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SATELLITE Pathways

COMSAT COMMUNICATIONS SATELLITE CORPORATION
COMSAT GENERAL CORPORATION

SATELLITE Pathways

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Cover. *Susan Kasser, daughter of Joe Kasser, author of this issue's special feature on radio amateurs, follows in her father's footsteps as she attempts to use his home radio station.*

COMSAT expanded its operations substantially in 1976. The services COMSAT provides to the U.S. international communications carrier companies through the global satellite system increased by 16 percent. In addition, COMSAT GENERAL began to provide maritime satellite communications services through the MARISAT System and to lease the capacity of two COMSTAR satellites to AT&T for U.S. domestic communications.

A total of six satellites were launched during the year: an INTELSAT IV-A satellite for global system service, three satellites for MARISAT service, and two satellites for COMSTAR service. With the exception of one of the MARISAT satellites which began service on January 1, 1977, all of these satellites were placed in service during 1976, as was an INTELSAT IV-A satellite launched in 1975.

1976: Year in Review

Global System Services

At the end of 1976, COMSAT was leasing nearly 5,000 full-time half-circuits to the U.S. international communications carrier companies.

At the end of 1976 COMSAT was leasing 4,461 full-time half-circuits to the U.S. international communications carrier companies, including 750 half-circuits between the U.S. mainland and Puerto Rico. This is 16 percent greater than the total leased at the end of 1975. COMSAT's television services in 1976 totaled 1,564 half-channel hours, 118 less than in 1975.

The Corporation's temporary services in 1976 totaled 11,053 half-circuit days, 2,776 fewer than in 1975. Through its temporary services, COMSAT provides extra communications capacity during peak traffic periods, such as holiday seasons and times when special events occur, and restores transmission capacity when undersea cable communications are interrupted.

The Space Segment

The communications capability of the global system was expanded in the Atlantic Ocean region in 1976.

The communications capability of the global system was expanded in the Atlantic Ocean region in 1976 by the addition in February and December of two INTELSAT IV-A satellites as replacements for two INTELSAT IV satellites. The third INTELSAT IV-A is scheduled for launching in mid-1977 to serve as a backup for the new satellites. The fourth INTELSAT IV-A is scheduled for launch in the fall of 1977 to serve as the primary satellite in the Indian Ocean region where traffic is growing rapidly.

Each INTELSAT IV-A has capacity for about 6,000 voice circuits and two television channels in the system configuration being used in the Atlantic region. This is two-thirds greater than the capacity of an INTELSAT IV satellite.

Five INTELSAT IV satellites remain in service in the global system: one as a standby over the Atlantic Ocean, one as operating and one as standby over the Pacific Ocean, and one as operating and one as standby over the Indian Ocean.

In preparation for the 1980's INTELSAT has ordered from Ford Aerospace & Communications Corporation seven INTELSAT V satellites for service in the global system. Each of the INTELSAT V's will have communications capacity of 12,000 circuits plus two television channels, about

double that of an INTELSAT IV-A. The first satellite in the INTELSAT V series is scheduled for launching and service during the latter part of 1979.

Earth Segment

The worldwide network of earth stations was extended in 1976 by the addition of 34 antennas and 29 earth station sites.

The worldwide network of earth stations was expanded in 1976 by the addition of 34 antennas and 29 earth station sites, and by the addition of 11 countries. This represented the largest growth in earth station facilities in any year since the start of commercial satellite service in 1965. By the end of the year, there were 157 antennas at 126 earth station sites in 82 countries, territories and possessions.

At the end of 1976 there were 491 satellite pathways providing direct lines of communications among countries with earth stations, 85 more than a year ago. Since satellite services are extended to still other countries through terrestrial connections, a total of 115 countries, territories and possessions were using satellite services full-time. COMSAT's satellite services put the U.S. in communication with 92 of them.

MARISAT System

The three satellites of the MARISAT System were launched in 1976 and placed in service to give three-ocean coverage.

The three satellites of the MARISAT System were launched in 1976 and placed in service to give three-ocean coverage. The MARISAT System, in which COMSAT GENERAL has an 86.29 percent ownership interest, provides high-quality communications to the U.S. Navy and to the commercial shipping and offshore industries.

Service to the Navy was initiated in the Atlantic Ocean region on March 25, in the Pacific Ocean region on June 28, and in the Indian Ocean region on January 1, 1977. Under the terms of a new service agreement, the Navy is committed to purchase service through the Atlantic and Pacific satellites until March 31, 1979, at an annual rate of $11.63 million per satellite, and through the Indian Ocean satellite until June 30, 1979, at an annual rate of $6.5 million. The Indian Ocean satellite initially will provide service to the Navy only. The Navy has options to extend the time of its use of all three satellites.

Service to the commercial shipping and offshore industries was initiated in the Atlantic and Pacific Ocean regions in 1976.

Service to the commercial shipping and offshore industries was initiated in the Atlantic and Pacific Ocean regions in July and August 1976, respectively.

COMSAT GENERAL offers a wide range of commercial MARISAT services, including telephone, telex, facsimile and data communications. These services are provided through mobile terminals COMSAT GENERAL sells or leases to MARISAT users. More than 35 commercial ships and offshore facilities representing 12 different countries are now equipped with these terminals, and orders are pending for terminals to be installed on additional vessels as well as on offshore oil facilities. COMSAT GENERAL has a worldwide organization of agents to sell or lease, install and maintain the on-board terminals.

COMSTAR Service

Two of the three COMSTAR satellites, whose capacity has been leased to AT&T, were launched during 1976.

Two of the three COMSTAR satellites, whose capacity has been leased to AT&T, were launched during 1976 and made available to AT&T on June 19 and September 9, respectively. COMSAT GENERAL owns and operates the COMSTAR satellites, the first satellites to be used for nationwide message telephone service. A third COMSTAR satellite is scheduled for launching in April 1978 to handle service growth. A fourth satellite will serve as an on-the-ground spare.

The COMSTAR satellites employ a technique known as dual polarization which permits simultaneous use of the same frequency bands so that each satellite can achieve a capacity of 14,400 circuits. Such capacity is made possible because the power of the COMSTAR satellites is concentrated on the U.S. to serve a small number of earth stations. AT&T owns and operates four earth stations working with the COMSTAR satellites. Through an arrangement with AT&T, three addi-

tional earth stations are owned and operated by a subsidiary of General Telephone & Electronics Corporation.

The AEROSAT Program

In September 1976, General Electric Company was selected as the prime contractor for the construction of two satellites to be used in the AEROSAT Program.

In September 1976, General Electric Company was selected as the prime contractor for the construction of two satellites to be used in the AEROSAT Program, an intergovernmental effort to test and evaluate satellite communications with aircraft flying transoceanic routes.

COMSAT GENERAL is participating with the European Space Agency (ESA) and the Government of Canada in supplying the space segment for this program. COMSAT GENERAL and ESA each have a 47 percent interest; Canada has a six percent interest. COMSAT GENERAL is to lease its entire share of satellite capacity to the U.S. Federal Aviation Administration (FAA).

Contracts with General Electric for the AEROSAT satellites, and with the FAA for communications services are under negotiation.

The Queen Elizabeth 2 sails into New York Harbor. In December, the QE2 made its first voyage which utilized the MARISAT system for communications.

Satellite Business Systems

The Federal Communications Commission (FCC) issued a press release on January 18 announcing that it had authorized Satellite Business Systems (SBS) to construct and operate facilities to provide specialized domestic satellite communications services. SBS's system applications had been accepted by the FCC for filing on February 6, 1976.

As *PATHWAYS* went to press, the FCC had not yet released its Memorandum Opinion, Order, Authorization and Certification, but the FCC said it had reached its conclusions without conducting a hearing because there was no legal or public interest need to do so, and that delay in SBS's entry into the domestic satellite field could in fact disserve the public interest.

The FCC stated further that, even if it were to accept the various arguments that SBS's entry could potentially lessen competition, it concluded that the public interest benefits outweigh potential anti-competitive concerns and that SBS's proposal, viewed as a whole, serves the public interest, particularly in view of various conditions the FCC had imposed with respect to interconnection, business relations between SBS and its partners and parents and marketing.

SBS is a partnership in which subsidiaries of COMSAT General, Aetna Casualty and Surety Company and IBM have joined to establish a unique all-digital domestic communications satellite system.

SBS's system will permit a customer with geographically dispersed locations to combine voice, data and image communications into a single, integrated, private-line switched network through satellites operating in the 12- and 14-gigahertz bands. This will be the first domestic satellite system in those bands offering an all-digital transmission service.

Frederic G. Donner retires as COMSAT director and becomes Director Emeritus

Frederic G. Donner, a Presidentially appointed director of COMSAT for the past 12 years, retired from the Board of Directors as of January 14.

After taking note of his retirement, the Board, at its January meeting, conferred the honor of *director emeritus* upon Mr. Donner and invited his "continued wise counsel." He is the first director emeritus designated by the COMSAT Board.

First appointed to the Board in 1964 by President Johnson, Mr. Donner continued to serve as a Presidential appointee during the administrations of Presidents Nixon and Ford.

Mr. Donner was Chairman and Chief Executive Officer of General Motors Corporation from 1958 to 1967. He rose to that position after joining General Motors in 1926 soon after his graduation from the University of Michigan. He retired as Chairman in 1967 and from the General Motors Board of Directors in 1974. From 1968 until 1975 he served as Chairman of the Board of Trustees of the Alfred P. Sloan Foundation.

To the President of the United States

The President
The White House
Washington, D. C.

My dear Mr. President:

This is to advise you that on this date I have submitted my resignation, effective at the close of business, January 14, 1977, as a member of the Board of Directors of Communications Satellite Corporation (COMSAT). My resignation is in keeping with my desire to reduce my activities and, consequently, I do not wish to be considered for another appointment as one of COMSAT's Presidentially appointed directors.

My service on the COMSAT Board over the past twelve years, by appointment and during the administrations of three Presidents, has spanned virtually the entire life of COMSAT. COMSAT was formed pursuant to the Communications Satellite Act of 1962 as the chosen instrument of the United States in the international communications satellite field. Through its leadership, we have seen the rapid establishment and growth of the global communications satellite system, and important initiatives in the domestic, maritime and aeronautical communications satellite fields. I am proud to have been able to participate in this enterprise in its critical formative years, and I believe that the entire nation can take great pride in its accomplishments. In my view, COMSAT is most deserving of support and encouragement from the government as it undertakes the further development of its current programs and additional communications satellite programs.

Respectfully yours,
Frederic G. Donner

From the Chairman of the Board

With deep regret, I hereby accept your resignation, effective at the close of business, January 14, 1977, as a Presidential appointee to the Board of Directors of Communications Satellite Corporation.

COMSAT was indeed fortunate in your appointment to the Board in its very early stages. You brought to the new company your vast experience and outstanding career in American industry. Your wisdom and counsel on the many decisions of the Board played a significant and unique part in the successful creation of the international satellite communications system and in the rapid and outstanding success of the Corporation.

All of us who have served with you on the COMSAT Board, and I particularly, have gained immensely from your wise counsel. We shall miss you greatly. I want you to know too that I, personally, appreciate your warm friendship, which has helped me so much during my service as Chairman.

With warmest regards, as always.
Sincerely,
Joseph H. McConnell

Resolution Adopted by Board of Directors at Regular Meeting Held on January 14, 1977, Citing

FREDERIC G. DONNER

"WHEREAS, Frederic G. Donner has served as a director of this Corporation since September 1964, by appointment and during the administrations of three Presidents of the United States;

"WHEREAS, drawing upon his vast business experience and great wisdom, he has brought to the deliberations of this Board of Directors an incisive intellect, a rigorous discipline of mind and a sharp sense of the highest standards of corporate management, all of which have contributed profoundly to the guidance of the Corporation through its formative years and the establishment of a firm foundation for its future development; and

"WHEREAS, Frederic G. Donner has resigned his position as a director of the Corporation effective January 14, 1977:

"RESOLVED, that his colleagues on this Board of Directors hereby record their high regard for him and their appreciation of his services to and association with the Corporation, and also record their desire that the friendship developed between each of them and him during the time of his service as a director shall continue."

A photo of Mr. Donner taken when he was Chairman and Chief Executive Officer of General Motors Corporation.

COMSAT Board Chairman Joseph H. McConnell, left, congratulates retiring Board member Frederic G. Donner upon his designation as COMSAT's first "director emeritus."

From the President of the United States

I have your letter of December 17 informing me that you have submitted your resignation as a member of the Board of Directors of Communications Satellite Corporation (COMSAT) effective January 14.

You have served in the unique capacity of director of a privately owned and operated corporation who has been appointed by the President with the advice and consent of the Senate over successive terms. The manner of your appointment was determined by the statute that first authorized forming this corporation to become the United States partner in a system of global communications by satellite, which is now known as INTELSAT. Your important role has been that of advancing the use by private enterprise of a new and extraordinary method of telecommunications which was an outgrowth of our government's highly successful program for the exploration of outer space.

Today we take for granted the means for instant and effective voice and television communications between distant points throughout the world, thanks to the advantages of transmitting electronic signals through geostationary satellites and an extensive network of ground stations. But when you began your service twelve years ago, the ultimate success of this visionary venture was not assured. For having helped to guide COMSAT through its developing years into the remarkable success it has now achieved, you are entitled to take much pride and satisfaction. You have had a significant part not only in achieving the original purpose of the corporation but also in seeing it expand into domestic, maritime and aeronautic communications by satellite.

I regret very much that you have decided to leave the COMSAT Board, but I can appreciate the desire you have to reduce your activities after so many exceedingly active years in business and in philanthropic activities. I know your colleagues on the Board will greatly miss having the benefit of your wise and resourceful counsel and the enjoyment of their association with you. You have earned their gratitude as you have mine for your devoted service and rewarding friendship.

You have my warm best wishes for many more years of good health and satisfying interests.

Sincerely,
Gerald R. Ford

Radio hams communicate worldwide using OSCAR family of orbiting satellites

BY JOE KASSER

Six times a day, two OSCAR spacecraft skim across the Washington Metropolitan skies on their never-ending journey around the earth. During each of the passes, area hams (amateur radio operators) lock in on the 65-pound "birds," less than 1,000 miles overhead, to discuss with other hams, within a range of 5,000 miles, topics running the full gamut from natural disasters to family small talk.

OSCARS (Orbiting Satellites Carrying Amateur Radio) are communications satellites, the brainchildren and products of radio amateurs. They rise above the horizon for periods ranging from a few seconds to 22 minutes, and present a moving target traveling at about 14,000 miles per hour for ground-bound amateur radio operators to zero in on and carry their messages to other operators within range.

Similar to Telstar and other low-altitude communications satellites, OSCARS VI and VII circle the earth at nearly two-hour intervals allowing radio amateurs within reach of their north-south trajectory to communicate by relaying messages received from the ground through their transmitter which operates at a power level of about one watt. This capability of OSCAR becomes more amazing when one considers that inexpensive CB radio transmitters have a power output two or three times that of the OSCAR transmitter.

The first satellite of the OSCAR family was carried into orbit on board a Thor-Agena launch vehicle, along with Discoverer XXXVI, on December 12, 1961. The launch marked 60 years to the day that Guglielmo Marconi, the world's self-professed original radio amateur, made history by receiving the first man-made transatlantic shortwave radio signals. OSCAR I, built by radio amateurs on the West Coast, transmitted telemetry and Morse code signals for three weeks until its batteries were exhausted.

The OSCAR program had its inception in the writings of a radio amateur in QST, the Journal of the American Radio Relay League, (ARRL), in 1960. He suggested the construction of a space satellite by radio amateurs. The idea caught on and Project OSCAR was formed in California.

But Project OSCAR was not the first acquisition of signals from space satellites by radio amateurs. When the U.S.S.R. launched SPUTNIK I in 1957, Russian scientists chose a beacon frequency very close to the 21-MHz Amateur Band. Presumably the choice was not by chance for, although signals from the spacecraft could be heard by anyone with a suitable receiver, it was the radio amateurs who were most likely to have such suitable receivers. Within minutes of the launch many amateurs were eagerly tuning their receivers to pick up SPUTNIK's signals from space.

OSCAR I, launched in December of 1961 and operated for 18 days, recorded more than 5,000 reception reports from amateurs in 28 countries. OSCAR I also introduced the concepts of "Doppler tracking" and "telemetry decoding" to the radio hams of the world. The satellite's telemetry system was very simple: the beacon transmitted the message "Hi" in Morse code over and over again. The number of "Hi's" transmitted within a 10-second time period was a function of the internal spacecraft temperature.

OSCAR II, launched June 2, 1962, was similar to OSCAR I and also had an active life of 18 days.

OSCAR III, launched March 9, 1965, was the world's first free-access communications relay satellite, having been placed in orbit one month before INTELSAT launched *Early Bird*. OSCAR III contained an in-band transponder at 145 MHz, powered by silver zinc batteries. It was active for 15 days, during which time 176 two-way contacts, including a number of transatlantic contracts, were claimed by 98 participating radio amateurs, 67 in North America and 31 in Europe. Battery life was somewhat reduced due to the fact that the battery covers were not replaced in the excitement prior to launch. OSCAR III also carried a three-channel telemetry beacon powered by solar cells which transmitted for several months, sending back spacecraft internal temperature and voltage data.

OSCAR IV, launched December 21, 1965, was the OSCAR Program's first "misfire." The spacecraft was supposed to be injected into a near-synchronous orbit at an altitude of about 32,000 km (approximately 20,000 miles) but the third stage failed to ignite, leaving the launch vehicle in a highly elliptical transfer orbit. Consequently, OSCAR IV was injected into an orbit with a range from approximately 200 km (125 miles) to an apogee of 33,000 km (20,500 miles) at zero degrees inclination.

Built by radio amateurs of the TRW Amateur Radio Club of Redondo Beach, California, OSCAR IV carried a transponder receiving signals at 144.1 MHz and transmitting them at 431.93 MHz within a 10-kHz bandwidth. Power was furnished by

solar cells instead of batteries.

OSCAR IV suffered from a solar array malfunction in the elliptical orbit. It has a passband only 10 kHz wide and was slightly erratic in operation. Thus, communicating through it was quite difficult but it did provide some communications capability, including the first direct satellite link of any kind between the U.S. and the U.S.S.R.

However, it was not until 1969, as the result of a talk entitled "Project OSCAR" given to the COMSAT Amateur Radio Club, that the feasibility of building, designing and testing such satellites by the amateurs on the East Coast was recognized. It was pointed out that this capability existed among the radio amateurs in the Washington, D.C. area, many of whom were employed by the government and commercial organizations. The formation of an East Coast group to conduct such a program was proposed.

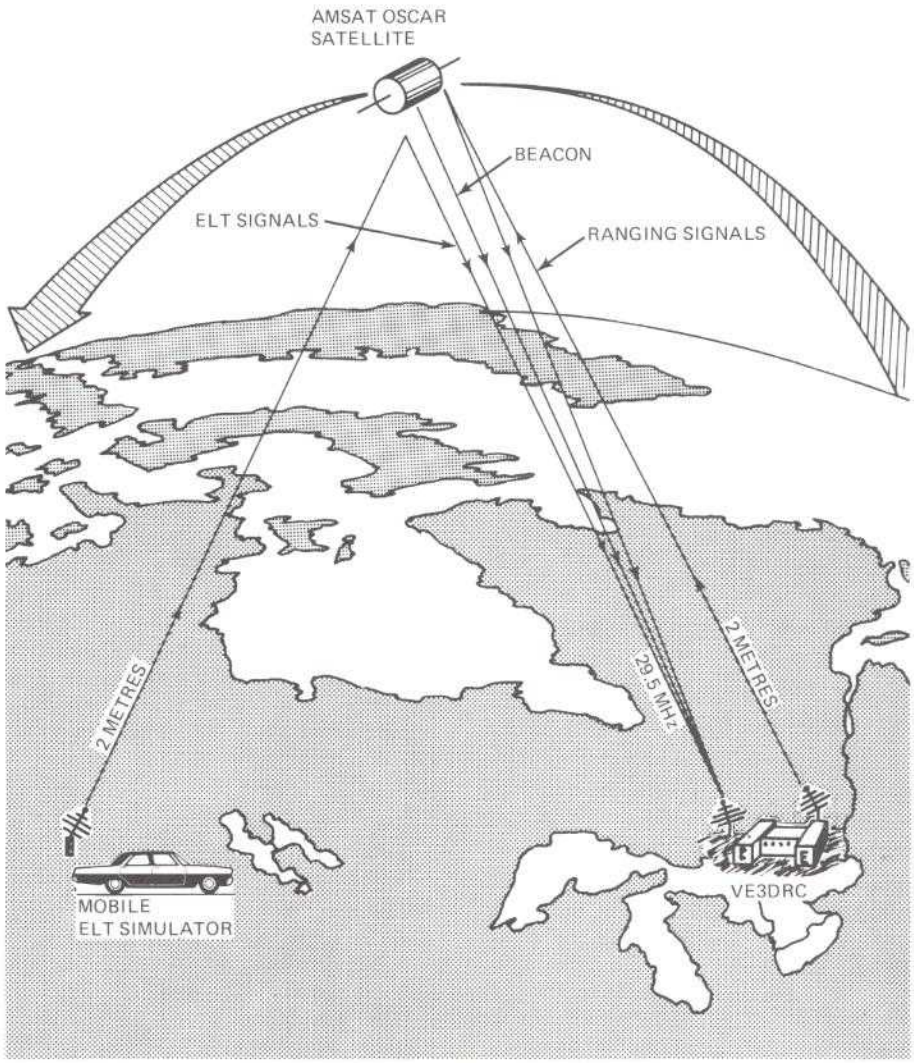
The idea took hold. Discussions were held between representatives of the amateur radio clubs of COMSAT, the Johns Hopkins University Applied Physics Laboratory, IBM Federal Systems Division, Aeronautical Radio, Inc., Communications & Systems, and NASA Goddard Space Flight Center. Many of those present at the various meetings, already involved in other space programs, were interested in the idea of the Radio Amateur Satellite Program, and, most important, were in contact with officials of government and industry who could render invaluable assistance to their program.

Thus, on March 3, 1970, the Radio Amateur Satellite Corporation (AMSAT) was formed and Perry Klein (K3JTE) of COMSAT was elected its first President.

AMSAT's first project was to manage the launch of the AUSTRALIS-OSCAR V spacecraft built by a group of radio amateurs at Melbourne University, Australia (from which group the spacecraft derived part of its name).

The AUSTRALIS-OSCAR mission was significant in a number of ways, the most important of which was the utilization of a command system to demonstrate that radio amateurs could successfully control the operation of a spacecraft in orbit. This capability was ably demonstrated when the 28-MHz beacon was commanded "on" on Fridays and "off" on Mondays, thus confining its operations to weekends when the greatest number of amateurs would be able to monitor signals from the spacecraft.

AUSTRALIS-OSCAR V was the first international effort; the satellite had been built in Australia and space-qualified by American radio hams. It was the forerunner to achieving greater international cooperation by radio amateurs in the satellite field.



Experiments are being conducted with a system using AMSAT's OSCAR VI satellite to pick up and relay signals from an Emergency Locator Transmitter (ELT) device which is ejected from a downed aircraft or a small boat in distress. The ELT automatically starts transmitting a distinctive distress signal on always-monitored aircraft VHF frequencies. By processing the Doppler frequency shift of the ELT signal received and relayed by OSCAR VI, studies showed that downed aircraft could be located within 20 miles. Results of actual experiments at 145 MHz have indicated it is possible that a location prediction can be given which is accurate to within five miles. Such a system, utilizing AMSAT satellites, could cut down dramatically on the cost of search and rescue operations and add greatly to the safety of life in both air and marine emergencies.

AMSAT-OSCAR VI was launched on October 15, 1972, and amateur radio contacts by satellite became everyday occurrences. OSCAR VI carried a transponder relaying signals from 145.9 MHz to 29.5 MHz within a 100-kHz passband. The telemetry beacon transmits 24 channels of data encoded in Morse code; consequently, any amateur with an understanding of the code can decode the telemetry and determine the condition of the spacecraft. Solar cells on the spacecraft recharge its nickel-cadmium batteries, extending the useful lifetime of the spacecraft.

The spacecraft also contains a message storage facility known as *Codestore* which contains a memory that can be loaded from the ground with a message in Morse code that can then be transmitted by the beacon instead of the telemetry data. *Codestore* is used by the Canadian and Australian Command Stations to exchange messages (the satellite is not within range of both stations at the same time) and by AMSAT to alert satellite communicators to changes in the operating schedule of the spacecraft.

OSCAR VI was designed and built by radio amateurs in the United States, Australia and Canada. Although designed for a one-year lifetime, it is still—after more than four years operational, though on a somewhat reduced schedule due to degradation of the solar cells and batteries. In fact, OSCAR VI has outlived the prime mission satellite, NOAA-2, with which it was launched.

The author, Joe Kasser, is a member of the Technical Staff, COMSAT Labs. In the photo above, Kasser operates his ham station at home. QSL cards confirming regular short wave and satellite contacts are mounted on the wall.

For AMSAT President Klein, November 15, 1974, was a special day; it was his birthday and also the day AMSAT-OSCAR VII joined its brother in space. Truly an international effort, having been built by radio amateurs in the United States, Canada, Australia and Germany, AMSAT-OSCAR VII carries two transponders (432 MHz/149.5 MHz and 145.9 MHz/29.5 MHz), each operational on alternate days. Telemetry is available both in Morse code and in Baudot-coded radio teletype and the satellite also contains a *Codestore* facility. Solar cells are again used to recharge its nickel-cadmium batteries.

Having two working satellites in space has enabled radio amateurs to make the first double-satellite communication links in which signals are uplinked to AMSAT-OSCAR VII at 432.1 MHz, relayed to AMSAT-OSCAR VI at 145.9 MHz and downlinked to earth at 29.5 MHz. Since the period of the orbit of AMSAT-OSCAR VII is just slightly shorter than that of AMSAT-OSCAR VI, AMSAT-OSCAR VII overtakes its little brother about every six months, and it is during these periods of overlap that double-satellite contacts take place.

AMSAT-OSCAR VII also carries an S-band beacon as proof of the interest of radio amateurs in the use of microwaves for space communications; however, much to their dismay they have not yet been able to obtain permission to power it up.

AMSAT-OSCAR VII was built largely by volunteer help with a cash investment of $60,000. The funds were contributed by individuals and organizations interested in the project. Project Manager Jan King, an Aerospace Engineer at the NASA Goddard Space Flight Center, estimated that, if built commercially, the spacecraft would have cost nearly two million dollars.

Pioneer space techniques

Systematic techniques for the direct broadcasting of bulletins about the AMSAT program; educational programming; and utilization of aeronautical, maritime and land mobile space satellite communications have been developed and demonstrated and are commonplace in the amateur world. But as far as the professionals are concerned, they have only recently been introduced, are being planned for introduction in the near future, or are still being talked about.

With the launching of a reliable long-life radio amateur communications satellite (AMSAT-OSCAR VI) in October 1972, radio amateurs were, for the first time, free to experiment with and pioneer space communication techniques in a systematic manner.

American Radio Amateurs are allowed to relay telephone calls ("phone patch") to certain countries through their ham equipment. The majority of such calls link American servicemen on board ships at sea and missionaries in remote places, where connections to the INTELSAT network are non-existent, with their families at home. In September 1974 the first claimed use of a satellite for this ham service was for a "phone patch" relay between the U.S. and Hawaii via AMSAT-OSCAR VI.

Anticipating AEROSAT and INMARSAT, radio hams have set up terminals in automobiles, private aircraft and yachts, and have demonstrated satellite communication capa-

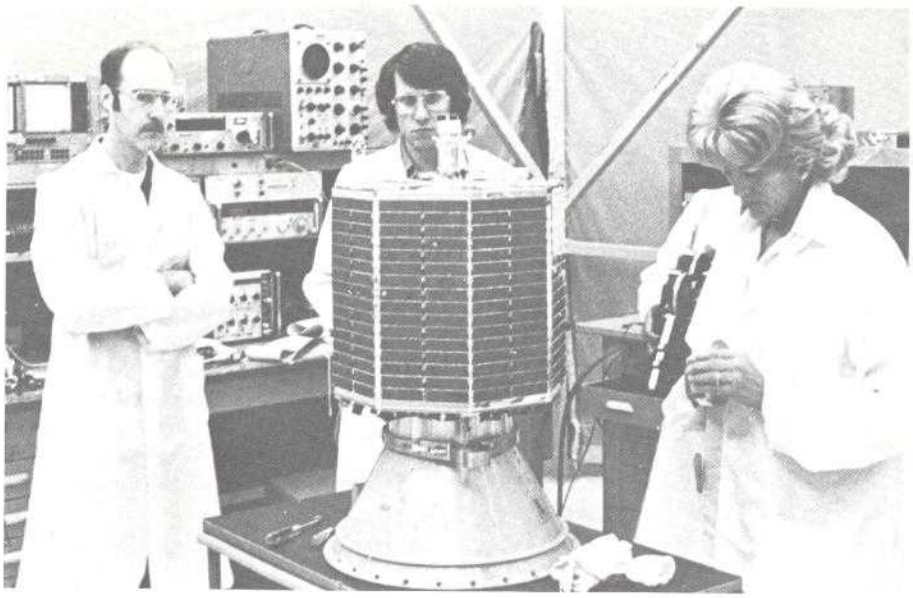
bility from automobiles in motion on the highways, small private aircraft, and yachts sailing off the coast of Florida and in the Caribbean.

The emergency communications capability has been demonstrated by special tests organized by the American Relay League simulating disaster conditions such as earthquakes in Alaska. Occasionally, hams journey to remote places to put a rare "country" or state on the "radio map." Such journeys, called "DX-peditions," have included spending a night next to a graveyard in West Virginia, operating a portable station in the Vatican, and setting up a battery-powered station on the Mall in Washington, D.C. for the opening of the new Aeronautics and Space Museum in July 1976. These DX-peditions and the results of the simulated Emergency Tests have shown that small, low-cost (less than $1,500), low-power (10-100w) stations can easily put usable signals into the OSCAR spacecraft.

In 1973 an Israeli ham proposed the transmission of electrocardiogram data (EKG) via the OSCAR satellites. In October 1975, such data was transmitted from Santa Ana, California, to the National Institutes of Health Amateur Radio Club, Bethesda, Maryland, via AMSAT-OSCAR VI and VII. The received data was an acceptable EKG pattern closely resembling the original transmitted signal. In conjunction with the portable and mobile terminal tests, amateurs have shown that medical data can be relayed from remote areas to hospitals via low-altitude, low-cost satellites and terminals.

The AMSAT-OSCAR VI satellite has been used by the Canadian Communications Research Center to successfully demonstrate the feasibility of a satellite-aided search and rescue technique that can reduce the time and costs associated with conventional methods of finding downed aircraft.

It is mandatory for all aircraft in the U.S. and Canada to carry Emergency Locator Transmitters (ELTs), operating on an international distress frequency of 121.5 MHz. The ELT is designed to switch itself on at the time of a crash and transmit a signal for at least 100 hours so that search and rescue aircraft can "home in" on it.



AMSAT hams Dick Daniels, Jan King (Project Manager) and Marie Marr, left to right, check out the AMSAT-OSCAR VII spacecraft.

Using simulated ELTs at 145.9 MHz, the satellite search and rescue concept has been proven because the position of the satellite at any instant is known due to the existence of precise orbital predictions, and because computers are available to process the distress signals relayed by the satellite. The Doppler shift in the frequency of the ELT as the spacecraft passes within range of a simulated crash site is processed, and at the conclusion of a spacecraft pass, an immediate "position fix" accurate to within about 100 km is available. Within 15 minutes or so, after computer processing of the data, an optimized "fix" is available, locating the simulated crash site to within eight km.

Experiments using the AMSAT-OSCAR VI spacecraft have demonstrated a new technique that not only can pinpoint the location of crashed aircraft to within about eight km, but can also provide large savings in time, fuel and other costs involved with respect to currently used search and rescue techniques. Researchers are planning for an operational system that might involve three spacecraft, each having a design lifetime of seven to 10 years, at a total cost of about $30,000,000. This is a fraction of the amount spent today for search and rescue (on an annual basis) in Canada alone. The satellites would fly at an orbital altitude of about 1,100 km—low enough to get good signals from the low-powered ELTs yet high enough to cover a sufficiently large swath of the surface of the earth.

Direct broadcasting from space to terrestrial receivers has also been demonstrated. The Hungarian Radio Amateur Society applied for and received special permission to conduct broadcasting experiments through the AMSAT-OSCAR VI and VII satellites. These tests were conducted in 1975.

In the U.S., AMSAT has been transmitting educational messages and bulletins via AMSAT-OSCAR VI most evenings. Each year, during the hurricane season in the Caribbean, special hurricane bulletins have been relayed via the OSCAR spacecraft. At times, when propagation conditions are bad, the OSCAR hurricane bulletins are the only warnings available to remote islands. The Hungarian tests, the AMSAT bulletins and the hurricane warnings have shown that satellite broadcasting is not only perfectly feasible but desirable, especially for getting information to remote places.

AMSAT is an international organization of Radio Amateurs working together for the common good. There are members in more than 80 countries, affiliate organizations in Italy, the United Kingdom, Canada, Mexi-

Ham antennas are varied and ingenious in construction and are adaptable for use on water and land, fixed and mobile. In the photo at left COMSAT's Chuck Dorian routinely maintains his elaborate rooftop antenna while, in the right photo, Joe Kasser demonstrates a simple antenna suitable for satellite communications.

co, Japan and Australia. Official AMSAT representatives are present in 21 countries, on all continents, including Poland, Romania, Israel, India, New Zealand, Brazil, Ireland and Switzerland. Information about the Radio Amateur Satellite Program should be requested from AMSAT, PO Box 27, Washington, D.C. 20044.

COMSAT's "Who's Who" of AMSAT

Many COMSAT employees are members of or have helped AMSAT at one time or another. Following, in alphabetical order, is a listing of some of those actively involved with AMSAT.

Pier Bargellini—A life member of AMSAT who also helped check out the AMSAT-OSCAR VI spacecraft.

Cal Cotner—Regularly communicates via the AMSAT-OSCAR VII spacecraft from the Labs during his lunch periods.

Chuck Dorian—A member of AMSAT's Board of Directors.

Joe Kasser—Edits the *AMSAT Newsletter.*

Ron Kessler—Machined parts for OSCAR VI prior to launch after the spacecraft developed complications during a vibration test.

Perry Klein—A member of the Technical Staff at the Labs in the formative days of AMSAT. Klein has since departed COMSAT to work full-time for AMSAT.

Wally Mercer—Built the prototype of the transponder flown on OSCAR VI.

Norma Moran—Spends some of her spare time assisting Kasser typing the *AMSAT Newsletter.*

Dave Rieser—Designed the antenna release mechanism for the 29 MHz dipole on AMSAT-OSCAR VI.

Members are dedicated to the degree that sometimes family situations just have to be fitted into communications scheduling. Fay, wife of Joe Kasser, a member of the Technical Staff at the Labs, was expecting her first child at the time of the launch of OSCAR VI. Following the launch, Perry Klein took a well-earned vacation and switched the AMSAT phone through to the Kasser home. After a few days of responding to calls from all over the world requesting information or reporting on the new spacecraft, communications came to a halt with the week-early arrival of potential ham operator Susie (see cover). With Fay at the hospital and Joe at the Labs, the world of AMSAT just had to wait until Perry returned from vacation.

Educational usage of OSCAR

The major factor in NASA's agreement to include the AMSAT-OSCAR spacecraft in its launches was the recognition of their educational uses. For example, the Morse code telemetry encoders on both AMSAT-OSCAR VI and VII can be commanded to send signals back to earth at a slow 10 words per minute. For students learning the Morse code, numerals can be mastered easily to the degree required to copy signals from the spacecraft at the 10 w.p.m. rate.

Numerous schools, museums and similar educational institutions, worldwide, use these spacecraft for teaching purposes as well as for "hands on" demonstration of space techniques. Specific areas of instruction can be conducted utilizing the AMSAT-OSCAR satellites.

In flight, the orbit equations and Doppler shift relationships can be demonstrated. The telemetry data can be decoded and interpreted in terms of algebraic equations and simple graphs. Here, we are dealing with mathematics.

Related to physics, we have basic orbital mechanisms, the relationships between orbital altitudes, and the period and velocity of spacecraft. Calculations can be made and verified by subsequent observations. Radio wave propagation such as polarization, skip effects and Faraday relation can be explained and illustrated by means of received satellite beacon signals.

(Continued on page 22)

New positions announced for Wood, Colino, Votaw, and Nye

Mr. Wood joined COMSAT in 1965 as Director of System Management. He was elected Assistant Vice President, Operations, in 1969 and, in 1975, Vice President, U.S. INTELSAT Division. In his new position as Vice President, INTELSAT Management Division, Mr. Wood replaces Mr. Votaw as the individual primarily responsible for carrying out and supervising the functions of COMSAT as Management Services Contractor to INTELSAT.

Mr. Wood retired from the U.S. Navy in 1965 with the rank of captain. During his Navy career he served as Director of Communications for the Commander in Chief, Eastern Atlantic and Mediterranean Command, and Assistant Director, Plans, for the Defense Communications Agency. Mr. Wood is a graduate of the University of Washington.

H. William Wood named
Vice President, INTELSAT Management Division

Richard R. Colino named
Vice President, U.S. INTELSAT Division

Mr. Colino joined COMSAT in March of 1965 and shortly thereafter was named Director of the International Affairs Division. Also, in 1965 Mr. Colino was accredited as Alternate U.S. Representative to INTELSAT's Interim Communications Satellite Committee. In 1968 he established the Corporation's European Office in Geneva, and served as its first Director for a year. He was involved in preparations for renegotiation of the INTELSAT Agreements and was Alternate U.S. Representative to the Plenipotentiary Conference which negotiated definitive arrangements for INTELSAT. In 1969 he returned to Headquarters as Assistant Vice-President, International.

He has been the U.S. Governor on the INTELSAT Board of Governors since 1973, and chaired the Board's Advisory Committee on Contracting and Patent and Data Matters. He served as Vice Chairman, and is currently Chairman, of the Board of Governors. In 1975 he was named Assistant Vice President and Deputy Director of the U.S. INTELSAT Division. Mr. Colino received his B.A. from Amherst College, and J.D. from Columbia University.

Mr. Votaw has been with COMSAT since 1963, when he became Project Engineer for EARLY BIRD. In 1965, he was named Director of the Space Segment Implementation Division. He became Assistant Vice President, Technical, in 1970 and Assistant Vice President, System Implementation, in 1972. In 1973, Mr. Votaw was elected Assistant Vice President for Technical Development and Support and in 1974, Assistant Vice President, Engineering. In 1975, he was elected Vice President, INTELSAT Management Division.

Prior to joining COMSAT, Mr. Votaw was Head of the Satellite Techniques Branch of the U.S. Naval Research Laboratory (NRL), in Washington, D.C. He received his B.E.E. degree from the University of Virginia.

Martin J. Votaw named
Vice President-Technical Operations, SBS

David S. Nye named
Assistant Vice President and Director of Personnel

Mr. Nye joined COMSAT in March 1973 as Director of Personnel. Prior to joining COMSAT, he was with Mobil Corporation for 15 years. During his tenure with Mobil, Mr. Nye had extensive experience in both personnel management and employee relations. Positions held included personnel assistant, job analyst, benefits and compensation, employee relations and employee relations advisor.

Mr. Nye is a native of Poughkeepsie, New York, and received his B.S. degree in Industrial and Labor Relations from Cornell University in 1958.

INTELSAT Board approves reduction in full-time space segment charge; approves 1977 budget

The Twenty-fifth Meeting of the INTELSAT Board of Governors was held at INTELSAT Headquarters in Washington, D.C. in December. Among its actions the Board:

Financial and Legal Matters

- Reduced the charge for full-time utilization from $690 to $615 per month ($7,380 per annum), reduced the charge for SPADE from ten cents to nine cents per minute, and maintained occasional use charges at present levels. The Board also decided to maintain the rate of compensation for use of capital at 14 percent per annum.
- Noted that no adjustment to the rate adjustment factor for Standard B earth stations was called for at this time or until such time as sufficient experience has been gained on the impact of Standard B stations on the system.
- Approved the addition of nine posts and one regrading in the Executive Organ. It approved a cost of living adjustment of 5.5 percent to the salary structure of the Executive Organ, effective January 1, 1977 and authorized the Secretary General to adjust individual salaries as appropriate.
- Approved the 1977, INTELSAT budget, comprising $134 million in capital expenses, $147.2 million in revenues, $6.3 million for Executive Organ operating expenses $24.4 million for Management Services Contractor operating expenses and $57.4 million for depreciation. The Board requested the Advisory Committee on Technical Matters to review the entire Project Support area of the budget and report to the Twenty-Sixth Meeting of the Board. It instructed the Director General to review the INTELSAT V support budget with the Management Services Contractor and report to the Board on the results as soon as possible but not later than the Twenty-Seventh Board Meeting. It also requested the Director General to review the future INTELSAT planning study and report to the Twenty-Seventh Board Meeting with recommendations.
- Noted the five-year INTELSAT financial plan (1977-1981) presented by the Secretary General and endorsed by the Advisory Committee on Finance.
- Noted the conclusions of the Special Committee on Financial Policies and Procedures regarding various aspects of INTELSAT financial policies and procedures, and decided to establish, effective December 31, 1976, a Budget and Accounts Review Committee of Governors and Alternate Governors to assist the Board in examination of budgets and annual financial statements, and approved its terms of reference. It also decided to discontinue the present Advisory Committee on Finance, with appreciation for the excellent assistance it has provided.
- Authorized the Management Services Contractor as requested by the Signatory of Switzerland to lend Selective Repeat ARQ equipment to Radio Suisse for laboratory tests, under a written agreement which will provide that Radio Suisse will: assume full responsibility for the equipment; bear all costs associated with the loan; return the equipment at the end of the loan in the same condition as received, less reasonable wear and tear; and will provide the test results to INTELSAT.

Technical and Operational Matters

- Decided, as recommended by the Management Services Contractor, not to exercise the present contract option for additional INTELSAT IV-A spacecraft, and authorized the Management Services Contractor to incorporate new options, valid until September 30 and December 31, 1977, into the contract after the requisite reviews have been completed.
- Noted that the Management Services Contractor intended to develop with NASA a new INTELSAT IV-A launch planning schedule to accommodate the operational plans approved in September, and that the goal will be to provide INTELSAT IV-A launches in June 1977, October 1977 and January 1978, with a backup launch in April 1978. The Board also noted that each specific launch would be the subject of Board decision.
- Approved allotment agreements for pre-emptible lease of one quarter transponder of spare capacity to Chile and to Saudi Arabia to meet their respective domestic public telecommunications requirements. The Board approved a draft allotment agreement with Sudan for one transponder commencing February 15, 1977, for domestic services. After presentations by Sudan it also decided to tender advice to the Meeting of Signatories that the Sudan domestic services fall within the requirements of Article III (b) (ii) of the Agreement and should be considered on the same basis as international traffic.
- Instructed the Management Services Contractor to inform the NASA Administrator that the proposed settlement of outstanding liability issues in INTELSAT IV-A launch services

agreement is unacceptable to INTELSAT. It also directed that the Administrator be informed: that INTELSAT does not understand the basis for, and finds unequitable, the proposed shift to INTELSAT of the financial burden of insurance or self-insurance arrangements to protect NASA and its contractors from third party or property damage claims which could arise from actions or failures to act by NASA or its contractors; that there appears to be no basis for altering the long-standing established relationship between NASA and INTELSAT; and that INTELSAT proposes that the outstanding liability issues be settled upon the same basis as the existing INTELSAT IV-A launch services agreement.

- Approved the Advisory Committee on Planning's recommendation that the Secretary General take into account the views expressed by the BG/PC and establish, well before the next Global Traffic Meeting, methods of integrating the development of long-range growth rates with that of short-term traffic forecasts. The Board noted the Secretary General's statement that he had already taken steps to implement this decision.
- Approved the commencement of Phase 2 of the Future INTELSAT System Planning Study and the 1977 program of work, as recommended by the Advisory Committee on Planning, but at a budget level of $400,000 pending review. It requested the Director General to review the study and report to the Twenty-Seventh Meeting with his recommendations. The Board noted that the Management Services Contractor will apply effort during the review period to the highest priority and most necessary areas of study.
- Authorized the Secretary General to issue a questionnaire developed by the Advisory Committee on Planning to assess potential demand for Standard B earth stations.
- Noted the Management Services Contractor's report on technical coordination of Teleglobe Canada's experiments on the SYMPHONIE Satellite.
- Began a review of the method used for recording intersystem coordination agreements, and deferred further consideration to the next ordinary meeting.
- Granted a one-year extension commencing January 1, 1977, to approval for the U.S. unattended earth terminal to access Atlantic satellites free of charge to conduct experiments and demonstrations. It approved 14 Sudanese stations to access the leased capacity, subject to review by the Advisory Committee on Technical Matters, verification of the stations' performance characteristics, and operation of them in accordance with INTELSAT approved procedures. It approved access by two transportable Saudi Arabian antennas on a temporary basis until April 30, 1977, in order that service could commence in January to meet the Signatory's urgent requirement, and limited operation of these stations to the satellite at 359° E. Longitude.

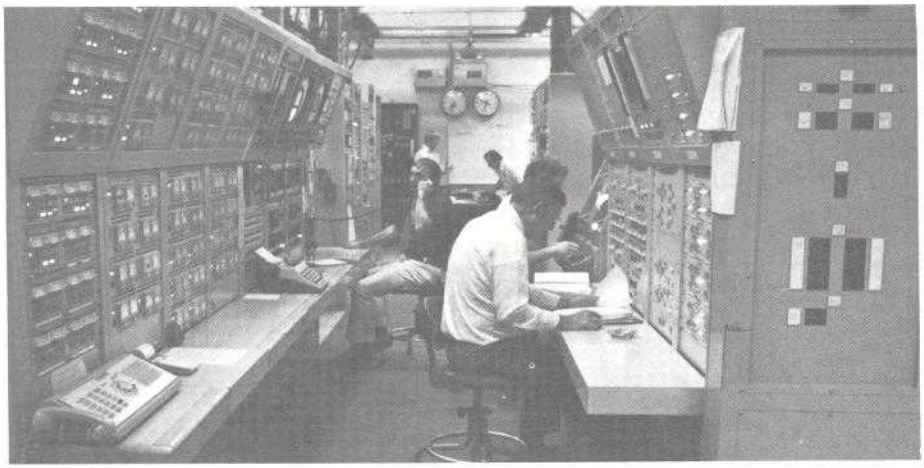
Organizational and Administrative Matters

- Decided to note a proposal from the Communications Satellite Corporation to designate H. William Wood in place of Martin J. Votaw as the official to be primarily responsible for carrying out and supervising the functions of COMSAT under the Management Services Contract, with E.T. Jilg, J.B. Potts and L.C. Meyer continuing to be responsible respectively for technical system implementation, system operations and space segment procurement.
- Approved the amendment to the Management Services Contract as recommended by the Special Committee, with one modification to the definition written into the contract of "permanent management arrangements." The Board subsequently noted that the Management Services Contractor and Secretary General had executed the amended contract on December 14.
- Decided, after discussion in executive session, to endorse the Director General-designate's approach to the implementation of permanent management arrangements as described to it during the executive session, and determined that, until otherwise decided, an item on implementation of permanent management arrangements will be included on the agenda of each future meeting. It also noted a report by the Secretary General on the progress being made in identifying a management system by which the Director General will be kept currently informed of Management Services Contractor activities; that the Executive Organ will present, for future Board approval, the required revisions to INTELSAT procedural documents; and that temporary staff adjustments will be made to accommodate the new document and information flow and new working relationships.
- Initiated discussion of INTELSAT policies concerning developing countries. It decided to continue this discussion at its Twenty-Seventh Meeting, and invited contributions from Governors on the mechanisms and work program to conduct the requisite study for the Assembly of Parties.
- Accepted the Canadian Signatory's invitation for INTELSAT to co-sponsor the Fourth International Conference on Digital Satellite Communications, authorized an INTELSAT contribution of not more than $35,000 to the costs of the Conference, and authorized the Secretary General to make the necessary arrangements.
- Established a Working Group, consisting of Africa Group II, France/Monaco, Japan, Southeast Asia Group, U.K./Ireland (Chairman), and the U.S., to assist the Board in preparation of reports to the Sixth Meeting of Signatories.
- Decided to continue the existing terms of reference for the Advisory Committees on Planning and on Technical Matters, and to review these after more experience is gained in the implementation of permanent management arrangements.
- Approved a six-month extension to the term of Mr. Keith Bagot, and a one-year term for Mr. Kevin Hodson, nominees of the U.K. Signatory, to work with the Management Services Contractor's staff.

The Board decided to hold its Twenty-Sixth Meeting from February 1 to 4, 1977; to visit the Ford Aerospace facilities on January 27 and 28; and to schedule a European Space Agency presentation on the Ariane launch vehicle program for February 3.

The preceding report was prepared by Ellen D. Hoff, International Affairs, U.S. INTELSAT Division.

Front page of Washington Post sent to Italian newsroom by satellite



Technicians at Etam during the transmission to Rome, Italy.

Newspage facsimile-transmitted to Rome, Italy, in matter of minutes via satellite and earth stations at Etam and Fucino.

George Lawler, Director of Marketing, briefs observers at the demonstration at the Etam Earth Station.

A high resolution facsimile of the front page of a final edition of the *Washington Post* was transmitted recently via satellite to Rome, Italy, in a demonstration for European newspaper publishers.

The high-speed transmission from the Etam, W. Virginia, earth station to a printing plant in Rome was routed via an INTELSAT IV-A satellite over the Atlantic Ocean to the Italian earth station at Fucino, thence by land lines to Rome.

Publishers attending an international symposium in Rome on laser and facsimile technology viewed the facsimile of the *Post* front page as it arrived in the offices of *Corriere Della Sera*, the Milan daily newspaper, at Typografia La Nuovissima in Rome. The symposium was sponsored by the INCA-FIEJ Research Association (IFRA) of Darmstadt, West Germany. IFRA is the international research association for newspaper technology. Some U.S. publishing industry representatives observed the transmission at Etam.

The transmission demonstrated the feasibility of communications satellites for high speed, overseas distribution of reproduction-quality newspaper page proofs to satellite printing plants far removed from the publication's editorial offices and composing rooms. The technique permits efficient, economical printing at satellite printing presses, since the time and cost for the transmissions is less than required for additional page composition at the remote printing plant or air shipment of printing plates. More than 30 newspapers in various countries, including the international *Herald Tribune*, published by the *Washington Post-New York Times*, the *Wall Street Journal* and the *Christian Science Monitor*, are presently using communications satellites and/or land lines for facsimile page transmission to remote printing plants.

The demonstration was the first such transmission to Europe using a digital technique at 50 kb/s (50,000 bits per second) over a single voice circuit. Ordinarily, 50 kb/s transmission speeds require the equivalent of several voice circuits at proportionately higher costs.

Dacom, Inc., a U.S. manufacturer of facsimile equipment, installed a Dacom 300 Telepress terminal at Etam for the demonstration.

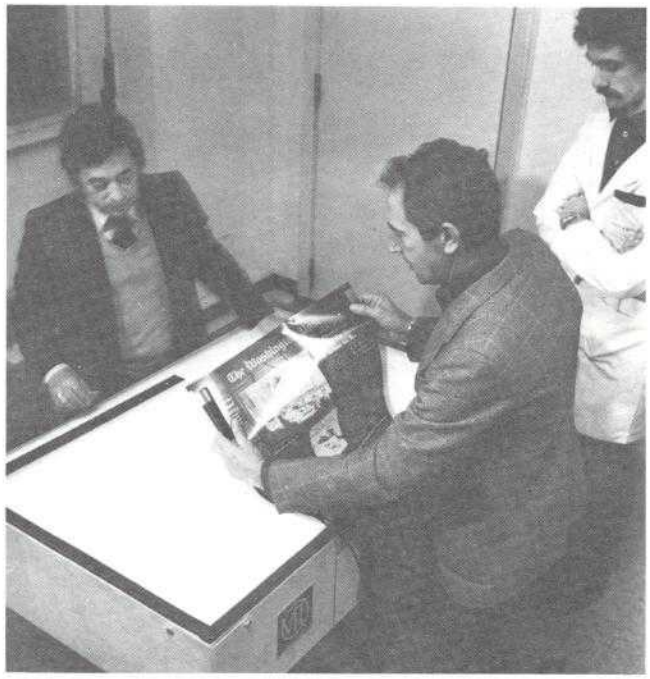
The time required for 50 kb/s facsimile transmissions varies from four to 10 minutes per page, according to the number of lines per inch being scanned by the transmitter, the number of half tones, and the amount of white space, which the Dacom 300 skips over quickly in a data compression technique.

The demonstration was arranged by Telespazio, the Italian satellite communications entity, and Intalcable, the Italian overseas communication entity. U.S. arrangements were made by COMSAT with the cooperation of the *Washington Post* and INTELSAT.

Robert Longstreet, Assistant to the Editor of the Washington Post, with a page proof of the Post's front page to be transmitted to the Fucino Earth Station in Italy.

PHOTOS BY ALLAN GALFUND

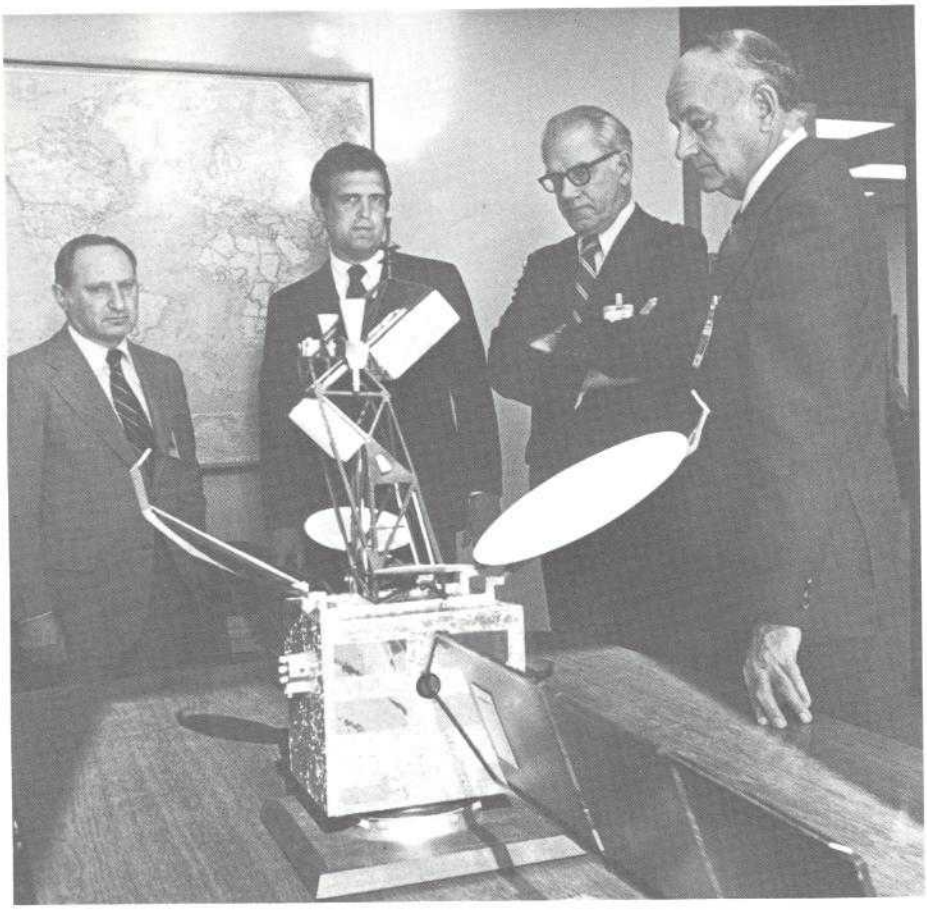
The page proof on the drum of the DACOM 300 Telepress. The high resolution facsimile of the page went by satellite to Rome.



The Post front page as it arrived at the Corriere Della Sera, the Milan daily newspaper, at Typografia La Nuovissima in Rome.

MILAN PHOTO

Charyk and Harrington visit Ford Aerospace



COMSAT President Joseph V. Charyk, (right) and Dr. John V. Harrington, Vice President, Research and Engineering, COMSAT, (second from right), examine a scale model of the INTELSAT V communications satellite to be built at the Palo Alto, California, site of Ford Aerospace & Communications Corporation. With Drs. Charyk and Harrington are Ford Aerospace President Henry E. Hockeimer (left) and Douglas G. Dwyre, INTELSAT Programs Operation Director for Ford Aerospace.

FORD AEROSPACE PHOTO

Labs' Horna gets research award

Dr. Otakar A. Horna, Signal Processing Department, Communications Processing Laboratory, has become the first recipient of the COMSAT Labs Research Award. The award, presented Dr. Horna by Labs Director B. I. Edelson (right) at an award ceremony, cited Dr. Horna's "significant contributions . . . in the development of digital logarithmic echo cancellation equipment." According to Dr. Edelson, as a result of Dr. Horna's inventions, designs and development, it is now believed possible to consider the echo canceller a realistic device for commercial operations, and to improve performance and reliability of both satellite and terrestrial communications.

Warren returns to Andover as station manager

James R. Warren has been appointed Manager of the Andover, Maine, Earth Station. He succeeds Donald Fifield who is being transferred to COMSAT Headquarters where he will assume new duties in the planning and operation of new earth station facilities.

Warren has been serving as Manager of COMSAT's Maintenance and Supply Center, located at the Labs, which is a central point for the repair, maintenance, and distribution of electronic equipment used by earth stations around the world.

Joining COMSAT in 1965 as a member of the Andover staff, he also has served as the assistant manager of the U.S. West Coast earth station at Brewster, Washington. Before joining COMSAT, Warren served as a project engineer with the Philco Corporation.

Digital data circuit initiated between U.S. and Spain

The first international 56-kilobit-per-second digital data circuit has been initiated between the United States and Spain via an INTELSAT IV-A satellite over the Atlantic Ocean.

COMSAT is providing the high-speed data circuit between the Etam, West Virginia, Earth Station and the satellite to RCA Globcom. RCA is providing the service to the National Aeronautics and Space Administration for high-speed data transmissions between NASA's Goddard Space Flight Center at Greenbelt, Maryland, and NASA's tracking station in Spain.

Notes From Personnel

BY MEL WILLIAMS

New benefits handbook to be issued soon

A handbook describing in detail the benefits available to COMSAT employees will be issued soon, according to David S. Nye, Assistant Vice President for Personnel. It will be in a loose-leaf, hard cover jacket which will allow the addition or removal of pages as changes take place within the Benefits Program.

"The contents will differ considerably from those presently in use," Mr. Nye states, "because they are being written in a less formal, easier-to-understand format."

The first section of the series will be made available to all employees in early April and will describe benefits available under the medical, dental, basic and supplemental life, and optional accidental death and dismemberment insurance programs.

The second portion, to be issued later, will explain the Thrift and Savings Plan, the COMSAT Retirement Program and the newly-established Employee Stock Ownership Plan.

General rules and policies concerning equal opportunity, employment, work performance and general conduct and related policies will also be provided for permanent inclusion in the new handbook.

"COMSAT provides an outstanding, comprehensive benefit program, but we have long recognized that this has not been communicated effectively to all employees. The Handbook will represent a major step towards correcting this situation," Mr. Nye said.

The revision of the benefits handbook is being prepared under Mr. Nye's direction by Lynford O. Russell, Manager of Staffing Personnel Services, Donald J. Chontos, Manager of Benefits and Compensation and Mel Williams, Administrator, Human Resources.

Medical and dental deductibles for 1977

Employees are reminded that a new deductible must be satisfied at the beginning of each calendar year for the medical and dental insurance. In order to establish a claim, so that accumulations to satisfy the deductible may begin, a claim form must be submitted with the first claim of the calendar year for both Plans. Subsequent claims may be submitted without a claim form by marking them "COMSAT G19502," if they do not pertain to an accident, major disability, or a previously established claim. A separate claim form is always required for these claims.

If you were in the process of having either medical or dental services performed in 1976 that were not completed, a claim form must be submitted with the first claim in 1977, even though a claim was established in 1976.

For example, if you or one of your dependents were in a periodontic program in 1976 which is continuing into 1977, a claim form must be submitted with your first claim for 1977. Also, if you or one of your dependents were undergoing treatment as an in-patient or out-patient in 1976, which continued into 1977, a claim form must be submitted with your first claim for 1977.

Some hints to speed up the processing of your claims:

- Always submit a claim form with each separate accident, major disability or new illness.
- When submitting a claim for pregnancy benefits, submit both hospital and doctor's claim form at the same time.
- If covered by a second medical insurance through spouse's employer, be sure to complete appropriate section on claim form. If claim is the result of an automobile accident, automobile insurance carrier must be listed.

SS deduction increased

The deduction for Social Security Taxes (FICA) has been increased to a maximum of $965.25 for 1977. The percentage of the deduction has remained the same at 5.85 percent; however, the wage maximum has been increased to $16,500.

Although your contributions to Social Security are quite substantial, that is only half of the story since the Corporation contributes an equal amount on your behalf.

Worth Noting

William M. Wannisky, Esq., has joined the Office of the General Counsel as an attorney in the Patent Division. Formerly with the United States Patent and Trademark Office, he holds a BS degree in Electrical Engineering from Pennsylvania State University and a Juris Doctorate from Georgetown University Law Center.

William H. Connor, Supervisor, Administrative Systems, has been awarded the professional designation of Certified Administrative Manager, C.A.M., by the Administrative Management Society.

Larry G. Hastings, a Senior Information Officer in the Public Information Office, has retired from COMSAT as of February 1. Prior to joining COMSAT in 1966, Hastings had held positions in the Office of the Secretary of the Air Force, the Naval Research Laboratory and NASA's Goddard Space Flight Center. He has been active in affairs of the National Press Club and the Congressional Squadron of the Civil Air Patrol.

Climbing the Ladder: TERESA HALSELL

Teresa Halsell is an energetic young electrical engineer with a delightful sense of humor that served her well as the only black female in the Engineering School of the University of Louisville in Kentucky.

With persistence and hard work she obtained a sound academic background and solid work experience through the university's cooperative education program. Her program included academic courses and work experiences on an alternate basis for four years. Her work assignments were varied and provided a great opportunity for learning and broadening her outlook. On assignment with the telephone company, Teresa came in contact with people who had literally "grown up" with the telephone industry and who deeply influenced her perception of the communications field.

At another assignment with the Naval Ordnance Station in Louisville, in the Gunfire Control Section, Teresa worked as a student engineer in a laboratory environment. "That summer spent in the lab alleviated the awe I felt about the use of lab facilities and equipment for accomplishing engineering goals."

In her last year of school, Teresa worked as a technician for a television station. In addition to learning the operational problems of the television studio and program production, she also gained some insight into the job of a technician.

As graduation approached Teresa was faced with misgivings about her status in the job market. "I was warned that companies would be more interested in the fact that I was black and female rather than in my actual goals as an engineer. I was really not too excited about the search for a job with this thought in mind."

Teresa sought the assistance of the University of Louisville's Cooperative Education and Placement Office which helped her contact a number of companies about the availability of openings for a person with her education and work experience.

Teresa says in retrospect, "I believe that because I am a black, female engineering school graduate, more job opportunities were open to me than I might have encountered otherwise. However, I was impressed with those companies where personnel interviewers really tried to determine just what my personal job goals were and explained how I would fit into the kinds of projects in which their companies engaged.

One of those companies was Communications Satellite Corporation (COMSAT) in Washington, D.C., where Teresa is now employed as a staff engineer. COMSAT is a privately owned corporation involved in international communications via satellites. COMSAT's primary business is providing overseas telephone calls. However, it is better known as the company that brought the Olympics "via satellite."

Teresa Halsell, Electrical Engineer

Teresa works with the U.S. Systems Plant operation which concentrates on providing COMSAT's earth stations (huge 97-foot radar type dish antennas which send and receive telephone calls and television programs to and from the satellites) with equipment to carry this "traffic." Teresa explains, "My particular responsibility is the multiplex equipment. This equipment is basically signal processing equipment used to interface with COMSAT earth station transmitters and receivers through our satellites to the outside world."

Her area of work is to provide information, specifications and modifications for a certain product that may be requested by the management. She is also involved in testing equipment to see if it is suitable for a project, such as bringing an earth station up to standards beyond which it is currently functioning. She also makes modifications if the equipment is not suitable.

"I like working with machines, which is one of the reasons I chose engineering," says Teresa. "I also enjoy working at COMSAT because they utilize the newest, up-to-date satellite technology, and there is definitely a sense of uniqueness about the field of satellite communications and of being part of a new frontier. For me, traditional electrical engineering has taken on a more exciting purpose with the new types of engineering problems being encountered at the stations."

She has visited an earth station located in West Virginia and hopes to visit other stations in Maine, Puerto Rico, California, Hawaii and Washington State in the future.

In discussing her plans for the future, Teresa says that she intends to return to school in the fall for graduate study, possibly in the area of communications engineering. "I would encourage women about to select a major in college to seriously consider engineering or engineering-related fields of study. At present, very few fields offer a choice of job openings to women like the field of engineering. It may not be the easiest program to make it through, but I can attest to the fact that job opportunities will literally fling themselves on your doorstep if you persist."

In conclusion she says, "While being black and female did open many job opportunities for me in the field of engineering, ultimately, the ability to perform the tasks assigned has always determined my success on the job."

Reprinted with the permission of Business World, a career magazine for College Seniors, from its Fall 1976 edition. Written by Business World Staff Writer Fran Orenstein.

Satellites relay inaugural TV coverage

COMSAT earth stations transmitted TV coverage of the recent inauguration of President Jimmy Carter to some 70 countries around the world using INTELSAT satellites.

COMSAT said the European Broadcasting Union (EBU), the USIA, the Armed Forces Radio and Television Service and other organizations used the international satellite network to reach audiences in Western Europe as well as Eastern Europe. Countries in Africa, the Middle East, Latin America, Asia and Australia saw many of the inaugural events either live or through film and videotape news summaries transmitted via satellite.

Eight television channels—two in each of four INTELSAT satellites—were used to transmit the events over the Atlantic, Pacific and Indian Oceans. Earth stations located in Andover, Maine, Etam, West Virginia, and Jamesburg, California, were used to transmit the inaugural events from the United States.

Total transmit-receive time for TV coverage via the satellite system was more than 61 half channel hours.

Charyk honored by AIAA

COMSAT President Charyk, left, receives Von Karman Award from Professor René Miller, AIAA President.

Joseph V. Charyk, President of COMSAT, is the recipient of the 1977 Von Karman Lectureship in Astronautics Award from the American Institute of Aeronautics and Astronautics (AIAA).

The award, consisting of a medal and certificate, is presented annually by the AIAA at its annual meeting to a person who "has performed notably and distinguished himself technically in the field of astronautics." It is one of the highest honors in the aerospace field, and is named for the late Theodore von Karman, world famous authority on aerospace sciences. Dr. Charyk earned his Ph.D. degree under Professor Von Karman at California Institute of Technology in the early 1940s.

In his Von Karman Lecture, delivered to the AIAA at its meeting at the Sheraton Park Hotel in Washington on January 12, Dr. Charyk reviewed the history of satellite communications and the outlook for future satellite technology.

SBS holds suppliers conference

Satellite Business Systems (SBS) recently held the first in a planned series of conferences for potential suppliers of complementary equipment to advise them of SBS's proposed U.S. domestic communications satellite system.

About 50 representatives of facsimile equipment manufacturers in the U.S., Canada, United Kingdom, Japan and Germany attended the first conference, held in the University Club, Washington, D.C. Additional conferences are being planned for manufacturers of teleconferencing and data transmission equipment.

Satellite Business Systems will apply the inherent advantages of satellite communications in offering a unique, all-digital private network system, designed to provide integrated voice, image and data communications network services to large, geographically dispersed organizations.

One of the important applications of the SBS system will be the use of facsimile (at speeds of two to 20 times greater than through current systems) for hard-copy distribution. In order to maximize the usefulness of the SBS system to its customers, SBS is opening a dialogue through this series of conferences to help ensure the availability of the advanced terminal equipment which its customers will be requiring to link the SBS system with the end user.

In his introductory remarks, Philip N. Whittaker, President of SBS, said he believed that application of the SBS system will result in "profound changes in the way in which business and government entities operate and how they utilize information in the management and control of their operations."

Labs' library offers researchers unlimited source of information

BY ROSA LIU AND BETSY CHRISTIE

. . . And then the boss said, "Dave, take a look into that." So now, what does Dave do? He could take himself back to his office mumbling about the injustice of a man who dreams up these crazy ideas, or he could go back to his office and furiously start flipping through his old college books in a frantic effort to find anything at all about "that." He could ask his next door neighbor if he had ever heard of "that," or he could stroll down to the library and ask, "What's that?"

What does the library provide? The response given by many users is that it provides technical books and journals as well as lunch time reading. This is correct, but much of what the library can do is overlooked. When attempting to obtain a specific article or book, going to the library is the obvious course. However, the library is also a good place to start when one is faced with a problem like Dave's. The library can be used to determine what has been previously published on a certain topic. This information can help a researcher to avoid duplication of effort and focus his research as well as expand his knowledge on the particular subject. The following are just a few examples of queries received and what the library and the librarian can do for the user in response.

Query: I copied this article sometime ago and want to use it now in a paper I am writing. I don't know where I found it. (The requester wants a complete bibliographic citation.)

Response: Although it is becoming more common for Journals to have their title, month and year printed at the top or bottom of every page, this is not done in all cases. Articles copied out of a conference proceeding or a book will contain even fewer clues as to their origin. If the article is a technical one, *International Aerospace Abstracts* or *Engineering Index* is a good place to start looking. If author, subject, contract number, paper number or report number are available, a complete reference citation and abstract can be found 90 percent of the time. This is more efficient than scanning through the actual books or journals which may have published the article. References that cannot be verified are generally from a personal (unpublished) or classified source not in the "open literature," or from a new publication. (A six months time lag exists between when a journal is published and when it appears in secondary sources such as indexes.) Occasionally, the reference is incorrect and cannot be verified.

Rosa Liu, Labs Librarian, helps Marianne Merrihew (left) use the card catalog to locate a book.

Query: I would like to know everything that has been done in the area of "nearly instantaneous companding" (a speech processing method for low bit rate transmission).

Response: The request that is prefaced by "everything on" should be approached with caution. This particular engineer knew exactly what he was looking for and his topic was specific enough not to cause a deluge of references. Sometimes "everything on" is too broad (for example, everything on future communication satellite systems) and the requester may need help to define his topic more specifically. At times "everything on" merely implies that the requester needs a good basic text book. The card catalog will be able to direct him to the right book since they are indexed by subject as well as by title and author. The engineer who requested this search was helpful and gave us a single article that typified exactly what he wanted, thus helping to define the search parameters.

A manual search of *IEEE Index*, *International Aerospace Abstracts* and *Engineering Index* under the subject heading under the author who had written the sample article did not yield results. An on-line search of the in-house document collection of approximately 23,000 technical reports revealed nothing. An on-line search was requested from NASA/RECON (NASA's database includes all non-classified technical reports and articles in the area of "aerospace," which is roughly translated to incorporate all applied science and technology). A first search on the terms "nearly instantaneous com-

panding" covering 1970 to the present retrieved two articles. Further consultation and refining of the search strategy retrieved five more references. The library was then able to supply the engineer with paper copies of the abstracts that he wanted to read.

Sometimes, from reading the abstract alone, an engineer can determine whether the full paper is needed or not. The engineer has started his project knowing what the published literature contained. (It is still hard to determine what has been done by companies whose staff do not publish in the "open literature" or where materials are classified.)

The library now has access via Lockheed Dialog system to 42 on-line bases. *Engineering Index* and NTIS (National Technical Information Service) are expected to be the most frequently used. In addition, the in-house document collection is available on-line. The combined resource allows for quick turnaround on searches and most documents. It is faster and more economical to use our in-house resources first and then the commercial services.

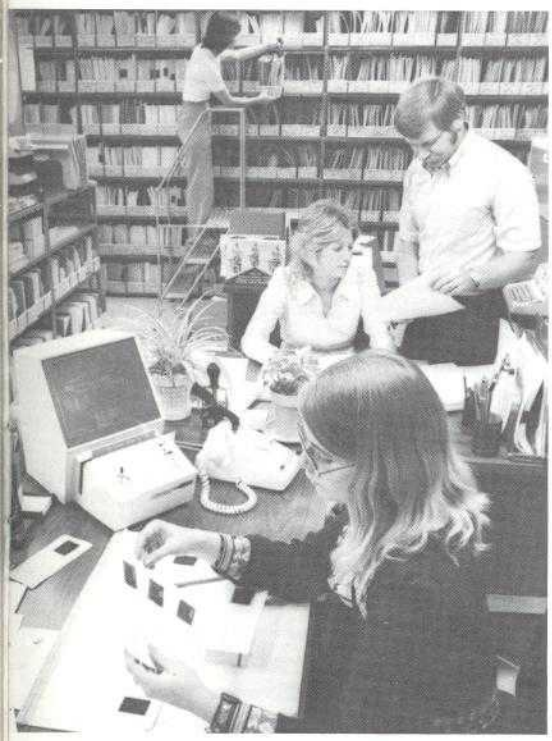
Debbie Boxwell, Library Assistant, and Roger Taur using the Visual Search Micro Film System, VSMF, to research standards and manufacturers catalogs. PHOTOS BY BILL MEGNA

The following steps are suggested when doing a subject search.

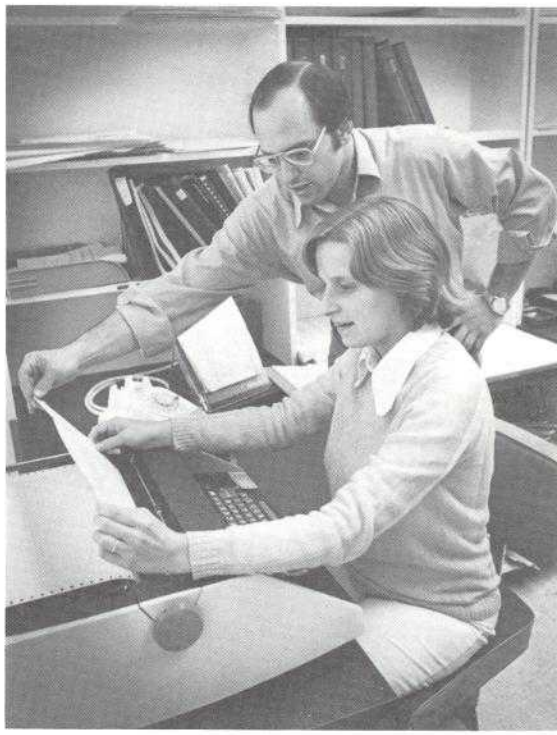
- Define the parameters of the search. Be as specific as possible. Do not hesitate to ask for assistance.
- Check the library card catalog for books.
- Request an on-line search of the Document Collection. Since this material has been collected specifically by and for COMSAT, pertinent reports may be found.
- Search the indexes manually under your terms. Try to find a sample article to refine your search parameters.
- Request a *Lockheed Dialog* search using index terms. Another search of the in-house document file, if your index terms have altered, may be productive.
- Check the specific items resulting from the *Dialog* search against the COMSAT holdings. The *Dialog* system searches index terms and abstracts while the in-house system searches only titles, authors and source information. Therefore, *Dialog* may retrieve references to reports already in-house but whose contents are not reflected in the title of the report.

The library's staff is on hand to provide any assistance and welcomes any suggestions to improve services. Try using the available resources and find out what the library can do.

(Our appreciation to Pep Ruddiman for her helpful comments and suggestions.)



Lab Records maintains all internal records as well as Document Collection. Shown in photo are, front to back, Vanessa Pennington, Debbie Moore, Pete Suthard and Carol Ecker.



Betsy Christie, Assistant Librarian, discusses an on-line search of Lockheed Dialog data base with Dave Kurjan whose research requirements suggested this feature.

OSCAR

(Continued from page 10)

In reference to the spacecraft, the internal equipment can be monitored by means of telemetry data, which provides data on the temperature and orientation of the spacecraft. Day to day variations can be recorded and students encouraged to explain them.

Diverse applications of the space sciences are possible by use of the spacecraft in many areas. Propulsion, radiation, Van Allen Belts, conduction, radiation eclipse and reliability are among the many concepts that can be illustrated and tied to the interpretation of the telemetry signals.

Computers and computer programming can be introduced to students by writing programs to predict the orbits or times of acquisition of signals from the spacecraft for any day, or to process the telemetry.

The Crookes Radiometer has long been a scientific "toy" used in schools to demonstrate the effects of light pressure. The first published practical use of the "photon pressure" effect as demonstrated by Crooke's Radiometer is the thermal subsystem of the AMSAT-OSCAR VII spacecraft. The VHF/UHF antennas on the spacecraft are painted black on one side and white on the other. Photon pressure thus causes the spacecraft to spin at a slow rate, keeping the spacecraft temperature in equilibrium. Confirmation of the fact that the spacecraft is spinning in this manner is obtained from the telemetry signals.

This is but a quick-brush treatment of the educational potential available through the use of the OSCAR spacecraft. Other scientific disciplines can be treated in similar manner. Teachers have found that the actual experience of hearing signals live from space, of plotting Doppler curves and of doing other basic exercises stimulates interest and enthusiasm among their students.

As encouragement to this interest AMSAT arranges special education demonstrations on Tuesday and Thursday mornings via OSCAR VI. A special guide to the use of the spacecraft for educational purposes is also published by the American Radio Relay League and is available to educators, free for the asking.

There is little doubt in my mind that we are really just beginning to explore the educational potential of space-borne satellites with unthought of advantages yet to be developed. **—J.K.**

AMSAT's aim: "Bigger and Better" OSCAR

AMSAT-OSCARS VI and VII provide educators with the means for practical demonstrations of space flight techniques and radio amateurs with some communications capability. AMSAT, however, is not satisfied with the service provided by the low altitude spacecraft and is currently building a "bigger and better" one.

Designated the AMSAT-PHASE III Satellite, this spacecraft will contain a microprocessor to perform the functions of Command Decoder, Telemetry Data Processor and Attitude Controller. It will contain redundant transponders operating cross band in the 145-MHz and 435-MHz bands and an S-Band telemetry beacon built by members of the San Bernardino Microwave Society of California.

The European Space Agency (ESA) has agreed to launch the PHASE III spacecraft as a lateral passenger on the LO2 Ariane test flight in December 1979. The spacecraft will be placed into a parking orbit by the Ariane launch vehicle. Then, about 45 days later, upon receipt of a ground command, it will boost itself into a highly elliptical eleven-hour orbit with an apogee above the northern hemisphere. The change of orbit will be achieved by use of an onboard perigee "kick" motor. The PHASE III spacecraft is the result of an international, cooperative effort: the design is German; the flight hardware, Canadian; ground test and support equipment, Australian; with project coordination provided by AMSAT in the United States.

When the PHASE III spacecraft becomes operational it will usher in a new era for amateur radio. For the first time, the majority of the world's radio amateurs will have reliable communications capability to any part of the northern hemisphere for hours at a time. There will be no "skip" or "dead" zones as on the conventional short wave bands. School children in Europe, North America and Asia could be linked together in "round table" discussion during educational demonstrations. Emergency communications facilities will be available anywhere there is a suitably equipped radio amateur. The PHASE III spacecraft will provide a communications capability that does not exist at this time and whose potential can only be guessed.

AMSAT is also working on a low orbit satellite as a replacement (complementing the existing orbiting vehicles). Known as AMSAT-OSCAR-D (A-O-D), and scheduled for launch in 1977, this spacecraft will be designed primarily for educational use, to provide the capability for educational demonstrations through the early 1980's as well as to provide communications capabilities between radio amateurs similar to those provided by AMSAT-OSCARS VI and VII. The spacecraft will carry two transponders, one similar to that of AMSAT-OSCAR VI, and the second operating on similar frequencies to one to be flown in the PHASE III spacecraft. The flight structure for the A-O-D spacecraft is provided by Project OSCAR. One transponder and the Spacecraft Control circuits are being built by the Japanese AMSAT group (JAMSAT); the second transponder, by AMSAT Headquarters in Washington, D.C.

AMSAT also has a program for developing low cost portable terminals for use with its spacecraft. These terminals cost in the order of $1,500 and comprise commercial transceivers integrated into a portable package. They are designed to be powered by an automobile battery and utilize TV-style antennas that can be folded up and carried in a golf bag. They are especially suited for use in disaster areas to provide reliable communications at low cost to the outside world. Prototypes have been used on the Mall in Washington at the opening of the new Aeronautics and Space Museum in 1976 and for a short duration test in Greenland.

Thus, in the space age, radio amateurs are still pioneering a way to the future.

Network Bits

Field Correspondents

Andover
Joanne Witas

Brewster
Dorothy Buckingham

Cayey
John Gonzalez

COMSAT General (Plaza)
Jen Baldwin

Etam
Bev Conner

Fucino
Sandy Tull

Jamesburg
C.B. Marshall

Labs
Carol Van Der Weele

M & S Center
Darleen Jones

New York
Stephen Keller

Paumalu
Bob Kumasaka

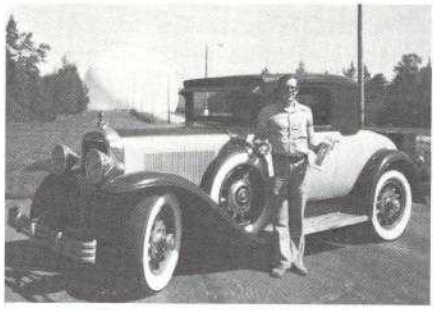
Plaza
Glora Lipfert

Santa Paula
Pat Hogan

Southbury
Eileen Jacobsen

ANDOVER. Bruce Simmons, Senior Technician, has progressed from an award for the most breakdowns to the AACA Junior Trophy (Antique Auto Club of America) in three months. Following two years of restoration Bruce took his car out last June for the first Bicentennial meet at Boothbay Harbor, Maine. Due to breakdowns in his 1929 Buick, Model 46S, it took Bruce 12 hours to drive 120 miles, this is what won Bruce the blue ribbon for most breakdowns—three.

Three months later in August, at the Owl's Head, Maine, judging meet, Bruce's car received between 300-350 out of a possible 400 points to win the Junior Trophy. Judging is based on everything from hubcaps being on straight to the shine on the



Simmons with 1929 Buick

car. Bruce is now repainting the car and applying a new finish to the bumper, hoping to qualify for next year's Senior Trophy, 350-400 points. In addition to his Buick, Bruce is also restoring a 1931 Auburn and a 1928 Chevy. He hopes to have the two completely overhauled within three years. Bruce's wife, **Sylvia,** is responsible for the sanding and reupholstering.

Stan Morse, Senior Technician, recently married **Donna Peters,** a teacher in the Mexico School system. The Facilities Department gave the log cabin Visitor's Building a facelifting. The exterior was painted with a dark brown stain and looks very attractive.

The CEAA held its annual Christmas Party at the Bethel Inn in December. The party was a combination Christmas and Farewell party for **Don Fifield,** former Station Manager. Don left Andover in January and will be temporarily working out of Headquarters until construction of the earth station in Pennsylvania gets under way.

The Children's Christmas Party was held in the Visitor's Building and special thanks go to **Joe Wooters** who made sure Santa arrived on time with his bag of gifts for the kids.

—**Joanne Witas**

ETAM. The horseshoe battle is over! **Marvin Miller** emerged victorious over **Mike O'Hara** in the final match to become the Etam Horseshoe Champion. Marvin was awarded a six-pack of beer from each of the losers. Self proclaimed (and last year's) champ, **Don Gaston,** said, "Marvin may be the Champ, but I am still the best."

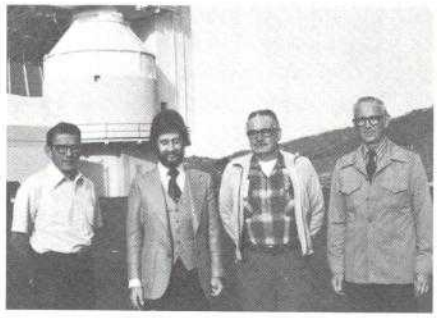
According to **Rupe Hobbs** the woolly worm was right this year. Winter started out cold and has not relented since. As in most parts of the country, it has been a long, hard early winter. The temperature as of this reporting date at Etam was a very cold -12 degrees.

To celebrate Christmas this year, the Etam CEA sponsored a Christmas dinner at Alpine Lake in Terra Alta, West Virginia. The menu consisted of an appetizer, baked chicken, scalloped potatoes, green beans, a salad bar and desert. Cold weather did not deter members from taking part in this event.

An additional part-time guard, **Jimmy Lansberry,** has joined the force of the Advance Industrial Security Guard Detachment at Etam.

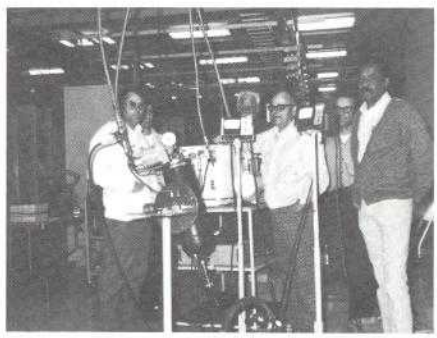
—**Bev Conner**

JAMESBURG. Dionisio Arras of the Tulancingo Earth Station in Mexico visited the station recently while on vacation and was given a two-day tour and orientation by each of the Department Supervisors.



Tulancingo's Dionisio Arras, second from left, visits with Jamesburg staffers, left to right, Jack Inman, Walter Robinson and Station Manager John P. Scroggs.

Congratulations to **Bill** and **Carolyn Hamilton** on the recent birth of their fifth son, **Paul,** who weighed in at eight pounds and 13 ounces. **Jim Vienneau,** former Senior Facilities



Jim Vienneau, left, instructs station members Loren Asmus, Roy Scheiter, Earl Jones, George Furford and Stan Nubin, left to right, in Cryo Refrigerator overhaul.

Mechanic, has joined the M & S Center staff as an Applications Engineer. Jim, who joined the Jamesburg staff from Andover in 1973, was given a farewell party by the station staff. His wife and two sons are planning to join him soon.

Personnel changes continue here at the station. **D. W. Palmer** has joined the staff as an Electronic Technician. He and his family hail from Osceola, Iowa, via a 21-year stint in the Air Force. The Palmers have three children. **David N. Bulk** also has joined the staff as an Electronic Technician. David and his wife, Victoria, (and their three cats) hail from Columbia, Pennsylvania. **Leverne (Pete) Oliver** is another addition to the station. A Facilities Mechanic, Pete, a military veteran of 21 years, is married and has one daughter. —**C. B. Marshall**

M & S CENTER. **Bill McGuire** moved into a new position with COMSAT GENERAL'S Maritime Operations Division at the Plaza. **Patricia Ross,** former Librarian and Technical Coordinator, filled the vacancy. A luncheon was held for **Dick Eliason** at the Washingtonian Motel prior to his transfer to an SBS experimental station in New York. **Bob Hamilton** has joined our Supply Section staff as a Material Controller.

John J. Vienneau of the Jamesburg, California, Station, has filled the vacancy left by the promotion of **Ramon Hashberger** to head of the Cryogenic and Facility Shop. **William G. Peck** reported to work and is up to his elbows in work in the Library and as the new Technical Coordinator.

The annual Christmas party was hosted by **Agnes** and **Lee Bolinger** at their home in Gaithersburg, Maryland, with 37 people enjoying the pot luck dinner and social evening. A farewell luncheon was held recently at the Potomac Room of the Washingtonian Motel for **Jim Warren** who is leaving to become Station Manager of the Andover Earth Station. **Jim Silvius,** previously associated with U.S. Systems Plant at the Plaza, replaced Warren as Manager of M & S. —**Darleen Jones**

NEW YORK. During the months of January and February, MARISAT terminals are scheduled for installation aboard three vessels of Prudential Lines, Inc., New York. This was a major effort on the part of the New York office, and is the largest single order from a U.S. flag shipping company. The terminals are going aboard the *Lash Turkiye, Lash Italia,* and *Lash Pacifico* in Brooklyn, New York. *LASH* means "Lighter (or barge) Aboard Ship." These ships carry their cargoes in barges which are handled by a special crane aboard ship. The advantage of these vessels is their ability to load and discharge cargo at anchor, without spending valuable time waiting for space at a pier.

John A. Johnson, President of COMSAT GENERAL, joined Spyros S. Skouras, Chairman of Prudential in New York, to sign the contract for the MARISAT terminals.

—**Stephen Keller**

PAUMALU. Eight Paumalu employees will be completing 10 years of service with COMSAT during 1977, joining 12 others who completed their decade of service with COMSAT in 1976. This year's 10-year service award recipients include: **Bob Kumasaka,** Administrator; **Joe Chow,** Facilities Supervisor; **Robert Makizuru,** Material Control Specialist; Senior Technicians **Paul Motoyama, Yoshiaki Daikoku, and Norman Murakami; Eddi Clarke, Jr.,** Mechanic Helper; and **Robert Manske,** Senior Facilities Mechanic. By year-end 1977, 20 of the 35 active employees at the station will have 10 or more years of service with COMSAT. Eleven of this group were with the original contingent when Paumalu commenced operations in 1966.

Senior Technician **Bill Osborn** became the newest homeowner on the Paumalu staff. Bill's new home is located about a mile from the site earning him the distinction of having the least number of miles to travel to get to and from work. Ironically, Bill's co-worker on Team 3, Senior Technician **Norman Murakami,** travels the greatest distance, some 80 miles round trip from his home in Honolulu.

Due to the importance of the Minicomputer in the operation and data collection of the SSMG and new T&C Upgrade, a Computer Maintenance Course was conducted here by a representative of Hewlett-Packard. Attending the two-week course were **Kenneth Yamashita, Eddie Miyatake, Tim Kolb, Ronald Miyasato, Paul Koike** and **Yoshiaki Daikoku.**

—**Bob Kumasaka**

PLAZA. CEA elections were held recently to fill three vacancies on the Board of Directors. Elected to two-year terms of office were **Mike Blackmon, Sandy Fox** and **Dede Runfola.** The COMSAT Ski Club recently returned from an all-day drip to Blue Knob, Pennsylvania, reporting a snowfall with slopes in good condition. A three-day outing was to be held on a February weekend.

Accounting Division personnel chose to contribute to the Children's Hospital Fund again last year, a practice the Division has continued since 1971. A contribution of $85 was sent to Radio Station WMAL with the group receiving recognition on the morning Hardin and Weaver show. Division personnel contribute to the Hospital in lieu of mailing individual Christmas cards to their fellow employees.

Cpl. Patrick G. Peterson, son of PATHWAYS Editor and Mrs. **John J. Peterson,** has been transferred from the 2nd Marine Division at Camp Lejeune to the First Marine Brigade in Hawaii; daughter **Elizabeth Susan** was recently commissioned a Second Lieutenant (nurse) in the U.S. Air Force and has been assigned to Travis AFB near San Francisco; and son **Michael J.** is enrolled in the Marine Corps Platoon Leaders Course and is scheduled to be commissioned upon graduation from the University of Maryland where he is majoring in Law Enforcement.

There are 40 potential linguists articulating around COMSAT with five language classes under way (four French and one Spanish). The classes are under the sponsorship of the COMSAT Employees Association and are held twice weekly for a period of eight weeks. Many of the students have progressed beyond the beginning state and are in their second eight-week classes. —**Gloria Lipfert**

SOUTHBURY. Southbury Employee's Association Christmas Party was held at the famous Curtis House

in Woodbury in December with arrangements by **Connie Sarles. Roger Miner,** Engineering Technician, is on temporary assignment in Fucino, Italy, as of the end of January.

The Annual Personnel visit was held at the beginning of January by **Teresa Walker** of Personnel accompanied by **Harry G. Gross,** Director of Domestic Operations. Ms. Walker answered many questions of interest to our new employees and listened to comments and suggestions. Mr. Gross gave a brief summary of the direction of COMSAT GENERAL and the growing opportunities available for employees.

Welcome to **Mrs. Annabelle Lyle,** our new part-time MARISAT Communications Operator. The site has a new space-age look with the new UHF Helix antenna (It looks like a large laser!) settled into place, thanks to **Jim Nelson,** our facilities mechanic. Brian Martin, Maintenance & Communications Officer from the Queen Elizabeth 2, visited the station with the QE2 purser and **Stephen Keller** of our New York office.

—**Eileen Jacobsen**

Employee chorus appears on "World of Music"

The COMSAT Employee Chorus sang a selection of Christmas carols for the intermission segment of COMSAT's "World of Music" radio program over Station WGMS-AM & FM, during Christmas week.

The chorus, under the direction of J. W. Breslow, Assistant Secretary, is composed of employees who gather on their own time to sing. The chorus is part of COMSAT's Music Appreciation Club.

At Presstime

COMSAT reports on 1976 earnings

COMSAT has reported consolidated net income of $38,271,000 or $3.83 per share for the year ending December 31, 1976, a decrease from the $46,243,000 or $4.62 per share for the preceding year.

The decreases resulted from the deduction from global service operating revenues, for the last six and one-half months of the year, of amounts required to be placed in escrow under an accounting and refund order issued by the Federal Communications Commission (FCC). The FCC issued the order, effective as of June 16, 1976, pending the outcome of COMSAT's court appeal from the FCC's adverse rate decision of December 1975.

Under the accounting and refund order, COMSAT is required to place in escrow, for possible refund in whole or in part to its common carrier customers, the difference between amounts collected from them under present rates and amounts calculated on the basis of the lower rates that would be required if the FCC's rate decision were to be affirmed. For the period June 16 through December 31, 1976, the amounts subject to possible refund total $30,175,000, exclusive of interest earned thereon, or $1.52 per share after provision for income taxes.

Operating revenues for 1976, net of amounts required to be placed in escrow, totaled $153,649,000, an increase of $11,068,000 from 1975. The 1976 revenues comprised net global service revenue of $115,292,000, MARISAT service revenue of $13,238,000, COMSTAR service revenue of $13,743,000, $8,869,000 derived from COMSAT's investment in —and the management services it provides for—the International Telecommunications Satellite Organization (INTELSAT), and other revenues amounting to $2,507,000. Initial MARISAT and COMSTAR services by the Corporation's wholly owned subsidiary, COMSAT GENERAL Corporation, began on March 25, 1976 and June 19, 1976, respectively.

In its global service, COMSAT at December 31, 1976, was leasing to its common carrier customers 4,461 full-time half-circuits, 627 or about 16 percent more than a year earlier. The service that COMSAT had been providing between the U.S. mainland and Hawaii on a bulk basis at a fixed charge was transferred to a U.S. domestic system on July 26, 1976. Revenues from that service, which constituted virtually all of COMSAT's service between the mainland and Hawaii through the global system, totaled $2,060,000 for 1976 and $6,950,000 for 1975.

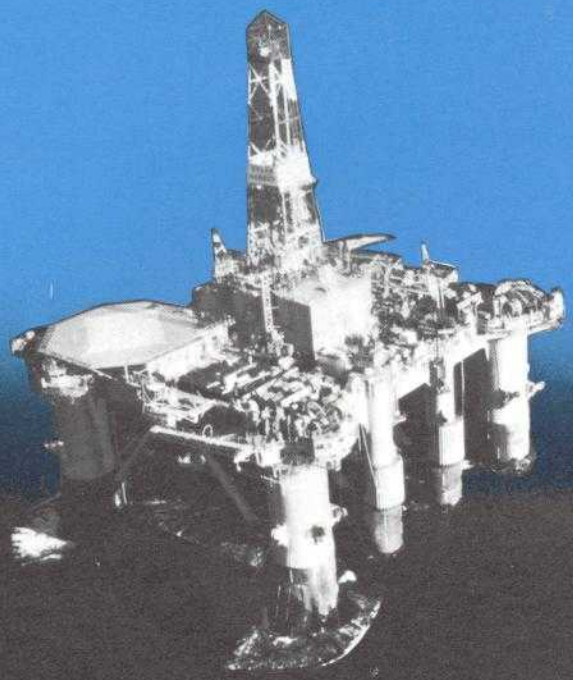
Operating expenses for 1976, including income taxes, totaled $120,635,000, an increase from the $101,655,000 for 1975. Higher depreciation charges associated with the launch of INTELSAT IV-A, MARISAT and COMSTAR satellites accounted for most of the increase.

Net operating income amounted to $33,014,000, down from $40,926,000 for the preceding year as a result of the escrow requirement.

Other Income totaled $5,257,000, down from $5,317,000 for 1975. Other Income for 1976 included the effect of an after-tax charge against income of $1,945,000 representing the Corporation's share of losses of —and amortization of certain costs relating to—Satellite Business Systems (SBS), the partnership formed by subsidiaries of the Aetna Life & Casualty Company, COMSAT GENERAL and IBM. Other Income for 1975 included the effect of an after-tax charge against income of $1,802,000 representing the Corporation's share of a write-off of certain assets by SBS.

For the fourth quarter of 1976, consolidated net income amounted to $8,774,000 or 88 cents per share, down from $10,086,000 or $1.01 per share for the fourth quarter of 1975. Operating revenues, net of amounts required to be placed in escrow, totaled $40,648,000, up from $36,400,000 a year earlier, and included MARISAT and COMSTAR revenues for the fourth quarter of $5,272,000 and $8,370,000, respectively. Operating expenses amounted to $33,542,000, up from $26,221,000 a year earlier. Net operating income amounted to $7,106,000, down from $10,179,000 a year earlier as a result of the escrow requirement.

Way Out There



In the Bering Sea the world's largest semi-submersible drilling rig is using our service-fast, modern communications via the new MARISAT satellite system.

The OCEAN RANGER, operated by ODECO and contracted to a consortium of oil companies, is now using COMSAT General's mobile terminal equipment for high-quality, instantaneous communications via satellite.

When you're exploring for oil you need good, dependable communications. And COMSAT General is providing just that with its MARISAT satellite services.

The MARISAT System is now fully operational with satellites stationed over the Atlantic and Pacific Oceans.

COMSAT General's wide range of MARISAT services include duplex telex, telephone, facsimile and data communications. Fast, reliable communications, 24-hours a day, in complete privacy. Linking offshore facilities and ships at sea via satellite with the world's telecommunications networks.

Further, we have mobile terminals, specifically engineered to operate with MARISAT, ready now for immediate installation on your rigs, platforms, barges or ships.

Through better communications, MARISAT offers you savings and better management of your marine operations. Ask the many major companies that are using our MARISAT services.

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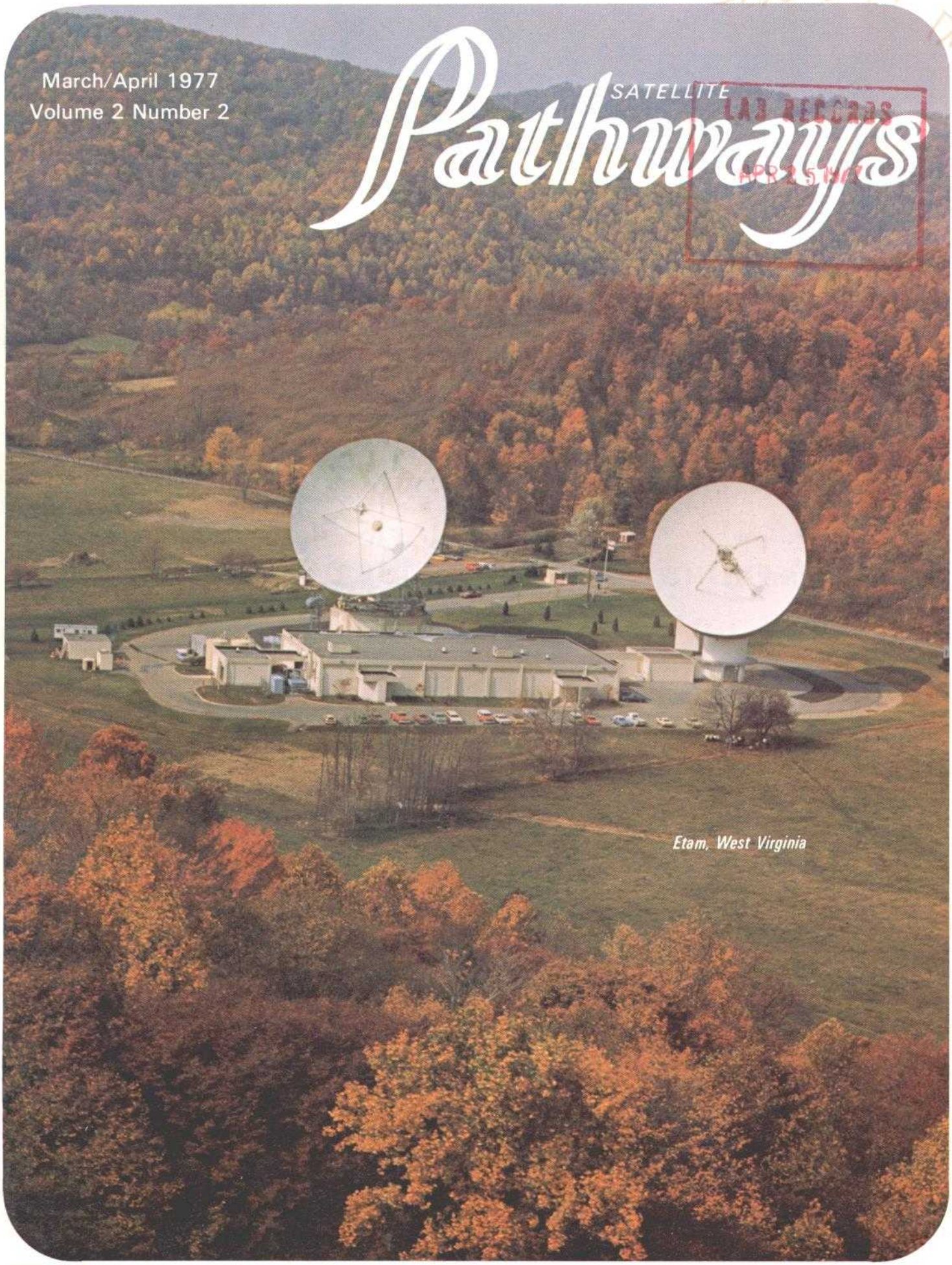
March/April 1977
Volume 2 Number 2

SATELLITE Pathways



Etam, West Virginia

COMSAT COMMUNICATIONS SATELLITE CORPORATION
COMSAT GENERAL CORPORATION

SATELLITE Pathways

March-April 1977
Volume 2 Number 2

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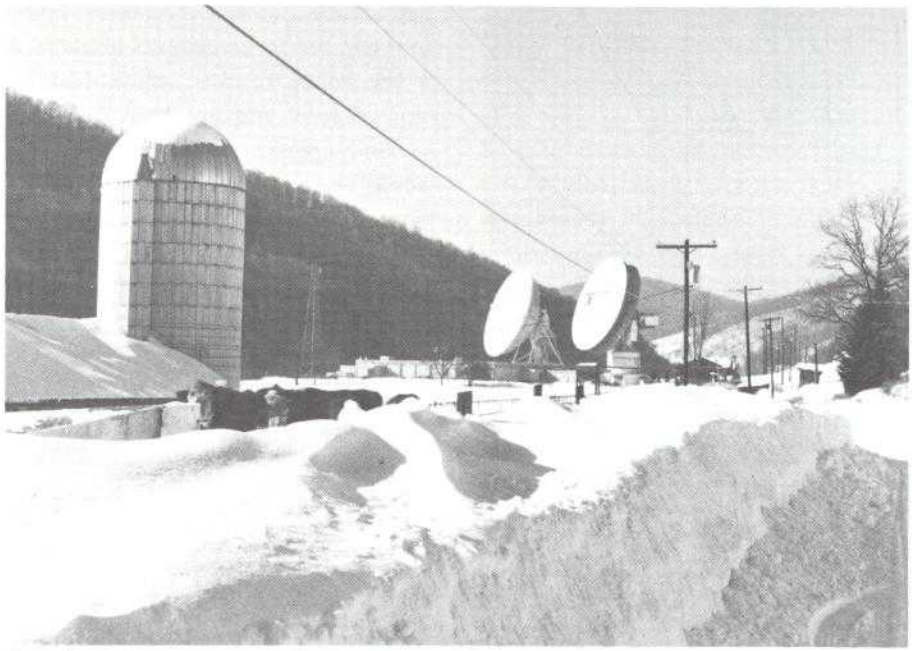
The 1977 Annual Meeting of Shareholders will be held at 2:30 p.m. on May 10, 1977, at The Capital Hilton Hotel in Washington, D.C. Notice of the Meeting and the Proxy Statement were mailed to shareholders on April 6. At the Meeting shareholders will vote on the election of directors, the appointment of Haskins & Sells as the Corporation's independent public accountants for 1977, and on a shareholder's proposal with respect to the provision of information concerning previous government service, if any, of certain persons serving the Corporation.

Riches in history, energy and scenery abound in "Mountaineer Country," the region of . . .



Etam's twin antennas blend into the wintry, pastoral scene typical of the mountain regions of West Virginia.

Etam: Communications Gateway to the Atlantic

BY JOHN J. PETERSON

The best and most complete description that can probably be given of Etam, West Virginia, site of the COMSAT-operated Earth Station, is taken from the Morgantown Dominion-Post, a "Preston County hamlet."

Webster's Dictionary describes a hamlet as a small village and Etam, a cluster of farms and houses a few miles south of the intersection of U. S. Route 50 and State Road 72 in Preston County, adequately fits the description.

Whereas the names of most cities, towns and villages can be traced to a historical origin, the name Etam carries the very simple notation in The West Virginia Heritage Encyclopedia: "A small community on Buffalo Creek, formerly a post office. The origin of the name is unknown."

Mr. Peterson is Editor of PATHWAYS

West Virginians close to Preston County pause when asked about Etam other than to relate the name to the earth station. As one newspaperman put it, "I hadn't even heard of Etam until they put the communications center there." Today, Etam has gained identity from its two massive antennas pointed skyward. Not only do visitors find their way into this "radio valley" now but students from West Virginia University in Morgantown also find their way to Etam to pursue studies in Communications with members of the station staff.

Located approximately 200 miles west of Washington, D.C., Etam is situated in Preston County in the northeastern part of the state. The County is bounded on the north by Pennsylvania, on the east by Maryland, and on the south and west by the counties of Tucker, Barbour, Taylor, Marion and Monongalia.

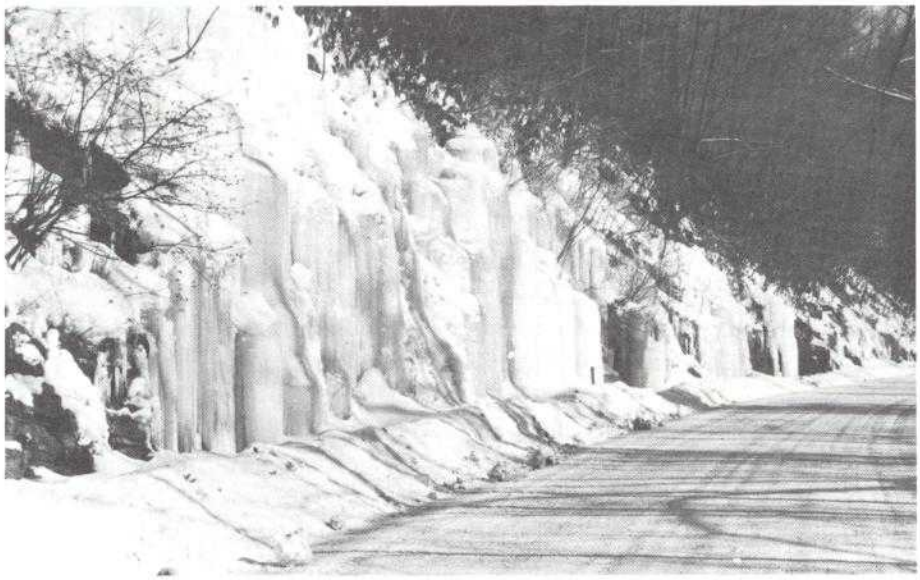
Preston County ranges in elevation from 800 to 2,000 feet. Its mountainous area is composed of two ranges: the eastern range called Briery Mountain and known earlier to the Indians as the Laurel Hill Range, and the western range known in the early days as Chestnut Ridge, yet, today, is called Laurel Hill. It extends along the western border of the county pretty much in the same direction as the eastern range.

The Cheat River is the county's main waterway, flowing south to northwest and very nearly equally dividing the county. It is the only body of water with sufficient volume to be considered navigable; however, its current is so swift it is considered unfit for any kinds of boats except rafts or the like, capable of floating downstream with the current. In earlier years the river was used for transporting rafts of logs to the sawmills of Pennsylvania and pig iron from the furnaces near Ices Ferry in Monongalia County when these were operating.

Most of the drainage of Preston County reaches the Gulf of Mexico

via the Ohio and Mississippi Rivers, with a small portion eventually reaching the Chesapeake Bay as part of the Potomac River System.

The more than 650 square miles of Preston County lie principally within the Ligonier Valley, the Newburgh Trough or Basin and the Cumberland Valley. The Ligonier Valley is canoe-shaped with an average width of 15 miles, more than 20 miles in length, containing over 300 square miles and 200,000 acres of land. The mountains are entirely free of morasses, swamps and boggy soils and, consequently, their freshness and purity of air and water render them the healthiest portions of the county.



Approaching Etam on State Route 72, ice formations encase the walls of rock and stone through which earlier road builders cut their way.

Coal deposits underlie a major portion of West Virginia. To date, over six billion tons have been mined with reserves of over 100 billion tons remaining. The state's coal industry production totaled an estimated 147 million tons in 1968 alone, accounting for 27 percent of the total U.S. bituminous production and two-thirds of the nation's coal exports.

Preston County is also rich in coal deposits. According to Author S. T. Wiley in his book *History of Preston County* written in 1882 (from which publication much of the information contained in this story was extracted), if the rocks of this region had remained level and not been subjected to land upheavals and rain wash, it would be safe to estimate that the region contained as much as four billion tons of coal.

"The presence of coal seams," wrote Wiley, "identical in appearance and structure, both east and west of the region, is sufficient proof that they (the seams) once were continuous across the entire surface of what is now Preston County."

Paralleling Wiley's writings relative to the effects of land upheavals on the land of Preston County were the findings of a survey published by The West Virginia Geological Survey Commission in 1914. The Commission concluded that the surface of the region in which Preston County was located had been a comparatively level plain, but, as the result of many complex forces through successive ages of geological history, a generally horizontal character had been warped into great arches and troughs, being, in many cases, elevated to heights sometimes hundreds and thousands of feet above their original condition.

Simply stated, the result of these earthen disfigurations was the formation of immense "wrinkles." Where rocks had been raised to an arch-like ridge, the formation was termed an "anticline." The corresponding depression between two anticlines was a "syncline." According to the Commission's report, an anticline passes through Etam known as the "Etam anticline."

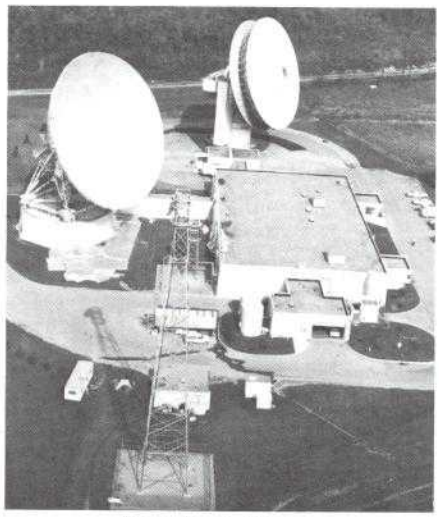
It can be concluded, then, that COMSAT's earth station at Etam is located on what had been at one time basically level terrain but is now an anticline, or ridge, of a wrinkle of the earth, the result of thousands of years of shifting and rain-washed land mass.

The first lines of communication across Preston County were the Indian trails which were developed by the Indians without the aid of science or engineering equipment, but many of which were so well located that later road builders had to do little more than widen them, paying tribute to the topographic instincts of the Indians.

On January 19, 1818, the General Assembly of Virginia declared the division of Monongalia County and the formation of the thirty-fifth county of the Commonwealth of Virginia, Preston County. The county was named after Virginia Revolutionary War hero General James C. Preston, the then Governor of Virginia. At the time, the population of the new county was approximately 3,000. On June 20, 1863, West Virginia became the thirty-fifth State of the Union.

Kingwood, which was to become the county seat of Preston County, located a little more than a dozen miles north of Etam, had its beginning in 1807 as the first settlers arrived and began building their homes around the present site of the county courthouse. The town took its name from a grove of large and stately trees which stood around an emigrant

camping place where the courthouse now stands. It was from the grove of trees called "King-wood" or "King-trees" that the town derived its name. Kingwood became the first town established in the territory of Preston.



Etam Earth Station

Etam Station: 1968 - 1977

The global system of satellites operating over the Atlantic, Pacific and Indian Oceans now carries a major portion of all international communications and more than two-thirds of all transoceanic communications.

The Etam Earth Station is an active link in the chain of satellite communications in the Atlantic Ocean region. Through its two antennas, Etam handles a large volume of communications traffic in the worldwide network of 165 antennas at over 130 station sites in more than 80 countries.

Etam has played a major role in the growth and development of the global system. When the station formally began commercial operation on Christmas Eve, 1968, with the Papal Mass from Taranto, satellite services reached a limited number of countries in the Atlantic and Pacific Ocean regions through only 13 satellite pathways. Today, there are some 500 satellite pathways among the countries with earth stations, and more than 100 countries, territories and possessions are using satellite services full-time.

Through the new Atlantic INTELSAT IV-A Primary Path satellite, Etam provides direct lines of communication between the U.S. and over 30 countries in North and Latin America, Europe, Africa and the Middle East.

Station Manager William L. Miller

The earth station and complex at Etam is located in Preston County, about 40 miles southeast of Morgantown in the northeastern part of West Virginia. It is about 200 miles west of Washington, D.C. The 28-acre site is in a relatively quiet "radio valley," an area providing natural shielding from many sources of radio interference. A second east coast earth station complex is located at Andover, Maine, about 90 miles northwest of Portland.

The second antennas, constructed at both Etam and Andover in 1975, provide each station with greater flexibility in operations with the Atlantic INTELSAT IV and IV-A satellites. Etam and Andover also provide back-up for each other in the event of a major outage at either station.

Other U.S. earth stations for international satellite communications are located at Brewster, Washington; Cayey, Puerto Rico; Jamesburg, California; Paumalu (Oahu), Hawaii; and Pulantat, Guam.

The landmarks of the Etam Station are its two dish-shaped antennas which stand taller than a 10-story building. The smooth surfaces of the dish reflectors were designed to such critical specifications that each antenna and receiver was tested and calibrated by listening to the known radio emissions from the star, Cassiopeia A, many light years away.

COMSAT shares ownership of the Etam Earth Station with other U.S. international communications carriers. In an interim ruling in 1966, the Federal Communications Commission set the following ownership quotas for the Etam station: COMSAT, 50 percent; American Telephone and Telegraph Company, 28.5 percent; RCA Global Communications, Inc., 10.5 percent; ITT World Communications Inc., seven percent; and Western Union International, Inc., four percent.

From its beginning in 1968, the Etam Earth Station has served as the pioneer in the advancement of satellite communications technology. Among its contributions, Etam was the first U.S. station to:

- Operate with the INTELSAT III satellites, which for the first time had sufficient power to relay all forms of communication simultaneously, and which established the global satellite system in July 1969.
- Introduce (in 1973) the SPADE system wherein a pool of frequencies is kept available for users on an as-needed basis, permitting one country to "call up" another as the occasion demands without establishing a full-time circuit.
- Be equipped in the Atlantic region (in 1973) for high-speed digital data (50 kilobits per second, or 50,000 words per minute) service to Europe.
- Work with the new INTELSAT IV-A satellites, which achieve a significant increase in communications capacity and flexibility by introducing frequency reuse through beam separation, the first commercial application of this concept in satellite communications.

Etymology of Etam

Whence came the name "Etam"? Was the tiny West Virginia hamlet named after a person, place or thing? Was its origin contemporary or biblical? Could the name be traced to a geographic feature, a history-making event, or what?

Usually, such name derivation is obvious, requiring little research and to be mentioned only in passing. For example, the nearest incorporated town to Etam is Rowlesburg, through whose post office Etam receives its mail. The origin of the name Rowlesburg is easy to determine. The town was named after Thomas Rowles, a Baltimore & Ohio Railroad Division Engineer who originally laid out the railroad through the area.

Determining the origin of Etam's name developed into a real challenge. In the libraries of Clarksburg and Kingwood (the county seat of Preston County), West Virginia, two reference books were found in which Etam was mentioned. One, entitled *The West Virginia Heritage Encyclopedia* contained the reference: "Etam. A small community on Buffalo Creek, formerly a post office. Origin of the name is unknown."

In the other, the *West Virginia Geological Survey*, published by the West Virginia Geological Survey Commission in 1914, there is reference to the "Etam anticline," a terrain feature of the Etam Earth Station site (see main story of feature for geological description).

At this point it could be speculated that Etam drew its name either from a post office serving a community on Buffalo Creek or from a terrain feature. If one or the other could be eliminated the origin of the name should become evident.

With the assistance of the Post Office Department's library staff at L'Enfant Plaza, reference was found in the January 1882 Postal Guide to a fourth class post office at Etam. Unfortunately, the origin of the name was still an unknown quantity. A PMG policy states, "Neither the origin of post office names, nor the reasons for their selection has entered into Post Office Department records. The practice has been that when the post office was to be established, the proposed patrons were asked to furnish a list of names from which the name of the new post office was to be chosen, and the Post Office Department named the new post office from that list. It is believed that this information can be obtained only from local histories or old residents of the communities."

At this point, the conclusion could be drawn that since the post office pre-dated the Geological Survey Commission's reference to the Etam anticline, the name Etam could be traced to the establishing of the post office.

A visit to the National Archives and a search of the Record of Appointments of Postmasters turned up the names of Sylvester J. Goldin and J.W. Davis as the first and second (and only) postmasters of the Etam post office. The post office was short-lived, established September 27, 1881, and discontinued October 30, 1882, a period of 13 months.

But still, why Etam?

Archivists Raymond DePue and Jerry Hess were able to locate the original application requesting permission to establish the post office and interpret its contents. Initially, the post office site was to be named Saint Joe, a community of 90 persons, to serve a population of 300. The contractor was the W. W. Sawyer Company, and the postmaster forwarding the application was John McHeckwan of Rowlesburg.

At the Post Office Department in Washington the name Saint Joe was scratched out and the name Etam substituted. A clue to the reason for this change can be found in a statement on the form which cautions the applicant (in red), to "Select a short name for the proposed Office, which, when written, will not resemble the name of any other Post Office in the United States." It can be assumed that repetition was the cause of the change.

But still, why Etam?

(Continued on Page 6)

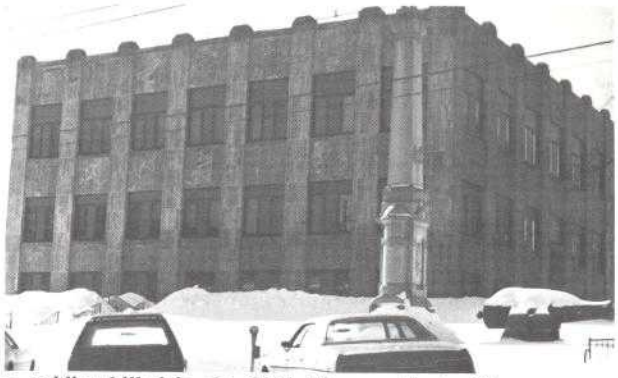
I would like to extend my appreciation to the many people involved in assembling the material used to prepare this special feature on the Etam Earth Station. Among those making major research contributions were: The Office of Senator Jennings Randolph of West Virginia; the West Virginia Department of Commerce; Clarksburg, W. Va., Librarians Merle Moore, Judy Westfall and Ellen Bone; Kingwood Librarian Joel W. Beane; West Virginia University Assistant Curator Harold M. Forbes; Post Office Librarian Leola Keull and Ann Boitel of the Postmaster General's Office; Raymond DePue and Jerry Hess of the National Archives; Larry D. Woodfork of the West Virginia State Geologist's Office; and W. L. Miller, C. A. Randolph, Rupert Hobbs and Carl Cooper of the Etam Station.

Last, but by no means least, the extremely cooperative staff of the Mountaineer County Travel Council in Morgantown: Sally Sternbach, Nancy Anne Fox and Twila Wagner. I have reserved the Council until last for special mention. At the time this story was being researched, Preston County, West Virginia, had sustained one of the worst blizzards in its history. Many of the locations to be visited were inaccessible. The Council was able to fill in many of the photographic gaps which would have otherwise made this feature incomplete. The Council's material (summer photos) contrasts with PATHWAYS *photos (winter shots) taken during the preparation of this feature.* **The Editor.**

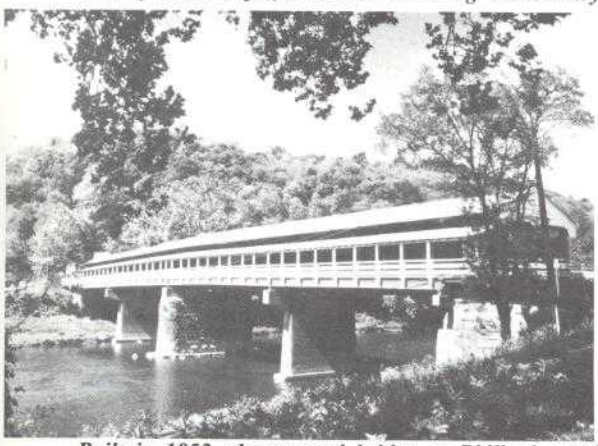
Etam today

Etam is a small unincorporated community located at the juncture of Buffalo Run and Route 72, approximately 42 miles east of Clarksburg, home of the Civil War General Stonewall Jackson. It is 13 miles west of Fairfax Stone, on Maryland's western border.

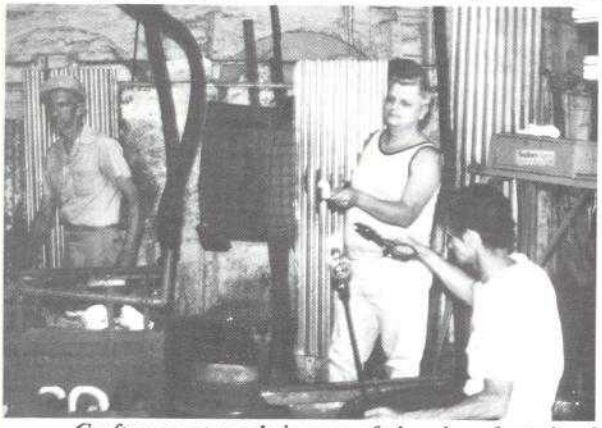
(Continued on Page 6)



A statue and plaque mark the birthplace of Civil War General "Stonewall" Jackson in Clarksburg, approximately 42 miles west of Etam (left); a marker honoring Thornsbury Bailey Brown, the first Union soldier killed in the Civil War, on Route 50 approaching Grafton (center); and the Preston County Courthouse in Kingwood, the county in which Etam station is situated (right).



Built in 1852, the covered bridge at Philippi, southwest of Etam, is the longest two-laned covered bridge still in use on a federal highway (left); Grafton, to the west of the earth station, houses the "International Mother's Day Shrine" (center); and a replica of a nineteenth century pharmacy on display in the Medical Center of West Virginia University in Morgantown (right).



Craftsmen at work in one of the glass factories for which West Virginia is famous (left); the remains of the Henry Clay iron furnace built in 1834-36, representative of the well-developed iron smelting industry of the day, found near Morgantown (center); a reenactment of frontier living at Prickett's Fort, northwest of Etam on Interstate 79 (right).

The Personal Rapid Transit System (shortened title "People Mover"), a cooperative experiment between WVU and the Department of Transportation, now in operation between the University and downtown Morgantown (left); Monongalia County's Old Stone House, nearly 200 years old, has served as a tavern, pottery, tanyard, church, tailor shop and residence (center); rich in energy resources, loaded coal cars melt into the distance on the outskirts of Fairmont near Clarksburg (right).

ETYMOLOGY

(Continued from Page 4)

Since Saint Joe was the only name requested on the application it was, in all probability, the only name offered by the applicant. A stamp on the back cover of the application shows that it was dispatched to the Topographer of the Post Office Department. Since such office no longer exists within the Department, evidence as to the origin of Etam ends, and it must be speculated that a postal employee in Washington gave the name to the small hamlet in which the Etam Earth Station is located.

But still the question persists, why Etam?

In reply to a query, Harold M. Forbes, Assistant Curator, West Virginia University, wrote "After extensive search of both printed and manuscript sources on the history of Preston County, West Virginia towns, and the origin of West Virginia place names, I was able to locate only a single reference . . . in *West Virginia Place Names, Their Origin and Meaning*, by Hamill Kenny . . . Kenny lists an 1898 Rand McNally map as the earliest appearance of Etam on the many maps he examined . . . Kenny speculates that the name has a Biblical origin, and cites the possible source of 'Edom, a country southeast of Palestine', and 'the Rock of Etam,' Samson, Judges XIV-XVI."

Forbes continues, "According to Kenny, Stephen G. Boyd in his *Indian Local Names With Their Interpretation*, 1885, defines Edom as the 'red,' given this interpretation owing either to the red hue of its mountains, or, as some think, to the color of the pottage furnished Esau by Jacob."

By coincidence, on the same day as the arrival of the letter from the West Virginia University, Ms. Ann Boitel of the Office of the Postmaster General, as the result of a request to the National Board of Geographic Names, provided information of basically the same content.

For help in making a final determination we turned to our own PIO staff member Juanita Smith, a student of the Bible, who, after some research and consultation with her pastor and his wife provided the following: that the closest root to be found in pre-Hebraic language means "a cliff." The word Etam occurs in at least two biblical passages. The first and most descriptive reference is found in Judges 14: 7-11. In this reference Samson retreats to dwell "in the top of the rock Etam." I Chronicles 4:3 presents Etam as a male descendant of the house of Judah but without explanation as to how his name was chosen.

So, as to the question, "Why Etam?" It can be speculated that the name of this tiny hamlet in West Virginia, housing COMSAT's communications facility, was decided upon by a biblical-minded Post Office employee in Washington, D.C. in the year 1871. A man or woman who, when probably called upon to suggest a name to replace Saint Joe, related "the rock Etam" to the hills of West Virginia.

ETAM TODAY

(Continued from Page 4)

There are six houses, one mobile home and one sawmill, "the Darrel Dean Sawmill Number 1." Actually, there are two industries in Etam—a sawmill and a beef herd—the latter partially supported by grass from the COMSAT property.

Etam is in what is known as a radio quiet zone. The National Radio Astronomy Observatory, located 70 miles south of Etam, is protected by government restrictions to prevent radio interference from disturbing their sensitive receiving equipment. Etam enjoys the benefits of this relatively low interference impacted area. The valley floor is 1,300 feet above sea level and between two mountain ranges, three quarters of a mile apart and 2,850 feet high, which shield the Etam Earth Station from high frequency interference.

Approximately 20 inhabitants consider Etam their home. Across the road and in line with the valley is a small hillside graveyard. Headstones there date back well over 150 years. Route 50, five miles north of Etam, is called "the Highway of the Presidents." George Washington was said to have been a part of its original survey team. The "Chessie" System Railroad runs seven miles north in an east-west direction (Amtrak - Washington, D.C., to St. Louis).

Local residents are closely related. Many of their ancestors were born here, some well over 100 years ago. The Peasley family immigrated here in the early 1800's from Germany. The Calhoun, Davis and Dean families are among the original settlers.

At one time Etam boasted two churches and a two-room schoolhouse which later became a home, since replaced by a modern mobile home. Before the turn of the century, Etam also contained a General Store and Post Office.

In 1920 the Martin Mill was built. A huge band-saw cut trees from Etam's thickly forested hillsides. To the west of the Etam Station the original brick structure still stands. The first electric line came in 1938 with the Route 72 roadbed. The road itself was not graveled until World War II and later paved.

A now deceased "old-timer" used to tell of driving a wagon into Rowlesburg, seven miles north, with the bed of the wagon dragging in snow most of the way. This was probably during the blizzard of 1888.

The mountain people, considered somewhat clannish, have accepted the two-eyed space age monster jutting up from the valley floor. To them it has become as much a part of the environmental scene as the column of bluewood smoke rising skyward, signaling passersby that the dweller is home and well.

—Rupe Hobbs

COMSAT's President Charyk appears before Congressional Subcommittee

COMSAT President Joseph V. Charyk appeared on March 16 before the House Interstate and Foreign Commerce Subcommittee on Communications. The Subcommittee, chaired by Congressman Lionel Van Deerlin (D-Calif.), is proposing to review federal communications policy and existing legislation, including the Communications Act of 1934 and the Communications Satellite Act of 1962.

The Subcommittee began preliminary hearings in March for the purpose of gathering background information on issues related to the provision of international telecommunications services. In a written statement submitted during these hearings, Dr. Charyk discussed COMSAT's achievements under the Satellite Act. He noted the Act called for the creation of a private corporation charged with the statutory mission of establishing a global commerical communications satellite system. The legislation specified that the new corporation was to be closely supervised and regulated by the government. It also required that satellite services be extended to economically less developed countries as well as to industrialized ones, and that the benefits of this new technology be reflected in both quality of service and charges for such service.

Dr. Charyk described COMSAT's success in carrying out these Congressional mandates. He reviewed the formation and growth of INTELSAT, and the technological advances made by each succeeding generation of INTELSAT satellites from Early Bird onwards. He spoke of developments that will lead to even further increases in satellite capacity and flexibility in the future. In summary, he said, the rapid establishment of the global communications satellite system "bears out the good judgment of the Congress in selecting, subject to governmental guidance and regulation, a 'chosen instrument' to foster, on behalf of the United States, satellite communications on the international level."

Under a decision of the Federal Communications Commission (FCC), COMSAT has been acting solely as a "carrier's carrier" in providing services through the INTELSAT system. Dr. Charyk pointed out that the communications carrier companies, upon whom COMSAT is dependent for the sale of its satellite services and with whom it shares ownership of U.S. earth stations, have major financial interests in undersea cables which are used on some of the most important international routes also served by satellites.

Dr. Charyk noted that, as U.S. representative in INTELSAT, COMSAT participates in the complicated planning process that involves more than 100 countries. He observed that the carrier companies, COMSAT's customers, supply the satellite traffic projections upon which this planning is based. Under present circumstances, he added, it is understandable that, irrespective of the advantages of satellites and for reasons including economic incentives, the American carriers tend to prefer using undersea cables, which they plan, build, own and operate, rather than global system satellites in which they have no ownership interests. Moreover, the foreign correspondents of the American carriers may share the same preference, for similar reasons. And, he said, industrial participation in the construction of telecommunications facilities can also play a major role in affecting a country's attitude toward cable construction and use.

COMSAT's President emphasized that one should be careful when comparing circuit costs in a satellite system designed to provide global coverage with those in a cable linking two points only, for there are distinctive differences between cable and satellite facilities. He pointed out that satellites have broad-band, large-capacity capabilities which permit access from a multiplicity of points, thus making planning and use of satellites global rather than regional. He mentioned that satellites are most economically and effectively used when heavily loaded. And, he continued, they give both developed and developing countries the opportunity to provide high quality, low cost modern communications links, thus fulfilling objectives of the Satellite Act.

After discussing the accomplishments of COMSAT and INTELSAT and the degree to which these are attributable to clear Congressional action, Dr. Charyk turned to new applications of satellite technology in which, he said, U.S. policy has been less cohesive. As an example, he cited maritime satellite communications and noted that the U.S. has still not designated a private entity to be the U.S. participant in INMARSAT, the proposed International Maritime Satellite Organization, even though agreements to establish INMARSAT have now been opened for signature and preparations are proceeding on technical, financial and organizational matters.

Dr. Charyk stressed that the U.S. can exert leadership in the international community only if the direction in which the U.S. wishes to go is clear and decisive. "Our own national commitment must transcend the competitive internal considerations that have at times limited our overall effectivess in the international arena."

INTELSAT Board notes accession of El Salvador for total of 95 member countries; Headquarters Agreement in force

The Twenty-sixth Meeting of the INTELSAT Board of Governors was held in February at INTELSAT Headquarters in Washington, D.C., with 23 Governors in attendance. With the accession of El Salvador on January 19, INTELSAT currently has 95 members. Among its actions the Board:

Technical and Operational Matters

- Requested the Director General to review the present technical and operational assumptions associated with plans for introduction of the INTELSAT V satellites, particularly the requirement for initiation of 14/11 GHz service in mid-1979, taking into account the impact of possible delay in the INTELSAT V program and the availability of 14/11 GHz earth stations. The results of this review will be submitted, with any appropriate recommendations, to the next meeting.
- Noted the Management Services Contractor's analysis and conclusion that the INTELSAT IV-A (F-4) should be shipped directly to the launch site, and the INTELSAT IV-A (F-3) be launched after (F-4) and (F-5), subject to review in the event of launch failure, thus making the dual polarization antenna on the (F-3) available in the Indian Ocean Region, instead of duplicating the polarization equipment available in the Atlantic Ocean Region.
- Approved in principle the preemptible allotment of two spare transponders to Brazil to meet its domestic public telecommunications requirements. Brazil intends to use these transponders beginning in mid-1978 to replace its current full-time lease of one transponder.
- Requested the Director General to bring to the attention of INTELSAT Signatories, Parties and Administrations the desirability of carefully considering certain intersystem coordination concepts, and frequency allocation matters identified by the Advisory Committee on Technical Matters, when developing their administration's positions for CCIR (International Radio Consultation Committee) meetings and the 1979 WARC (World Administrative Radio Conference).
- Expressed in the form of a recommendation, pursuant to Article XIV(c) of the Agreement, the finding that the Indian INSAT domestic satellite network to be located at 74 degrees E. Longitude will be technically compatible with the INTELSAT system when operated in accordance with certain restrictions agreed to with INTELSAT. India will request formal coordination of the INSAT operational spare satellite network at a later date, as well as requesting coordination under Article XIV(e) of the broadcasting and meteorological services to be provided by these satellites.
- Requested the Director General to review alternative methods for recording intersystem coordination agreements, and report his recommendations to the Twenty-eighth Board meeting after consulting with the Advisory Committee on Technical Matters.
- Received a presentation from Mr. Roy Gibson, Director General of the European Space Agency (ESA), and members of his staff on ESA's Ariane launch vehicle.
- Requested the Director General to provide the Advisory Committee on Technical Matters with a study on possible applications and benefits deriving from the introduction of SCPC (Single Channel per Carrier), companded FM and/or delta modulation techniques in the INTELSAT global system.
- Approved access by the non-standard earth station near Papeete, Tahiti, to Pacific satellites, on certain conditions including the proviso that the station convert to Station B operation before January 1979.
- Approved access by the non-standard earth station at Sonsonate, El Salvador, on certain conditions including the requirement that it be converted to Standard A operation no later than June 1978.
- Approved a Reggane, Algeria, earth station for use with Algeria's leased transponder, subject to verification of the station's characteristics and other specific operating conditions.
- Decided that non-standard earth stations may operate with more than one destination until conversion to SCPC is completed in all cases where no additional carriers are needed and no changes are required to the parameters of the carriers now operating with the stations.

Organizational and Administrative Matters

- Noted that the INTELSAT Headquarters Agreement became effective as of November 24, 1976, following signature by President Ford of the requisite Executive Order and an exchange of notes between the Department of State and INTELSAT.
- Decided to note (*i.e.*, accept) COMSAT's proposal that Dr. John Harrington replace Mr. Eugene Jilg in the period February 7 to May 5, 1977, as the COMSAT official primarily responsible for technical system implementation under the Management Services Contract.
- Noted the Director General's report on the progress of implementing permanent management arrangements. It will consider at the next meeting his conclusion that the tech-

nical services contracts could be awarded pursuant to Article 16 of the Operating Agreement without open international tender, due to the restricted number of entities capable of fulfilling them. The Director General will develop both the basic elements of the RFP statement of work or specifications and a list of potential suppliers for the next meeting, when the Board will consider open or restricted-source or sole-source procurement.

• Designated Mr. Reginald Westlake to serve as Acting Director General, pursuant to Article XI (d)(i) of the Agreement.

• Decided that effective December 31, 1976, the Director General should have a housing allowance of $500 per month and a car and driver—benefits previously awarded the Secretary General, which ceased with the termination of that office.

• Approved the addition of five positions in the Technical/Operations Division of the Executive Organ (four engineers and one administrative aide), as requested by the Director General.

• Approved a new policy for reimbursement of U.S. taxes to staff joining INTELSAT after December 31, 1976, and requested the Director General to report to the next Board meeting on possible methods for phasing in the new policy for existing staff, in order to eliminate or minimize the adverse financial impact on them.

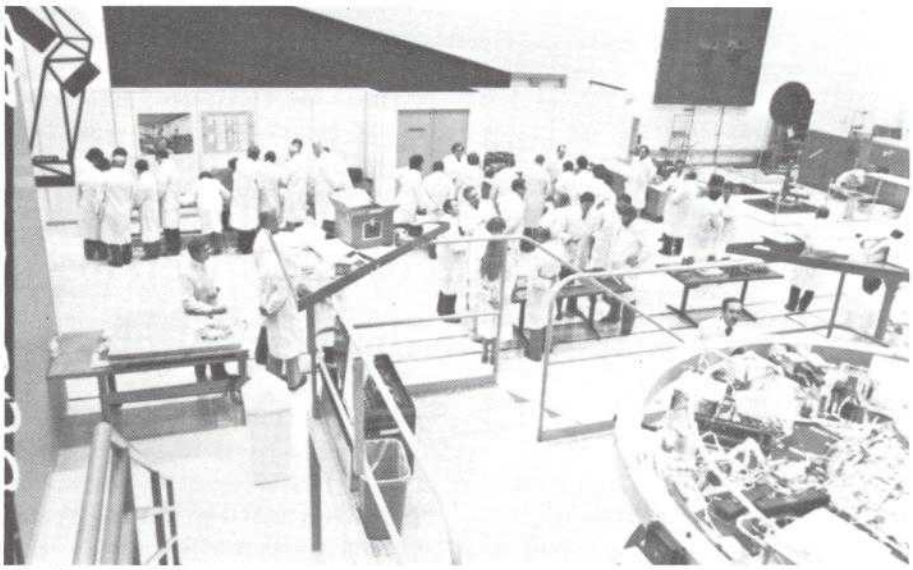
• Requested the Director General to present to the next Board meeting his initial recommendation on the role and scope of INTELSAT's participation in the future work of the INMARSAT Preparatory Committee.

• Noted the Secretary General of the ITU (International Telecommunication Union) had informed the Director General he is not prepared at this time to propose the establishment of formal relations between the two organizations, but is willing to continue and increase the present working relations. The Director General will continue to keep the Board apprised of developments concerning relations with the ITU.

• Adopted amendments to its Rules of Procedure to reflect the Director General's assumption of office and the establishment of the Budget and Accounts Review Committee (BARC).

• Approved its reports to the Sixth Meeting of Signatories on Future Programs, and on the classification of Sudan's domestic services on the same basis as international traffic under Article III (b)(ii) of the Agreement.

• Approved a one-year assignment for Mr. Yasuo Hirata, a nominee of the Japanese Signatory, and one-year extensions to the terms of Mr. Favio Galante, a nominee of the Italian Signatory, and Mr. Pierre Neyret, a nominee of the French Signatory, to work with the staff of the Management Services Contractor.



Members of the INTELSAT Board of Governors and its Advisory Committee on Technical Matters tour the Satellite Assembly Area of Ford Aerospace & Communications Corporation at Palo Alto, California, prime contractor for the new INTELSAT V series of communications satellites. FORD AEROSPACE PHOTO

Financial and Legal Matters

• Approved the inclusion of tasks related to TDMA (Time Division Multiple Access) systems studies in the 1977 budget, bringing the 1977 Project Support Budget to $2.97 million.

• Authorized the Director General to communicate to COMSAT GENERAL that the royalty payments for its use of INTELSAT computer software are: $33,000 for the FDM/FM Interference Package; $46,000 for the CIA-4 (Intermodulation) program; $34,000 for Performance Evaluation; $28,000 for Transmission Performance; and $4,000 for Antenna Beam Optimization. The use will be pursuant to a non-exclusive, non-transferable license and without the right to grant sublicenses.

• Decided to express its regret and deep concern that because of the lack of Office of Munitions Control clearance deemed necessary by the prime contractor, representatives of the Director General were unable to participate in the INTELSAT V design review. The Board also placed on record that it expects the Director General and the U.S. Government, as a Party to the INTELSAT Agreement, to take the necessary actions to solve this problem.

• Decided, as recommended by the Director General, that, as of February 1977, all long-term allotments agreements for preemptible leases will incorporate charges of $150,000 for termination after the second year of service, $100,000 after the third year, and $50,000 after the fourth year.

The Twenty-seventh Meeting of the Board of Governors was scheduled to be held at INTELSAT Headquarters beginning March 30, 1977.

The preceding report was prepared by Ellen D. Hoff, International Affairs, U.S. INTELSAT Division.

COMSAT's antenna and a mobile unit of the American Red Cross symbolize the advancement of Red Cross disaster services into space-age communications.

Satellite communications add speed to Red Cross response in disaster relief

BY ROY POPKIN

It has taken American Red Cross disaster workers ninety-five years to travel the path of human need from Clara Barton to COMSAT.

This compassionate trek began in the charred, still smoking rubble of an Upper Michigan forest fire in 1881, when the Red Cross record of organized assistance began in a thickly wooded section of the state known as "the thumb of the mitten."

For ten days, men fought a losing battle against the flames, but on September 10, it rained. By then, the death toll reached 125; later fatalities from injury and disease made it higher. Loss of property and crops ran to two million dollars. Thousands of people were left to face the oncoming winter without shelter, food, medicine, clothing, cattle, tools. The fire left only ashes, and a willingness to rebuild.

Word of the tragedy reached the east by the only means of nationwide communication then in existence—the telegraph.

When newspapers reported what had happened, people all over the United States rallied with contributions of funds and supplies. And in the small upstate New York community of Dansville, a new concept of organized humanitarianism rose to meet the needs created by disaster. In that city, a fledgling organization, less than four months old, was functioning under a brand new symbol, the Red Cross. Its leader was Miss Clara Barton.

Miss Barton, a distinguished social worker who became famous for her work with the wounded on the battlefields of the Civil War, went to the scene to supervise and coordinate the distribution of relief supplies to the Michigan fire victims.

From that small beginning has grown a nationwide disaster program which sees local Red Cross chapters responding to 32,000 disaster situations annually in the 50 states, ranging in size from small local fires to massive and widespread floods triggered by torrential rains from hurricane-borne winds and clouds.

In fact, the Red Cross disaster program created by Clara Barton in the United States and shaped in the crucibles of such catastrophes as the Johnstown Flood, the Galveston and Sea Island Hurricanes, the San Francisco earthquake and fire, and the great floods in the Mississippi and Ohio River valleys in the early 1920's and 30's, has become a prototype for Red Cross disaster programs in many other countries.

In the early days Red Cross disaster workers traveled to stricken areas by riverboat, railroad and early model automobiles, and often used horseback to get around.

Communication at first was by telegraph, mail and courier, then, later, by telephone and rudimentary short-wave radio.

Today, in an era of modern technology, high speed teletype, radio and sophisticated telephone systems spread the word, bring needed supplies, personnel and equipment. And in the disaster area, people and supplies are moved by four-wheel drive jeeps, heavy duty trucks, amphibious vehicles and helicopters; large quantities of equipment and even large mobile units can be moved across the country by transport planes, and often are.

But all this modern technology notwithstanding, there are times when it is not enough.

When floodwaters from the Chene and Tanana Rivers inundated eighty percent of Fairbanks, Alaska, in 1967, only two long distance lines remained

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Mr. Popkin is Assistant National Director, Disaster Services, The American National Red Cross.

Labs terminal focal point of Ohio Valley "disaster" communications

The heavy winter snows were thawing with the approach of spring. The Ohio River had leaped its banks and was threatening to inundate the entire Ohio River Valley. With massive flooding predicted, the problem of moving and housing thousands of people required immediate and swift attention.

In Cincinnati, the area chapter of the American Red Cross activated its Disaster Relief Plan merging the many Red Cross volunteers, ham radio operators and regional emergency units into a single cohesive force directed from the Red Cross Headquarters Building in downtown Cincinnati.

In the meantime, anticipating the worst, the National Headquarters was gearing up to handle what could become a disaster of major proportions. Vital to the effective use of its disaster relief machinery was quick and efficient communications. Similar operations through the years had been hampered by the lack of communications with an immediate capability to provide coordination between the disaster scene and the National Headquarters.

At COMSAT Labs in Clarksburg, Maryland, Kim Kaiser and Fred Seidel loaded their small, highly-transportable earth terminal onto a Red Cross helicopter. In a matter of minutes they were whisked to the Baltimore-Washington International Airport then by chartered flight to Cincinnati. In a matter of hours from the request for assistance, Kaiser and Seidel were establishing communications from the parking lot outside the Chapter's Headquarters in Cincinnati.

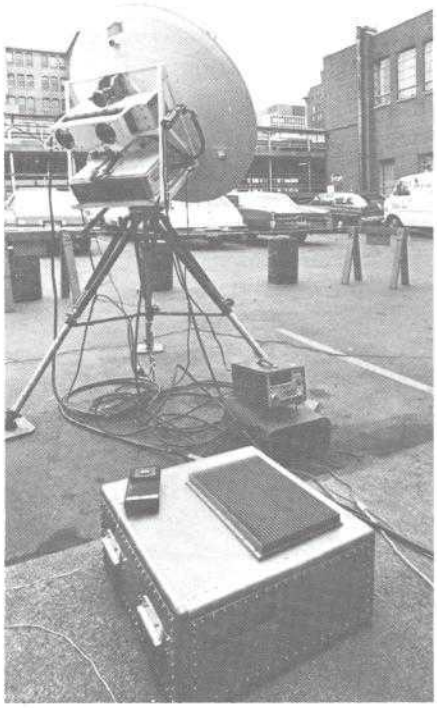
While Kaiser and Seidel were en route to Cincinnati, Jeff Steinhorn and Dave Lehmann made preparations to man the two-meter terminal on the roof of the Labs building. Eric Ackerman was dispatched to Alexandria, Virginia, to provide communications coordination for Red Cross Headquarters operations.

Communications were quickly established with two voice circuits between the Cincinnati terminal and the Labs with one of the circuits tied in to Red Cross Disaster Headquarters in Alexandria. Free of terrestrial obstacles and atmospheric conditions the CTS (Communications Technology Satellite) in synchronous orbit closed the communications loop. A vital link had been forged greatly enhancing support services into a stricken area, a link which for many could mean survival.

Much of the story so far is fiction sprinkled with fact. The Red Cross did put its disaster plan into operation recently in Ohio but as a test of its ability to respond. And Ohio was not a choice of coincidence; much of the present-day disaster operations were shaped during the early part of the century when the nation was stricken with catastrophes including the great floods in the Mississippi and Ohio River Valleys.

And COMSAT did deploy its transportable terminal to Cincinnati as part of disaster operations providing instant communications between the emergency units in the field and the Red Cross Regional Disaster Headquarters in Alexandria, Virginia. However, instead of being speedily air-transported to the "disaster area," the terminal made its way to Cincinnati in a rented U-HAUL trailer towed by Seidel's station wagon.

The Small Terminals Group at the Labs has been experimenting with disaster communications via the CTS satellite for a year. The small, highly-transportable earth terminal with a 1.2-meter antenna mounted on a tripod and two baseband and IF units (Intermediate Frequency), developed



The Labs' transportable antenna, set up in the Cincinnati Chapter's parking lot, enables the Red Cross disaster force to communicate over the CTS satellite with its headquarters in Alexandria through COMSAT's earth terminal in Clarksburg.

at the Labs, was set up in the Cincinnati ARC Chapter's parking lot. Communications were established with two voice circuits between the field terminal, the Labs and disaster headquarters in Alexandria.

Since the CTS satellite is used by more than 40 experimenters, Canadian and American, it was agreed that circuits would be shared with other experimenters rather than preempting their time. Consequently, Kaiser and Seidel shared the satellite with experimenters conducting a two-way teleconference session by Westinghouse between Baltimore and Lima, Ohio, during the period preceding the actual disaster test and, on the day of the actual test, shared the satellite with a color TV broadcast originating in Cleveland and destined for Columbia, South Carolina, by the South Eastern Communications Association.

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According to Kaiser, "By some rather tricky arrangement of our frequencies, made possible by the highly versatile, COMSAT-designed up/down converters, we were able to accommodate all the signals in just one of the transponders of the CTS satellite. This also meant that we were all in the same very narrow spot-beam footprint. All of these arrangements went well and we even entertained the visitors at the Cincinnati end with a very fine TV picture derived from our small terminal along with disaster communications channels."

"flood damage," requirements for assistance and the dispatch of emergency units. The messages were coordinated and dispatched to the national operations center in Alexandria using the telecopier for marked-up situation maps, the telephone for urgent verbal requests and the teletype for written orders and requests.

"We made short work of all of the communications with the 300-word-per-minute teletype," said Kaiser. "While the telecopier with its 4-6 minutes per page was a bit slower, it transmitted budget sheets and maps with equal accuracy. While this was going on, John Hoyle, our rapidly trained teletype whiz, was able to fill the reels of tape on our teletype which spewed out the messages at, what most observers admitted, was an astonishing rate—and full duplex at that.

"The operation lasted until 4 p.m. at which time we held a short debriefing session. Questionnaires were passed out to get the reactions of the participants. Most were impressed but recommended that more than one channel to Alexandria be established and noted the advantages of having a COMSAT vehicle available for providing such communications support."

M. R. "Bud" Fink, Chief of Emergency Communications for the Red Cross Disaster Service (standing at left) and J. "Kim" Kaiser, Principal Experimenter for COMSAT (extreme right), oversee the performance of volunteers in the Cincinnati Communications Center.

At 8 a.m. Saturday, February 26, the Communications Center located in the Red Cross conference room, equipped with baseband and IF equipment, telephones, teletype and telecopier, was activated as the actual test got underway. Staffing the Comm Center were Milford R. Fink and Ralph Davis, Chief and Assistant Chief of Emergency Communications, National Division of Disaster Services, and Garry Miller and the staff members and volunteers of the Cincinnati Chapter's Disaster Services.

The Center functioned efficiently, according to Kaiser, with relays coming in by telephone and ham radio networks indicating the extent of

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functional in that central Alaskan city. Even emergency communications were delayed for many hours. An amateur radio operator using a portable rig in a Red Cross shelter in Fairbanks had to relay his messages through other amateurs on Wake Island to get around the high mountains between Fairbanks and Anchorage, 430 miles away.

When Hurricane Camille slammed into the Mississippi Gulf Coast with 200-mile-an-hour winds and twenty-foot-plus tides in 1969, the Gulf Coast suffered a major communications blackout. Even Mississippi Highway Patrol communications had to be relayed from car to car when the Patrol's coastal transmitters were blasted out of commission.

Red Cross disaster workers could communicate locally, from emergency van to emergency headquarters, using shortwave radios on the Red Cross assigned 47.42 MHz frequency, but someone wanting to talk to New Orleans or Atlanta or Washington had to drive sixty miles or more inland through traffic and debris-clogged roads to find a working telephone. It often took several hours just to drive one way to find that phone.

And when the Susquehanna River, swollen to record heights by the rains from tropical storm Agnes, topped the levees at Wilkes-Barre, Pennsylvania, by several feet in June of 1972, the city's entire telephone system was wiped out.

Again, over-burdened shortwave radio and couriers driving to working phones in other communities were the backbone of hard-pressed Red Cross communications.

For many purposes, shortwave radio is more than adequate. The Red Cross not only has its own disaster system, built around 531 base stations licensed by the FCC, but has close working arrangements with the American Radio Relay League, REACT, the Civil Air Patrol and other groups with communications capability. The

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Donald E. Greer

Greer elected Assistant Vice President

Donald E. Greer has been elected Assistant Vice President, General Services, and Headquarters Executive Officer. Joining COMSAT in 1964 as Special Assistant to President Joseph V. Charyk, Mr. Greer subsequently became Headquarters Executive Officer and Director of General Services.

Mr. Greer retired from the United States Air Force in 1964 with the rank of Colonel after more than 20 years of service. At the time of his retirement he was military aide to the Secretary of the Air Force and served frequently as a military aide at the White House. Mr. Greer, a command pilot, flew B-29 missions from the Marianas during World War II. During the Korean War, he and his brother flew 33 combat missions as members of the same crew.

Mr. Greer received a B.A. degree and an M.A. degree from the College of the Pacific, now the University of the Pacific. On the football team at the College of the Pacific, Mr. Greer won national recognition as the blocking back for Eddie LeBaron under coach Amos Alonzo Stagg.

MARISAT expansion planned

COMSAT GENERAL Corporation has announced it plans to expand MARISAT voice capacity serving the shipping and offshore industries from the present one to as many as six duplex high quality voice circuits in each of the Atlantic and Pacific satellites.

The MARISAT System, which began service last year, provides modern, 24-hour communications to the U.S. Navy, and to commercial maritime users. COMSAT GENERAL offers telephone, telex, facsimile and data services between the shore and ships or offshore facilities at sea via MARISAT.

"This significant increase in capacity will mean faster and more convenient service," COMSAT GENERAL President John A. Johnson said. "Queuing for a circuit will be minimized and data can be handled in real-time with additional voice circuits. Heavy communications users, such as oil drilling rigs and passenger ships, will be assured almost immediate access."

A study of the performance of the MARISAT satellites during their months of operation indicates that the satellites can be operated at a higher power mode in the commercial maritime frequencies, while providing full service in UHF frequencies to the Navy.

Thus, COMSAT GENERAL said, from its share (86.29 percent) of the MARISAT System, it now will be able to substantially increase its commercial service to as many as six telephone circuits in each satellite, while still providing 25 channels for telex service in each satellite.

MARISAT satellites presently providing full-time service to the U.S. Navy and commercial shipping/offshore interests are positioned in synchronous orbit 22,240 miles above the Equator over the Atlantic Ocean and over the Pacific Ocean; a third MARISAT satellite currently providing service only to the Navy is stationed over the Indian Ocean. Each satellite can serve an area encompassing about one-third of the earth's surface.

At present, more than 40 ships and offshore facilities registered in 13 different countries are equipped with COMSAT GENERAL terminals for operation with MARISAT, and additional terminals are on order by industry users.

COMSAT GENERAL said it will promptly seek appropriate authorization from the Federal Communications Commission to expand its MARISAT voice-grade services in the near future.

FCC authorizes DIGISAT service

The Federal Communications Commission (FCC) has approved COMSAT's application for authority to offer DIGISAT data service in the Atlantic Ocean region.

DIGISAT is COMSAT's new, all-digital service for international data communications via satellite, at speeds of 2,400 bits, 4,800 bits, and 9,600 bits per second. Service will be offered from the United States to countries in the Atlantic Ocean region of the INTELSAT system.

DIGISAT will provide international data users a technologically advanced service that features lower costs, higher reliability and simplified maintenance. The DIGISAT channels will interface with any terrestrial analog voice channels via International Telecommunication Union standard modems.

COMSAT's proposed tariff for the U.S. portion of the Atlantic DIGISAT service, to be filed shortly with the FCC, provides charges to the U.S. international record carriers of $1,200 per month for a 2.4 kilobit per second channel, $1,440 for a 4.8 kilobit channel, and $1,920 for a 9.6 kilobit channel. These charges represent a substantial economy for data users who must now purchase a full voice circuit at substantially higher cost to obtain the transmission speeds achieved with DIGISAT.

Business and youth: partners in progress

BY CHERRYL HOLT

You won't find Starlite Enterprises or United Productions listed in any directory of Washington area corporations, but both of the COMSAT-sponsored Junior Achievement companies are now doing well.

Starlite and United are participants in Junior Achievement's national economic education program to help high school students learn first-hand how the American enterprise system works by running small businesses of their own.

Junior Achievement Incorporated, founded in Springfield, Massachusetts, in 1919, is organized into about 275 geographical areas within five national regions. Starlite Enterprises, with 15 student employee/shareholders, and United Productions, with 16 student employee/shareholders, are among the approximately 60 JA companies being operated by 1,300 students in the Washington area. Nationwide, more than 200,000 students are operating some 7,000 JA companies during the current school year.

COMSAT's Participation

In its sponsorship of Starlite Enterprises and United Productions, COMSAT makes an annual contribution to the funding of Junior Achievement Incorporated and provides a team of advisors for each of the companies it sponsors. The students, themselves, run every phase of the business they choose to operate.

Mel Williams, COMSAT's Human Resources Administrator, is Coordinating Director for the COMSAT-sponsored companies. June Burton, Corporate Affairs Staff, Richard Keefer, Senior Accountant, and Johan Curtin, Internal Auditor, serve with Mel as advisors to the companies.

Al Ledesma, a student at Bishop Ireton High School, is President and Chairman of the Board of Directors of Starlite Enterprises. Dan Chandler, also of Bishop Ireton High School, is President and Board Chairman of United Productions.

Starlite Enterprises staff assembling their fast-moving can cigarette lighters.

About The Companies

Starlite Enterprises and United Productions, as Junior Achievement companies, give students a practical learning experience by providing them with an opportunity to run a company "on their own." These teenage business people form their own companies, decide what they want to do and then experience, as do businessmen, the satisfaction of success or the consequences of failure.

The students serve as investor/shareholders, the Board of Directors, the management and production staff and the sales force. They sell stock at $1 a share to establish working capital. From working capital and the revenues they derive from sales, they pay for materials, space rental, use of equipment and other required services.

As employees, the students pay themselves wages and salaries, usually 25 cents an hour for each of the two hours worked during their weekly meetings. They also earn commissions on sales as an added incentive to move their products.

Books and records are kept by the companies, as they are for incorporated businesses, and the Achievers do this themselves. They also pay taxes: sales, excise and applicable state and local taxes. A surtax is paid on net income over the first $25, a scaled-down version of the federal requirement. This surtax, however, is paid into a fund of the Washington Area Junior Achievement to finance scholarships and other JA activities.

The businesses are liquidated at the end of each 30-week program. If the business has been profitable, the

Ms. Holt is in the COMSAT Office of Public Information.

shareholders are paid a dividend. If the business has not been profitable, the young people learn for themselves a lesson their parents may have learned about stock ownership.

First Try May Not Be Best

Starlite Enterprises and United Productions are both now doing a brisk business, but neither started out that way last October.

Starlite's first product selection was imprinted safety matches. These could not be moved fast enough to derive revenues worthy of the time involved, so a Market Research Committee was formed to evaluate other product opportunities. The Marketing Committee suggested the production of can cigarette lighters, which the Directors approved. Sales of can cigarette lighters, at about $5 apiece, totaled $261 by early March.

United Productions started business by making and selling ashtray lamps. Supply problems, however, forced UP to abandon this line. Using a similar process, United turned to the manufacture and sale of auto trouble lights. Sales of auto trouble lights, at $8 each, totaled $361 by early March.

What It's All About

The basic aim of all businesses is to make a profit, but some businesses do not succeed. In JA, however, this does not necessarily mean total failure if the Achievers are able to understand why they made mistakes, learn from their mistakes and do not repeat the same mistakes, either in Junior Achievement or in later life.

The inability to sell safety matches, or to take home a 25-cent-per-hour paycheck will not mean the "end of the world" for an Achiever. However, a business failure and the inability to take a paycheck home to the family as a result of a business failure is a serious matter in the real world. This lesson is the lesson Junior Achievement strives to teach to students at an early age. The mistakes are theirs, but so are the rewards.

Red Cross volunteers man the Cincinnati Chapter's Operations Center receiving and passing on information from radio hams throughout the Ohio River Valley.

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League of Red Cross Societies has radio units capable of reaching its headquarters in Geneva from most parts of the world, once the transmitter is in place.

But by and large, the Red Cross and amateur groups, including CB'ers, have a short-range capability and must compete with a great deal of other emergency traffic on the air and what limited phone service is available (and usually overloaded).

That's where the COMSAT experiments come in. The new portable transmitter developed by the COMSAT Labs in Clarksburg will be tested in mock disaster situations. It will be used to relay survey information, damage reports, requests for supplies and personnel, medical data and other information from a disaster scene in which there is a communications blackout. Information will be relayed to the COMSAT transmitter (which will be brought in, perhaps, by helicopter, and placed in a Red Cross disaster van) for transmission by voice and teleprinter to Clarksburg and thence to Red Cross Disaster Services headquarters in downtown Washington, D.C., or to other operational headquarters points.

Obviously, the few seconds it takes the information to travel from the earth station to the satellite and then on to Clarksburg and Washington will be a great deal swifter than it would take a courier in a jeep dodging fallen power lines, downed trees, pieces of broken houses and traffic congested by emergency vehicles, disaster victims on the move and hordes of sightseers, as he searches for a telephone many miles away from the impact area.

It is apparent that good communications are essential to successful disaster relief operations.

On one Thanksgiving Day weekend not long ago, the American Red Cross was at the scene of a plane crash in Virginia; assisting thousands of snowbound motorists in Pennsylvania, Ohio, Michigan and other states; helping coastal storm victims in Alaska and flood victims in Puerto Rico. One wonders if Clara Barton could have envisioned such widespread activities when she organized her first disaster relief effort in Michigan in 1881—or that less than a century later a satellite in the sky would be speeding the kind of help she took weeks to arrange.

Building an education or retirement fund? Looking for a tax break? U.S. Savings Bonds offer many advantages.

BY LYN RUSSELL

Payroll Savings is an automatic system for installment-plan purchases of Series E Bonds through regular allotments set aside from each paycheck. You enroll by signing a card authorizing COMSAT to set aside a specific amount from each paycheck for the purchase of bonds, which are delivered to you when the purchase price has been accumulated. Cards are available at your personnel office.

The amount of the allotment is up to you. Regularity, rather than amount, is the secret of successful saving.

Once the authorization card has been signed, it remains in effect until cancelled or until you leave COMSAT. However, changes can be made at any time in the amount of the allotment, the denomination of the bond, or the inscription, simply by filling out a new authorization form.

Series E Bonds are accrual-type registered securities available in seven denominations starting at $25 (purchase price $18.75). Their interest rate is now a full six percent, compounded semi-annually, when held to maturity of five years (first year rate 4-1/2 percent), with an automatic 10-year extension privilege.

Series E Bonds may be exchanged at any time in multiples of $500 for current-income **Series H Bonds,** which pay interest each six months by Treasury check. Interest is exempt from state or local income and personal property tax. While subject to Federal tax, this may be deferred until the bond is cashed or reaches maturity.

Mr. Russell is Manager, Staffing and Personnel Services.

Bonds may be issued in the name of one person, in the names of two persons as co-owners, or in the name of one person as owner with a second person as beneficiary. They are completely safe, backed by the full faith and credit of the United States, and, if necessary, Series E Bonds may be redeemed at any time after the first two months. In case of loss, theft, or destructions, they will be replaced without charge.

In addition to providing a regular payroll deduction savings plan Savings Bonds have certain tax advantages in saving for education and retirement.

FOR EDUCATION. The money you put aside for college expenses goes further when you take advantage of the tax savings which bonds offer:

Method Number 1. Purchase E Bonds in your child's name with a parent as beneficiary (not co-owner). (Gifts of over $3,000 to any one donee during a single calendar year require filling of a gift tax return.) At the end of the first year, file a Federal income tax return in the child's name, listing increase in bond value as income to the child. This establishes "intent," and no further returns need be filed (or tax paid) as long as the child's total income does not exceed the amount of his personal exemption. Thus, when bonds are cashed to meet college costs, all accrued interest is free from Federal tax. Retain a copy of tax return as proof of intent.

Method Number 2. Purchase E Bonds in your child's name with a parent as beneficiary (not co-owner). (Stipulation in parenthesis in previous paragraph also applies here.) Wait to file a tax return until the child begins to cash the bonds to pay college expenses. A return would then be filed by the child each year, reporting the full amount of interest on redeemed bonds as income. As long as total annual income does not exceed the amount of his personal exemption, no tax will be due.

Under either method the child's Social Security Number must be included in his tax return, as required by IRS.

Keep in mind that Series E Bonds mature in five years. They have an automatic 10-year extension privilege, so that bonds bought in a child's early years would be reaching final maturity by the time he is ready to enter college.

FOR RETIREMENT. Another advantage is in the special tax break you get when buying Series E Bonds to build up a retirement income. This results from the tax deferral feature which permits you to delay reporting the Series E Bond interest. Here are two good ways of realizing this tax break:

Method Number 1. Purchase E Bonds during your working years at a rate fitted to income. After retirement, cash the bonds as needed to supplement income, reporting the interest on the Federal tax return. Income is usually lower in retirement and, with double tax exemption after age 65, taxes are greatly reduced or eliminated entirely.

Method Number 2. Purchase E Bonds during your working years at a rate fitted to income. At retirement, exchange the E Bonds for H Bonds which pay interest semi-annually by Treasury check. The accumulated interest on the E Bonds is applied to the purchase of the H Bonds with the privilege of further deferring tax liability on E Bond interest until the H Bonds are cashed or mature. Thus, the tax money you still owe on the E Bond interest enables you to earn more money in H Bond interest.

For example, if you buy a $100 E Bond (for $75) each month for 15 years, you accumulate $21,397. At that point you exchange the E's for $21,500 in H Bonds (which requires adding $103 in cash to bring the

(Continued on next page)

New vacation policy

SPI 70-301, *Vacation,* has been issued, updating and revising the COMSAT vacation policy. While there are a number of changes in the policy, the following major changes should be highlighted.

The vacation year has been changed to coincide with the Corporate payroll year. The 1976 vacation year ended on December 26, 1976, the last complete pay period in 1976.

Employees voluntarily terminating their employment with COMSAT will have vacation eligibility for the portion of the year completed, as determined by an accrual schedule in the SPI. Under this schedule, an employee accrues 10 percent of his total vacation in each of the first 10 months of a year.

Questions concerning the revised plan may be directed to Lyn Russell on Ext. 6077.

(Continued from preceding page)
amount exchanged up to the next highest $500 multiple). Of this total, $7,897 represents accrued interest which is not taxable at exchange.

From your $21,500 in H Bonds you receive $1,075 in interest the first year, $1,247 each year for the next four years, and $1,400 each year for the last five years. Average monthly income for 10 years would be $109 compared to the original monthly investment of $75 (plus the lump sum payment of $103 at the time of exchange), leaving the $21,500 principal sum intact. Tax on the accumulated E Bond interest would be due, of course, when the H Bonds reach final maturity or are redeemed—but at your lower post-retirement rate.

Film crew at Paumalu

Film Director Bastian Wimmer and Cameraman H. J. Brown shoot a scene inside the Paumalu Earth Station for a new COMSAT film. TT&C Supervisor Eddie Miyatake, standing, scans the INTELSAT IV Console while Senior Technician Tamotsu Iwamoto mans the Antenna Control Console.

CEA Board meets

The 1977 CEA Board of Directors held its first meeting recently at the Plaza Headquarters. Martin Kelinsky (center), newly elected Association President, discusses the year's programs with Board Members, left to right, Michael Blackmon, David Perlmutter, Diane Lusby, Kelinsky, Hank Mueller, Jen Baldwin and Sandy Fox. Board Members Pat Irby and Dede Runfola were not present when the photo was taken.

Labs Closeup: WALTER L. MORGAN

Walter L. Morgan
Senior Staff Scientist

BY SHIRLEY TAYLOR

Walter L. Morgan, resident geosynchronous orbit utilization expert, is a familiar personage around the Labs. Also known as "The Egg Man," every Tuesday and Thursday he can be seen, bright and early, delivering cartons of jumbo eggs to his delighted colleague-customers. Raising chickens (and also cattle) is an interesting sideline for this systems engineer. At COMSAT, however, in his position on the project staff of Louis Pollack, Labs Assistant Director-Technical, Walt manages interlab projects, looking into all facets to see how they relate and fit together. He assists the Labs Director as well in research and coordination of projects, and analyzes what kinds of R&D are needed to prepare for the future.

Walt has an obvious talent for illustration—see Mar/Apr 76 PATHWAYS, cover and lead article "The Geosynchronous Orbit." As part of a Labs public relations effort, he designed and developed a communications satellite slide rule—an ingenious analog device that calculates information needed for equipment service (for example, what power amplifier is needed for a certain communications bandwidth). This device has proven to be very popular with contractors and various manufacturers, as well as professional educators, and is stocked by Labs Records.

Mrs. Taylor is in the Senior Scientist's Office at the Labs.

Presently Walt is investigating how an orbiting "antenna farm" might be built and used in the late 1990's. In addition, he is acting as East Coast Chairman of the 1978 AIAA Communications Satellite Systems Conference.

Walt Morgan was born in New Jersey but his family moved around a lot while he was growing up due to his father's mobility as a chemical consultant. He attended private schools in the Philadelphia area and graduated from Carnegie-Mellon in Pittsburgh with a degree in Electrical Engineering. His interest in electronics developed at an early age in experiments with short wave radio. He was involved in other scientific fields as well; as a senior in high school he won second prize in a National Science Fair for his project on diffraction of sunlight.

After earning his B.S. in 1954, Walt joined RCA's David Sarnoff Research Center in Princeton, N.J., where he was in program management at RCA's Space Center on the TIROS, ESSA and NOASS WEATHER satellite programs. In 1969 he came to COMSAT as a Systems Engineer.

Walt, his wife Emily, and eleven-year-old son Edward, live outside Hyattstown, Maryland, about ten miles from the Labs. Although inexperienced in farming, he is raising cattle and about 100 chickens on his fifteen acres of land. A contractor built his house, but he constructed the barn and two chicken houses himself. His son Edward is in the egg business and has his own customer route, while Walt brings in about 20 dozen eggs a week to the Labs—unless the weather gets very cold, and the poor hens shiver instead of laying eggs!

In his "spare" time, Walt serves as Secretary/Treasurer of the Urbana Lions Club, and is engaged in writing a handbook on satellite communications. His wife Emily, an accomplished musician who is organist and associate music director at the local Methodist Church, is also very adept at needlepoint. Walt designed a 3-1/2 x 4-foot wall hanging of the INTELSAT I-IV global system, which his wife spent two years working in bright-colored wool. The finished product is a showpiece, and hangs in Walt's office.

It is hard to believe he would leave his 15-acre farm, but Walt says his future plans are to retire and farm on his property in the Virgin Islands.

Morgan displays communications satellite slide rule he designed.

Network Bits

Field Correspondents

Andover
Joanne Witas

Brewster
Dorothy Buckingham

Cayey
John Gonzalez

COMSAT General (Plaza)
Jen Baldwin

Etam
Bev Conner

Fucino
Sandy Tull

Jamesburg
C.B. Marshall

Labs
Norma Broughman
Joan Prince
Blaine Shatzer

M & S Center
Darleen Jones

New York
Stephen Keller

Paumalu
Bob Kumasaka

Plaza
Glora Lipfert

Santa Paula
Pat Hogan

Southbury
Eileen Jacobsen

ANDOVER. **Paul DeShong**, Senior Technician, has accepted a transfer to the Jamesburg Earth Station. Our local schools are doing great in basketball competition with the Dixfield girls' team winning the State Class C Championship. The Mexico boys' team made it to the semi-finals in Class B. The Rumford Panthers won their second straight Western Maine Class A title, making their fourth in the past five years, then went on to win the state championship defeating Stearns High School to become New England champs, boasting a record of 47 straight wins.

Jack Conner, Senior Technician, has been accumulating trophies for shooting since joining the Rumford Pistol and Rifle Club last October. Jack's expertise is with the .22 caliber pistol. The Rumford Club's four-man team, of which Jack is a member, recently won the State Team Championship, competing against teams from the U.S. Navy, State Police, National Guard and Border Patrol.

Lynn Lepage, daughter of **Chuck** and **Joan Lepage,** a sophomore at Rumford High School, continues to gather awards in gymnastics, winning first place on the uneven bar, third place on beam, fifth place on floor and third in the all-around 1977 state gymnastic championships.

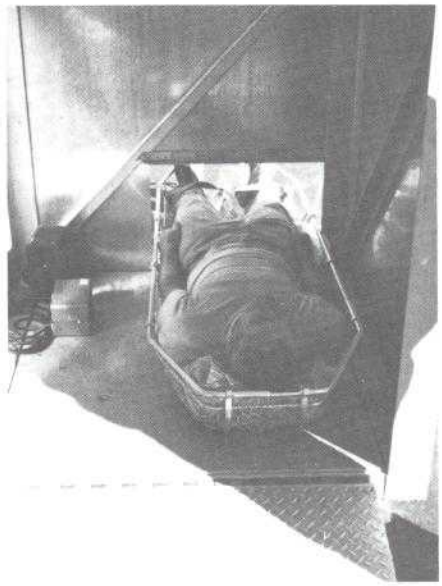
Although spring is always welcome, sometimes its arrival brings problems. With unusually warm weather, snow is melting fast, resulting in waterways overflowing and causing minor flooding in some low areas. **—Joanne Witas**

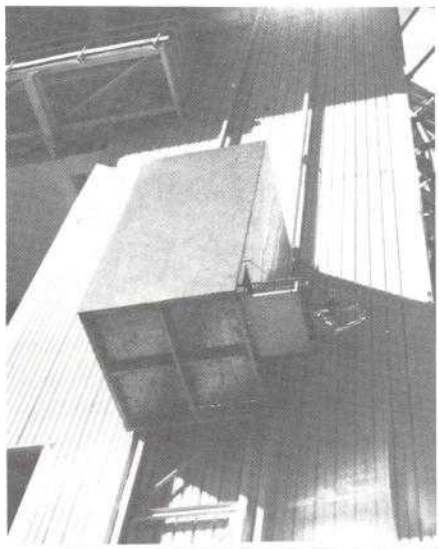
JAMESBURG. Because of the remoteness of its location and the possibility for the need for medical services there—for example, a staff member could have an accident or suffer a heart seizure after climbing the more than 100 steps in making the ascent—an alternate First Aid Station has been established in the EER (Elevated Equipment Room). The aid station contains orally-inflated plastic pressure splints, blankets, a first aid cabinet and a Stokes stretcher.

The Facilities Team, headed by **Walter Robinson** and including **Roy Scheiter** and **Jim Vinneau** (formerly at Jamesburg), resolved the problem of lowering an injured or ill person from the EER to the ground level in event of an emergency by modifying the antenna hoist.

The configuration of the antenna stairwell is such that it is impossible to carry a patient in a stretcher by way of the stairwell. The Team modified the antenna hoist by installing a door in its side to accommodate the Stokes stretcher. Although the hoist is used exclusively to transport equipment it could be pressed into service in the event of an emergency.

In the sequence of photos that follows, an emergency is simulated. From top to bottom: stretcher and patient are placed inside the grounded hoist, the hoist is lowered from the ERR, the hoist with patient reaches ground level.





Loren Asmus left COMSAT to join Radionics, Inc. AT&T's Supervisor **Les Phelps** has moved to Sacramento and been replaced by **Terry Kirby. Bobbie Keen** and **Jon Martin** have been reassigned to San Francisco.

—C.B. Marshall

ETAM. A few of our employees decided to escape the harsh winter and spend some time in warmer climates. **Bill** and **Betty Bell** went south for three weeks to Florida as did **Roger** and **Pearl Parsons** and their daughter and **Don Gaston** who joined his family already vacationing in the "Sunshine State." **Andy** and **Mary Thomson** spent a week in Texarkana, Texas, then went on to Arkansas to visit retired Operations Supervisor **Bob Leard** and wife **Doris**.

Congratulations to **John** and **Barbara Banister** on the recent adoption of a daughter, **Rebecca**, age five and Korean born. The Banisters have three other children, **John**, **David** and **Raimona**. A few of our staff have spent some time in the hospital recently. Among these were both **Bill** and **Betty Bell** and **Rupe Hobbs.**

Looks like a fine fishing season ahead. The Department of Natural Resources has been busy stocking the streams with trout. **—Bev Conner**

LABS. New LABS employees and departments joined include: **Kenneth Anders**, Facility Services; **Kevin Hodson,** INTELSAT Asignee; **Terry Burns,** Shipping and Receiving; **Duane Johnson**, Model Shop; and **Louis Pryor**, Microwave Lab. While bidding welcome to our new members we also bid farewell to INTELSAT asignees **Y. Tsuji, M. Sugiyama** and **T. Inoue,** who have returned to Japan, and to **J. Mass** who has returned to Israel.

Dr. Edelson has been busy recently presenting awards: 10-year awards went to **Dave Collins**, **Cal Cotner**, **Hank Mueller** and **Lou Pollack**; 5-year awards went to **Mike Barrett**, **Allen Gatfield**, **Bill Holloway**, **Buck Jones**, **Don Lee** and **Roger Taur**; and Patent Incentive Awards were received by **F. Assal**, **A. Atia**, **W. Baker**, **A. Berman**, **W. Billerbeck**, **O. Horna**, **N. Jacobus**, **J. Jankowski**, **C. Mahle**, **K. Stuart**, **V. Uzunoglu**, **K. Virupsksha** and **A. Williams**.

John Sickel is home from the hospital recovering from a back operation. **Cris Inman** spent five days in Bermuda enjoying the warm weather and sunshine. **Paul Fleming** is sporting a beautiful tan on his return from a cruise. **Don Fietkiewicz** is giving special delivery on oranges from Santa Paula. A farewell luncheon was held at the Comus Inn for **Doug Kitchener**. **Joan** and **Bruce Merrihew** were married February 14.

Norma Broughman, **Esther Disney** and **Marvin Ginsberg** are organizing a cruise scheduled for April 1978 for COMSAT employees. For further details, contact any one of the three. **Bill Fallon** has been seen jogging around the Labs. Our bowlers are keeping active: **Marianne Merrihew** rolled a fantastic 223 and **Julie Wallick** came close with a 198 game. Unfortunately, **Marianne** is now out of commission with a sprained ankle.

Seaman **Kenneth A. Miller**, son of **Shirley Taylor,** recently completed Signalman training in Orlando, Florida, and is assigned to duty aboard the nuclear destroyer *USS Stoddard*. His home port will be Pearl Harbor, Hawaii.

Social activities have been numerous recently: a dinner party was held for departing INTELSAT assignee **Tsuji** at which he was presented with a briefcase and plaque; celebrations were held for **Dan Schaefer** on his first anniversary with COMSAT and in recognition of his status as an expectant father, and for **Gundars Osvalds** on his promotion to Technical Specialist.

As always, the Labs stays active in sports. Its basketball team won the Gaithersburg A League Championship under the guidance of **George Meadows**. The team had tied for first place in the regular season, then went on to win the tie-breaker. The trophy rests in the cafeteria display case. In addition to producing a championship team of their own, the Labs basketball enthusiasts also provide coaching staffs for many of the local, competition-winning, youth clubs. Among those included on these staffs are **Buck Jones**, **Bob Cool**, **Paul Schrantz**, **Blaine Shatzer**, **Pete Carlton**, **Gordon Bush** and **Rocky Lee.**

Incidentally, anyone interested in tryouts and practice schedules for the county softball team should contact **Hank Mueller.** **—B.P.S.**

M & S Center. Taking to the highways during the long, cold winter were **Pierce** and **Ann Stine.** They escaped part of the wintry weather by loading up their motor home and heading for Florida for a week in the sun. **Jim Vienneau,** his wife and two sons, recently arrived from California, have moved into their new home in Clarksburg.

Regret the brevity of this issue's column, however, your M & S correspondent had an engagement for some surgery in the hospital during March.

—Darleen Jones

PAUMALU. The Operations Room at the Station resembled a Hollywood movie studio during the recent on-location filming for a new 14-minute motion picture being produced by the COMSAT Office of Public Information. A film crew, accompanied by Information Officer **J. T. McKenna,** spent three days filming the major activities of the station. Paumalu was selected as the Pacific Region Station for the film to be used in a variety of COMSAT programs.

Station staff members participating and assisting in the production were **Stanley Holt** (selected to depict the typical earth station engineer), **Eddie Miyatake, Ken Yamashita, Charlie Ogata, Paul Koike, Tamotsu Iwamoto, Norman Murakami, William Osborn, Norman Kato, Paul Motoyama, Leonard Nagashima, Les Goya** and **Yoshiaki Daikoku.**

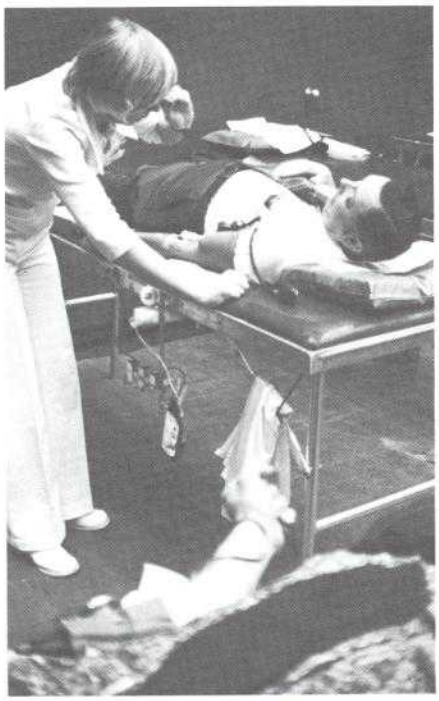
—Bob Kumasaka

PLAZA. After three years at the Labs and six at the Plaza, **Pat Irby** has left Comsat to join SBS. Pat says she will miss her friends and activities at COMSAT, but we should point out that she will also be missed by her many friends at the Plaza and the Labs and our employee functions will miss the enthusiastic support Pat was always willing to give. One advantage of her move to her new office at Tyson's Corner is that she will be but five minutes drive from her new home.

Frank Graves of the Satellite Orbital Control and Monitoring Department, and wife **Becky** have a new daughter, **Kerrie Renée**, born February 25. **Mike Kelly** of the Communications Transmission Engineering staff was seen recently escorting his attractive wife **Joan** and three-month-old son **Brian Joseph** around headquarters. Mike first worked for COMSAT as a co-op four years ago. One of his present tasks is the semi-monthly presentation of the INTELSAT Systems Status Briefing.

—Gloria Lipfert

Blood drive



COMSAT's William B. Carroll donates blood during the annual Red Cross Blood Drive conducted here recently. Corporate employees responded as in previous years in numbers sufficient to meet the Corporate goal.

SOUTHBURY. Congratulations to **Denis Bouchard** and **Richard Vasko** (Technicians), and **Constance Sarles** and **Dolores Raneri** (Communications Operators) on their first year of service at the station. With ice and snow disappearing the jogging enthusiasts are out, joined this year by **Constance.**

The Southbury Volunteer Firemen's Association members visited the station recently and were given a tour by Station Manager **Dave Durand. Jim Nelson,** Facilities Engineer, a fireman/engineer with the Association, arranged for the visit. A beautiful bouquet of spring flowers was received by the MARISAT operators on Valentine's Day, sent by Radio Officers Eric and Paul from the Cable Ship Mercury.

Rose Marie Eureka, MARISAT Operator, is a major contributor to the camaraderie that exists here at Southbury. Her thoughtfulness in baking surprise birthday cakes and cookies for employees is appreciated.

—Eileen Jacobsen

May 15 deadline for 1977 graduates

As in previous years, PATHWAYS will again carry a listing with pictures of the 1977 high school and college graduates, the sons and daughters of COMSAT, COMSAT GENERAL and INTELSAT employees. Since the graduates will be included in the May-June issue, it will be necessary that material and photos be submitted to The Editor, PATHWAYS, **no later than May 15.**

Photographs may be graduation pictures or, in the absence of such, head and shoulder shots. Photos can be either black and white or in color. Accompanying material will be limited to the full name of the graduating student, names of parents (Mr. and Mrs. John J. Smith) or parent, working location of parent (Headquarters, Labs, Jamesburg, etc.), name and location of school, and, for college graduates, the degree earned.

All such material should be on a separate sheet of paper—**do not write on the back of the photo and do not attach the paper to the photo with a paper clip.** Both methods frequently leave marks which are invisible to the eye but result in glaring flaws when the picture is "reshot" frequently making the photo unusable.

As a rule photographs are returned to the magazine by the printer following publication and may be picked up at the PATHWAYS office. However, the possibility of photos being misplaced or damaged in the process does exist. Photos considered irreplaceable should not be submitted.

Junior Achievement

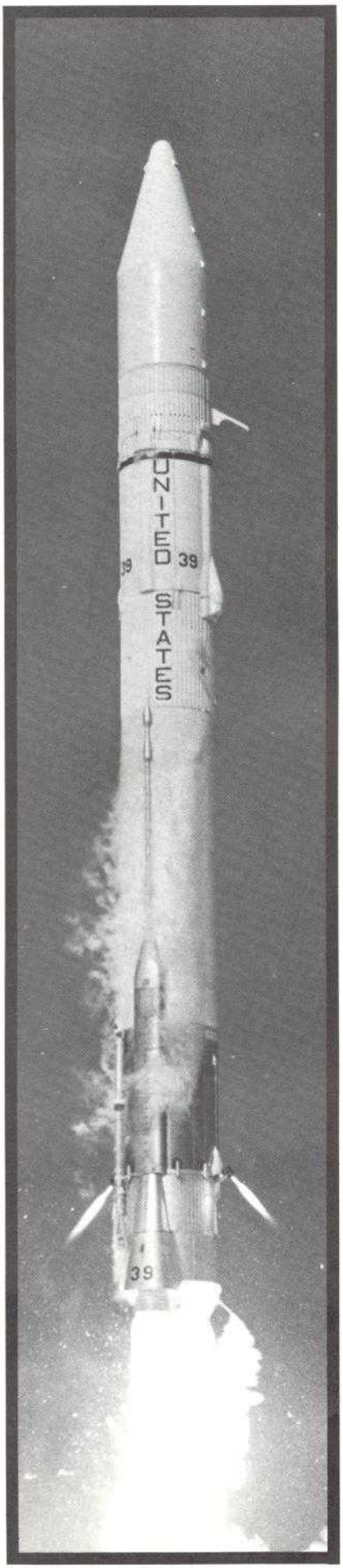
Where young people learn the business of business

Production of auto trouble lites by United Productions

In this issue of PATHWAYS (see Page 14), COMSAT pays tribute to the 31 area high school students who are now closing the books on Starlite Enterprises and United Productions, the two Junior Achievement companies they started under COMSAT's sponsorship last October for the school year. When the annual reports are completed, these young "business-people" will know whether they receive full wages as employees, or a dividend on their dollar-a-share investments in their companies. Whatever the outcome, we hope they have profited from this learning experience as much as we have from working with them.

COMSAT

COMMUNICATIONS SATELLITE CORPORATION



SATELLITE Pathways

May-June 1977

Volume 2 Number 3

Launch of the INTELSAT IV-A
May 26, 1977

COMSAT COMMUNICATIONS SATELLITE CORPORATION
COMSAT GENERAL CORPORATION

SATELLITE Pathways

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Cover. *Launch of the third in the series of INTELSAT IV-A satellites at 5:47 p.m. EDT, Thursday, May 26, 1977, from Cape Canaveral, Florida.*

Shareholders told COMSAT achievements establish foundations for future growth

Through a well-conceived R&D program we aim to maintain our preeminent position in satellite communications. In such a posture we can look forward with confidence to the challenges and opportunities that lie ahead.

COMSAT President Charyk

Following is the text of the remarks of COMSAT President Joseph V. Charyk at the 1977 Annual Shareholders Meeting held May 10 in Washington, D.C.

The past year has been one of considerable achievement for the Corporation and one in which we reached noteworthy milestones. The INTELSAT system has been expanded further, our services through the system have increased and the COMSTAR and MARISAT systems are firmly in place and providing service satisfactorily.

The number of INTELSAT half-circuits we leased to our customers, the United States international carriers, increased 16 percent in 1976. However, total use of the global system rose about 23 percent during the year. This reflects rapidly increasing usage of the system for telecommunications traffic not originating or terminating in the United States. As a consequence, COMSAT's percentage of the total INTELSAT investment has been diminishing. We expect that the use of the system as a whole will continue to grow substantially as the demand for high quality international communications services escalates.

COMSAT will, of course, benefit from this rising demand as the United States participant in INTELSAT. However, the extent to which new traffic between the United States and other countries will be carried through the system depends largely on decisions of the FCC relating to the distribution of traffic between undersea cables and the satellite system. **We regret recent FCC decisions authorizing what we consider to be excessive projected use by our carrier customers, over the next couple of years, of undersea cables in the Atlantic Ocean region.** The carriers naturally favor using cables because they have substantial ownership interests in them and, therefore, can include the cable investment in their rate base and earn a return on it. We are taking every opportunity to urge the FCC to assure that an equitable share of new traffic will be carried by the satellites, and we remain hopeful that the FCC will be forthcoming in this respect. In addition, we hope that public interest considerations will be carefully weighed by the FCC before new cables are authorized in a situation where satellite facilities are available. *(Continued on page 2)*

I am highly optimistic about the future of the business. We are in a strong financial position and have the resources, the capability and the will to seize upon new opportunities as they arise.

Chairman of the Board McConnell

Following is the text of the remarks of COMSAT Chairman Joseph H. McConnell at the 1977 Annual Shareholders Meeting held May 10 in Washington, D.C.

In 1976 we had a 16 percent increase in the number of half-circuits leased to our customers through the INTELSAT system. By year-end, this put us well over the 4,000 mark in the number of half-circuits leased by us on a full-time basis. We also began providing maritime satellite services through the MARISAT system in the Atlantic, Pacific and Indian Ocean regions. In addition, we placed in service two of the three COMSTAR satellites whose capacity is being leased to AT&T for domestic communications. And early in 1977, the FCC gave its approval to the domestic satellite system proposed by Satellite Business Systems—SBS—the partnership formed by COMSAT GENERAL, IBM and Aetna Life & Casualty.

(Continued on page 2)

President Charyk, seated, and Chairman of the Board McConnell confer prior to opening of Shareholders Meeting.

CHARYK

(Continued from page 1)

INTELSAT is placing in service new INTELSAT IV-A satellites, each with a communications capacity of 6,000 circuits plus two television channels. Two of them have already been launched and are providing service in the Atlantic Ocean region. (EDITOR'S NOTE. *Another* INTELSAT IV-A *satellite was launched May 26, 1977, to serve as a second Major Path satellite in the Atlantic Ocean region. Two additional* IV-A *satellites are scheduled for launch in 1977, one in the fall to serve as the Primary Path satellite in the Indian Ocean region and one toward the end of the year to serve as a standby satellite in the Indian Ocean region.)*

The expansion of global system earth station facilities in 1976 was the largest ever. There are now 174 antennas at 140 earth station sites around the globe. Over 500 satellite pathways link these stations with direct lines of communication, an increase of 85 pathways during the year. Through the U.S. earth stations, COMSAT, by the end of 1976, was putting the U.S. in communication with 92 other countries, seven more than a year earlier.

During the year, INTELSAT laid the groundwork for future expansion by awarding a contract to Ford Aerospace & Communications Corporation for the construction of seven INTELSAT V satellites, each able to handle 12,000 circuits plus two television channels—about double the capacity of an INTELSAT IV-A. These new satellites will bring a number of technological innovations to the global system of the 1980's. The INTELSAT Vs will have transmission capability at both currently used and higher microwave frequencies. They will employ advanced techniques to enable signals to use the same frequency bands simultaneously. And they will generate more power through an array of solar cells arranged along large, flat, sun-oriented surfaces.

Also, in accordance with the definitive international agreements, INTELSAT is transforming its organizational structure to pave the way for implementation of permanent management arrangements. On December 31 of last year, Mr. Santiago Astrain became INTELSAT's first Director General. As chief executive, the Director General is responsible to the INTELSAT Board of Governors for all management functions, including work performed by COMSAT under its current Management Services Contract which will be in effect through February 11, 1979. For certain technical services beyond that date, new contracts will be awarded. We hope that INTELSAT will choose to continue to draw upon COMSAT's managerial experience and technical expertise in order to maintain the stable and efficient operation of the INTELSAT system.

(Continued on page 3)

McCONNELL

(Continued from page 1)

With the growth of our INTELSAT services and the initiation of MARISAT and COMSTAR services, our gross operating revenues reached a record high of $183.8 million in 1976—$41.2 million more than in 1975.

This would have produced record high earnings in 1976. But we were required to place about $30 million of revenues for the last half of the year in escrow pending the outcome of our court appeal from the FCC's rate decision of December 1975.

Chairman McConnell (left) and Corporate Secretary Robert B. Schwartz enter the meeting area at Washington's Capital Hilton Hotel.

As a result of the escrow requirement, our after-tax earnings for 1976 were reduced by $1.52 per share to $3.83. For 1975, our earnings were $4.62 per share.

Our operating results for the First Quarter of this year were similarly affected by the escrow requirement. First Quarter earnings totaled 89 cents per share. Although this was a slight improvement over the 88 cents earned in the last quarter of 1976, First Quarter earnings were 21 cents below those in the first quarter a year ago. To meet the escrow requirement, we had to deduct almost $14.5 million from revenues for the First Quarter, amounting to 73 cents per share after taxes. Fortunately, the impact of the escrow requirement on First Quarter results was softened somewhat by COMSAT GENERAL's operations. COMSAT GENERAL contributed about 16 cents

(Continued on page 3)

CHARYK

(Continued from page 2)

Apart from these global system developments, 1976 was also important to us because it marked the initiation of service by COMSAT General through the MARISAT and COMSTAR programs. In developing MARISAT, COMSAT GENERAL has taken the lead in introducing the world's first reliable maritime communications system. All three MARISAT satellites were launched during the year, establishing three-ocean coverage. All of them are supplying service to the Navy, and those over the Atlantic and Pacific Oceans are also providing commercial service to the maritime and offshore industries.

Under a new agreement reached during the year, the Navy is committed to purchase service through the Atlantic and Pacific satellites at least until the second quarter of 1979, at an annual rate of $11.63 million per satellite. Through the Indian Ocean satellite, the Navy currently is committed to purchase service through the first half of 1979, at an annual rate of $6.5 million. COMSAT GENERAL is receiving about 86.3 percent of these revenues, in accordance with its ownership interest in the MARISAT system.

Initially, the Indian Ocean satellite is being used only for service to the Navy because there is currently no earth station equipped for commercial MARISAT service in the Indian Ocean region. Recently, however, certain countries have expressed interest in constructing earth station facilities for commercial service through this satellite, and we are pursuing the possibility.

Our own efforts to develop a commercial market for maritime satellite services in the Atlantic and Pacific regions have started to show results. Through its worldwide network of agents, COMSAT GENERAL has already equipped more than 40 commercial ships and offshore drilling facilities with its mobile terminals. They include oil tankers, container ships, drilling vessels, non-passenger ships, as well as two large passenger ships: the *Queen Elizabeth 2* and the *Royal Viking Sea*.

COMSAT GENERAL charges $6.00 per minute for MARISAT telex service and $10.00 per minute for telephone service. To accommodate demand, power in the MARISAT satellites was reallocated recently to gain a five-fold boost in available telephone capacity.

It is estimated that investment in the MARISAT program under the joint venture arrangement will total about $107 million, of which COMSAT GENERAL's share will be about $92 million. Independently, COMSAT GENERAL is investing additional amounts totaling about $11 million, principally for the procurement of terminals to equip commercial vessels and offshore facilities for service.

(Continued on page 4)

U.S. Intelsat Division's Richard R. Colino, standing, talks with Board Members George Meany, left, and Melvin R. Laird.

McCONNELL

(Continued from page 2)

to First Quarter earnings, principally as a result of earnings from COMSTAR service to AT&T.

We are now placing about $5 million per month in escrow pending the outcome of our court appeal from the rate decision.

The case was argued before the Court on January 27, and we are awaiting a decision. We, of course, cannot predict when or how the Court will decide the matter. Aside from the disposition of the funds that will have been accumulated in escrow, the outcome of the appeal will determine whether or not we will be permitted to recover the earnings deficiencies of our start-up years of operations and to earn what we consider to be a reasonable rate of return on our overall investment in the INTELSAT system. In our opinion, the FCC's decision was manifestly unfair to the shareholders in both of these respects, and we hope that the Court will recognize the merits of our position.

Now I would like to comment briefly on a question which is of special interest to the shareholders—the question of dividends. We have proceeded cautiously because we have had a number of uncertainties.

For example, our MARISAT and COMSTAR operations began only last year and until the satellites were up and working, we could not be sure of the operational success of these projects. And the question of our rates for international service has been unresolved for several years—and is still unresolved, as I have just noted. Our COMSTAR and MARISAT programs are now well underway, and a court decision on the rate question is likely to be issued

(Continued on page 5)

CHARYK

(Continued from page 3)

COMSAT General is actively exploring alternatives for the next generation of satellites to provide MARISAT service. Its success in these efforts will depend, among other things, upon working out satisfactory arrangements with governmental agencies, as well as with other U.S. companies and perhaps foreign interests.

It is expected that maritime satellite services ultimately will be provided through an international system to be known as INMARSAT. Agreements for INMARSAT were negotiated over the past several years, but our government has not yet made the decisions that would determine which entity or entities will participate in the INMARSAT system on behalf of the U.S. and the terms upon which participation will be possible.

With respect to COMSAT GENERAL's other major program—the provision of satellite capacity for U.S. domestic communications—two COMSTAR satellites were placed in service in 1976. COMSAT GENERAL is receiving from its customer, AT&T, about $1.3 million a month per satellite. A third COMSTAR satellite is scheduled for launch in April of next year.

COMSAT GENERAL's total investment in the program is estimated to be about $194 million. We now estimate that revenues and receipts will total about $337 million if each of the three satellites performs satisfactorily throughout its projected seven-year service life.

With the growth of our services through the global system and the operational success of our MARISAT and COMSTAR efforts, we have established a strong foundation for growth in the years ahead and can look forward to future achievements.

We are actively exploring new uses for communications satellite technology. Next month, in fact, COMSAT GENERAL will begin participating with the U.S. Geological Survey and Telesat Canada in a program to evaluate the use of satellites for the collection of water resource data from remote geographical regions.

A principal goal of this pilot program is to test the economic feasibility of using satellites in the identification and monitoring of earth resources. This project is a simple example of the use of satellites for the collection, processing and distribution of information—a field we believe has significant future potential.

Communications satellite technology has matured dramatically over the past decade. The communications capacity of the earlier INTELSAT satellites was limited primarily by the prime power available to drive the onboard amplifying and transmitting equipment. This, in turn, restricted the potential revenue-generating capabilities of those satellites.

Technical advances, many developed by COMSAT Laboratories, have made it possible to overcome power limitations and, within the frequency bandwidths allocated for satellites, to achieve capacities like the 12,000 circuits on each of the forthcoming INTELSAT Vs. Moreover, through techniques now under development communications capacity will be increased to at least 30,000 circuits in the next generation of satellites.

Starting with the INTELSAT IV series, the satellites have been configured so that narrow beams are focused on geographical regions where communications capacity is needed most. The INTELSAT V satellites will not only employ beams at the four- and six-gigahertz frequency bands now shared by satellite and terrestrial microwave systems, but also at 14- and 11-gigahertz which, along with other higher frequency bands, will be coming into use in advanced satellite systems. The spatial separation of beams, a technique already used in the INTELSAT IV-A series, permits the same frequencies to be used in both beams—thus doubling the capacity. This effect is also being achieved in the COMSTAR satellites where signals within the same beam are separated from each other through another new technique known as dual polarization. In the INTELSAT VS we will use both the separation of beams and dual polarization techniques.

All of these advances are based on careful exploratory research and development programs carried out by our Laboratories. These activities include work on multiple beam formation, simultaneous use of the same frequency bands through dual polarization, the effect of precipitation on the transmission and reception of signals in the higher frequency ranges, more precise satellite stabilization, more efficient solar power generation and energy storage, and high-speed onboard switching to route the flow of traffic efficiently among satellite beams. Also under active development are modulation and signal processing techniques which will lead to more efficient use of the available frequencies.

Progress in multibeam technology is producing changes on the ground too. As stronger signals are provided, much smaller earth stations can be used, an important advantage especially in future domestic systems.

The communications satellite industry is evolving swiftly, and rapid changes in technology are required from one generation of satellites to the next. An effective research and development effort is an essential part of continued progress and success in this field.

Through such a well-conceived program, we aim to maintain our preeminent position in satellite communications. In such a posture we can look forward with confidence to the challenges and opportunities that lie ahead.

(Continued from page 3)

sometime during the year. Thus, before long we should be in a better position to determine the appropriate level of dividends at this juncture in the company's development, and you can be sure that your directors will take a close look at the matter from the standpoint of both the business and the shareholders' investment.

Dr. Charyk will review the status of our current programs and the groundwork that is being laid for the further development and extension of our services. But before concluding my remarks, I wish to comment on two of our projects that have been pending for quite a while, and to give you my general view of our future prospects.

For several years, COMSAT General has been engaged with the Canadian government and the European Space Agency in planning the space segment for a program to test and evaluate the use of satellites for communications with aircraft flying heavily-traveled transoceanic routes.

Under the arrangements for this AEROSAT system, COMSAT GENERAL's share of the satellite capacity would be used by the Federal Aviation Administration. Congressional action is required before the FAA can make payments to COMSAT GENERAL for use of the AEROSAT capacity. Recently the House of Representatives adopted an FAA research and development bill which limited funds for the AEROSAT program to $1 million for a "feasibility study" of the program. In view of this limited action by the House, it is uncertain whether the program will go forward —at least in its currently proposed form. **We think there is a growing need for an aeronautical satellite capability. The Congressional process is not yet complete, and we hope that something can be done to salvage the program.**

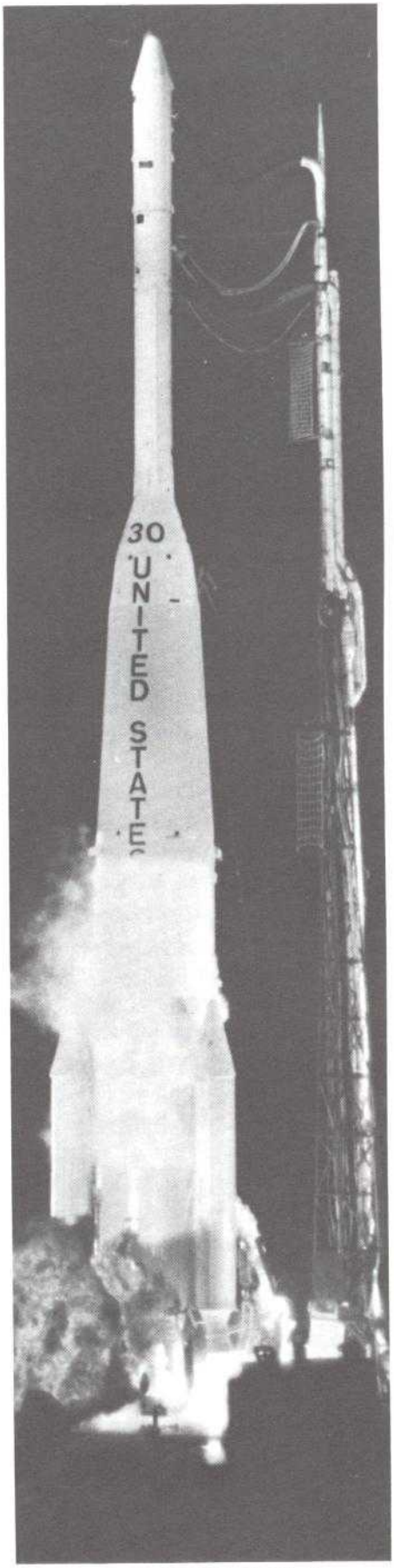
While I am on the subject of matters pending in the Congress, I should note that a House of Representatives Subcommittee on Communications is considering various communications issues in connection with a possible rewriting of existing legislation in the communications field. The issues include international telecommunications policies and facilities. We have provided our initial testimony before the Subcommittee, and we are cooperating in every way we can. Since it is anticipated that the study will go on for a couple of years, it is too early to ascertain the nature of the legislative proposals that will emerge. But in the meantime we are following the study very closely.

Now, as I mentioned earlier in my remarks, the FCC has approved the proposed SBS domestic satellite system. By far, the SBS system will be the most ambitious application of advanced satellite technology. It will be designed especially to meet the needs of customers whose communications requirements involve many locations throughout the country. The SBS system will tie the numerous installations of these customers together in a sophisticated network providing all forms of communications including voice, data and image transmissions. The SBS system will involve an investment of several hundred million dollars, which will be supplied in part by the partners and in part through outside financing.

COMSAT President Charyk greets shareholder.

Although some parties are seeking judicial review of the FCC's approval of the SBS system, preparations for the system are moving forward and we are optimistic that the FCC's action will be sustained. The SBS staff, now located in new headquarters in McLean, Virginia, is putting the final touches on the system design. We anticipate that satellites will be launched in the latter part of 1980, and that commercial operations will begin early in 1981. **With the technical and financial strength which SBS will have and with the cooperation of such distinguished partners as IBM and Aetna, we have every hope and belief that SBS will become a substantial and profitable entity in the communications industry.**

As I look back and consider how far we have come in extending our services and developing the technology, I am highly optimistic about the future of the business. We are actively exploring promising new applications of the satellite technology and related business opportunities. We are in a strong financial position and have the resources, the capability and the will to seize upon new opportunities as they arise.



Launch of Early Bird.

Welch and Killion retire, become Directors Emeriti

The retirement of Leo D. Welch and George L. Killion from COMSAT's Board of Directors serves as a reminder of a historic event they helped make possible and the contributions they made to the success of COMSAT which followed.

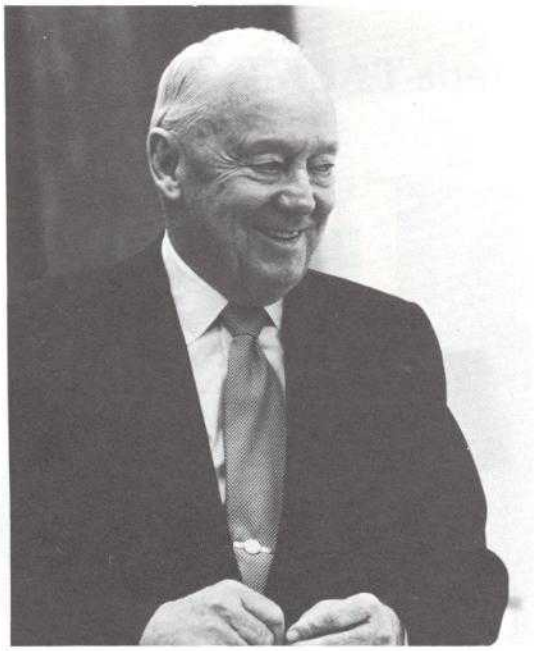
It is Tuesday evening, April 6, 1965. The auditorium of COMSAT's Headquarters at 19th and L Streets in downtown Washington, D.C., is filled with government and telecommunications dignitaries. All eyes are focused on the closed-circuit TV monitors. Whatever conversation there is goes on in hushed tones.

At 6:48 p.m., EST, EARLY BIRD, the first of the commercial communications satellites, soars into space from Cape Kennedy. Silence rules the group until it is announced that the satellite has successfully reached its transfer orbit. The tension is broken by the enthusiastic applause of those watching the launch.

In the gathering are Vice President of the United States Hubert Humphrey, Minnesota Senator Walter Mondale, now Vice President of the United States, and three men who were to provide guidance and momentum to the use of satellites for instant global communications—incorporators and original Members of the COMSAT Board of Directors, Leo D. Welch, George L. Killion and Dr. Joseph V. Charyk.

Nominated by President John F. Kennedy as incorporators, and later elected to the Board of Directors,

Hubert H. Humphrey, then Vice President of The United States, and Walter F. Mondale, now Vice President, right, applaud the successful April 6, 1965, launch of the Early Bird satellite as Dr. Charyk and Mr. Welch, left, look on.



George L. Killion

Leo D. Welch

Messrs. Welch and Killion leave the COMSAT Board after nearly 15 years of dedicated and energetic service to a unique communications venture.

Mr. Welch, first Chairman and Chief Executive Officer of COMSAT, and Dr. Charyk, first President of COMSAT, were elected to their respective positions by COMSAT's first Board of Directors early in March 1963.

Until he was succeeded by James McCormack in December 1965, Mr. Welch guided COMSAT through its most critical years. There was much to be done and little time to do it, but the succession of achievements during his three-year direction of COMSAT was remarkable.

Within a year, the decision had been made to use synchronous satellites rather than the low-orbiting satellites favored by many at that time.

The new corporation needed start-up capital and that was obtained through lines of credit provided by a number of banks. The initial financing was then followed in June 1964 by a successful offering of 10 million shares of COMSAT stock at $20 a share, which gave the Corporation a capitalization of nearly $200 million.

The search for countries interested in participating in the development of a single global commercial communications satellite system was also fruitful, and the International Telecommunications Satellite Consortium (INTELSAT) came into being in August 1964 when 11 countries signed a pair of interim agreements to establish the global system.

Finally, EARLY BIRD was launched successfully in April 1965 and entered commercial service in the Atlantic Ocean region in June.

COMSAT and INTELSAT were now "off the ground," and Mr. Welch embarked on his second retirement in December 1965 when he relinquished his post as Chairman and Chief Executive Officer, but still remained as a Director of COMSAT.

Mr. Welch came out of retirement from Standard Oil Company (New Jersey) to join COMSAT. At the time of his retirement he was Chairman of the Standard Oil Board of Directors and Vice Chairman of the Executive Committee. He had come to Standard Oil as Treasurer in 1944, after 25 years of experience in international trade and finance. He was elected a director of the company in May 1953, and was named a vice president and member of the Executive Committee in April 1958. He became Chairman of the Board and Vice Chairman of the Executive Committee in May 1960.

George L. Killion, having served as one of the original COMSAT incorporators, was appointed to the Board of Directors by President Kennedy in February 1963 and has served as a director continuously since that appointment.

Mr. Killion is a former U.S. Ambassador to the United Nations and has held numerous executive positions in business and government. He served as a director of many corporations, including Metro-Goldwyn-Mayer, Inc., and Nytron, Inc., both of which he also served as Chairman of the Board, and American President Lines, Ltd. (a steamship company) of which he was President from 1947 until 1966.

His other past positions include Director of Finance for the State of California, Assistant to the Petroleum Administrator during World War II, a member of the President's Committee to study the Federal salary program and a member of the White House Fellows Commission.

Even as they retire from COMSAT's Board, Leo Welch and George Killion do not "leave" COMSAT for they will continue their association with the Corporation as directors emeriti.

The 14th Annual Meeting of Shareholders

Registering .

Asking questions.

Gathering material.

Viewing exhibit.

Awaiting the vote.

Young shareholders.

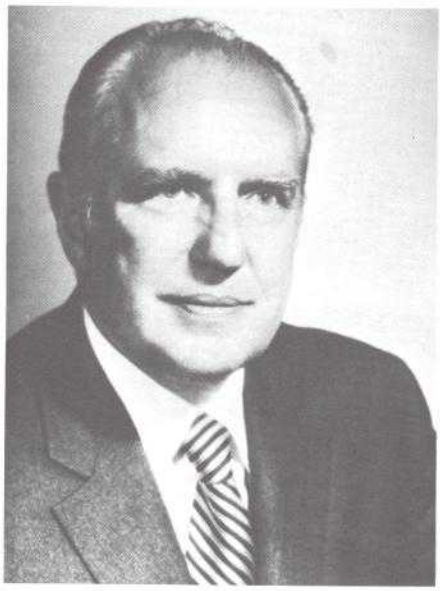
Chatting with executives.

COMSAT shareholders elect directors

COMSAT shareholders elected 12 directors at their recent 14th Annual Meeting. The elected directors are: Joseph V. Charyk (President of COMSAT), Gordon Edwards, William W. Hagerty, John D. Harper, John A. Johnson, Melvin R. Laird, Joseph H. McConnell (Chairman of the COMSAT Board of Directors), Howard J. Morgens, Rudolph A. Peterson, Charles J. Pilliod, Jr., Bruce G. Sundlun, and William L. Zimmer III.

Ten of the directors were reelected by the shareholders. The two new directors are Mr. Morgens, who is Chairman Emeritus and a director of The Procter & Gamble Company, and Mr. Pilliod, who is Chairman of the Board and Chief Executive Officer of The Goodyear Tire & Rubber Company. They replace George L. Killion and Leo D. Welch who retired from the board after nearly 15 years of service. Both of them were incorporators of COMSAT and Mr. Welch was its first Chairman and Chief Executive Officer.

Shareholders also reappointed the firm of Haskins & Sells to serve as the Corporation's independent public accountants for 1977, and rejected a shareholder's proposal for the provision of information concerning previous government service, if any, of certain persons serving the Corporation.



HOWARD J. MORGENS was elected to a first term as a COMSAT Director. He is Chairman Emeritus and a director of the Procter & Gamble Company, a manufacturer of household and industrial products. He was Chairman of the Executive Committee of that company from 1974 until early 1977, and was its Chief Executive Officer from 1957 until 1974. He is also a director of General Motors Corporation, J. P. Morgan & Co., Inc., Morgan Guaranty Trust Company of New York and Owens-Corning Fiberglas Corporation, and a member of the Business Roundtable and the Business Council.

CHARLES J. PILLIOD, JR., was elected to a first term as a COMSAT Director. He is Chairman of the Board and Chief Executive Officer of the Goodyear Tire & Rubber Company, a company engaged principally in the development, production and distribution of tires and other transportation-related products. He was President of that company from 1972 until 1974. Previously he had served as President of Goodyear International Corporation, a Goodyear subsidiary, and as Executive Vice President of the parent company. He is also a director of CPC International Inc., Manufacturers Hanover Corporation and Manufacturers Hanover Trust Company; and a member of the Business Roundtable and the Business Council.

COMSAT reports first quarter earnings

COMSAT reported consolidated Net Income of $8,880,000 or 89 cents per share, for the first quarter of 1977, a decrease of 21 cents from the fourth quarter of 1976.

The Board of Directors, at its monthly meeting, declared the regular quarterly dividend of 25 cents per share, payable on June 13, 1977, to all shareholders of record as of the close of business on May 13, 1977. It is COMSAT's twenty-seventh consecutive quarterly dividend and the twelfth at the 25-cent rate.

The decrease in consolidated Net Income from that of the first quarter a year ago was caused by the deduction of $14,414,000, or 73 cents per share after taxes, from COMSAT's global service Operating Revenue under an accounting and refund order issued by the Federal Communications Commission (FCC).

Under the FCC order, which was effective as of June 16, 1976, COMSAT is placing in escrow revenue amount-

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ing to the difference between present charges to its common carrier customers for global system service and charges calculated on the basis of lower rates that would be required if the FCC's rate decision of December 1975 were to be affirmed. The escrowed revenue, which amounted to $44,589,000 as of March 31, 1977, exclusive of interest earned thereon, is subject to possible refund in whole or in part to COMSAT's customers, depending on the outcome of COMSAT's appeal from the rate decision. The appeal is pending in the U.S. Court of Appeals for the District of Columbia Circuit.

Operating Revenues for the first quarter, net of amounts required to be placed in escrow, totaled $41,953,000, an increase of $4,677,000 from the $37,276,000 for the first quarter of last year. The increase resulted from gains in COMSAT's global system service and from the MARISAT and COMSTAR services provided by COMSAT GENERAL Corporation, COMSAT's wholly owned subsidiary.

COMSAT GENERAL accounted for $15,192,000 of COMSAT's 1977 first-quarter revenues and 16 cents per share of consolidated Net Income. In the first quarter a year ago, COMSAT GENERAL operations resulted in a net loss of eight cents per share.

In its global system service, COMSAT at March 31, 1977, was leasing to its customers 4,444 full time half circuits, a gain of 608, or 16 percent, from March 31, 1976.

Operating Expenses, including income taxes, increased to $35,073,000 from $27,172,000 for the first quarter a year ago, largely due to higher depreciation charges resulting from MARISAT and COMSTAR satellites placed in service.

Because of the higher expenses and the escrow of revenue, Net Operating Income declined to $6,880,000 from $10,104,000 for the first quarter a year ago. Other Income amounted to $2,000,000, up from $937,000 for the first quarter a year ago, primarily as a result of an increase in the amortization of investment tax credit.

As compared to the fourth quarter of 1976, consolidated Net Income for the first quarter of 1977 increased by $106,000 or one cent per share, Operating Revenues net of amounts placed in escrow increased by $1,305,000, Operating Expenses increased by $1,531,000 because of depreciation charges for the third MARISAT satellite, Net Operating Income decreased by $226,000, and Other Income increased by $332,000.

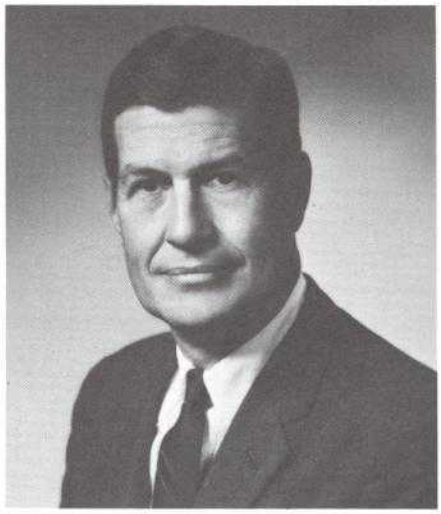
COMSAT General's Johnson becomes Chairman, McLucas elected President

DR. JOHN L. MCLUCAS, former Administrator of the Federal Aviation Administration, has been elected President of COMSAT GENERAL Corporation. Former President John A. Johnson has assumed the position of Chairman and Chief Executive Officer.

Dr. McLucas was also elected to the Board of Directors of COMSAT GENERAL, according to COMSAT President Joseph V. Charyk.

Nominated as FAA Administrator by President Ford in 1975, Dr. McLucas served in that capacity until April of this year. Earlier, he was Secretary of the Air Force (1973-1975) and Under Secretary of the Air Force (1969-1973). Before that he served as Assistant Secretary General for Scientific Affairs of the North Atlantic Treaty Organization (NATO) and as President of the Mitre Corporation.

Dr. McLucas is a native of Fayetteville, North Carolina, and holds a B.S. from Davidson College, an M.S. from Tulane University and a Ph.D. in Physics and Electrical Engineering from Pennsylvania State University.



JOHN A. JOHNSON has been President of COMSAT GENERAL since the wholly-owned COMSAT subsidiary was established in February 1973. Prior to that he served as Vice President, International, of COMSAT, which he joined in 1963, and as a Senior Vice President.

Mr. Johnson was Chairman of the Interim Communications Satellite Committee, the governing body of INTELSAT during its formative years, and served as the first United States Governor on the INTELSAT Board of Governors.

He holds degrees from DePauw University and the Law Schools of the University of Chicago and Harvard and is a member of the Illinois Bar. In 1940 he served as an Attorney in the Office of the General Counsel of the Chicago, Burlington and Quincy Railroad. In 1941 he entered private practice, which was followed by three years active duty in the U.S. Navy. During successive years, and prior to joining COMSAT, Mr. Johnson was associated with the Department of State, the Department of the Air Force and NASA.

INTELSAT Board approves three-satellite configuration for Atlantic Ocean Region; Caruso-Westlake-Wood Directors General

The INTELSAT Board of Governors has approved the appointment of Mr. Andrea Caruso as Deputy Director General-Administration; Mr. Reginald C. Westlake, Deputy Director General-Finance; and Mr. H. William Wood, Deputy Director General-Operations and Development. It is expected that the appointees, who will report to Mr. Santiago Astrain, the Director General, will have assumed office by September 1977. The appointments represent an important step in implementing the permanent management arrangements for INTELSAT which are to be fully in effect by February 1979.

Mr. Caruso's extensive background in telecommunications began in Rome, where he served from 1951 to 1964 with the Italian Ministry of Post and Telecommunications as Chief of the Secretariat for International Affairs and as the Italian delegate, and Chairman, to various CCITT and CCIR committee meetings of the International Telecommunication Union (ITU). After five years' service as Chief of the Division for Technical Assistance to Latin America of the ITU in Geneva, Mr. Caruso returned to Italy to join Telespazio S.p.A. for Space Telecommunications in Rome, and served two terms as its Director of International Affairs (1968-1974 and 1975 to present). From 1974 to 1975 he served as INTELSAT's Director of Administration and Conference Affairs at INTELSAT Headquarters in Washington, D.C.

Mr. Westlake served with the British Post Office from 1934 to 1968 in a number of financial posts, including that of Director of Telecommunications Finance, at the rank of Under Secretary. He also served as the first Chairman of INTELSAT's Advisory Subcommittee on Finance from 1964 to 1967, when he represented the United Kingdom in that forum. From 1968 to 1973 Mr. Westlake held the post of Director of INTELSAT Finance in the Office of INTELSAT Management at COMSAT, and from 1974 to the present has served as Director of Finance of INTELSAT.

Newly appointed Deputy Directors General Reginald C. Westlake, Andrea Caruso and H. William Wood, left to right, pose for photo following INTELSAT Board action.

Mr. Wood began his career in the U.S. Navy, where he served in a variety of posts, including Director of Communications for the Commander-In-Chief, Eastern Atlantic and Mediterranean Command; and Assistant Director, Plans, for the Defense Communications Agency. In 1965, Mr. Wood joined COMSAT as Director of Systems Management. Subsequently, he has served as Assistant Vice President, Operations; Vice President, U.S. INTELSAT Division; and Vice President, INTELSAT Management Division.

The Twenty-seventh Meeting of the INTELSAT Board of Governors was held March 30-April 5 at INTELSAT Headquarters in Washington, D.C., finishing a day earlier than planned. Twenty-three Governors attended all or part of the meeting.

A major accomplishment of the meeting was a decision that the space segment configuration for the Atlantic Ocean Region from 1977 onwards shall consist of three operational satellites—a Primary, Major Path 1 and Major Path 2 satellites. The Board also requested the Director General to study the types of earth stations

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which may be permitted access to the Major Path 2 satellite. Among its other actions the Board:

Technical and Operational Matters

- Noted that the Director General in reexamining operational plans will study: plans to cover the expected delay of two 14/11 GHz antennas; contingency plans for 3 to 6 and 12-month delays in availability of the INTELSAT V or necessary earth station facilities; operational plans for the Atlantic and Indian Ocean Regions including apportionment of traffic between satellites and off-loading traffic from the Indian Ocean to the third Atlantic Region satellite; the operational consequences of repointing the west 14/11 GHz spot beam of the INTELSAT V primary satellite; the feasibility, cost and operational consequences of increasing the e.i.r.p. in that beam.
- Decided to launch the INTELSAT IV-A (F-4) spacecraft over the Atlantic Ocean region and to locate it at a nominal position of 340.5° East Longitude.
- Decided that the INTELSAT I and INTELSAT II (F-1), (F-2), (F-3) and (F-4) satellites will be de-energized; and the INTELSAT III (F-2), (F-4) and (F-6) satellites be maneuvered to raise and circularize their orbits and be de-energized. The IFRB will be requested to remove the above satellites from the Master Register, and appropriate telemetry and command equipment, with the exception of INTELSAT III equipment at Cameroon, will be disposed of as surplus property.
- Noted the Director General's report that COMSAT GENERAL has requested emergency back-up TT&C services, and that he will provide to a subsequent meeting an analysis of this request, including possible reciprocal arrangements.
- Noted that recommendations will be submitted to the Twenty-eighth Meeting on future procurement of INTELSAT TT&C, including proposed procedures, schedules and RFP's, based on the Director General's long-range study of future TTC&M requirements.
- Noted the existing TTC&M agreement with Telespazio would be amended to reflect increased costs of $38,165 in 1977 and $45,797 in 1978 for provision by Telespazio of a TTC&M technician to replace the INTELSAT-provided technician.
- Approved expansion of the TOCC Services in the Indian Ocean Region provided by the British Post Office.
- Approved an allotment agreement with Nigeria for the lease of one transponder (their third) of spare space segment capacity.
- Approved, in principle, the allotment of one quarter transponder to India to meet domestic telecommunications requirements.
- Extended until December 1, 1977, temporary approval for two Saudi Arabian transportable earth stations, with access limited to the INTELSAT satellite at 359° East Longitude.
- Extended approval of the non-standard experimental earth station at Goonhilly Downs, in the receive-only mode, without charge, for one year from April 1, 1977, to conduct further cross-polarization experiments.

Operational and Administrative Matters

- Decided that the potential number of qualified sources for the technical service contracts is so limited as to preclude solicitation by open international tender, and that spacecraft manufacturers would not be suitable sources for these contracts. The Director General will provide at the next Board meeting an analysis of the appropriate type of contract for provision of technical services solicited on a restricted or sole source basis.
- Approved the appointment of Mr. Reginald Westlake, Deputy Director General-Finance; Mr. Andrea Caruso, Deputy Director General-Administration; and Mr. H. William Wood, Deputy Director General-Operations and Development. Approved the addition of a new grade of Deputy Director General to the Executive Organ salary structure at a range of $43,400-$64,250.
- Noted COMSAT's proposal to designate Mr. James B. Potts as the COMSAT official primarily responsible for carrying out and supervising the functions of COMSAT under the Management Services Contract, effective from the date Mr. Wood takes office as Deputy Director General, Operations and Development. Mr. Potts will also continue to be responsible for system operations of the INTELSAT space segment.
- Approved the addition of 10 new positions (five in Administration, eight in Personnel and two in Accounting) and regrading of two existing jobs on the Executive Organ Staff.
- Decided to provide the Director General with an annual housing allowance of $8,000.
- Approved expenditure of up to $100,000 for a consultant to assist the Director General for approximately one year in the implementation phase of the permanent management arrangements.
- Authorized the Director General to award study contracts to two real estate firms to assist in the search for other premises for INTELSAT Headquarters and to evaluate possible terms for obtaining such premises. For the short-term the Director-General will negotiate for additional space in either the COMSAT Building or the North L'Enfant Plaza Building.
- Decided that for Executive Organ staff in post on December 31, 1976, the new tax reimbursement system be phased in over a ten-year period.
- Requested the Director General to study the Ivory Coast proposal and provide the Board with a legal analysis and opinion with respect to the possibility of implementing the proposal under the Agreement.

(Continued on page 13)

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• Noted that INTELSAT's participation in the INMARSAT Preparatory Committee should continue with representation at both the Technical Panel and the Economic, Marketing and Finance Panel. The observer's participation at the first meetings of these panels will be limited to presenting service alternatives in general terms, if necessary.

• Approved one-year extensions to the present terms of assignment of Messrs. Jean-Paul Berges of France and Miles E. Butcher of the U.K. to May 2, 1978.

• Approved one-year terms of assignment for Messrs. Bartolome Arroyo Fernandez of Spain, Joao Celio Barros Brandao of Brazil, Hidetoshi Nishi and Toshitake Noguchi of Japan to work with the staff of the Management Services Contractor.

Financial and Legal Matters

• Authorized reimbursement to the MSC of $82,675 for 1976 in-house R&D budget overrun and instructed the MSC to propose to the Director General an equivalent downward adjustment for 1977 in-house R&D.

• Adopted the INTELSAT financial statement for the year ending December 31, 1976, and authorized the Budget and Accounts Review Committee to meet September 12 and 13.

• Decided that $160,000 of direct costs included in INTELSAT V capitalized costs in the MSC 1977 budget be set aside as a contingency provision, and requested the Director General to authorize expenditures by the MSC against the provision for unforeseen technical problems in the INTELSAT V program.

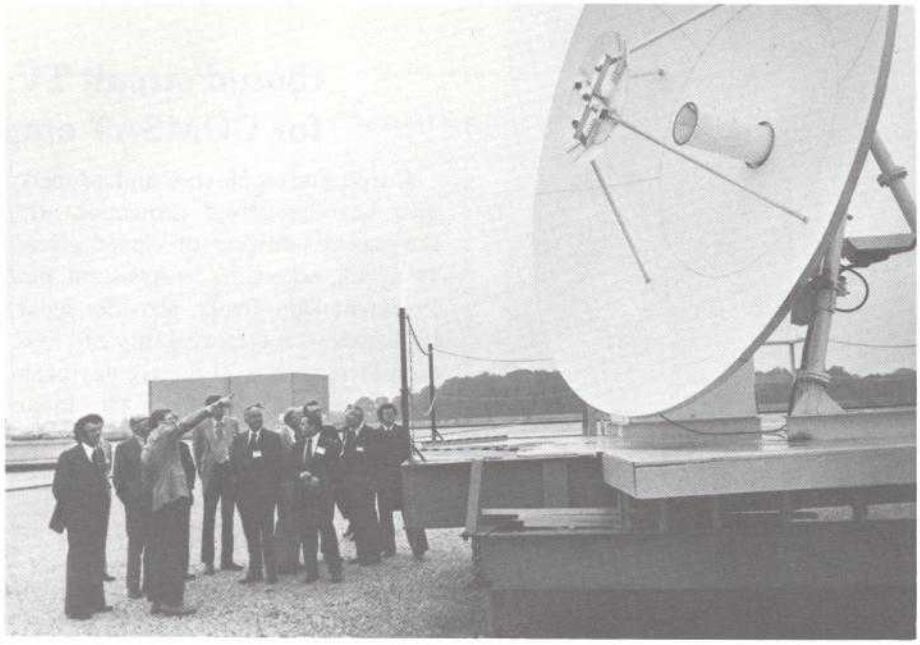
• Approved a revised 1977 budget for the Future INTELSAT System Planning Study at a level of 83 direct man-months and $451,200 direct costs.

• Approved and authorized the licensing of INTELSAT software for non-INTELSAT use on the basis of non-exclusive, non-transferable licenses, without the right to grant sublicenses, in consideration of a fixed royalty payment. The fixed royalty is to be based on a percentage of the estimated reproduction cost and estimated marketability of the package.

• Noted that the Director General will endeavor to ascertain, in negotiations with Bell Laboratories on their request for utilization of an INTELSAT-developed computer package (STRIP), whether a license may be granted to cover Bell operating companies in a way consistent with the general software licensing policy.

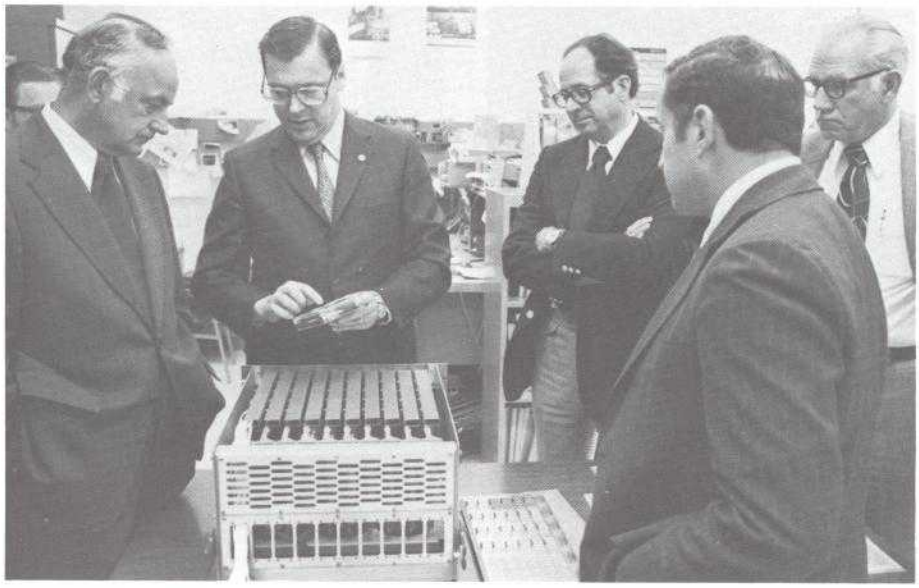
The Twenty-eighth Meeting of the Board of Governors was scheduled to be held in Monaco beginning June 22, 1977.

The preceding report was prepared by Ellen D. Hoff, International Affairs, U.S. INTELSAT Division.



Joint COMSAT/IBM experiment

COMSAT Lab's Kim Kaiser, pointing, describes five-meter antenna mounted on the roof of the IBM Building in Gaithersburg, Maryland, to communications officials visiting the site. The antenna is being used in a joint COMSAT/IBM digital data experiment between the United States and Europe using the French Symphonie satellite.



Labs developing TDMA equipment

COMSAT President Charyk, left, checks on progress being made by the labs in the development of Time Division Multiple Access equipment (TDMA) for use in future communications satellites.

Closed circuit TV increases security for COMSAT employees and property

Corporate employees and property now have increased protection with the recent addition of closed circuit TV which, according to Assistant Vice President Don Greer, provides security forces with the capability of "live" monitoring, on a 24-hour-a-day basis, of corporate areas of the Headquarters Building.

According to Mr. Greer, surveillance includes the garage areas used by employees. Security personnel are also able to stop the scanning action of the cameras and "lock-on" to an individual or area. This lock-on capability will permit observation of employees departing the garages after working hours and can be requested of the Lobby Guard. COMSAT and L'Enfant Plaza Security forces have been instructed to react immediately to any unusual activities, detected attempts of theft, vandalism or other suspicious acts.

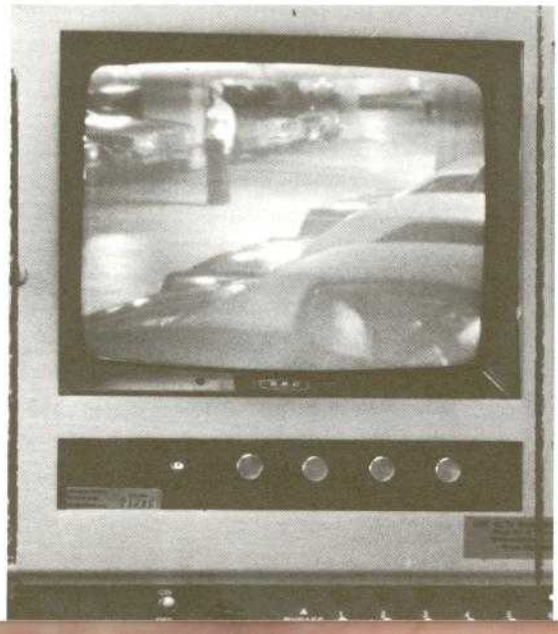
Gene E. Christensen, right, Manager, Facilities and Office Services, and Raymond D. Andrews, Security Officer, observe lobby on monitor in the Security Office.

Head of Security Andrews enacts the "breaking in" of the trunk of a car picked up by the monitor . . . and is followed on the TV screen by security guards.

Security Officer Shirley Griffin reports on any suspicious activities in the garage observed on her monitor in the lobby.

Valli Agent, Facilities and Office Services Secretary, demonstrates the ability of the security monitor to view female employees going to and from their cars in the garage. Photo at right shows the taping capability of the closed circuit system at all hours of the day and night.

Donald E. Greer, Assistant Vice President, General Services, center, with Security Officers Griffin and James T. Bible, checks the performance of the lobby TV monitor.



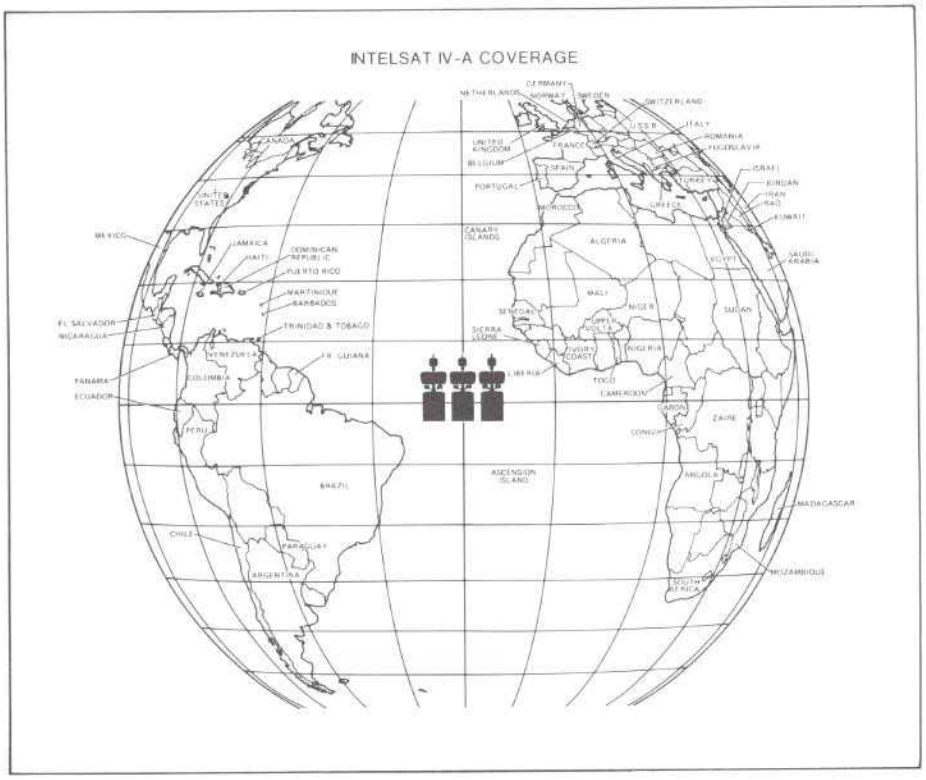
INTELSAT Division realignment announced

A realignment of responsibilities within the U.S. INTELSAT Division and certain internal organizational changes were announced recently by Richard R. Colino, Vice President of USID. According to Mr. Colino, "these actions are expected to improve the efficiency and effectiveness of USID."

William B. Carroll is now responsible for U.S. Communications Systems. Reporting to Carroll are George J. Tellmann, Director, U.S. Systems Operation; Donald W. Fifield, Director, U.S. Facilities; and James R. Silvius, Manager, Maintenance and Supply Center.

Irving Goldstein is responsible for External Relations and Business Development. Reporting to Goldstein are Joel R. Alper, Director, INTELSAT Affairs; Richard L. Granger, Director, Systems Analysis and Evaluation; George A. Lawler, Director, Sales and Business Development; and Jack Oslund, Assistant Director, External Relations, headed by Goldstein on an acting basis.

Robert W. Kinzie is responsible for Management and Administrative Support. Reporting to him are William T. Patterson, Director, Earth Segment Program Management; Nathan Tonelson, Director, Operations Analysis; Robert W. Adams, Manager, Systems Support; and L. Howard Reagan, Manager, Documentation and Procedures.



Third INTELSAT IV-A launched successfully

The third in the series of INTELSAT IV-A communications satellites was launched aboard an Atlas-Centaur launch vehicle from the Kennedy Space Center in Florida at 5:47 P.M., Thursday, May 26.

The 1,500-kilogram INTELSAT IV-A is scheduled to be placed in geostationary orbit over the Atlantic Ocean at 340.5° East Longitude. The INTELSAT IV-A system in the Atlantic Region will provide international communications services to over 60 countries reaching from Mexico to Iran. The satellite has a seven-year design life and the capacity to relay over 6,000 simultaneous calls and two television programs.

This is the third INTELSAT IV-A scheduled for the Atlantic Region. Future IV-A satellites will be placed over the Indian Ocean to meet the expanding communications requirements in that area of the world.

Worth Noting

James B. Potts, Assistant Vice President, Communications Operations, has assumed the additional responsibility of serving as Director, INTELSAT Management Division, with the appointment of H. William Wood to the position of Deputy Director General, INTELSAT.

Milton C. Nomkin, formerly an Assistant General Counsel for Commercial Matters, has been promoted to Associate General Counsel.

Ella U. Owens, Esq., formerly with the Federal Communications Commission, has joined the Office of the General Counsel. Ms. Owens holds a Juris Doctorate from the University of Southern California.

Drs. **P. L. Bargellini** and **L. S. Golding** are co-authors of a Section entitled "Information Theory" in the recently published McGraw-Hill edition of the *Electronic Designers Handbook.*

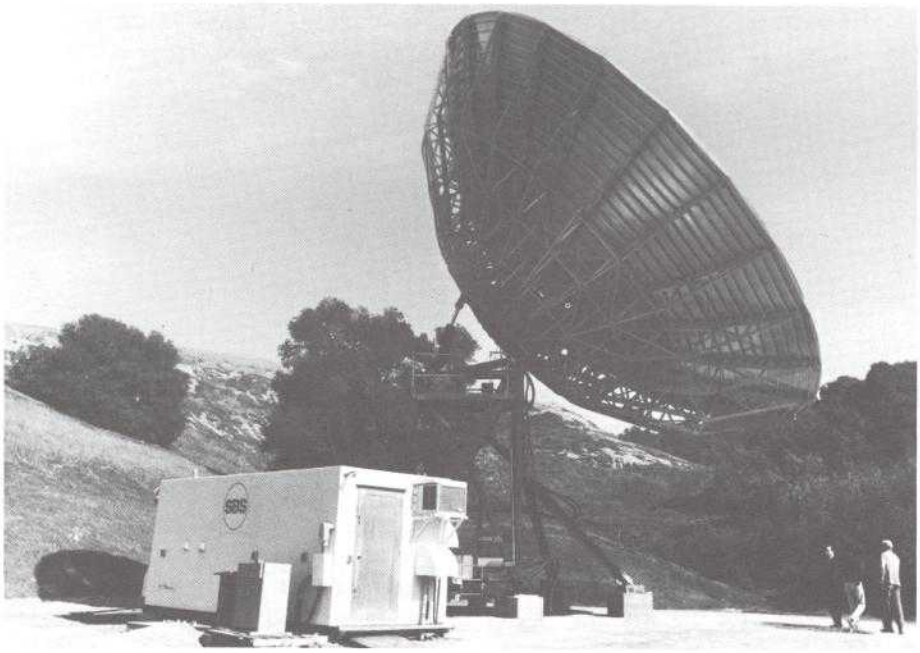
Lawrence Weekley, formerly Manager, Media Relations and Information Services, Office of Public Information, has joined SBS as Manager, Public Affairs.

Clarissa S. "Cris" Inman of the Labs was elected State Treasurer of the Maryland Federation of Business Women at its annual convention in Ocean City, Maryland.

SBS invites proposals for advanced satellites

Satellite Business Systems (SBS) has invited U.S. satellite manufacturers to bid on the construction of three advanced, high-powered communications satellites for the SBS operational system. The satellites are to operate at the higher frequency ranges of 12 and 14 gigahertz.

In issuing the Request for Proposals (RFP), SBS asked for proposals by August 8, 1977, in order to permit a contract award as soon thereafter as possible.



SBS began its preoperational program traffic tests recently using two small earth stations located at Poughkeepsie, New York, and Los Gatos, California, (above photo). The preoperational program is being conducted in the 6 and 4 GHz frequencies, unlike the SBS operational system which will operate in the higher 14 and 12 GHz frequencies.

Two of the three spacecraft are to be launched in the second half of 1980 to meet the SBS schedule for system operations to begin January 1, 1981. The third spacecraft will be a ground spare.

The SBS operational system will provide fully switched, private networks to businesses, government agencies and other organizations with large, sophisticated communications requirements. Each customer's network will include small earth stations sited on his premises (rooftops and parking lots) at his traffic concentration points.

The all-digital SBS service will comprise voice, high speed data, facsimile and videoconferencing—an innovative, technically advanced, integrated service in which the customer determines how his network is used and what communications are distributed to which facilities and when.

The SBS system will operate in a TDMA (time division, multiple access) mode, which is an essential characteristic of the broadband network service that SBS will offer.

The spacecraft may be either spin-stabilized or three-axis-stabilized and are designed for launch by the National Aeronautics and Space Administration Shuttle or the Delta 3910 launch vehicle. SBS would be among the first commercial customers for Shuttle services, which are scheduled to be available in time for the SBS launches.

SBS asked for proposals on spacecraft with 10 transponder channels each, with each channel having a 43 megahertz bandwidth and a radio frequency output in excess of 20 watts. They are among the most powerful satellites yet specified.

Each spacecraft solar array will generate about one kilowatt of DC power. On-board batteries will also be provided to permit full operation during solar eclipse seasons.

The spacecraft are designed for seven-year lifetimes in orbit. Each will weigh approximately 1,200 pounds initially in synchronous orbit.

For Shuttle launch, SBS proposes a vertical alignment within the cargo bay, with the spacecraft positioned atop a solid-fuel perigee stage.

After injection by the Shuttle into a circular transfer orbit (at an altitude of 187 statute miles), the spacecraft perigee stage would be fired to raise the apogee of the orbit to synchronous altitude (approximately 22,300 statute miles). Each spacecraft also will carry a solid-fuel apogee motor to raise the perigee of the transfer to synchronous altitude and correct the orbit inclination. An RFP for the large number of radio frequency earth terminals required for the operational system is expected to be issued by SBS in the near future.

New COMSAT film

VOICES, a new 20-minute film portraying the role of the COMSAT-operated U.S. earth stations in the global satellite system has been released by the Corporation's Office of Public Information.

Filmed on location in Maine, Hawaii and Washington, D.C., the 16-mm film documents the expertise of COMSAT employees in the day-to-day activities required in maintaining an efficient and reliable system of international communications.

VOICES, produced by Image Associates of Washington, D.C., and coordinated by the Information Office's James T. McKenna, is available for loan for group showings. Arrangements for loan may be made by contacting the Information Office, (202) 554-6100.

Credit Union reports expansion of services in 1976; continued growth expected

BY CHERRYL HOLT

Services of the COMSAT Federal Credit Union (CFCU) to its members were expanded significantly in 1976 and prospects for even further expansion in 1977 look good.

In addressing about 200 members attending the Credit Union's 10th Annual Meeting, President Jim Kilcoyne reported that savings, loans and membership had increased sharply during 1976, and that the staff of INTELSAT's Executive Organ is now eligible for full membership in CFCU. He also noted that a proposed change in the Federal Credit Union Act would permit CFCU to compete strongly with other lending institutions for first trust home mortgages.

Editor's Note: Since the CFCU Annual Meeting, President Carter on April 19 signed Public Law #22—H.R. 3365, entitled "Modernization of the Federal Credit Union Act." A summary of major changes in the law accompanies this article.

In his report on the financial status of CFCU, treasurer Dan Thomas summarized the Credit Union's accomplishments, as of December 31, 1976, as follows:

• Membership, including eligible employees, their families and relatives totaled 1,419, an increase of 10.5 percent from a year ago.

• Dividends paid to members amounted to $170,000, or a rate of 6.25 percent compounded quarterly. This rate of return, maintained since it was established for the fourth quarter of 1975, is substantially higher than that paid by other savings institutions in the area.

• Member savings, in $5 shares, reached $3,131,213, an increase of 28 percent from a year ago. All accounts, Thomas emphasized, are insured up to $40,000 by the National Credit Union Administration.

• Loans to members reached $2,046,877, an increase of 16 percent from a year ago. Thomas added that interest rates on loans are constantly monitored and kept competitive with the area's lending industry average.

• Earnings on CFCU investments, including gains, totaled $95,000 for a yield of 9 percent. Thomas said that the Credit Union was able to maintain its 6.25 percent dividend rate primarily because of the extraordinary 9 percent return on investment, and gave much of the credit for this performance to Paul Cook, COMSAT's Investment Manager, who serves as a consultant to CFCU.

• The Credit Union's loan-loss ratio was decreased significantly during 1976 for the first time since 1973, and for the third time since CFCU was formed. This decrease in loan defaults resulted from the initiation of new and more rigid procedures for obtaining repayment of loans from members who are no longer employed by the company.

In other business before the shareholders, elections were held to fill three vacancies on the seven-person Board of Directors, and to elect all members of the five-person Credit

(Continued on page 18)

Credit Union Shareholders review 1976 Annual Report.

Daniel F. Thomas, Credit Union Treasurer, reports on CFCU's finances at annual meeting.

Ms. Holt is in the COMSAT Office of Public Information.

(Continued from page 17)

Committee. Reelected to the CFCU Board of Directors were John Capossela, Cindy Clarke and Dan Thomas.

Elected to the Credit Committee were Jack Dicks, Steve Emanuel, Barbara Mosely, Booker Weaver and Linda Kortbawi, who was re-elected.

As in past years, a drawing for door prizes followed the balloting. This year's winners were: Wallace Wells, first prize, $50 in shares; Bill Fallon, second prize, two radial tires; and Joe Donnelly, third prize, use of the COMSAT box at the Capital Centre for a hockey game.

The Board of Directors met the following day and re-elected all of the CFCU's officers for one year terms. The officers are: President, Jim Kilcoyne; Vice-President, Ed Wright; Secretary, Jacqueline Wakeling; and Treasurer, Dan Thomas. Also serving on the Board are Bill Hanson, Cindy Clarke and John Capossela.

Public Law #22 (H.R. 3365) signed by President Carter on April 19 introduces changes in the Federal Credit Union Act designed to strengthen the competitive position of Chartered Credit Unions in the lending market, thereby enabling them to continue to operate in a manner beneficial to their members, and to grant the National Credit Union Administration greater flexibility in the Administration of the Credit Union Act.

It is expected to take The National Credit Union Administration several months to evaluate the law and to issue new rules and regulations for its implementation. In the meantime the CFCU Board of Directors is studying changes in the law to determine what effects it will have on its lending policies to expand services to CFCU members.

Following are some of the changes that the CFCU Board is studying.

- **Lines of Credit:** The law permits Credit Unions to establish lines of credit to their members so that advances can be made to the members without the need for Credit Committee approval for each individual advance.
- **Real Estate Loans:** The law permits loans with maturities up to 30 years secured by a first trust, for the purchase or construction of a one-to-four family residential dwelling which serves as the principal residence of a Credit Union member. The sales price of such a residence cannot be more than 150 percent of the median sales price of residential real property situated in the geographical area in which the property is located.
- **Home Improvements:** The law permits loans for conventional mobile home and home improvements with maturities up to 15 years.
- **Unsecured Loan Ceiling:** The law removes the $2,500 maximum amount for unsecured loans, but retains the provision that no one loan or aggregate of loans to any member is to exceed 10 percent of the Credit Union's unimpaired capital surplus.

Corporate volunteers assist summer jobs program

COMSAT and COMSAT GENERAL volunteers contributed more than 80 hours of participation to the recent "Summer Jobs For Needy Youth" program sponsored by the Metropolitan Washington Board of Trade. The program's objective is to prevent school drop-outs by locating summer jobs for high school and college students between the ages of 16 and 21 who cannot afford to continue their education without the financial assistance summer employment provides.

The Corporation volunteers joined approximately 200 other volunteers from various employers throughout the Metropolitan area in conducting an intensive six-week telephone solicitation campaign to locate available jobs. More than 33,000 private sector employers in the Metropolitan area were contacted. Last year's campaign resulted in over 32,000 jobs for students in the program, some of which were, and continue to be, provided by COMSAT and COMSAT GENERAL.

PHOTOS BY MIKE GLASBY

James Braxton

Jean Davis

Dolores Anderson

Phyllis Rhoe

Reber awarded COMSAT scholarship

COMSAT President Charyk presents COMSAT's 1977 National Merit Scholarship Award to Steven C. Reber. Steve was also informed by President Carter that he has been selected as one of the 121 Presidential Scholars for 1977.

PHOTO BY MIKE GLASBY

Steven C. Reber is the winner of COMSAT's 1977 National Merit Scholarship. He is the son of Carl J. Reber, COMSAT's Assistant Vice President, Financial Administration and Acting Director, Finance. The award was presented to Steve by COMSAT's President, Joseph V. Charyk.

In addition to receiving the National Merit Scholarship, Steve was further honored by being selected one of 121 Presidential Scholars for 1977. He was informed of his selection by telegram from President Carter, which read in part, "I am very pleased to inform you that today I am naming you a Presidential Scholar for 1977 . . . You represent the finest of this country's education effort and will receive the Presidential Medallion, the only national award for intellectual excellence, scholarship and leadership for graduating high school seniors."

The Presidential Scholars Program was established in 1964 by President Johnson "to recognize the most precious resource of the United States, the brain power of its young people—to encourage the pursuit of intellectual attainment among all our youth."

Steve graduated at the top of his class from Woodward High School in Rockville, Maryland. While at Woodward, he was captain of the school team on the TV panel show, "It's Academic." Steve will enter Massachusetts Institute of Technology and intends to major in electrical engineering.

Other recent COMSAT Scholarship winners are Steven C. Drill (1974), Johns Hopkins University; Peter R. Karasik (1975), University of Pennsylvania; and David M. Vollrath (1976), University of Southern California.

COMSAT is one of 1,300 corporate sponsors of National Merit Scholarships throughout the country. Most corporation-sponsored scholarships are given to graduating high school students of employees or residents of the community in which the corporation is located. COMSAT's four-year scholarships are given to students of employees. The Corporation has participated in the Program since 1968.

Competition for the scholarships begins in the student's junior year. Some 50,000 students take the PSAT/NMSQT. Outstanding scores on this test determine the Semifinalists. Finalists are chosen on their SAT scores. The competition ends with the awarding of nearly 3,800 scholarships to students in the spring of their senior year.

Corporate scholarships range from $250 to $1,500. The amount of the award is based on the financial position of the family and the costs of the school being attended. Should a scholarship winner transfer to another school, the grant is adjusted accordingly to costs at the new school.

The National Merit Scholarship Corporation sets the standards for selection of candidates for the awards. The purpose of the National Merit Program is to "identify and honor intellectually talented young people and to encourage academic excellence at all educational levels by focusing public attention on a sizable group of able youth throughout the nation."

COMSAT's continued support of the National Merit Scholarship Program reflects the Corporation's interest in, and responsibility to, its employees and to the community. The scholarship program represents more than just another benefit: it is, in effect, an investment in the development of human resources since constantly rising costs are making post-secondary education a very expensive and increasingly limited goal for high school graduates. COMSAT is pleased to help deserving students realize this goal.

Radio interview

Henry E. Hockeimer, President of Ford Aerospace & Communications, is interviewed by Washington Radio Station WGMS staff announcer Renee Channey for COMSAT's "World of Music" series.

Network Bits

Field Correspondents

Andover
Joanne Witas

Brewster
Dorothy Buckingham

Cayey
John Gonzalez

Etam
Bev Conner

Fucino
Sandy Tull

Jamesburg
C.B. Marshall

Labs
Norma Broughman
Joan Prince
Blaine Shatzer

M & S Center
Darleen Jones

New York
Stephen Keller

Paumalu
Bob Kumasaka

Plaza
Gloria Lipfert

Santa Paula
Pat Hogan

Southbury
Eileen Jacobsen

BREWSTER. Six station employees recently receiving ten-year awards were **Melvyn Tate, Jim Harding, Dewey Martin, Darold Browning, Tom Cheeseman** and **Donald Briggs. Tom Landon,** the newest addition to our staff, has moved with his family to the Brewster area from California.

Sonia Browning, daughter of Mr. and **Mrs. Darold Browning,** a junior at Brewster High School, represented the community as Miss Brewster at the recent Apple Blossom Festival in Wenatchee, Washington. The Quad City float, representing the communities of Brewster, Bridgeport, Mansfield and Pateros, depicting the "Queen's Garden," received the Community Grand Sweepstakes Award and an invitation to participate in the Lilac Festival Parade in Spokane. —**Dorothy Buckingham**

ETAM. Elfriede O'Hara, wife of **Mike O'Hara,** has just returned from visiting her parents in Bavaria, Germany. **Gerry** and **Marty Reeves** vacationed at Myrtle Beach, South Carolina. **David** and **Marion Cross** visited Williamsburg, Virginia. **Sam St. Clair** spent three days in Cayey, Puerto Rico, testing his expertise on its antenna.

Bill Mayes gave a Patio Party with a different twist. He served fellow Technicians **Sam St. Clair** and **Spencer Everly** a southern sausage breakfast complete with hot biscuits and gravy all washed down with cold beer. Of course, before the sumptuous meal was served, the invited guests had to help pour the concrete for the patio.

Charles Adams, son of **Bill** and **Sunny Adams,** was elected Honor Boy at Tunnelton High School. Charles plans to attend West Virginia Technical College in Montgomery. **Marvin Miller** recently purchased 70 acres of land near Kingswood, moved a mobile home onto the land, and hopes to have his well drilled and be living on his new acreage by fall. **Jimmy Lansberry** is now a resident of Etam having purchased two acres of land near the station and moved his mobile home onto the property.—**Bev Conner**

LABS. A baby shower was held recently for **Barbara Reader. Carol Van Der Weele** is expecting a baby in June. **Jack** and **Allison Rieser** are the parents of a new son, **Christian James.** Dr. and Mrs. **Daniel J. Schaefer** have a new son, **Daniel Charles.**

A farewell luncheon was held for **Roger Taur** who is transferring to the West Coast office. **Zaheer Ali** celebrated his first anniversary with COMSAT. **David Carino** will receive his Master of Science degree from MIT in June. A co-op student in the Spacecraft Lab, **Dave** plans to work for the Analytic Sciences Corporation in Reading, Massachusetts, following graduation. **Debby Boxwell,** a work-study student in the Library, has graduated from high school.

Vacationers include **Tom Kirkendall** and **Rocky Lee** and families to Disney World, **Rosa Liu** to Canada, **Claudette Tucker** to Europe, **Pam Beckelman** and **Yvette Viviani** also to Europe, **Warren Trachtman** to Holland, **Harry Jones** to Europe and **Bernie Free** planned a cruise on his new boat.

Terry Rodgers is planning a new mural for the lobby, assisted by a project committee consisting of **Dave Perlmutter, Dianne Lusby, Dirk Van Der Loo** and **Hank Mueller. Henri Suyderhoud** has been elected a senior member of the IEEE.

New employees include **Paulette Luper,** Applied Sciences Lab; **Christine King,** Transmission Systems Lab; **Ralph Burral,** Meterology and Instrumentation Department; **Peter Poggi,** Assembly/Clean Room; and **Jean Elmendorf,** Computer Center.

Ten-year awards were presented to **Joe Stockel, Ron Kessler, Dennis Curtin** and **John Falvey.** Five-year awards were awarded to **Esther Disney, Bill Schaefer** and **Mike Barrett.** Receiving Patent Incentive awards were **Joe Campanella, Its'hak Dinstein, Ray Lanier, Ed Rittner, N. Shimasaki** and **Henri Suyderhoud.** Employees moving into new homes were **Ray Kessler** to Mount Airy, **Jim Allison** to Sugar Loaf Estates, **Joan Prince** to Lewistown and **Dave Kurjan** to Gaithersburg.

There is much this issue to report on sports. A Golf Club is being formed and currently has 10 members. Those interested in joining should contact **Roger Bowen** or **Bud Bell. Dick Van Der Loo** of Spacecraft Labs is very active in the Metropolitan Washington Soccer Referee Association. In addition to being the Association's President Dirk referees soccer games at the amateur, high school and university levels. The Annual COMSAT Softball Tournament was held in May with part of the proceeds going to the Montgomery County Association for Retarded Citizens.

—**B. P. S.**

M&S. Bob Riblet became a grandfather for the third time with the birth of **Chay Adam Riblet. Bill Peck** is back at work following surgery and

convalescence. **Bud Kennedy** spent three days at the Santa Paula Earth Station. The Calibration Team composed of **Don Rounsaville** and **George Hannah** completed a 64-day, 20,000-mile trip taking in earth stations at Santa Paula, Guam, Jamesburg, Paumalu and Brewster.

Vactioners include **Bud** and **Erma Kennedy** who, along with Erma's mother, motored to Florida. **Darleen** and **Laird Jones** spent a week attending weddings in Youngstown, Ohio, and Norfolk, Virginia. One-year service awards were presented to **Vito Visaggio** and **Don Rounsaville.**

—**Darleen Jones**

PAUMALU. The station hosted numerous visitors since submitting our last column, among whom were INTELSAT Deputy Director General **W. Wood,** Board of Governors Member **W. Geddes,** U.S. INTELSAT Division Vice President **R. Colino,** and the Division's **I. Goldstein.**

The U.S. Operations Representative also hosted a Circle Island Tour of Oahu, including a visit to our station, for the delegates and staff members attending the POR/IOR Operations Representatives Conference in Honolulu. **G. J. Tellman,** Director, U.S. Systems Operations, along with **B. Falkofske,** Manager, Plans and Regulatory, headed the group of 42 visitors to the station. Serving as tour guides were members of the station staff including Station Manager **Glenn Vinquist, Ken Yamashita, Joe Chow, Charlie Ogata, Allan Prevo** and **Bob Kumasaka.**

Three more station employees have joined COMSAT's ten-year club, **Joe M. Chow, Robert H. Makizuru** and **Paul L. Motoyama, Sr.** Station Manager **Vinquist** presented them with certificates and service awards.

Members of Operations Team Two have taken over the reins of the Paumalu CEA. The new officers are: **Tom Akimoto,** President; **Ronald Miyasato,** Vice President; **Allan Prevo,** Secretary; and **Gilbert Estores,** Treasurer.

And then there is the true Hawaiian fish story (not about the one that got away). Operations Supervisor **Stan Holt** and his two brothers hit the fishermen's jackpot recently about three miles off the windward side of Oahu. They ran into a school of yellow-fin tuna *(Ahi)* and reeled in more than 100 of the fish, each weighing in at two to three pounds. Station personnel were not only able to view the catch but shared in it as well. Station Clerk **Lily Miram** prepared the tuna to perfection, along with other Hawaiian goodies, for a luncheon enjoyed by the entire staff.

—**Bob Kumasaka**

PLAZA. Newly elected and appointed officers of the Federal Credit Union Board of Directors include: **James H. Kilcoyne, Jr.,** President; **Edward N. Wright,** Vice President; **Daniel F. Thomas,** Treasurer; **Jacqueline A. Wakeling,** Secretary; and members **John Capossela, Cynthia Clarke** and **William L. Hanson.**

Credit Committee members are: **Booker Weaver,** Chairman; **Linda Kortbawi,** Secretary; members **Steven A. Emanuel, Jack L. Dicks** and **Barbara Moseley;** and alternates **Jack Lehan, Carl Sederquist** and **Aaron Coleman.** Members of the Supervisory Committee are Chairperson **Alice Bullie, Joe Cooper, Johan Curtin** and **Chet Hall.**

Wallace Wells won the $50 door prize at the Annual CFCU Meeting and two Michelin tires donated by the Universal Tire Corporation of Rockville were won by **Bill Fallon.**

COMSAT held its annual Spring Golf Tournament in May at Bretton Woods on a day considered by all to be "perfect." Fifty-five golfers participated in the free-swinging affair and when the dust settled, Procurement's **John Donahue** emerged the new champion with an impressive low gross of 76. **Fred Seidel** of the Labs shot a low net of 73. **Don Greer** took second low gross with an 84 with **George Meadows** of the Labs second low net with a 74. Other winners for net score, in ascending order, were **Dave Eggers, Bill Ferguson, Steve Smoke, Bob Myer** and **Lew Meyer.** Top winners received merchandise certificates for the Pro Shop while other winners received golf balls and hats.

Among the contestants were **Francis Kline, Toni Loomis, Ruth Hodgson, Paulette Luper** and **Dolores Anderson,** who won longest drive for the ladies. **Marty Levine** and **Ed Knopic** had longest drives, front and back respectively, while **Bill Kreutel** and **George Meadows** had closest to the pin for the front and back nines.

Players on the 1977 softball season *COMSTARS* include **Patti Altizer, Linda Atsus, Evelyn Braswell, Joyce Casebeer, Debbie Fall, Ruby Ferrell, Linda Kortbawi** (Manager), **Karen Liston, Diana Pontti, Cheryl Reynolds, Nancy Stephenson** (Co-Captain), **Claudia Toy** (Co-Captain), **Cathy Walker, Laura Wright,** and Coaches **Rod Witt** and **John Walker.**

The official roster of the men's Softball Team includes **Mickey Alpert, Morgan Baker, Royal Bailey, Dennis Beaufort, Vernon Brow, Wayne Brown, Melvin Harley, Joe Jankowski, Gregory Jefferson, Mike Jefferies, Stanley Jordan, Marty Kelinsky, Mike Kelley** (Manager), **Kent Linnebur, Ed Mikus, Bill Newman** (Captain and Coach), **Tony Poitier, Frank Roseboro, Arnold Sanchez** and **Mike Smith.** The team will be setting the pace in fashion this season in snappy new blue and gold shirts.

Melvin P. Harley, Litho-Line Cameraman, receives his 10-year pin from Reprographics Manager Paul C. Eckley as his supervisor, John A. Cotton, Jr., looks on.

Howard Briley has joined Marketing's Sales and Business Development Department as a Senior Customer Representative. Howard had been associated with ITT for the past 16 years, with more than 12 years as

(Continued on page 25)

GRADUATES – CLASS of '77

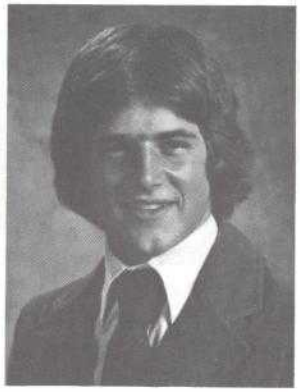
PATHWAYS is pleased to present the 1977 Graduates, the sons and daughters of the employees of COMSAT, COMSAT General and INTELSAT.

Charles D. Adams, son of Mr. and Mrs. William H. Adams (Etam), Tunnelton High School, Tunnelton, W. Va.

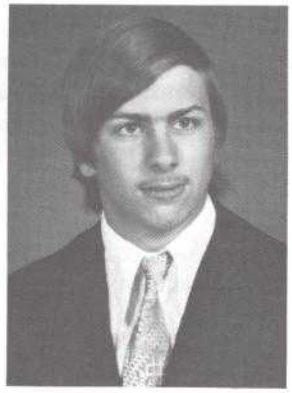
Lucky E. Arevalo, daughter of Mrs. Lidia C. Oliva (Headquarters), Montgomery Blair High School, Silver Spring, Md.

Eiron Bryce Attwood, son of Richard Attwood (Brewster), Brewster High School, Brewster, Wash.

Stephen Edward Bland, son of Mr. and Mrs. Floyd F. Bland (Labs), Lock Raven Senior High School, Towson, Md.



Patrick Bolinger, son of Lee and Agnes Bolinger (M&S center), Seneca Valley High School, Germantown, Md.



C. T. Bowman, Jr., son of Mr. and Mrs. C. T. Bowman, Sr. (Labs), Richard Montgomery High School, Rockville, Md.

Joseph P. Bulko, son of Mr. and Mrs. Joseph A. Bulko (Headquarters), Annapolis Senior High School, Annapolis, Md.

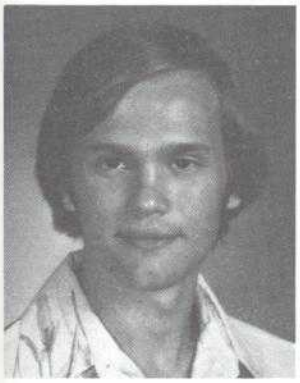
Linnea J. Callaway, daughter of Mr. and Mrs. William L. Callaway (Headquarters), Friendly Senior High School, Oxon Hill, Md.

Christina M. Calvit, daughter of Thomas O. Calvit (COMSAT General), Winston Churchill High School, Potomac, Md.

Dewayne E. Cooper, son of Carl Cooper (Etam), Washington Irving High School, Clarksburg, W. Va.

Karla Sue Cooper, daughter of Mr. and Mrs. Dennis B. Cooper (Headquarters), Bowie Senior High School, Bowie, Md.

Doreen Daikoku, daughter of Mr. and Mrs. Yoshiaki Daikoku (Paumalu), Kalaheo High School, Kailua, Hawaii.

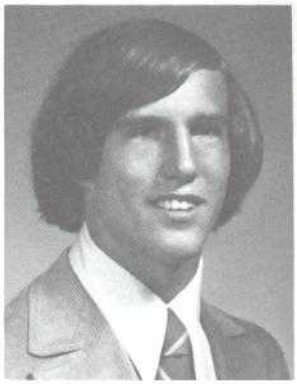


Paul W. Davis, son of Mr. and Mrs. Robert C. Davis (Labs), B.S. from College of William and Mary, Williamsburg, Va.

Cynthia A. Dendall, daughter of Bob and Carol Dendall (Headquarters), Seneca Valley High School, Germantown, Md.

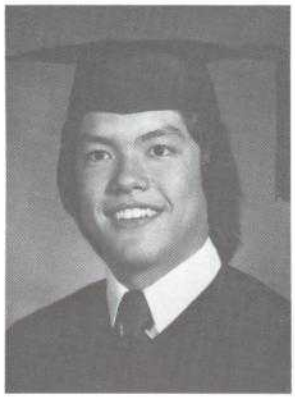
Charles L. Dorian, son of Capt. and Mrs. Charles Dorian (COMSAT General), Ph.D. from The George Washington University.

Stephen S. Edelson, son of Dr. and Mrs. Burton I. Edelson (Labs), B.A. from Yale University.



Robert S. Evans, son of Mr. and Mrs. J. H. Evans (Headquarters), Winston Churchill High School, Potomac, Md.

Efrain Flores Colon, son of Efrain and Zoraida C. Flores (Cayey), Miguel Melendez Munoz High School, Cayey, P.R.



David Franklin, son of Mr. and Mrs. Charles J. Franklin, Potomac Senior High School, Oxon Hill, Md.

Valerie J. Getsinger, daughter of Mr. and Mrs. William J. Getsinger (Labs), George School, Newtown, Pa.

Peter A. Gordon, son of Dr. and Mrs. Gary D. Gordon (Labs), Gaithersburgh High School, Gaithersburg, Md.

Bonnie M. Habib, daughter of Mr. and Mrs. Edmund J. Habib (Plaza), La'Reine High School, Suitland, Md.

David M. Habib, son of Mr. and Mrs. Edmund J. Habib (Plaza), B.S. from Catholic University, Washington, D.C.

(Photos of above graduates not available at presstime.)

Debra L. Haines, daughter of Mr. and Mrs. Howard L. Haines (Labs), Damascus High School, Damascus, Md.

Eric A. Hanson, son of Mr. and Mrs. H. A. Hanson (Headquarters), Dulaney Senior High School, Cockeysville, Md.

Patricia A. Hook, daughter of Mr. and Mrs. Fred J. Hook (Headquarters), M.A. from University of Maryland, College Park, Md.

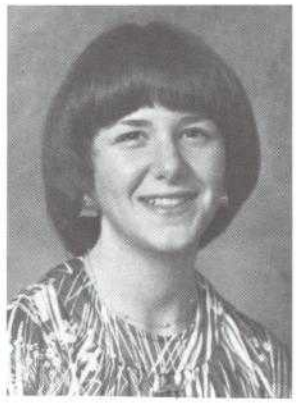
Dagmar A. Horna, daughter of Dr. and Mrs. O. A. Horner (Labs), Bethesda-Chevy Chase High, Bethesda, Md.

Deborah Hyman, daughter of Nelson Hyman (Labs), Randallstown High School, Randallstown, Md.

Linda Hyman, daughter of Nelson Hyman (Labs), — Randallstown High School, Randallstown, Md.

Samuel Kirkbride Jones III, son of Betty and Sam Jones, Jr. (Labs), Sherwood High School, Sandy Spring, Md.

Shelley Lynne Lancaster, daughter of Lin and Dee Lancaster (INTELSAT), Crossland Senior High School, Temple Hills, Md.

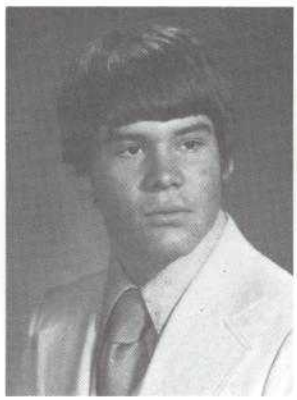


Laurie E. Landesberg, daughter of Mrs. Viola Newhouse (Headquarters), B.A., Psychology, from Emory University, Atlanta, Ga.

Michael J. Lepage, son of Charles and Joan Lepage (Andover), Rumford High School, Rumford, Me.

Khambrel R. Marshall, son of Cambrel and Francetta Marshall (Jamesburg), B.S., Mass Communication, Arizona State University, Tempe, Ariz.

Linda Martin, daughter of Mr. and Mrs. Edward J. Martin (COMSAT General), Woodward High School, Bethesda, Md.



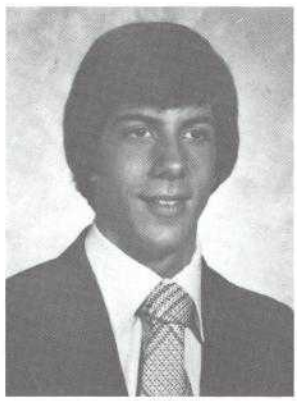
Jeffrey H. Maughan, son of Dr. and Mrs. Paul Maughan (Headquarters), Friendly High School, Oxon Hill, Md.

Kathryn Anne Miller, daughter of Cindy Miller (Labs), Seneca Valley High School, Germantown, Md.

Kathy E. Miller, daughter of Edward H. and Joan B. Miller (Headquarters), Montgomery Blair High School, Silver Spring, Md.

Margaret Kathryn Miller, daughter of Mr. and Mrs. Norman P. Miller (Labs), Rockville High School, Rockville, Md.

Joseph E. Molz, son of Mr. and Mrs. Joseph L. Molz (Labs), Archbishop Curley High School, Baltimore, Md.



Jeffrey D. Ott, son of Mr. and Mrs. Robert R. Ott (Headquarters), Robert E. Peary High School, Rockville, Md.

Steven C. Reber, son of Mr. and Mrs. Carl Reber (Headquarters), Charles W. Woodward High School, Rockville, Md.

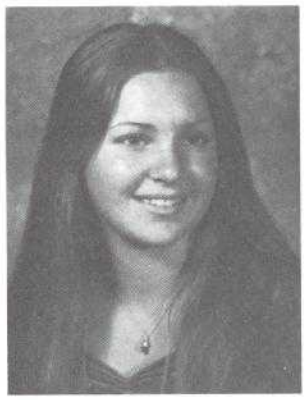
Bobby Richardson, Jr., son of Mr. and Mrs. Bobby Richardson, Sr. (Andover), Telstar Regional High School, Bethel, Ma.

William M. Rountree, son of Mr. and Mrs. Robert M. Rountree (Headquarters), Hayfield High School, Fairfax, Va.

Angelique Ruggiero, daughter of Sandy Fox (Headquarters), Montgomery Blair High School, Silver Spring, Md.

David J. Senones, son of Mr. and Mrs. Richard I. Senones (Paumalu), Mililani Town High School, Mililani Town, Hawaii.

Elizabeth J. Sharp, daughter of Mr. and Mrs. Howard Sharp (Headquarters), Robinson High School, Fairfax, Va.



Teresa A. Shatzer, daughter of Mr. and Mrs. Blaine T. Shatzer (Labs), Middletown High School, Middletown, Md.

Wendy Bridget Smith, daughter of Mr. and Mrs. Richard Smith (Labs), Charles W. Woodward High School, Rockville, Md.

Susan Sparrow, daughter of Larry and Shelley Sparrow (Labs), Magruder High School, Montgomery County, Md.

Terri Lynne Thompson, daughter of Mr. and Mrs. Jesse L. Thompson (Labs), Brunswick High School, Brunswick, Md.

Gilbert A. Velasco, Jr., son of Mr. and Mrs. Gilbert A. Velasco, Sr. (Labs), Glen Burnie Senior High School, Glen Burnie, Md.

Frederick W. Weber, Jr., son of F. W. and Nancy E. Weber (Headquarters), Springfield Senior High School, Erdenheim, Pa.

NETWORK BITS

(Continued from page 21)

Deputy Director, Europe, Africa and Middle East for ITT World Communications.

Bob George's *Angels* (the hard working group in the Computer Room) has a new member—**Jean Elmendorf**—who came to COMSAT from SBD Data Prep Corporation.

—**Gloria Lipfert**

SOUTHBURY. Cindy Bachyrycz and **Frank Makray** recently completed one year at the station. **Cindy,** one of our MARISAT operators, vacationed in Italy and planned to visit the Fucino Earth Station. **Mike Tasse** and wife **Mona** are looking forward to the arrival of their first child, expected around the end of July. The Atlantic MARISAT operators express their appreciation to Pacific MARISAT operator **Shirley Speer** at Santa Paula for an instruction book on plant hangers and a ceramic plant pot.

From the bird watchers notebook: six golden eagles were sighted near the station and, although some controversy exists as to their specific identification, members of the Flanders Nature Center in Woodbury, Connecticut, have officially recognized and identified golden eagles in this exact area.

Our site pond, formed from the spring thaw and rain, has created a perfect nesting place for our mallard duck family, increased in May with the addition of nine baby ducks. Incidentally, all are being fed and well cared for by the station bird watchers.

—**Eileen Jacobsen**

COMSAT's World of Music

Join Renee Channey each Wednesday at 8:05 p.m. for some of the world's greatest music.

WGMS 570 AM 103.5 FM

JULY-AUGUST PROGRAM SCHEDULE

July 6 **United States**	Aug. 3 **Switzerland**
July 13 **France**	Aug. 10 **Poland**
July 20 **Spain**	Aug. 17 **Egypt**
July 27 **Belgium**	Aug. 24 **Roumania**

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