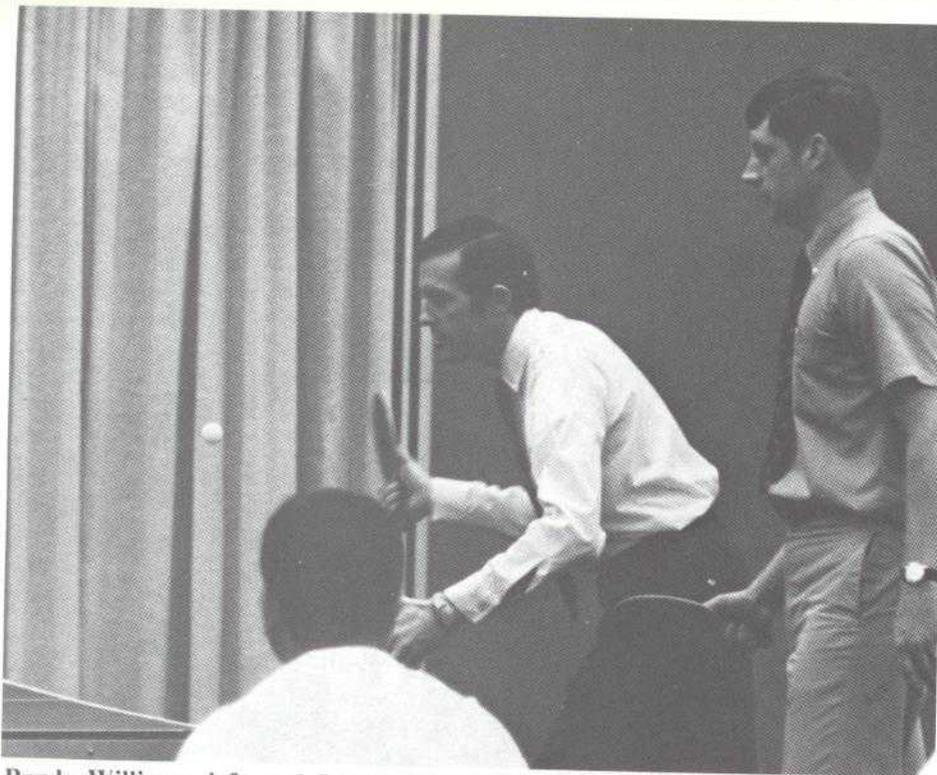
James R. Owens, manager, positioning and orientation branch

Lewis Y. Smith, member of the technical staff, earth station implementation

William Surber, electrical engineer, earth station implementation

John W. Talcott, Jr., member of the technical staff, physics lab

Jack M. Trepp, member of the technical staff, communications processing lab



Randy Williams, left, and Roman Rollins take on challengers at the CEA table tennis center, fourth floor, Plaza.

## CEA Headliners

# COMSAT Club Off to Flying Start

By Beverly J. Nitkowski

CEA's fastest moving club, the flying club, was incorporated in the District of Columbia as a non-profit organization on August 6 and has been active since that time.

The purpose of this club is to provide for its members a convenient means for flying, at the most economical rates.

The Club is now considering the purchase of an airplane to be housed at the Frederick Airport. Some of the funds will be provided by CEA. Club fees of \$50 initiation and an additional \$10 per month per member will constitute the rest of the club's income.

Charles Heise, a licensed flying instructor, has offered his services to club members.

Election of club officers was held on November 13. Charles Heise was elected president, and Walt McKee, as his right-hand man, was elected vice president. Pier Bargellini was elected secretary, Chris Mahle, treasurer, and John Keyes, scheduling officer. Lyn Heiges is the maintenance officer.

### Chess Team Takes Bellcomm

An eight-man Labs-Plaza chess team, led by Rene Costales, defeated Bellcomm, 5-3, in an evening match December 10. Other players for COM-

SAT were W.L. Pritchard, Jerry Bidlack, Bill Higler, M.R. Atwell, Hermes Sanchez, Alberto Bracht, and N. Bertschinger.

Bellcomm was host for the event.

### Astronomy Club

CEA's astronomy club needs membership support. Anyone interested in giving a helping hand should contact Bill Young.

Vic Slabinski, an active member of the club, will be showing pictures and slides at future meetings in regard to tracking INTELSAT satellites in synchronous orbit with the aid of a 36-inch reflecting telescope.

### United Buying Service

For information about your one-stop shopping center for cars, appliances, furniture, carpeting, and fine furs, call 657-1920.

The United Buying Service 1971 New Car Catalogue is out. Visit the Credit Union and look at the book at your convenience.

### Table Tennis

The TT clubs at the Plaza and Labs are gaining many participants. Each day a rather large number of players participates in this energy-needed

### Athletics

Calling all CEA members: Tony Buige and George Domurot, CEA's athletics vice presidents, need help in grading and landscaping the new Athletics Field which was allocated by COMSAT Labs for CEA sports events. Since this field will benefit both Labs and Plaza personnel, all members are urged to lend a helping hand.

### Football and Basketball

CEA's football team has been going strong. The grid boys played two "grudge" games (between the Plaza and Labs teams) in November.

Attention all basketball fanatics: basketball season is here. Interested players should contact Tim Connolly, Ext. 6499.

Sports fans will agree that Women's Lib started many years ago in the field of basketball. This year, CEA has organized a female team, better known as "The Long Shots." Call LaVerne Vanderschaaf, Ext. 6166.

Wanted: One male to coach "The Long Shots."

Extra: Tony Buige has an active volley ball team at COMSAT Labs.

### CEA Board Elections

Elections for the 1971 CEA board of directors are now under way. The outgoing board members would like to take this opportunity to wish everyone a Merry Christmas and a very prosperous New Year and to extend our many thanks for all your fine support in making CEA 1970 bigger and better than ever. The 1971 directors, whoever they will be, will need your help, so please keep up the good work.

### Children's Christmas Party

This year, CEA is throwing a party for CEA members' children. The Children's Christmas Party will be held Saturday afternoon, December 19, from 1 to 4 p.m., at the American Legion, Bethesda, Maryland.

All children up to and including 10 years of age are invited. Party arrangements include refreshments, games and, of course, the "star" of Christmas—Santa Claus.

## Toastmasters Meet

The Milestone Toastmasters Club meets each Thursday from noon to one o'clock on the eighth floor of L'Enfant Plaza North Building. The purpose of the club is to improve the individual's professional speaking ability. The club also provides opportunity to speak before various groups and offers criticisms.

For further information, contact

# News of People At Headquarters

By Judy Holmes

For the past year Jeff Binckes, technical, has been a member of the Oratorio Society of Montgomery County, a choral group made up of one hundred amateur singers. The society celebrated its 10th anniversary on November 20 and gave a concert with full orchestration and professional guest soloists.

This is a non-profit organization and funds required to put on concerts are raised by dues, selling of tickets and donations. Although Jeff really enjoys singing 1st bass in the chorus, his real love is the piano which he has been playing for 23 years.



Jeff Binckes

Cora Guillermo, accounting, has just returned from a six-week visit to her home in the Philippines. This was Cora's first trip back since she and her husband left five years ago.

Doris Byas, service center, had a baby boy on November 2.

Belated congratulations to Tom Minturn, Finance, and wife, Susie, on the birth of a baby boy, Thomas Fredrick, born August 21.

Linda Mercer, legal, was married to Greg Delia in Alabama on October 31.

Janet Russell, purchasing, married Raymond Inlenburg on December 12 and honeymooned at Bryce's Mountain in Bayse, Virginia.

A going away luncheon was given at the Flagship for Brenda Edge, legal, who left COMSAT on November 13 to work in a law firm downtown.



Members of the photography club who participated in the selection of photos for display are (left to right) James Tallon, Gayle Garrett, President Alan Coburn, Bill Young and Carl Sederquist.

By Members of CEA Club

## Amateur Photography on Display

If you haven't wandered in to the fourth floor employees lounge in the past few weeks, now is one of the better times to do so. Photographs taken by members of the CEA photography club are on display until December 21.

All of the 17 members of the photography club were asked to submit prints to a three-man panel, chosen by President Alan Coburn, which selected entries for the exhibition.

To qualify for display, prints had to be at least eight by ten inches in size and mounted. Both black and white and color were acceptable.

Some of the photos and photograms (which are prints made not from negatives but from objects and designs

placed on photographic paper during exposure) are for sale.

## Labs Staff Skilled In Many Languages

A recent check on foreign languages proficiency of COMSAT Labs personnel revealed some interesting facts. Over 75 persons included themselves on the foreign language list. The languages in which they are proficient range from French to more than 20 other languages.

Second on the popularity list is German, spoken by 33 persons, followed by Spanish, represented by 14 persons.

Hungarian and Dutch are familiar languages for five persons each, while Italian and Arabic are spoken by four each.

Swedish, Chinese, Japanese, Hindu and Portuguese are each familiar to three persons at the Labs.

Languages familiar to at least one person are Hebrew, Korean, Persian, Marathi, Norwegian, Czech, Greek, Estonian, Finnish, Turkish and Urdu.

## Classified Ads

*Poodle pups, for Xmas. 1 silver toy female, \$100; 5 miniatures (4 female, 1 male) \$50 each. AKC reg. Contact Mary Lane, Ext. 6895.*

*Wanted: Used ski equipment. Man's buckle boots, size 10 m; metal or fiberglass skis, 190-200 cm; poles. Contact Kay Smith Ext. 6100.*

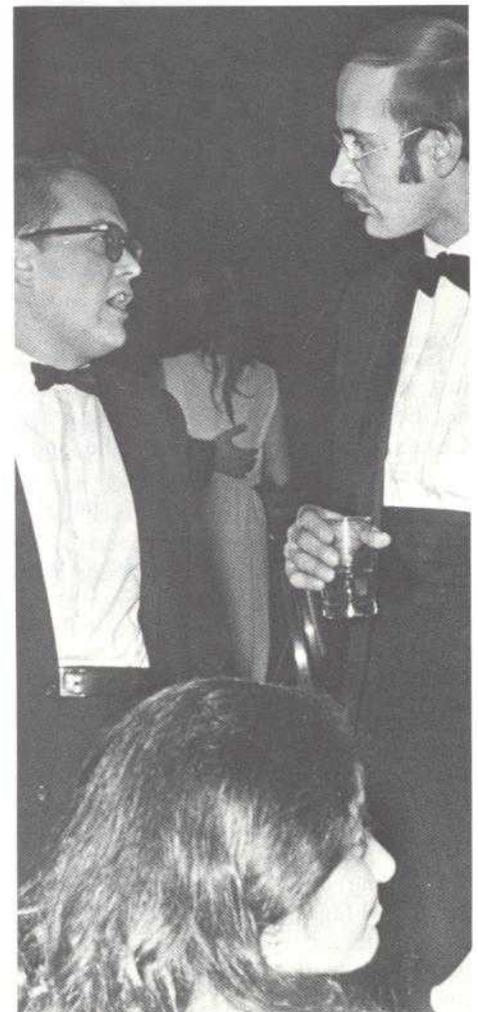
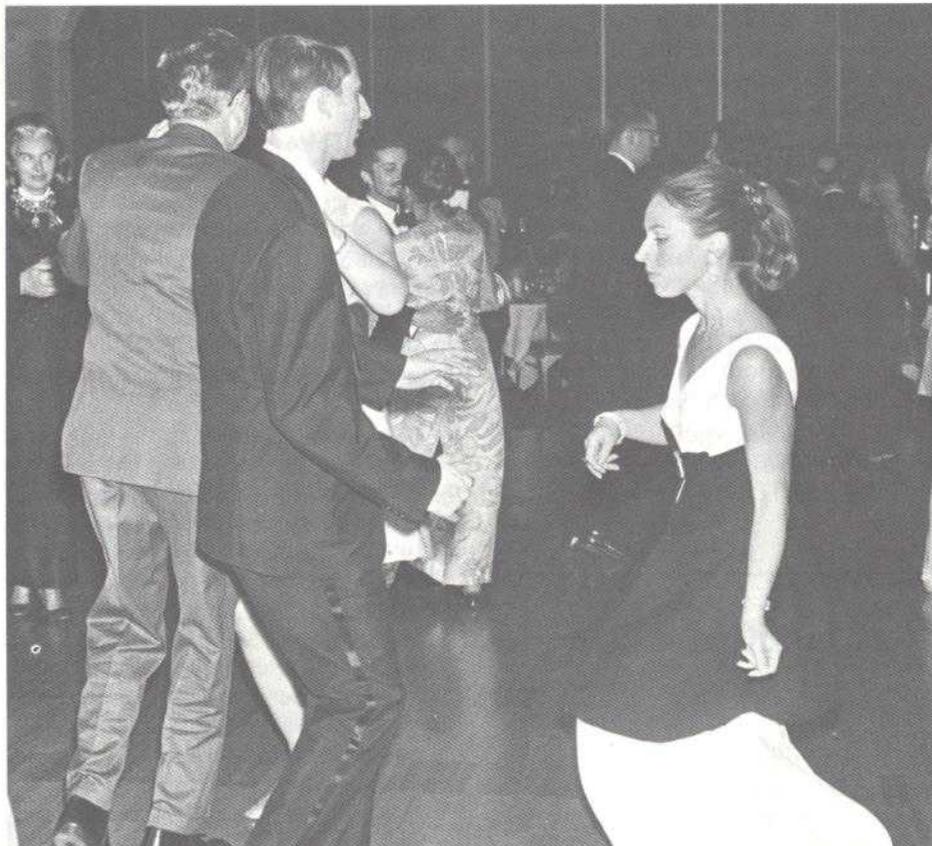


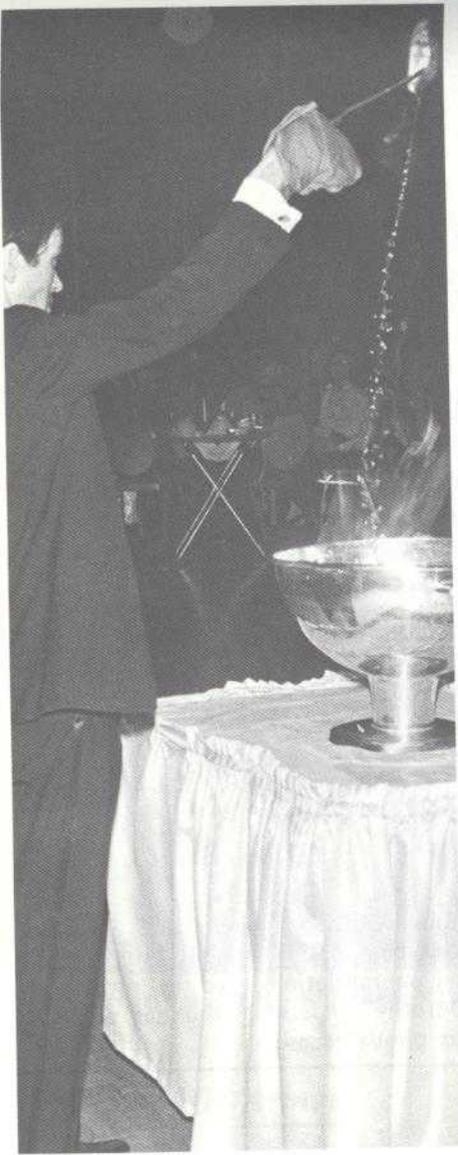
## In the Holiday Spirit

*CEA's biggest event of the year, the annual Christmas dinner dance was held on December 5 at the International Grand Ballroom of the Washington Hilton Hotel.*

*Beginning with cocktails on a cash bar basis at 7:00 p.m., the evening continued through a delightful evening of dinner and dancing. The main course consisted of fresh breast of capon Hawaiian with Canadian bacon and pineapple slices, broccoli and curried rice.*

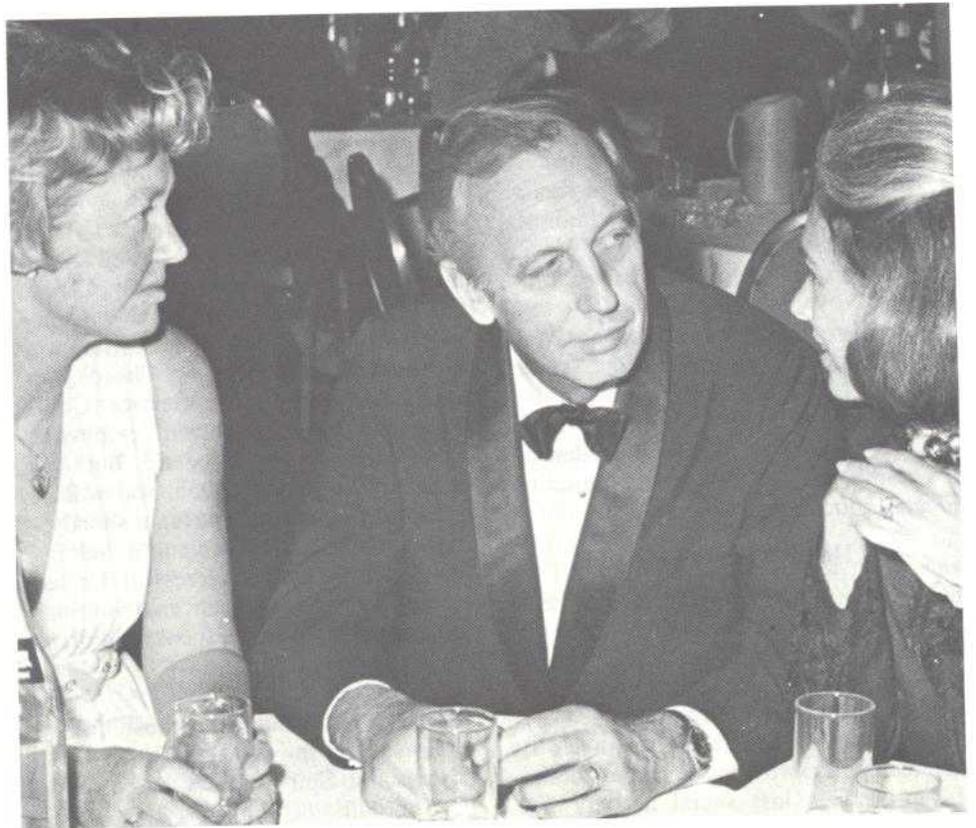
*After dinner, drinks were served while the music of Gene Donati's 12-piece orchestra played on. Six-hundred persons attended the holiday season event.*





## Miss CEA 1971

*Miss Sandie Brown of COMSAT Labs was chosen Miss CEA 1971 at the annual Christmas dinner dance. Her name was drawn by Mrs. Joseph Charyk from the names of six lovelies nominated by fellow employees to represent them at the event. President and Mrs. Charyk crowned Miss CEA, who will reign over special CEA events during the coming year.*



## The Latest Banter

Our "Great Hunters" seem to have failed; the pictures that we promised in the last COMSAT News are missing—as well as the "Whoppers"—the ones that got away. In lieu of the big game, Darrel Nelson did treat us to a delicious lunch of roasted sage hen.

### New Arrival

Mr. and Mrs. Dewey Martin welcome their third child, Frank Alexander, born October 20, 1970.

### Parties

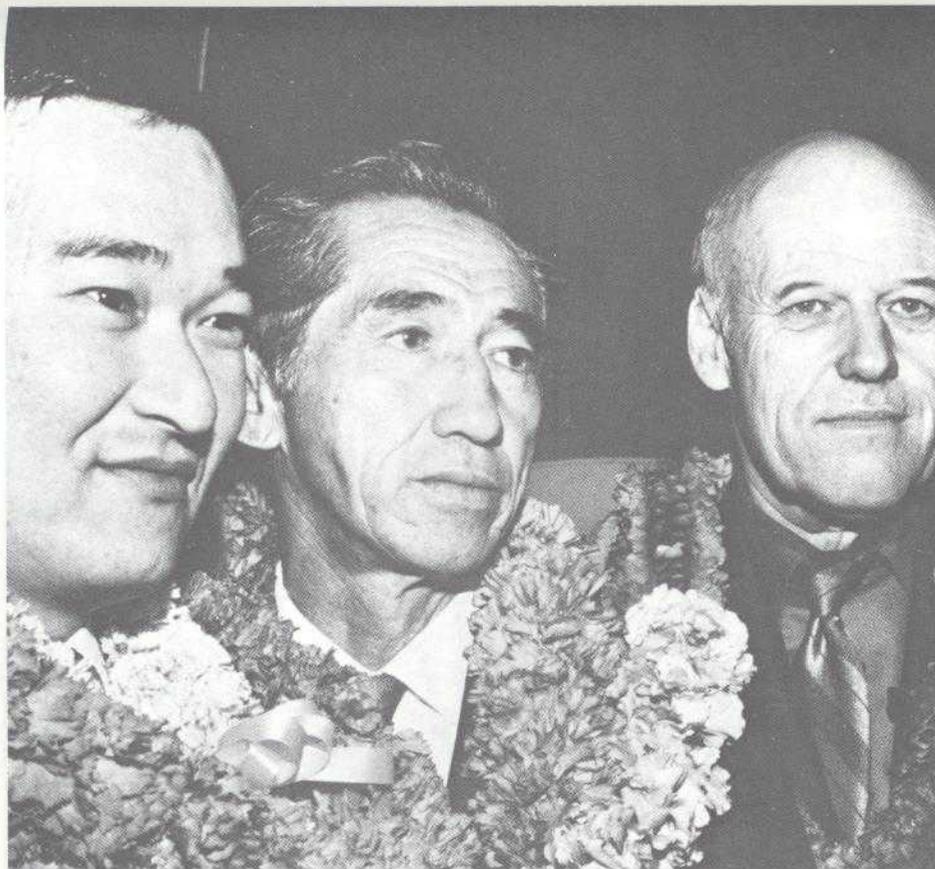
The Children's Halloween party was well attended—35 children plus parents. The costumes were delightful.

Plans are being made for our annual Christmas party to be held at Paul's in Okanogan on December 22.

### Personal Notes

Harvey Andersen recently returned from Chicago where he attended teletype updating seminars.

Congratulations are in order for Dorothy Andersen, who has received her pilot's license.



Robert Kumasaka (left) and two other members of the Hawaii Board of Education were sworn into office following the November 3 elections.

## Paumalu Administrator Wins Seat On Hawaii's Board of Education

Robert Kumasaka, Paumalu administrator, was elected to the State of Hawaii Board of Education, having received over 96,000 votes in the November 3 elections. Prior to throwing his hat into the political ring, he had served as an advisor to the former school board for the past four years.

He and the ten other elected members were sworn in and took the oath administered by Chief Justice W. S. Richardson in the Governor's chambers on November 5.

Mr. Kumasaka has served as Paumalu station administrator since January 1967. The Kumasaka family, including wife Helen and three children, are lifelong residents of Haleiwa, a residential sea-shore community located nine miles from the station.

### Holiday Party Plans

With the holiday season fast approaching, the Paumalu branch of the CEA is planning on a big dinner-show at one of the top Waikiki night-spots. The CEA officers, headed by Ken Elder and assisted by Stan Holt, are currently working on the details to make this last social activity for

1970 a most successful and enjoyable one for all.

Others who comprise the Board of the Paumalu CEA include Charlie Wong, Thelma Park, Richard Coleman, Harvey Fujimoto, Allen Prevo, John Stanko and Norman Kato.

### Welcome Aboard

Paumalu welcomed two new technicians within the past month. Cenon G. Usita, formerly with Page Communications, joined the station on November 2. Robert L. Thorpe, an ex-RCA International Service Company and Kentron Hawaii employee, came on board November 23. Both are currently undergoing OJT and will be assigned to a permanent team shortly.

Paumalu employees lent a helping hand to this year's successful United Fund Campaign by their contributions of nearly \$2,000 to the local fund drive.

### Football Popularity

It appears that the most talked about subject in island households these days is not Spiro Agnew but satellite live football.

The Honolulu dailies have devoted a number of articles to the impact that live telecasts of football games have had on island households since the start of the pigskin season.

Island viewers are treated to not one, but two games on Sunday mornings (yes, mornings, due to the time difference) and another game on Monday evenings.

How would a housewife react to her husband having the neighborhood gang over for a pro-football party starting at 8 o'clock on a Sunday morning? And would you believe the party doesn't break up until 2 p.m.—or, as they say, until the final gun has sounded and the local announcer reports, "This has been a satellite live presentation."

It's no wonder, then, that the grass on many lawns in Hawaii appears a bit taller than usual come the fall season.

Fortunately, this station has not received any-threatening phone calls from irate housewives. Perhaps we've made some new football fans out of all this.



The ruggers are at it—with them is rugby enthusiast, Ivor Knight, lower right.

### *Without His Armor*

## *British Knight Shines Light on Rugby*

While he's not a Knight in shining armor or even on a white horse, he's COMSAT's Ivor who's trying hard to bring rugby out of the darkness among U.S. sports.

Yet, Ivor Knight may never be successful, if you interpret U.S. light on a sport as stadiums filled with fans, or teams and leagues dotting the nation.

"It will probably never be that way," the British-born Ivor, a member of Operation's U.S. Systems Management staff, says, "because rugby doesn't make for spectator interest."

The game, however, has great appeal for its players and the small band of wives and sweethearts who follow their men.

In fact, the sport, in Canada, where Ivor played for 12 years, is called ruggie, and defined by one writer as "a game for ruffians played by gentlemen," and the feminine followers are described as "ruggie-huggers."

Yet, the appeal to the guys and gals is different, too. The players like the stamina, finesse and skills that rugby

requires—similar to U.S. football except there's no blocking.

The gals wait for the game (two 40-minute halves with a five-minute intermission and no times out) to end, hoping the men don't get hurt.

Then, completely different from most U.S. sports, there's the traditional beer party for both teams' guys and gals following the game—no matter how hard or even bitter a game was played.

"We always get together for beer and friendship after," Ivor said, "and it seems it has always been that way. Why in England, and even Canada, rugby clubhouses are built just for that purpose." Most everybody agrees that rugby is in a class by itself.

Played throughout the British Commonwealth for more than 140 years, rugby began to slowly spread from Canada down the U.S. east coast in the early 50's. It's been played in an informal, yet organized way in the D.C. area since 1967 with the season split—from September through November, then March through May.

Knight is an import to the game in the U.S., but work brought him here rather than the sport itself. He joined COMSAT in July, 1969, from the Canadian Overseas Telecommunications Corporation.

After finishing his professional engineering education in England (and playing rugby there, too, from his boyhood days), he was pirated—in the personnel sense—from the BBC to Canada in 1957 by Northern Electric.

Knight believes that U.S. football is the best comparison to rugby, although some Americans might think soccer is a valid comparison, too.

Rugby is played on a field 110 yards long and 75 yards wide, and has goal posts on the goal line, like professional football. (a football field is 100 yards long and 50 yards wide plus end zones 10 yards deep).

Besides no blocking, rugby is different from football, too, in that there's no forward passing.

However, like in soccer, the ball is passed in from out-of-bounds. Pete Dawkins, the former Army All-American footballer, revolutionized the game when in England as a Rhodes Scholar, because he would pass the ball in with a bullet-like toss of 40 yards or more.

And unlike practically all other U.S. sports, there's no substitution. You start the game with 15 players, and if an injury occurs you go on with 14...then 13...then 12.

Well, "you usually don't lose more than a couple," Knight says, "but when you do then you are usually forced to play mostly a defensive game." That means keeping the other team from scoring what's called a try or a goal.

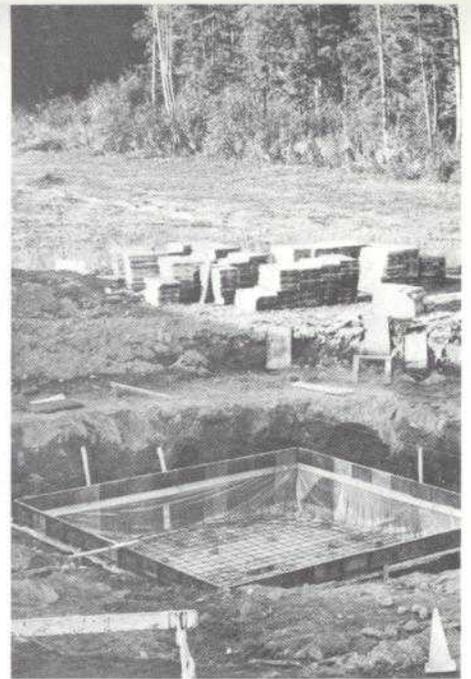
A try is scored when a player touches down the ball over his opponents' goal line, hence the word touch-down. A kick is scored when the ball is booted between the opponents' goal posts above the cross-bar.

The ball is moved forward in one of two ways. One is by the ball carrier who can pick up the ball and run with it; the other is by kicking it forward.

Extensive protective equipment is absent. Physical fitness is an absolute necessity.

The 6-foot, 200-pound Knight has five ribs that show they were once broken. But he says he never really knew it until an x-ray taken for a job physical pointed them out.

"I think I would really have liked to play American football," he says. "That contact and blocking thrills me."



## *Changes at Andover*

Installing the new antenna at Andover calls for construction changes that will give a new look to the earth station site.

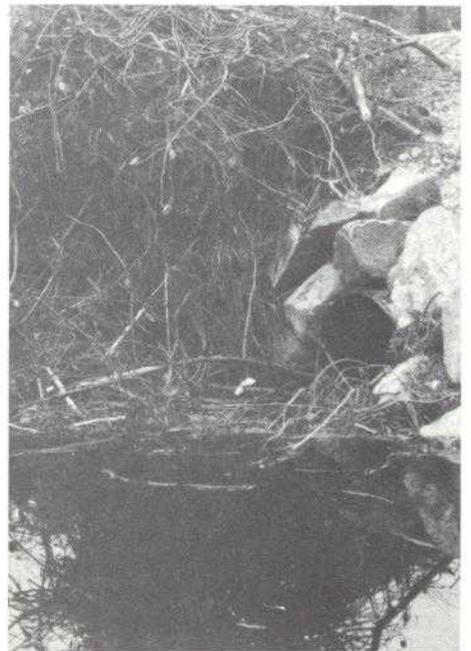
(Above left) Heavy machinery is used to clear land where the new antenna will be erected.

(Above right) Concrete pour-forms for the elevator pit are put into place.

(Center) The concrete base wall-forms for the new track and wheel antenna are put in place around the elevator casing.

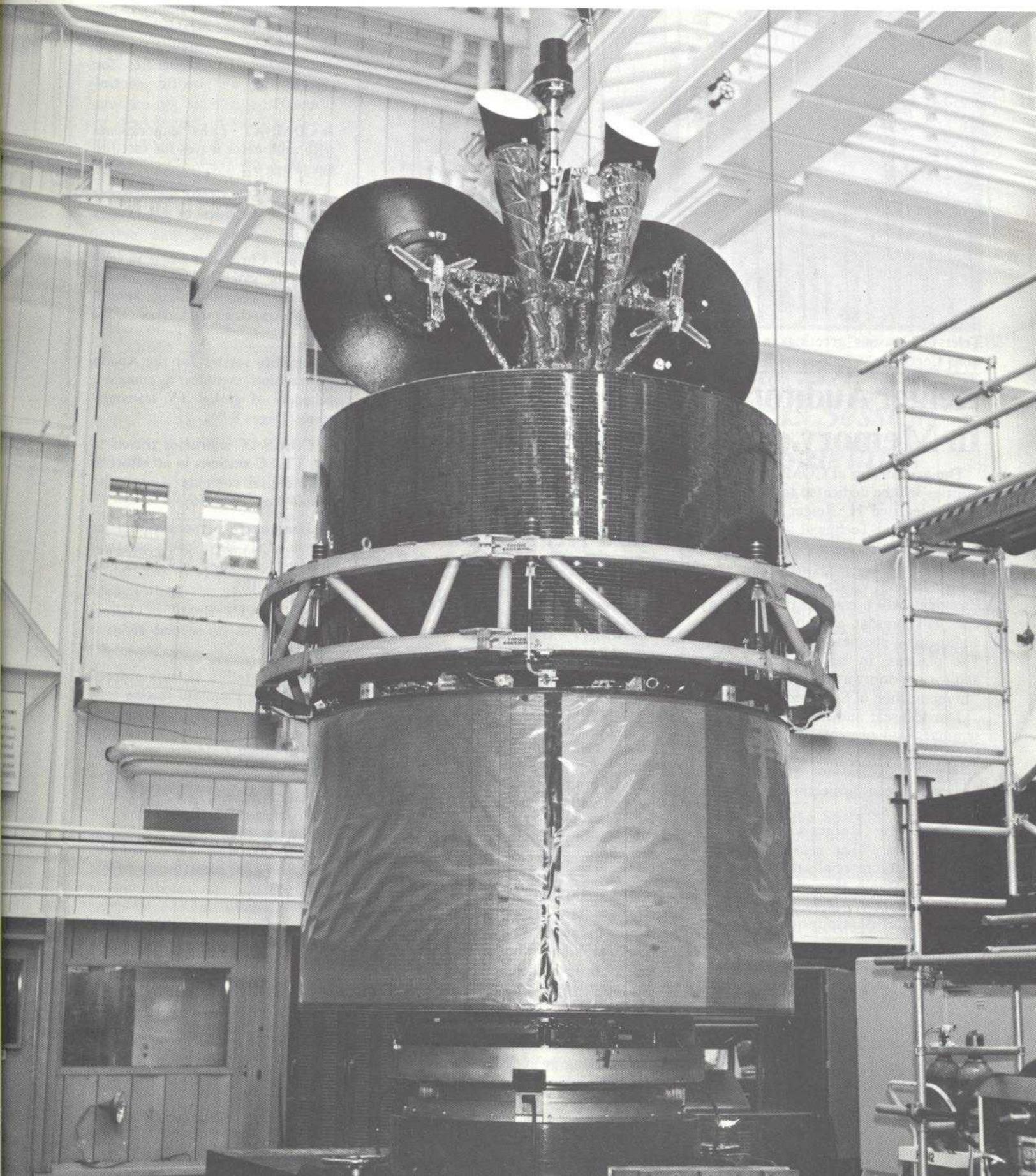
(Below left) Neil Merrill, senior mechanic, installs heater blankets for melting snow off of the transportable TT&C antenna.

(Below Right) Busy as Beavers? You bet. Never to be outdone, Andover's neighbors have been working on their own construction in a brook near the station.



# COMSAT NEWS

January 1971





Teletyped seasons' greetings in many forms were received via satellite by the Operations Center.

## Reiger Auditorium To Be Dedicated In Memory of the Former V. President

The auditorium at COMSAT Laboratories will be dedicated to the memory of Siegfried H. Reiger, COMSAT Vice President-Technical who died last summer, in a ceremony at 11 a.m. on January 28.

Dr. Joseph V. Charyk, COMSAT President, will preside at the ceremony and will present a duplicate of the auditorium plaques to Mrs. Reiger. The plaques, to be mounted on the auditorium doorways, will be inscribed, "In memorium of Siegfried H. Reiger."

The 150-seat auditorium is used for seminars and presentations within the Corporation as well as for meetings of affiliated organizations. It is equipped for rear-screen projection of motion pictures and slides.

After Mr. Reiger's death, Dr. Charyk said, "The establishment of the global commercial satellite system, in a time frame that did not appear possible to most, is in a very direct way due to his inspiration, guidance,

## Utilization Grows

Full-time commercial use of the satellite system increased by approximately 52 percent during 1970.

The growth in U. S. traffic via satellite was approximately 55 percent. Non-U. S. use continued its strong growth trend also, with a 49 percent gain.

technical wisdom, perseverance and selfless dedication."

## Plaza Health Unit Conducts Annual Blood Donor Drive

COMSAT Headquarters medical unit will conduct its Blood Donor Drive on Wednesday, January 27, in conjunction with the Mobile Red Cross Team, which will be participating in the drive.

If at least 20 percent of the COMSAT employees are donors during each 12-month period, blood will be supplied without charge to all employees at any hospital which accepts Red Cross blood. In addition to all regular COMSAT employees, this service will also be extended to employees' spouses, children under 18, parents, parents-in-law, grandparents, grandparents-in-law or any relative living in the same home who is economically dependent upon the employee.

In order to be a donor, one must be between the ages of 18 and 65. Those under the age of 21 must secure parental permission unless they are married or living away from their parents' home and are self-supporting.

Any employee wishing to take part in the Blood Donor Program should contact Mrs. Hazeline Durant, R.N., on ext. 6080.

## News at a Glance

- First INTELSAT IV is prepared for launch from Cape Kennedy (Pages 4-5).

- Administration's Office of Telecommunications Policy issues guidelines for the establishment of an aeronautical satellite system deploying UHF frequencies for government air traffic control (Page 3).

- COMSAT Labs experiments with millimeter waves for satellite use (Page 6).

- The ICSC affairs department has multiple roles to fill (Pages 12-13).

- Papal Christmas Mass is televised via satellite to its largest audience yet, including several Latin American countries (Page 14).

- Satellite service for the Apollo 14 mission includes a complete schedule of global TV transmissions (Pages 8-9).

- COMSAT instructor travels to the TT&C stations in an effort to take digital computer training to employees (Page 16).

- Jamesburg personnel aid in rescue of six Boy Scouts and their leaders from the Los Padres Forest (Page 10).

- COMSAT's Board of Directors declares its second dividend (Page 3).

- Extra satellite circuits ordered through the Paumalu station contribute to record-breaking number of long-distance phone calls placed by Hawaiian residents on Christmas Day (Page 11).

## On the Cover

Having been given pre-launch tests, the first in a series of INTELSAT IV satellites is stored before being mounted on the Atlas Centaur vehicle, which is expected to launch it into orbit from Cape Kennedy, Florida. See INTELSAT IV coverage on pages 4-5.

January 1971 — Year 6, No. 1

COMSAT News is published for employees of the Communications Satellite Corporation by the Information Office, COMSAT Building, 950 L'Enfant Plaza, S.W., Washington, D.C. 20024.

A.V.P. for Public Information

Matthew Gordon

Editor: Kay Smith

# Administration Sets UHF Standards For Government Air Traffic Control

The Administration in a major policy decision issued January 7 set forth guidelines for the establishment of aeronautical satellite services, calling for deployment of satellites in a pre-operational system over the Pacific by 1973 and over the Atlantic by 1975.

The policy directed that UHF frequencies be used in the system for government air traffic control, positioning and air-ground communications for international aviation. It also directed that the Government lease commercial facilities for such a system wherever possible.

The policy guidelines were issued by the Office of Telecommunications Policy (OTP), headed by Dr. Clay T. Whitehead, in a four-page document entitled, "Statement of Government Policy on Satellite Telecommunications for International Civil Aviation Operation."

COMSAT long has actively proposed satellite links to provide voice and data communications for airplanes flying international routes. In May of last year COMSAT submitted a detailed proposal to Government agencies and the aviation industry to provide services via synchronous satellites stationed over the Atlantic and Pacific Oceans operating in two frequency bands—the VHF and UHF bands.

The OTP policy appeared to clear the way for establishment of an operating system.

In setting down broad policy guidance, it directs that the Department of Transportation and Federal Aviation Administration assume program management responsibility, and that the UHF frequency band near 1600 megahertz be utilized in both pre-operational and operational satellite air traffic control communications.

"Pre-operational use and evaluation of voice communications should be implemented in the Pacific in 1973 and Atlantic in 1975," the policy statement said.

"Feasibility demonstration of independent surveillance in an air traffic control environment will be promoted in the Pacific in 1973, with subsequent transition to a pre-operational evaluation in the Pacific and Atlantic in the post-1975 time period."

The OTI said the UHF range was chosen because it "will alleviate seri-

ous spectrum congestion at VHF frequencies," and also because it accords with preferences of foreign administrations.

During a press briefing on the policy statement, Dr. Whitehead introduced Dr. George F. Mansur, Deputy OTP Director, as the man who had directed his agency's three-month study of aeronautical satellite services and coordinated the OTP's policy formulation.

Dr. Mansur told newsmen that aviation traffic was expected to grow on the order of two to four times present volume within the next ten years, both domestically and internationally. He said HF radio could not adequately handle all future needs, and that there was an almost unanimous agreement that satellites were the only answer to meeting requirements in a reliable manner.

In answer to newsmen's questions, Dr. Mansur said he expected other governments to participate in using the system, and that airlines would use it for communications purposes as well as DOT/FAA using it for air traffic control and positioning services.

He explained that use would be voluntary during the pre-operational period. But he expected use to be mandatory for all by the time an operational system comes into being by about 1980.

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## COMSAT to Pay Second Dividend Of 12.5¢ a Share

The COMSAT Board of Directors declared a quarterly dividend of 12½ cents on January 14. The dividend is payable on March 15, 1971, to all shareholders of record as of the close of business on February 12, 1971.

It is COMSAT's second dividend. The first dividend, also 12½ cents per share, was declared on October 16, 1970, and was payable on December 14, 1970.



Dr. S. H. Durrani

## Labs' Dr. Leads IEEE Session On Satellites

Dr. S. H. Durrani, COMSAT Labs, chaired the session on satellite systems at the IEEE International Conference on Systems, Networks and Computers held in Oaxtepec, Mexico, January 19-21. The meeting in Oaxtepec, located about 50 miles outside Mexico City, was sponsored jointly by the IEEE and the University of Mexico.

In his presentation, Dr. Durrani discussed trends in commercial communications satellite systems into the 1980s, the INTELSAT IV system and reviews of current R&D programs.

Papers by D. Charhut of McDonnell Douglas and H. Gerwin of NASA described the Space Station Program and the Applications Technology Satellites (ATS-F and G), respectively. Other papers discussed large deployable space-borne antennas developed by Lockheed and General Dynamics.

Papers of specific interest to COMSAT included those on electronic mail and data via satellite by W. Gross of GE, a proposed domestic satellite system by R. Greenquist of Western Union and Phase II Defense Satellite Communications System by W. Finley of TRW.

Other topics included the possibilities of TV broadcasting via satellite, presented by Dr. Greg Andrus of NASA, and the problems of information distribution in a remote sensing program for Argentina.

## INTELSAT IV Readied For Launch at the Cape

After the first satellite for launch in the INTELSAT IV series underwent a series of extensive tests at Cape Kennedy, members of COMSAT's Board inspected NASA facilities and were briefed on launch activity. The Board held its monthly meeting at the Cape January 13-14, when the members were also briefed on Apollo 14 activity.

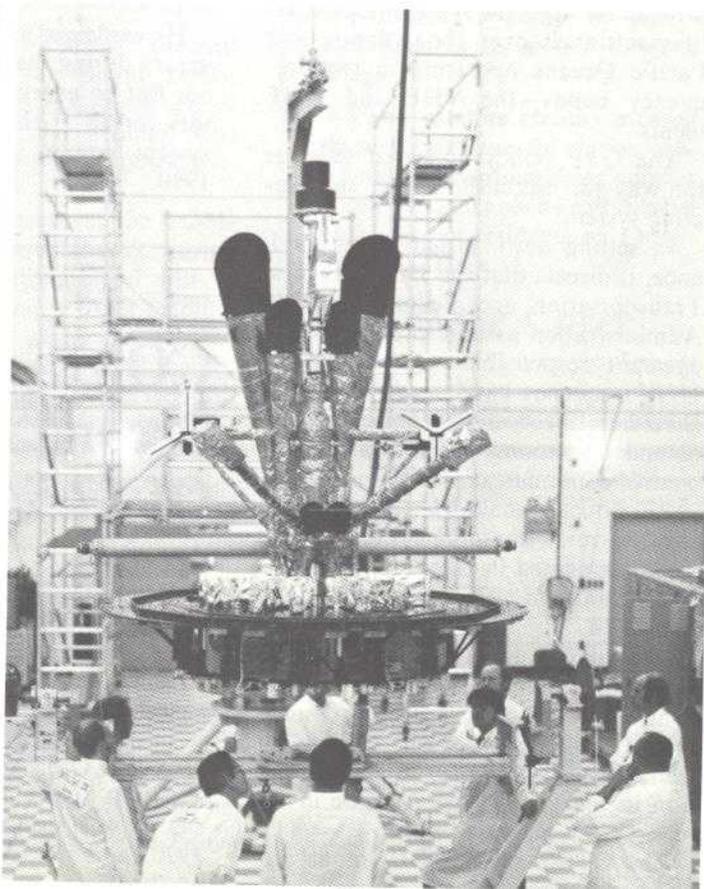
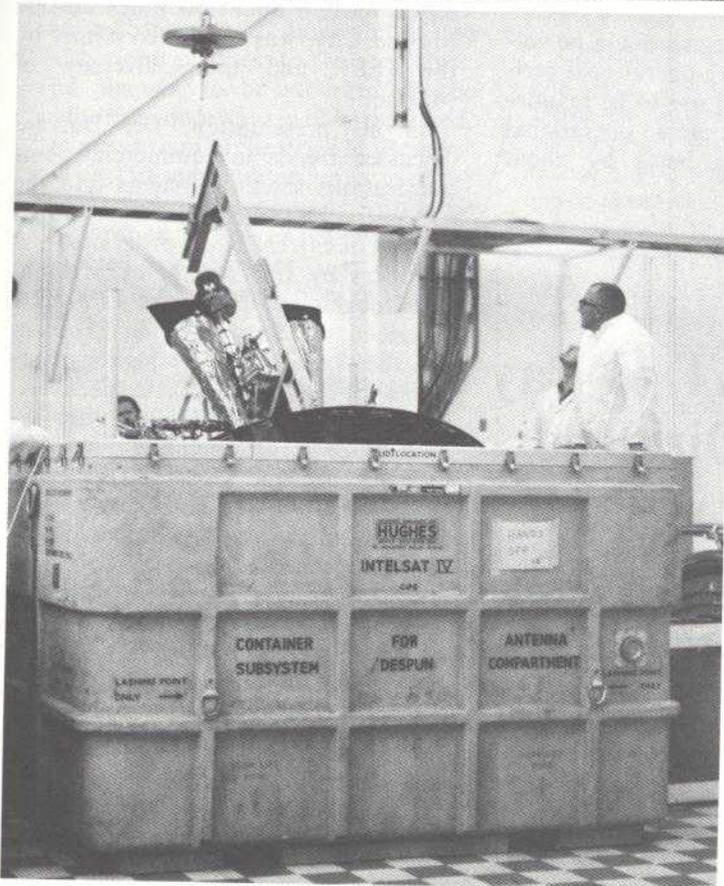
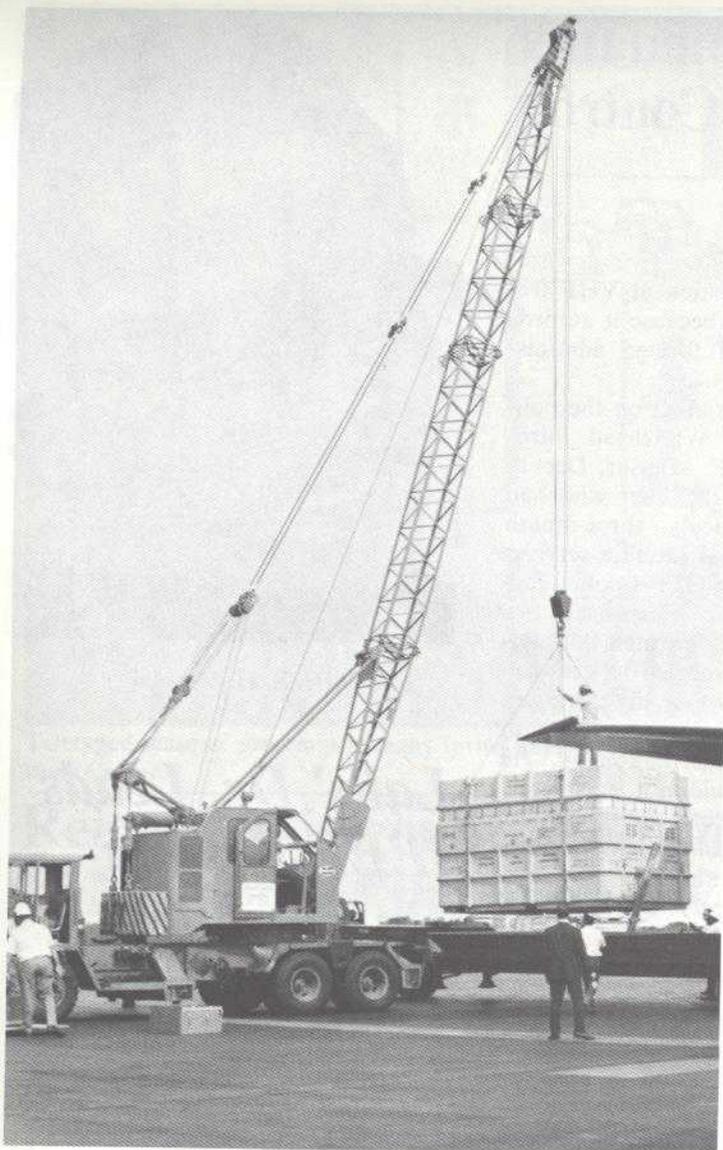
The satellite was shipped by air from Hughes Aircraft Company, El Segundo, California, to the Cape. To facilitate the shipping, the satellite was disassembled and packaged in 20 specially designed shipping containers. After arrival at the Cape, unloading and reassembly began.

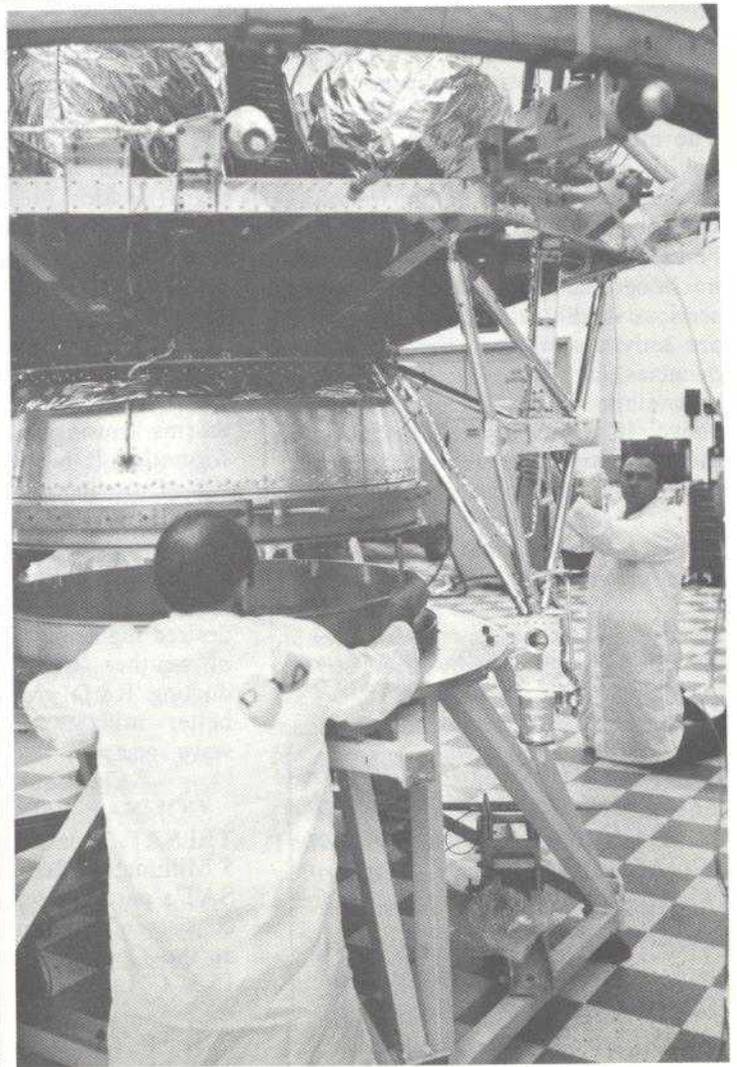
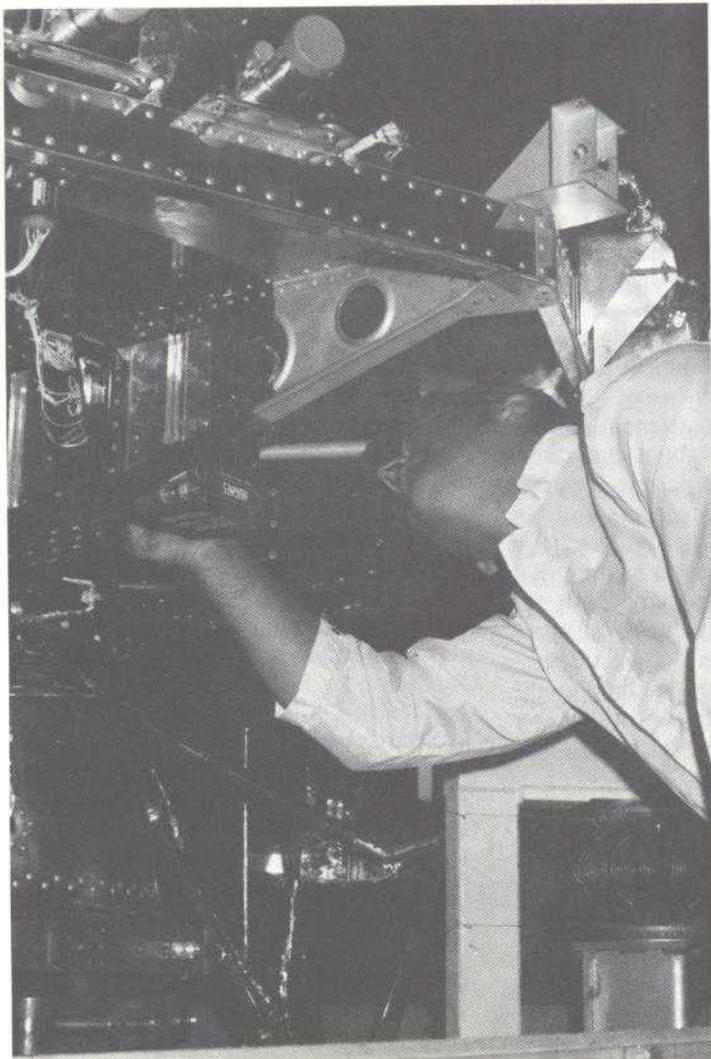
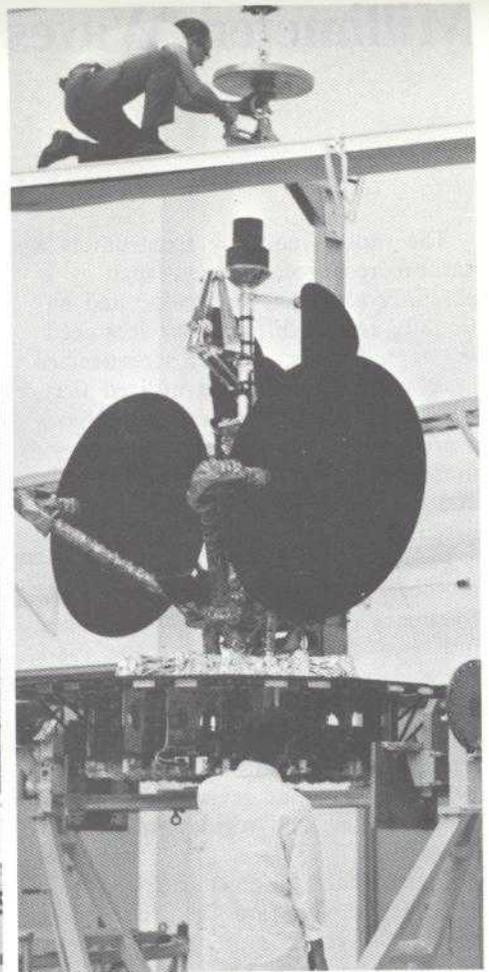
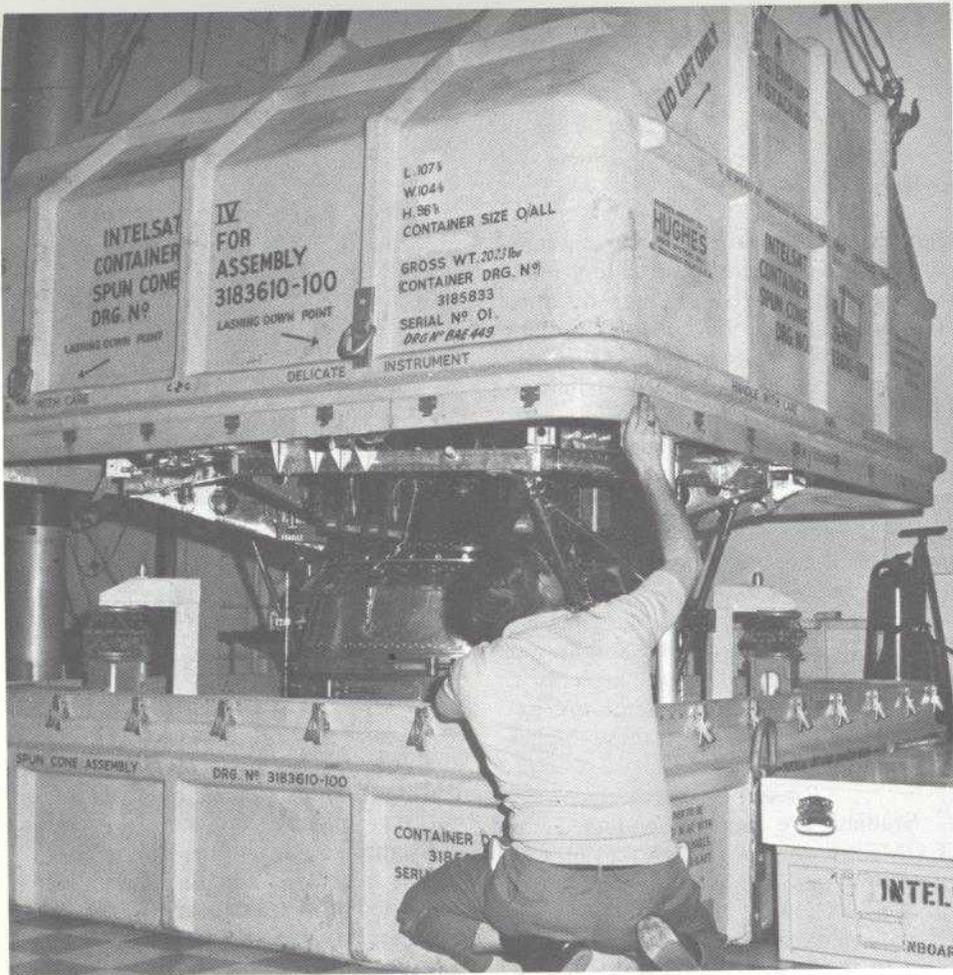
Once the spacecraft was reassembled by COMSAT and Hughes engineers, functional testing took place to test the spacecraft for all functions it would have to perform in space. Following this, the same tests were commanded from the Spacecraft Technical Control Center at Headquarters to assure reliability of communications between the Center and the spacecraft.

After the tests were completed, the spacecraft was moved to the explosive safety facility at the Cape, where the apogee motor was mated to the spacecraft and the hydrazine fuel stored on board.

Before mounting the spacecraft on the launch vehicle, final functional tests, including apogee motor tests, will be conducted.

Further coverage of these and related events will appear in the next issue.





# Millimeter Waves for Satellite Use

By J. Levatich

The radio frequency spectrum is a natural resource, and as such it is carefully allocated worldwide and nationally among different services needing frequencies. Lower frequencies have been explored and utilized first, but as the available spectrum becomes more congested and the technology more advanced, progressively higher and higher frequencies are being utilized.

Present commercial satellite communications operate in the 4/6 GHz frequency band, which is approaching full use by various existing and planned systems. In order to plan efficient use of expanding spectrum space, a World Administrative Radio Conference will be held beginning in June 1971 to review and revise the frequency allocations and regulations now in effect.

Of particular interest to COMSAT and INTELSAT are the frequencies above 10 GHz, commonly referred to as millimeter waves.\*

## Uses for Millimeter Waves

The use of millimeter waves for satellite communications appears to be attractive for a number of reasons. The most important one is the availability of frequencies and bandwidth in the part of the radio frequency spectrum above 10 GHz. The currently used frequencies of 4/6 GHz cannot meet the demand for anticipated services in the future, and new bands are only available at the higher frequencies.

Another advantage of frequencies above 10 GHz is the feasibility of forming narrow antenna beams with reasonably sized spacecraft antennas, which in turn makes it feasible to locate smaller terminals near and in large metropolitan areas, where sur-

\*Millimeter waves are, by definition, those at frequencies above 30 GHz, but use of the term millimeter waves for frequencies above 10 GHz is commonly accepted.

*Mr. Levatich is the manager of the propagation branch in the Systems Laboratory at COMSAT Labs. As a part of his functions he has been conducting experiments on the use of millimeter waves during the past two years.*

face communications centers generally are located. Presently, satellite ground stations are located at some distance from communication hubs and require lengthy terrestrial connections in order to reach central distribution points. Use of millimeter waves with the high precision antenna and earth station facilities will help to shorten this distance.

It is anticipated that millimeter waves will be used for domestic, regional and international systems of the future. The urgency and the time frame for implementation might not be the same for all types of service, but inevitably, future systems are expected to make use of these higher frequencies.

## Present Research

Studies are being conducted by COMSAT and INTELSAT to investigate the possible use of frequencies above 10 GHz for use on INTELSAT V communications satellites, in addition to the 4/6 GHz frequency bands.

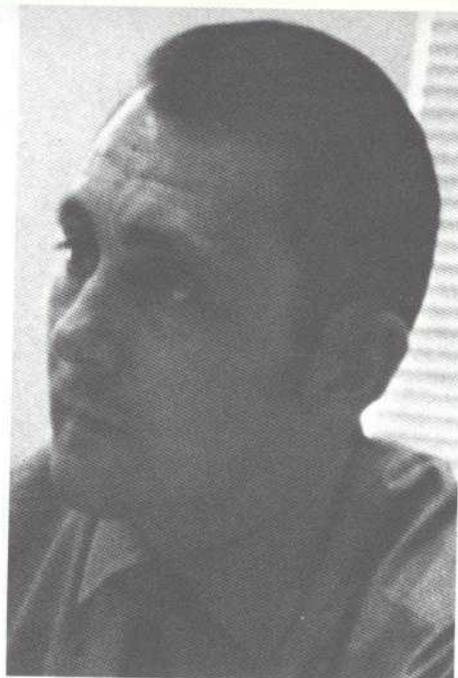
The use of frequencies above 10 GHz, however, does present some difficulties not encountered at 4/6 GHz, mostly due to increased attenuation of the radio waves when passing through heavy rain. In the rare case of the signal passing through the center of a severe thunderstorm, the attenuation can become so great that no signal is received at all, if reasonable power margins are used.

At the present, sufficient data are lacking on the geographical and temporal distribution of heavy thunderstorms causing high attenuation. Information is needed about the statistics of attenuation to permit a careful evaluation of this problem, so that satellite systems can be designed that can economically operate in the millimeter wave frequency band with the desired high reliability during all types of weather. COMSAT Labs is conducting R&D projects leading to the better utilization of the millimeter wave spectrum.

## Clarksburg Terminal

COMSAT Labs, on behalf of INTELSAT, is participating in the ATS-5 Millimeter Wave Experiment. COMSAT's participation in this experiment consists of monitoring and recording at the Clarksburg receiving terminal 15.3 GHz signals transmitted from ATS-5.

So far, data have been collected and



J. Levatich

analyzed for a period of over a year. During periods when the satellite is not transmitting, the sun is used as the signal source, or the sky temperature is measured and the temperature converted to attenuation. The data collected so far indicate that during this year, 10 decibels of attenuation, the outer range of acceptability in these experiments, was exceeded for a total time of about 3 hours.

## Data Exchanged

Data are exchanged with the other experimenters to obtain information on attenuation statistics from other locations.

COMSAT, on behalf of INTELSAT, has purchased a transportable terminal, receiving at 15.3 GHz, and signed a contract with INTERCOMSA of Panama, to operate this terminal in Panama for a year. This terminal will be used to collect data from the ATS-5 satellite in a climatic region different from that found in the U.S. Data collection using this terminal will begin in February 1971.

Attempts are being made to correlate the measured attenuation with generally available meteorological data, to assist in the prediction of attenuation to be expected at other locations and other frequencies.

Studies are underway to derive a useful weather model that can be used to make a preliminary evaluation of the usefulness of millimeter waves in the domestic satellite service.

## Experiments for Designing a Satellite System Using Millimeter Waves

For actual satellite system design, the models need to be verified experimentally. COMSAT is proposing an (See Millimeter Waves, Page 17)

## 'Twas The Night After Christmas

By Dee Wallace

*'Twas the night after Christmas,  
and all through Eriksson's  
nest,*

*There were glasses of glögg,  
being consumed by COMSAT  
West.*

*The gang was huddled  
all close to the fire,  
While visions of prime rib  
piqued their desire.  
Ladies in pantsuits,  
dresses long and short,  
Proceeded to the Plush Horse,  
each with her escort.*

*Then what to our wondering  
eyes did appear,  
But Marty Vonnegut,  
with a bottle of beer!*

*While dancing and chatting  
and waiting to sup,  
We all did our very best  
to catch up.*

*Then dinner was served  
and enjoyed by everyone,  
And soon we returned  
to our dancing and fun.*

*Si "Robin Hood" Bennett  
with Susie in tow,  
Came to cheer up our party,  
but forgot his bow!*

*Dee Wallace and Merna Votaw,  
who planned the whole party,  
Were there with their husbands,  
John and Marty.*

*Bob Sackheim plus two,  
a mother and a wife,  
Bob's mother came from New  
York to enjoy our good life.*

*Marilyn Mitchler and Bob Ely,  
were there as a pair,  
There's news of their engagement  
filling the air!*

*The rest of our gang  
was just glad to be here,  
Cape Kennedy's no fun  
this time of the year!*

*The drinking and dancing  
lasted 'til two,  
Then we bid the Plush Horse  
a jolly adieu!*



Snows building up to as much as 80 inches don't bother Jim Erskine, facilities engineer, who clears the roads leading to Brewster with the help of 'big Mac'.

### From Brewster

## *Snows Enhance Holiday Atmosphere*

If there were any doubts about a "White Christmas" at Brewster, they were quickly erased. Snow fell steadily after Thanksgiving and by the Christmas holiday season, approximately three feet had accumulated in the Brewster station area.

To make winter travel between station and antenna readily possible at all times we have purchased a Ski-Doo snowmobile. It scoots over the snow in a flash—and it's fun. No more buried golf cart or four-wheel drive vehicles to be dug out of the snow.

The Brewster CEA annual Christmas party was held at Paul's in Okanogan on December 22. Beginning with cocktails at 6:30, the evening continued with a delightful dinner and dancing. Thirty-four people attended.

#### **Holiday Trips**

The Ray Hashbergers drove over Stevens Pass to visit Ray's parents during the holidays. Ray reported a great amount of snow on the pass, approximately 80 inches. Anyone for skiing?

Darold and Wilba Browning and family had Wilba's parents as holiday guests over Christmas. Their daughters, Stephanie and Sonia, returned to Ellensburg, Washington, with their grandparents to spend the rest of the school vacation.

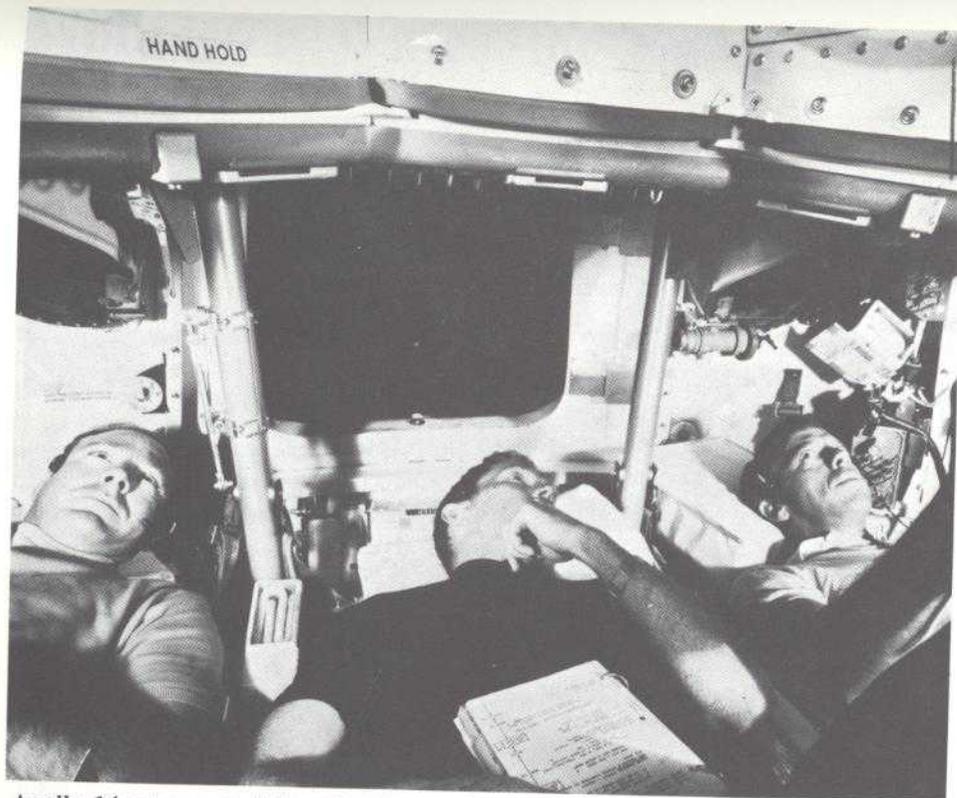
The Darrel Nelsons drove to Seattle to spend the holidays with Darrel's parents.

The Bill Cooks spent the holidays visiting their daughter, Margaret, and son, Dick, in Seattle.

Lloyd Mathews and his wife were surprised by a visit of Lloyd's brother, Wally, from Alaska. They had not seen each other in six years and had a few yarns to spin during his brief visit.

The Jerry Bowes family spent Christmas with friends in Wapato. Their plans to proceed into Oregon to visit relatives were cancelled by the weather.

Bird season was closed due to the snow, giving the local "Nimrods" a rest and time to clean and oil their guns for the spring turkey hunt scheduled in April.



Apollo 14 astronauts Edgar D. Mitchell, left, lunar module pilot; Stuart A. Roosa, center, command module pilot; and Alan B. Shepard, Jr., commander, participate in simulated training in preparation for their lunar mission.

## Satellite Services During Apollo 14 Again Will Include Global Television

On Sunday, January 31, at 3:23 p.m. EST, if all goes according to NASA's launch schedule, Apollo 14 will liftoff from Cape Kennedy and head toward its Fra Mauro landing site on the moon, a quarter of a million miles away. It will be the seventh manned Apollo flight and the third to land on the moon.

As before, INTELSAT satellites and earth stations in the global system will provide a vital link in NASA's Apollo communications network as well as transmission facilities for live television coverage to countries around the world.

COMSAT supports the Apollo flights with two general categories of communications services: voice and data communications between the spacecraft and the Manned Spacecraft Center in Houston, Texas, and live, closed-circuit telecasts of flight operations and crew activities for mission analysis.

Under normal circumstances, NASA releases most of the television service to the TV pool, which makes it available for retransmission for public viewing around the world.

Voice and data communications with the spacecraft will be relayed to Mission Control Center at Houston, through the Goddard Space Flight Center NASCOM Switching Center in Greenbelt, Maryland, via any of several routes:

### Voice and Data

- (1) Reception at the NASA tracking station in Spain, then through the Spanish earth station at Buitrago to the INTELSAT III, F-6, thence to the Etam earth station for relay to Houston by terrestrial facilities.
- (2) Reception at the NASA tracking station on Ascension Island, then through the United Kingdom earth station on Ascension to the INTELSAT III, F-7, thence to the Andover earth station for relay to Houston by terrestrial facilities.
- (3) Reception by the NASA tracking ship Vanguard in the Atlantic Ocean, thence to the INTELSAT III, F-7, and down to the Andover earth station for relay to Houston by terrestrial facilities.

- (4) Reception by the NASA tracking station at Honeysuckle Creek, Australia, thence to the Australian earth station at Moree, up to the INTELSAT III, F-4 satellite, and down to the Jamesburg earth station for relay to Houston by terrestrial facilities.

### Television From The Spacecraft

The INTELSAT satellites are scheduled to transmit live television coverage to the Houston Center of crew activities inside the command module and the transfer of the crew from the command module to the lunar module. The satellites also are scheduled to transmit coverage of two periods of lunar exploration EVA (Extravehicular Activity) I and EVA 2 and of docking maneuvers of the command module and lunar module following lunar exploration.

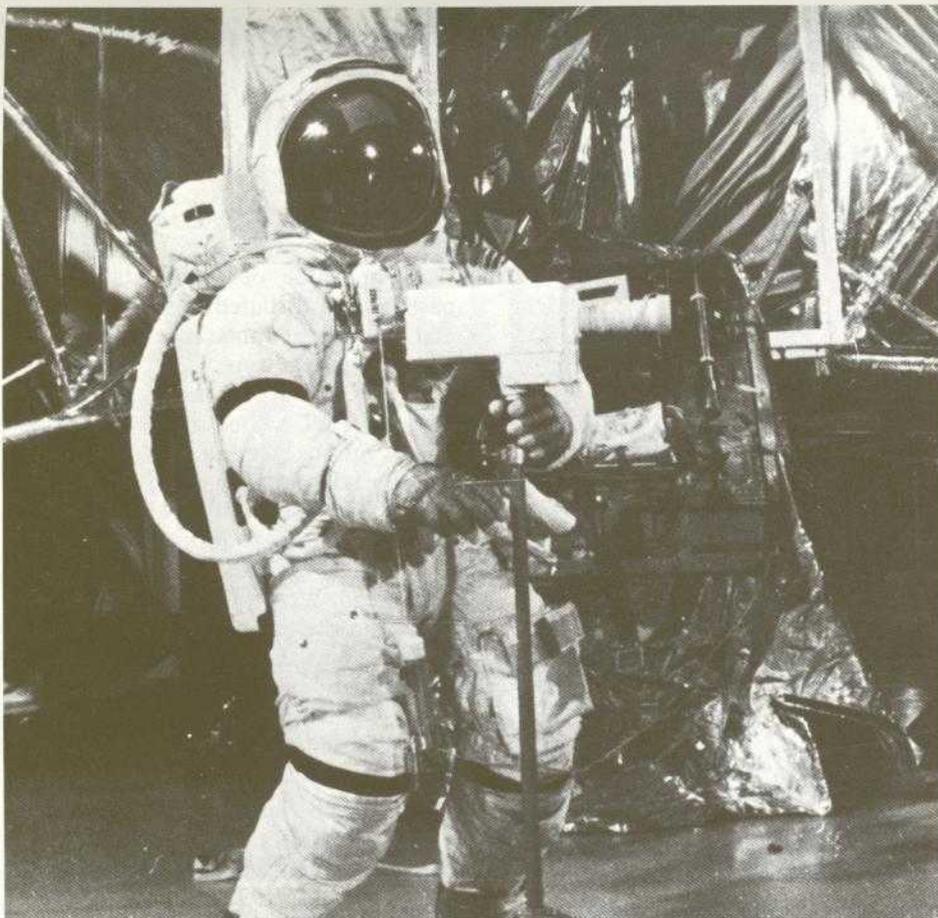
Transmissions will be in color. Both the command module and lunar module will carry color TV cameras with an additional black and white camera in the lunar module. Television signals from the spacecraft that reach the earth via satellite will be transmitted by either of the following routes, depending on which is in line-of-sight with the earth at the time:

**Western Pacific Route:** Transmitted from the spacecraft to the NASA tracking station at Honeysuckle Creek, then to the Australian commercial earth station at Moree, up to the Pacific INTELSAT III, F-4, and down to Jamesburg station, thence to terrestrial facilities for relay to Houston.

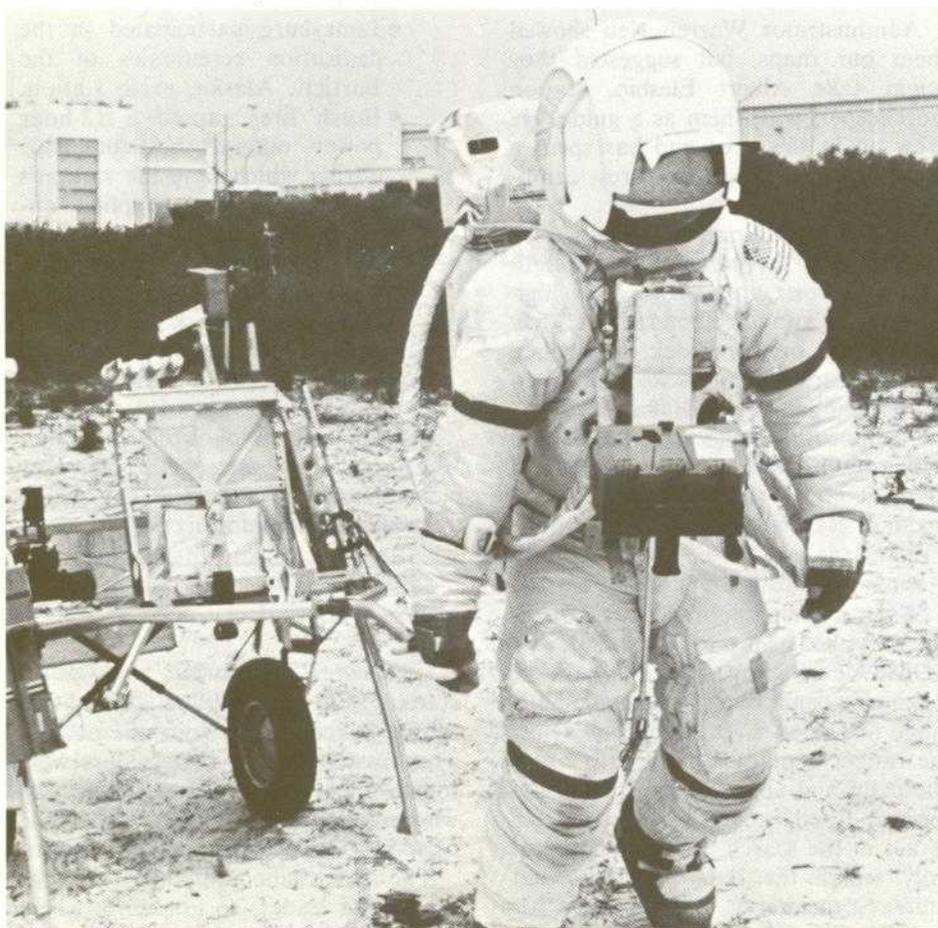
**European Route:** Transmitted to the NASA tracking station near Madrid, thence to the Buitrago station, up to the INTELSAT III, F-6, and down to Etam for relay to Houston by terrestrial facilities.

In addition to the TV that is received by satellite, some TV will be received directly from the moon at Goldstone, California, and relayed to Houston via terrestrial facilities.

Inflight TV coverage, as determined by NASA, will be released to a TV pool at the Manned Spacecraft Center for relay to the TV pool in New York for U.S. distribution and for worldwide distribution via the satellite system.



During a practice session, Astronaut Shepard adjusts the lunar surface color camera to be used for the Apollo 14 mission.



Commander Shepard, participating in lunar surface simulation training, pulls the Modular Equipment Transporter, which carries, among other tools, three cameras for still photographs and TV transmission.

## Apollo 14 TV Schedule

- Sun. Jan. 31, 3:23 pm EST - Liftoff  
 Sun. Jan. 31, 6:28 pm EST - Transposition of vehicles and Docking  
 Wed. Feb. 3, 5:08 am EST - Interior Crew activities and Intervehicular transfer  
 Thurs. Feb. 4, 8:23 pm EST - Fra Mauro landing site  
 Fri. Feb. 5, 9:20 am EST - Lunar surface EVA-1  
 Sat. Feb. 6, 4:54 am EST - Lunar surface EVA-2  
     6:28 am EST - Lunar surface EVA-2  
     9:24 am EST - Lunar surface EVA-2  
     3:14 pm EST - Rendezvous  
     3:29 pm EST - Docking  
 Sun. Feb. 7, 7:53 pm EST - In-Flight demonstration  
 Tues. Feb. 9, 4:01 pm EST - Splashdown

*From Page 8*

## Televised Events

The Apollo 14 liftoff will be covered at Cape Kennedy by each of the major U.S. TV networks as well as by foreign television entities. The TV pool in New York City will distribute live coverage in the U.S. and release live feeds for transmission overseas via the satellite system.

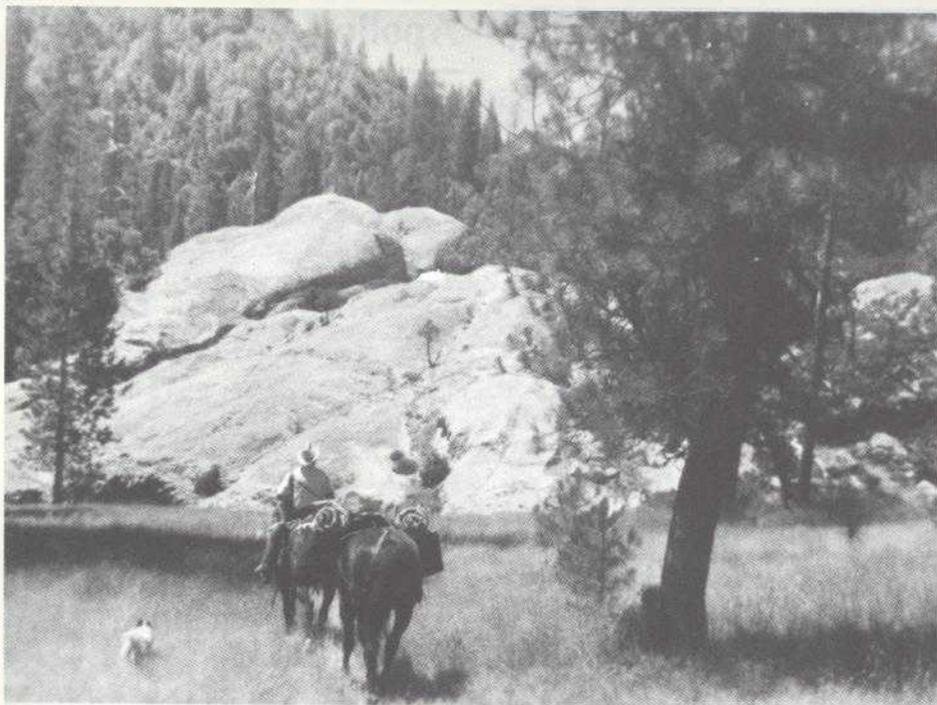
Live television coverage of the splashdown, scheduled in the Pacific Ocean for Tuesday, February 9, will originate aboard the aircraft carrier U.S.S. New Orleans for relay via the III, F-4 satellite to the Jamesburg station, thence to the TV network pool in New York City.

Transatlantic telecasts will be relayed from New York to either the Etam or Andover earth stations for transmission via either the III, F-6 or F-7 satellite to European earth stations. The European Broadcasting Union will distribute the programming in Western Europe. EBU also has an interconnection capability with Intervision to the Soviet Union and Eastern European countries.

Transpacific telecasts will go from New York to the Jamesburg station, thence via the III, F-4 to earth stations in Australia, the Far East, Alaska and Hawaii.

TV coverage for the Indian Ocean region will be double-hopped via either an Atlantic or Pacific satellite and the Indian Ocean satellite.

## Jamesburgers Look at 1970



Al Eleshio, station storekeeper, leaves Pine Valley with his pack mules, supplies and dog in search for the six scouts and their two leaders, who are lost in the Los Padres Forest.

### *Jamesburgers Assist in Rescuing Scouts Lost in Los Padres Forest*

By M. Lee Dorsey

In late autumn, California coastal regions suffered the heaviest rain storms in 17 years. Of the 15 people who became lost in the Los Padres National Forest, six were able to walk out eventually by themselves, eight were rescued, and one did not survive.

The eight who were rescued included six Boy Scouts and their two leaders. The scouts were due to come out of the forest on Sunday, but didn't make it. Monday passed, no scouts. Tuesday passed, and still no scouts.

By that time the storm was severe: rain, high winds recorded by the station at 45 knots, thunder and lightning, and snow at higher elevations.

Concern for the scouts' safety was felt from the San Francisco area to the Monterey Peninsula. Parents of the lost scouts arrived on the scene to help in the search.

#### Parents Aid in Hunt

Two days had passed since the scouts were due to come out of the forest. Because the parents were not familiar with the area and possibly could also become casualties of the storm, they stopped at the district ranger's office for guidance. Ranger Pozzi was already out in the forest, so the ranger's office sent the party of parents to COMSAT to look at our maps of the area.

Administrator Warren Neu showed them our maps, but suggested they might take Albert Eleshio, station storekeeper, with them as a guide. He grew up in this area and has spent a great deal of time in the forest camping and hunting.

Horses and pack mules were readied, and the party started out to scout the river area to see how high the water was and to determine if they could cross on horseback. They then doubled back to Chews Ridge to pick up the ranger. By then dark was almost upon them and they decided to return to the lowlands and await daylight.

#### Rescue Party Grows

When morning approached, the rescue party had grown to include another COMSAT employee, Jimmy Clark, technician, and Bill Wyman, a Sierra guide and packer. On Albert's advice, the ranger contacted the sheriff's rescue team and advised them that if the weather lifted enough for a helicopter to aid in the search, they should carefully search the Buckskin Flats and Sulfur Springs area. This is where Albert Eleshio felt the lost scout party would be waiting.

As Eleshio was leading his search party up in the forest, the weather

A multitude of events during the past year contributed to the operations and life style at Jamesburg.

Among them were:

- Jamesburg was chosen by AT&T as one of the communications facilities to be shown each month to their VIPs.
- Cachagua Valley was suggested as one of the four proposed dam sites by the California-American Water Company. (So far, no site has been chosen.)
- Jamesburg assisted in the operations take-over for the Paulalu-Brewster traffic during a temporary outage at Brewster.
- Representatives of the proposed Israeli earth station visited Jamesburg in preparing plans for their station (to be completed in 1972).
- Jamesburg shared the role of bringing communications through for the Apollo 13 mission.
- Jamesburg participated in the dedication ceremonies of the Bartlett, Alaska, earth station.
- Brush fires caused a 12-hour power outage in September, during which time the station's diesel generator supplied operating power.
- During October, the station blood bank was established for station personnel, and 66 2/3 percent of station employees enrolled in the Thrift and Savings Plan.

Plans in the making for 1971 include JCEA quarterly get together for employees, and the annual JCEA picnic to be held in late June.

started clearing, enabling a Fort Ord Army helicopter to join the search. The six scouts and two leaders were found by the helicopter team just where Albert Eleshio said they would be. All were cold and wet, but unhurt.

The Army helicopter airlifted all the scouts and leaders to Fort Ord, where they received dry clothes and warm food. The Army then dispatched them to their homes in the San Francisco area by Army bus.

## *What's Happening* At Jamesburg

By M. Lee Dorsey

Walter Robinson, facilities engineer, won the station horseshoe tournament again. This makes it a clean sweep for Robbie, who has won both horseshoe tournaments held at Jamesburg.

A COMSAT, AT&T & A.I.S. wives luncheon was held recently at the new Rancho Canada Golf Club. The hostesses were Mrs. Ruby Downey and Mrs. Thelma Neu. Attending were Dorie Ford, Kos French, Barbara Hartke, Timie Inman, Eunice Jodoin, Mamie Nubin, Betty Scheiter, Ruth Stauffer and a special guest, Bess Law.

### Visitors

Eleven AT&T western area managers visited and toured the station. They were part of an AT&T group attending a three-day Managers Meeting in Carmel, California.

Fifteen VIPs from Alameda, California, guests of AT&T and PT&T, toured the station. The VIPs included the commanding officer of Government Island, the president and vice president of the Alameda Chamber of Commerce, the Alameda district attorney, the fire chief, city manager, police chief, city attorney and two city councilmen.

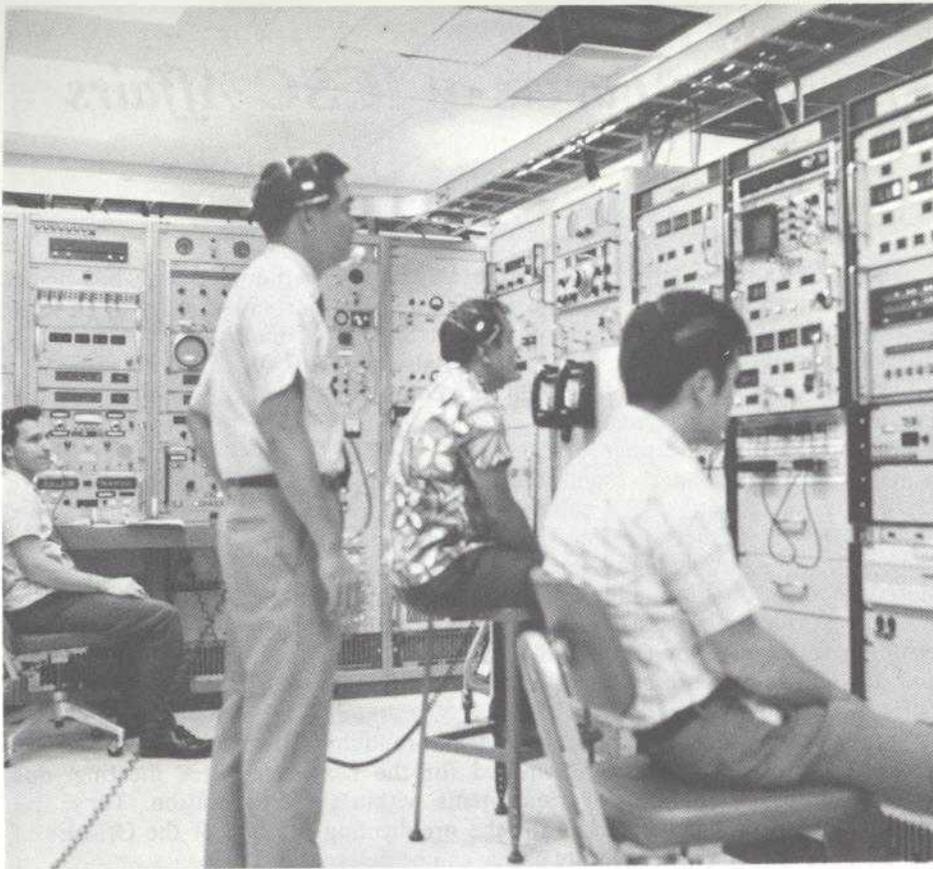
John Woolfenden, columnist for the Monterey Herald newspaper, visited us to acquire current information for the preparation of an article on our station. The published article consisted of a full page of pictures and an up-to-date account of what Jamesburg is doing currently in communications.

### German Scientists Visit

George Durfie of Stanford Research Institute brought as his guests three German scientists and five men from SRI to visit the station. The JCEA invited them to join our weekly barbeque of hamburgers and cheeseburgers.

### 1970 Out With a Bang

Eddie Clarke, maintenance, received a big tax break, just 24 hours before the year-end deadline, when his wife, Stefanie, gave birth to an 8-pound 13-ounce boy at Wahiawa General Hospital. "This is the best Christmas gift ever", explained the beaming new father. It was the first child for the Clarkes. Mother and son are doing well.



Testing TT&C equipment for the INTELSAT IV launch are Paumalu employees, seated left to right, Jack Vollrath, Eddie Miyatake and Paul Koike, all senior technicians, and Ken Yamashita, TT&C supervisor. Similar tests were conducted at all TT&C stations in preparation for use with the Series IV satellites.

## *From Paumalu*

# Extra Satellite Circuits Called Up For Record Hawaii Telephone Calls

The Paumalu Earth Station played a key role in the record number of long-distance telephone calls handled by Hawaiian Telephone Company on Christmas Day. Hawaii residents, visitors and servicemen placed 19,948 long-distance calls on December 25, an increase of 16.6 percent above the previous record, which was set on Christmas Day, 1969.

These long-distance calls went via 281 transpacific circuits, of which 132 were satellite circuits through the Paumalu Station. Twelve temporary satellite circuits were ordered up by AT&T and HAWTEL to handle the anticipated increase in holiday traffic between Hawaii and the mainland.

### Bowl Games 'Via Satellite'

Island TV viewers were treated to nine hours of televised football on New

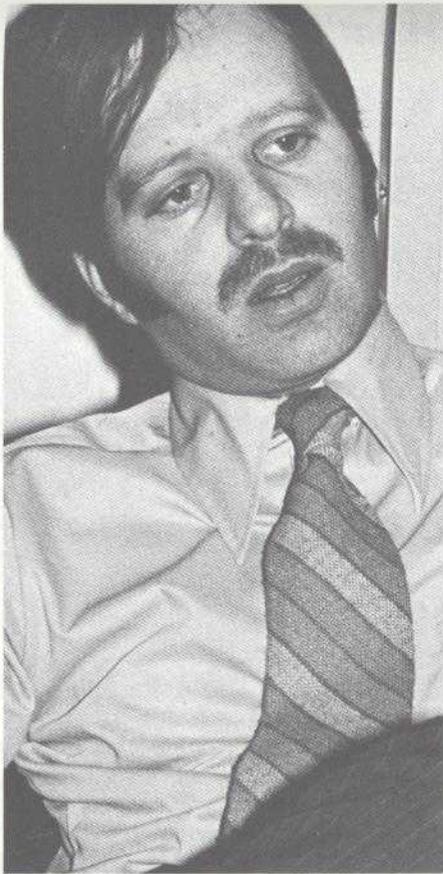
Year's Day. Three bowl games—Cotton, Rose, and Orange—with all the color and pageantry that accompany these games were televised "satellite live", making it possible for thousands of blurry-eyed Hawaii residents to join millions of football fans on the mainland in viewing the traditional games.

The record number of "satellite live" television programs transmitted to Hawaii in 1970 undoubtedly contributed significantly to the local residents' esteem for and familiarity with satellite communications.

### Hawaii - Alaska Circuit

The first satellite circuit connecting the 49th and 50th states was activated on December 30, 1970. The circuit was ordered up by WUI to provide voice service between FAA Alaska and FAA Hawaii.

## *The Many Facets of ICSC Affairs*



As an ICSC staff member, Bill Hutchinson attends ICSC-Finance meetings in addition to his other responsibilities.

The ICSC affairs department of the INTELSAT affairs division has prime responsibility for providing support for COMSAT's participation as U. S. Representative to the Interim Communications Satellite Committee, INTELSAT's governing body. In addition, ICSC affairs also provides support with respect to COMSAT's participation as U. S. Representatives to the ICSC's advisory subcommittees on technical, financial, and contracting matters, as well as the operations representatives meetings.

In carrying out these responsibilities, ICSC affairs staff members prepare U. S. position papers, U. S. contributions, and pertinent briefing material for John A. Johnson, Vice President-International and the U. S. Representative, on subjects to be considered by the ICSC or its subcommittees. In addition, the staff assists Mr. Johnson in his role as Chairman of the ICSC.

Staff members also assist in coordinating with the U.S. Government on the positions to be taken by COMSAT in the ICSC. This includes detailed briefings and debriefings of representatives from the FCC, the State Department, and the Office of Telecommunications Policy.

Staff members draft a preparation memorandum after each ICSC meeting which indicates documentation required for the next committee meeting, due dates, and responsibility for various items within the Corporation. They also coordinate and prepare materials for the pre-meeting briefing of the Officers of the Corporation, so that corporate policy can be determined.

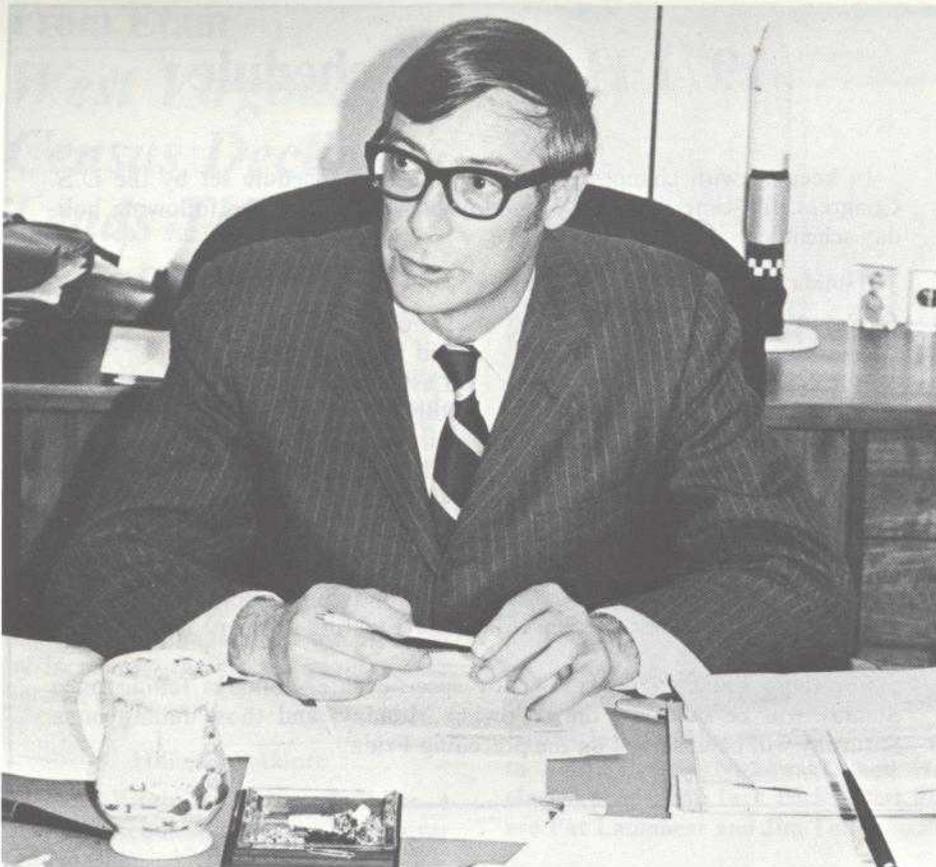
Flexibility is a basic requirement for the staff members, who are called upon to be familiar with each of the detailed and frequently complex items on the ICSC agenda.



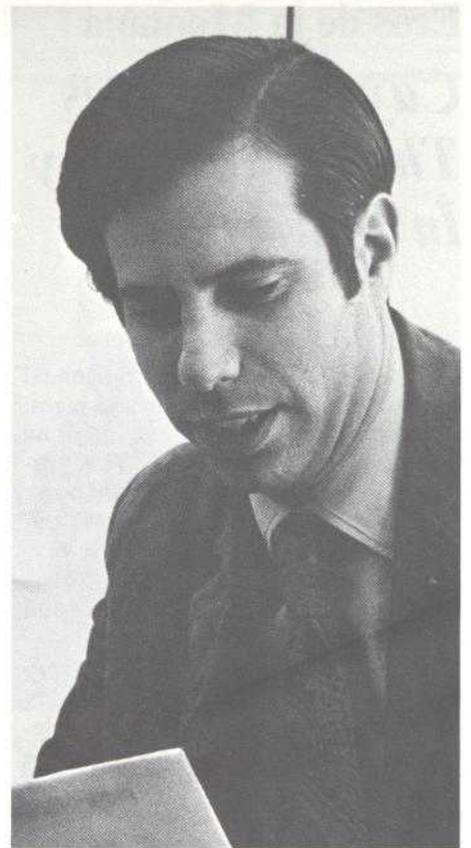
Joe Pelton, manager of the ICSC affairs department, talks over the organization of agenda items with secretary Janet Tingley.



Ronald Letteney, ICSC affairs staff member, reviews technical documents and will in the future act as secretary to the ICSC-Technical Committee.



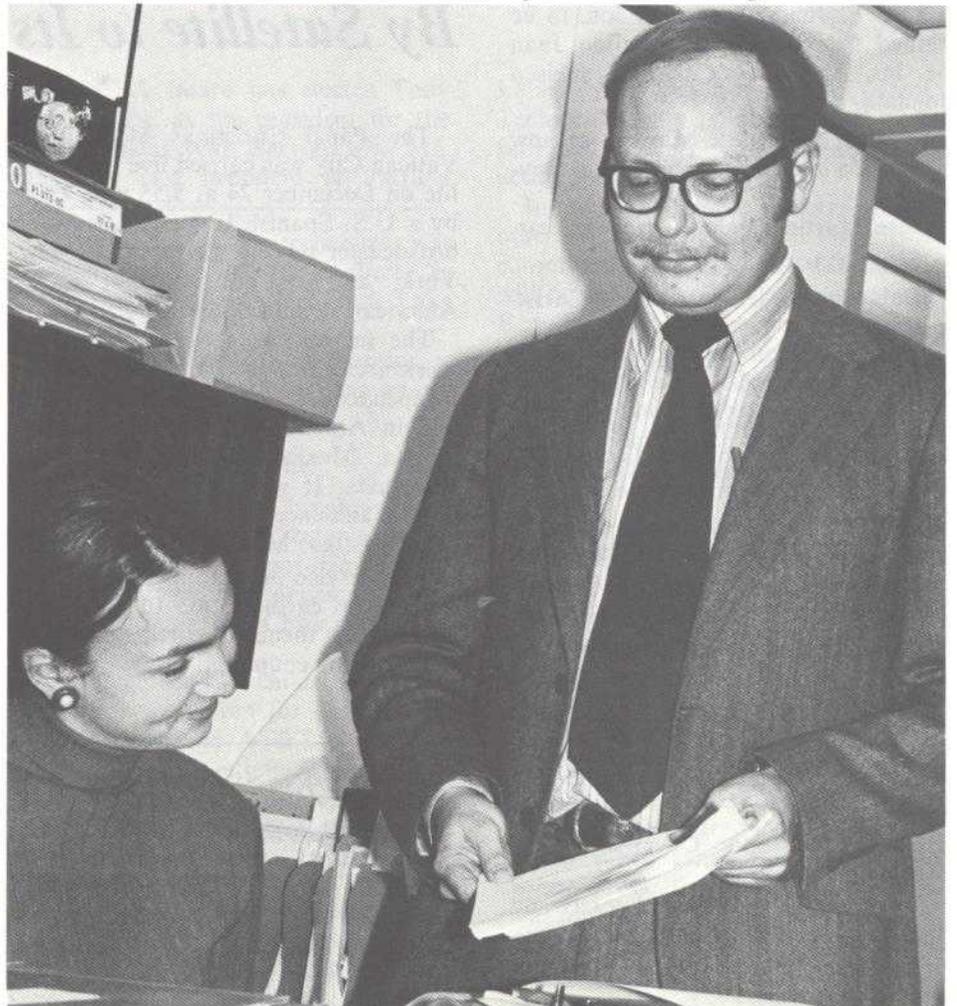
As director of INTELSAT affairs, Robert W. Kinzie oversees the functions of ICSC affairs as well as the secretariat, with his prime responsibility being the smooth operation of INTELSAT meetings.



In addition to responsibilities for agenda and briefing papers, staff member Robert Brown attends operational representatives meetings.



Staff member and former teacher Sigrid Beethan explains the position paper she prepared for the ICSC meeting.



William Snow, the newest member of the staff, discusses an assignment with Susie Lei, secretary, who transferred to Headquarters last fall from the Geneva office.

## Ecos de la Montana *Cayey Observes Three Kings Day In Spirit of Fun*

**By Luis R. Rodriquez**

The Cayey CEA held its annual Christmas party on Saturday night, December 19, at the home of John Gonzalez, club president. The traditional menu of roast barbeque pork, "arroz con gandules", "platanos" and pudding rice was enjoyed by everybody. Door prizes were won by Mrs. E. Castro, Mrs. Elba Medina and Juan Castanera.

Puerto Ricans have always been very fond of Three Kings Day, a holiday connected with Christmas but celebrated on January 6. This year the Three Kings decided to stop at our station. They left the following whimsical wishes for our employees:

Juan R. Castanera: More flooded rivers in which to catch catfish without the aid of traps.

Lee. E. Jondahl: another son, to be named Florencio Hermenegildo Juan de los Apostoles Carlos Francisco Jondahl.

Ada A. Gonzalez: Mastery of how to shift to low gear on the way to Cayey.

Jose Martin Esteban: a reliable car.  
Elfren Castro: an FCC license.

Bob Smith: less expensive Christmas greetings.

Frank Falmar: a paid-off charge account.

Bill Reece: somebody to do his laundry, house cleaning and cooking.

John Gonzalez: an Apache airplane.

Paul McGranahan: two acres of property in which to store all his boats.

Luis R. Rodriquez: Caribbean baseball series title for his beloved Criollos.

Luis Maldonado: his diploma from the P. R. Barber's School.

Arsenio Reyes: a van full of cocolias and catfish caught by Mr. Castanera.

Juan Tirado: a pawn shop at Barrio Arus.

Luis Medina: the Cayey-San Juan expressway.

Jose Carriles: more holiday pay and 56 hours per week of O/T.

Agustin Ferrer: an appointment with Dr. Barnard.

Efrain Flores: celebration of more cachetes.

## 1971 Holiday Schedule

In keeping with changes in the 1971 holiday schedule set by the U.S. Congress, full-time COMSAT employees will observe the following holiday schedule:

Holiday	Date
1. New Year's Day	January 1.
2. Washington's Birthday	3rd Monday in February
3. Memorial Day	Last Monday in May
4. Independence Day	July 4.
5. Labor Day	1st Monday in September
6. Veterans' Day	4th Monday in October
7. Thanksgiving Day	4th Thursday in November
8. Christmas Day	December 25.
9. Floating Holiday	*To be selected by the Corporation

\*At locations other than Headquarters and the Laboratory, the site manager will determine on what date the Floating Holiday will be celebrated.

For those holidays determined by specific date, holidays falling on a Sunday will be observed the following Monday, and those falling on a Saturday will be observed on the preceding Friday.

## *Papal Christmas Mass Is Televised By Satellite to Its Largest Audience*

The Papal Christmas Mass from Vatican City was carried live via satellite on December 24 at 5:55 p.m. EST by a U.S. Spanish language television broadcaster serving metropolitan New York, and stations in eight Latin American countries and Puerto Rico.

The services were seen in the New York area through channel 41, and an independent station in Paterson, N.J., and in Argentina, Brazil, Chile, Columbia, Mexico, Panama, Peru and Venezuela. It was believed to be the largest audience ever to see the Vatican Christmas Mass at one time.

The service was transmitted from the Fucino earth station to an Atlantic satellite, thence to earth stations in the receiving countries.

The Etam, West Virginia, earth station relayed the program to the Paterson station.

## **Members' Shares In Credit Union Will Be Insured**

With the beginning of the new year, the COMSAT Federal Credit Union announced that in the near future each member's account will be federally insured up to \$20,000.

At the close of the 1970 year, the Credit Union had \$800,000 in assets from savings shares, with \$650,000 in loans outstanding.

Also at the year end, the Credit Union had 1,066 members or 85 percent of COMSAT's employees enrolled in its share program.

Office hours have been extended to 10:00 a.m. to 4:00 p.m., Monday through Friday. A complete account of the Credit Union's operations will be presented at the annual shareholders' meeting scheduled for sometime in March.

Otto Irizarry: a promotion to operation supervisor.

Joaquin Lopez: a plush TV repair shop at Plaza Las Americas.

Jimmie Payne: O/T pay while on vacation.

German Ramos: a reinforced back.  
Emilio Rodriquez: a trip to New York for his wife without being hijacked to Cuba.

Juan Sierra: quintuplets.

## From Etam

# West Virginia's Census Decline Leads The Rest

By Deloris Goodwin

The recent federal census report showed West Virginia was leading the nation in the fight against the population explosion. West Virginia was leading with a 6½ percent reduction. Its closest rival, North Dakota, reported a 2 percent reduction. While West Virginia was working strenuously toward this goal, it was shown that California and New York had ignored the population problem and, in fact, had actually compounded the problem by increasing their populations by 22 percent each.

### Hillbilly Folklore

West Virginia hill people have a custom of cooking cabbage, with silver coins inside, which they eat on the first of the year. Anyone finding silver in his cabbage is supposed to have good luck and a lot of money the rest of the year. The hill people are making an urgent plea to the President to revert to purer silver, because the copper in current coins turns the cabbage black.

### Personal Notes

Dave Bulk spent Christmas with his parents, Mr. and Mrs. Henry Bulk, of Kingwood. Dave recently enlisted in the United States Navy and is now attending Aviation Electronics School in Memphis, Tennessee. Dave's father, Henry, is the Etam material control specialist.

Dennis Hobbs, son of Mr. and Mrs. Rupard Hobbs, traveled from Kansas to spend Christmas with his parents. Dennis is serving with the United States Air Force at McConnell Air Force Base, Wichita, Kansas. Prior to his enlistment, he attended a private technical school in computer operation. After his enlistment in the Air Force and completion of basic training, Dennis was given a direct assignment in a supply career field.

Sandy Carroll spent Christmas with her parents, Mr. and Mrs. William Carroll. Sandy teaches American history in Wicomico Junior High School, Salisbury, Maryland.

It seems as though Florida is a favorite vacation spot this time of year. Darrell Riddle and Roper Parsons and their families vacationed in Tampa and Melbourne, respectively.



Discussing plans for the coming year are the members of the 1971 CEA board. Left to right: Beverly Nitkowski, Neil Helm, Kitty Stephenson, Tony Buige (newly elected president), Jack Dicks, Bert Runfola and Bob Cool. Missing from the photo are Pat Lamphear and Jim Tallon.

## CEA Elects New Board for 1971

The CEA Board has elected Tony Buige, Labs, as the president for the 1971 calendar year. Serving with Mr. Buige as vice president is Patricia

Lynn Rector, senior technician, was recently married to Evelyn Fetty in the Mormon Tabernacle in Salt Lake City.

Chester Randolph, administrator, is now back at work after having an ear operation.

### Holiday Parties

The ECEA held its Christmas party on December 4 at the Preston Country Club in Kingwood. Approximately 15 couples attended the delicious buffet served with all the Christmas trimmings.

On December 12 a children's Christmas party was given for the children of COMSAT and AT&T employees. Twenty children attended this party and were shown a movie entitled, "Spirit of Christmas." Refreshments were served and Santa appeared and presented gifts to each. Also, stockings filled with candy, nuts and fruit were given.

COMSAT and AT&T wives held their Christmas party on December 10 at the home of Alix Evans. A gift exchange was the highlight of the party.

Lamphear, Operations. Neil Helm, Technical, again holds the treasurer's post and Beverly Nitowski, Legal, is acting secretary.

In addition to the officers' posts, other board members will chair club committees. Jack Dicks, Technical, will act as the athletic chairman, and Bert Runfola, Finance and Administration, will head the membership committee. Kitty Stephenson, Legal, and Bob Cool, Labs, will share the duties as social chairmen. CEA Clubs and special arrangements chairman for the year is Jim Tallon, Finance and Administration.

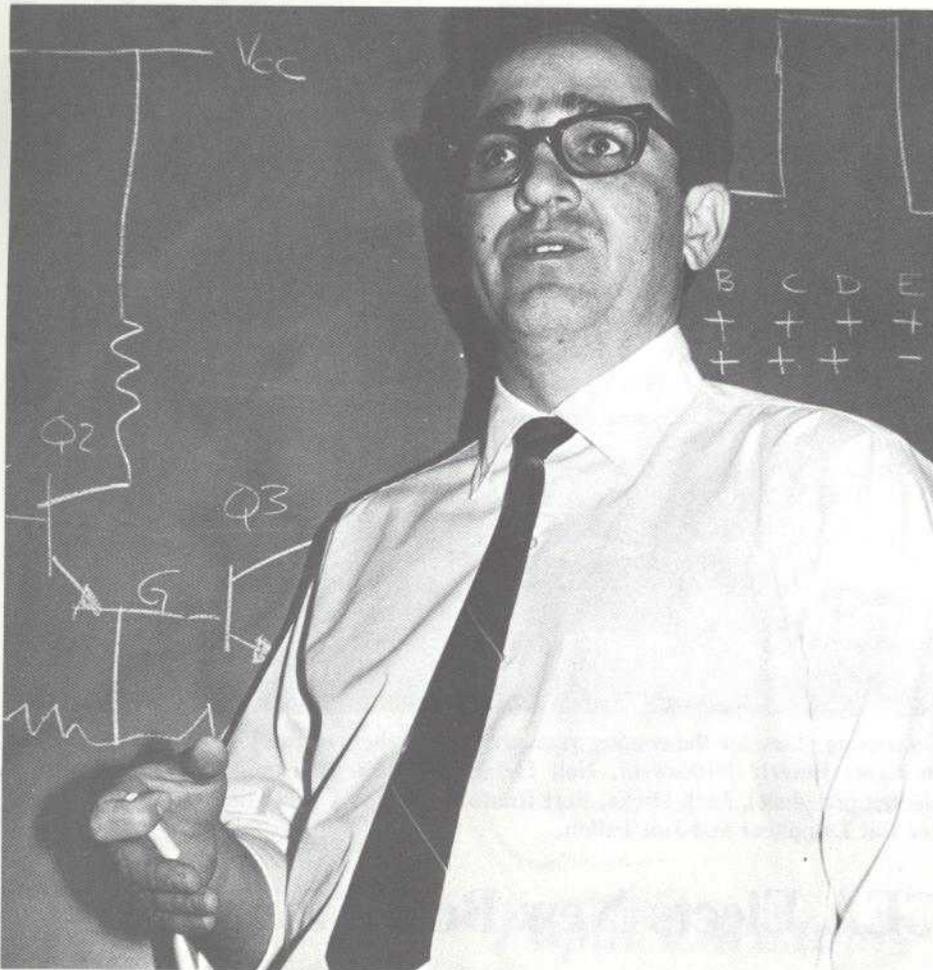
One of the first actions of the 1971 CEA Board will be to initiate the membership drive, which is taking place during the last two weeks of January.

### Girls' Basketball

The CEA's Girls' Basketball Team, the "Long Shots", is off to a one win and two losses start in the basketball season. When asked for a statement for the press, the girls replied, "It's great fun and terrific exercise."

Games are played on Thursday evenings in Georgetown.

Anyone interested in playing should contact Tyrone Ricks, coach, or Joe Bolding, assistant coach.



William Zarecor, operations training group, prepared and instructed digital computer training courses for TT&C personnel.

## *Instructor Goes Long Way to Teach Mini-Computer Course to Employees*

William Zarecor, operations training group, will go to any lengths to get his point across. He did, in fact, go to quite some length—60,000 miles—in preparing and presenting courses on the digital mini-computers to be used in conjunction with the INTELSAT IV TT&C consoles and satellite systems monitoring equipment.

The tracking, telemetry and command consoles are installed for the purpose of monitoring and commanding satellites at four earth stations: Andover, Maine; Paumalu, Hawaii; Fucino, Italy; and Carnarvon, Australia. Mr. Zarecor traveled to each of these stations to present his course to employees who will be using the mini-computer in conjunction with the INTELSAT IV TT&C equipment.

The satellite system monitor (SSM), another piece of equipment to make use of the digital mini-computers, is scheduled for installation at the TT&C stations to monitor power, bandwidth and center frequency of each radio frequency carrier on a

particular satellite to insure that no earth station degrades satellite traffic.

Mr. Zarecor designed and taught the course of instruction, which, while tailored to the needs and capabilities of each class, ran the gamut from basic digital theory to actual operation of computer circuits. It highlighted computer operations from a maintenance standpoint. Basic programming was included to provide analytical insight into maintenance and operational problems.

In preparing the program, Mr. Zarecor attended a two-week programming school in Cupertino, California, in January 1970, and conducted the two-week course at each of the TT&C stations at intervals between May 18 and November 18 last year.

The course represents the operations training group's first venture into a comprehensive digital electronics course and emphasized the move away from contracted training in favor of COMSAT provided training.

## Labs Scientist Honored by AIAA

Dr. Pier L. Bargellini, senior staff scientist at COMSAT Laboratories, has been appointed a member of the AIAA Technical Committee on Communications Systems for 1971.

As a technical committee member, Dr. Bargellini will suggest and organize special conferences and meetings, monitor AIAA publications for quality of technical content, and review proposed technical papers.

The appointment was announced by Ronald Smelt, President of AIAA, the American Institute of Aeronautics and Astronautics.



P. L. Bargellini

## Canadian Co. to Design Power Transfer System

COMSAT, on behalf of INTELSAT, has awarded a contract to SPAR Aerospace Products, Ltd., Toronto, Canada, to evaluate various electrical power transfer methods and to fabricate a model of an optimum design. The \$48,500 contract is to be completed within a year.

## Classified Ads

*Interested in chamber music? If you play the violin, viola, piano or any other instrument suitable for chamber music and wish to join others with similar interests, contact E. Stein-*

# Millimeter Waves Are Being Tested For Satellite Use

experiment to be a part of the NASA ATS-F satellite, which would verify the attenuation models postulated for the U.S.

This experiment calls for 24 small and inexpensive terminals at 12 and 18 GHz to transmit to the satellite. At the satellite, the 12 and 18 GHz signals will be converted to low power 4 GHz signals and transmitted to a large earth station. At this station the individual signals will be separated, recorded and prepared for analysis.

In addition, COMSAT Labs, on behalf of INTELSAT, plans to participate in another millimeter wave experiment on ATS-F, in which two frequencies, 20 and 30 GHz, are transmitted, each one modulated to provide 9 separate signals covering a total bandwidth of 1.5 GHz at each frequency. This experiment is designed to test the usefulness of millimeter waves for the transmission of very wideband information.

COMSAT also plans to participate in the Italian satellite experiment, the SIRIO project. This satellite is designed to measure propagation effects at 12 and 18 GHz, and also to transmit television signals for a systems test. In this experiment, the COMSAT participation will consist of receiving the 12 GHz down link signal.

The availability of hardware at millimeter waves is another important factor that is being considered in the evaluation of the usefulness of these frequencies. COMSAT is actively engaged in evaluating available components operating at frequencies up to 30 GHz, and also is designing hardware needed for use in communications satellites, such as oscillators and mixers. COMSAT Labs plans to build the transponder for the proposed propagation experiment on ATS-F.

The indications from the hardware studies are that reliable systems can be built at millimeter waves now, but that research and development is needed to select the optimum components for specific applications and to improve the efficiency and reliability of available ones.



Three-year-old Sarah Corcoran of Phoenix, Arizona, was caught napping with her COMSAT shareholders' report safely tucked away. Her parents, Mr. and Mrs. Robert Corcoran, took the picture when they discovered their daughter had taken her mail (Sarah is a stockholder) to read in bed.

## News of People At Headquarters

Having problems getting your plants to grow? Bob Matthews may be just the man you've been looking for to give you some life saving hints.

Bob received a philodendron from a friend a year ago last August, and he has been treating it with tender loving care ever since. The results? The plant has just about taken over his entire office.

"There's really a method to the madness of getting these plants to grow," he said, "and it isn't feeding them leftover Coke and coffee."

Whatever Bob's method is, it works.

### Personals

Jim Potts, earth station implementation division, was married on December 19 to Sylvia Graff.

Sandy Gordon, information office, is engaged to Willy Wallace of Washington, D.C. A June wedding is planned.

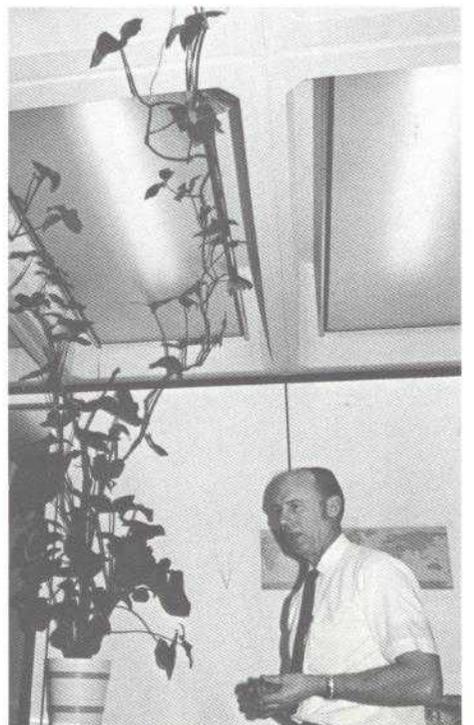
Larry Devore, assistant general counsel for regulatory matters, and wife, Terry, are the parents of David, born December 25. He is their first child.

Millimeter waves will present the needed additional communications capability for communications satellite systems, but some of the systems parameters must be further refined and possible difficulties analyzed and problems resolved to make the optimum use of these new frequency bands. COMSAT is actively working on all known aspects of the technology and physical phenomena affecting the utilization of millimeter waves for satellites communications.

Carl Schmitt, Technical, and wife, Sue, announce the birth of their first child, Elizabeth Lindsey, born December 11.

Jim Tallon, Finance, and his wife just missed adding a tax exemption to their 1970 return. Kerry Patrick, their first child, was born on January 1, 1971.

In case you haven't heard, Wes Costin has gone and done his own thing. He left COMSAT Labs a couple months ago and is making a big splash in Louisville, Ky., where he's writing country and western music.



Bob Matthews shows off the product of his plant wizardry.



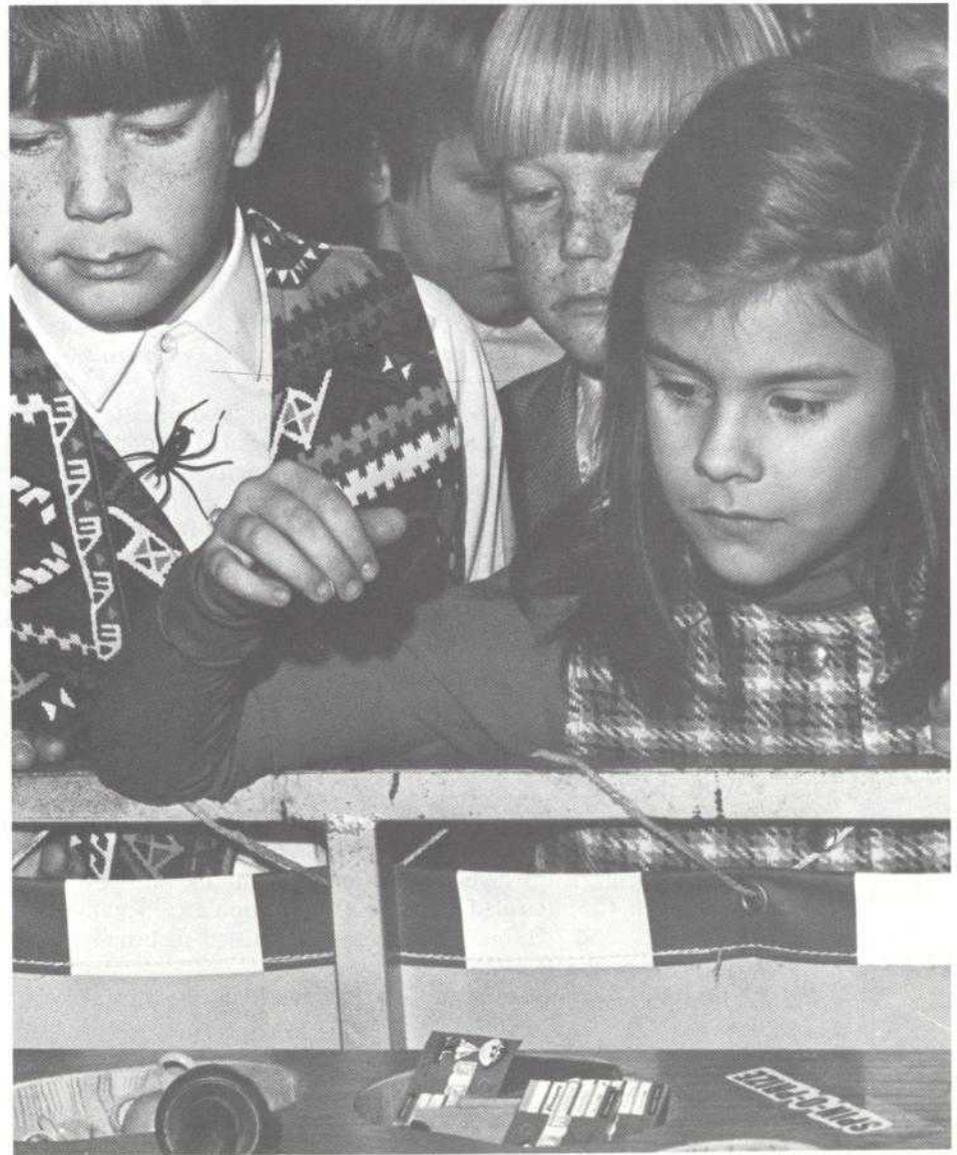
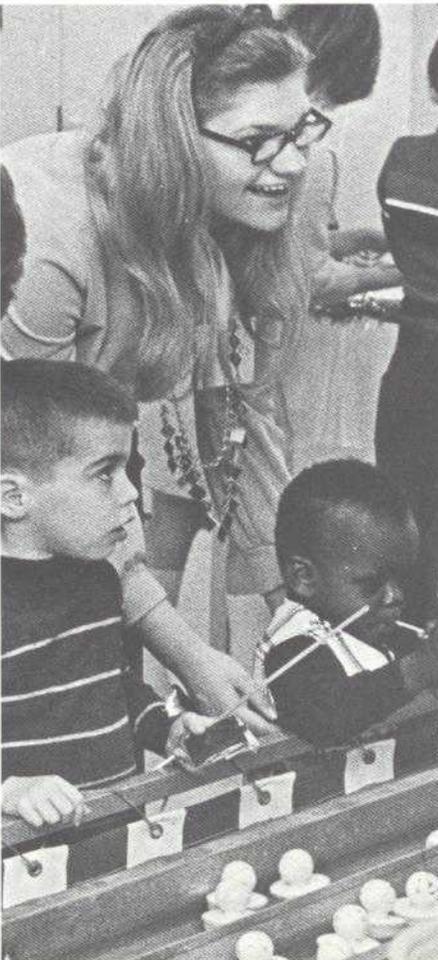
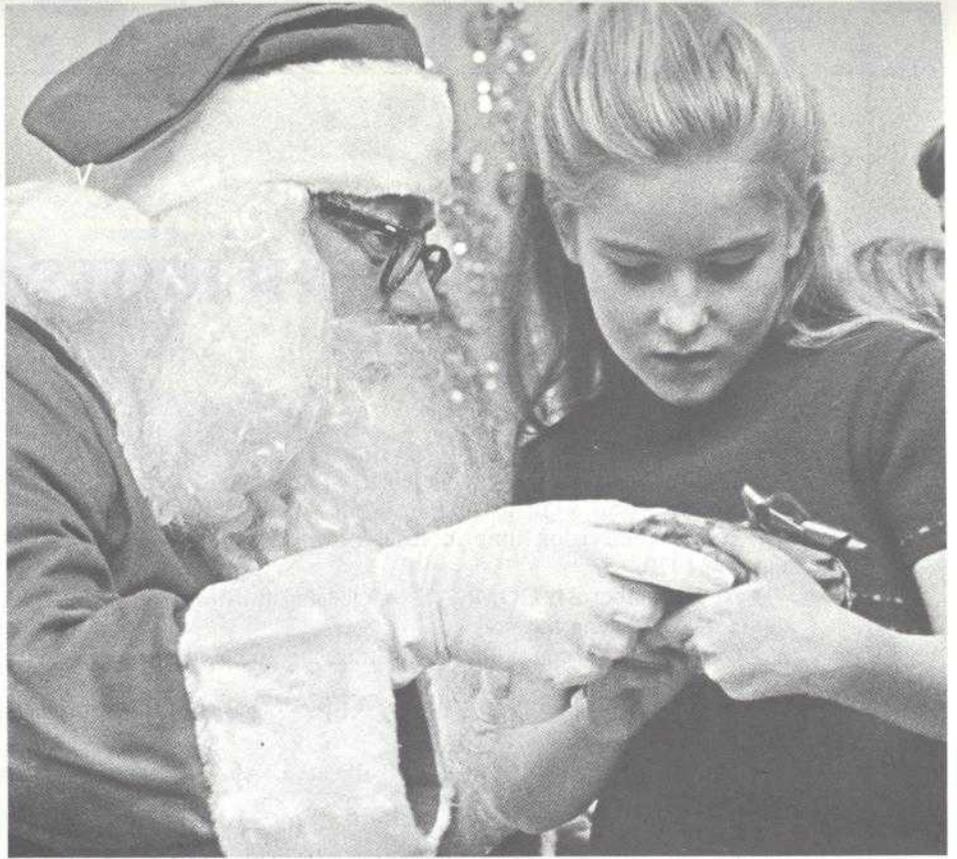
## About 200 Attend Holiday Party

*On December 19 the children of Headquarters and Labs CEA members were the guests at the children's Christmas party. Ice cream, cookies, and Cokes were served. Wilson Fun Services provided three hours of enjoyment for the children prior to the arrival of Santa Claus.*

*At 3:00 p.m., Santa arrived in his red Mustang, bearing presents for the children, who played with the gifts and swapped toys during the party.*

*Gratitude was expressed to the committee, to Santa and to others who helped to make the party great fun.*





## SOME HIGHLIGHTS OF 1970

- Commercial use of the satellite system continued to increase. At December 31, all users around the world were leasing full-time 4,388 equivalent half circuits, a gain of 1,396 during the year. Global television time increased from 1,826 half-channel hours in 1969 to 2,427 half-channel hours in 1970.
- At December 31, COMSAT was leasing full-time to its customers 2,139 equivalent half-circuits, a gain of 704 during the year.
- COMSAT revenues, net operating income and net income showed strong gains throughout the year.
- A milestone was reached by COMSAT when the Board of Directors, on October 16, declared the Corporation's first dividend.
- The Bartlett Earth Station at Talkeetna, Alaska, was inaugurated on June 30 and began commercial service on July 1.
- Construction began on a new 97-foot antenna at the Andover Earth Station to replace the horn antenna and radome through which was provided the first U.S. commercial satellite service.
- Ten new foreign earth station antennas were added to the global system. These, with the Bartlett station, increased the number of antennas in the system to 51.
- The INTELSAT III, F-6, was launched successfully on January 14 and placed in service over the Atlantic Ocean.
- The INTELSAT III, F-7, was launched on April 22. Despite launch vehicle underperformance, the satellite was raised to synchronous altitude and placed in commercial service over the Atlantic Ocean.
- The INTELSAT III, F-8, was launched into satisfactory transfer orbit on July 23, but was lost on July 24 during the apogee motor firing.
- The first satellite in the INTELSAT IV series was delivered to Cape Kennedy for prelaunch checks and tests.
- Membership in INTELSAT increased by seven to a total of 77. The new members were Dominican Republic, Trinidad and Tobago, the Congo, Yugoslavia, Zambia, Senegal, and Ecuador.
- COMSAT completed an agreement for U.S. domestic satellite services with American Telephone and Telegraph Company, and filed a related application with the Federal Communications Commission for two large satellites whose capacity would be leased to AT&T. COMSAT also advised the FCC that it would file a proposal for a second U.S. domestic system to serve other users.
- James McCormack retired as Chairman of the Board of Directors and Chief Executive Officer. He remains a director. The Board of Directors elected Joseph H. McConnell as its Chairman; and the title of Chief Executive Officer was abolished. Dr. Joseph V. Charyk continues as President.
- James J. McTernan, Jr., was elected Vice President-Finance and Administration, succeeding A. Bruce Matthews, who resigned to join another corporation.
- Siegfried H. Reiger, who guided development of the global system as COMSAT Vice President-Technical, died in June.
- Richard R. Hough and George S. Beinetti were elected as Series II directors, replacing Harold M. Botkin (now deceased) and Douglas S. Guild.
- With the sale of Series II shares by General Telephone and Electronics Company and RCA Global Communications Inc., the percentage of COMSAT shares held by communications common carriers decreased from 36.8 at the beginning of the year to 30.8.
- In a trademark infringement action brought by the Corporation, the U.S. Court of Appeals for the Fourth Circuit ruled that the Corporation's tradename and trademark, "COMSAT", is a "strong mark" and "famous name" and is entitled to broad protection. The U.S. Supreme Court refused to review the decision.
- COMSAT initiated a Thrift and Savings Plan, open to all regular full-time employees after six months of service.