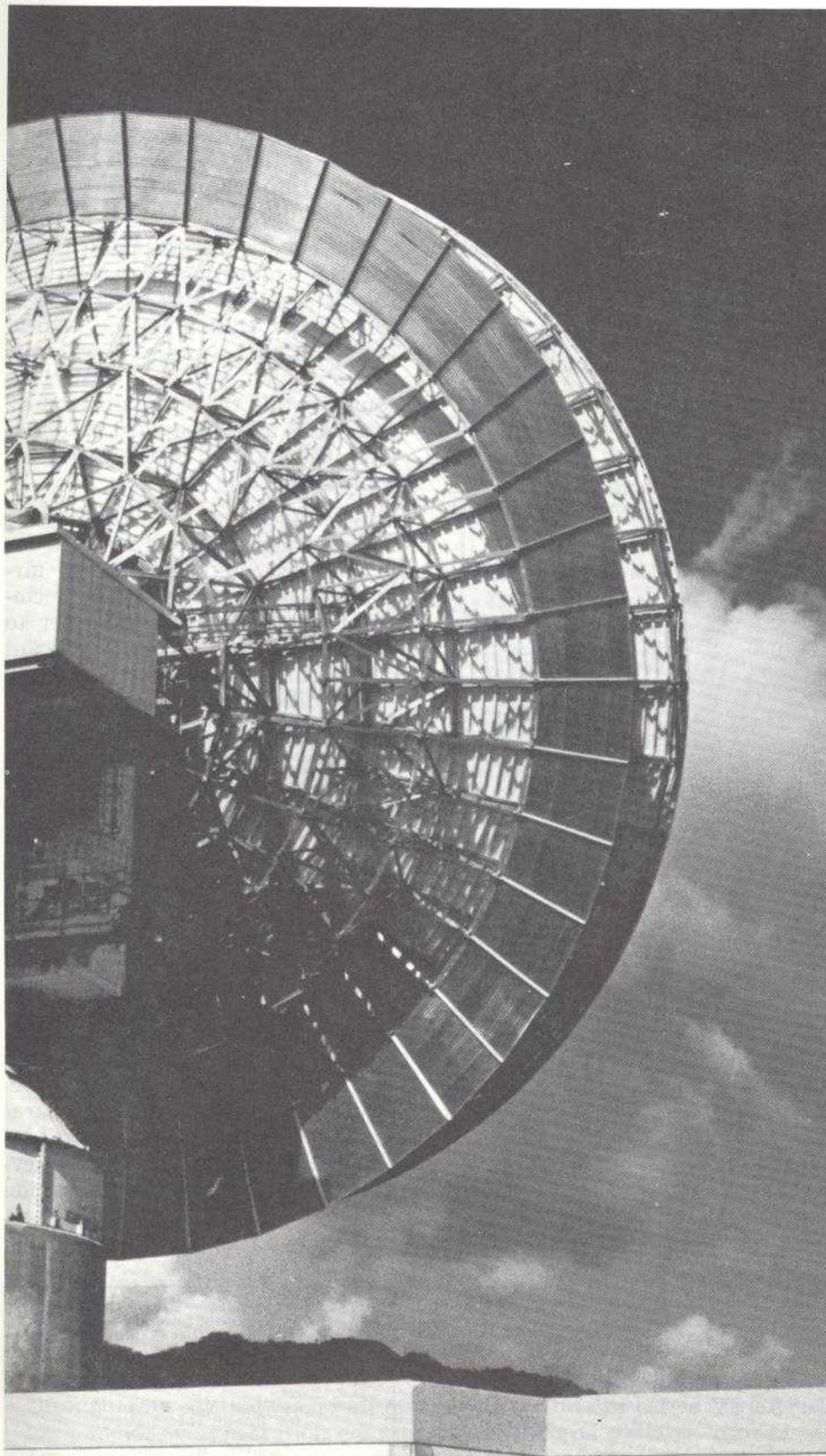


COMSAT NEWS

November 1969



Earth Stations Evolve Toward 4th Generation

Communications satellites because they are part of the Space Age, have attracted much public interest. It is widely known that great strides have been made in developing satellites providing greater communications capabilities at much lower cost per available circuit.

There is less awareness, however, of the significant progress that has been made in the design and operation of the earth stations which comprise the land-based portion of the satellite communications system. Without earth stations, a communications satellite is useless.

Station Evolution

The "early bird" among U.S. commercial satellite earth stations is at Andover, Maine. It was designed and constructed by AT&T in 1961-62 as part of the TELSTAR program and constituted a substantial step forward in communications technology, extending the latest proven technology of conventional terrestrial microwave relay systems and adding a number of advanced developments such as the maser, the high-power traveling-wave tube transmitter, and FM demodulators that employed feedback principles.

The Andover station had an initial capability of establishing a small group of telephone circuits to a single foreign earth station or one TV channel.

A "second generation" design was employed in the Brewster, Washington, and Paumalu, Hawaii, stations which COMSAT completed in November 1966. These two almost identical stations employed more advanced equipment, including many compact solid state designs. The Brewster and Paumalu stations initially had the ability to

Next Launch is Tentatively Planned; Vehicle to Carry 3rd-Stage Telemetry

The next launch in the INTELSAT III series has been tentatively planned for no earlier than December.

The investigation which followed the COMSAT/INTELSAT launch failure on July 25—although the findings have not been announced—has confirmed preliminary indications that the failure resulted from a malfunction in third-stage firing of the Delta launch vehicle.

The next launch will be the sixth in the INTELSAT III series and is intended to emplace a second Series III satellite over the Atlantic Ocean.

A seventh launch in the current series, now planned for sometime early in 1970, also is intended to emplace a Series III satellite over the Atlantic.

Success with the INTELSAT III F-5 and F-6 missions would permit the present Series III satellite over

the Atlantic to become an in-orbit spare. The present satellite, which went out of service during July as the result of a thermal-related problem, has provided fully satisfactory full-time service since it was restored to duty early in August.

Delta vehicles have compiled a long and impressive record for reliability as the workhorse of the U.S. space program. However, three of the past 15 Delta launches have resulted in failure. These failures and the preliminary indicated causes were:

- Sept. 18, 1968, INTELSAT III F-1, malfunction in first stage pitch rate system
- July 25, 1969, INTELSAT III F-6, third stage malfunction
- August 27, 1969, Pioneer E, first stage hydraulic system failure.

A NASA failure review team, which includes COMSAT represent-

atives, is thoroughly investigating these failures.

For the next COMSAT/INTELSAT launch, third-stage telemetry will be added to the Long Tank Delta vehicle.

The absence of third-stage telemetry made it more difficult to determine the cause of the COMSAT/INTELSAT launch failure on July 25.

Up until now weight and cost considerations have ruled against the installation of third-stage telemetry on a regular basis.

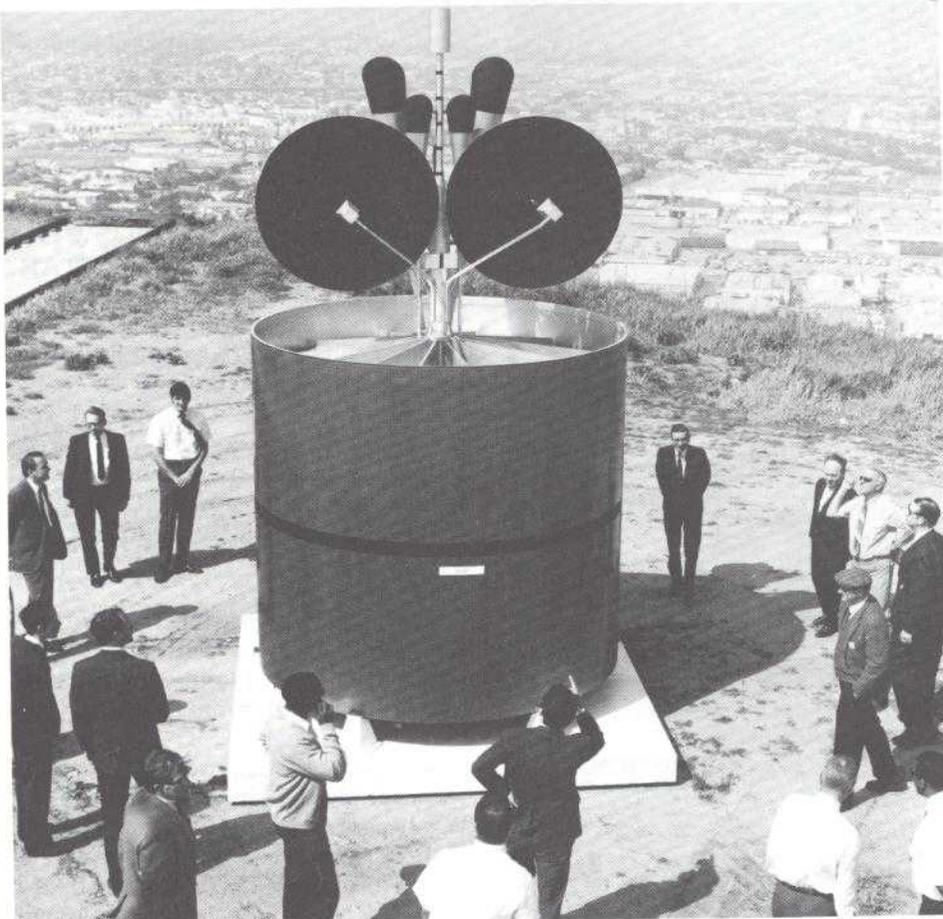
But the trajectory—or flight path—for the next launch has been modified to eliminate these cost and weight disadvantages.

The modified trajectory will permit the acquisition of second and third-stage telemetry by an Ascension Island station during critical phases of flight and also will permit a higher payload, easily accommodating the approximately 12 pounds of added payload resulting from the addition of the telemetry equipment.

With Ascension receiving the telemetry data, there is no need for a specially-equipped ship or airplane to be on station in the vicinity of the flight path in order to receive the data. This significant cost factor has been eliminated by the modified trajectory.

Other advantages of the new flight path are that it will improve "visibility" of the satellite by INTELSAT's tracking, telemetry and command stations while in the transfer orbit. The transfer orbit resulting from the new trajectory also will be somewhat more advantageous for subsequent injection into synchronous orbit.

The telemetry data planned for the third stage on the next launch will provide information on engine chamber pressure, third-stage accelerations and spacecraft separation. The actual equipment will include a pressure transducer, several accelerometers, two separation switches, a small transmitter, a battery and four probe antennas.



Engineers at Hughes Aircraft Company, El Segundo, Calif., take a close look at a full-scale model of the INTELSAT IV series satellite with its newest antenna configuration. The high-capacity satellite is planned for launch beginning in late 1970 or early 1971.

November 1969—Year 4, No. 3
COMSAT News is published monthly for employees of the Communications Satellite Corporation by the Information Office COMSAT Building, 950 L'Enfant Plaza South, S.W., Washington, D.C. 20024.

Assistant Vice President
for Public Information:
Matthew Gordon
Editor: Kay Smith

Their First Five Years



William Young



George Dill



Frances Baxter



Nellie Brooks



Andrew Werth

From Page 1

Earth Stations Evolve Toward 4th Generation

establish telephone circuits to two distant earth stations, plus the capability of one TV channel.

A "third generation" design came into operation during 1968 and 1969 at four locations: Etam, West Virginia; Cayey, Puerto Rico; Jamesburg, California; and the second antenna at Paumalu, Hawaii. This design employs a larger antenna and fully redundant, mostly solid-state, electronic equipment which automatically switches to backup equipment if the on-line equipment should malfunction.

The stations yield almost perfect reliability, with high-capacity communications links to many distant stations. The Etam station, for example, was handling more than 550 full-time circuits between 12 different overseas stations by September of this year, plus TV programming.

A "fourth generation" station is now under construction at Talkeetna, Alaska, for a total cost of approximately \$4.5 million. Completion is scheduled for July 1970. While initial traffic requirements do not dictate a capacity as large as the Etam station, the Alaskan station will employ the latest in electronic equipment design including much use of integrated circuits.

Thus, over less than a decade, earth stations have evolved through four distinct generations, each successive generation characterized by lower unit costs, greater

Earth Station Development

The number of earth stations in the commercial INTELSAT system has grown at a record pace this year. By late October, 15 new station antennas had gone into service—the greatest number in any single year.

A box score showed 33 earth stations in the system, equipped with 35 antennas, located in 22 different countries. By the end of this year, this is expected to grow to 37 earth stations, with 42 operational antennas, in 24 different countries. This data is kept up to date by the Analysis and Traffic Division of Operations.

When a new earth station opens later this year in Morocco, satellite communications will reach directly to every major continent of the world.

New earth stations which already have come on the air this year include: (Atlantic basin) Argentina, Brazil, a new antenna at Mill Village in Canada, Lebanon, Iran, Peru, Etam, West Virginia and Cayey, Puerto Rico; (Pacific basin) Hong Kong and Carnarvon #2, Australia; (Indian Ocean basin) Bahrain, Kuwait, Indonesia, and Yamaguchi, Japan. The old antenna at Goonhilly Downs was switched to Indian Ocean service, from the Atlantic, this year.

According to the latest October figures maintained by Director Walter Temple and Analyst Robert E. Carl of the Traffic Department, 7 more station antennas are expected to be in service this year. They include a second antenna at Pleumeur Bodou in France, Morocco, Republic of China, Guam, a second antenna at Sri Racha in Thailand, a second antenna at Raisting in West Germany, and a new station at Ceduna, Australia.

capabilities and higher reliability.

International Trends

This same process, which might be called aggressive evolution, has been apparent in the construction of earth stations by the foreign partners of the U.S. in the worldwide INTELSAT system. Early foreign earth stations could be roughly equated to the "Andover generation" in terms of construction cost, manning requirements and communications capabilities. The more recent stations bear much similarity to the third and

fourth generation station designs by COMSAT.

As manager of the INTELSAT system, COMSAT has played a major role in the development of technical specifications for satellite earth stations. In addition, COMSAT has provided technical advice and assistance in earth station construction under contract to 14 foreign countries.

COMSAT predicts a continuation of the favorable trend in future earth station capabilities and costs.



Participating in the ceremonies at the British Embassy were (left to right) Henry Eggers, Managing Director of Cable and Wireless, British Ambassador John Freeman, Dr. Joseph V. Charyk and NASA Administrator Dr. Thomas Paine.

Hong Kong Earth Station Dedicated, Live Broadcast Initiates Service

Live television programs were exchanged between Washington and Hong Kong to officially inaugurate Cable and Wireless, Ltd's new earth station on the Stanley Peninsula in Hong Kong.

Depending upon where you sat, the ceremony was held the evening of September 23, Washington time. In Hong Kong, across the International Dateline, it was after breakfast the morning of September 24.

Guests gathered in the amphitheatre in the British Embassy in Washington, where color TV cameras and a large screen projector were set up. In Hong Kong, the ceremony was held in City Hall, and the inaugural program was also relayed to home TV viewers in Hong Kong.

Greetings Exchanged

Speakers for the Washington portion of the televised inaugural included Henry Eggers, Managing Director of Cable and Wireless; British Ambassador John Freeman; COMSAT President Joseph V. Charyk and NASA Administrator Thomas Paine.

Mr. Eggers pointed out that the \$6 million Hong Kong station was built to withstand winds in excess of 200 miles per hour. In fact, he noted, Typhoon Shirley passed directly over Hong Kong with winds of 120 mph during construction of the station last year.

In complimenting COMSAT, Mr.

Eggers noted that a British journal, "The Economist," had commented only last month that, "The Communications Satellite Corporation has been magnificent in getting a world satellite system going."

Dr. Charyk congratulated Cable and Wireless and others who participated in bringing the new Hong Kong station into operation. "This is a significant event in communications progress," he said. "I am proud to extend to you best wishes on the inauguration of this new facility."

Dr. Paine also extended his congratulations, and narrated brief portions of a film on the Apollo 11 moonlanding mission.

From Hong Kong, Sir David Trench, Governor of Hong Kong, and Col. Donald McMillan, Chairman of Cable and Wireless, sent greetings. News films also were exchanged between the two points during the ceremony.

Expanding International Channels

The Hong Kong station, Mr. Eggers said, will establish channels with the U.S., Japan, Australia and Thailand. Service to other areas will be added during 1970-71, in-

COMSAT Savers!

The COMSAT Federal Credit Union is moving rapidly towards becoming a half million dollar (\$500,000) corporation by year end. Loan demand is consistently exceeding share purchases, however; and Credit Union officials are hopeful that members will increase their share purchases. The anticipated dividend, payable in early January, is at a 5½% annual rate. Close to \$10,000 in dividends will be distributed at that time—make sure you get your share.

69th INTELSAT Member

Participation in INTELSAT increased to 69 nations on September 10 with the accession by the Ivory Coast to the Interim and Special Agreements.

The Ivory Coast participant is the Ministry of Posts and Telecommunications of the Republic of the Ivory Coast. It has an investment quota of .1 percent.

cluding New Zealand, South Korea, South Vietnam and Hawaii.

Cable and Wireless owns and operates an earth station on Ascension Island. In addition to a second antenna at Hong Kong, the company has announced plans to construct two stations in the Caribbean area, and an associate company of Cable and Wireless is building a station near Nairobi in East Africa.

Dr. Charyk also participated on October 3 in the inauguration of satellite services between the United States and Argentina. Speaking on a telephone link from his Washington home to Buenos Aires via the Atlantic INTELSAT III, Dr. Charyk sent congratulations to Argentina, ENTEL and "all those associated in bringing into operation your magnificent new earth station in Balcarce.

"I salute you on this important occasion," Charyk said. "We at COMSAT extend best wishes."

Mr. Oscar R. J. Dietrich, ENTEL, spoke from Buenos Aires to Dr. Charyk and Mr. Harold Botkin of AT&T in New York City during the exchange. Col. Dietrich praised COMSAT as the creator and promoter "of this new telecommunications era."

News of People At Headquarters

By Laura Weldon

Betty Glazer, Technical, left the Corporation to join her husband in Japan where he teaches. She plans to come back to COMSAT when they return to the States.

Donna Dargitz was given a going away luncheon at the Showcase Restaurant by her co-workers. She has left COMSAT to join the General Research Company.

Ralph Hill, Mail Room Manager, and his wife are beaming with pride about their oldest daughter, Diane, who graduated from Brawley High as an honor student. Diane is entering the School of Mathematics at North Carolina State University in Raleigh.

Wesley Coston, COMSAT Labs, has written several songs and presently one of his songs entitled "Darling I Cried," sung by the Louvin Brothers is Number 8 on the Country & Western best sellers list. This success, however, is not the first for Wesley. He tells me that 4 years ago he had a record out that did not reach the best sellers list but was a money maker for him.

Another COMSAT employee breaking into the entertainment field is Sandra Gorelli. Sandra sings Rhythm & Blues and she's looking forward to cutting a record in the upcoming weeks.

Emogene Madison, First Floor Receptionist, went to New York City for Tom Jones' opening night at the Copacabana.

Baby boys were born to the Richard Grangers, Technical, and the Ron Jennings, Technical. Congratulations to the Grangers and Jennings.

Lydie Hull, the Chairman's Secretary, vacationed in Paris, France until the middle of October, when she returned to work.

Mary Lane, Technical, just returned from vacationing in Spain. One of the highlights of the trip was the bullfight in Madrid and the flamenco dancers. Mary said she was able to communicate with the people, thanks to the Spanish course given at COMSAT.



Don Chontas, COMSAT UGF Chairman, explains campaign goals to James T. McKenna, Information.



Emogene Madison, Receptionist (upper), and Sharon Finley, Personnel, will be on hand to answer questions about UGF.

COMSAT Joins UGF Campaign 'Give More for a Better Community'

COMSAT employees and their families will be asked this month to help the United Givers Fund meet the expanding goals set for the Metropolitan Washington fundraising campaign.

In order to meet the demands on the 151 UGF agencies, the goal for this year's fundraising campaign has been set at \$16.2 million, an increase of \$4 million over the \$12.2 million collected last year.

The UGF agencies provide the widest possible variety of services to the residents of the District of Columbia and seven surrounding communities in Maryland and Virginia. These services range from adoption programs, care for the aged, hospital and clinic care to disaster relief, blood programs, family counseling, legal assistance, and recreational planning for parentless youth.

The COMSAT/UGF campaign has received the endorsement of both James McCormack, Chairman, and Dr. Joseph V Charyk, President. The theme for this year's campaign is "Give more. Get back a Better Community." The concept behind the campaign is for employees to contribute as COMSAT families rather than as individuals to the fund drive.

The chairman for the program is Don Chontas, Personnel. As chairman, Mr. Chontas developed an organized publicity and promotion program for the employees' convenience. The program includes distribution of information to the employees' homes and a simple contribution return process.

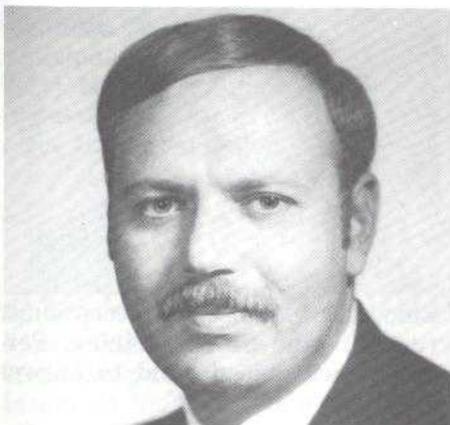
Again, as last year, there will be a UGF information center located in the lobby of the L'Enfant plaza building. Any questions that arise concerning the campaign can be answered by a visit to the Center or call 554-6661.

It is hoped that during the COMSAT UGF campaign our families will give what they consider to be their fair share toward making the drive a successful one for UGF and Metropolitan Washington.

Assistant Vice Presidents are Elected



William H. Berman



Richard R. Colino



Matthew Gordon



Sidney Metzger

The COMSAT Board of Directors has elected eight key management personnel to the new rank of Assistant Vice President.

The promotions were announced to the staff on October 20 by Chairman James McCormack in a notice accompanied by the press release which said:

This action (the elections) followed the recent consolidation and streamlining of the COMSAT headquarters organization, under which is created a new Office of Management Review and Coordination reporting to the President, Joseph V. Charyk, and the responsibilities of two Vice Presidents, Lucius D. Battle and A. Bruce Matthews, are broadened.

The newly elected officers of the corporation are as follows:

William H. Berman, Assistant Vice President and Associate General Counsel.

Richard R. Colino, Assistant Vice President—International.

Matthew Gordon, Assistant Vice President for Public Information.

Sidney Metzger, Assistant Vice President and Chief Engineer.

Lewis C. Meyer, Assistant Vice President for Management Review and Coordination.

Joseph H. O'Connor, Assistant Vice President—Finance and Administration.

Wilbur L. Pritchard, Assistant Vice President and Director of COMSAT Labs.

H. William Wood, Assistant Vice President—Operations.

The COMSAT Vice Presidents continue to be: David C. Acheson, Vice President and General Counsel.

Lucius D. Battle, Vice President for Corporate Relations, a responsibility now broadened to include additional internal responsibility for coordination of the development and execution of corporate plans and policies affecting COMSAT's relationships with a number of government and non-government agencies and with the public.

John A. Johnson, Vice President—International.

A. Bruce Matthews, Vice President—Finance and Administration, the latter responsibility being added to the Finance responsibilities previously held.

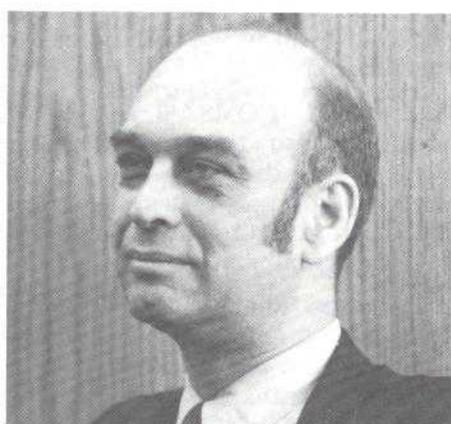
(See Page 8)



Lewis C. Meyer



Joseph H. O'Connor



Wilbur L. Pritchard



H. William Wood

Ecos de la Montana

First Directors Are Elected by CEA at Cayey

The COMSAT Cayey Employees Association became a reality at the general assembly held on September 12, 1969. The first Board of Directors was elected as follows: President, Luis Medina-Santos, Supply; Vice-President, Paul J. McGranahan, Operations (Silver Team); Secretary, Ada A. Gonzales, Administration; Treasurer, Arsenio Reyes, Facilities; Other Member, Otto R. Irizarry-Muniz, Operations (Red Team).

Mr. Medina's victory was attributed in part to Frank Falmar's terrific job as campaign manager. Once elected President, Mr. Medina delivered a well prepared speech, both in English and Spanish, on what he expects to accomplish during his one-year term.

General McNitt, President of ITT, visited the Station on September 3. He was accompanied by Messrs. Arrieta and Martinez.

F. Karl Willenbrock, Professor of Engineering and Applied Science, State University of New York at Buffalo and President of the Institute of Electrical and Electronics Engineers (IEEE) visited the Station on September 12, and was accompanied by Ray A. Larnier, engineering consultant and a fellow member of the IEEE. Both were in Puerto Rico attending the Pan American Congress of Engineers held in San Juan during the week September 8-14.

A group of engineers, all members of the IEEE, Caguas-Guayama District, accompanied by Faustino Martinez, President of the Colombian delegation to the Pan American Congress of Engineers visited the Station on September 13. Sandwiches, coffee and refreshments were served.

Juan R. Castanera, the Station Manager, Lee E. Jondahl, Chief Engineer, and Luis R. Rodriguez personally greeted the group. A tour of the site was given by John Gonzalez, Operations Supervisor, and Jose M. Megron, Technician.

This tour was followed by a luncheon sponsored by the IEEE Caguas-Guayama chapter.

A group of approximately 45



Dr. Charyk presented incentive awards at luncheon.

Recipients of Incentive Awards Honored At Luncheon Ceremonies

COMSAT staff members who have designed patentable inventions while working for the Corporation were honored at a luncheon held at the Washingtonian Country Club on October 1. Dr. Joseph V. Charyk presented the awards, which were given as a part of the Inventions Incentive Program designed to stimulate ideas and to reward employees for submitting inventions to the Corporation.

Dr. Charyk noted that the awards were the first to be presented under the new incentives program, and he termed the men's efforts as "vital contributions on which the future (of COMSAT) rests." He continued on to say the "technical group, by the very nature of our business, is at the heart of the Corporation, and your efforts and the efforts of others like you could heavily influence the future."

Inventions and the recipients of the cash awards for their origination were as follows:

Delay Correlation Radiometer,

district visited the station on September 14. A presentation and tour was given by the Blue Team under the supervision of Ken Remington.

On September 9 a safety suggestion program was initiated with an installation of a box placed in the lounge. A monthly prize of \$5.00 will be awarded for the best safety suggestion received.

John P. Beyer.

Deployable Flexible Solar Array, Wilfred J. Billerbeck and James R. Owens.

Third Electrode Charge Control, Ronald W. Bounds and James D. Dunlop.

PCM-FDMA (SPADE), Eugene Cacciamani, George D. Dill, Richard B. McClure, John G. Puente, William G. Schmidt, and Andrew Walker.

Terrestrial Interface, George D. Dill.

Digital Voice Detector, Dr. Ettore Fariello.

Synchronizer for TDMA and TDMA Signal Bursts, O. Gene Gabbard.

Synchronous Predictor, Leonard Golding.

Antenna for Space Vehicle, Emeric Podraczky.

TDMA Acquisition, Analog Phase Lock Loop, TDMA Double Aperture Technique and Digital Phase Lock Loop for Bit Timing Recovery, John G. Puente.

Channel Reallocation, Frame Replica Store, Error Correction Slash, Maximum Variance Detector, Biorthogonal Code Generator and Nonlinear PCM Sampling, William G. Schmidt.

Radome Gutter, Lewis V. Smith.

Nonlinear Phase Lock Loop, James C. Su.

Tunnel Diode Voltage, Control Oscillator and Constant Loading FM Device, Marvin R. Wachs.

Phase Lock Loop, G. Walsberg.

Page 6

Old and New Are Blended At Clarksburg

By Shirley Taylor

If you look out of a window at COMSAT Laboratories you will see rolling green farmlands and gentle mountain slopes in the distance. In 1791, when there were only farmlands and mountain slopes, the whole area, including the present town of Clarksburg, was appropriately known as "cow pasture." Those of us who travel Old Baltimore Road to the Labs see vivid evidence that cows are still a large part of life in the area.

In 1876, when the U.S. celebrated its first Centennial, President Grant requested that all towns, counties and states have accounts written tracing their beginnings. In response, T. H. S. Boyd prepared a book entitled, *The History of Montgomery County, Maryland, from its Earliest Settlement in 1650 to 1879*.

The book states that Montgomery County, in which the Labs are located, was named after Richard Montgomery, a Revolutionary War General. This was the first time a county in the 13 colonies was named after a "local hero" rather than a titled personage in the old country.

The land on which the laboratories are built was originally granted to Henry Griffith in pre-Revolutionary times. The first house was built by John Clark—hence the name Clarksburg. The town had one claim to fame—the "Catawba" grape, which was developed in the garden of Mr. Scholl, at the east end of the village.

In the year 1879 the population of Clarksburg was 250. There were two Methodist-Episcopal Churches, an Odd Fellows Hall, and surprisingly, a literary association. The village had a Postmaster, a Justice of the Peace, one hotel, a tax collector (What town could get along without that?), a shoemaker, two carpenters, two merchants, three doctors, four blacksmiths and wheelwrights, and 37 farmers.

Boyd's book was published in Clarksburg, which appeared to have the only publisher in the area at that time. Since Clarksburg covered a larger area of land in those days, that original publishing house may have been situated in what is now the village of Boyds.



European scientists confer with Labs personnel during visit.

Negotiations On New Cables To Be Deferred

The Federal Communications Commission has asked American Telephone and Telegraph Company to defer negotiations for any new submarine cables until certain policy determinations can be made.

The FCC action followed a submission by AT&T that it regards additional cables across the Atlantic and Pacific Oceans as necessary and that it had begun preliminary discussions with foreign parties for the construction of such cables.

COMSAT had advised the FCC that the satellites of the late 1970s, with 20,000 to 30,000 circuits of capacity each, will provide the highest standards of reliability, redundancy and useful lifetime.

Satellites now provide important economies of scale, along with redundancy and flexibility of routings. Greater satellite gains are imminent. Therefore, COMSAT is concerned that additional cable facilities where satellite capacity is or will be available may impose unnecessary burdens on rate payers.

The 1968 census gave the population of Clarksburg as 790. Now that we are here, who knows what will happen. Maybe it will get to be as busy a place as it was in colonial days!

European Scientists Visit COMSAT Labs

A team of engineers and scientists from the European Space Research Organization (ESRO) Technical Center (ESTEC) in Holland visited the Laboratories on September 24 to discuss project coordination with COMSAT personnel. The project discussed involved the use of frequencies above 10 GHz for space purposes.

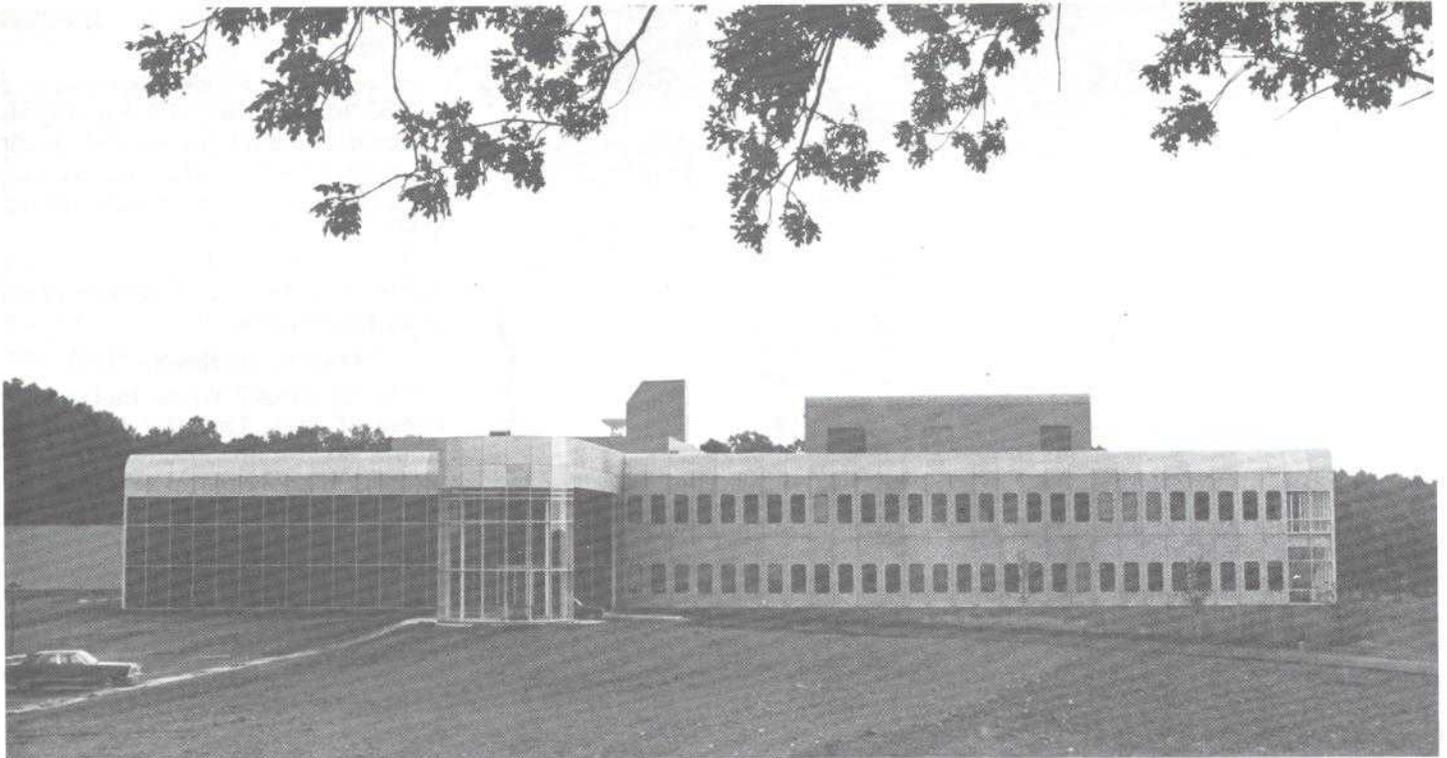
Accompanying Professor W. Kleen, ESTEC Director, were Messrs. P. Blassel, Director of Projects; R. Collette, Head, Systems; J. Toussaint, Head Telecommunications Division, and J. B. Lagarde, Head, Programme Coordination.

From Page 6— COMSAT Board Elects Assistant Vice Presidents

Siegfried H. Reiger, Vice President—Technical, with continuing supervisory responsibilities over both the office of the Chief Engineer and the COMSAT Labs.

George P. Sampson, Vice President—Operations.

[This notice followed a memorandum issued on September 26 by President Joseph V. Charyk announcing the reorganization to the staff.]



Move is Complete

Labs New Home Found Comfortable

By Jeffrey L. Rubin

Two weekends in September found COMSAT Laboratories alive with the sounds of Paxton Van Lines moving the Laboratories, computer center and maintenance and supply service center into the new facilities in Clarksburg.

On September 6 and 7, the Lab's equipment and supplies were moved to Clarksburg, along with the library, central records and machine shop. On September 20, the M&S service center, computer center furniture and remaining furniture from 2100 L Street were moved.

Computer center personnel had occupied their area in early August, when the IBM 360-65 computer was delivered.

All of us at COMSAT Labs have been expecting the move for a long time. A three-month delay because of a carpenters' strike in May failed to dampen our enthusiasm. While we have had some complaints, the large new laboratories and comfortable offices have made many of the move-in problems more tolerable.

Three years ago when the new building was being designed most

of our functions did not exist. However, the new facilities have met most of our requirements without difficulty. New additions of special interest are the technical library, an environmental test facility, and the cafeteria, which can serve the needs of our employees and small luncheon groups.

Many of the problems encountered in connection with the move have been solved, while a few remain with us. But, as with other moves within COMSAT, and as we settle into routine, this move, too, will soon be a memory.



New Labs cafeteria for employees and guests.



Testing the Etam equipment

News and Notes From Etam

Employees Take Training Courses, Update Skills on New Equipment

Facilities training classes on water systems, uninterrupted power systems and diesel, low voltage switcher, electrical distribution system, air-conditioning, and heating systems are being conducted at Etam. Training in these areas is needed in order to familiarize everyone with the facilities of the station.

Crawford Booth, Facilities Maintenance Supervisor, and Andros Thompson, Senior Facilities Mechanic, are supervising the training program, which will include all technicians.

Additional on-the-job training is continuing in the Electronics Maintenance Shop for the purpose of acquiring a higher degree of proficiency in each of the various subsystems. This training is conducted during the normal working hours. Darrell Riddle and William Bell have just completed this course, and Spencer Everly and Lynn Rector have been assigned to the Elec-

tronics Maintenance Shop for similar training. It is hoped that this type of training will continue until each technician is completely familiar with all our subsystems.

James Evans, Operations Supervisor, plans to attend the PRADCO training course at Cleveland, Ohio, in October. Paul Helfgott, Operations Supervisor, recently completed this same training course.

Promotions

The following persons have been promoted:

John Formella, Senior Technician to Operations Supervisor, effective September 29; Leonard Gifford from Technician to Senior Technician, effective September 15; Darrell Riddle from Technician to Senior Technician, effective September 1; and Andros Thomson from Facilities Mechanic to Senior Facilities Mechanic, effective September 15. Congratulations are extended to these men for their fine performances.

William Mayes, Electronic Tech-

nician, recently obtained his Second Class FCC license.

ECEA Holds Picnic

The Etam COMSAT Employees Association held its second picnic on September 20 at Camp Horseshoe Recreation Area near Parsons, West Virginia. The second picnic was held for employees who were unable to attend the first one earlier in the summer.

Western Barbecue Held

The COMSAT wives met at the home of Mrs. Dorothy Riddle on Route 50 for an outdoor country-western barbecue on August 21. Eleven people attended the outing which was hosted by Mrs. Dorothy Riddle and Mrs. Gerry Gaston.

Golf Tournament

In an economy move to help in reducing the cost of aerating the golf course, the Kingwood Country Club invited the Etam earth station employees to hold their first annual golf tournament at their course in September. A total of 11 COMSAT and AT&T employees participated. Prizes were offered for low gross, high gross, and low score using the blind bogey handicap system.

Ed Doll of AT&T captured the low gross with a round of 90. Gerry Reeves captured the title under the handicap system with a 76. John Nelson of AT&T came in with high gross, but to avoid a slander suit the score is being withheld.

In keeping with the tradition of it never raining on a golf course, all participants became thoroughly drenched while playing through a 15-minute downpour of "heavy dew." Another tournament is being considered for next month in light of the many excuses being offered (all blaming the weather) for the high scores.



Chester Randolph (left) presents golf awards to Gerry Reeves (center) and John Nelson (right).

The World's Biggest Bubble

Andover Radome Gets Face Lifting

What appears to be an insurmountable task is made to look easy by a twosome of young men swinging down the sides of COMSAT's radome at Andover, Maine. Believed to be the world's largest bubble, the radome is getting a face lifting.

The men washing and painting the bubble are employees of an outside contractor. They do this unusual work for a living—they tackle structures of unique sizes and shapes, cleaning, scrubbing, repairing, painting.

For their task of cleaning the 16 story high radome which encloses the Andover horn antenna, these men donned yellow wet suits, sneakers and crew caps. They looked as comfortable making the ascent to the top as anyone else would look striding out to the back nine for a Sunday afternoon golf game.

The scrubdown began on September 13 and was completed the last week of September. Then came the application of the first of three coats of hypalon paint, which is used on all radomes of this type. Hypalon paint, which is made es-

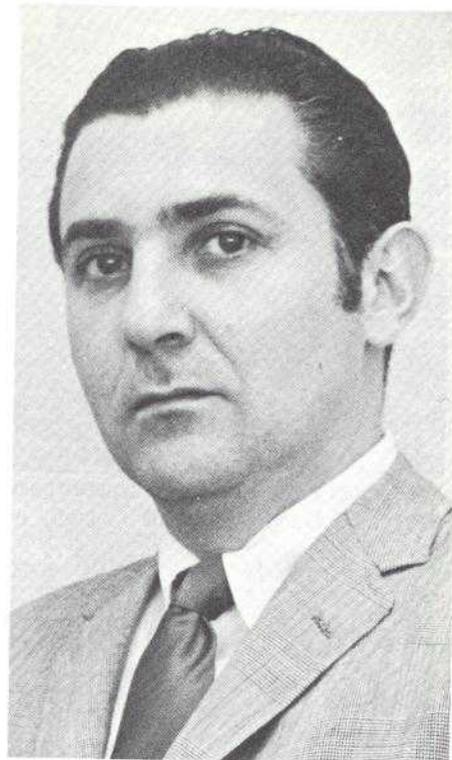
pecially for large fabric areas, is both flexible and durable.

Initial Task

The initial task of rigging the radome with lines and ladders is accomplished from inside the building. One man must exit from the inside of the building through a door at the top of the radome, where the safety lines are attached. Then the rest of the crew is deposited by helicopter on top of the radome, where the safety lines are then attached to them.

The cleaning is done by each man following the one before him with his part of the task, hosing, spreading industrial detergent, mopping or rinsing. The team works in concentric circles from the top to the bottom of the radome. A supplemental crew took over the task of painting once the cleaners had completed their job.

According to the Andover Station Manager, Donald Fifield, the painting will be finished by late October. The weight of the 1,300 gallons of paint needed to cover the surface area will have little effect on the air inflated structure. Mr. Fifield said "perhaps a little air will have to be added" before the task is completed.



Joseph L. Mahran

Directors Elect New Comptroller Of Corporation

Joseph L. Mahran, formerly Assistant Treasurer of the American Electric Power Company in New York City, has been elected Comptroller of COMSAT.

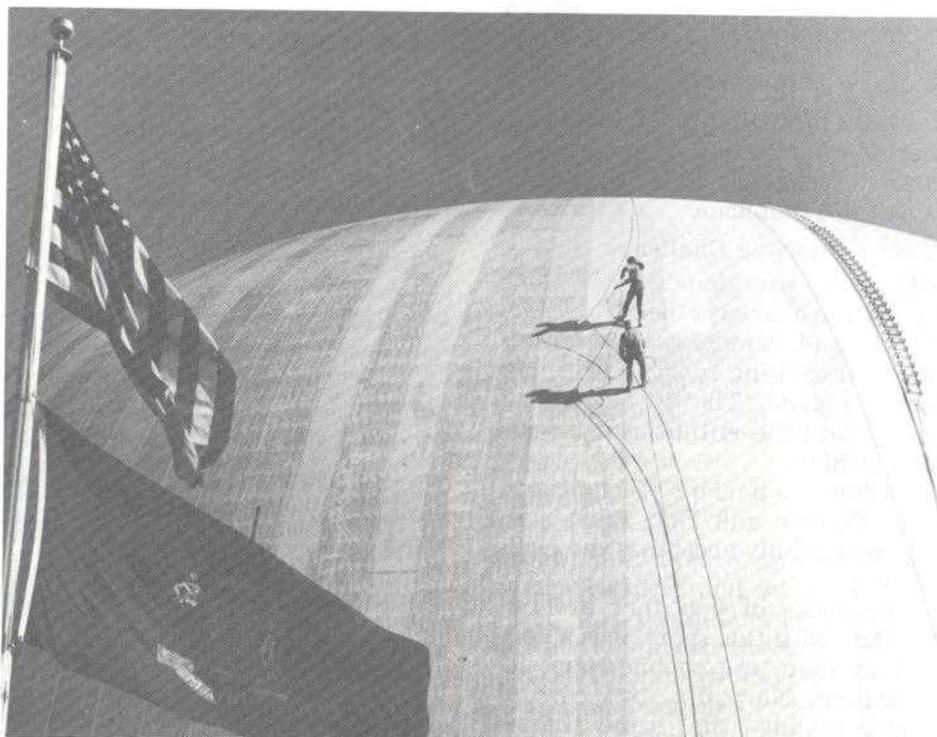
Mr. Mahran will report to the Financial Vice President, A. Bruce Matthews, and will direct an enlarged Comptroller's group that encompasses the Accounting, Rates and Revenue Requirements, Financial Planning, and Systems and Procedures functions.

As Comptroller he succeeds Frederic M. Mead, who recently was elected Treasurer of COMSAT.

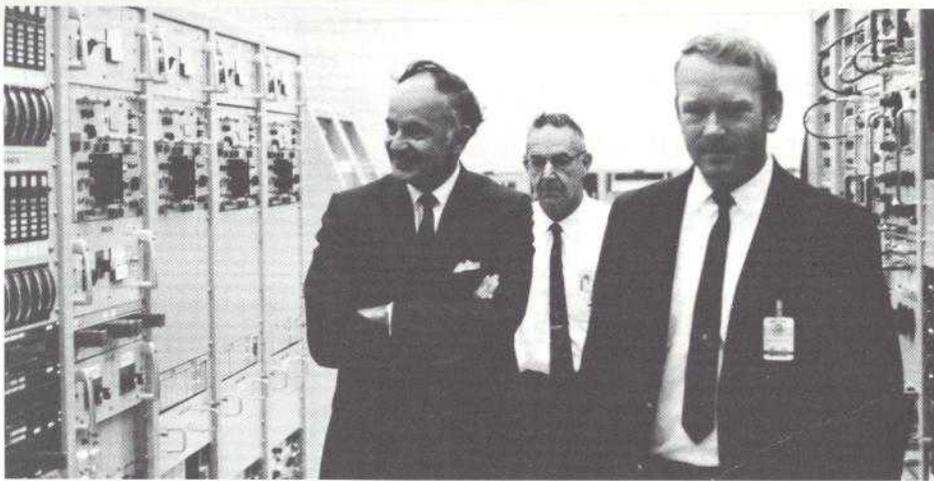
For the past 12 years Mr. Mahran was with American Electric Power, which is the largest investor-owned electric utility system in terms of sales.

Earlier Mr. Mahran was a Certified Public Accountant in New York State. He is a native of New York City and was educated at New York University where he received a B.S. in accounting and an M.B.A. in Finance.

He and his wife and their four children have moved from Morris Plains, N.J., to their new home in



Andover radome gets its first coat of paint



Dr. Charyk (left) was accompanied by engineers Herman Sauret (center) and David Durand (right) on a recent visit to the Andover station.

News and Notes From Andover

Andover Closes 8th Tourist Season; 29,577 Visit Station During Summer

By Joanne Witas

The Andover Station, which recently completed its eighth summer season as a tourist attraction, welcomed about 500 visitors per day. The automated slide program was a huge success as confirmed by the guides who heard statements, such as "It's the best I've seen" and "Am I glad I didn't miss seeing this!"

The tour guides, all seasoned veterans, are three teachers from nearby Rumford. Can you imagine how many times these men have answered the question of "Why did they locate here?"

The Visitors Building has additional points of interest. One of them is the "Mini-Horn" or the miniature antenna enclosed in a glass bubble that was installed a month ago.

The newspaper article written by a Rumford correspondent titled "COMSAT Proves Small Town Boom" also is an attraction. Those who take the time to read this amusing article usually end up smiling.

All in all, the tourist season was booming. Out-of-staters, hundreds of boys and girls, campers, an occasional Miller's Tour and general tourists made another successful season for Andover, with a total of 29,577 visitors this summer through August.

President Charyk Visits

It was our pleasure to have Dr. Charyk visit the station on August 22.

Dr. Charyk was received by the

Chief Engineer, David Durand, who was acting in the absence of the Station Manager, Donald Field.

The entire station was toured, and Dr. Charyk was briefed on the various operation activities by Mr. Durand, Herman Sauret, Facilities Engineer, and Carl Sederquist, Administrator.

Congratulations

Don Auger and his wife Faye had their second child, a boy born June 13.

Mr. and Mrs. James Fogg are congratulated on the birth of their daughter, Deanna Marie, born on August 8, weighing 8 pounds, 8 ounces.

Neil Merrill, Facilities Mechanic, has been promoted to Senior Facilities Mechanic, and Dan Grenier, Junior Technician, has been promoted to Technician.

Sporting Challenge

Maine's traditional summer sports have always been boating, fishing and camping. However, a new and exciting sport is sweeping New England. The sport is drag racing and the enthusiasm in this area is high.

Andover Junior Technicians, Jack Conner and Don Bachelder, are successfully accepting the challenge.

For those of you that are unfamiliar with this sport, it is a contest of man, automobile, and acceleration. Normally, two cars of approximately the same horsepower and weight, line up on the starting line. When the drivers of

the cars see the green or "start" light, they accelerate as fast as possible toward the finish line, which is usually one-eighth or one-quarter of a mile away.

The winner of the race is the car that accelerates the distance in the fastest possible time. Often, the winner is decided by a fraction of a second. Regardless of the type of car, quick reflexes and good engine tuning are required.

Jack Conner's car, appropriately named the "Earlybird," is a 1969 Chevrolet Z-28 Camaro. His modified production type engine (302 cubic inches) produces about 425 horsepower on pump gasoline.

His best elapsed time from start to finish is 7.79 seconds with a top speed of 88.29 miles per hour. This accomplished on a one-eighth mile course. Jack feels that with more experience he will be able to better that time by at least 1 second.

A man with much racing experience, Don Bachelder, has raced where the sport originated, on some of California's finest drag strips. His car, named the "Super Tang" is a 1968 Ford Mustang GT. He has tuned his 302 cubic inch engine to produce more than 400 horsepower on pump gasoline.

A collector of win trophies, Don is as tough a competitor as you will find anywhere. His plans for 1970 include turning his car into a full racing machine. The best elapsed time to date for Don is 7.65 seconds at 88.30 miles per hour on a one-eighth mile course.

On or off the race track, Don and Jack are the kind of sportsmen that give drag racing a good name. They both agree—"To be a winner, you also have to be a good loser."



Don Bachelder (left) and Jack Conner show their drag trophies.

Alaska, Guam Earth Station Work Advances

Work progressed rapidly and on schedule this fall before the winter snows at the 280-acre site of COMSAT's new earth station for satellite communications near Talkeetna, Alaska.

Concrete was poured for the antenna pedestal, which will house all the electronic equipment except the low-noise amplifier and the carrier equipment. For efficient operation, control consoles for the station also are located there.

A prefabricated support building attached to the antenna structure also will be erected this year.

By late September, drilling for a well was underway. This will be the main water supply source for the station. Work began on the roadbed for a permanent 3½ mile access road. When completed, it will replace a temporary gravel access road now being used.

The new facility, which will be equipped with a 97-foot diameter antenna, is located in pine-tree country below the permafrost line. Annual snowfall is about nine to ten feet.

Construction on the station started last July. It is scheduled to be in service by July 1, 1970.

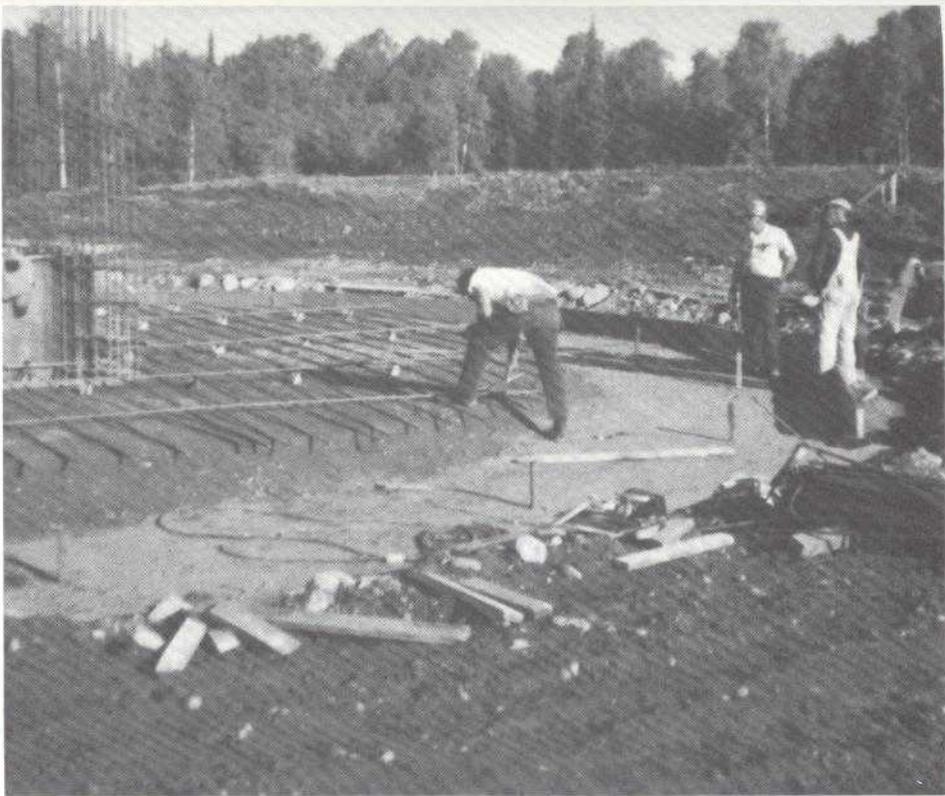
The prime contractor for the job is General Telephone & Electronics International. William T. Patterson, COMSAT Operations, has been named manager for the station.

Guam Station

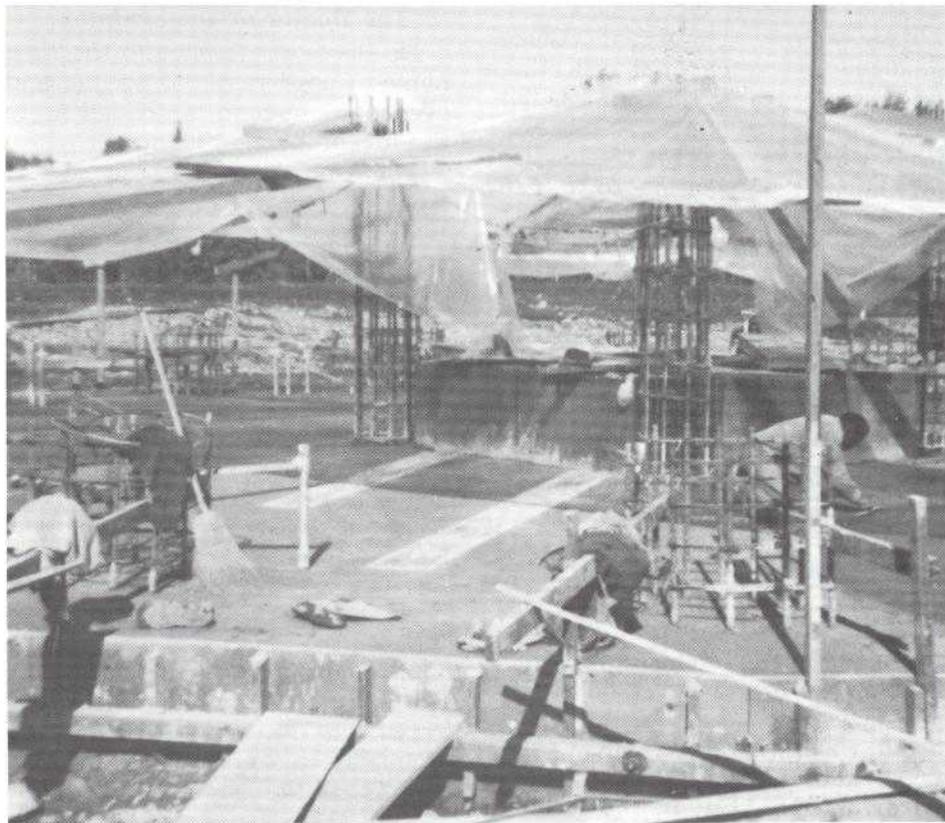
Construction work also moved ahead on a new Guam earth station, which is scheduled to begin initial operations November 1 of this year.

The station site is near Pulantat about 10 miles south of the capitol city of Agana in the central part of the island of Guam. The station is being built by ITT Space Communications, Inc., under a contract with RCA Globecom, Guam Operations Manager. COMSAT, System Manager, has a 50 percent ownership interest in the facility.

Reports indicated that electronics equipment and vans taken from the former transportable earth station in Thailand had been shipped and tested on site in Guam. Most of the parts for the antenna system, including the 98-ft. diameter reflector, also had been shipped



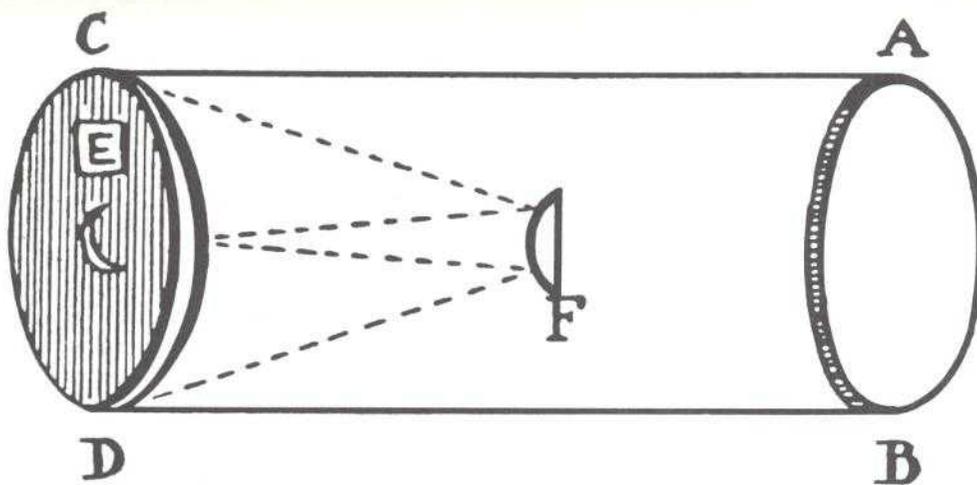
First stage of construction is nearing completion at Talkeetna, the site of the earth station designed to serve Alaska's communications needs.



from the United States by chartered freighters and jet planes, and work was proceeding on assembly of the antenna at the Guam site.

Construction work on the station is planned in two stages. The initial station, employing a standard large antenna and new low-

noise receivers, will be integrated with ground communications and control equipment taken from the old Thailand transportable facility. More permanent facilities will be built next year, and new electronic equipment added to increase the capability of the station.



Dr. Berce's sketch of Cassegrain's telescope

"ABCD is a strong tube, in the bottom of which there is a great concave Spectrum, CD, pierced in the middle, E. L. is a convex Spectrum, so disposed, as to its convexity, that it reflects the species, which it receives from the great Spectrum, towards the hole E, where there is an eye-glass, which one looketh through."

Identity of Cassegrain Lost in History

Isaac Newton Scoffed at The Cassegrain Antenna

In 1672, 30-year-old Isaac Newton's claim to have built the world's first workable reflecting telescope was unexpectedly challenged.

The French scientist de Berce published a sketch of a reflecting telescope which he claimed was not only superior to Newton's but also preceded it by several weeks. He attributed its invention to a man named Cassegrain of de Berce's own city of Chartres.

Newton was enraged. In May of 1672, he presented a paper, "... concerning the Catadioptrical Telescope, pretended to be improved and refined by M. Cassegrain," to the Royal Society. In his critique Newton claimed that Cassegrain's optical geometry would at best produce an image "very obscure and dark; and not only so, but also confused." He concluded by saying: "The advantages of this design are none, but the disadvantages so great and unavoidable, that I fear it will never be put in practice with good effect . . . I could wish, therefore, Mr. Cassegrain had tried his design before he divulged it. But if, for further satisfaction, he please hereafter to try it, I believe the success will inform him, that such projects are of little moment till they be put in practice."

In spite of Newton's criticism, not only are today's standard INTELSAT earth station antennas of modified Cassegrain design, but the largest reflecting telescope in the world, the 200-inch Hale instrument at Mt. Palomar California,

follows Cassegrain's arrangement.

And we don't even know for certain who Cassegrain was.

The Doctor or the Sculptor?

De Berce's reference to the man named Cassegrain was vague, and even now, opinion is divided as to the inventor's real identity.

The *Nouvelle Biographie Universelle* lists one N. Cassegrain, a physician and professor at the College of Chartres, as the inventor of the improved telescope and further ascribes to him a treatise on the megaphone.

Bell, on the other hand, in his definitive book on the history of the telescope, asserts that he was Sieur Guillaume Cassegrain, a sculptor at the court of Louis XIV. Between 1666 and 1692 Guillaume Cassegrain cast a number of statues for the royal palace and gardens at Versailles. Among his castings were a bust of Louis by Bernini* and an equestrian statue by the king of Girardon, which was destroyed in the French Revolution. The bulk of Guillaume Cassegrain's work, however, consisted of reproductions of classic statues, including the Farnese Hercules and the Laocoon group.

A Mirror Instead of a Lens

The basic idea of a reflecting

* Another casting from Bernini's original bust of Louis is in the National Gallery of Art, Washington, D.C., just a few steps west of the Mercury fountain. The hollow bronze replica is anonymous, and thus there is a slight possibility that it is by Cassegrain himself.

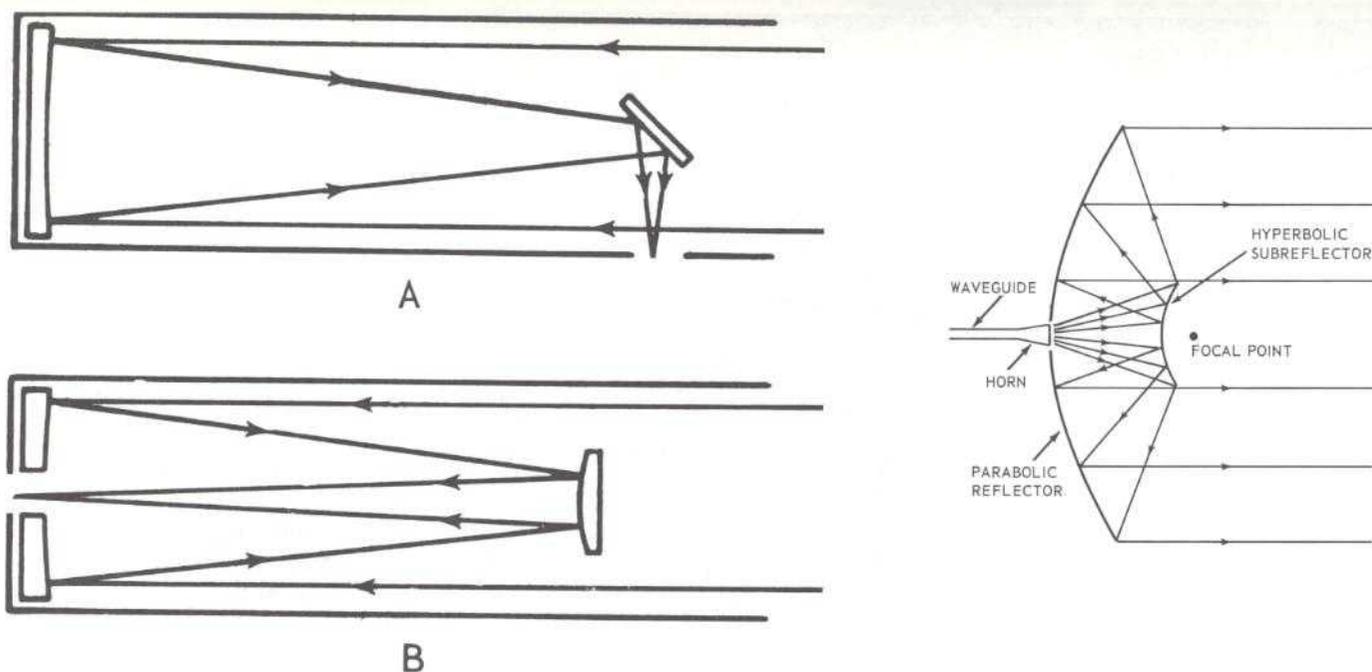
telescope is that incoming light, instead of passing through a lens at the front of the tube, is focused by a concave mirror at the rear. In Newton's telescope the focused light rays are reflected by a flat second mirror, set at an angle to the tube, through a hole at the side of the telescope and into the eyepiece. In Cassegrain's reflector, the incoming light is focused by a convex secondary mirror through an aperture in the center of the main mirror.

Since all electromagnetic energy obeys the same laws, a radio-frequency antenna operates much like a telescope. The difference in wavelength between RF frequencies and visible light accounts for the difference in size.** The reason that Cassegrain geometry is attractive for satellite communications is that the feed (which corresponds to the eyepiece in a telescope) is located behind the main dish, and thus there is no necessity for long connecting links between the signal processing equipment and the dish itself. Much of the amplifying gear is immediately behind the aperture which prevents loss of signal strength and inhibits the introduction of noise through lengthy waveguides.

Incoming signals are focused by the parabolic dish toward a point

(Continued on Page 15)

** Actually, a telescope mirror corresponding in diameter-to-wavelength ratio to a 97-foot dish antenna would measure only about 1/100 of an inch.



Newton's reflecting telescope (A) compared with Cassegrain's model (B). **Geometry of Cassegrain Antenna**

(Continued from Page 14)

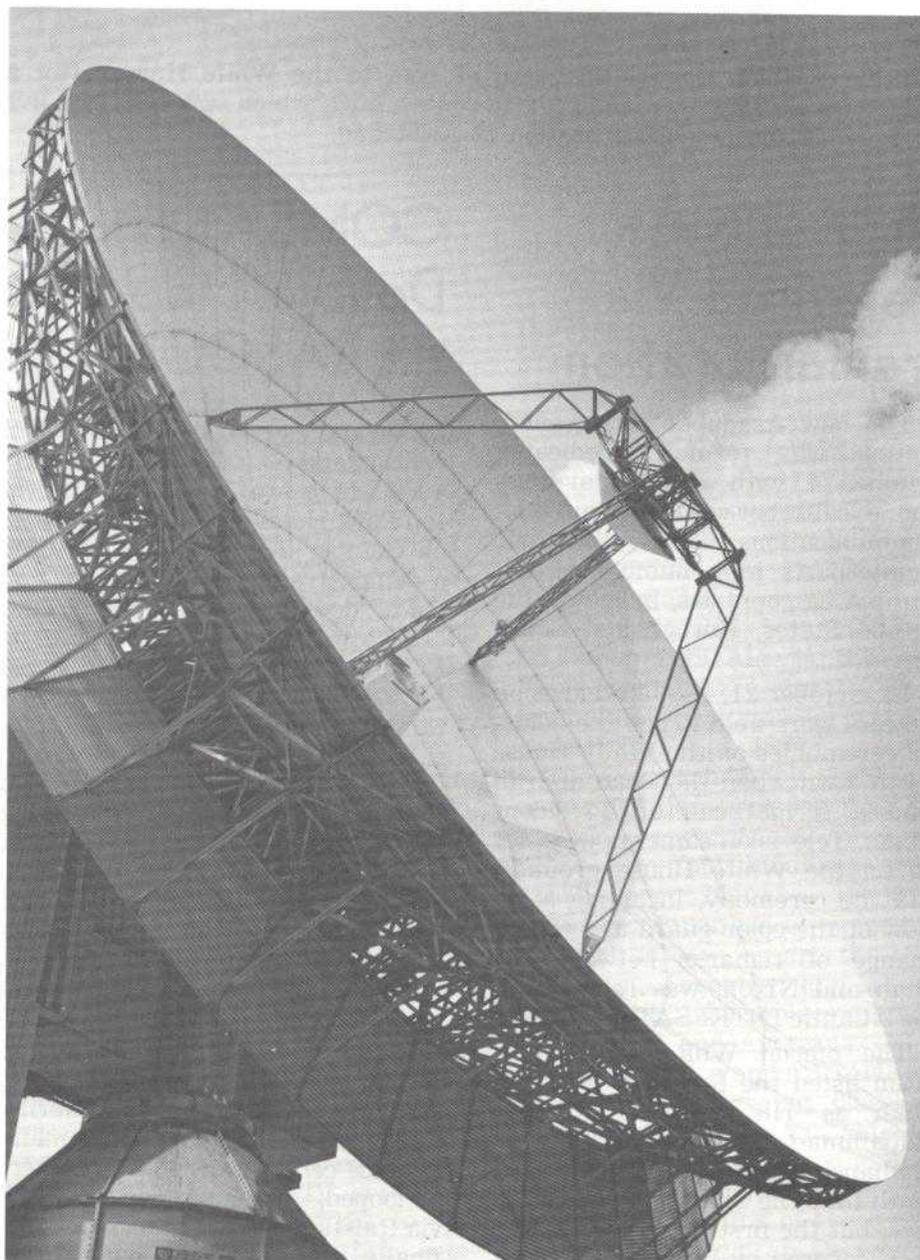
behind the subreflector. The hyperbolic curve of the subreflector directs the signal toward the hyperbola's opposite focus. That is the point, either at or just in front of the center of the dish, where the signals enter the waveguide.

Outgoing signals follow a reverse path. They leave the transmitting horn, strike the hyperbolic subreflector, are reflected to the parabolic surface of the main dish as though they came from the focus behind the subreflector, and are beamed into space. Since no matter where the parts of the beam strike the subreflector or main reflector, they travel the same distance as all other parts, this geometry also transmits the rays of the beam in phase. The outgoing beam is thus aligned both in direction and in phase.

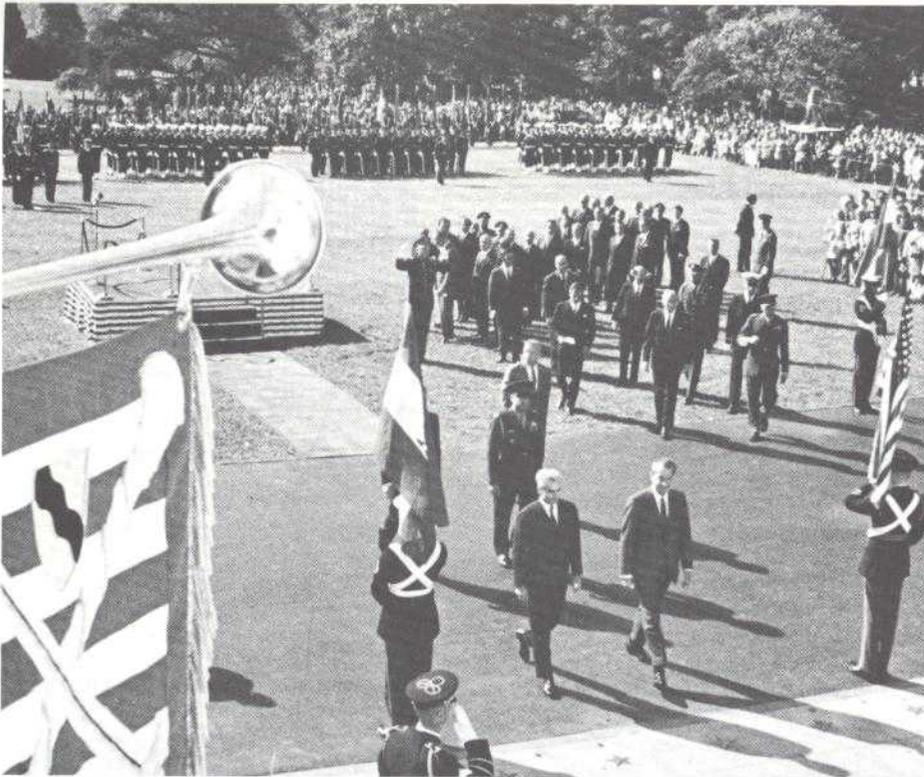
INTELSAT's Big Dishes

The 97-foot antennas at the United States earth stations are monuments to Cassegrain's idea.

Each of these big dishes, standing taller than a 10-story building, weighs about 375 tons. The concrete tower supporting the antenna weighs another 400 tons. The individual plates of the big dish itself are fabricated to tolerances of approximately twenty-thousandths of an inch, and are assembled to tolerances of approximately fifty-thousandths of an inch. When in place, the plates are separately adjustable. The surface of the dish is thermally controlled to help offset the effects of sun and weather.



Antenna at Etam, West Virginia, displaying the Cassegrain reflector



President Nixon escorts the Shah of Iran to the White House after a colorful welcoming ceremony on the south lawn which was televised live to Iran via the new earth station at Asadabad.

Visit of Shah Televised Via Iranian Station

The new Asadabad, Iran, earth station was formally dedicated October 4 with ceremonial telephone calls between Iranian telecommunications officials and their counterparts in a number of Atlantic area countries, including the United States, Europe and South America.

On October 21, Iranian television viewers were able to see the colorful ceremonies on the White House south lawn when the Shah of Iran paid a formal call on President Nixon. Television cameras were set up on the White House grounds, and the ceremony, including a review of the color guard and an exchange of remarks between the Shah and Nixon, was relayed via the Atlantic INTELSAT III to Iran.

The official White House program listed the formal title of the Shah as His Imperial Majesty Mohammad Reza Shah Pahlavi, Shahanshah of Iran. It was the tenth time the Shah had visited the U.S., but the first time his visit had been covered by live TV broadcast via satellite to his home country.

COMSAT Shows Double Hop Link At EASCON 69

The COMSAT exhibit at the Electronic and Aerospace Systems Convention and Exposition (EASCON) 1969 which was held at the Sheraton Park Hotel in Washington, D.C. on October 27, 28 and 29 features a demonstration of a telephone call via a "double hop" satellite circuit.

Two telephones in booths at the COMSAT exhibit were connected by means of two satellite circuits in tandem, or a double-hop earth-satellite circuit.

This setup enabled visitors to have the experience of conversing over a double-hop satellite circuit, a distance of approximately 100,000 miles. For the purpose of this demonstration, the circuit is routed from Booth No. 1 at the exhibit to the Etam, West Virginia earth station; from there via the INTELSAT III—F2 satellite to the Raisting, Germany earth station; then via land lines to the International Telecommunications maintenance center in Frankfurt, where it looped, and subsequently back via Raisting, the satellite, Etam and finally terminated in Booth No. 2, also at the exhibit.

14 Cent-a-Share Earnings Posted For 3rd Quarter

COMSAT reported net income of \$1,446,000 or 14 cents per share for the quarter ending September 30, compared to \$1,750,000 or 17 cents per share for the third quarter of last year.

For the first nine months of 1969, earnings totaled \$4,947,000 or 49 cents per share compared to \$5,054,000 or 50 cents per share for the first nine months of 1968.

Revenues totaled \$11,760,000 for the third quarter and \$33,528,000 for the first nine months, compared to \$7,569,000 for the third quarter of last year and \$21,821,000 for the first nine month of last year.

At September 30, 1969, COMSAT was leasing on a full-time basis to its customers a total of 1,364 circuits, an increase of 522 over the 842 being leased at September 30 last year. Of these, 859 were over the Atlantic Ocean and 505 were over the Pacific.

The earnings of 14 cents per share for the third quarter of 1969 compared with 20 cents per share for the second quarter of 1969.

The reduction in earnings resulted from the failure of revenues to reach the expected level due to the interruption of service on the INTELSAT III series satellite over the Atlantic Ocean in July and from increased depreciation and amortization costs due to the expansion of the satellite system.

Contract Awarded For New Control System

COMSAT, on behalf of INTELSAT, has awarded a study contract for \$24,810 to Lockheed Missiles and Space Company, Sunnyvale, California, a division of Lockheed Aircraft Corporation. Lockheed will compare the advantages and trade-offs of one, two, and three-wheel attitude control systems for future communications satellites.

Today's INTELSAT spacecraft are stabilized in orbit by spinning the entire satellite body. It is expected that succeeding generations of communications satellites will be characterized by increased size, power and antenna directivity. With an eye to the future, INTELSAT is investigating the feasibility of alternative control systems.

Mind Teasers

In each issue of COMSAT News, COMSAT Labs plans to present challenging puzzles. The one appearing below is a favorite of the Labs Director, W. L. Pritchard. The answer appears on page 18.

A hotel guest has a gold chain with 23 links and the landlord, who has no links to start with, has agreed to accept one link per day as rent. Clearly, the first day the guest must give him a single link, but thereafter he has the option of giving him longer sections of chain and get links in change if the landlord has them. The guest wishes to stay 23 days. What is the fewest number of cuts he can make in the chain in order to pay out a net of one link per day for the entire time?

Hawaiian Viewers Receive Sports 'Double-Header'

On Sunday, October 12, television viewers in Hawaii had their choice for the first time of two live TV events relayed simultaneously via two INTELSAT satellites.

The double-header sports programming included the Mets versus Orioles World Series baseball, and the Los Angeles Rams versus San Francisco 49ers pro football game.

The Pacific INTELSAT III and the INTELSAT II F-4 satellites were used for the simultaneous telecasts live from the U.S. mainland. The programs were transmitted by the Jamesburg and Brewster earth stations, and received through the two large antennas at the Paumala earth station.

The INTELSAT II F-4 satellite was reactivated October 2 following modification and expansion of facilities built at Brewster and Paumalu in 1966. The 85-foot diameter antennas at Brewster and Paulmalu No. 1 were enlarged to 97 feet in diameter, and other modifications completed. Some U.S. mainland-Hawaii traffic was switched to the INTELSAT II F-4 satellite between Paumalu No. 1 and Brewster



Dennis Neill, Manager of the Spacecraft Technical Control Dept., explains satellite operations to the members of the Science and Industry Committee of the Washington D.C. Board of Trade. The 65 member Committee was shown the slide presentation, "History of Satellite Communications," and taken on a tour of the Spacecraft Technical Control Dept. and The Operations Center during a visit on October 14.

ICSC Directs COMSAT to Buy Two More INTELSAT IV Satellites

As directed by the ICSC at its last meeting, COMSAT has exercised an option for the purchase of two additional INTELSAT IV series satellites from the Hughes Aircraft Company.

The two additional satellites, the fifth and sixth in the series, have a combined delivery price of \$10,990,000. They will be identical to the first four satellites in the series which had been previously ordered.

Also pursuant to the Committee's instructions, COMSAT has negotiated with Hughes an option exercisable until December 19, for two "buses" together with option for the purchase at a later date of two communications subsystems of the same configuration as those presently on order, and for an engineering study pertaining to the improvement of the communications subsystem for INTELSAT IV (F-7) and subsequent INTELSAT IV satellites.

In other action at its 43rd meeting, held in Washington October 1-9, the ICSC:

- Accepted COMSAT's recommendation that the option be exercised for a fourth set of tracking, telemetry and control equipment for the INTELSAT IV series of satellites, in an amount not to exceed \$280,000. The first three sets had been included in the original

INTELSAT IV contract with Hughes.

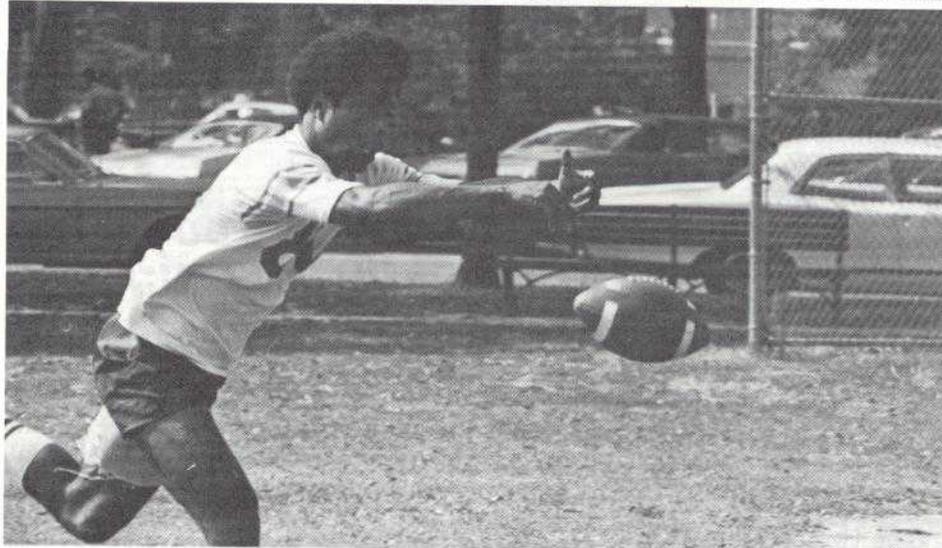
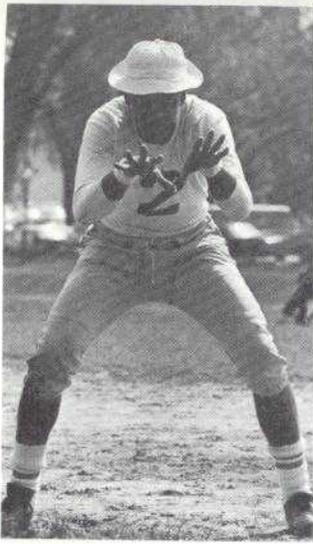
- Accepted COMSAT's recommendation for the exercise of an option to purchase two additional Atlas-Centaur launch vehicles for the INTELSAT IV series satellites. These vehicles will support the INTELSAT IV (F-3) and (F-4) launches.

- Approved the following seven individuals to a panel from which Presidents of Arbitral Tribunals shall be selected: George Ball of the United States, Dr. Aldo Armandon Cocca, Argentina; Jens Evenson, Norway; Mohammed-Salah Mohammadi, Algeria; Raimundo Peres-Hernandez y Moreno, Spain; Radhakrishna Ramani, Malaysia, and Hisao Yanai, Japan.

The Supplementary Agreement on Arbitration provides that such a panel be constituted each two years. The four members of the panel from Norway, Malaysia, Spain and Japan were reappointed. Mr. Ball is new, as are the members from Argentina and Algeria, and Algeria, who replace members from Brazil and Australia.

- Approved standard earth stations at the following places for access to INTELSAT satellites: Guam, Taipei (No. 1), and Baqa, Jordan.

The 44th meeting of the ICSC is scheduled to begin on December 3 in Washington.



Contract for Apollo Services Is Extended

COMSAT and the National Aeronautics and Space Administration have executed a one-year extension of the contract under which COMSAT provides Project Apollo communications support services.

Since July of 1966, COMSAT has provided direct service to NASA consisting of voice/data and teletypewriter channels via satellite for the NASA communications network. These communications services are vital to the success of the manned space missions.

Under the old arrangement, which expired September 30, COMSAT realized revenues of approximately \$8.9 million a year for communications services in the Atlantic and Pacific between the U.S. and three different overseas earth stations, plus U.S. to three communications ships at sea.

The new arrangement, reflected in tariffs filed with the Federal Communications Commission, provides for revised services for a minimum period of one year. Instead of three ships, NASA will employ only one. Due primarily to this, annual charges to NASA are expected to be reduced to approximately \$3.2 million.

In order to permit sufficient time for further review and comments, the FCC authorized the revised NASA tariff to go into effect for an interim period of 45 days.

COMSAT and HEW Tied for Second As Labor Leads D.C. Football League

The COMSAT football team holds a 2-1 record in the D.C. Recreational League, putting the team in a tie for second place with HEW. The eight-team league is led by Labor Department team with a 3-0 record.

COMSAT won its first game in a 12-0 roll over HUD. Ronald Tate scored both touchdowns of the game, making him the star re-

ceiver for passes from quarterback Earl Turner.

Melvin Harley leads the team in interceptions and Rudy Thomas is the leading linebacker.

In the game against Navy Ships, the only touchdown of the game was scored on a fumble picked up by a Navy Ship end. COMSAT lost by a score of 6-0.

COMSAT picked up its second win in a forfeit by GSA.

Answer to Mind Teasers

It can be done in two cuts. The secret is to note that in a single cut, you can remove one link from the center of the chain which will leave the chain in three segments. With an additional appropriate cut, the entire chain can be made into segments of 3, 1, 6, 1 and 12 links, which can be used to fulfill the payment requirements.

Employee Ads

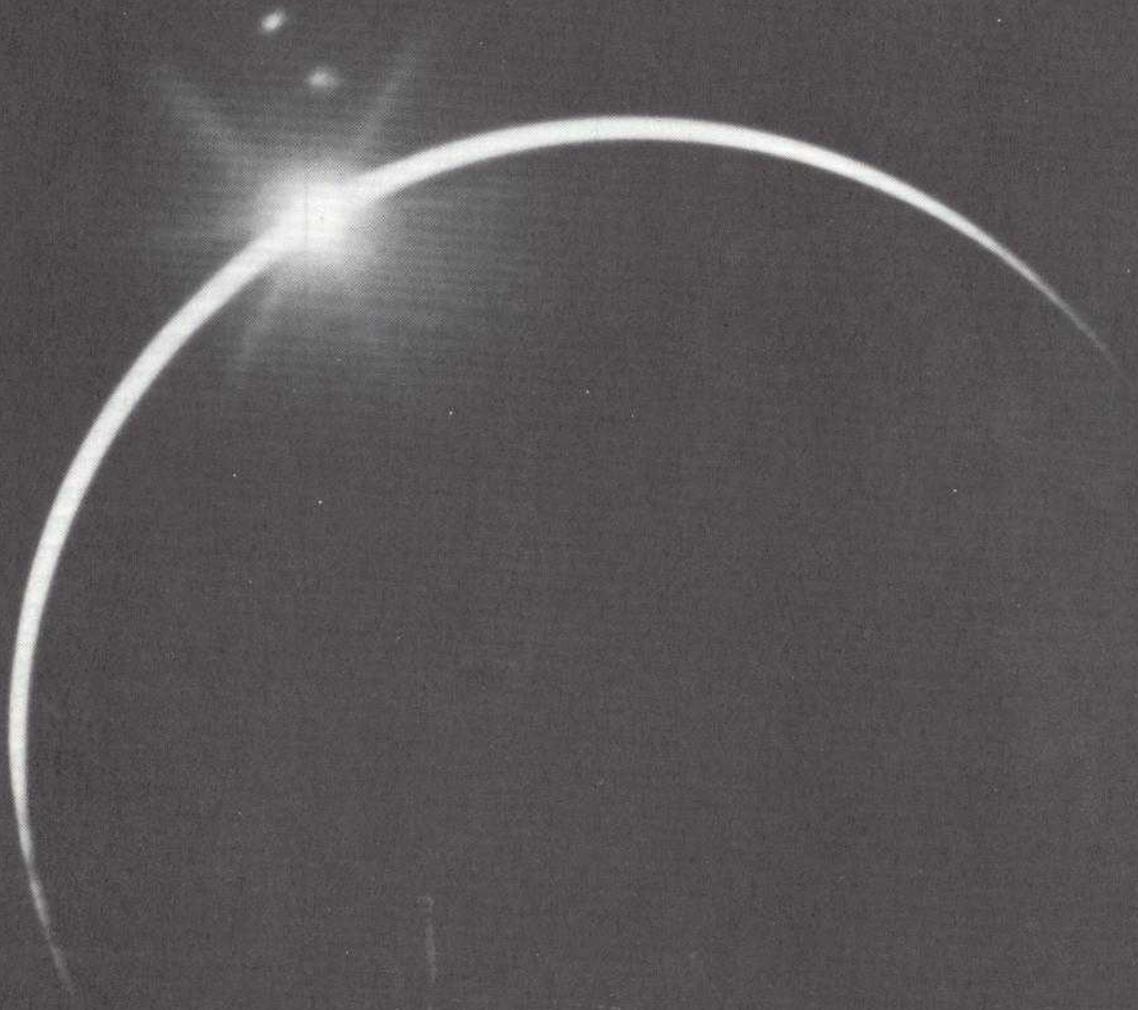
FOR SALE: Used 14-inch rock maple or oak chairs for children, good condition, \$3. Will deliver any number required. Call J. Talcott. 948-5581 after 6 p m

Sat., Nov. 1	NAV-SHIPS	vs. HEW	9:00 a.m.	1100 Ohio Drive
	Agriculture	vs. GSA	10:00 a.m.	1100 Ohio Drive
	Labor	vs. COMSAT	11:00 a.m.	1100 Ohio Drive
	HUD	vs. NAV-STIC	1:00 p.m.	West Ellipse
Sat., Nov. 8	HUD	vs. GSA	9:00 a.m.	1100 Ohio Drive
	NAV-STIC	vs. COMSAT	10:00 a.m.	1100 Ohio Drive
	Agriculture	vs. NAV-SHIPS	11:00 a.m.	1100 Ohio Drive
	Labor	vs. HEW	1:00 p.m.	West Ellipse
Sat., Nov. 15	Labor	vs. NAV-SHIPS	9:00 a.m.	1100 Ohio Drive
	COMSAT	vs. HEW	10:00 a.m.	1100 Ohio Drive
	HUD	vs. Agriculture	11:00 a.m.	1100 Ohio Drive
	NAV-STIC	vs. GSA	1:00 p.m.	West Elipse

Field Locations—1100 Ohio Drive—Along Ohio Drive behind National Capital Parks Headquarters; West Ellipse—Behind White House.

COMSAT NEWS

December 1969



*On the way to splashdown
seen around the world...
the Apollo 12 astronauts witnessed
the eclipse of the sun behind the earth.*

COMSAT Proposes Domestic System For Broadcasters, Press Media

COMSAT has taken the initiative in arranging talks with the TV networks and other large potential users to discuss its new proposal for providing direct service to them via a COMSAT domestic satellite system.

The discussions have produced widespread attention in the news media.

Renewed public interest in the domestic satellite system arose with a speech in New York City before the Audio Engineering Society by Dr. Frank Stanton, President of CBS, on November 15. Dr. Stanton proposed that a satellite system be established to handle domestic programming of the three networks, as well as facilities for educational TV.

Both COMSAT and AT&T issued statements commenting on Dr. Stanton's widely publicized speech. COMSAT said, in part, that it believed "... that through appropriate governmental authorizations, arrangements can be established whereby COMSAT can satisfy the requirements of the TV networks and meet their objectives."

AT&T said: "We believe the wisest possible policy at this time would be to permit any organization or group interested in establishing a domestic satellite system, including the networks, to apply for licenses to establish and operate such a system.

"We believe this approach will allow flexibility and incentive for creative private initiative and would provide the most appropriate means for an orderly development of domestic satellites.

"We have not had an opportunity to study the new CBS plan for a satellite system for the broadcasting industry, but it would appear to merit consideration in the context of a careful appraisal of the most efficient use of the frequency spectrum and orbit space, as well as other relevant technical and economical factors.

"Looking to the future, AT&T anticipates that when it makes good technical and economic sense to do so, it will seek authorization to use satellites in its own operations. Our recent studies indicate satellite costs currently may be less favorable compared to terrestrial costs than appeared to be the case some years ago."

On November 29, Chairman

James McCormack and President Joseph V. Charyk met in New York City with TV executives of the three major commercial networks—ABC, CBS and NBC—and the new Corporation for Public Broadcasting to discuss a COMSAT system designed primarily to directly serve TV requirements.

On November 5, executives of the American Newspaper Publishers Association, Associated Press, United Press International and the International Press Telecommunications Committee met at COMSAT Headquarters with Corporation officials to discuss how the press might share in the use of a COMSAT domestic system for distribution of national news and pictures.

Led by Chairman McCormack and President Charyk, COMSAT outlined at these and other meetings a concept for a non-exclusive, cooperative domestic communications satellite system.

The system outlined by COMSAT envisioned two in-orbit satellites, each with a capacity of up to 24 color TV channels, and a network of earth stations located across the country. It would be capable of handling all forms of communications.

In explaining its new system approach, COMSAT pointed out that the Delta vehicle, capable of placing about 300 pounds of useful payload into synchronous orbit, has been the basic launch vehicle employed by INTELSAT to date. This kind of payload does not appear to be suitable for a domestic TV distribution task.

The next category of launch vehicle, an Atlas-Centaur or a Titan-Agena, would place about 1,500 pounds into synchronous orbit, which would result in satellites of suitable capacity to handle domestic requirements.

On the ground, COMSAT proposed it build initial send-and-receive stations in the New York and Los Angeles area. It also would construct receive-only stations as required.

At the same time, COMSAT
(See Domestic System, Page 3)

News at a Glance

- COMSAT discusses proposed domestic satellite system with broadcasting CATV and press representatives; awaits report from White House, FCC. (Page 2)

- President Charyk keynotes digital satellite conference, urges early experimentation, use. (Page 5)

- Next launch preparations continue; Delta vehicle modified after recent failures. (Page 8)

- A. Bruce Matthews, Vice President—Finance and Administration, resigns from Corporation. (Page 14)

- ICSC members of the technical staff tour spacecraft facilities on the West Coast. (Page 13)

- Site shielding experiment shows favorable results for use of ground stations for domestic satellite system. (Page 14)

- Brewster Earth Station is back on the air. (Page 12)

- EASCON exhibit demonstrating the double hop satellite circuit is successful. (Page 4)

- L'Enfant Plaza gets a "window to the world" as new antenna is erected on site. (Page 3)

- CEA Chess Club drops its first tournament match with BELLCOM. (Page 16)

- COMSAT opens Alaskan office in Anchorage to coordinate Corporation activities in the area. (Page 4)

December 1969—Year 4, No. 4
COMSAT News is published monthly for employees of the Communications Satellite Corporation by the Information Office COMSAT Building, 950 L'Enfant Plaza South, S.W., Washington, D.C. 20024.

Assistant Vice President
for Public Information:
Matthew Gordon
Editor: Kay Smith

From Page 2

Domestic System

suggested that receive-only stations in the system could be owned by individual bulk users, such as the networks, or they could be jointly owned by a number of large communications users. COMSAT said it remained flexible on how this should be done.

In addition to TV and press representatives, COMSAT also has held discussions with CATV interests, Hughes Sports Network, certain computer service companies interested in wideband channels for high speed data distribution, and others.

COMSAT officials repeatedly have emphasized in the talks that the proposed system would provide a vast capacity at potentially substantial economies. In talks with press representatives, COMSAT pointed out it would accommodate not only the prime needs of the TV networks, but it would have a sizable remaining capacity to handle a variety of other forms of communications, such as distribution of news services, pictures, newsfilm, and facsimile.

The press representatives offered strong support for the system, and said they wished to share in its use. The AP and UPI wrote letters of endorsement to COMSAT, and following the November 5 meeting at COMSAT, representatives of the American Newspaper Publishers Association, International Press Telecommunications Committee, AP and UPI expressed support of the COMSAT proposal.

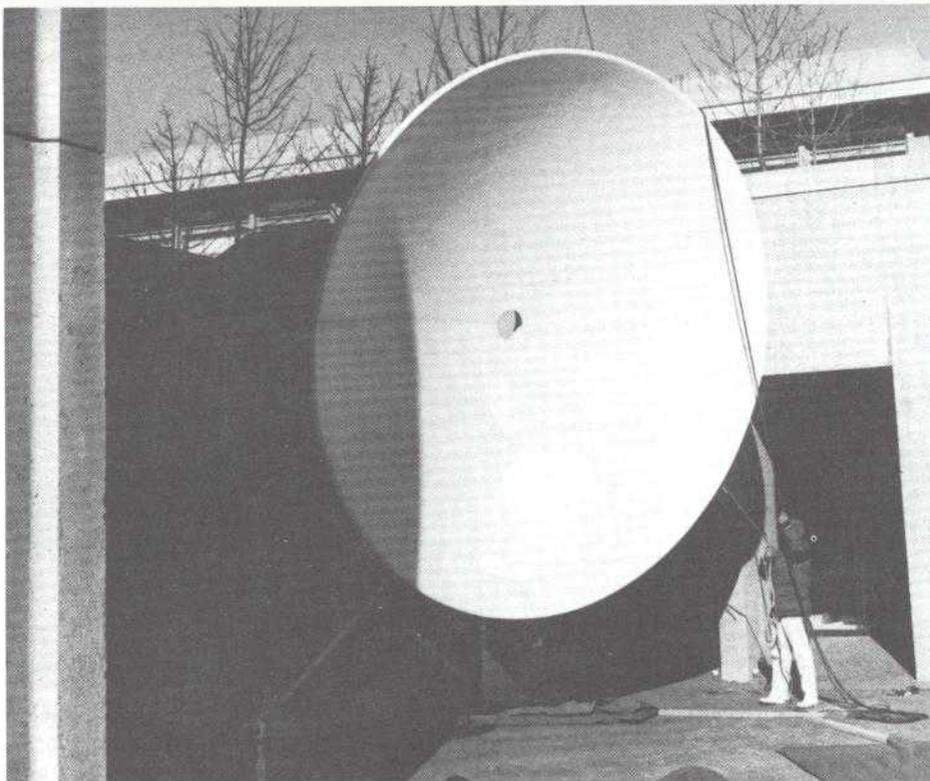
Meetings are continuing between COMSAT and potential users as efforts are made to define the specific requirements of the interested parties.

CEA Football Ties for Third In D.C. League

COMSAT played its first season of recreational ball this year, winding up the football season in a third place tie with HEW.

The Dept. of Labor team took the first place honors by turning in an undefeated season with a record of 7-0. Agriculture posted a 6-1 record to take second place.

There were eight teams participating this season.



A 16-foot antenna is placed in position at L'Enfant Plaza.

Plaza Gets "Window to the World" As Engineers Install Small Station

Using largely shelf-item electronics, COMSAT engineers are putting together a small send-and-receive earth station at the northeast corner of the COMSAT Building in L'Enfant Plaza.

The small transportable station located on the Promenade level is equipped with a 16-foot diameter antenna, and other electronics, to operate with an Atlantic INTELSAT III satellite. The "control room" for associated transmit and receive equipment is adjacent to the antenna.

Project Manager Don S. Kutch, of the Domestic and Special Project Office, Technical, said that equipment for the station—amplifiers, mixers, converters, etc.—were purchased largely from available sources of supply, and these shelf-item components were assembled by COMSAT personnel at the Plaza. The mount for the antenna was designed in-house and fabricated locally.

The station will be used to conduct a variety of tests and experiments in voice, data and telegraphic communications, working through an INTELSAT III Atlantic satellite, either with the Etam, West Virginia, station or on a loop basis.

Tests using conventional and improved FM modems and digital modems will be conducted to develop an optimum configuration. A primary objective is the development of a low cost small terminal that might be employed for a variety of small user applications, perhaps involving unattended operation in a remote area.

Under consideration is the feasibility of moving the facility sometime early next year to Texas to test satellite communication support services for NASA's Manned Spacecraft Center in Houston.

A portion of the INTELSAT III satellite television band will be used for testing when it is not being used for other purposes.

The station fits neatly into a corner at the foot of outside Plaza steps that lead to the Promenade level. The facility is located adjacent to the office of WMATA, which has jurisdiction over Washington's subway system.



Senator Goldwater (R-Ariz.) talks with visitors at COMSAT exhibit.

COMSAT Opens Alaskan Office In Anchorage

Wallace M. Lauterbach, manager of the Brewster Flat earth station for the past four years, has been named Director of COMSAT's Alaskan office, which opened December 1. The office, situated in Anchorage, will coordinate COMSAT activities in the Alaskan area.

In making the announcement, George P. Sampson, Vice President—Operations, noted that construction on two projects in Alaska is now underway: the new earth station near Talkeetna and a land microwave system between the Talkeetna station site and Anchorage.

"In addition to the coordination associated with these two projects" Gen. Sampson said, "the Anchorage office will serve as a COMSAT focal point within Alaska for other communications satellite matters under consideration for application within the state."

"Double Hop" Exhibited at EASCON Sen. Goldwater, Others Test Quality

On October 27, 28 and 29, at the EASCON Convention, held at the Washington Sheraton Park Hotel, COMSAT exhibited a display of the INTELSAT system of satellites and earth stations, and demonstrated the communications capabilities of a double hop satellite circuit.

For the display, one telephone booth was connected via land lines to the Etam earth station, from there via INTELSAT III satellite to the Raisting, West Germany, station then via land lines to the International Telecommunications Center in Frankfurt, where it was looped back via Raisting, the satellite, Etam and terminated at the second booth at the exhibit. The transmission had traveled twice over the satellite, a process referred to as "double hop."

The total distance of circuit miles was approximately 100,000, and yet it took only slightly more than one half a second for speech signals to travel that distance. Double-hop circuits would allow full worldwide communications via satellites, which would benefit many countries.

Engineers and technicians of the Baseband Signal Processing Branch of COMSAT Labs provided the "end" circuitry of telephones, switching, ringing and echo cancellation techniques. The latter is a

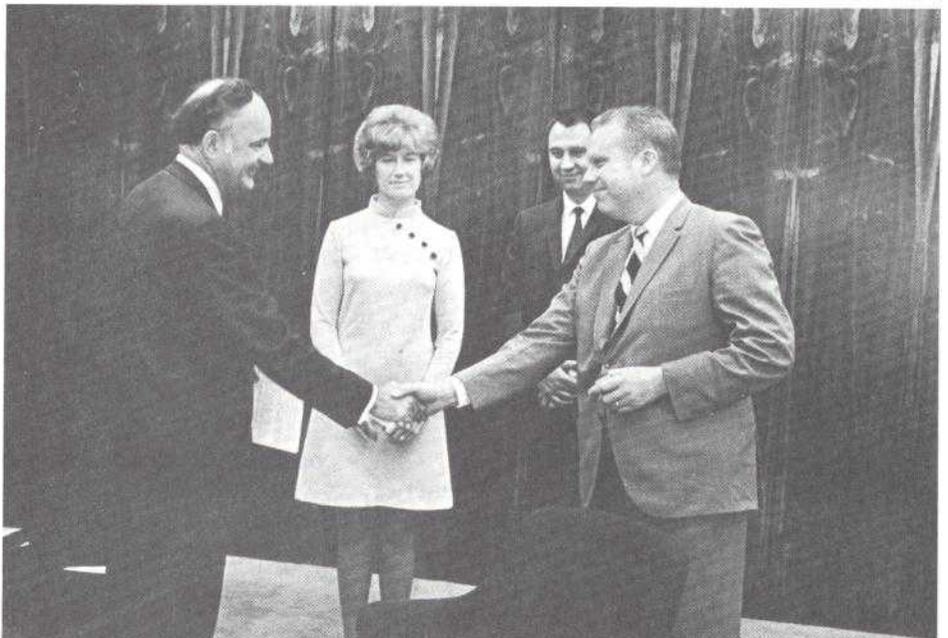
rather new principle which was evaluated subjectively during the exhibit by having people use the circuit and later respond to a questionnaire. Well over 60 percent of respondents rated the circuit "Excellent," about 35 percent said it was "Good," and only a few said it was "Fair."

The highlight of the three day exhibit was the visit by Senator Goldwater, who was impressed with the quality of the circuit.

Double Hop Quality Rating

Visitors to the COMSAT exhibit at EASCON were asked to rate the quality of the circuit they tested. Results of the questionnaire were as follows:

Excellent, 60%; Good, 35%; Fair, 4%; Other, 1%.



President Charyk presents five-year award to Edward Martin, Technical. Also receiving awards are Mary Downs, Credit Union (left), and Janet Yenyo, Operations.

President Charyk Keynotes London Satellite Conference

In a keynote address delivered before the International Conference on Digital Satellite Communication in London on November 25, Dr. Charyk noted that "Digital techniques are in widespread use in various terrestrial applications, but they hold an even greater potential in communications by satellite because of the unprecedented versatility, flexibility, capacity and economies inherent in satellite transmission."

Speaking before more than 500 communications scientists and engineers at the conference sponsored jointly by INTELSAT and the Institution of Electrical Engineers (IEE), he added that "Our task during the next few days is, therefore, to consider not whether but when and how the digital impact will occur on satellite communications."

Dr. Charyk listed five characteristics of digital techniques that seemed to him to be particularly attractive for satellite communications.

First, digital systems offer an opportunity to guarantee any prescribed amount of error control which is obviously essential where integrity of data is essential.

Second, digital systems offer efficiency in the tradeoff between bandwidth and signal-to-noise ratio.

Third, digital systems are flexible. There are many operations of message handling which can be accomplished readily by using digital techniques, but which are extremely cumbersome using analog methods.

Fourth, digital systems have a capability for implementation with rugged and relatively inexpensive circuits requiring minimum maintenance.

Fifth, digital systems have great adaptability to many forms of signal processing.

Subsequently, Dr. Charyk reviewed work that is being pursued at COMSAT in its R&D program. He pointed to the Time Division Multiple Access system which uses pulse code modulation (PCM) and phase shift keyed (PSK) modulation in which as many as 1,350 channels could be passed through a single INTELSAT IV transponder with 8-phase PSK and 1,800 channels with 16-phase PSK. He also described the potentials that can be realized through "demand assignment" with the SPADE system, and the digital communica-

tions system for color television being developed which offers the possibility of transmitting via satellite two television channels with the bandwidth and power which otherwise would be used to transmit one channel.

Dr. Charyk also said that "We are studying digital traffic handling techniques which will speed the day when communications satellites will be the traffic processing and relaying centers in the sky, providing a broad class of service to a multitude of users."

BACKGROUND

Telephone conversations and television, as we normally encounter them, are transmitted in analog form. These signals can, however, be converted for transmission into numerals (digital form) representing the original signals.

In closing, Dr. Charyk cautioned that "the technology for digital satellite communications is here. The market potential is here, but so are a number of nontechnical problems (such as the need for standard national coding structures and international cooperation and agreement on machine language.) How soon we tap that potential (digital satellite communications), he concluded, "will depend as much upon the speed with which we can solve practical administrative problems, as upon technical effort."



The Working Group on Legal Matters of the Preparatory Committee of the Plenipotentiary Conference on Definitive Arrangements for INTEL-SAT met in Washington from Nov. 12-28. Chairman Ashley Greenwood, M.C. of the United Kingdom (center, holding paper), chaired the committee.



Lowell Doud, U.S. State Dept. (left), and William English, COMSAT Assistant General Counsel for International Matters, discuss a legal issue under consideration by the members of the legal committee in session.



The Jondahl's hosted a farewell party for the Skrobans . . .

"Ecos de la Montana"

Cayey CEA Coordinates Activities

By Luis Rodriguez

The Cayey CEA has been very active lately with planning and carrying out tournaments and parties for Cayey employees.

One activity that attracted several persons was the domino tournament, in which five teams entered into competition in October. The standing after the first round was as follows: first, L. Rodriguez and J. Martin; second, L. Jondahl and J. Rirado; third, L. Maldonade and L. Medina; fourth, M. Lopez and E. Rodriguez, and fifth, J. Castanera and A. Reyes.

Following the first round there was a playoff between the second and third place teams. Jondahl and Rirado were defeated by Maldonado and Medina, who then went on to defeat the first round champions, Rodriguez and Martin.

Two birthday parties were also held for Cayey personnel. The first one was in honor of Agustin Ferrer and Herman Ramos. A luncheon was served in their honor, and they were sung a beautiful rendition of Happy Birthday by the other employees.

A second celebration was held for the birthdays of Paul McGranahan and Elfren Castro. A delicious cake was baked by Mrs. Lee Jondahl, and coffee and refreshments were shared with station personnel.

Promotions

Robert Smith was promoted

from Senior Technician to Operations Supervisor. Three Technicians, Paul McGranahan, Efrain Flores and Jose Negron, were promoted to the status of Senior Technicians.

News about People

Juan and Edith Sierra are the proud parents of a girl, Sandra Lee, born on September 13. She weighed 6 pounds 10½ ounces at birth. Congratulations to the Sierras.

A farewell party was given for the Richard Skrobans, who departed for Washington Headquarters in October. The party was given at the Lee Jondahl's house. A beautiful flower vase and a

traveling kit were presented to Dick Skroban and his wife on behalf of the CCEA members.

Training

Mr. Frank Falmar, Operations Supervisor and Station Safety Officer, attended a one week First Aid Methods Course sponsored by the Bureau of Accident Prevention, P.R. Department of Labor. A certificate of course completion was given to Mr. Falmar.

Juan Castanera and Luis Rodriguez attended a one day Personnel Management Seminar. The Job Evaluation seminar was sponsored by P.R. Economic Development Society for Personnel Management and the Manufacturers Association on November 5 at the Sheraton Hotel. Representatives from several industries and banks participated.

Valuable Stamps

The Cayey Station sent over 140 letters to stamp collectors on November 14, containing the stamp commemoration of the Apollo 12 launching. Of these, two went to Canada, 23 to West Germany and the remainder to the U.S. mainland.

"Tippy Canoe"

Juan Castanera, Station Manager, is the proud owner of an Indian canoe he ordered from the mainland. Mr. Castanera, who is a very active fisherman, decided to try his canoe on a recent Sunday. So, he and Jon Gonzalez, Operations Supervisor, took off for Lake Patillas. It so happens that on that particular day one of the worst rain storms in many many years hit Puerto Rico. Hmmm . . . next time, Juan.



. . . the Skrobans opened their gifts from fellow employees.

Service Centers Now Coordinated; Mrs. Whitehead Appointed Manager

For those wondering what the recent construction near the service center on the fourth floor was all about, it was to create an office for Mrs. Theresa Whitehead, who has been appointed to the new position of Branch Manager in charge of Service Centers.

Mrs. Whitehead, who came to COMSAT a year ago last September, started as a service center operator on the fourth floor. She was in charge of one of the six service centers, one of which is located on each floor of the COMSAT Building.

The concept of placing a service center on each floor has worked out quite well for COMSAT, according to Paul Eckley, Director of the Management Services Division. Each center is in charge of stocking and distributing supplies as well as performing mail collection and distribution. Because there are a number of service centers, the operation of each can be tailored to meet the needs of the offices it serves.

The key to Mrs. Whitehead's success with center operation is a relatively simple one—efficient, good quality service. So, it was logical to introduce her operational concept into all the centers, a task she is now appointed to carry out.

As Branch Manager, Mrs. Whitehead sees the service centers as performing these basic functions: stocking supplies and filling requisitions, providing sufficient service and operating the mail pick-up and delivery system.

She described the main goal of the centers right now as better and faster service. She also commented that "the service center concept is dependent on the people who run it, and therefore only they can make it work."

Mrs. Whitehead added that she welcomed comments and criticisms about the center operations and would do her best to fulfill employee requests for service.

During her hours away from COMSAT, the cheerful Mrs. Whitehead uses her talents and energies for, among other things, singing. She has been singing for the past 24 years with the choir of the Bible Way Church, World Wide, Inc., located at 1130 New Jersey

Avenue in northwest Washington.

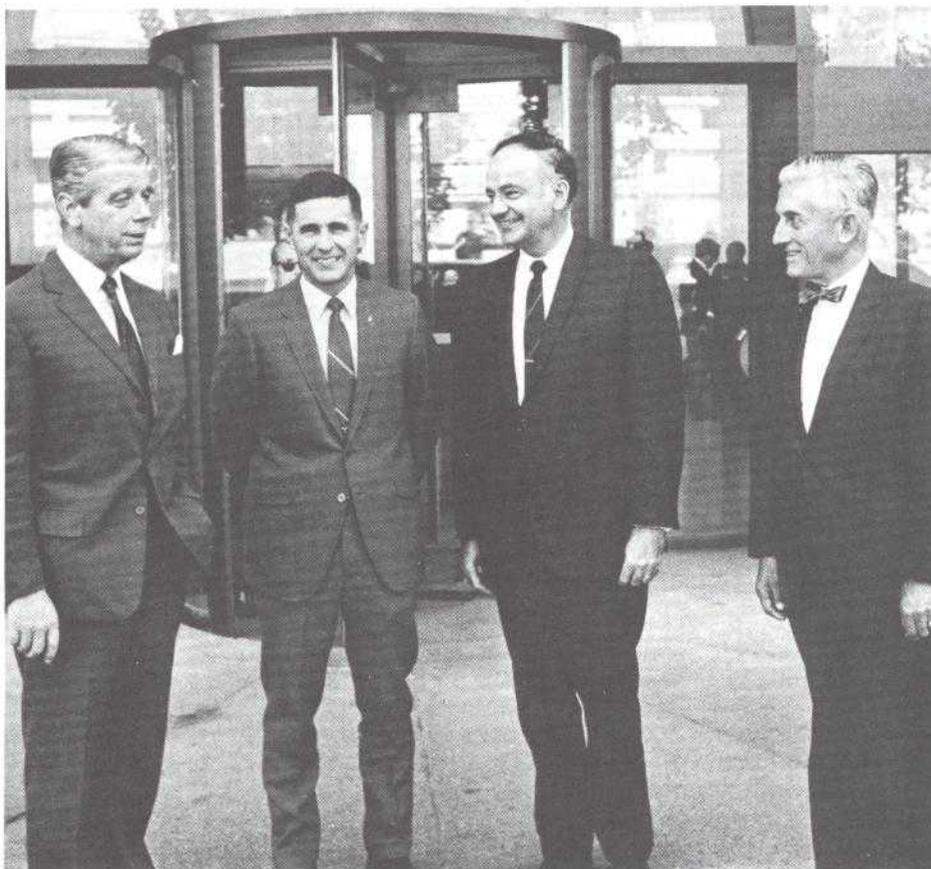
The choir, under the direction of Mrs. Whitehead and guidance of Bishop Smallwood E. Williams, Th.DD., made a recording entitled "Father and Son, God Will Help You," distributed by Golden Rule Recording Co. Mrs. Whitehead sings the solo on one side of the record and the pastor's son, Albert Williams, performs the sermons on the other.

One song entitled "I Sing" was dedicated to Hubert Humphrey during his 1968 campaign for the U.S. Presidency. The song was dedicated as a symbol of his supporters' hopes for Humphrey's election.

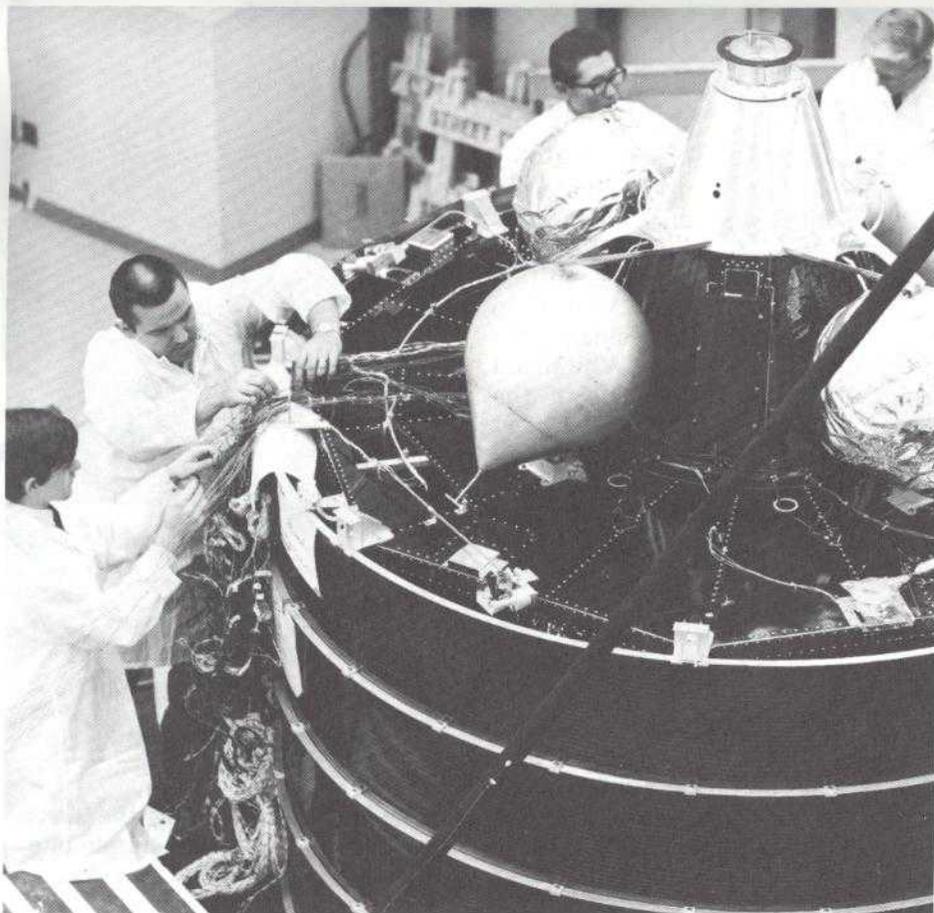
Mrs. Whitehead, who has been a member of this immediate church for 24 years and is highly respected in many capacities, said the religious recording is "doing quite well."



"The key to managing the service centers is a relatively simple one—efficient, good quality service."



Chatting with Chairman James McCormack (left) and President Joseph V. Charyk (third from left) is William A. Anders, (second from left) Executive Secretary of the National Aeronautics and Space Council and pilot of the Apollo 8 Lunar Module from which television transmission was broadcast to earth on Christmas eve, 1968, and Captain Winfred Berg (right), Senior Staff Assistant of the Council. Both visitors were at COMSAT Headquarters for briefings on satellite communications.



Technicians assemble wire harnesses to be used for conducting heat sensors during tests on the INTELSAT IV satellite. The Space Systems Division of Hughes Aircraft Company, El Segundo, California, is producing the Series IV satellite, planned for launch in the next series.

Next Launch Plans Taking Shape; COMSAT Insures 75% Investment

An important expansion of global satellite system capacity is due early next month with the launch of the sixth satellite in the INTELSAT III series.

Delta launch vehicle No. 75, modified as a result of recent experience in the Delta program, is scheduled to launch the satellite from Cape Kennedy no earlier than January 7.

After an investigation of two recent Delta failures, the National Aeronautics and Space Administration cleared the Deltas in November and resumed Delta operations at Cape Kennedy on November 21 with the successful launch of a British Skynet satellite aboard Delta No. 74.

The forthcoming INTELSAT launch is intended to place another Series III satellite in synchronous orbit over the Atlantic Ocean where it will augment the present Series III satellite there. The seventh satellite in the III series,

planned for launch later this winter, also is intended for an Atlantic station. INTELSAT III series satellites over the Atlantic, Pacific and Indian Oceans are providing full-time global coverage to a growing number of earth stations in the system.

For the sixth launch, COMSAT has insured 75 percent of its investment in the satellite and launch. In the event of a launch failure, COMSAT would recover about \$4.5 million, or 75 percent of its approximately \$6 million investment in the satellite and launch.

The investment by other participants in INTELSAT is not insured because the ICSC decided that INTELSAT should be a self-insurer. COMSAT, however, elected to obtain insurance for its portion of the investment costs.

The coverage negotiated by COMSAT through its insurance broker, Marsh & McLennan, in-

sured the Corporation against more than a normal number of failures among the first six launches in the INTELSAT III series. The probability of two failures among the first six launched was considered normal, and the insurance was negotiated to cover up to two failures beyond the two "normal" ones.

Since the second launch failure did not occur until the fifth launch last July 25, the sixth launch is the first for which insurance benefits will be payable upon a failure. No Series III launches beyond the sixth are insured.

Two NASA teams reviewed the July 25 launch failure (Delta No. 71) as well as the failure of Delta No. 73 on August 27 during the Pioneer E mission.

NASA reported that the Delta No. 71 failure was "associated with the third stage TE 364 motor believed to have failed as the result of a rupture of the motor case or failure of the nozzle."

Modifications ordered for the Delta as a result of the No. 71 failure include the addition of internal insulation, plus motor X-rays and additional pressure tests at the launch site, NASA said.

The failure of Delta No. 73 was found to have been caused by a malfunction of the first stage hydraulic system due to a chattering or vibrating relief valve resulting in a hydraulic fluid leak. Hydraulic fluid and pressure were lost, causing the vehicle to veer off course.

As a result, modifications to the Delta vehicles include the installation of specially tested and selected valves and new acceptance tests for the hydraulic system.

Meanwhile NASA is continuing an overall review of the Delta program, especially regarding opportunities for improved management, failure reporting, manufacturing and testing procedures, and improved liaison between contractors and NASA.

Another Delta modification for the forthcoming INTELSAT launch is the installation of third-stage telemetry equipment. The flight path for the launch has been modified to eliminate the cost and weight disadvantages previously associated with third-stage telemetry on INTELSAT launches.

The absence of third-stage telemetry on Delta No. 71 made it more difficult to determine the cause of that failure.

News of People At Headquarters

By Laura Weldon

What did you do on your vacation? Gayle Garrett (Technical) spent part of her's rubbing brasses in the church of St. Petrox, Dartmouth, Devon, and at Wells Cathedral, Somerset, England. Rubbing brasses is not the same as polishing them, though this is one by-product of the work. Brasses (monumental brass plates sometimes marking a grave) are rubbed by applying a wax like substance called heelball to paper or cloth stretched over the plate. After a couple of hours of rubbing, an impression appears on the paper and if the brass is in a good state of preservation, the impression may be remarkably detailed. The resulting picture, be it of a 14th century knight or an anonymous Elizabethan merchant, is a unique decorative object as well as an interesting historical footnote.

Good Policy

It has been a long time since I heard that old expression "Honesty is the best policy," but apparently it is still around. For Mr. Wilbert Zarecor, Technical, honesty did prove worthwhile. Mr. Zarecor found a purse belonging to a Belgian citizen and returned it to the Belgium Embassy. For this, Mr. Zarecor received a gracious letter of thanks and two books from the Embassy.

Personals

Paul Griffith (Procurement) has just returned from a week's vacation in the Bahamas with his new bride.

Margaret Walker (Planning & Research) will be spending Christmas in Houston, Texas, with her daughter.

Rock Mattos and Rick Cornelius formerly of O&MP have transferred to the Procurement Department. Mr. Mattos is presently a procurement officer and Mr. Cornelius is a procurement officer trainee.

The Pete Reynards, Technical, had their third child in October, a boy.

Anthony Corio, Technical, was married recently to the former Maria Krug. The newlyweds spent their honeymoon in California.



Dr. Charyk presents Corrinne Tuozzo, who resigned, with silver candelabras on behalf of other 8th floor personnel.

Corrinne Tuozzo Resigns

All of the employees of the 8th floor will notice a definite void with the departure of Corrinne Tuozzo. Corrinne resigned from the Corporation on November 21, after serving almost six years as Executive Suite Receptionist. Several farewell parties were held in Corrinne's honor, and Dr. Charyk presented her with two lovely sterling silver candelabras as a parting gift from everyone on the 8th floor. Corrinne resigned in order to stay home with her family, but she promises to keep in touch.

Library At Your Service

The COMSAT Central Library is here to serve you. It is located

in room 4165 at the Plaza. Mrs. Joan Koehler and Miss Elizabeth Preston are available to assist you in selecting proper information sources. The collection of books and journals is varied with the primary emphasis on electronics, engineering, telecommunications, mathematics and business. In addition the library has government reports, reference material, various technical meeting proceedings, university bulletins and selected literature from the International Telecommunications Union, including the CCIR and CCITT Plenary Assembly reports. If the material you require is not in the library, the library will try to obtain it for you.

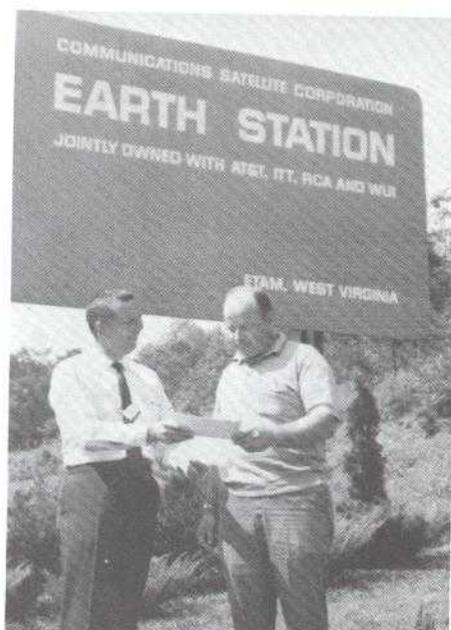
CEA Hold Christmas Dinner Dance

Six hundred people are expected to attend the annual Christmas Dinner Dance Saturday, December 13, 1969, at the Sheraton-Park Hotel. A wide variety of delicious cocktails will be served in the Virginia Suite from 7 p.m. to 8 p.m., and a gourmet candlelight dinner at 8 consists of fresh Hawaiian pineapple appetizer, braised beef au vin rouge, Duchesse potatoes, string beans almondine, mixed green salad and Cheshire cheese dressing, ice cream bombe cardinale with cherry sauce and coffee or tea. The ten-piece orchestra of Paul Day, brought back by the popular demand of dancers at last year's dinner dance, will play for four hours of dancing from 9 p.m. to 1 a.m. There will be no formal program scheduled.

The Christmas theme is carried out in red and white, which includes a flower and candle centerpiece on each table, purchased by COMSAT, and will be taken home by one lucky person at each table. The dress is black tie (optional).

William Kaht, CEA President, an dMiss Betty Stover, CEA Social Chairman, said that this party will be the best ever held and the last social function planned by the current board of directors, since a new board will be elected soon.

For those employees attending—you should have an evening to remember.



Samuel St. Clair (right) receives his safety award from Station Manager William Carroll.

Credit Union Ends 2nd Year, Nears One Million Mark in Loans

The COMSAT Credit Union completed its second year of operations in October, 1969. The following statistics help to show how successful these two years have been:

	October 1967	October 1968	October 1969
Numbers of Members	212	466	740
Total Shares	\$6,159	\$133,847	\$397,229
Total Number of Loans Made	4	328	809
Total Value of Loans Made	\$900	\$242,244	\$800,080

These phenomenal results have been made possible by the efforts of interested fellow employees as well as significant corporate support.

60% of all COMSAT employees belong to the Credit Union and save money earning 5½% yearly. They borrow at interest rates of 9% and 12% yearly for secured and signature loans respectively. If any employee is interested in learning more about the Credit Union, he can call Mary Downs, Office Manager, at extension 6638.

News and Notes From Etam

Training Exchange Helps Operations

By Penny Chidester and Deloris Goodwin

Robert Smith, Operations Supervisor of the Cayey earth station, visited Etam for two weeks of training. Mr. Stotler, from the Training Department at COMSAT Headquarters, accompanied Mr. Smith to the station. During his stay, Mr. Smith exchanged ideas with Etam personnel, and also proved to be valuable with the daily operations of the station.

A senior technician from the Cayey earth station, John Gonzalez, visited Etam during October. The purpose of his two-week stay was to obtain some additional training for operations at Cayey. We hope both Mr. Smith and Mr. Gonzalez had an enjoyable and profitable stay.

Roger Parsons, Etam Station Engineer, spent the last week of October at the Jamesburg Station exchanging operational ideas with engineers there. He thought the visit was valuable and brought back with him several ideas to consider for our operations.

Personnel Notes

Miss Penelope Louise Chidester of Albright, West Virginia, joined COMSAT in September as our station secretary. Penny is a 1969 graduate of Kingwood High School and enjoys sports of all kinds, particularly football. When asked how she likes working for COMSAT, she answered, "It's wonderful!"

Two Etam Technicians, Don Gaston and William Mayes, were recently promoted to Senior Technicians. Both Mr. Gaston and Mr. Mayes deserve congratulations for their good work.

Alan Allen, Electronic Technician, resigned from his position in Operations to continue his military career in the United States Army. We want to wish Mr. Allen good luck with his new career.

William Mayes, Senior Technician, was married the last weekend of October. He and his bride, Brenda, have the best wishes from all of us at Etam.

Thanksgiving Dinner Held

The Etam CEA held a Thanksgiving dinner on November 23 at the Community building in Kingwood. The 65 people who attended the dinner shared in the traditional Thanksgiving dinner, with all the delicious trimmings. Another dinner is being planned for the Christmas holidays.

Safety Awards Presented

Two awards were presented recently to Etam personnel for suggestions. Samuel St. Clair suggested that the door on the elevation silicon control rectifier cabinet be hinged on the right side instead of the left side for personnel safety.

The second award went to Wil-

that proper floodlighting be established at the gatehouse.

Both awards, each worth \$5, were presented by Station Manager William Carroll.

The Safety Committee is now busily engaged in preparing a half-hour presentation on winter driving. It is hoped that the presentation will promote better attitudes toward safety.

Donald McKenzie, Administrator at Jamesburg, Dies

Mr. Donald McKenzie, Jr., Jamesburg Station Administrator, suffered an apparent heart attack while attending a high school football game on Friday, November 14. Mr. McKenzie, who did not recover from the seizure, was taken to the hospital, where he was pronounced dead upon arrival.

Mr. McKenzie, 51, had been with the Corporation since September of 1967, when he was hired as Station Administrator. He had been previously self-employed.

The immediate family surviving Mr. McKenzie include his wife, Jean; two daughters: Mrs. David Hoover and Sally McKenzie; and two sons: Scott and Stewart, who is on duty with the USS Coral Sea.

The family requested that any gift condolences be given as contributions to the Heart or Cancer

Danish Students, Teachers Tour COMSAT Labs

COMSAT Labs was host on October 29 to a group of 40 electrical engineering students and two professors, Dr. Apple-Hansen and H. Lottrup Knudsen, from the Technical University of Denmark, Lyngby, Denmark. The students visited the laboratories as part of a three-week study tour to Canada and the United States.

The students, whose interests include low noise amplifier work, antenna projects, physics and operational research, were divided into four groups and briefed on Lab activities in these areas by representatives from the RF Transmission Laboratory, the Spacecraft Laboratory, and the Physics Laboratory.

Dr. Joseph Engel, Director of Planning Research and Services at the Plaza, briefed part of the group on operational research. Following this the students were given a general tour of the facility.

COMSAT Lets Contract for Small Stations

COMSAT recently contracted with Raytheon Company for three transportable earth stations for satellite communications at a fixed price of \$724,716.

The proposed contract was filed with the Federal Communications Commission in conformity with FCC procurement rules.

The small aperture earth stations, equipped with 32-foot diameter antennas, are designed as receiver-only stations for television and other communications. Plug-in transmit capability can be added if required.

COMSAT said the stations can be used for satellite tests and demonstrations in a variety of ways, including operation in a proposed demonstration program for Alaska.

The facilities will be designed so they can be packaged and transported to different sites. They will be capable of working with INTEL-SAT satellites. Applications Technology Satellites (ATS) and satellites in a U.S. domestic program.



Marty Levine, Finance, assists Emogene Madison, Receptionist, as she draws the name of the first winner in the UGF Campaign Sweepstakes.

UGF Campaign Brings in \$18,380; Sweepstake Winners Take Prizes

The 1969 UGF Campaign came to a successful close on November 14, with contributions by COMSAT employees totaling \$18,380. This was \$3,032 more than the previous year's total of \$15,348.

The sweepstakes, held in conjunction with the campaign, offered enticing bonuses to those participating. For the winners in each the non-exempt and the exempt categories, the first prize was an extra week's paid vacation in 1970; second prize, an extra three days paid vacation, and third prize, dinner for two at the restaurant of the winner's choice.

The lucky winners were: non-exempt: first, Bonnie Nix; second, Mary Breen, and third, Ruth Sickel; exempt winners were first, Kay Smith; second, Donald Ross, and third, Lawrence Gray. These people all agreed, "Happiness is giving to UGF!"



Artist's rendering of transportable station which Raytheon will build

News and Notes From Brewster

Resumption of Service Is Celebrated

A cocktail party was held on September 20 at Paul's in Okanogan to celebrate the "Resurrection" of the Brewster Flat earth station. The shift schedule enabled almost everyone to attend. We danced to the music of the B Flats and enjoyed delicious and varied refreshments. If smiles and laughter are an indication of a successful party, this was definitely a success.

Promotions

There have been several promotions since Brewster last spoke out and let the other COMSAT people in on the local news: John Hewitt is Electronics Maintenance Supervisor, Lloyd Mathews is Chief Station Engineer, Jim Erskine is Facilities Engineer and Dick Eliason and Tom Cheeseman are Operations Supervisors. While we may be remote and small in size, we don't stand still.

Several COMSAT families are expecting additions to their families in the near future. Babies are a joy and a pleasure if you overlook those "rare" moments that sometime come in the middle of

the night. We feel certain that Don and June Allen have had a few of these moments since the arrival of their second child, a son, in July as well as Jim and Connie Peasley who welcomed another little girl in September.

Personnel Changes

Two former Brewster employees have transferred to COMSAT Labs. Jim Warren left us the first of July and Tom Schultz departed the latter part of October.

We welcome Jerry Bowes, Supply Technician, into our COMSAT family. He, his wife Deanne and two children have settled into their new home in Okanogan.

Sportscast First

Brewster, Jamesburg and Paumalu together participated in another "first" on October 12 when dual live TV programs (football and World Series) were transmitted simultaneously from Brewster and Jamesburg to Paumalu. Not long ago, Hawaii had to get its sports second hand, and now, look! Two sports to choose from at the same time.

Irving Novgrod, Engineer, Dies

Irving Novgrod, U.S. Army Retired and an engineer with COMSAT, died during the night of November 19 at King Edward's Hospital in Bermuda. His death was caused by complications of injuries incurred in an accident and a series of heart attacks.

Mr. Novgrod had been participating in a tennis tournament in Bermuda during the Veteran's Day weekend when the accident occurred. His wife, Vivian, arrived in Bermuda shortly after she had been notified of his state. He did not regain consciousness before his death eight days later. He was buried in Arlington Cemetery on Monday November 24.

Recently promoted to Senior Staff Engineer, Mr. Novgrod had been with the Corporation since May 1965. Since that time he had been a member of the Operations Division.

Surviving him are his wife, Vivian; his two sons, Robert John and Peter; his mother, Mrs. Fanny Novgrod, and a sister, Mrs. Skolnick.

News and Notes from Paumalu—



Hawaiians enjoy picnic frolic.

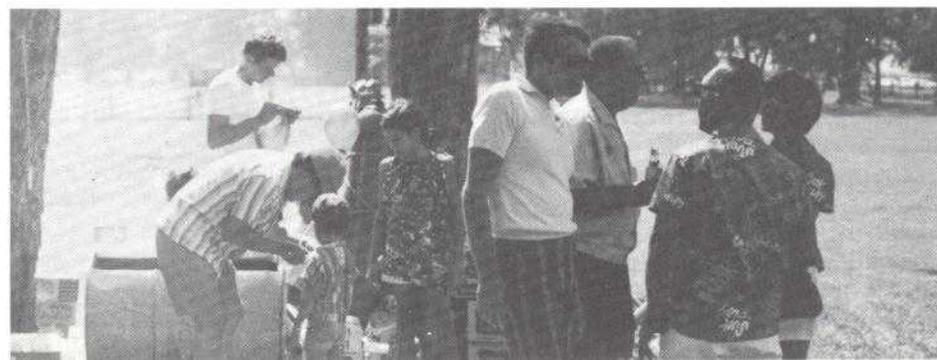
"Anytime is picnic time in Hawaii"

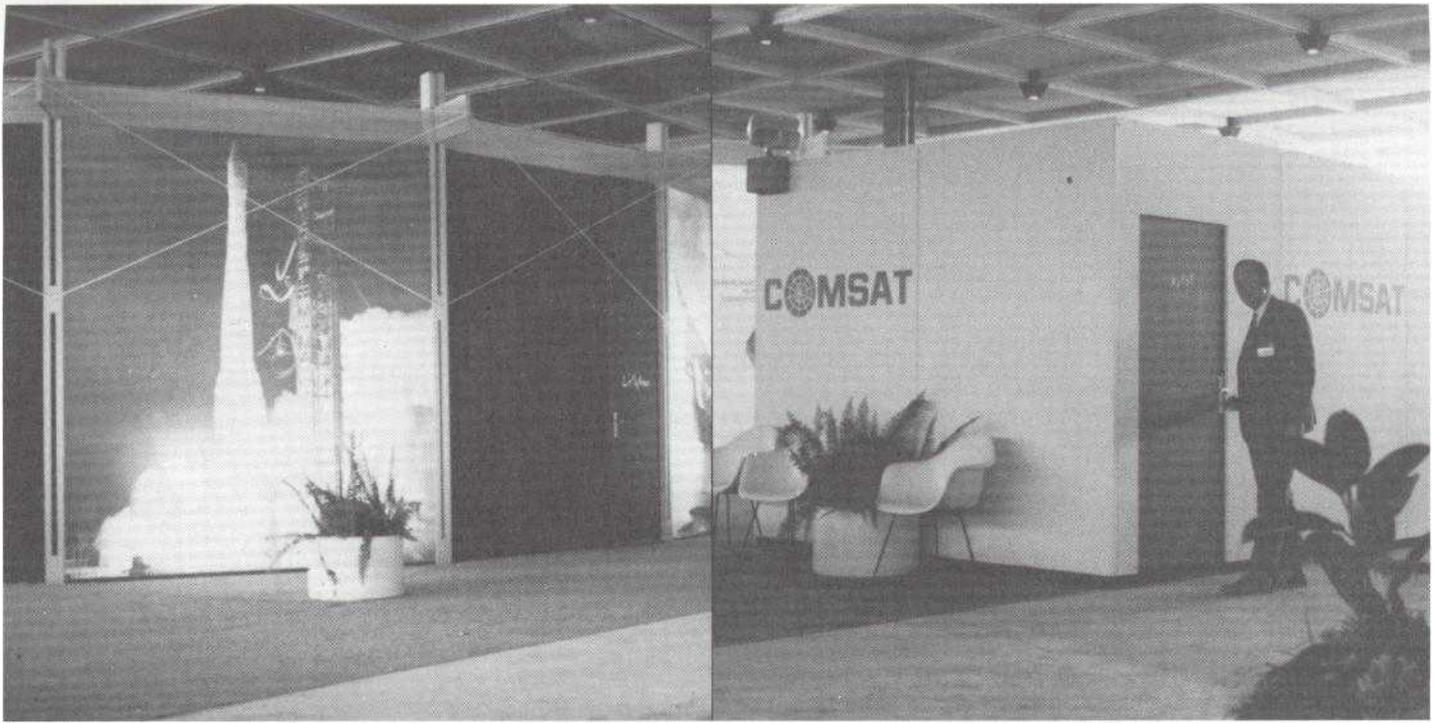
This is how most of us who have lived and worked in Hawaii long enough to consider ourselves permanent residents feel—that whether it be January, June, or October—anytime of the year is ideal to have a picnic in Hawaii.

With this in mind the traditional "Summer Picnic" was hosted by the Paumalu branch of the CEA for station employees and their families on Saturday, October 25. The site was Puuiki Beach Pavilion, a private picnic ground, in Waialua, located 12 miles from the station.

Some 30 employees and their families enjoyed a day filled with lots of "kau kau" (For the uninitiated that's Hawaiian for "food"), cold refreshments, games for young and old, and good fellowship. An abundance of sunshine provided good swimming weather.

Charlie Ogata, Operation Team Supervisor, and his wife, Ruth, coordinated the details for the picnic. They were ably assisted by Technician Bill Osborn, Ken Elder, Dan Geer, Ken Yamashita, and John Gray.



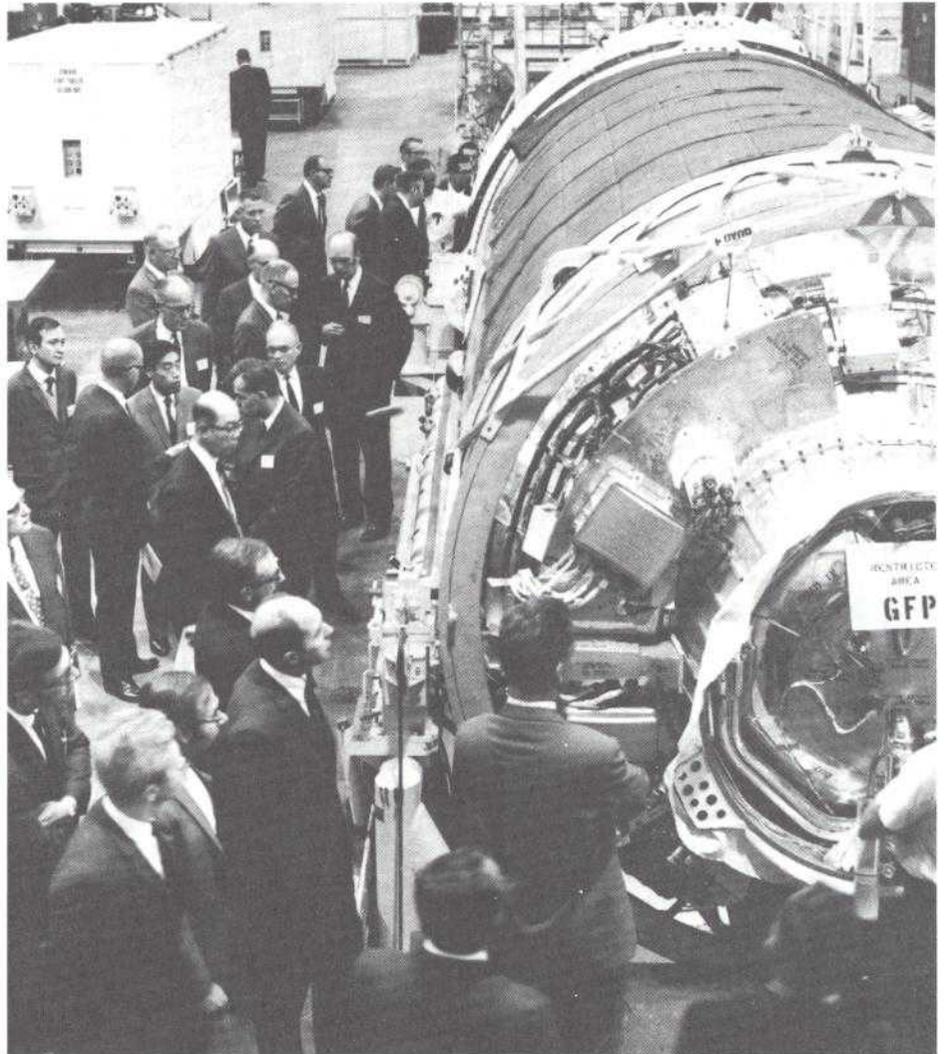


ICSC Members Visit Western Spacecraft Firms

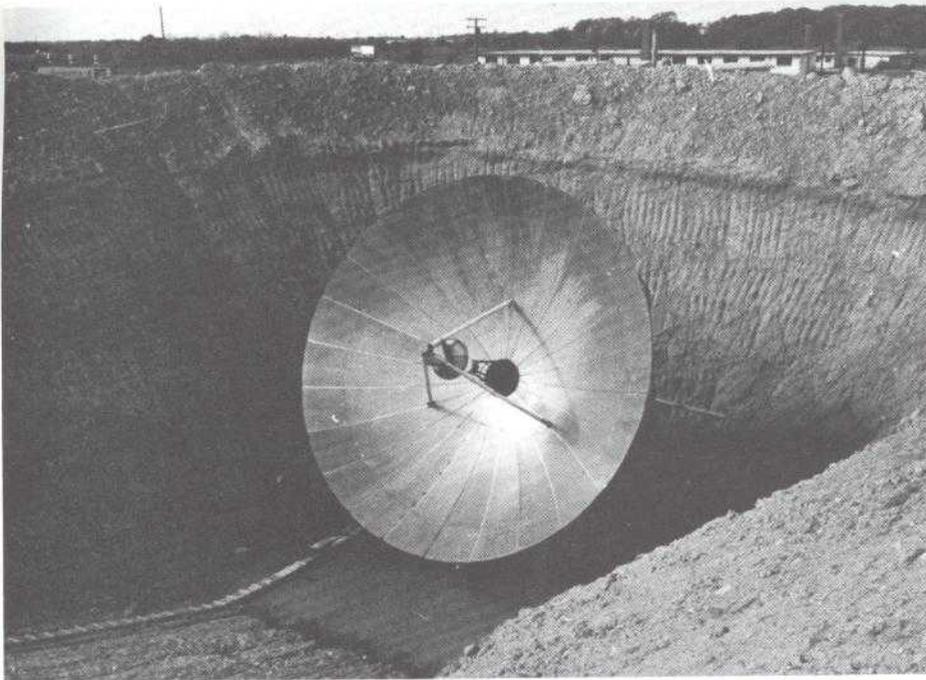
Members of the technical subcommittee of the ICSC toured INTELSAT contractors plants in California on November 6 and 7. The tour included General Dynamics—Convair Division in San Diego, which makes the Atlas Centaur launch vehicle planned for use in the INTELSAT IV series, and Hughes Aircraft Company in Los Angeles, prime contractor for the INTELSAT IV spacecraft.

Several COMSAT employees took part in the tour, held in conjunction with a conference of the London Working Group convening in San Diego. COMSAT participants were: Wilbur Pritchard, Director, COMSAT Labs; Lewis C. Meyer, Assistant Vice President for Management Review and Coordination; E. N. Wright, assistant to the Vice President—Technical; Reinhart Stamminger, Manager, Spacecraft Utilization Dept.; Clarence Blackwell, Manager Terrestrial Interface and Earth Station Dept.; Michael Waldman, Operations; Arnold Berman, Branch Manager, RF Transmission Lab; Joe Pelton, IAD; Martin Votaw, Director, Space Segment Implementation Division; E. T. Jilg, Deputy Director, Space Segment Implementation Division; Simon Bennett, Manager, Radio Frequen-

The COMSAT-INTELSAT story was presented in a three-screen audio visual production at the Second Annual Asian International Trade Fair in Tehran, Iran, October 5-24. On the left is pictured the display at the COMSAT Theater entrance, and on the right Jim Kilcoyne, Information, who acted as manager for the exhibit, enters the exhibit office.



Members of COMSAT Technical Division and of the ICSC London Working Group examine the Atlas Centaur launch vehicle being assembled at



Portable antenna on site in Illinois for artificial shielding experiment.

Site Shielding Experiment Shows Favorable Results

Late last summer work began on a strange looking excavation at the Andrew "Nike Site" in Orland Park, Illinois (formerly a Nike Missile Site). Local residents, used to strange looking pieces of metal being moved around the Andrew antenna factory, were bewildered when a large crane lowered a 32-foot diameter antenna into the hole. When the antenna was attached to a concrete and steel support located at the bottom of the 160 by 90 by 40 foot deep oval hole, a group of COMSAT engineers were on hand to begin measurements of the effects of artificial site shielding.

The hole was designed by Ed Lucia, Domestic and Special Project Office, to be the minimum size excavation capable of enclosing on all four sides a 32-foot diameter antenna, and still permit visibility of the synchronous satellite arc. The antenna is the kind that would be used as a receive only station for a domestic satellite system. The purpose of the antenna/hole combination was to determine if artificial site shielding would provide sufficient protection from possible interference coming from terrestrial radio-relay stations which transmit in the 4 GHz band.

A small rented van truck was converted into a mobile test transmitter by removing its rear doors

and mounting a 6-foot dish over the rear bumper. It was then loaded with a portable generator and other equipment necessary for transmitting an un-modulated carrier in the 4 GHz band. Receive equipment was placed behind the feed of the 32-foot antenna.

With the help of Jack Beyer, Domestic and Special Project Office, and John Stein, a co-op student from Drexel, and several Andrew personnel, measurements were made of the shielding effects of the hole. This was accomplished by sending a signal from the transmitter van which was located several miles away at various angles around the excavation, and measuring the receive signal strength as compared to a standard gain horn. These measurements of the antenna/hole combination give an indication of protection from interference.

Initial reduction of the measurement data indicates that the hole offers in the neighborhood of 30 db of protection, although a careful analysis of the data is not complete. The results of the measurement test indicates that a small station could be located much closer to certain major metropolitan areas than is now possible, leading to substantial savings in terrestrial tie in costs.



A. B. Matthews Resigns to Join Firm in Chicago

A. Bruce Matthews has resigned as COMSAT's Vice President—Finance and Administration to join Bliss & Laughlin Industries, Inc., a highly diversified manufacturing company headquartered in Chicago.

The election of Mr. Matthews to the new position of Executive Vice President of Bliss & Laughlin was announced December 4 by the board of directors of that company. He will assume his new duties at the end of this year.

Mr. Matthews joined COMSAT in October 1965 as Financial Vice President, later assuming the additional responsibilities of Vice President—Finance and Administration.

Prior to joining COMSAT, he was a partner in Arthur Andersen & Co., the international firm of certified public accountants.

In 1945, Mr. Matthews began a 20-year association with Arthur Andersen & Co. in its Detroit office. In 1956 he was admitted to partnership in the firm and placed in charge of the Denver office which he headed until he joined COMSAT.

He is a Director of the American Security Corporation of Washington, D.C., a Trustee of the National Symphony Orchestra of Washington, a Director of the Big Brothers of the Nation's Capital, a member of the National Executive Committee of Junior Achievement, Inc., and National Treasurer of the Partners of the Alliance.

Two Recover from Heart Attack, Auto Accident

Robert Tuohy, Operations, suffered a heart attack on Wednesday, November 12, while working at Headquarters. When Operations personnel realized his apparent attack, they called the Corporation nurse, Miss Hazel Durant, R.N. She supplied Mr. Tuohy with oxygen and emergency treatment until the ambulance arrived and the attendants took over.

Mr. Tuohy was taken to the Naval Dispensary at 18th and Constitution, where he was given preliminary treatment. He was later taken to Bethesda Naval Hospital and placed in the intensive care unit.

Since then, Mr. Tuohy has not had recurring attacks and has been transferred to Ward 3-B, where he is reported to be recuperating and in satisfactory condition.

Larry Covert, Operations, reported that Mr. Tuohy's physician was not able to estimate when he would return to work.

Larry O'Hara, also of Operations, was involved in a car accident on the weekend of November 8. He was traveling along George Washington Parkway during the evening hours, when he lost control of his car and skidded off the parkway into a wooded area.

As a result of the accident, Mr. O'Hara was treated for broken ribs and jaw and released from the hospital. He remained at home for the next two weeks and returned to a light work load just following Thanksgiving.

News and Notes From Jamesburg

Jamesburg CEA Elects H. McClure

By M. Lee Dorsey

Members of the Jamesburg CEA recently elected new officers, who were installed in office in October. Harold McClure was elected President, and Jack Ramey was elected as Vice President. Other officers are Al Eleshio, who is Vice President-Athletic; Jim Shaff, Vice President-Social, and Pat Blatnik, Treasurer.

Visitors

Mr. Vincent C. Nsomi, Postmaster General of Zambia, visited the Jamesburg station, accompanied by a State Department escort, James Goodwin. Mr. Nsomi is responsible for all postal affairs and telecommunications in Zambia.

A State Forestry Department supervisor and employees now working in the Jamesburg area were given a tour of the station by Walter Robinson, our Facilities Engineer. The tour was conducted in the interest of promoting cooperation for fire fighting and rescue services.

James Hepburn, Vice President, RCA Global, and a group of RCA personnel with a group of Japanese Communicators toured the Station.

Awards

George Ford, Technician, won a safety award suggestion, which is given periodically when a good suggestion is made.

Jim Shaff has been granted a second class FCC license. Mr. Shaff's award is a meaningful one because now all our technicians have their FCC Licenses.

Personnel

Howard Wisniewski and Joe Tanner, both Technicians, resigned from COMSAT to take positions elsewhere.

Dave Humphreys has been transferred to Washington, D. C. His new position at Headquarters is Systems Coordinator. We will all miss him and his wife, Regina. Mr. Humphreys served as Jamesburg CEA's first President.

The Carmel Valley Kiwanis Club invited Station Manager John P. Scroggs to become a member. He was installed in September.

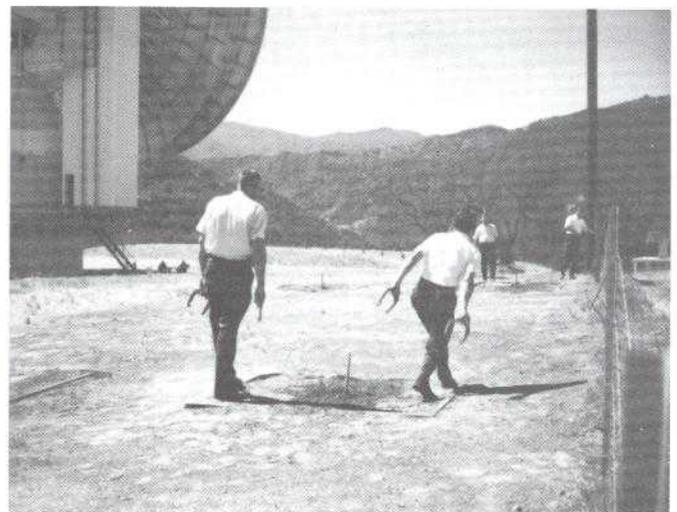
Horseshoe Tournament

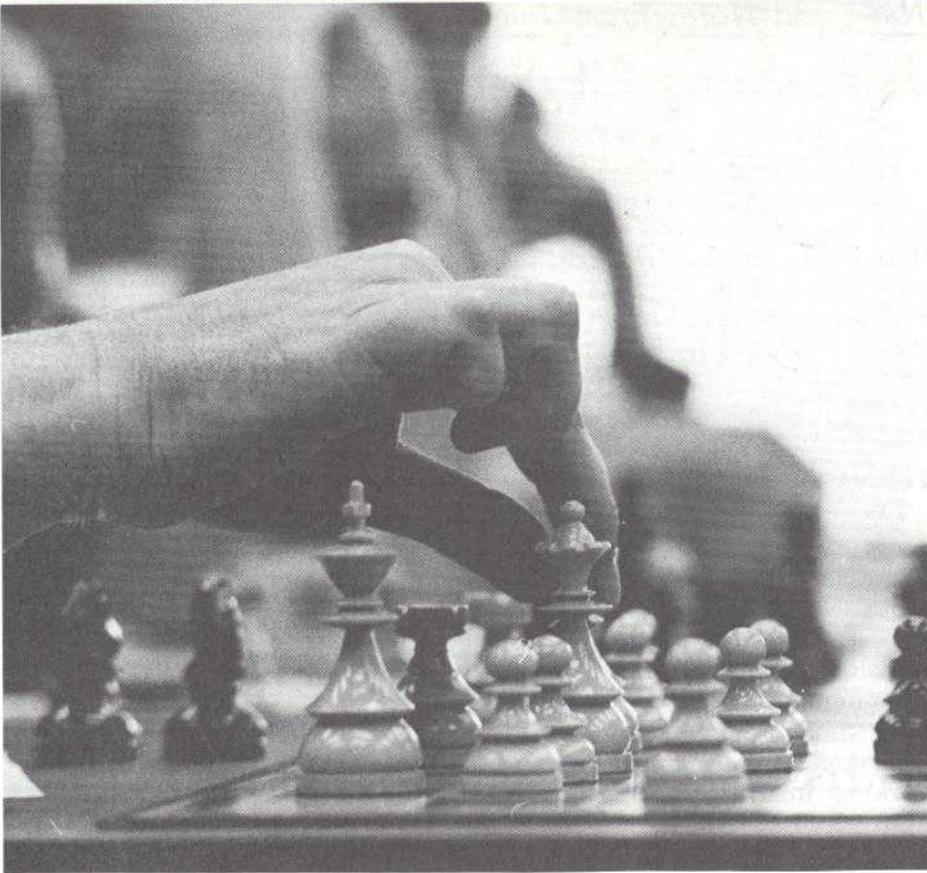
Jamesburg has a horseshoe tournament in progress at the station. There is a regular horseshoe pitching court and picnic tables set up so everyone can enjoy eating lunch outside or playing a game of horseshoes. Walter Robinson, Facilities Engineer, is the current station champion.

About People

We have a communique from the Larry Cisneros station. There's a new sound coming from the vicinity of 69 Paso Cresta Carmel Valley Village. Her name, Susan Marie; date of arrival: September 11; her weight, 8 pounds, 1½ ounces. The Audio comes in loud and clear daily around 2 a.m.

Don McKenzie, Station Administrator, and his wife hosted a "Bon Voyage" party for their son Stewart. He left for nine months of sea duty aboard the aircraft carrier, USS Coral Sea.





Chess Club Challenges BELLCOM, Loses First Round Tournament, 4-1

The Tournament

On November 4, the CEA Chess Club team challenged their counterparts from BELLCOM, whose offices are in the North building at L'Enfant Plaza.

The players holding the first five seats on the COMSAT chess ladder, Jerry Bidlack, Information; Joseph Hawkins, Finance; Jorge Rosa, Technical; John Ebelink, Technical; and Dan Flynn, Personnel, took their places opposite their opponents at the table.

BELLCOM was prepared. In the first day's playoff, COMSAT's number four and five men lost their matches: John Ebelink lost to Philip Schaenmen, while Dan Flynn dropped his match to George Bell.

Games on the first three boards were carried over to Wednesday's lunch hour, when COMSAT fared a little better, but not enough to recover the previous day's losses. Jorge Rosa lost a close match to Jim Cappellari. Joe Hawkins posted a draw against Herman Kraus, as did Jerry Bidlack in his match against Bill McLaughlin. The tournament ended in BELLCOM's favor, 4-1.

The Club

The CEA chess club is an informal group of employees who are interested in playing chess for fun and competition. Most of the games arranged through the club are played during the lunch hour.

There are currently 25 members now registered, who compete in challenge games for positions on the chess ladder. The chess team is composed of those persons holding the first five ladder positions.

Challenge matches are held continuously, and official matches are played through registration with a club officer.

Players are always looking for challenges, so anyone is welcome to join the club, even if they are new to the game. Instructions and boards are available through CEA on a loan basis, and there are plenty of people around to do the coaching.

Anyone interested in joining the chess club can do so by filling out a registration form which can be obtained from Joe Hawkins. That's all that is needed to join the fun, or even help the team win a rematch with BELLCOM.



Jerry Bidlack, COMSAT's No. 1 player, contemplates his opponent's calculated move.



Four more chess players take their game seriously. COMSAT's team, left to right, Dan Flynn, John Ebelink, Jorge Rosa, Joe Hawkins.

January 1970

Launch Succeeds, F-6 Readied for Atlantic Service

The new Atlantic satellite, positioned in orbit after a successful launch on January 14, is being readied for commercial communications service to begin shortly. (The liftoff is shown at the left.)

Some 37 hours after the launch, the apogee motor aboard the satellite was fired successfully on command from the Andover earth station, thrusting the satellite into an essentially synchronous orbit at an altitude of about 23,300 miles. The motor firing was directed from Technical Operations Center in Washington, D.C.

While orbital refinements proceeded, preliminary tests of the satellite's communications equipment indicated that these systems were functioning properly and that the satellite is ready for full commercial service.

The satellite is being allowed to drift toward its intended position at 24.5 degrees west longitude over the Equator approximately mid-way across the Atlantic Ocean. Upon arriving there, the drift rate will be halted by activating the station-keeping jets aboard the satellite.

(See **INTELSAT**, Page 2)



From Page 1

INTELSAT III Satellite Is Launched, Goes Into Synchronous Orbit

The new satellite, the sixth in the INTELSAT III series—or the INTELSAT III (F-6)—will replace the INTELSAT III (F-2) in Atlantic service. The F-2 is to remain at its present position over the Atlantic as a spare in orbit.

The seventh satellite in the series (F-7) is planned for launch in another month or so. It is intended for positioning at 6 degrees west longitude. With success in the F-7 mission, the F-6 would be repositioned at 31 degrees west longitude.

The successful launch on January 14 aboard Delta No. 75 occurred after five postponements which illustrated the complexity of launches.

Two postponements resulted from a faulty nitrogen regulator in the second-stage attitude control system and from an unacceptable helium leak in the second-stage fuel pressurization system.

On another day, postponement resulted from a leak in a nitrogen line in the second stage.

Still another postponement resulted from a problem during first-stage ignition.

Launch successful after delay

Then on January 14 a delay of more than an hour was necessary because of a temporary interruption in the range safety radar at Bermuda, which was mandatory for launch.

Liftoff occurred at 7:16 p.m. EST, which was six minutes outside of the original launch window of 6:10 p.m. to 7:10 p.m. However, during the week of postponements the launch window had gradually lengthened somewhat so that by January 14 the window extended to 7:16 p.m.

The launch window—which is the optimum time for the launch to occur—is determined partly by what is computed to be the relative positions of the sun and the satellite at the time when apogee motor firing is desired. One objective is an acceptable sun angle on the nozzle of the apogee motor in order to avoid excessively cold temperatures in the motor.

The successive postponements of the launch were ordered by

NASA's Delta mission director, Robert Gray, after consultation with the vehicle manufacturer, McDonnell-Douglas Company, and COMSAT.

Spacecraft Center Takes Over

Once the satellite reached transfer orbit, after third-stage firing and the third-stage coast phase, NASA responsibilities were fulfilled. At that point, the Spacecraft Technical Control Center at L'Enfant Plaza took over, monitoring the satellite, computing and refining its orbit and commanding apogee motor fire.

The transfer orbit was completely acceptable, although the apogee was about 200 miles lower than perfection would have required. Through careful adjustment of the attitude of the satellite before the firing, the apogee motor thrust nearly circularized the orbit. The satellite's control systems will be used to refine the orbit.

Delta Modifications

The vehicle for the launch, Delta No. 75, had been modified to minimize the chance of failures of the kinds that occurred in two Delta launches last year. Following those failures, NASA grounded the Delta pending an investigation and the completion of necessary modifications.

Despite those problems last year, the Delta remains a reliable vehicle for unmanned launches. Out of 75 launches to date, there have been only 11 anomalies, or serious problems, during Delta missions. Of those seven were regarded as launch "failures."

For the F-6 mission, third-stage telemetry equipment was added to the Delta vehicle to provide data on third-stage separation and early transfer orbit data.

About 26 minutes after liftoff, the data was acquired on schedule by the Ascension Island earth station. The flight path for the launch had been modified, partly to permit the acquisition of third-stage data by Ascension.

News at a Glance

- INTELSAT III F-6 launched successfully on Wednesday, January 14 at a 7:16 EST. Apogee motor was fired Friday morning, January 16, placing satellite in essentially synchronous orbit (Page 1).

- Highlights of 1969 (Page 3).

- President Joseph V. Charyk testifies on the domestic satellite system before the House Space Subcommittee, refers to substantial economies and a wider range of services for public (Page 7).

- Satellites play key role in providing spaceflight TV to world (Page 10).

- Amplitude and frequency modulation are essential techniques for satellite communication (Page 14).

- AMSAT members pool resources as amateur radio enthusiasts to launch experimental satellite (Page 17).

- Sidney Goldman resigns from Corporation (Page 18).

- Warren E. Neu assumes position as administrator at Jamesburg Earth Station (Page 4).

- Cayey Station is featured in local documentary depicting interesting places to visit (Page 5).

- Hawaiian coast is swept by high winds and raging tidal waves (Page 7).

- Etam amateur radio club prepares for radio licenses, operation of radio equipment (Page 16).

- ICSC actions taken at the forty-fourth meeting held in Washington, D.C. reported (Page 11).

January 1970—Year 5, No. 1
COMSAT News is published monthly for employees of the Communications Satellite Corporation by the Information Office COMSAT Building, 950 L'Enfant Plaza South, S.W., Washington, D.C. 20024.

Assistant Vice President
for Public Information:
Matthew Gordon
Editor: Kay Smith

HIGHLIGHTS OF 1969

- With the positioning of an INTELSAT III series satellite over the Indian Ocean in June 1969, full global coverage was established, a milestone achievement for COMSAT and INTELSAT.
- Construction proceeded on the INTELSAT IV series of satellites for launch beginning in early 1971, and the Atlas Centaur was selected as the launch vehicle.
- Two new U.S. earth stations, in Puerto Rico and West Virginia, commenced full-time commercial operations. A third, on Guam, began initial operations. Construction proceeded on a new U.S. earth station at Talkeetna, Alaska.
- Earth station construction by national entities in nations besides the United States culminated during 1969 in the commencement of full commercial operation by 22 standard antennas in 18 countries. Forty-one antennas at 36 earth stations in 24 countries were in full operation by the end of 1969.
- Utilization of the satellite system continued to increase. By December 31, 1969, full-time equivalent half circuits leased by COMSAT to its customers totaled 1,434. Full-time equivalent half circuits leased by all participants, including various foreign entities as well as COMSAT, totaled about 2,790.
- Television use of the satellite system continued to increase during 1969, with total transmit time amounting to 763 hours. Live TV coverage of the historic Apollo 11 moon-landing was transmitted by satellite to six continents, making it the most widely shared event in history.
- In early 1969 COMSAT reduced its television rates by an average of about 40 percent, the second such reduction in less than two years.
- Membership in the International Telecommunications Satellite Consortium (INTELSAT) increased by seven during 1969 to a total of 70.
- The INTELSAT International Conference convened in Washington in February 1969, then adjourned after four weeks until February 1970. A Preparatory Committee worked during the year on draft agreements for Definitive Arrangements to be submitted to the full conference.
- COMSAT reiterated its request to the Federal Communications Commission for authority to build and operate a domestic U.S. satellite service. COMSAT advised potential users that it was prepared fully to meet their requirements for service in the United States and so advised the White House which conducted another study of U.S. telecommunications policy issues.
- The COMSAT Laboratories, a major new facility serving as the focus of the Corporation's research and development efforts, was completed in the summer of 1969 in Montgomery County, Maryland.
- Rudolph A. Peterson of San Francisco was elected to the COMSAT Board of Directors to fill the Series I (public) vacancy created when David M. Kennedy resigned to become Secretary of the Treasury. In accordance with the 1969 amendment of the Communications Satellite Act of 1962, two additional Series I Directors were elected at the sixth annual meeting of shareholders—Philip W. Buchen of Grand Rapids, Michigan, and Joseph H. McConnell of Richmond, Virginia.



Jamesburg CEA and the local AT&T employees organization jointly held their annual Christmas party on December 19.

News and Notes From Jamesburg

Warren E. Neu Assumes Position As Administrator at Jamesburg

By M. Lee Dorsey

Warren E. Neu, retired colonel in the U.S. Army, has been named as the new station administrator for Jamesburg. Mr. Neu was employed as a material control specialist before taking over the position as administrator, and before coming to COMSAT he spent thirty years with the U.S. Army, part of that time as a Signal Corp Officer. He succeeds the late Don McKenzie.

Mr. Neu resides in Del Rey Oaks, with his wife Thelma. They have one daughter, Mrs. Joseph P. McNeill, and three grandchildren.

COMSAT on VIP Tour

Jamesburg has been chosen by AT&T as one of the communications plants to be shown each month to their VIP's. During December, sixteen distinguished Bay Area visitors, including the Attorney for San Francisco's Mayor Alioto, toured the station.

Other visitors to Jamesburg included Dr. M. Stiles, Professor Lusigan and Mr. Olsen and Mr. Albernaz of Stanford University, who are working on a design with the National Science Foundation for a small earth station to be

located in the Antarctic. It will send data via Pacific INTELSAT III to Jamesburg and operate unattended.

Safety

Jamesburg's Safety Bulletin Board holds employees' interest with all the latest safety reading material. Our Safety Committee, chaired by Assistant Station Manager Michael Downey, is doing a fine job in promoting safety at work, on the job and at home.

Many preliminary tests were made by Jamesburg's Electronic

Engineer, Jack Inman, and the control room staff to insure a successful TV coverage of the Apollo 12 moonflight. The tests made from Jamesburg with the GE transportable station aboard the U.S.S. Hornet resulted in reception of the best quality TV yet received in the Apollo program.

People to People

Earl Jones, Technician, was recently promoted to Senior Technician. Also promoted were Joe Speak, Technician to Senior Technician, and Jim Clark from Junior Technician to Technician.

Dale Cantrell was hired as the new Utility man, replacing Bob Manjares, who resigned to take over his own gas station in Carmel Valley.

Bill Rogers, Technician, resigned to return to the Pacific Telephone Company.

Joe Speak tumbled from his motorcycle on the way to work and injured his ankle. He spent some time in the Ft. Ord Hospital for treatment, and then was allowed to return home. We all wish him a speedy recovery.

A California Christmas

The Holiday season started off with a housewarming party at the home of Patty Blatnik. Then came the annual Jamesburg Christmas Party, held in conjunction with the AT&T employees at the local Community Center. The party, held on December 19, proved to be a good time for all.

Other holiday parties included a number of open house affairs. On December 26, the party was hosted by Station Manager John Scroggs. On the 27th, the party was at the new house of Technician Stan Nubin, and the following day Administrator Warren Neu hosted the housewarming.



At work or play, anytime is safety time at Jamesburg.

Take A Break (a coffee break)

Just as a matter of interest to the employees at Headquarters who find they can't seem to make it through the day without a relaxing cup of hot coffee, the new self-service coffee arrangement is here to stay. Through cooperation from the members of the Facilities Services and the Macke Coffee Company, coffee percolators have been set up throughout the Corporation.

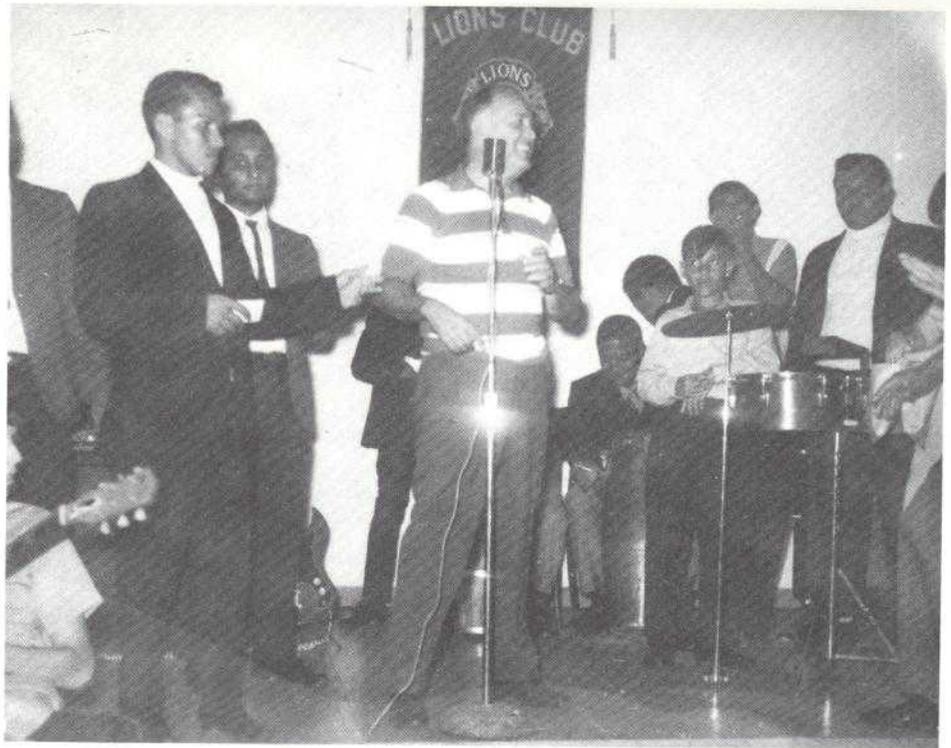
Coffee, which was once 15c per cup, can now be bought for 10c, making it one of the very few items that can be bought for less these days. Still, there is a small profit gained, which is being used to purchase a new oven for the employees' lounge.

The coffee centers have been operating since last September, when 17 central units were installed. Since then, 130 full kits of coffee, each containing 630 cups of coffee, have been consumed, indicating that the program is enjoying considerable success.

Oh, for those who harbor a competitive spirit, a new title is in the offering—biggest drinker title—currently held by John Welsh, who drinks enough coffee to take on just about anybody.



Arsenio Reyes enjoyed a Christmas dance with his daughter



Luis Rodriguez officiates at the drawing for the Christmas raffle. Lucky **Bob Smith** walked off with the prize, refreshments for the holiday season.

"Ecos de la Montana"

Cayey Station Shown in Documentary Featuring Local Points of Interest

By **Luis R. Rodriguez**

The Cayey Station was featured in a local documentary film shown on Puerto Rican television stations 11 and 18. The film, produced by United Promoters Agency, featured the earth station as a place of interest for islanders to visit.

A professional model was hired for the film and served as narrator. The television series showing the film is called "On Sundays What Shall I Do" and features important and interesting sites in Puerto Rico.

Holiday Celebration

Cayey CEA held its annual employee Christmas party on Friday, December 19 at the Cayey Lions Club starting at 8 p.m. All station members, wives, husbands and dates were invited to attend the cocktail hour and dinner party. Dancing was held after the dinner was served, and a Christmas drawing was held. Bob Smith was the lucky winner who walked off with a bottle of scotch, a case of beer and a case of other refreshments.

Station Visitors

Several groups toured the earth station during November and December. Members of the U.S. Ma-

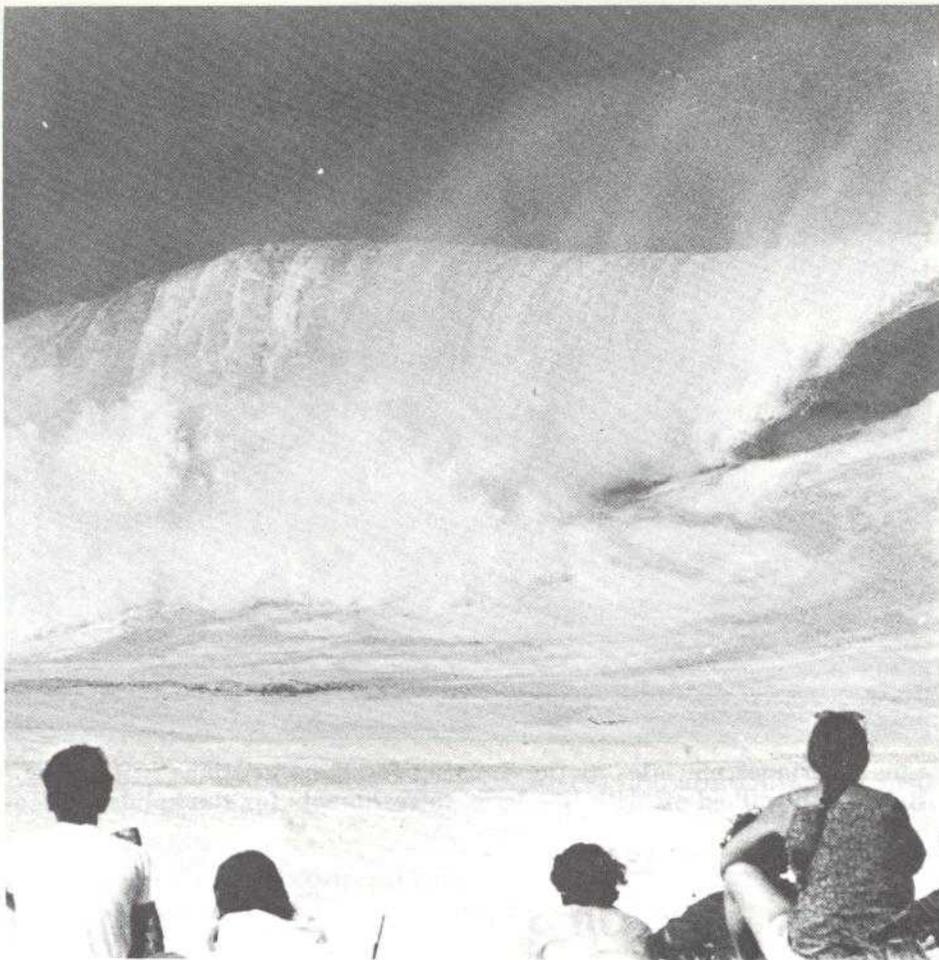
rines stationed at San Juan Naval Station were brought in by Rubin Emilio, the son of station Utility man, Don Emilio.

Among the visitors were a number of student groups including 62 students from Stubbe Elementary School, Cidra, Puerto Rico, and 11 electronics students from Miguel Such Vocational Military Academy, Guaynabo, Puerto Rico. In addition, 21 cub scouts from Caguas, Puerto Rico, also visited.

Birthdays

November birthdays were celebrated on Thanksgiving eve for Luis Medina and Luis Maldonado. A delicious turkey stew, rice and bread were served by Arsenio Reyes, who did all the cooking. Dessert of pumpkin pie and ice cream topped off the social event.

December birthdays were celebrated at a luncheon for Arsenio Reyes, Jose M. Negron and Juan Sierra. A Puerto Rican favorite, "serenata," was served. A "serenata" is a large salad consisting of boiled codfish, yams, potatoes, green bananas, eggs, onion and tomatoes served with spanish olive oil. This was a special treat for



(Photographed Terry Luke, Honolulu Star Bulletin)

News and Notes from Paumalu

Would You Believe...50 Foot Waves?

Forty to fifty-foot surf that battered the North Shore of Oahu during the first week in December caused hundreds of thousands of dollars of destruction and left behind a multitude of homeless families. Among the more than 100 homes reported damaged or completely destroyed included those of three COMSAT employees at the Paumala Station, Technicians Charles Kraft, Terrance Nevin and George Crowther.

The punishing surf hit Oahu on Monday, December 1, and continued its plunder for most of the week. Oahu's North Shore was the hardest hit. COMSAT's Paumalu Station overlooks the devastated area and was not affected.

All three COMSAT employees remarked that they were fortunate in evacuating their homes without anyone in their families sustaining any injuries. Charlie Kraft's rented home suffered the greatest damage. His household furnishings and appliances were badly damaged, and many other personal items of value were lost. All three technicians spent the night and most of the week at the home of their supervisor, Ken Elder, whose house is located on a hillside overlooking Waimea Bay.

Other COMSAT employees who were forced to evacuate from their beachfront residences included John Gray, Dan Geer, Al Sutton, Thelma Park, Ed Clark, and Bob Kumasaka. Only minor water damages were sustained at their homes, and they were able to return after a short evacuation period.

High surf is more common during the winter months in Hawaii, but this one, referred to by islanders as "freak surf", was gigantic in comparison with most. High winds and surf hit the north side of the island where the Paumalu Station is located, but did not affect higher population areas in the south near Honolulu.

INTELSAT Orders 2 More Satellites For Series IV

COMSAT as Manager for INTELSAT has ordered a seventh and eighth satellite in the INTELSAT IV series from Hughes Aircraft Company for a combined price of \$9,918,000.

An option for the two additional satellites was exercised on December 18 by COMSAT at the direction of the ICSC. Two months earlier COMSAT had ordered a fifth and sixth satellite in the series for a combined price of \$10,990,000.

Four of the satellites were ordered under the original contract with Hughes in October 1968. The Series IV satellites are scheduled for delivery beginning in late 1970.

Cost Study Begins

The management consulting firm of Booz, Allen & Hamilton has begun a study of cost aspects of the present INTELSAT management arrangements. The study, authorized by the ICSC at its December meeting, will take about three months to complete at a cost not to exceed \$66,000.



Technicians George Crowther (left) and Charles Kraft hose down the stove filled with sand in an attempt to salvage the appliance at Kraft's surf-damaged home.

(Photographed by Terry Luke
Honolulu Star Bulletin)

House Holds Satellite Hearings; Dr. Charyk Explains Domestic System

Dr. Joseph V. Charyk told a House Space Subcommittee during December hearings that COMSAT's domestic satellite program offered "substantial economies and a wider range of services" to the American people.

Charyk appeared twice before the Subcommittee on Space Sciences & Applications, which held hearings for four days starting December 16 to explore advances in satellite communications technology, and to review communications plans for Alaska.

Dr. Charyk highlighted activities of COMSAT and INTELSAT during the past five years, and pointed out that the Corporation has actively sought the establishment of domestic satellite services since 1966.

"COMSAT has been advocating a domestic satellite system for the United States for almost four years," Charyk said. "We believe that the technology is here and the need is here, and we have available the private financial and other resources to carry out the mission."

As for Alaska, Charyk said COMSAT was cooperating with RCA Alaska Communications, state and military officials in preparing a master plan that would envision a mix of satellite and terrestrial facilities to vastly expand Alaska's telecommunications system.

Other witnesses who appeared included those from NASA, the Office of Telecommunications Management, Senator Mike Gravel and Rep. Howard W. Pollock, both of Alaska, AT&T and RCA.

Richard R. Hough, Vice President, Long Lines Department of AT&T, declared that, "We perceive no barrier legal or otherwise which would prevent us from owning and operating a satellite system for domestic communications, subject of course to the jurisdiction of the Federal Communications Commission." Hough emphasized that AT&T felt terrestrial facilities were far more economical than satellites, but that satellites for domestic service may have a role in the future. "We feel satellites will have a part in our network," Hough

said, "but they must be carefully integrated into our systems."

Howard R. Hawkins, President RCA Globcom, outlined plans for his company's wholly owned subsidiary, RCA Alaska Communications, to purchase the Alaska communications system and expand services in that state next year.

Dr. Willis H. Shapley, an Associate Deputy Administrator of NASA, reviewed that agency's work in experimental satellite communications, including a plan for providing TV service via the ATS-F satellite to India in 1972. He explained that NASA planned to build an earth station in Europe to transmit VHF programming to India, and that India planned to expend an estimated \$10-\$15 million for construction of about 3,000 earth receivers.

Senator Gravel and Congressman Pollock both urged speedy action on plans for introducing satellite communications for intrastate and interstate Alaska services. William E. Plummer, Acting Director of the Office of Telecommunications Management, reviewed the work of his executive branch agency in allocating frequencies and other matters.

What's New?

Global Satellite Communications!

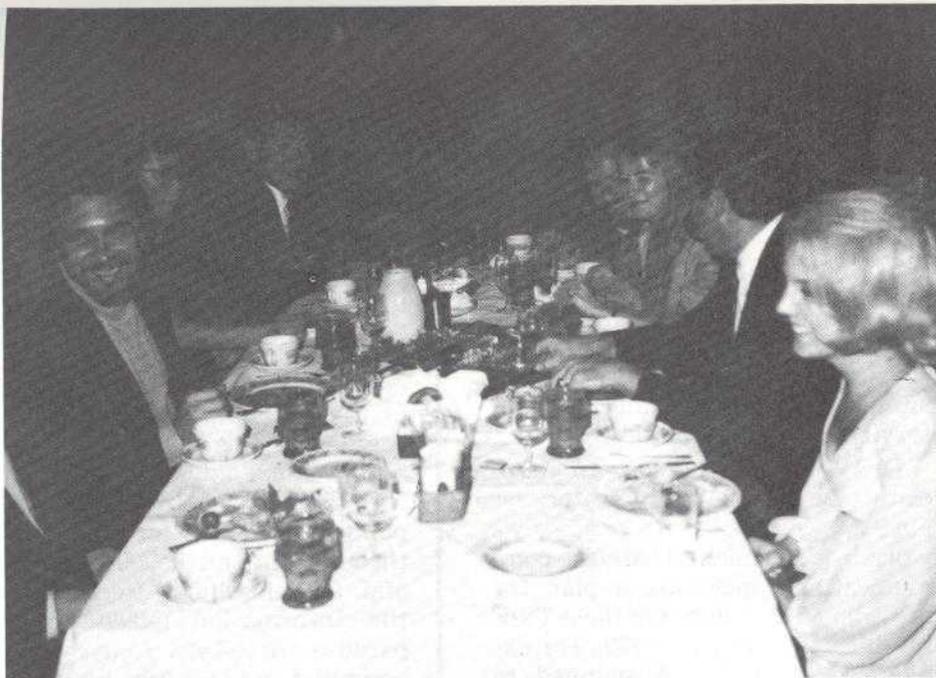
Since the middle of 1969, a global system of communications satellites has been serving a growing number of earth stations in countries around the world—24 different countries at the beginning of the year, and about 35 by the end of this year.

The rapid advancement of the global system is being publicized in many ways through the media, booklets and a wall chart. Recently, the Information Office prepared a three-fold, four-color pamphlet which fits into a number 10 envelope for insertion with correspondence in response to requests for information or materials, and for inclusion with letters written to people for the first time.

A supply of these pamphlets is available from the Information Office to all secretaries and staff personnel wishing to assist in this program to broaden understanding of COMSAT, INTELSAT and the growing global communications satellite system.



Three employees recently received five year awards from the Corporation. They are (left to right), John H. Heck, Management Review and Coordination, John P. McCusker, Supervisor, Laboratory Equipment Section, and Richard J. Hammerly, Technical



Getz & Gilberto Set Festive Mood For West Coast Holiday Celebration

By J. P. Wilde

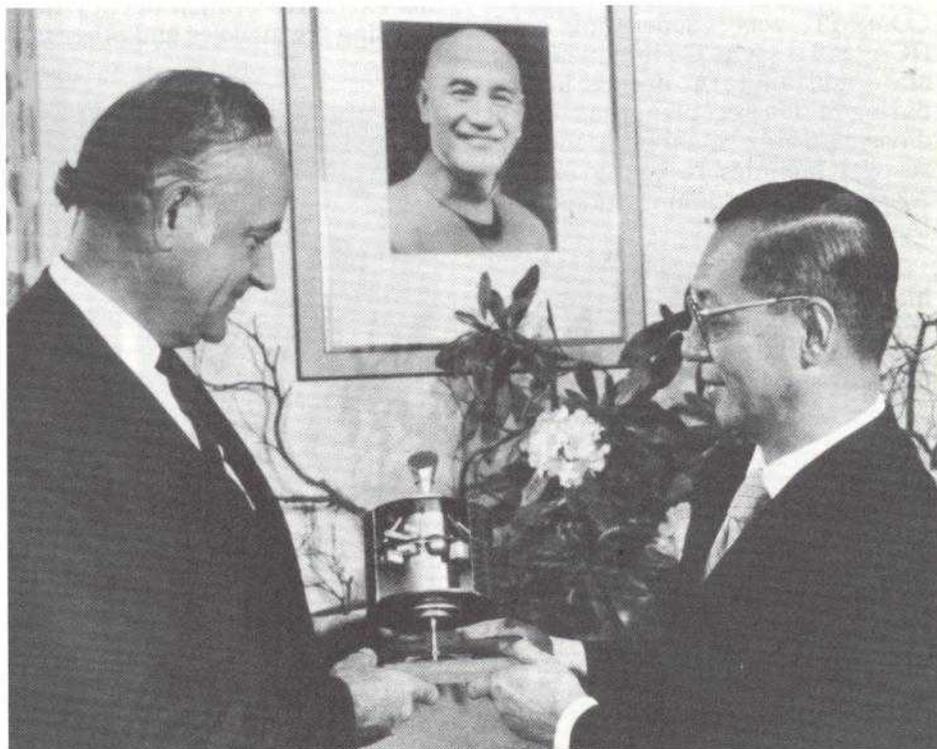
The Great Anaheim, Azusa and Cucamonga Gravy Train chugged to a brief but riotous halt at the Plush Horse Inn, Redondo Beach, on the night of Friday, December 19, as the West Coast Technical Project Office celebrated the Christmas season.

The date coincided with the completion of INTELSAT III F-2's first year in orbit, and for that one evening Getz and Gilberto prevailed over the usual favorite recording of spacecraft telemetry. This slap-up evening of dining, drinking and dancing to taped and live music was organized by Dee Wallace and Bill Corbin, so charm and quality were assured. They brought together the twenty COMSAT couples in the Los Angeles area who monitor the production of INTELSAT III and IV spacecraft, as veterans of thermal vacuum testing and the thirty-foot diameter Great Pumpkin caroused with Aquavit-fueled newcomers in a most enjoyable party. The evening was marred only by the absence of Merna Votaw and our Division Director, Marty, who had the previous day succumbed to the local hazard of abalone allergy.

Our fashion conscious readers should know that with only one

great formality, for California, of wearing collars and ties—while the ladies flaunted their cocktail dresses, pajamas, pant suits or part thereof.

In short, a most enjoyable evening of which the close at 2 a.m. came only too soon!



President Joseph V. Charyk presents an INTELSAT III satellite model to Ambassador Shu-Kai Chow of the Republic of China during the making of a film used as part of the dedication ceremonies. The Taipei Earth Station was dedicated on December 28, 1969, bringing the total number of stations in operation to 40.

It's a New Era

A new four-color wall chart entitled "New Era: Global Satellite Communications" is available upon request from the Information Office.

Measuring 17" x 22", the wall chart folds to a convenient 8½" x 11" filing size. A copy panel describes COMSAT, INTELSAT and the global communications satellite system, and is accompanied by six colored pictures and captions highlighting various aspects of the satellites and the system.

Credit Union Membership Grows

The COMSAT Federal Credit Union will soon reach the 1000 member mark. To commemorate this occasion, the person drawing membership 1000 will be presented with their first share of the credit union.

Services offered to COMSAT employees are a savings plan with payroll deductions, low cost signature and secured loans, convenient location, fast service and generous dividends.



*T'was two weeks before Christmas
And all through the Corporation
People were awaiting
The Yuletide celebration.*

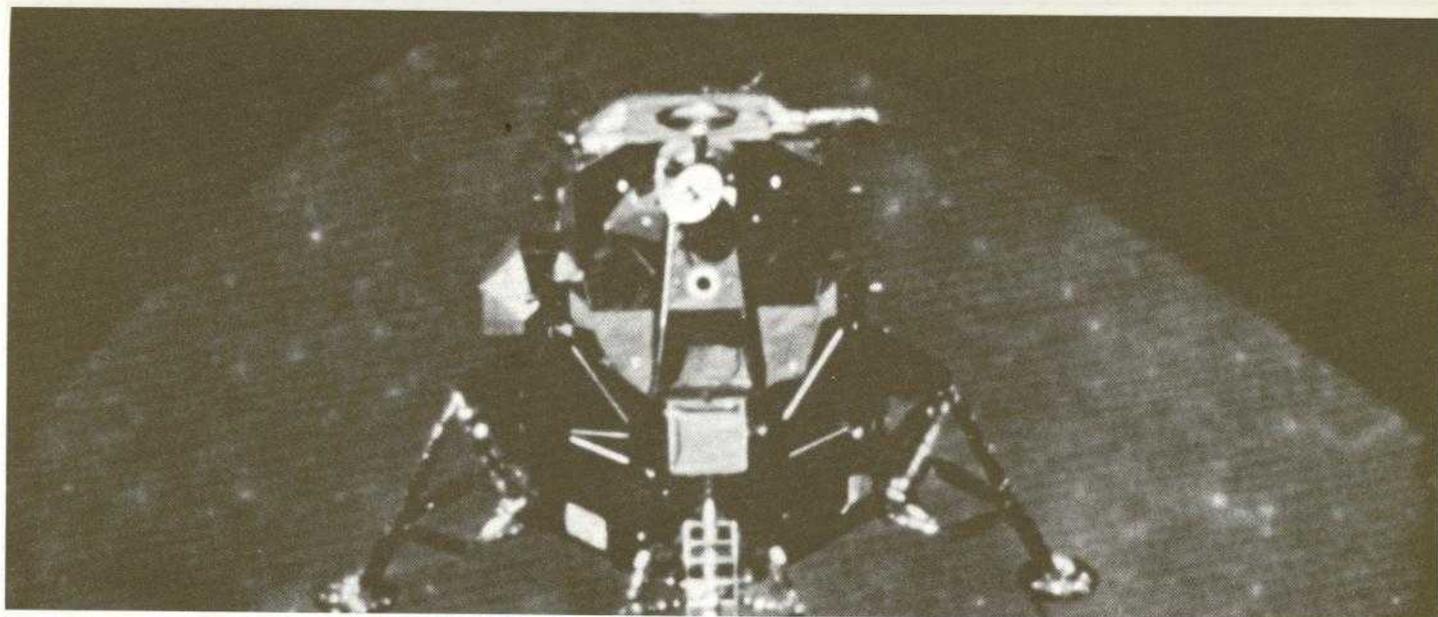
*Decorations were hung
At the Sheraton with care
Waiting for the people
Who soon would be there.*

*Cocktails were ready
To bubble delight
While dinner was warming
For the festive night.*

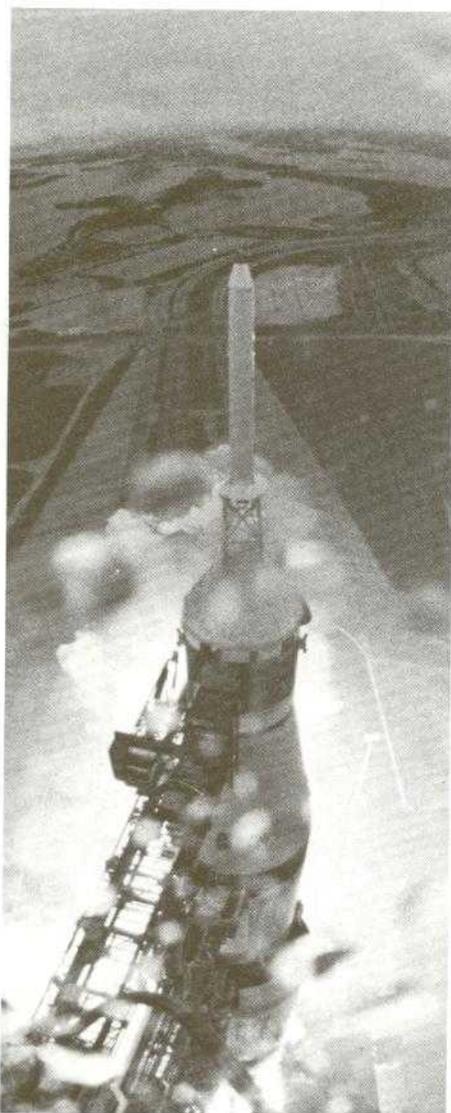


*People gathered for good company
Fine food, good cheer and festivity . . .*

—Anonymous



On to the moon . . . as lunar module "Intrepid" separates from the command module "Yankee Clipper" and heads for its landing on the Ocean of Storms.



A panoramic view of the Florida coastline unfolds as the Saturn V and its three-man crew lifts off from Cape Kennedy. Liftoffs and other portions of Apollo missions receive world-wide TV coverage via satellite.

Satellites Provide Key Links For Spaceflight TV to World

When Neil Armstrong descended the LEM ladder during the early hours of July 20, 1969, two important events occurred: Man, for the first time, set foot on another body within our solar system; and people throughout the world witnessed the event via live television through the communications satellite system of INTELSAT.

Statistics gathered by both the National Aeronautics and Space Administration and the news media showed that no single event in history was so widely shared. Live TV coverage of the Apollo 11 mission was seen by several hundred-million viewers in approximately 40 countries on six continents.

Coverage of Manned Flights

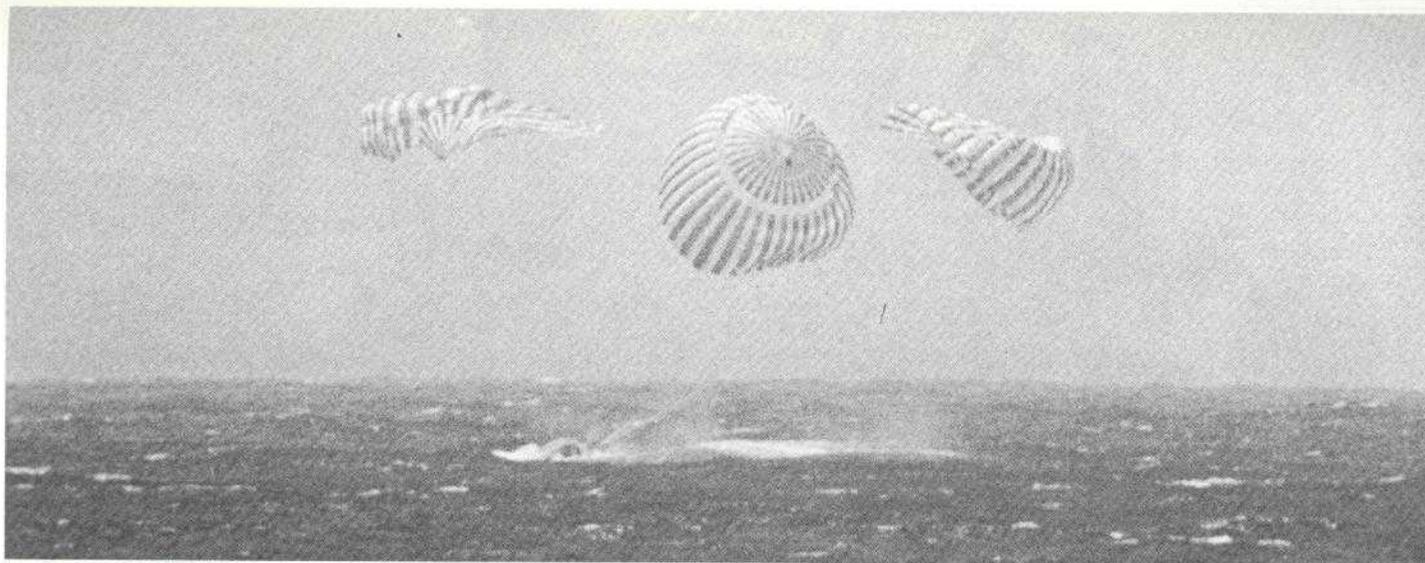
During the early Project Mercury manned flight days, it was the first orbital flight of Astronaut John Glenn in February 1962 which resulted in widest coverage. The Gemini IV flight of Astronauts James McDivitt and Edward White, Jr., in June 1965, with the first "space walk" of White, commanded the broadest viewing during the Gemini Program. Apollo 11, of course, commanded the widest coverage so far during the Apollo missions.

Using press coverage and TV viewer interest as a reference point, coverage of manned space flights can be placed in the following order: Apollo 11—Astronauts Neil Armstrong, Edwin Aldrin and Michael Collins; Apollo 12—Astronauts Charles Conrad, Jr., Richard Gordon and Alan Bean; Apollo 8—Astronauts Frank Borman, James Lovell and William Anders; Gemini IV—Astronauts McDivitt and White; Gemini III—Astronauts Virgil I. (Gus) Grissom and John Young; and Mercury 6—Astronaut Glenn.

Reporters and Representatives

The number of newsmen reporting from either Cape Kennedy or the Manned Spacecraft Center in Houston depends partly on the number of such support personnel as television technical crews and clerical workers who register as news representatives. For the Apollo 11 flight, the NASA Public Affairs Office at Cape Kennedy reported approximately 3,500 news media representatives registered to attend the flight at the Cape, 812 of whom were foreign newsmen. Of the total registered, 1,095 (including 402 foreign) attended.

The number of industry representatives servicing the news media and NASA at both locations is large and worthy of note. For the Apollo 11 flight there were 169 industry representatives registered to attend the pre-launch activities and lift-off at Cape Kennedy. For Apollo 12 the number was 132.



Live TV coverage of the splashdown originated aboard the carrier Hornet, was then relayed via the Pacific INTELSAT III to Jamesburg and on to the TV network pool in New York for world-wide distribution by INTELSAT's global satellite network.

At Houston, 158 were in attendance for Apollo 11 and 88 for Apollo 12. These industry public relations and information effort are a source of information to the members of the news media, especially during the extended periods of translunar and transearth flight, and in the event of malfunctions or contingency operations.

Live Coverage

The importance of this NASA-industry news media relationship is sometimes overlooked. News coverage during a manned flight is live, with spacecraft communications transmitted directly to earth and instantly relayed via communications satellites over the world.

Live coverage was emphasized at one of the change of shift briefings in Houston during Apollo 12 when a reporter asked Capsule Communicator (CAPCOM) Astronaut Paul Weitz whether or not newsmen were getting real time or delayed replays.

Weitz replied, "You're getting it complete. You get a replay only during the color telecasts and that is a 12-second delay necessitated by the conversion to color. All air-to-ground, other than that, is real time—live."

Unfortunately, the "via satellite" caption accompanying TV transmissions over the communications satellite system does not tell the entire story of COMSAT/INTELSAT involvement. Except in isolated instances such as the Frank McGee reportage of the splashdown of Apollo 12 over NBC when he identified the INTELSAT satellite as the mode of transmission for world-wide live coverage of the landing in the Pacific Ocean, some viewers are only vaguely aware of the global satellite system.

Satellite Hours Used

Satellite time for Apollo 11 amounted to 91:24 hours of transmit time and 208:44 hours of receive time. For Apollo 12 the totals were 41:43 hours transmit time and 87:12 hours receive time. The approximately 60 percent reduction in receive time was attributed primarily to the enormous interest displayed in the first lunar landing and considerably less interest in the follow-on flight of Apollo 12 which was lessened further when the lunar TV camera failed.

Transmit time is the number of hours of television transmission via the INTELSAT satellites, while receive time is the total hours such transmissions are received by the various earth stations through multi-destination transmissions. For example, the satellite might transmit for an hour (one hour transmit time), and five foreign countries taking this same hour from the satellite would account for five hours of receive time.

Other statistics provided by Analysis and Traffic show that of approximately 18 countries (including the U.S.) receiving transmissions from the satellites through their earth station during Apollo 11, the U.S. accounted for the greatest number of receive hours (43:27), Europe was second (34:33 hours), and Japan was a close third (33:32 hours).

During Apollo 12, Europe replaced the U.S. as the principal user with 19:16 hours receive time, followed by the U.S. (15:07 hours) and Kuwait

Committee Actions

The Interim Communications Satellite Committee held its forty-fourth meeting in Washington from December 3 to 9 with Mr. Carlos Nunez of Mexico as chairman. The Committee noted that the Federal Republic of Cameroon, with a quota of 0.05 percent, became the 70th member of INTELSAT on November 6, and took the following actions:

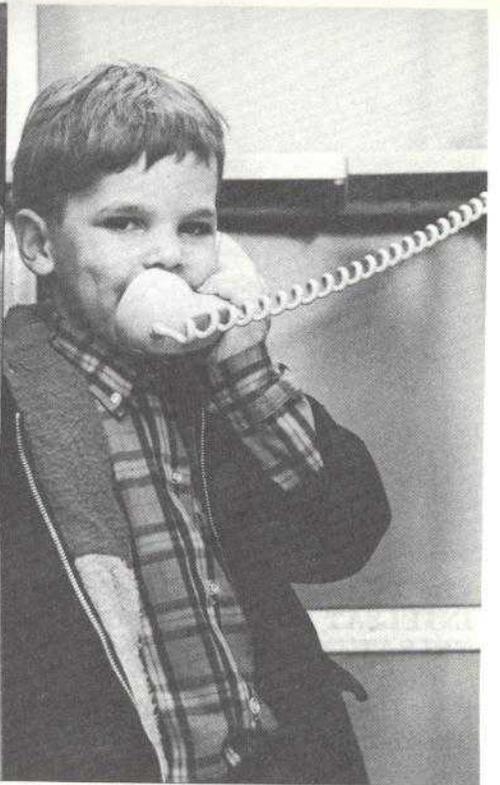
- Authorized COMSAT to contract for the seventh and eighth satellites in the INTELSAT IV series. (Story on Page 6)

- Decided that INTELSAT III F-6 would be positioned at 24.5° west longitude over the Atlantic with F-7 to be positioned at 6° west longitude and the F-6 then to be moved to 31° west longitude.

- Authorized COMSAT to issue an RFP for equipment required to monitor e. i. r. p., carrier frequency, deviation and out-of-band noise at the present TT&C locations (Fucino, Italy; Andover, Maine; Paumalu, Hawaii; and Carnarvon, Australia).

- Approved access to the Atlantic INTELSAT III satellite, for COMSAT's non-standard earth station located at L'Enfant Plaza for experimental purposes, contingent on ICSC/T approval at its January meeting.

- Approved the application of the Ministry of Communications of the Federal Republic of Nigeria for a standard earth station at



Comsat Labs Hosts New Neighbors And Old Friends





On December 6, COMSAT employees and their families were invited to visit the new LABS facilities in Clarksburg.

On December 11 the new Comsat Laboratories was put on display for about 250 guests. Representatives from government, industry and the press were treated to tours of the facility and a buffet.





FIGURE 1. ALTERNATING CURRENT/VOLTAGE. The current reaches a maximum flow in one direction, then turns and begins to flow in the opposite direction.

Modulation: Amplitude and Frequency

The first essential in the transmission of sound is vibration. This holds true for the air carrying ordinary speech from one person's mouth to another's ear and for the waves carrying radio messages from a transmitter to a receiver. In human speech, the larynx produces a vibrating column of air which the jaws, tongue, and lips vary (modulate) in quality to make recognizable words. Speech is transmitted at audio frequencies, the vibration rates being roughly between 15 and 20,000 cycles per second.* Most radio frequencies are far above that. Before they can be heard, however, they must be stepped down to audio level and converted into vibrating air.

Carrier Waves

Just as the larynx produces vi-

*Actually, most speech occurs within an octave or two of middle A on the piano, 440 cycles per second.

brating air, a radio system must produce an oscillating carrier wave. A transmitter does this by causing an electrical current to alternate at a certain rate (frequency). This alternating current relayed to an antenna causes a corresponding release of electromagnetic energy into space.

Since it is alternating, the electrical current can be described in terms of a sine wave above and below a mean voltage (Figure 1). The electromagnetic wave in space can also be visualized as a sine wave, the wave length being the distance from crest to crest and the frequency being the number of waves (cycles) occurring in one second.

This wave can be manipulated, or modulated, to carry information; in the case of telephony, this is a replica of human speech.

Modulation Systems

There are many ways to modu-

late a wave, but all are refinements of three basic operations: the wave can be made louder or softer, higher or lower in frequency, or it can be made to start and stop. This last method—on and off—was first used for telegraphy and is now used for radar and various forms of pulse modulation. The others — louder and softer, higher and lower—are used for sending telephony, radio, and television.

If this is all that is done to an electromagnetic wave to make it carry information, how is high-fidelity reproduction of the complicated sound of a symphony orchestra possible? The answer is in the incredibly fast information rates of high-frequency transmission: a radio transmitter operating at 600 kilocycles is broadcasting a wave which can be varied 600,000 times in one second, and an FM station broadcasting at 100 megacycles is

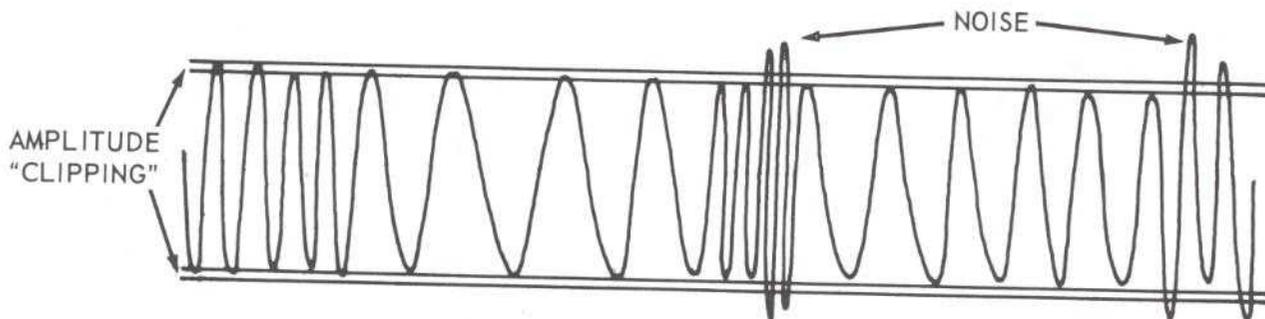
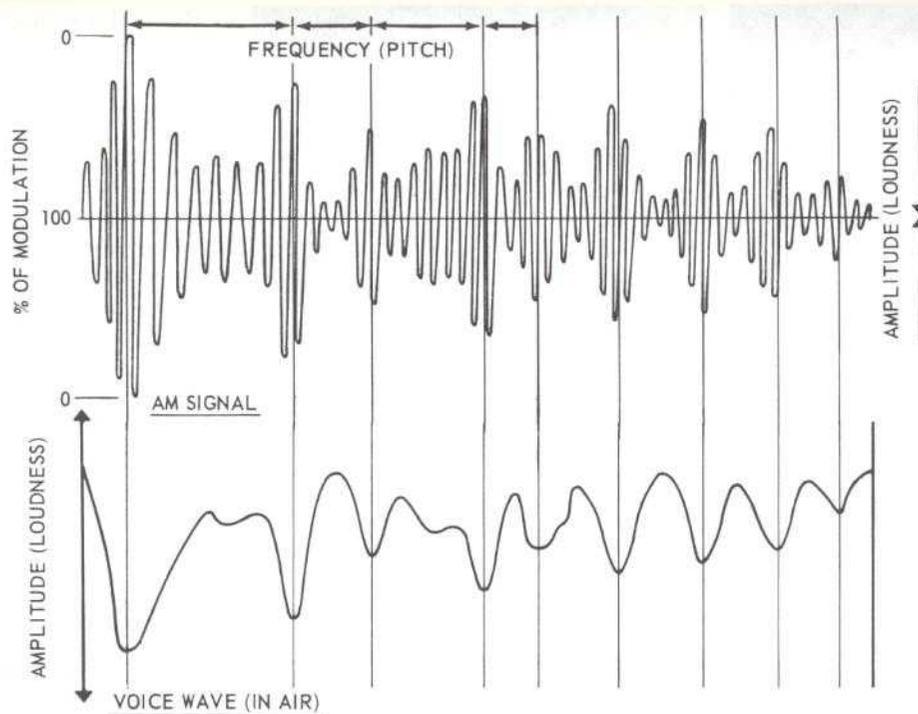


FIGURE 3. FREQUENCY MODULATION. The frequency carries loudness information; the rate of change determines pitch.



G-5053

FIGURE 2. AMPLITUDE MODULATION. In this illustration the electromagnetic signal looks like the inverse of the voice signal, because the more the signal is modulated the nearer it approaches the center line.

producing a carrier wave which can be varied 100 million times a second. The INTELSAT system transmits at about 6 gigacycles and receives at about 4 gigacycles—in other words, roughly 6 and 4 billion cycles per second.

At rates like these, a radio wave can easily carry any combination of volumes, pitches, and timbres.

Amplitude Modulation

When vibration patterns of sound are impressed by a modulator on a carrier wave of fixed frequency, the resulting mix looks like Figure 2. Above and below the imaginary center line (which represents 100% modulation, or the maximum volume the system can tolerate) is an analog of the audio wave. Amplitude information is carried in the varying height above and below the center line, and frequency is determined by the changing horizontal distance from crest to crest. Since only the amplitude varies while the basic frequency is held constant, this system is called amplitude modulation (AM).

A modulator produces two useful groups of frequencies located around the carrier frequency, each carrying the same intelligence. These frequency groups are called upper and lower sidebands, since one is the sum of the carrier and modulating signal, and the other

is the difference between the two. Through the use of filters it is possible to isolate one sideband to use in transmitting the message. An upper sideband carrying one message and a lower sideband carrying another can be transmitted on a single carrier, thus conserving bandwidth. Multiplexing is the process of "stacking" groups of these single sidebands for simultaneous transmission over wide frequency bands.

Frequency Modulation

Frequency modulation is somewhat more complicated than amplitude modulation. It has some real advantages, however—one of them being a higher signal-to-noise ratio.*

Figure 3 shows how frequency modulation works. The frequency of a carrier wave is made to swing by amounts corresponding to degrees of amplitude—the broader the swing, the louder the sound. The pitch, or frequency, of the incoming information is carried by the *rate* at which the carrier changes its frequency. (Remember that there are millions of cy-

cles per second in FM transmission, and each cycle carries its own frequency and indicates a minute but measurable rate of change.) It may seem like a paradox to express loudness in terms of frequency, but that's the way it works.

FM has a disadvantage in that it requires more bandwidth than AM. The signal-to-noise ratio in an FM system rapidly improves as the frequency swing is increased. In certain applications, however—for example in satellite communications—the increased "cleanness" of signal is worth it.

AM and FM in INTELSAT

Both AM and FM are used in the INTELSAT system. AM is used in the multiplexing and demultiplexing equipment on the ground in order to gain the advantage of single sideband transmission. In the space segment between earth stations and satellite, FM is used because of its better signal-to-noise ratio.

Part II of this article will discuss another type of modulation called Pulse Code Modulation (PCM). In PCM, messages are converted into binary code for transmission. A recent international conference in London, sponsored by INTELSAT and the British Institution of Electrical Engineers (IEE), considered the state-of-the-art of PCM and its possible uses in future systems.

*Static noise in FM affects only the amplitude of the signal. Since the amplitude variations carry no intelligence, they can be clipped off the signal. That is why there is less static on FM than on AM.



Equipment readjustment takes place as Etam carries heavier traffic load.

News and Notes From Etam

Etam Amateur Radio Club Tunes Up, Members Study for Test, Operation

By Penny Chidester and Deloris Goodwin

The Amateur Radio Club is under way at the Etam station. The recently organized club has ten members from COMSAT and AT&T, and members of the employees' families have also been asked to join.

Andrew Thomson is serving as Chairman and Roger Janis as Secretary of the organization. Presently, the club does not have an operator's license, but six members plan to take the novice test in the near future. The purpose of the club is to encourage friendship among the members and to encourage an interest in radio operations.

Christmas Parties

A Christmas party for the children of COMSAT employees was held on Sunday afternoon, December 21 from 1:00 to 3:00 in the training room of the Etam station. John Smallwood, a magician from Clarksburg entertained the children with feats of magic. Refreshments were served, and best of all, Santa showed up to hear what the children wanted for Christmas.

While the children enjoyed their holiday party, moms and dads waited their turn for Christmas cheer. A party for adults was held on December 27 at the Arthurdale Inn, Arthurdale, West Virginia. Cocktails and dinner were served and, afterwards, music was pro-

vided by the Hilltoppers from Morgantown.

Station Manager William B. Carroll recently made a presentation about COMSAT to the Fairmont W.Va. Women's Club. He showed

them the movie, "Anatomy of Success," and later spoke briefly about the Corporation, its operations and responsibilities.

Personals

Carl Cooper, Operations Technician, was married to Sonja Burrows on November 22 in Clarksburg, West Virginia. They are living in Cheat Park outside Rowlesburg. Everyone wishes them happiness in their marriage.

Don Gaston, Senior Technician, recently had surgery performed at Preston Memorial Hospital in Kingwood. He has been released from the hospital and is progressing well. The only discomfort he faces is having to eat his dinners off the mantle!

To Cope with the Coop or Not, That was the Question

John Formella, Operations Supervisor, decided that his egg bill was just too high. But unlike most of us who just suffer through the rising cost of living, John bought a flock of chickens. Now he can furnish his five children with all the eggs they want. And he only has to contend with the rising cost of chicken feed. Lucky John. . . .



James McCormack, COMSAT Chairman and Chief Executive Officer, answers questions following his policy address to the New York Society of Security Analysts in New York on December 10. (Additional copies of Mr. McCormack's speech are available from the Information Office.)

AMSAT Members Join Together, Confirm Plans for Satellite Launch

Some COMSAT employees have a keen interest in a satellite that is not at all like the big, versatile IN-TELSAT III's. It's an amateur one.

The 35-member COMSAT Radio Club, a partner in a venture with several other U.S. and international amateur groups, called the Radio Amateur Satellite Corporation (AMSAT), hoped to have a 39-pound satellite working by the last of January.

Launch of the amateur satellite—called Australis OSCAR-A because it was constructed by amateur radio operators at Melbourne, Australia, University—was scheduled for January 19 from the Western Test Range in California.

Australis-OSCAR was scheduled to ride into space as a secondary, or piggyback, payload during the NASA launch of a Tiros-M satellite. It was to be ejected into orbit from the second stage engine compartment of a Thor-Delta launch vehicle.

The planned circular orbit was scheduled to be nearly polar with an inclination of 101.56 degrees to the earth's equator at an altitude of about 910 miles.

The OSCAR part of the satellite's name comes from Project OSCAR, a West Coast organization of radio amateurs who have previously built and obtained launches for four amateur radio satellites.

COMSAT Amateur Radio Club members worked closely with the testing of Australis-OSCAR, after it was received in the U.S. from Australia, and modified it to fit NASA specifications.

Most of the work was done at nights and on weekends at the Goddard Space Flight Center in nearby Maryland, Perry Klein, a member of the COMSAT Technical staff, and club secretary-treasurer, said.

Amateur radio operators throughout the world have been asked to monitor Australis-OSCAR's signals, Klein explained, and to report the following:

—the signal strength

—the time the signal is acquired and lost

—any unusual reception characteristics.

Times of the broadcasts will be carried around the world by the Voice of America, Klein said.

COMSAT Amateur Radio Club members hope to be able to receive Australis-OSCAR's signals on its equipment, both at Clarksburg and the Plaza.

The launch of Australis-OSCAR will be the first satellite put up by AMSAT, organized in March of last year to foster radio amateur participation in space research projects.

Australis-OSCAR is expected to have a life expectancy of about two months. The satellite will transmit low-power signals on two amateur bands at frequencies of 29.45 MHz in the ten-meter band and at 144.05 MHz in the two-meter band.

The two-month estimate of the satellite's lifespan is based on continuous operation on the two-meter band and weekend operation on the higher one.

New Equipment Installed by Radio Enthusiasts

COMSAT Amateur Radio Club members have installed some of the latest in amateur transmitting and receiving equipment at their COMSAT Labs' offices in Clarksburg, club President Cal Cotner reports.

The equipment enables members to talk to most points in the world by voice and code.

In addition, club members at the Plaza have installed a receive antenna on the roof of the Plaza building.

The club calls its Plaza receiving equipment COMSAT's smallest earth station. The terminal was bought second hand for less than \$120. It is so small—yet performs so well—that it is operated from the top of the desk of club Secretary-Treasurer Perry Klein in room 6169 at the Plaza. The antenna was used to pick up ATS-3 satellite transmissions of aircraft and ship communications. The antenna for the terminal is on the roof of the Plaza building.

In addition, club members used their equipment to talk with amateur radio operators in Australia to discuss the status of the Australis-OSCAR project.



Perry Klein demonstrates COMSAT's smallest earth station.



Dr. Charyk presented trophies to COGS Tournament winners on behalf of the Corporation. The lucky winners are (left to right) Dave Burks, Gen. George P. Sampson, William Wood, John P. Gerstner and Drew Walker.

COMSAT "Fivesome" Take Tourney; Golfers Honored by Corporation

With smiles all around, the COMSAT fivesome who took first place honors at the 1969 COGS Tournament accepted their congratulations from President Joseph V. Charyk. Dave Burks, John Gerstner, General George P. Sampson, Drew Walker and William Wood won the top honors in competition against the other 34 fivesomes entered in this year's play-off.

COGS Tournament play began in 1966, when three friends, all in the communications fields, got together on the golf course. As John Gerstner recalls, he, Lloyd Bond of Western Union and Jim Merdock of J. Merdock, Assc. were passing the usual comment about the lack of communications among members of the communications fields. They decided that there just didn't seem to be much communication, except, they joked, on the golf course.

Thinking it over, the men decided that maybe they could put communications and golf together and come up with a catalyst for better communications. Maybe they could get a number of communicators out on the golf course once a year to renew acquaintances.

That was the beginning of COGS, the Communicators Golf Society. The goal of COGS is "to once each year bring communicators who are also golfers together to perpetuate the spirit of communicability." Attaining this goal is manifested in the annual event known as the COGS Tournament.

The first year, 45 players took part in tournament play, with a handful of communications agencies participating. Since then, the popularity of the competition has grown. In the tournament held on September 19, 1969 at the Washingtonian Golf and Country Club, 170 members participated, representing 35 communications elements of government and industry.

Winners in the tournament received trophies at an awards dinner held following the play-off. Dr. Charyk presented members of the first place team with trophies from the Corporation in recognition of their excellent representation of COMSAT in the tournament.

The COGS play-off is organized each year by a different communications agency, the responsibility rotating in alphabetical order among the participating organizations. COMSAT was the organizing representative in 1968.

Sidney Goldman Resigns to Join Western Union

Sidney Goldman, Assistant Director of Governmental Relations, resigned from the Corporation to assume the position of Assistant Regulatory Counsel with Western Union Telegraph Co. He will assume his new position at 1828 L Street N.W., Washington, D.C., on January 19.

Mr. Goldman joined COMSAT in 1967 as the Special Assistant to Bruce A. Matthews, former Vice President of Finance and Administration. Before joining COMSAT, he was the Acting Chief of the International and Satellite Communications Rates Branch at the Federal Communications Commission.

From Page 11

ISCS Actions

Lanlate to access INTELSAT I, II and III satellites.

- Established principles by which the French Government could use INTELSAT data and inventions resulting from the INTELSAT IV contract.

- Scheduled the Forty-fifth meeting of the Committee to begin on January 21, 1970 in Washington, D.C.

Siemens Contract

COMSAT on behalf of INTELSAT has awarded a \$37,747 contract to Siemens Aktiengesellschaft, Munich, Germany, to develop an engineering model of a microwave filter/equalizer. The Siemens organization has proposed a new approach in filter/equalizer design for possible application in future communications satellite transponders.