

COMSAT AT 10

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DISTRICT OF COLUMBIA
OFFICE OF SUPERINTENDENT OF CORPORATIONS
CERTIFICATE OF INCORPORATION
OF
COMMUNICATIONS SATELLITE CORPORATION

The undersigned, as Superintendent of Corporations of the District of Columbia, hereby certifies that duplicate originals of Articles of Incorporation for the incorporation of Communications Satellite Corporation, pursuant to the provisions of the Communications Satellite Act of 1962, duly signed and verified pursuant to the provisions of the District of Columbia Business Corporation Act of June 8, 1954, as amended, have been received in this office and are found to conform to law.

ACCORDINGLY, the undersigned, as such Superintendent of Corporations, and by virtue of the authority vested in him by law, hereby issues this Certificate of Incorporation of Communications Satellite Corporation and attaches hereto a duplicate original of the Articles of Incorporation.

Dated February 1, 1963



Alfred G. [Signature]
Superintendent of Corporations
FILED
BY: [Signature] FEB - 1963

COMSAT NEWS

February 1973

COMSAT NEWS

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COMSAT at 10. On the cover is shown the first page of COMSAT's certificate of incorporation, which was issued on February 1, 1963. The COMSAT News takes further note of the first decade with a compilation of major milestones on Page 16-17. On the inside back cover is a reprint of COMSAT's 10th anniversary advertisement. Press kits reviewing progress of the decade and containing a detailed chronology of events are available from the Information Office.

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FCC allows COMSAT-AT&T lease plan, participation in multipurpose system

By HALE MONTGOMERY

The Federal Communications Commission (FCC) has cleared the way for COMSAT and other applicants in the protracted domestic satellite case to proceed with the implementation of plans to provide the nation with new communications channels via satellites.

After more than seven years, the FCC completed the basic policy framework, within which applicants can pursue their goals, in an Order issued December 22. The Order was welcomed by COMSAT. The last line of the Order read with a note of finality: "This proceeding is TERMINATED."

With policy issues settled, the next major steps by the FCC will involve the processing of specific applications and requests by parties. (The first construction permits—to Western Union for three satellites—were granted on January 4).

The December 22 Order, adopted unanimously, reaffirmed in general the FCC's basic June 1972 "multiple entry" domestic satellite policy; but it carried substantial modifications, primarily affecting COMSAT.

The Order permitted COMSAT:

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

- to lease satellite capacity to AT&T under a proposed COMSAT-AT&T long-term lease arrangement, and

- to join MCI Communications and Lockheed Aircraft (MCIL) in forming a restructured corporation, each with a one-third interest, to provide through a separate multipurpose satellite system a wide variety of communications services to all customers other than AT&T.

Under limitations of the earlier June Order, which COMSAT vigorously opposed, the FCC had disallowed the COMSAT-AT&T lease agreement, permitting COMSAT to serve AT&T and other carriers only as a "carrier's carrier" on a regular tariff basis. It also had restricted COMSAT to choosing between this course or that of pursuing another application for a multipurpose system of its own, but not both.

In its December Order the FCC said that the COMSAT-AT&T lease arrangement, and COMSAT's participation in a joint endeavor with MCIL, were subject to certain conditions.

The Order expressed concern about "interlocking relationships between AT&T and COMSAT." In order "to mitigate the potential conflict of in-

terest," the FCC said, it directed that nominees by AT&T to the COMSAT Board cannot be officers of, or persons having affiliation with, AT&T. Thus, AT&T must replace its present three Board members with nominees unaffiliated with that company.

In addition, if AT&T wishes to put competitive services on satellites, the FCC directed AT&T to divest itself of its 29 percent ownership of COMSAT stock within three years after it begins using domestic satellites (or present an acceptable plan for such divestiture). It limited AT&T initially to carrying only non-competitive message toll telephone (MTT) traffic, AUTOVON and government private line services via satellites.

The Order said that "the underlying considerations which motivated Congress to permit and encourage AT&T's ownership in COMSAT are no longer controlling. On the contrary, the competitive roles which COMSAT and AT&T are assuming in the domestic communications field dictate the need for maximum independence from each other and an arms-length relationship."

The FCC further declared: "The COMSAT-AT&T lease arrangement will be approved only upon condition that any members of the COMSAT Board nominated by AT&T shall be persons who do not have any present or past affiliation with AT&T; and that COMSAT submit for Commission approval prior to authorization, a

statement of the procedures that the COMSAT Board of Directors will follow to avoid any participation by AT&T elected members in matters involving the COMSAT-MCIL domestic satellite venture. These requirements in combination with the requirements for divestiture of AT&T's stock in COMSAT described [earlier] will in our judgment protect the public interest."

The FCC found the COMSAT-MCIL joint proposal a venture which "constitutes a significantly different situation from that before us at the time of the Second Report (last June's Order)."

The FCC had before it last June an application by COMSAT for a wholly owned multipurpose satellite system of its own, plus the COMSAT-AT&T lease agreement. It was not until September that COMSAT offered to withdraw its multipurpose application when an alternative proposal was made public involving the joint venture with the combined MCIL group in which each would own equally a minority one-third interest in a multipurpose satellite system.

The FCC approved the venture. The Order said the COMSAT-MCIL proposal "would bring together some of the basic elements that are conducive to the likelihood of the successful provision of communication common carrier services via domestic satellites."

The FCC required COMSAT to form a separate subsidiary to engage in all the domestic activities of the Corporation and to separate such functions from COMSAT's role in INTELSAT. This requirement, plus the requirements for COMSAT to deal with AT&T at arms length, were designed by the FCC to isolate COMSAT from potential conflicts of interest. The Commission at the same time rejected arguments that COMSAT would somehow dominate the COMSAT-MCIL corporation, finding instead that precautions taken in the formation of the restructured corporation on voting and other issues afford effective safeguards.

Other portions of the 50-page Order dealt with pleadings by other parties in the case.

FCC Chairman Dean Burch expressed some concern about the limi-

tations placed on AT&T in a concurring statement, joined in by Commissioners Charlotte Reid and Richard Wiley.

"Candidly, carving up the marketplace and unfurling protective umbrellas are abhorrent to me in principle—and the limitations we have imposed on AT&T's initial use of satellite technology clearly cross the line in both respects," Chairman Burch said. "But we are not here dealing just with principle: we are in the grip of reality and we must deal with it as best we can."

Recent events: new companies being formed

Shortly after the FCC issued its Order on December 22, COMSAT proceeded on two different fronts to formalize its domestic satellite plans.

Representatives of COMSAT and AT&T met in Washington and New York in a number of sessions to work out changes in the COMSAT-AT&T lease agreement which was the first filed with the FCC in October, 1970, and revised in February, 1971. The changes relate to the provision of service to off-shore U.S. points and to a few other technical matters. The changes will form the basis for the filing of amended applications with the FCC in the near future.

In parallel actions, COMSAT representatives met with those of Lockheed and MCI to make effective the agreement providing for their joint ownership of a company to provide multipurpose domestic satellite services. COMSAT made its initial contribution of \$250,000 for a one-third stock interest in the company which, for the time being, has been named CML Satellite Corporation. The first Board meeting of CML was scheduled for the second week in February.

Meanwhile, to conform with the FCC Order, COMSAT is forming a separate subsidiary, called U.S. COMSAT, Inc., to engage in all of its domestic activities including those relating to the AT&T and the COMSAT-MCI-Lockheed arrangements.

The COMSAT Board of Directors at its December 29th meeting authorized the transfer of the Corporation's stock in CML to the new subsidiary, U.S. COMSAT, Inc.

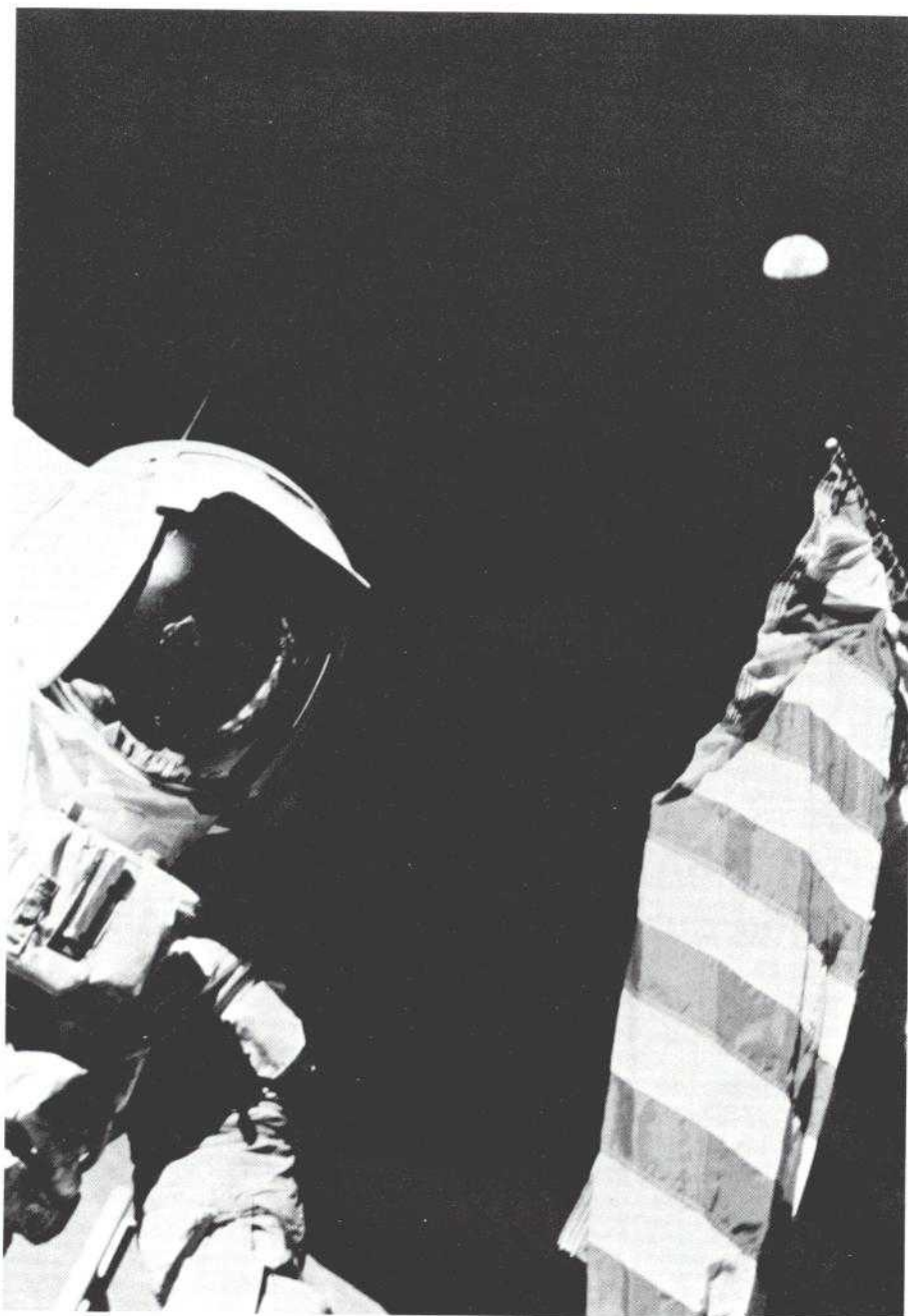
Major 1972 events in domestic satellite case

June 16: The Federal Communications Commission (FCC) issued its Second Report and Order, spelling out basic "multiple entry" policy on a 4-to-3 vote. It disapproved the proposed COMSAT-AT&T lease agreement, and required that COMSAT choose between providing "wholesale" carrier's carrier services, or "retail" services through its own multipurpose system.

July 17: COMSAT filed for reconsideration, urging the FCC to allow the COMSAT-AT&T lease arrangement, permit COMSAT to serve all other customers and markets of its choice as well, and grant COMSAT authority to serve off-shore points without restrictions.

October 3: COMSAT, Lockheed Aircraft Corporation and MCI Communications reached formal agreement on terms for a jointly owned company to provide domestic satellite services through a multipurpose system. The signed agreement, carrying out intentions announced in September, was filed with FCC.

December 22: The Commission issued an Order modifying its earlier June 16 Order, allowing (1) the COMSAT-AT&T lease agreement and (2) authorizing COMSAT to join Lockheed and MCI in a restructured corporation, each with a one-third interest, to provide services to customers other than AT&T through a multipurpose system.



In an unusual photo, Astronaut Schmitt stands next to an American flag on the moon's surface with the earth in the background.

Worldwide audience views final lunar flight

The old adage "that you can't please everybody" lost some of its meaning during the final lunar flight of Apollo 17. For the remnants of the at-peak 350,000-man NASA-industry team which had taken Apollo from the drawing board and made it a national achievement, it was as close to a textbook flight as it could be. For the millions of viewers within sight of the Cape Kennedy launch area and for those watching the evening liftoff over television, it was a magnificent spectacle.

For the avid followers of space lore (and their ranks are enormous), the liftoff became a unique item. Never before had an Apollo launch taken place on two separate days. If one happened to be in the Central Standard Time Zone, for example, in Houston, Texas, the liftoff took place at 11:33 p.m. Wednesday, December 6. If one's locale was New York, Washington, D. C., or Orlando, Florida and governed by Eastern Standard Time—liftoff came at 12:33 a.m., Thursday, December 7.

Other than for the delay in launch, only minor problems afflicted Apollo 17, problems such as gas on the stomach of Mission Commander Astronaut Eugene A. Cernan and the body and fender repair work done on the lunar rover. Otherwise, little of the unusual or unexpected developed to stir the enthusiasm of the approximately 700 members of the news media methodically covering the last Apollo flight from the Manned Spacecraft Center in Houston. Even the colorful televised splashdown within sight of the *U.S.S. Ticonderoga*, 350 miles southeast of Samoa, took place at the precisely predicted time of 2:25 p.m., EST, Tuesday, December 19.

COMSAT and the global satellite system transmitted televised portions of the Apollo 17 mission to a worldwide audience as in the past. Of the 10 manned Apollo flights, Apollo 17 rated third on a "receive time" scale with 101.20 hours.

TV Coverage Summary for Manned Apollo Flights

Transmit Time	Receive Time
Apollo 11 — 91.24 hrs.	Apollo 11 — 208.44 hrs.
Apollo 15 — 69.21 "	Apollo 15 — 106.10 "
Apollo 16 — 64.27 "	Apollo 17 — 101.20 "
Apollo 14 — 55.16 "	Apollo 14 — 100.56 "
Apollo 17 — 45.40 "	Apollo 16 — 100.08 "
Apollo 12 — 41.43 "	Apollo 12 — 87.12 "
Apollo 13 — 32.23 "	Apollo 13 — 53.09 "
Apollo 10 — 29.12 "	Apollo 10 — 47.18 "
Apollo 8 — 24.22 "	Apollo 8 — 31.50 "
Apollo 9 — 8.04 "	Apollo 9 — 14.27 "
Total 460.32 hrs.	Total 849.50 hrs.

Violet Cell license awarded Centralab

The Centralab Semiconductor Division of Globe-Union, Inc., El Monte, California, has been licensed by COMSAT to manufacture and market new, high-efficiency solar cells. The improved solar cells were developed by COMSAT Laboratories.

Under terms of the license, Centralab will have exclusive U.S. rights and non-exclusive worldwide rights for the manufacturing, distribution and sale of the solar cells.

Solar cells, which directly convert sunlight into electrical energy, are the prime source of power for unmanned satellites and will be used extensively in the soon-to-be-launched NASA Skylab program. Centralab is also doing research in the feasibility of solar cells for supplemental electrical power in terrestrial facilities. (Solar cells are already employed in automatic unattended buoys and weather sensing devices).

The new cells are called "violet solar cells" because they are responsive to a greater portion of the sun's spectrum for energy, i.e. the blue-violet area of that spectrum. The previous state-of-the-art solar cell is responsive to a relatively smaller segment of the solar spectrum. This expanded response of the new cell allows an efficiency increase of electrical energy by 30 to 40 percent without any increase in weight or the enlarging of solar cell arrays.

Use of the violet cell provides increased power for additional on-board electronic gear without the additional weight burden of bigger solar panels. Violet solar cells are interchangeable with older cells and may be integrated into programs with no redesigning.



Bob Campbell, Associated Press (seated), talks with Juan Castanera as International's Don Owen looks on.

PHOTOS BY J. T. MCKENNA

NICATELSAT station provides sole link to world during December earthquake

BY J. T. MCKENNA

It was 8:30 a.m. when the phone rang at home on December 23. On the line was Matthew Gordon, Assistant Vice President-Information. He said H. William Wood, Assistant Vice President-Operations, and John A. Johnson, Vice-President-International, had called to tell him about a severe earthquake that had hit Managua, Nicaragua, earlier that morning.

First reports indicated that all communications between Managua and the outside world had been disrupted or totally wiped out. One exception was the earth station for satellite communications located about two miles southwest of the city. Fortunately, the station was designed to withstand earthquakes, and was undamaged. Using its own diesels as a source of power, the station was able to remain on the air and served as an emergency communications center for the trans-

mission of news via satellite to other parts of the world.

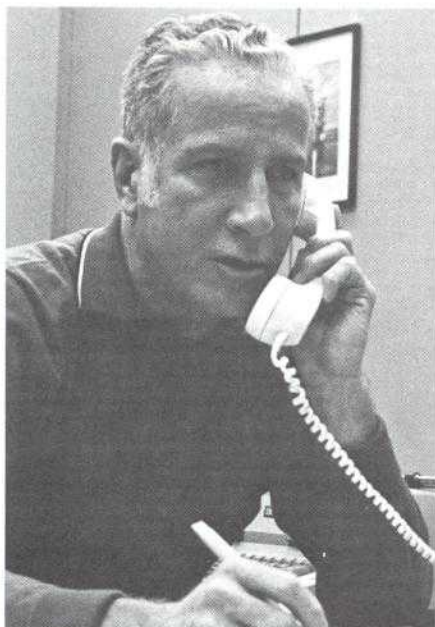
News from Managua was sketchy in those early hours after the quake. Initially, reports from ham operators in Managua were monitored in Mexico City and relayed to the world.

One of the first ham operators on the air with news of the quake was COMSAT's Managua Earth Station Manager, Juan Castanera (YNICX). His "CQ emergency" call was picked up at 8:30 a.m. (EST) by Don Wilkes in Bethlehem, Pennsylvania. Mr. Wilkes passed the disaster news to the COMSAT Operations Center in Washington, D. C.

After giving the early alarm to the outside world, Juan proceeded by foot down the access road to the floor of the Caldera Nejapa, a depression of volcanic origin in which the earth station is located.

After he surveyed the area, Juan realized that all microwave links leading from the earth station to Managua were out of service. The only

■ Mr. McKenna is a COMSAT information officer.



Bill Wood, Communications System Management, discusses quake damage on Saturday morning.

immediate way to communicate with the city was to relay messages from the station to town by motorcycle or car.

However, on that Saturday morning, there were excellent voice communications between the earth station and COMSAT's Operations Center in Washington, D. C. and Juan was able to describe the situation in the city as he saw it to COMSAT personnel working in the Operations Center.

By mid-morning, Bill Wood, Bob Barthle, Don Owen and members of the Communications System Management staff had arrived at the Operations Center to see how they could help Managua re-establish communications via satellite with the world.

Word spread rapidly within the news community that COMSAT had a direct communications link with the earth station in Managua. Phones in the Operations Center rang constantly with requests from across the U.S. for information and situation reports. In order to serve as many newsmen as possible, COMSAT asked Mr. Castanera to give a first person report to representatives of the Associated Press (AP) and the United Press International (UPI). Such an interview would allow most newspapers, radio and TV stations in the U.S. to use his comments as a base for their stories on the earthquake.

Juan agreed to a noon interview.

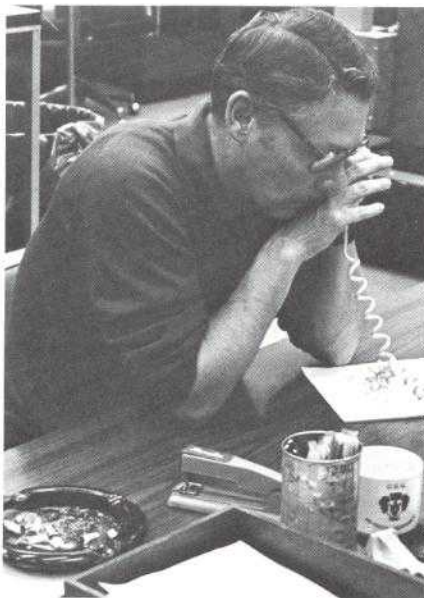
Thus his telephone interview via satellite was distributed nationally over the UPI radio wire and appeared in numerous newspapers across the country including *The New York Times* and *The Washington Post*.

As the news interview was taking place, Operations Center staff were using the same communications console to determine what equipment and services COMSAT could provide to re-establish microwave communications between Managua and the earth station.

Later Saturday, one voice channel into the town of Managua became available. This channel was used for emergency messages to other parts of the world to request emergency relief. President Nixon talked over this satellite link to General Somoza and offered emergency U.S. relief in the form of food, water, and medical supplies.

After the first day, microwave links were re-established between town and the earth station. As more communications channels became available, press messages, telephone traffic, and news photos were transmitted daily from Managua to the U.S. via satellite. UPI even set up a dark room in the ladies room at the earth station to process photos. These photos were then sent from the station to the U.S. via satellite.

A small communications center was set up in a tent in downtown



Information's Hale Montgomery answers a press inquiry on Saturday afternoon.

Managua to transmit telephone traffic to other parts of the world via satellite. Therefore it was necessary to go to the communications tent to place a call.

At the end of January more than 12 satellite circuits were being routed through the Nicaraguan station, carrying both voice and facsimile transmissions as clean-up efforts continued. In addition, the station has provided satellite service to Honduras. These circuits have been on the air since the quake occurred and were not interrupted by the disaster.

It will be a long time before things return to normal in this Central American city, but worldwide communications via satellite are now available on a normal basis to help in any way possible.

Keeping the station operational was a real team effort during those first few days after the quake. A great deal of the credit must go to Station Manager Castanera and his team who overcame all obstacles to keep the earth station working.

An executive from UPI in New York sent us the following message: "When UPI's Matt Kenny and Paul Wyatt arrived in Managua 12/23 night, they went direct to the satellite station and began filing the story by telephone to UPI New York. The crew not only helped set up emergency communications, but also let the weary UPI staff sleep on the floor at the station (all hotels were knocked out), and use the makeshift shower (a garden hose hooked to a fence at the rear of the building).

"Under all sorts of personal strains due to the damage to their own living quarters in town, with wives hysterical and being shipped out on refugee flights, the NICATELSAT personnel worked long hours and were extremely helpful, not only to the press but to private individuals who reached the remote station to contact relatives in other countries."

The Managua station became operational only last November 28, 1972, but already it has proven its worth many times over. Working with an Atlantic INTELSAT IV satellite, it was Managua's only link with the outside world during those long hours immediately following one of nature's worst disasters of recent years.

S.S. HOPE to use satellite link from Brazil

By JOACHIM KAISER

On February 1 the American hospital ship S.S. Hope sailed from Baltimore, Maryland for Maceio, Brazil. On board was the 8-foot diameter antenna used in last year's satellite communications experiment from the Queen Elizabeth 2. Along with the antenna and all the electronic equipment required to operate a small earth station was the "team of Kaiser and Reiser."

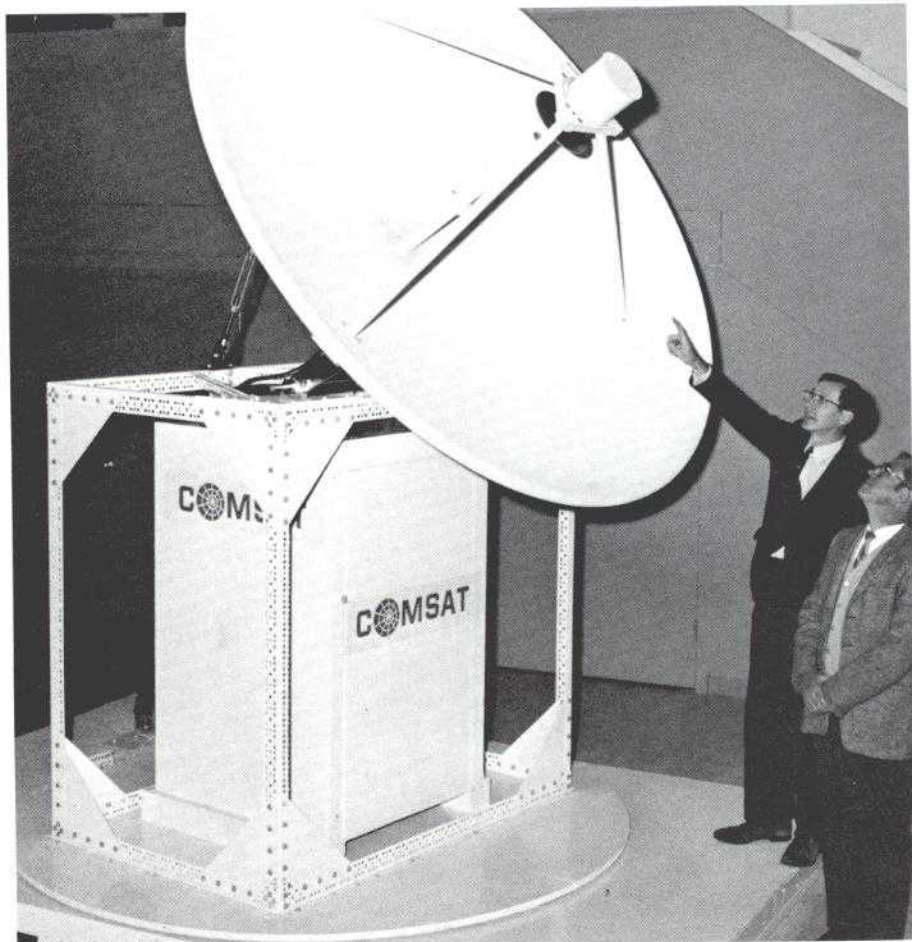
The following article by Mr. Kaiser outlines the scope of the experiment.

Some time last year, and, I'm told, as early as four years ago, it was suggested that an experiment in satellite communications be conducted from the S.S. Hope on one of its voyages to assess the impact of reliable long distance communications between a medical team operating in a remote location and specialized medical facilities in the U.S. and elsewhere in the world.

Project Hope is a unique American experiment in medical practice and teaching. It is, in fact, no longer an experiment, but a well-established program to bring medical skills and knowledge to parts of the world where these are much needed but not fully available. Project Hope was organized by Dr. William B. Walsh in 1958, and the ship S.S. Hope has made a dozen trips to many parts of the world.

During these voyages and while in distant ports, communications between the ship and the project headquarters in Washington, D.C., have been provided principally by amateur radio, diligently conducted, by a group of faithful volunteers using parts of the Navy MARS network. Such communications, even though feasible, are limited in reliability and

■ *Mr. Kaiser is senior staff scientist in the Technology Division, COMSAT Labs, and project manager for the shipboard terminal project.*



Project manager Kim Kaiser (left) discusses the antenna with the Hope's Communications Officer Dave Veazey, prior to its installation.

restricted to a simplex voice channel.

With the many advances in satellite communications, it is natural to try an experiment to determine the impact of modern reliable and high quality communications on the medical missions of Project Hope.

To demonstrate and assess the value of such communications, we will have a formidable array of peripheral equipment. In addition to voice communications, we will use teletype, Xerox telecopier, RCA slow scan "video voice" equipment, and Teleserv electrocardiogram data transmission.

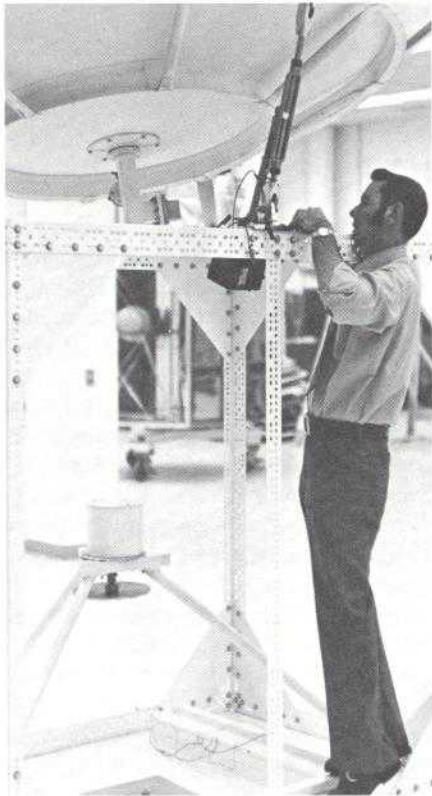
The satellite link will be established between the 8-foot antenna on the S.S. Hope and the new Reliable Earth Terminal (RET) at COMSAT Labs. The link will be extended via telephone lines to the Project Hope headquarters at 2233 Wisconsin Avenue in Washington, D. C.

The RET portion of the experiment is under the direction of Laurence Gray and William Sones, with myself

as overall project manager. Dave Reiser from Gene Cacciamani's modulation techniques department will join me on the ship for the 15-day voyage to Maceio. We expect to be quite busy installing the peripherals and checking out the entire ship terminal operation. Engineering tests between the ship and the RET are scheduled to begin on February 19. Since both of the terminals are essentially new, link operation and demonstrations must wait until our engineering tests are completed.

Much of the ship antenna modification work has been done by John McClanahan, who always seems to find ways around "impossible" mechanical problems. The fairly sophisticated baseband interface is being handled by Joe Campanella's baseband signal processing department, under the direction of Henri Suyderhoud, with construction assistance from Eric Kauffman.

The ship terminal has the 8-foot dish mounted on an "erector set"

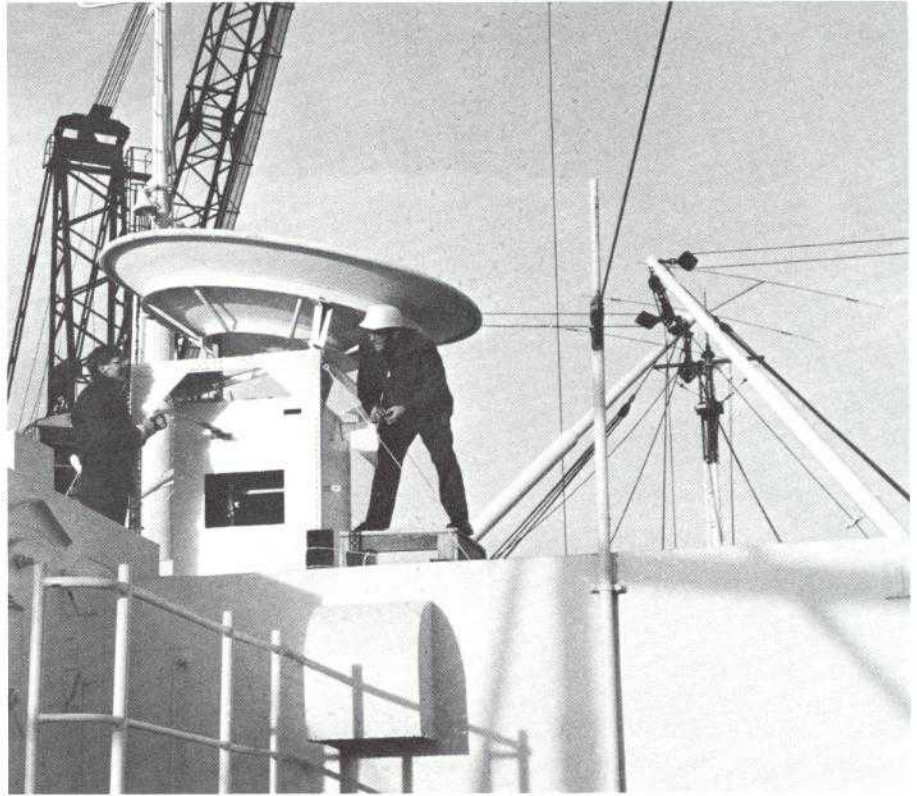


COMSAT team member John McClanahan adjusts antenna unit.

pedestal which permits limited motion in both elevation and azimuth. The present configuration of the shipboard antenna evolved from an earlier sketch for a simple lightweight easy-to-ship terminal originally intended for a demonstration in India. The erector set pedestal was to be disassembled, the round base serving as a shipping protector for the dish, and the transmitter house serving as shipping container for the electronics. The present design was put into practice by Clarence Crane's draftsman Frank Hess, and all woodwork was constructed by the Lab's carpenter Jack Allison.

The look angle to INTELSAT IV, F3, whose Transponder No. 6 is being graciously lent for the experiment by INTELSAT is some 76 degrees, since Maceio is located at 10 degrees South latitude and 36 degrees West longitude. (By the way, we expect to augment the ship's fresh water supply by runoff from tropical rains on the antenna!)

The antenna pedestal contains a Sperry 300-watt transmitter, a low noise parametric amplifier and up and down converters from and to 70 MHz. This equipment is to be connected to



Kim Kaiser (right) and John McClanahan complete the antenna installation on the top deck of the *Hope*.

the signal processing rack in the ship's radio room by 70-MHz I.F. cables. Transmitter and antenna motion controls are remotely actuated from the radio room.

To accommodate the ± 0.8 degree diurnal azimuth motion, representing the satellite orbit inclination combined with the geographic position of the ship terminal, we have an ingenious clock mechanism driving a furnace damper actuator which moves the upper portion of the antenna, transmitter enclosure and all, on a bearing made from rings of solid teflon rods. The ship's roll motions, which will be very slow and quite small, are being compensated by a pendulum-driven circuit controlling an ex-aircraft flap actuator that moves the antenna elevation axis.

We expect to turn over the operation of the ship terminal to the *Hope's* versatile communications officer, retired Navy Captain Dave Veazey, who signed on for another year just for this experiment.

The outcome of the experiment will be reported in detail. We hope that it will lead the way to additional uses of satellite communication through small earth terminals.

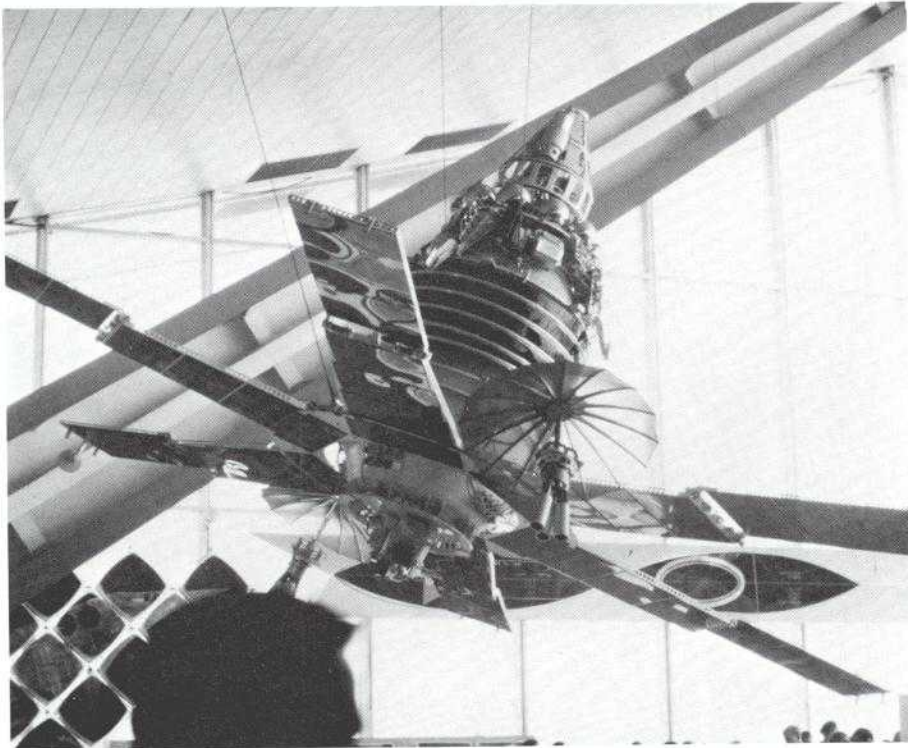
Briskman to lead IEEE committee

Robert D. Briskman, Director of Domestic Systems, has been appointed Chairman of the Institute of Electrical and Electronics Engineers (IEEE) Standards Committee for 1973. The IEEE is a transnational society made up of over 165,000 electrical and electronics engineers dedicated to improving the understanding of its engineering specialties and applying them to the needs of society.

Mr. Briskman, in his role as chairman, will be concerned with the development of uniform definitions, standards, methods of measurements, and test procedures, as well as promoting their adoption nationally and internationally.

A COMSAT employee since 1963, he holds an engineering degree from Princeton University and a degree in electrical engineering from the University of Maryland.

Prior to joining COMSAT, Mr. Briskman was responsible for NASA's program development of tracking, telemetry, and command systems in support of such missions as Apollo, Gemini, Mariner, and Ranger.



A Molniya satellite similar to the one shown in the photo will be used as part of the Satellite Hot Line.

Via Satellite: added security and reliability for Hot Line

The famous Washington-Moscow Hot Line, which theoretically allows everybody in the world to sleep a little easier, soon will be moved to satellites.

Earth stations will be built in the United States and the Soviet Union for two parallel satellite system Hot Lines. For redundancy, one will go via an Atlantic INTELSAT IV satellite; the other will go via the Russian system of Molniya 2 satellites.

Two new earth stations are needed: A U.S. station to be built at Fort Detrick, Maryland, to work with the Molnyias, and a Russian station near Moscow to work with the INTELSAT system.

For one circuit, the Fort Detrick station will transmit and receive over the top of the world, via Molnyias, with an existing Russian station. For the other circuit, the Etam, West Virginia Earth Station will work with a Russian station via an Atlantic INTELSAT IV satellite.

From both Fort Detrick and Etam redundant terrestrial links will reach

to the White House and other points. On the Russian side, terrestrial links will reach from the earth stations to the Kremlin and elsewhere. Thus, the Hot Lines will provide direct communications links offering capability for instantaneous communication between the respective heads of state in the event of an accidental or unauthorized nuclear threat to either nation.

The satellite Hot Lines result from an agreement between the U.S. and the U.S.S.R. of September 30, 1971, to improve the terrestrial Hot Line established in 1963. The present Hot Line consists of two teleprinter terminals—one in Washington and one in Moscow—connected by a wire-telegraph circuit routed via London, Copenhagen, Stockholm and Helsinki. It is operated in the West by ITT Worldcom and inside Russia by the Soviet Government. A backup radio telegraph circuit, via Tangier, is operated by RCA Globcom and the Soviet Government.

The 1971 Hot Line agreement specified multiple terminals in each

country for each satellite circuit. In the language of the agreement, multiple terminals will provide greater flexibility and reduce risks of outage associated with vulnerability of the respective national capitals; also the satellite circuits will reduce the vulnerability of the links in a "hostile environment" and eliminate dependence on third countries.

Under the terms of the agreement, the satellite Hot Lines will be duplex, telephone-bandwidth circuits, equipped for secondary telegraphic multiplexing. When the reliability of the satellite circuits has been established, they will become the primary Hot Line circuits. However, the present terrestrial Hot Lines will be continued in operation unless the two countries agree that they are no longer needed.

The necessary carrier arrangements for the U.S. half of the INTELSAT circuit have not been made. As for the Molniya circuit, no carrier will be involved; the Department of Defense and the Soviet Government will operate the facilities and provide the service.

For users of the INTELSAT global system, accustomed as they are to satellites in equatorial synchronous orbits, the Russian Molniya satellites in highly elliptical orbits are something new. The Russians have chosen this orbital configuration apparently because of the high latitudes of their populated communities and the high latitudes of their launch sites. The latter constraint would impose severe additional energy requirements on synchronous orbit missions.

It is not known whether the Soviet Union has attempted synchronous orbits. But the Russians have announced that they plan a synchronous satellite over the Indian Ocean for the "second stage" of their Intersputnik system.

The first Molniya 2 was launched on November 24, 1971, from Plesetsk, which is at 65 degrees North latitude, near Archangel. The U.S.S.R. has other launch sites as far south as 45 degrees North latitude. From sites at either latitude it is easy to achieve an orbital inclination of 65 degrees. And a 65-degree inclination is highly desirable for elliptical orbits because 65 degrees is "the stable inclination."

That is, 65 degrees is the inclination at which the latitude of the apogee will remain fairly stable. (The longitude of apogee is controlled by the period of the orbit.)

The result is a system of Molnias in 12-hour, 65-degree orbits with apogees of about 24,500 statute miles and perigees of about 310 statute miles. These orbits, incidentally, are similar to INTELSAT transfer orbits, except that Molnias have about twice the inclination angle and their apogees occur about twice as far north of the Equator.

The Molniya apogees occur in opposite hemispheres; therefore, an apogee over the Soviet Union occurs only once each 24 hours with each satellite. It is the apogees over the Soviet Union that are most favorable for Russian domestic communications because the entire Russian land mass is visible throughout the 8-hour apogee pass.

The alternate apogees occur over western North America. Given the relatively high latitudes of both Washington and Moscow, it is possible that Hot Line capability could be established in either apogee pass. The duration of a Molniya's mutual visibility between Moscow and Washington will be about eight hours during a Western hemisphere apogee pass and less during an Eastern hemisphere pass. For continuous, 24-hour capability, at least three Molnias, properly spaced, are needed if the satellites are used during the Western hemisphere pass only. If they are used in both the Eastern and the Western pass, two satellites theoretically might suffice.

But precise determinations of visibility times cannot be made in the absence of detailed data on the orbital parameters of Molnias which will be used for the Hot Line and an understanding of Soviet capabilities to trim the Molniya orbits to meet service requirements.

Each earth station operating in the Molniya system must have at least two steerable antennas—one to work with the passing Molniya and one to look toward the horizon and pick up the next Molniya as it appears.

The Molniya satellites have been proven through seven years of Soviet

domestic satellite communications. Through a network of Orbita earth stations, Moscow relays Soviet television simultaneously to such extreme points as Murmansk in the northwest and Vladivostok in the far east.

Details of the Molniya 2 are not available, but it is known to be an improved version of the later Molniya 1, which is a cylindrical satellite 11.3 feet long and 5.2 feet in diameter, weighing about 1,800 pounds.

According to the *TRW Space Log*, Molniya 1 has six solar cell arrays which deploy in orbit to form a paddle wheel at the base and provide 500 to 700 watts of power. Two 3-foot dish antennas extend on arms from the base. Sun and earth sensors provide orientation reference and antenna-pointing control. The communications system comprises three transceivers with two more on standby. The useful life of the satellite is estimated to be about five years. On-board propulsion systems provide capability for positioning and attitude correction. The Molnias have been gradually upgraded to improve radiation resistance, decrease noise levels and increase power output.

At least 19 Molnias are known to have been launched. Those in use transmit voice, video and data to the 33 Orbita earth stations in the U.S.S.R., plus one in Mongolia and one in Cuba.

The Fort Detrick station (about 50 miles northwest of Washington) and the Moscow station will easily communicate via a Molniya over the 4,800 statute miles of surface distance along a Great Circle Route.

The Soviet Union has awarded a contract to an ITT subsidiary for ground equipment for an earth station near Moscow, along with terrestrial links and associated equipment.

Agencies of each government have exchanged technical information about the respective satellite systems and the required performance specifications and operating procedures. Details for implementing the satellite Hot Line agreement were negotiated at the State Department by representatives of the two Governments. William Lee of COMSAT, manager of operations in INTELSAT systems management, represented COMSAT at the

State Department sessions and provided INTELSAT operational standards and procedures.

The delegation of Soviet telecommunications officials at the State Department meetings visited Etam as guests of COMSAT. They also visited the Spacecraft Technical Control Center, the Operations Center at COMSAT Headquarters and COMSAT Labs. Their COMSAT hosts for the visit to Etam were Robert C. Barthle, Director, U.S. Systems Management; James B. Potts, Director of Earth Station Implementation; and George A. Lawler, Director of Marketing.

At Etam the Russians asked knowledgeable questions about operations, traffic and maintenance.

Hot Line crews practice with fables and poems

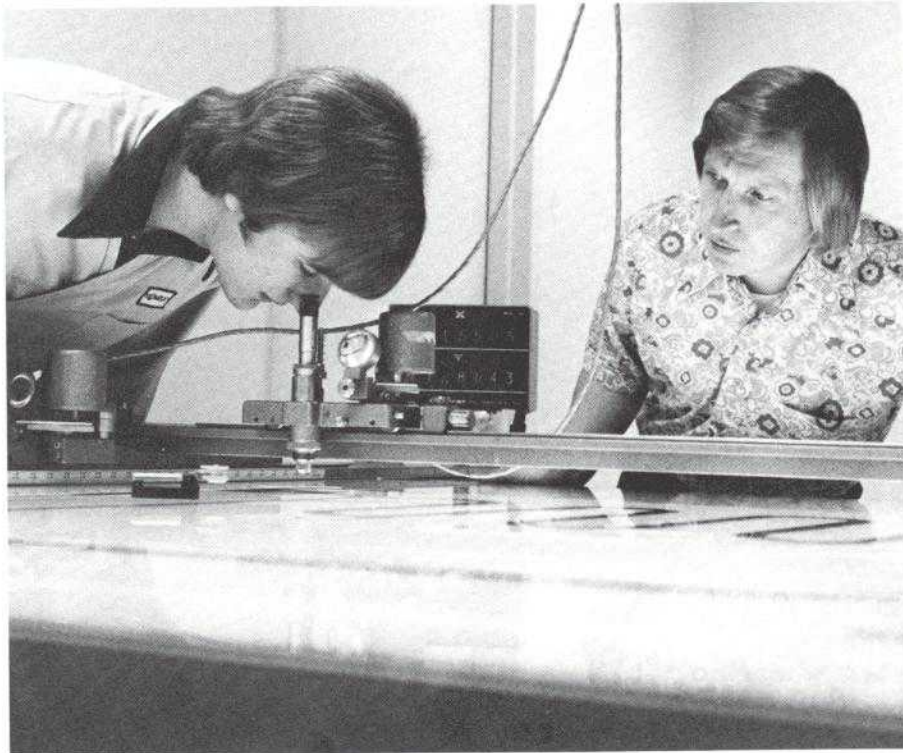
The present Washington-Moscow Hot Line is used regularly for test transmissions to keep the crews at each end in practice.

On a recent visit to the terminal in the Pentagon War Room, a UPI reporter was shown a stack of 12 Russian and 12 American messages which had been sent in the preceding 24 hours. He reported that the Moscow messages were printed on an East German teletype machine with Russian letters. One of them told the fable of a fox who kept jumping into a creek with a bunch of straw in his mouth. The fox would sink into the water until only his nose and the straw were visible. He would shake the straw away, then climb the bank and get more straw. Some hunters who were watching finally realized that the fox was ridding himself of fleas by getting them to crawl on the straw and then throwing the straw away.

One of the test English messages was:

The written word
Should be clean as a bone,
Clear as light and firm as stone.
Two words are not
As good as one.

The test messages are picked by the respective Hot Line crews for linguistic challenge and absence of controversial content.



John Bennett (left) and Stan Para cut a "layout" 20 times the size of an MIC.

PHOTOS BY J. T. MCKENNA

MIC technology revolutionizes microwave field

BY PETER F. VÁRADI

Microwaves propagate inside tubular "pipes" or in coaxial cables. "Plumbing" or "hardware" are therefore the slang names used by microwave engineers to describe the building blocks of microwave circuits. A new microwave circuit technology has been developing since 1964, which is in essence a dielectric (e.g. ceramic) board on which printed conductors are deposited to form microwave circuits. Active (diodes or IC's) and passive (resistors, capacitors) elements may be directly attached to the conductors and in this way a large variety of microwave circuits may be designed. This type of circuit is called a Microwave Integrated Circuit (MIC).

■ *Dr. Váradi is manager, material science department, Applied Sciences Labs, COMSAT Laboratories and is responsible for the Microwave Integrated Circuit fabrication technology development.*

MIC technology not only replaces the bulky "plumbing" of the "old" coaxial circuits, but revolutionizes the microwave field in both designs and applications. Compared to coaxial circuits, MIC permits excellent reproducibility, lighter weight and lower cost, therefore its importance for communication satellites as well as for earth stations is obvious. MIC technology ultimately will make possible an economical home receiver for satellite-to-home TV.

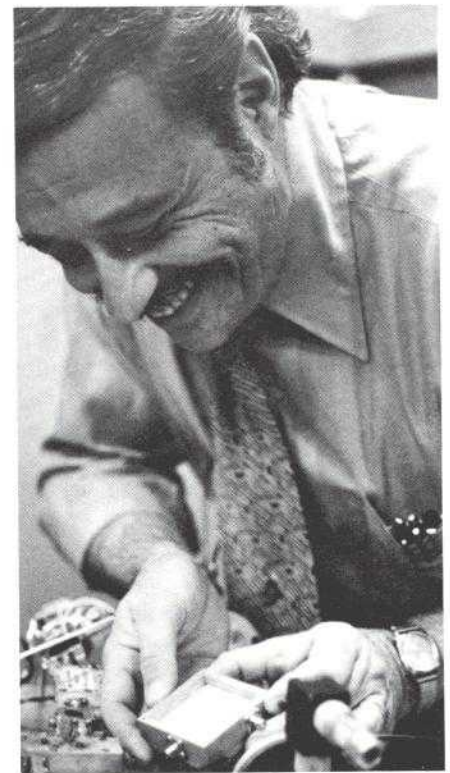
The advantages of MICs were realized several years ago. In a joint program the RF Transmission Laboratory and the materials science department of the Applied Sciences Division began developing MIC and fabrication technology. As a result of this effort the current Reliable Earth Terminal (RET) program at COMSAT Labs utilizes a great number of these new MICs, not only to replace coaxial components but also to improve reliability and performance.

All of the MICs utilized in the RET were fabricated in COMSAT Labs by the materials science department of the Applied Sciences Division. The fabrication technology of MIC (as with many other types of electronic circuitry) utilizes the various dis-

ciplines of chemistry. MICs are recent developments and therefore the materials and processes are all in an experimental stage. It is remarkable that at this early stage of MIC development they already exhibit superior reliability and stability with respect to the coaxial types.

Experiments to fabricate MICs in COMSAT Labs were initiated in 1970. Since then over 1,000 experimental circuits have been fabricated by the chemical processing branch under the direction of Lawrence Sparrow.

The MIC is built upon a dielectric board typically of 99.5 percent pure alumina ceramic. Its size may vary from 1" x 1" x 0.025" to 2" x 4" x 0.025". The MIC fabrication process starts with a sketch of the design made by a microwave engineer. This schematic is converted into coordinates and subsequently cut out from a special plastic film on a precision cutting table, called a "coordinatograph", an instrument operated by John Bennett. This "layout" is cut in a size exactly 20 times that of the required circuit. This enlarged size is necessary to ensure ultimate precision, as the next step is to reduce the artwork photographically to the desired exact size. This photo-reduc-



Larry Sparrow checks an MIC mixer with its coaxial counterpart.

tion work is performed by Stan Para utilizing a 23-foot camera and ultra-precise lenses. It is interesting to note that the accuracy required is such that the tolerances are smaller than one tenth the diameter of a human hair. This understandably requires a highly precise camera, special film and superior photographic knowledge. The special film utilized has such high resolution as to be capable of reproducing the entire Bible in a square inch! The photo-reproduced film of the circuit is evaluated under three different types of microscopes before it is ready to be used for fabrication.

Before the film can be used, the proper size ceramic dielectric must be chemically processed. The ceramic material must have very tight mechanical tolerances and polished surfaces. These ceramics, when received, are inspected in the machine shop under Ronald Kessler with respect to mechanical tolerances and to surface finish. The ceramics are then put through a vigorous chemical cleaning procedure and subsequently are coated by a combination of thin layers of metals. The first metal layers are deposited in a vacuum process developed by Dr. Richard Arndt and Nathan Morrell of the Physics Laboratory. These thin (1,000Å, which is less than the wavelength of visible light) metal films serve to provide firm adhesion of the metallization to the ceramics and also to provide a conductive layer onto which a "thicker" metal layer of still higher electrical conductivity can be deposited by electroplating. The ultimate thickness of the "thick" layer must be about .0002" in order to minimize losses at microwave frequencies. The preparation of the thicker conductive layer requires a special plating process which deposits pure 24 karat gold. This plating process was developed by Lawrence Sparrow and Rockwood Lee. The alumina dielectric substrates now coated on both sides with a 0.002" thick, conductive gold layer is then coated with a photosensitive layer.

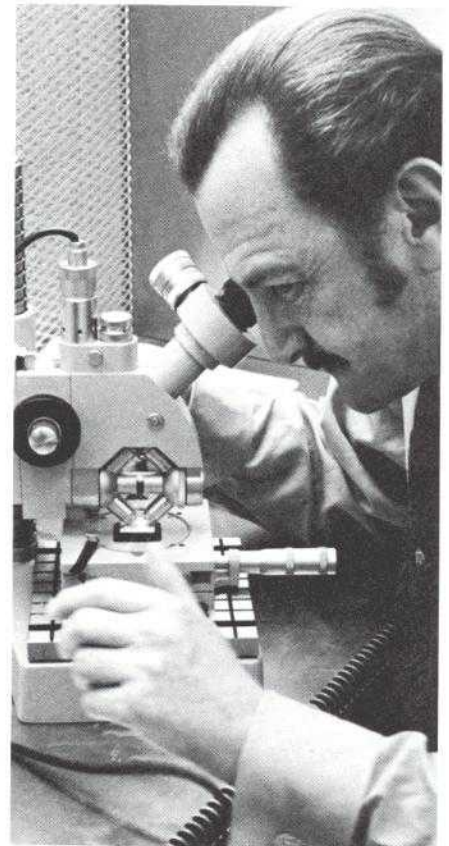
The now sensitized ceramic substrate is then carefully mounted on the film prepared previously by Stan Para in the photo lab. The film and ceramic substrates will be carefully aligned, utilizing aligning marks on

the film. Then the photosensitive layer on the ceramic will be exposed to ultraviolet light through the film. By washing the ceramic with a proper solvent, the exposed photosensitive material will be easily dissolved while the unexposed areas stay on. This development of the image is followed by an etching process in which the gold is etched off from areas not covered by the photosensitive material but the gold film will stay on where protected by the unexposed photosensitive film. When the exposed photosensitive material is finally removed by another solvent, the etched circuit is then ready for final inspection. William Cox was instrumental in assembling the required equipment and also helped to develop the process to photoetch the circuits. After the circuits are inspected for accuracy of the etched pattern, they are ready for incorporation of discrete elements when required and for assembly.

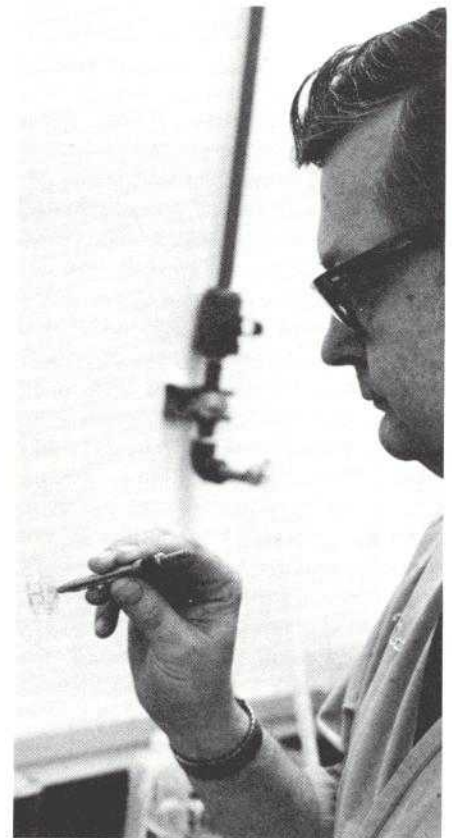
Among the many interesting applications of the ceramic MIC technology at COMSAT Labs was the fabrication of the ATS-F tunnel diode amplifier. This circuit was designed by Ronald Stegens of the RF Transmission Laboratory. To the best of our knowledge, this will be the first MIC to be used in a space application. The space application of the MIC required tight specifications on materials and processes. The material process specifications were finalized by Dr. J. Matthew Sandor. Over 100 identical MICs were fabricated to satisfy the needs of the ATS-F program.

Another interesting example is the development of the parametric amplifier circuit for the Reliable Earth Terminal (RET). This required the use of a new substrate material because of the very high frequencies involved. Since the parametric amplifier needed no refrigeration, it was considered an important improvement in the RET project.

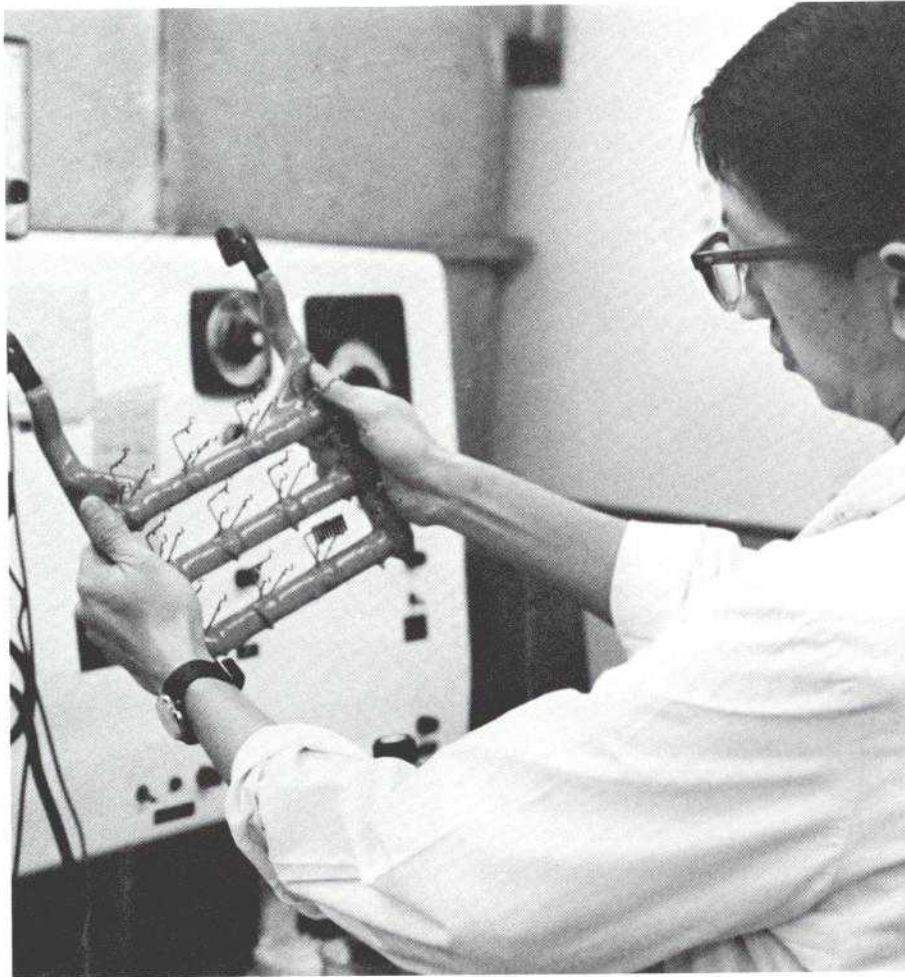
The circuit designed for this purpose by Dr. Su Min Chou, William Getsinger and Paul Koskos utilizes a 0.5" x 0.1" x 0.017" fused silica substrate. Fused silica is a new substrate material utilized at present only on a highly limited basis. From preliminary experiments it became obvious that the fabrication of fused silica MICs requires far more than a simple



Peter Váradi determines the line thickness of an MIC.



Bill Cox checks the completion of an etching.



Rocky Lee removes a fused MIC after the substrate has been gold-plated.

adaptation of the ceramic MIC process. To ensure the timely development of the required fused silica circuit, an outside source was sought and a simultaneous in-house effort was made to fabricate it. Only the in-house work succeeded and the RET parametric amplifier, based upon fused silica MICs, was completed on schedule. The newly developed MIC technology utilizing fused silica substrates has been mastered only in very few laboratories in the world.

It is not easy to describe and demonstrate the impact and utility of this simple-looking, but technologically demanding, new microwave circuitry. The fact that, in the past three years, practically all microwave circuit designs at COMSAT Labs changed from "coaxial" to "MICs" demonstrates the impact. The MIC components designed for and utilized in the Reliable Earth Terminal or the ATS-F experiment demonstrate utility. The success of new circuits encourages more applications. This however, requires

improved and new materials and development of refined fabrication technology. It can be seen that the MIC field is a challenging one as it will do as much to microwave engineering as printed circuitboards have done to electronics.

I have probably kept in suspense all of those readers for whom performance, reliability or engineering marvels are counter-balanced by realities of economy. Well, the economy of the fabrication of MICs over "coaxial" designs is outstanding. An experimental MIC, independent of its complexity, may be fabricated in a maximum of 20 man-hours. Additional pieces may be made in from 15 minutes to two hours each, depending on the required number and degree of automation. It is estimated that, including materials and labor, MICs are five to 10 times cheaper than their coaxial counterparts, in either development or production, and this makes the gold plated wiring shine over the sparkling white ceramic substrates.

ICSC approves IV-A program

The Interim Communications Satellite Committee, governing body of INTELSAT, has approved the INTELSAT IV-A program as a follow-on to the present INTELSAT IV satellites.

The program calls for construction of three high capacity satellites for use by INTELSAT commencing in mid-1975 as part of the global system.

Final action on the program in the form of contract approval is expected at the first meeting of the Board of Governors of INTELSAT which is scheduled for March 14. The Board of Governors will be the governing body of INTELSAT under the new international arrangements which became effective on February 12.

The new INTELSAT IV-A satellites will have almost a two-fold increase in communications capability over the present INTELSAT IV's.

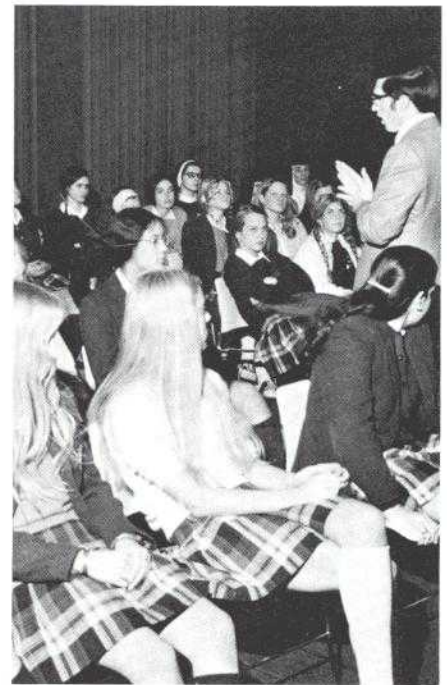
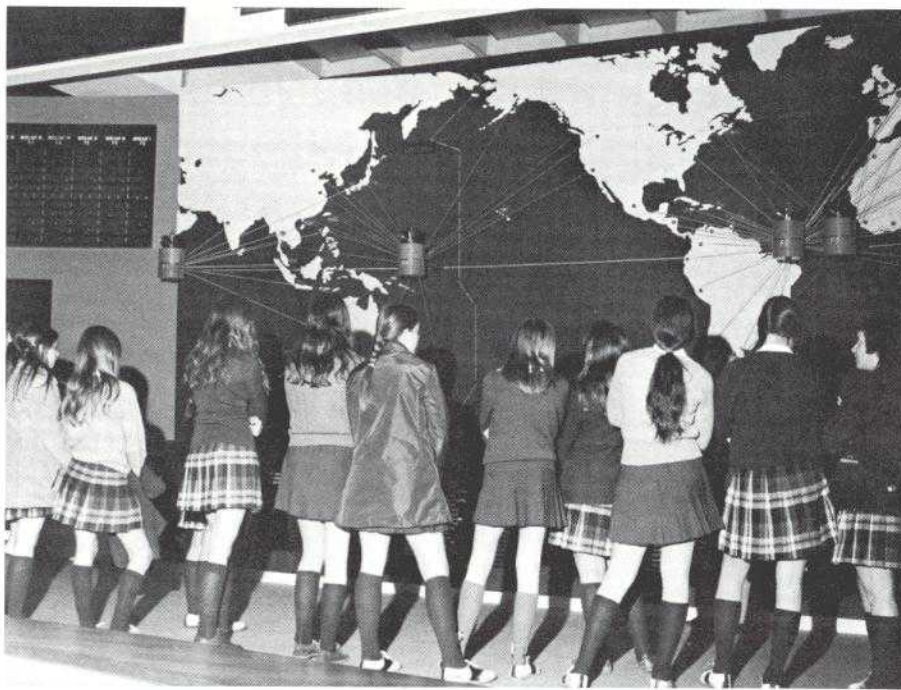
Launch postponed

The next INTELSAT IV launch has been postponed until the second quarter of this year because of delays in final acceptance testing of the on-board guidance equipment in the Atlas-Centaur launch vehicle.

Japanese firm wins study contract

Fujitsu Ltd., of Tokyo, Japan, has been awarded a contract by COMSAT on behalf of INTELSAT to conduct a synchronization and acquisition study.

This contract to be completed within 16 months will lead to the development of a satellite-switched Time Divided Multiple Access (SS/TDMA) System.



Visitors Center draws a full house

More than 90 sophomores from Georgetown Visitation Preparatory School, Washington, D. C., recently viewed the Visitors Center's 3-screen slide presentation and then toured the Operations Center as they learned the history of satellite communications. In the left photo, a group studies the global system map. In the right photo, Information's J. T. McKenna describes how a satellite operates.

PHOTOS BY ALLAN GALFUND

Highlights of ICSC action at 62nd meeting

The 62nd meeting of the Interim Communications Satellite Committee (ICSC) was held from December 13 to 20, 1972, in Washington, D. C. Seventeen members, representing a total of 45 of the 83 INTELSAT signatories, were present at the meeting.

Among its actions, the Committee:

- Noted that on December 14, 1972, Jamaica was the 54th nation to adhere to the Definitive Arrangements and fulfilled the requisite number of accessions for the Agreement and Operating Agreement to enter into force. These new international agreements will formally take effect, after a 60-day waiting period, on February 12, 1973, eight and a half years after the entry into force of the interim arrangements on August 20, 1964. The Committee also agreed with COMSAT's intention to convene the first meeting of the Board of Governors on Wednesday, March 14, 1973.

- Authorized COMSAT as Manager to commence negotiations with the Hughes Aircraft Company, on the basis of the work statement and specifications, to be distributed to the members of the Technical Subcommittee, of a draft amendment to the INTELSAT IV contract to include three INTELSAT IV-A satellites in a time frame consistent with an operational capability in mid-1975. The Committee also decided henceforth to use the designation INTELSAT IV-A for this modified INTELSAT IV, rather than the previously used term INTELSAT IV-1/2A.

- Requested COMSAT as Manager to proceed rapidly towards the preparation of an INTELSAT V system definition leading to specifications and a work statement for a request for proposals for the procurement of INTELSAT V satellites, taking into account the information to be provided by the Technical Subcommittee and the Ad Hoc Group on Long-Range Planning (or their successors) in order to make it possible for the Board of Governors, if it so desires, to make a decision in January 1974.

- Approved the 1973 INTELSAT research and development program

of \$5,314,000—\$2,654,000 for in-house R&D work at COMSAT Laboratories, and \$2,660,000 for contract commitments.

- Approved the COMSAT Laboratories Reliable Earth Terminal for access to Atlantic satellites for one year free of charge for tests and demonstrations under provisions of ICSC-18-15 (Rev 1). The Committee also approved continued access by the COMSAT non-standard earth station in Norwood, Massachusetts, to the space segment for a period of one year free of charge for tests and demonstrations under ICSC-18-15 (Rev 1). Finally, the Committee approved the RCA ALASCOM non-standard earth station for access to a Pacific INTELSAT IV satellite for communications service to Anchorage via the Bartlett Earth Station, subject to a rate adjustment factor of 5 while the station is operating with a G/T of 28.7 dB/K, and 2.5 when the station is operating with a G/T of 31.7 dB/K. For television, normal rates would apply with no increase in satellite power.

- Scheduled its 63rd and final meeting which began on January 24, 1973, in Washington, D. C.

New INTELSAT arrangements begin on February 12

On February 12, 1973, COMSAT became the United States participant in a new organization: the International Telecommunications Satellite Organization (INTELSAT).

On that date the International Telecommunications Satellite Consortium established on August 20, 1964, ceased to exist.

The new organization comes into being pursuant to definitive arrangements and succeeds the partnership arrangement which has been operating under interim arrangements since 1964.

The definitive arrangements, as the interim arrangements, consist of two separate but interrelated agreements: the Agreement, concluded among governments, and the Operating Agreement, concluded among governments or their designated telecommunications entities, public or private.

COMSAT was designated by President Nixon to be the U.S. participant in the day-to-day operations of the organization and to be the U.S. Signatory to the Operating Agreement.

As of January 23, 1973, sixty-nine other countries in addition to the U.S. had completed all necessary action constituting final adherence.

The first meeting of the Board of Governors of the new INTELSAT will convene in Washington, D. C., on March 14, 1973. COMSAT will be the U.S. representative, and, in accordance with provisions of the agreements, will make all necessary administrative arrangements for the meeting.

The Board of Governors will have

primary responsibility for the design, development, construction, establishment, and operation and maintenance of the INTELSAT space segment, and for carrying out other activities undertaken by INTELSAT pursuant to determinations made by the Assembly of Parties in certain specified instances as set forth in the Agreement.

The Board of Governors will be composed of representatives of Signatories to the Operating Agreement, having either individually or in groups at least a minimum investment share as determined by the Meeting of Signatories.

Prior to the first meeting of the Meeting of Signatories, the minimum investment share will be equal to that of the investment share of the Signatory holding place number 13 in the numerical order of investment shares.

COMSAT's share is expected to be around 40 percent.

In addition, there will be a number of representatives on the Board, each representing five or more Signatories from an ITU region, irrespective of their combined investment shares.

With certain specific limitations, voting will be proportional to investment.

In addition to the Board of Governors, other components of the four-tier organization structure are an Assembly of Parties, Meeting of Signatories, and an executive organ responsible to the Board of Governors.

The executive organ will be headed initially by a Secretary General who will be responsible to the Board of Governors for the performance of services of a financial and administrative nature.

A Secretary General is expected to be selected by mid-1973.

COMSAT will furnish technical and operational management services pur-

suant to a contract with INTELSAT for six years from entry into force, i.e., until February, 1979. In doing so, COMSAT will act pursuant to relevant policies and directives of the Board of Governors.

The Agreement says that not later than December 31, 1976, a Director General will be appointed to the Board of Governors. He will be responsible to the Board for all management services and for the supervision of COMSAT's performance of technical and operational management services, for the remainder of the six-year contract.

After the expiration of the management contract with COMSAT, the Director General is required to contract out technical and operational management functions to the maximum extent practicable.

The Assembly of Parties will be composed of a representative of the government of each member state, and will meet every two years unless it determines otherwise from meeting to meeting. It must have its first meeting within one year of entry into force, or by February 12, 1974.

The Meeting of Signatories will be composed of representatives of Signatories. Thus, COMSAT will be the U.S. representative to this body. It will meet annually, and must have its first meeting within nine months after entry into force, or November 1973.

The Assembly of Parties will provide a forum for governments to consider matters of concern to them while the meeting of Signatories will consider operational matters and other matters of interest to INTELSAT investors and participants.

Voting in both the Assembly of Parties and the Meeting of Signatories will be on the basis of one member, one vote.

New data service developed by Labs now in operation

A new high-speed data service using advanced digital techniques has been placed in full-time, commercial operation between the U.S. Mainland and Hawaii.

This new service, using single-channel-per-carrier (SCPC) equipment developed by COMSAT Labs, was inaugurated via an INTELSAT IV Pacific satellite in December for the Advanced Research Projects Agency (ARPA), a facility of the Department of Defense. The channel connects the NASA Ames Research Center located at Mountain View, Calif., with the University of Hawaii and provides capability to transmit and receive large quantities of computer data at high speeds.

COMSAT has also received a second order for such a channel, to be activated in June of this year, which will connect NASA's Goddard Space Flight Center with a NASA switching center at Robledo, Spain.

As a matter of fact, the SCPC service, which is unique to satellite communications, can accommodate data speeds up to 56,000 bits per second. (The basic language of computers is in "bits" with a typical letter or numeral being composed of about eight "bits" of information.) This is the equivalent of about 70,000 words per minute and at this rate a typical newspaper page can be transmitted in seconds.

These high-speed channels can be used in a number of applications, including transmissions between interactive and time-shared computer installations overseas, high-speed facsimile for photos, news and printing uses, inputs for electronic plotters, and other volume data communications.

The equivalent of only a single voice-grade satellite channel is required to transmit and receive data at these speeds, using this new digital technique. The same volume of data, employing conventional frequency modulation (FM) techniques, requires the equivalent of 12 voice-grade channels.



"What on earth is an earth station?"

Britain's Princess Margaret recently officiated at the inaugural of a new earth station on the Caribbean island of Barbados. In her comments, the Princess asked, "What on earth is an earth station?" She then proceeded to answer her own question, explaining that "because of this installation of yours, words and pictures will be projected to and from the ends of the earth, unhindered by the physical barriers which separate country from country." In the photo above, Her Highness unveils a plaque marking the opening of the new station. COMSAT President Joseph V. Charyk and Mrs. Charyk were guests at the ceremony.

In addition, the most common mode of satellite operation uses frequency division multiplex-frequency modulation (FDM-FM). The SCPC service, in contrast, is a phase shift key (PSK) system, utilizing digital coding techniques that permit greater volumes of data to be carried, thus using smaller amounts of satellite bandwidth than are needed in normal FM operations.

The rate filed with the Federal Communications Commission (FCC) by COMSAT for the new service is \$5,800 a month for a through satellite link between the COMSAT-operated earth stations at Jamesburg, California, and Paumalu, Hawaii.

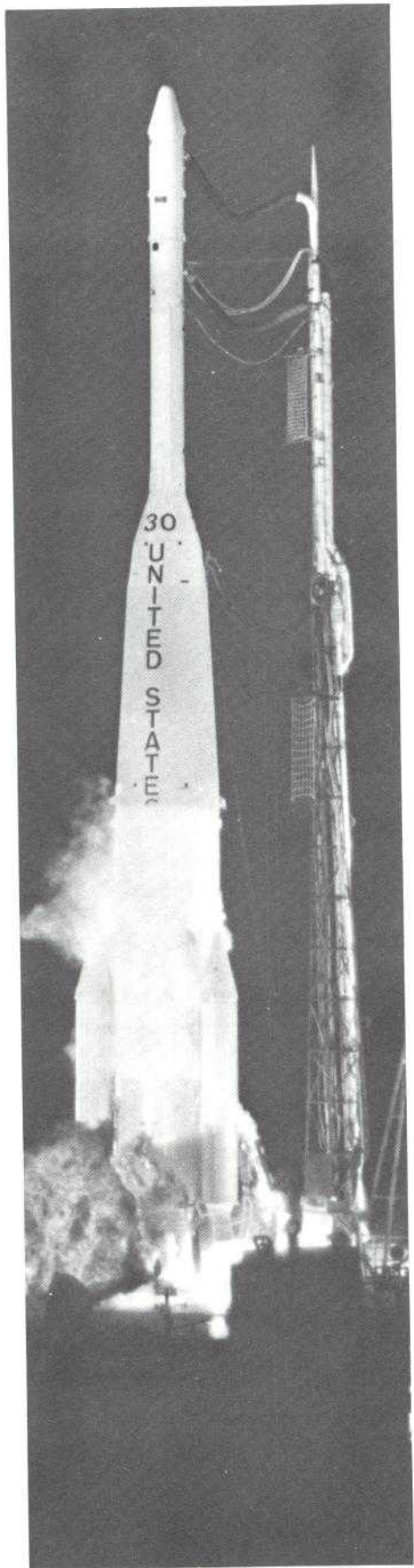
"The significance of this new service offering," COMSAT told the FCC in its tariff offering, "is that intercontinental high speed data services can

be furnished more economically, which should open up a new market not visualized prior to the implementation of satellites."

Nippon Electric awarded transducer contract

COMSAT on behalf of INTELSAT has awarded a contract to Nippon Electric Company of Tokyo, Japan, to design, fabricate, test and deliver a dual polarized transducer assembly.

The \$57,500 fixed price contract is for an earth station assembly which would operate in a satellite communications system in which orthogonal polarization techniques would be employed to reuse the frequency band. The transducer assembly will be designed for installation in the feed systems of existing earth stations with 97-foot antennas.



Early Bird was launched in April 1965 and began the global system.

Milestones of COMSAT's First 10 Years

- 1962** The Communications Satellite Act of 1962 received final approval in the Congress on August 27 and was transmitted to the President of the United States, who signed it four days later.
- 1963** The Articles of Incorporation of Communications Satellite Corporation (COMSAT) were executed on January 29 and transmitted to the President of the United States, who approved them. COMSAT was incorporated in the District of Columbia on February 1.
- 1964** COMSAT adopted a program for development of the global satellite system and for financing the program through an initial stock offering. COMSAT's public financing was carried out on June 2 when 10 million shares (at \$20 a share) were offered through a nationwide underwriting. Both the Series I (public) and Series II (communications common carriers) offerings were over-subscribed the first day.

The International Telecommunications Satellite Consortium (INTELSAT), a unique partnership for progress, was created as a result of two international agreements opened for signature in Washington, D. C., on August 20. Eleven par-

ticipants signed during the first day and the number grew steadily, to 83 by the end of 1972. The agreements designated COMSAT as Manager on behalf of the Consortium.

The first annual meeting of COMSAT shareholders was held. The initial Board of Directors was succeeded by 12 directors elected by the shareholders and three appointed by the President of the United States with the advice and consent of the Senate.

- 1965** Early Bird was launched on April 6 and on June 28 began providing the world's first commercial communications satellite service.

The Federal Communications Commission (FCC) granted COMSAT interim authority to own, construct and operate the initial United States earth stations.

- 1966** Based on the success of Early Bird, a synchronous orbit configuration was chosen for the initial global system.

COMSAT submitted its first proposals for U.S. domestic and aeronautical services, which were revised and expanded in subsequent years.

COMSAT completed construction of the Brewster, Washington, and Paumalu, Hawaii, Earth Stations.

- 1967** Three satellites of the INTELSAT II series were launched successfully into synchronous orbit and placed in operation, extending full time service to the Pacific region and expanding availability in the Atlantic region.

COMSAT proposed a pilot program for U.S. domestic services.

COMSAT commenced full commercial operations, following developmental accounting methods during its formative years.

COMSAT instituted its first rate reduction.

- 1968** The first two satellites in the INTELSAT III series were successfully launched and put into commercial service.

COMSAT completed construction of the Etam, West Virginia; Jamesburg, California; and Cayey, Puerto Rico, Earth Stations, while worldwide earth station development by COMSAT's partners in INTELSAT increased significantly.

- 1969** Worldwide coverage by satellite was established when an INTELSAT III satellite went into service over the Indian Ocean.

COMSAT Laboratories, a major research and development facility, was completed and occupied.

- 1970** The Board of Directors declared COMSAT's first dividend. COMSAT completed construction of the Bartlett Earth Station in Alaska.

COMSAT filed for authority to provide a separate domestic satellite system whose capacity would be leased to American Telephone and Telegraph Company.

COMSAT refined its earlier concepts for aeronautical satellite services and again submitted a proposal to the Government and the airline industry.

- 1971** Satellite system capability was expanded by the launches of the first and second INTELSAT IV satellites, which were put into service in the Atlantic region.

COMSAT proposed a multipurpose domestic services program.

Agreements for definitive arrangements for INTELSAT to supersede the interim arrangements of 1964 were drafted by an international conference and opened for signatures.

- 1972** The third and fourth INTELSAT IVs were successfully launched in the first half of the year and put into service.

President Nixon's visits to the People's Republic of China and the Soviet Union were widely viewed on TV via satellite. Other notable satellite TV coverage included the Sapporo and Munich Olympics, Apollo 17, and the U.S. national elections.

In June, by a 4-3 vote, the Federal Communications Commission (FCC) adopted a U.S. domestic services order which would severely restrict COMSAT. COMSAT petitioned the FCC to stay the order and to reconsider the restrictive policy.

COMSAT, MCI Communications Corporation, and Lockheed Aircraft Corporation announced agreement for establishment of a jointly owned company to provide nationwide satellite communications services.

Jamaica became the 54th INTELSAT member to ratify the definitive arrangements, thus completing the necessary ratifications to bring the new arrangements into force, which will happen on February 12, 1973.

Acting on petitions for reconsideration of its domestic satellite policy enunciated in June, the FCC authorized COMSAT to establish a satellite system whose capacity would be leased to AT&T for domestic services and to participate with Lockheed and MCI in a joint venture to establish a separate, multipurpose domestic satellite system which could serve all users other than AT&T.

At year's end the number of regular communications pathways in the satellite system numbered more than 250 among 79 antennas at 65 station sites in 49 countries.



COMSAT's David E. Burks (left) and Ivor N. Knight review a document during the recent CCITT Plenary Assembly.

COMSAT delegation participates in CCITT plenary

BY IVOR N. KNIGHT

A large proportion of the 400,000 inhabitants of Geneva, Switzerland, are statesmen, diplomats, interpreters and secretaries, associated with the United Nations and the multitude of international organizations which have chosen this city for the location of their headquarters. During the months of November and December, 1972, the city's population figure was increased another 800 plus, by the arrival of delegates from 70 countries for the Fifth Plenary Assembly of the CCITT (International Telegraph and Telephone Consultative Committee), and the meetings of the various study groups which preceded it.

Long the international crossroads of Europe, Geneva owes its estab-

■ *Mr. Knight is a member of the U.S. Systems Management Division and was a COMSAT delegate to the Fifth Plenary Assembly.*

lishment as the meeting place of the world to one of its residents, Henri Dumont, whose dramatic accounts of 19th century warfare led to the signing of the Geneva Convention in 1864 and the founding of the International Red Cross. However, the geographical location of the city—situated at the southern tip of beautiful Lake Lemman and close to some of the most famous winter sports resorts in the world—together with the charm of the picturesque "Old Town" area, must be credited, at least in part, to the influx of so many international organizations over the years.

The International Telecommunication Union (ITU), the CCITT's parent body, transferred its operation to Geneva in 1948 and has held most of its meetings in its modern headquarters building opened in 1962. However, the progress in telecommunications technology, during the four years since the last CCITT Plenary Assembly, created so much interest that one of the older, glass-domed structures of Geneva, the Maison de Congress, had to be pressed into service to accommodate the meeting requirements. Described by a past director of the CCITT in 1960 as "Our good old glass cage, icy in

winter, glowing in summer and threatened with demolition for 30 years", the "Maison" became the daily office during most of November and December, 1972 for eight COMSAT employees who attended the Plenary Meeting. Led by Charles Baer, COMSAT's ITU coordinator, the delegation participated in most of the 20 Study Group meetings which considered questions ranging from changes to the existing international telephone rates to the development of a future international demand assignment system via satellite.

As in the past the presence of COMSAT's European Office in Geneva was a great asset to COMSAT staff members attending the ITU meeting. Mr. Goldstein's staff made a significant contribution to the success of the meeting by providing very efficient administrative and secretarial support.

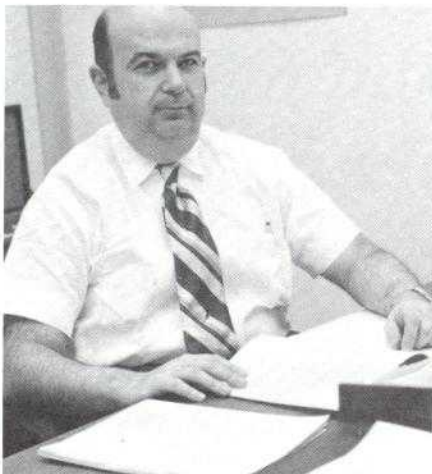
Although the progress made since the last Plenary Assembly has far exceeded past performances, a major task which confronted the Assembly was to develop methods to speed up the work of the study groups. During the next four-year study period, these meetings will be grouped together in an effort to reach decisions more rapidly but it still appears that patience will be a necessary virtue for the developers of new international communications techniques and applications for some time to come.

Many proposals to rearrange the activities of the CCITT study groups were made by various Administrations during the meetings but agreement on an optimum structure could not be reached, so the present arrangement will be maintained during the next four years. However the Chairmen and Vice Chairmen of the various study groups were changed as it is the normal procedure to elect new officers at the Plenary meetings. Mr. Helmo Raag of the COMSAT Labs' System Division was elected by the Plenary Assembly as Vice Chairman of Study Group Special D. This study group deals with digital systems, an area of great importance for inter-continental services during the next four years.

Even the most ardent Genevois will not object to the statement that November and December are not the

best months to visit Geneva. Situated as it is, between two mountain ranges, more often than not the city and lake are covered by a low cloud at this time of the year and if it isn't raining at a given moment, it looks as if it will start in seconds.

Nevertheless on two Sundays in a row the sun shone briefly, enabling at least two COMSAT delegates to try the national Swiss pastime of mountain walking. In Geneva the popular Sunday stroll is up the face of the "Saleve", a mountain overlooking Geneva to the south-east of the city. Only in Switzerland would it be termed a stroll, in most other locations it would be definitely described as a climb.



Dr. Golding

Lab's Golding appointed study group chairman

Dr. Leonard S. Golding, Technology Division, COMSAT Labs, was recently appointed as Chairman, U.S. CCIR Study Group CMTT.

The International Radio Consultative Committee (CCIR) is one of four divisions of the International Telecommunications Union (ITU). Study Group CMTT, a major component within the CCIR, is concerned with television transmission matters.

Dr. Golding, a COMSAT employee since April, 1967, is manager, image processing, in the Communications Processing Lab. He is the second COMSAT staff member presently leading CCIR study groups. James B. Potts, Director, Earth Station Implementation, has been U.S. Chairman, CCIR Study Group 4, since 1971.

Satellite usage gains continued during 1972

The use of the global satellite system for international communications continued to increase during 1972, as it had each year since commercial satellite service was begun.

At December 31, 1972, COMSAT was leasing to its carrier customers 2,971 half circuits, 17.2 percent more than the 2,537 being leased a year earlier.

On a global basis, full-time usage (including COMSAT's) amounted to 7,497 half circuits, a gain of 29 percent over the 5,822 being leased a year earlier.

The full-time leased circuits account for about 94 percent of satellite system revenues. The remaining 6 percent comprises television transmissions, temporary service such as cable restoration, and other occasional services.

Temporary service provided by COMSAT during 1972 amounted to 18,857 half circuit days, as compared to 23,481 during 1971.

Temporary service on a global basis amounted to 53,833 half circuit days, as compared to 46,828 during 1971.

Cable restoration service on a global basis amounted to 36,428 half circuit days, as compared to 29,822 in 1971. COMSAT provided 13,288 of these, as compared to 15,814 in 1971.

Television service also increased during the year. U.S. (or COMSAT) half-channel hours totaled 1,666, an increase of 75 percent during the year.

Among the major events contributing to the record total of U.S. TV via satellite were President Nixon's visits to the People's Republic of China and the Soviet Union, the Olympic Games in Sapporo and Munich, the Apollo 16 and 17 missions, the conflicts in Asia and the Middle East, the Paris Peace Talks, the U.S. election campaigns, and the transmission of sports events to Hawaii and Puerto Rico.

Global television transmissions and receptions amounted to 6,792 half-

channel hours, an increase of 90 percent.

The frequency of TV transmission via satellite also increased in 1972 to a global average of 328 transmissions per month, as compared to 203 in 1971, and 96 in 1970.

The increased TV transmissions during the year were primarily due to four factors:

- continued growth in the number of countries with satellite earth stations,
- an unusually large number of news events of international interest in 1972,
- growth in the number of transmissions among countries other than the United States, and
- expansion of regular multideestination news telecasts involving foreign countries.

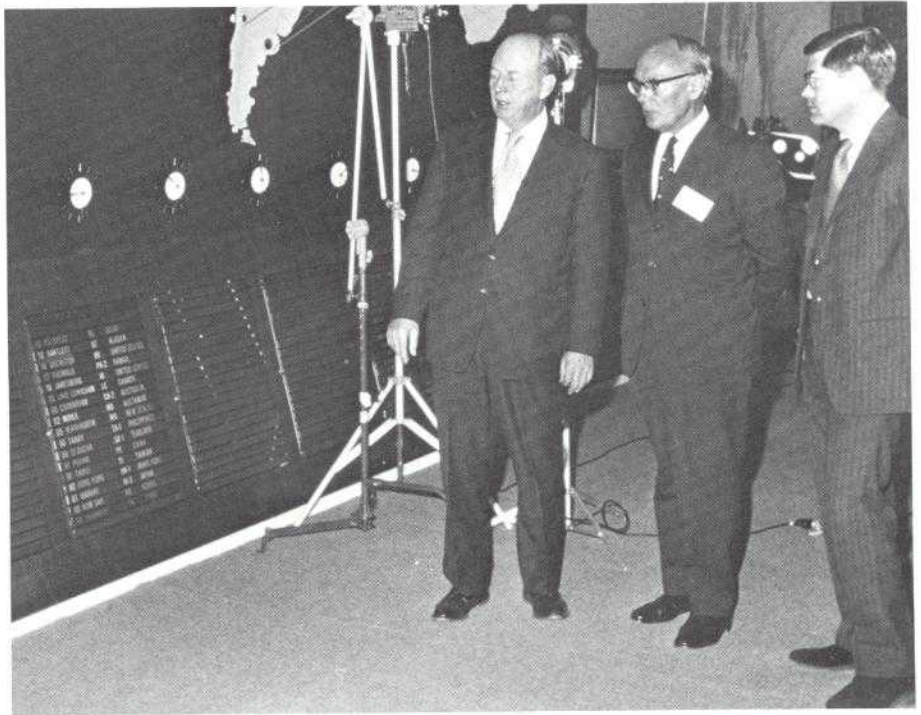
At the end of 1972, the global system comprised 79 antennas in 49 countries, as compared to 63 antennas in 39 countries at the end of 1971.

Also increasing is the number of countries leasing satellite services on a full-time basis through adjacent countries having satellite stations. There are about 30 such countries.

Sports events remained an important category of satellite TV. In addition to global distribution of Olympics Games coverage, the satellite system transmitted coverage of soccer games widely in Latin America and between Europe and Latin America, and a number of soccer, boxing and other sports events to countries in the Middle East and Africa. The satellites also transmitted coverage of the recent All-African Games held in Nigeria to a number of African countries.

Also during 1972 Spain continued its thrice daily 30-minute broadcasts to the Canary Islands. And the Iberoamerican news service continued to exchange newscasts five times a week among Spain, Colombia, Peru, Venezuela, Brazil, and Argentina.

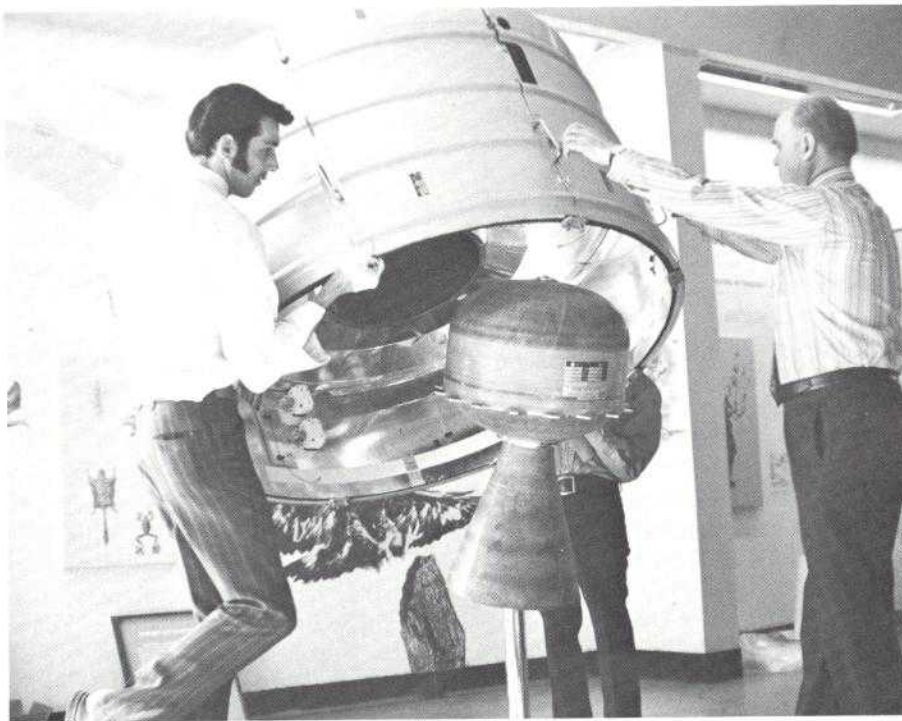
A new daily multideestination newscast was initiated from France to Israel (10 minutes), to Jordan (10 minutes), to Morocco (30 minutes), to the Ivory Coast (20 minutes), to Martinique (30 minutes), and to Zaire (20 minutes).



PHOTOS BY ALLAN GOLFUND

Cable and Wireless Chairman visits COMSAT

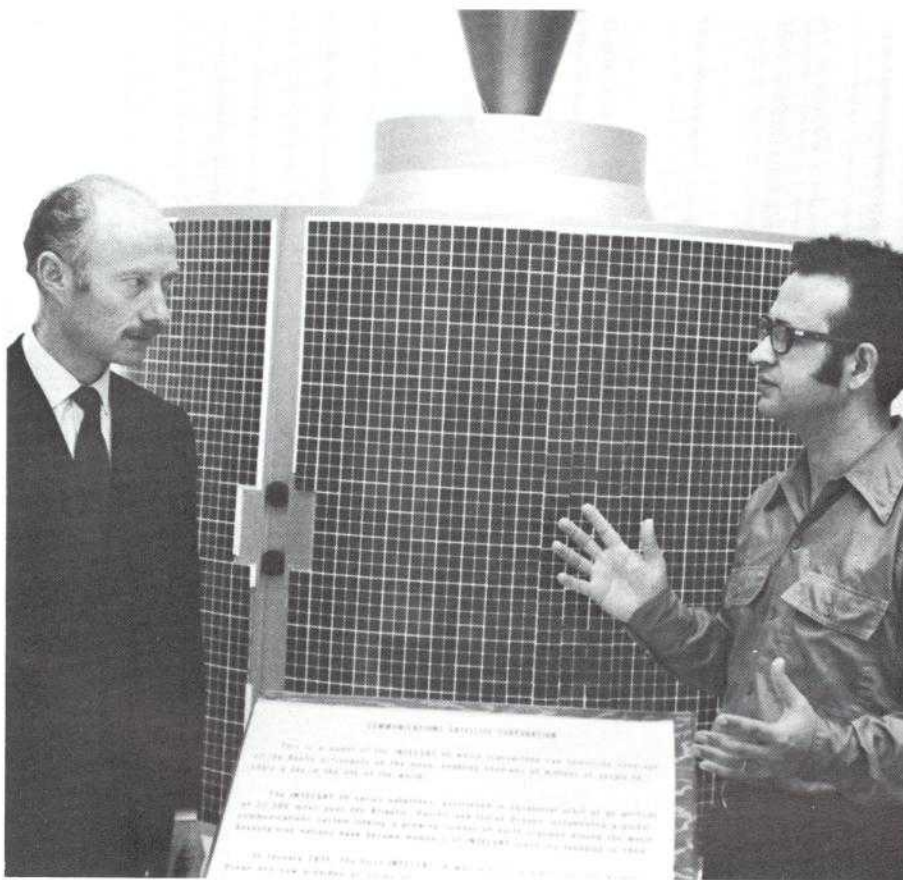
H. G. Lillicrap, Chairman of Cable and Wireless Limited, London, England, recently visited COMSAT. In addition to its extensive cable interests, Cable and Wireless owns and operates seven INTELSAT earth stations. In the left photo, Mr. Lillicrap talks with an overseas location from the Operations Center console as COMSAT's Dennis V. Neill looks on. In the right photo, Larry Covert (left) explains the global map to Mr. Lillicrap (center) and INTELSAT assignee Dai Rees, a Cable and Wireless employee.



PHOTOS BY J. T. MCKENNA

INTELSAT II satellite goes on display at Smithsonian

INTELSAT II, F-5 was recently presented to the Smithsonian Institution's Air and Space Museum. In the left photo, Rod White (left) and Bill Barr position the satellite over its apogee motor. In the right photo, Gordon Johnson explains how the satellite operates to Miss Toni Anthony, a young visitor from North Carolina.



Joseph Biala (left) listens as Francois Assal, COMSAT Labs, explains in Hebrew the global satellite system.

PHOTO BY J. T. MCKENNA

Israeli visits COMSAT

Joseph Biala, head of the International Telecommunications and Tariffs Division, Israeli Ministry of Communications, recently completed a three-week visit to COMSAT on an International Telecommunications Union (ITU) Fellowship.

While at COMSAT, he reviewed the "economic aspect of international communications, tariffs, criteria, and calculations" with Carl Reber, Director, Financial Analysis, and members of his staff.

Board declares regular dividend

COMSAT's Board of Directors declared the regular quarterly dividend of 14 cents on each of the Corporation's outstanding shares at its meeting held on January 26. The dividend, COMSAT's tenth, is payable on March 12, 1973, to all shareholders of record as of the close of business on February 9, 1973.

Intertechnique to design satellite control unit

COMSAT on behalf of INTELSAT has awarded a contract to Intertechnique of Plaisir, France, for a distribution control unit.

The contractor will develop, test and deliver within 15 months an engineering model of a spaceborne distribution control unit which will dynamically control signal switching in future communication satellites. This engineering model will stress reliability and low power consumption through the utilization of advanced, large-scale integration semiconductor technology.

Antarctic station completes a year of unattended service

The small unmanned earth station located at McMurdo Sound in the Antarctic successfully completed one year of unattended operation in January.

The facility, called the UGO (Unmanned Geophysical Observatory), is equipped with an 8-foot diameter antenna, electronic equipment and its own power generating source. It automatically collects geophysical data and transmits it via the Pacific INTELSAT IV satellite and the Jamesburg Earth Station to a computer center at Stanford University near Palo Alto, California.

On January 3, it completed its first full year of operation. A Stanford University report to COMSAT said "data quality has been excellent, demonstrating that automatic stations can be effectively used in remote areas such as the Antarctic to extend our ability to monitor the earth's environment."

The report said the thermal design of the station works well, and the propane thermoelectric generators supplying electrical power have functioned reliably.

The report noted that "the INTELSAT communications link is reliable despite the low elevation angle and is not degraded during intense magnetic storms such as occurred August 4, 1972."



Are you from the North Pole?

COMSAT EMPLOYEE NEWS

CEA Christmas party

More than 125 children of COMSAT employees in the Washington, D. C., area enjoyed a visit from Santa on December 9.

Gifts, games, a lollipop tree and plenty of fun highlighted this annual CEA-sponsored event.



They all look so good.



Yes, I have been a good girl.



A gift from Santa.



What could it be?

CEA holds dinner dance

The 1972 CEA Christmas Dinner Dance, held for the first time at the Army-Navy Country Club in nearby Arlington, Va., was an evening to remember.

More than 150 couples enjoyed a gourmet dinner, excellent music and holiday cheer.



The Atsushi Tomosawas add distinction to the dance floor.



Al and Janet Yenyo set a fast pace.



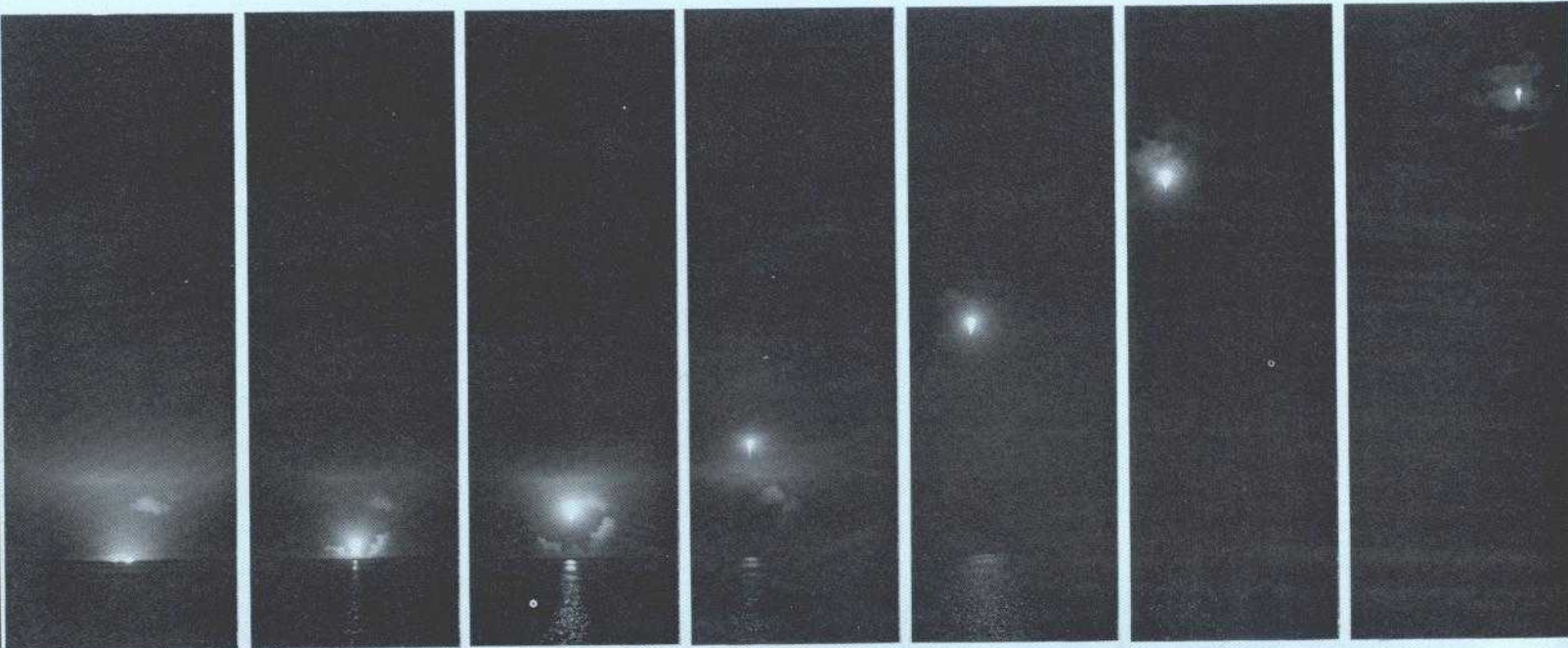
Ed and Barbara Lucia in action.



Mary Anne Stamminger and John Puente enjoy the music.



The Don Greers relish a quiet moment on the dance floor.



Apollo 17 and the Magic Kingdom; a combination to remember

The long countdown for the final flight in the \$24 billion Apollo program had begun. The slender white Apollo 17 launch vehicle, 363 feet high, stood poised on the pad. Radio announcers estimated that 41,000 VIPs and other invited guests had gathered for the spectacular night launch. Dr. Charyk, Matthew Gordon and Larry Hastings were also on hand in their "working clothes."

And then there was the COMSAT charter group.

The chartered Allegheny Convair sat on an apron at National Airport just across the river from the COMSAT building. It was 8:30 a.m. Wednesday morning . . . and holding. Six members of the group, snared in the rush-hour Beltway traffic (they claimed), eventually came sprinting down the concourse, quickly boarded our space vehicle and the COMSAT Cape Special was finally launched sometime around 9:00 a.m.

We planned a short fuel stop in Charleston, S. C. However, one of our passengers had to run into the terminal to mail a postcard to the folks back in Washington, so this added a few minutes to our time on the ground. Finally, off we went to Titusville, Florida.

After briefly circling Disney World in a holding pattern, our charter

landed at the Titusville Airport at 12:30 p.m. We were off by bus for a tour of the Cape with the first stop at the Visitor's Center where we were joined by our NASA escorts. Everyone had a chance to see the exhibits, including the new COMSAT display, buy souvenirs and, yes, postcards.

Next stop was the VAB or vehicle assembly building. (To reach this huge structure we drove through orange groves laden with fruit ready to be picked.) It was in this building, containing more cubic feet than the Empire State Building, that some 5,000 men worked to assemble the Saturn rocket which launched Astronauts Cernan, Evans and Schmitt on their trip to the moon.

As we left the VAB, we saw the final results of all those many man-hours of work standing on Pad 39A just three miles away—the Apollo 17 launch vehicle ready for liftoff and what could be man's last trip to the moon for years to come.

Our last stop took us to a nearby hangar where the next flight model in the INTELSAT IV series of satellites was being assembled. Dennis V. Neill, manager, system control, who was on the trip, helped our NASA guides explain some of the satellite's features and answered the group's questions.

By now the dinner hour was close,

and the scheduled launch time of Apollo 17 was nearing. We headed for nearby Cocoa Beach and Ramon's Restaurant for cocktails and dinner.

The above photograph of the Apollo 17 liftoff is a composite of seven individual exposures taken at Cape Kennedy by Carl W. Johnson (International) using a Canon 35mm camera with a 50mm lens at a speed of 1/40, f/4.

After an excellent meal, we bussed to a local marina and boarded our boat, a 66-foot fishing ship out of Daytona Beach, for the cruise up the Indian River to a spot where we had a clear view of the huge Saturn 5B rocket eerily illuminated in the distance by powerful floodlights.

Everyone was anxiously awaiting the scheduled launch time—9:53 p.m. When the now-famous delay occurred at 30 seconds before liftoff, more cold beer was in order. We waited and waited, listening intently to the radio broadcasts giving status reports on the courses of action that could take place.

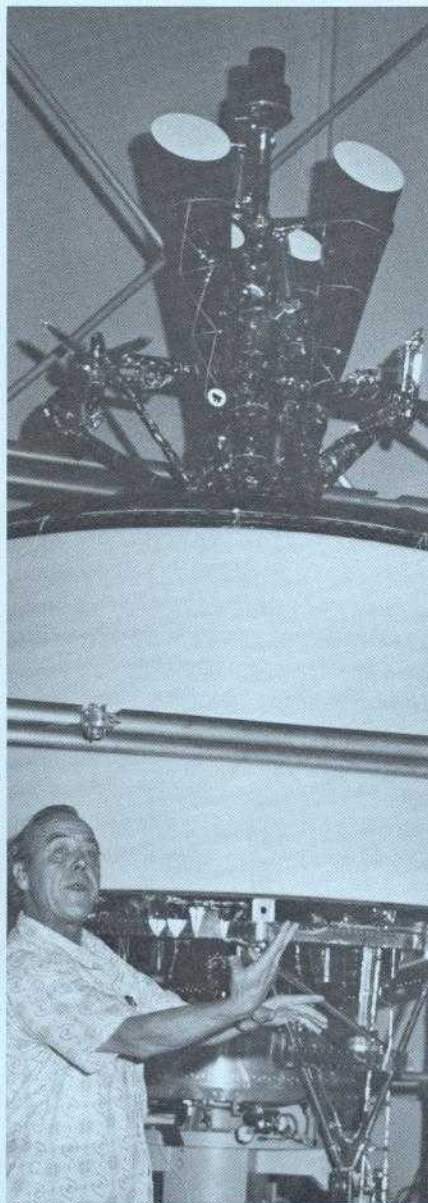
As the hours dragged on, some of the folks took naps on the upper deck of the boat, while others ate



Main Street in Disney World.



Pat Kiernan (left) and Jean Lutwin marvel at the size of the VAB.



Denny Neill describes the interior of an INTELSAT IV satellite.

sandwiches and potato chips and drank more beer.

Finally, the count resumed and everyone was on their feet looking over the railing at the huge white rocket in the distance. Then it came. "... 10-9-8, we have ignition." The sky and ground lit up as if a ball of fire had been rolled from one end of Cape Kennedy to the other. The rocket with its three-man crew roared past the metal gantry, pounded the ground with its thrust and left behind a trail of fire. For over three minutes, the naked eye could see Apollo 17 soar out over the Atlantic aiming for a moon landing four days later.

Several hours later, we found our

motel near Orlando after a long bus ride through the morning darkness and fog. It was after 4 a.m. Thursday morning when we finally called it a day, but it was a day that none of us will soon forget.

It seemed like only minutes later when our wake-up call came. Actually it was 9:45 a.m. and we were only 45 minutes away from our next launch.

After a quick breakfast (for most of us) we were off to Disney World and a trip through the Magic Kingdom.

Under sunny skies and with the temperature in the low 80s we spent a pleasant day with Mickey and his friends.



Our stewardess had almost as much fun as we did.

We left Disney World about 5:30 p.m. that afternoon wearing our Mickey Mouse ears and singing the traditional Mouseketeer song and headed for the Orlando airport and home. We were given an official escort to the runway where our plane was waiting. To our surprise, we were greeted by our crew in their own Mickey Mouse ears.

Within minutes, we were on our way and after an in-flight dinner, we arrived home about 9:30 p.m.

Friday was work as usual, and most of us did make it to the office to tell our stories to anyone who would listen.



Tom Easter unloads a big one.



Jean Sephton initials the roster prior to picking up her bird.

Turkey day at Plaza

For the second consecutive year, COMSAT employees were presented with a Christmas turkey as a gift from the Corporation.

On December 23, Headquarters personnel received their tender toms ready for the oven.

PHOTOS BY J. T. MCKENNA



Gene Christensen prepares to bag a turkey for distribution.



Bob Adams (left) and Herb Chu with their Christmas dinner in hand.



Cayey holds Christmas party in spite of rain

Ignoring a tropical downpour, Cayey held its annual Christmas picnic in mid-December. In the left photo, Station Manager Lee Jondahl plays Santa Claus. In the right photo, John Gonzalez enjoys a holiday hug.

From COMSAT West

BY AL VERBIN

Parties have been held for just about everything lately. Two more of COMSAT West's oldtimers left the rigors of Southern California living to move back to Headquarters as Jim Wilde and Si Bennett headed east. Irv Dostis hosted a party for Si, while Jim's party was given by Bob Sackheim who left COMSAT in 1972. Jim was presented with a full-race timing light so that he could take over the job of tuning Bennett's car while Si got a blender so he could provide Jim with appropriate refreshments.

We enjoyed our Christmas party at a novel place called the 1520 A.D. where the food, entertainment, and particularly the serving wenches were in the manner of 16th century England. Jeff Robinson, who arranged the feast, soon found that the prices were regrettably contemporary.

■ *Mr. Verbin is a member of COMSAT's West Coast Space Support Implementation Office.*

After only one runoff ballot, we elected the 1973 COMSAT West Employee's Association Officers. Phil Avruch leads us, while Charlie Johnson and Bill Nakano are first and second vice president, respectively. Suzie Lee declined to run for secretary-treasurer again so Muriel Johnson won by a romp giving us the distinction of having two Johnsons in office at the same time.

Best wishes for the new year from COMSAT West.

News and notes from Andover

BY JOANNE WITAS

The CEAA sponsored its sixth annual children's Christmas party on December 17 at the Visitors Building. In addition to the gift each child received from Santa there was plenty of punch, candy, ice cream, and cookies.

Once again the snow machines and skis are in action as winter has really set in at Andover. Skiing, for us, is a

family sport as well as an individual effort. On the slopes, you will often see members of the Arness, Durand, Engblom, Lepage, and Michaud families. Skiing for our Andover team are the Briggs, Jaros, Sauret, and Summerton kids.

As for the snow machines, approximately 50 percent of the folks at Andover own at least one machine and some as many as three. Our secretary, Judy Hodgkins, just acquired a new snow machine of her own and within the first 10 minutes managed to tip it over. Fortunately she didn't get hurt.

As in past years, our COMSAT wives donated a holiday gift to a local worthwhile cause. This year the ladies presented poinsettias to nearby nursing homes.

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



Corporate Secretary Robert B. Schwartz (left) confers with Assistant Secretaries Jerome W. Breslow (center) and Marvin R. Jawer regarding a Board of Directors meeting.

PHOTOS BY J. T. MCKENNA



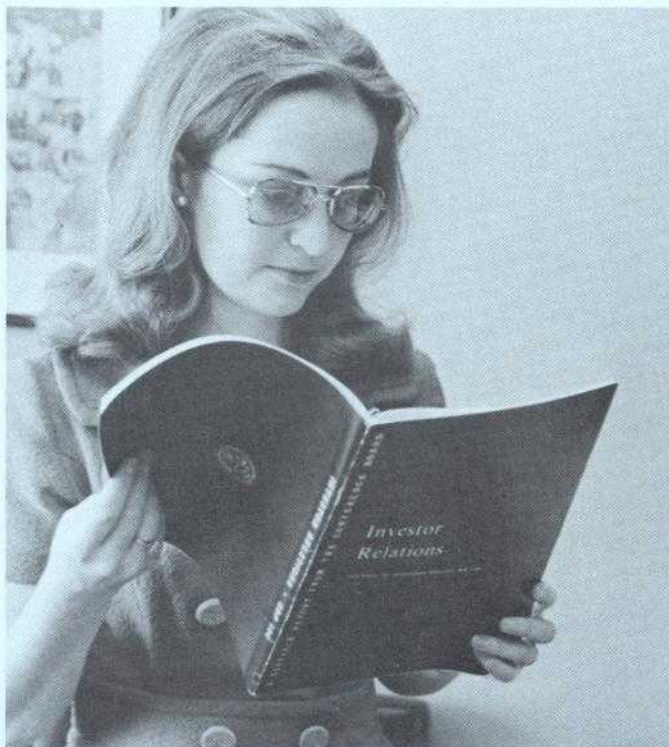
Virginia A. Oehler places a telephone call for Mr. Schwartz.

Secretary's office provides variety of corporate services

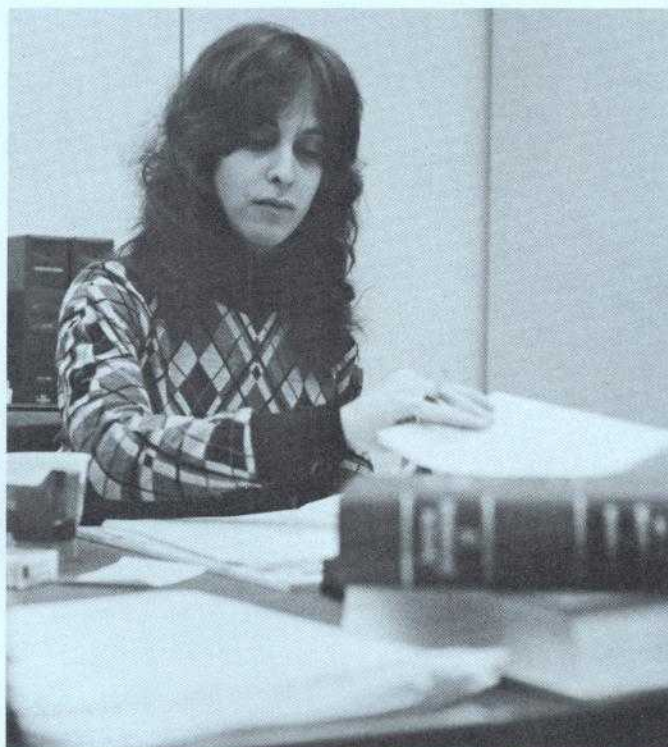
The office of the Secretary and Counsel for Corporate Matters is responsible under the Vice President and General Counsel for providing legal advice and services in the area of corporation law. The office also is responsible for matters relating to the conduct of meetings of the shareholders and of the Board of Directors; for matters relating to the issuance and transfer of shares of the Corporation's common stock and the listing and trading of shares on the stock exchanges; for correspondence with shareholders; for matters relating to conflict of interest and delegations of corporate authority; and for a variety of formal functions including the retention and safekeeping of important documents, the use of the corporate seal, and the making of attestations and certifications.



Ann Younger assembles an agenda in preparation for a meeting.



Judy Elnicki, assistant for shareholder relations, studies an investor manual.



Meryl Rosen, assistant for corporate matters, prepares a paper for a director's meeting.



Ann Younger, Hazel Ewing, Lee Thompson, and Virginia Oehler (left to right) assemble agendas.



"Poosh," the monkey, joins the Cook family

Former COMSAT employee Davina Cook was lucky (?) winner of a Capuchin monkey recently raffled off by George Lawler, COMSAT's Director of Marketing. In the left photo, Mr. Lawler is assisted by John Mullen (right) as they carry "Poosh" into the COMSAT building. In the right photo, Mrs. Cook becomes acquainted with Poosh prior to his joining the Cook family.

PHOTOS BY J. T. MCKENNA

The Plaza scene

BY JEAN QUINN

Hope everyone got what they wanted for Christmas!

Now that the hustle and bustle of the holiday season is over, it appears that many COMSAT employees spent their free time relaxing, enjoying the football games, and just visiting friends and relatives. A few even took advantage of the holidays by vacationing in various parts of the world.

Kathleen Wilson's month of vacation permitted her to spend the holidays with her family in Ireland.

Puerto Rico and Antigua were on Jim Lawson's 12-day vacation itinerary. However, the loss of his lug-

■ Miss Quinn is a secretary in Finance.

gage prevented him from ever getting to Antigua. He reports that he enjoyed his 12 days in Puerto Rico though.

Aloha to Peggy Fisher on her return from the islands of leis, grass skirts and white, sandy beaches.

Apparently the sun was shining brightly in Florida during Gay Colletto's week of vacation. She looks great with the suntan she brought back.

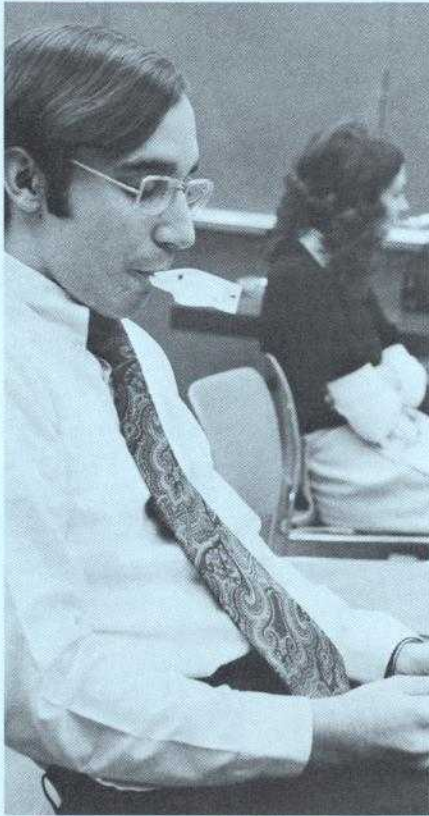
The Robert E. Buttons recently entertained the Lake Barcroft, Virginia, Women's Club at a Champagne Musicale. With Bob at the piano, and Decima singing, the Club enjoyed hearing this talented couple, who met over a piano during an air raid in London 30 years ago. Maybe we should sign them up for COMSAT's 1973 Christmas Party.

On the "not-so-bright" side, Surjit Jerath, an INTELSAT Assignee from India, suffered a heart attack on New

Year's Day. He is now recuperating at home. We hope that Albert Hand, who is still recovering from recent surgery, will soon be back in tip-top shape.

Congratulations to Hasin Hashmi and his wife Linda who became United States citizens on December 15, 1972. Mr. and Mrs. Hashmi are natives of Pakistan and the Philippines, respectively. They met here in the United States, were married here and are the proud parents of a 4-year old daughter, Nyla. "Hash," as he is known to most, has been employed at COMSAT since 1968.

Just before Christmas, Dennis Fruhwirth and Bill Callaway spotted a small dog in the cold water of one of L'Enfant Plaza's fountains and it was a toss-up as to who would perform the task of rescuing the small dog—Dennis lost. Your act was in the Spirit of Christmas, and the SPCA would be proud of you, Dennis!



Please keep it under your tongue.

1973 blood drive

The COMSAT Headquarters medical unit under the direction of Hazel Durant, R.N., coordinated the Red Cross blood drive held on January 24.

More than 90 COMSAT employees participated in the program.



Wait your turn.



A pleasant moment or two of relaxation for a worthy cause.

PHOTOS BY J. T. MCKENNA

COMSAT chess players active in County play

COMSAT's chess players are active these days in an organization known as the Montgomery County Chess League.

The league, composed of teams from eight area companies, meets regularly.

A recent tournament between the COMSAT team and the National Bureau of Standards was held at the Labs. While the NBS group won a close victory in this particular match, COMSAT's record to date stands at four wins, two losses, and a tie.



COMSAT's ranking player Tom Throop (right) moves against Martin Stark of NBS as teammates Rolf MacCullough and Mike Vogt watch.

5 year awards

The following personnel received five-year service awards during January and February.

Administrative Services: Thomas I. Easter, Eugene P. McCarthy, William T. Randall, and Sookhi Ro.

Andover: David L. White.

Cayey: Jimmie L. Payne.

Communications System Management: Matthew P. Cobert, Robert W. DeGoede, Gordon L. Johnson, Dixie D. Joye, Joseph A. Kearns, Jr., Lawrence J. O'Hara, Darrell W. Riddle, Myron Waldman, and Roderick W. White.

Corporate Affairs: Robert A. Dahlgren.

Etam: William H. Adams.

Finance: Alice D. Bullie, Jeanne M. Marnoch, and Edward R. Slack.

General Counsel: Barbara Swaylik and F. Thomas Tuttle.

International: Jane P. Boyd, Janet M. Tingley, and Carmen L. Vazquez.

Laboratories: Lidia C. Arevalo, Leonard E. Bonneau, Henry E. Carlson, Clarence B. Crane, Jack L. Dicks, Martin W. Earl, Andrew Meulenberg, Jr., Thomas C. Patterson, Joseph A. Sciulli, Lee A. Terry, and Henry B. Williams.

News & Notes from Jamesburg

BY M. LEE DORSEY

The year 1972 was anything but quiet or calm for us weatherwise. We experienced five earthquakes and our first snow in 10 years. The earthquakes we are somewhat used to, but to have enough snow to make snowballs and build a snowman was truly a beautiful experience for our children and some of the grown-ups too.



Lee Dorsey, Pat Blatnik, and Steve Moulton (left to right) and the Jamesburg Snow Man.

The JCEA held its annual Christmas Party at the Monterey Elks Lodge on December 9. Fifty-four people attended the dinner-dance. We always say our last party was the best, but the JCEA officers really outdid themselves this time with a buffet dinner, the best ever, and dancing to the music of the "Neil Armstrong" band until well after midnight.

Senior technician Jack Ramey and wife, Judy, recently became the proud parents of a baby girl. Dianna Kay arrived on December 29 weighing in at 8 pounds and 4 ounces. A nice 1972 tax deduction!

Four generations of the Jack H. Inman family were together during the holidays to celebrate their birthdays—all within two weeks of each other. Jack's mother, Mrs. Mollie Inman, 73 years young, who lives in Morristown, Tenn., made her first airplane trip for the occasion. Also celebrating birthdays were Jack Sr., Jack Jr., and Jack Jr.'s son, young Oliver Inman who became two years old.

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

Next-door neighbors via satellite.



An artist's imagination? Not at all. This is how it really is, as Comsat marks its 10th anniversary.

Comsat is helping pull the world together . . . putting far-away places on the main street of business, industry and com-

merce . . . giving people a front row seat to history. Live via Satellite . . . pioneering new potentials for U.S. domestic as well as international telephone, television, telegraph, data and facsimile communications.

Comsat, a shareholder-

owned communications company created by the Communications Satellite Act of 1962, operates the satellites in the global system . . . U.S. earth stations for satellite communications . . . the COMSAT Laboratories and a wide range of related technical

activities that are creating new communications advances.

These are a part of a world-wide satellite system to give you better communications.

More than 80 countries already communicate daily with each other via satellite.

COMSAT AT 10

COMMUNICATIONS SATELLITE CORPORATION · 950 L'ENFANT PLAZA, S.W. · WASHINGTON, D.C. 20024

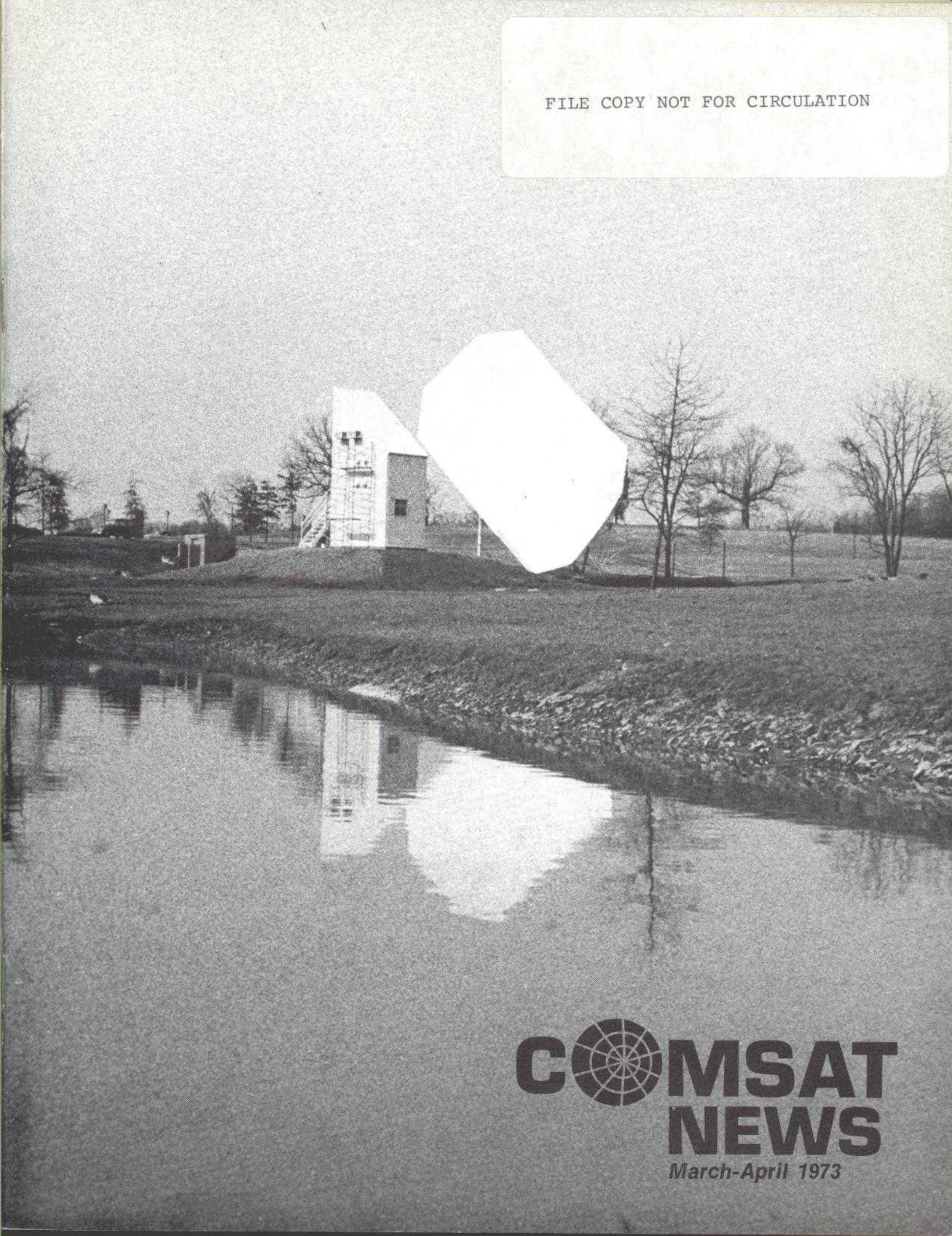
MSAT NEWS

Communications Satellite Corporation
The COMSAT Building
950 L'Enfant Plaza, S.W.
Washington, D.C. 20024

Next-door neighbors via satellite.

 **MSAT AT 10**

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COMSAT
NEWS
March-April 1973

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On the cover

COMSAT's Reliable Earth Terminal (RET), situated at the Labs, has been serving as the antenna for the Project Hope experiment. Its reflection in the water symbolizes transmissions to and from the *S.S. Hope*. For details about the successful experiment, see page 14. *Photo by Allan Galfund.*

March-April 1973—8th Year, No. 2

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

James H. Kilcoyne, Jr., Editor

FCC acts on Navy-maritime system; additional filings to be made

The FCC on April 12 acted on COMSAT's request for a waiver of a construction permit to permit COMSAT to proceed immediately at its own risk to procure satellites for service to the Navy and maritime industry.

The Commission did not grant the waiver as requested by COMSAT, but granted instead a partial waiver subject to several conditions. Among these conditions is a requirement that COMSAT amend its application to permit any U.S. common carrier now providing services via a public correspondence station in the Maritime Mobile Service to participate with COMSAT in the entire system including that portion used to serve the Navy, under terms prescribed by the Order.

The FCC said those carriers eligible to participate with COMSAT include AT&T, ITT Worldcom, RCA Globcom, and TRT Telecommunications Corporation.

In its Memorandum Opinion and Order, the FCC gave the carriers 20 days after COMSAT files amendments in response to the Order to indicate whether they wish to participate.

COMSAT was preparing a response to the Order as this issue went to press.

In its March 6 filing, COMSAT asked the FCC for authority to proceed promptly on a maritime satellite system providing communications to the Navy under contract and offering separate services to the commercial shipping industry.

The Navy announced on March 2 that it had awarded a \$27,912,000 contract to COMSAT for the lease of a portion of the capacity of two satellites to provide fleet communications

during an interim two-year period. Service is planned to start September 1, 1974.

The system would consist of two multifrequency satellites stationed in geostationary orbits, one over the Atlantic and one over the Pacific, and related ground control facilities.

The application is assignable to COMSAT's wholly owned subsidiary, COMSAT General Corporation, as soon as this newly established company completes its organizational activities.

In its application for authority to own and operate the system, COMSAT said that separate capacity would be available for service to the maritime industry for new and improved voice and data communications to commercial ships at sea. This would be at frequencies available for commercial maritime service.

The Navy would utilize frequencies allocated for government use (UHF Band) for its requirements between the satellites and Navy-provided ship and shore terminals. It retained options for a third year of UHF service and for additional capacity as the Navy's communications needs might require.

COMSAT said in its filing that the system concept, using multifrequency satellites with five-year design lifetimes, offers "substantial cost benefits to both the Navy and other users." It also makes possible, COMSAT said, the introduction of high-quality communications via satellite to the commercial shipping industry of greater reliability and scope—including voice, teletype, facsimile, and high-speed data—than are now available.

The Corporation emphasized that

the UHF channels for the Navy requirements are a wholly independent contractual service with their use under the control of the Navy; COMSAT did not propose that UHF be part of any arrangement relating to commercial service.

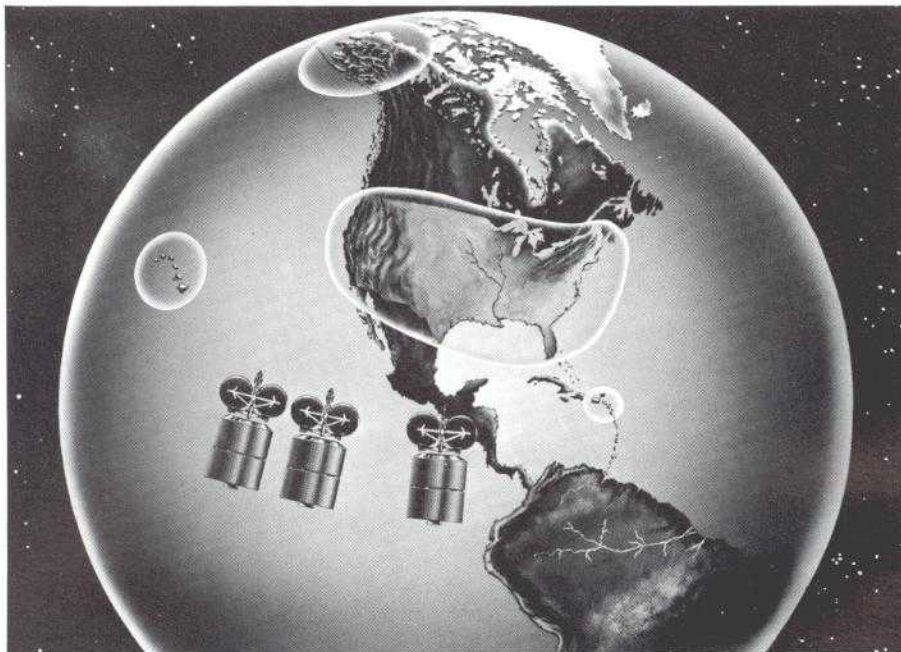
COMSAT pointed out to the FCC that in the unique design of the system, as Navy requirements diminished, satellite power reserved for UHF could be switched to the commercial frequencies to provide more maritime service.

Concerning service for merchant shipping, the filing said: "The satellite communications system proposed by COMSAT will allow continuous 24-hour real-time communications between ship and shore of a high quality and reliability not possible with currently utilized HF (high frequency) systems."

According to recent surveys, more than 3,500 ships operating in busy Atlantic and Pacific shipping lanes might be expected to use satellite communications by 1980. Present day HF radio is subject to fading and interference; some 93 percent of all messages in commercial high seas communications is via radiotelegraphy, or Morse Code, and the average delay for messages is 12 hours.

Each satellite would weigh approximately 1,400 pounds (at liftoff) and would be launched by improved Thor-Delta launch vehicles designated Delta 2914.

COMSAT proposed two new earth stations, one in Connecticut and one in California, to be equipped with 42-foot diameter antennas to perform tracking, telemetry and command (TT&C) duties. They also could serve as U.S. mainland communications stations for the commercial maritime service.



An artist's rendering depicts the proposed domestic space segment.

COMSAT satellites ready for AT&T use by end of 1975

BY HALE MONTGOMERY

The first satellite for lease to AT&T should be ready for launch from Cape Kennedy by the fall of 1975, to be followed by a second before the end of the year, if plans go according to schedule.

COMSAT told the Federal Communications Commission (FCC) in a filing on March 8 that procurement of the satellites must proceed promptly to meet AT&T requirements for two in-orbit satellites by December 1975, enabling AT&T to have the facilities for customer needs starting in 1976.

In its applications, COMSAT said it planned to procure four satellites, three for in-orbit use and one on-the-ground backup. AT&T will lease the satellites under a long-term COMSAT-AT&T lease agreement.

The newly formed COMSAT General Corporation, a wholly owned subsidiary of COMSAT, will become the applicant and party to the lease agreement as soon as practicable.

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

Each satellite will have a design capacity for approximately 14,400 two-way voice-grade circuits. They are to be placed in geostationary orbits, their antennas focused to provide service to the U.S. Mainland, Alaska, Hawaii, and Puerto Rico. COMSAT stations for specialized tracking, telemetry, and command (TT&C) duties are to be located on each coast, one at Southbury, Connecticut, and one near Santa Paulo, California.

Lease payments by AT&T will depend on certain variable costs. With a \$150 million COMSAT investment, AT&T's payments would be \$272 million during the seven-year lifetimes of the satellites.

The COMSAT filing followed issuance by the FCC of an Order last December setting final policy guidelines for applicants seeking licenses to provide domestic satellite communication services.

On March 29, AT&T filed application for ground segment requirements, including five large communications earth stations, connecting terrestrial facilities and other facilities, and for authority to utilize the satellites in its network.

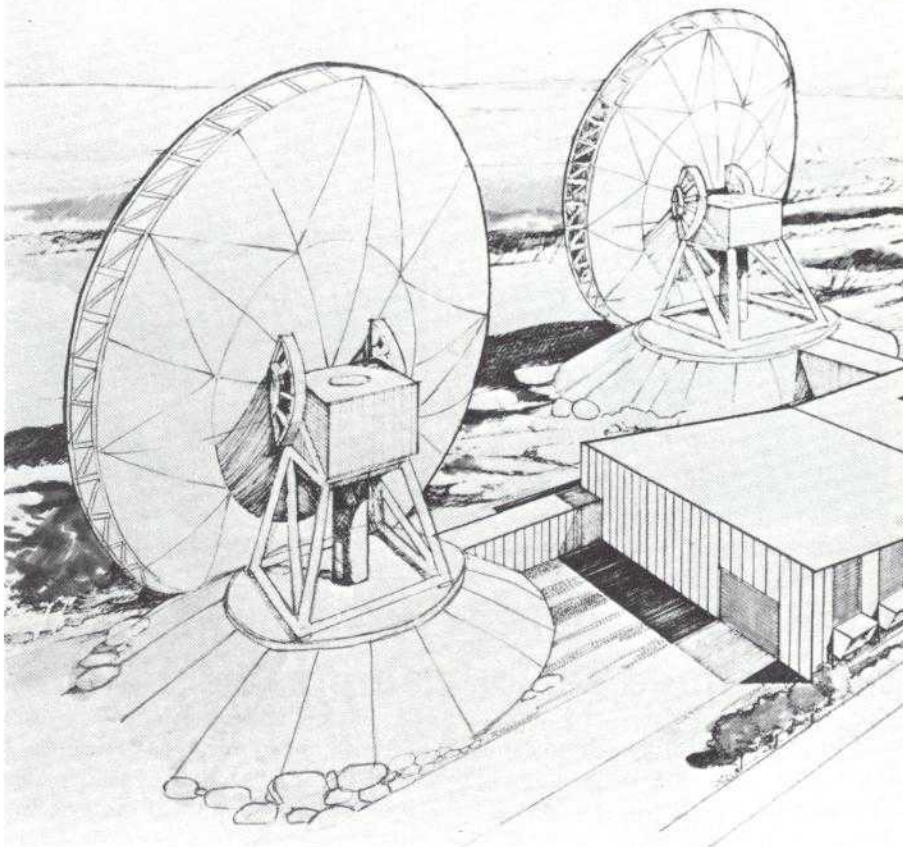
AT&T announced that its Long Lines Department will construct and operate the large communications earth stations, to be situated at Hawley, Pa.; Woodbury, Ga.; Hanover, Ill.; De Luz, Calif.; and the San

Francisco area. Capital investment by AT&T of more than \$70 million will be required for the system.

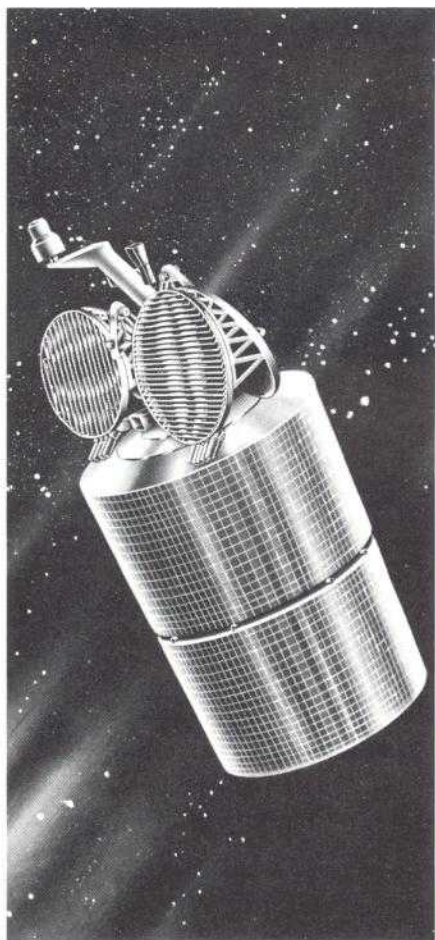
The COMSAT filing was similar to one made in October 1970 and revised in March 1971. One of the major changes in the current filing involved expansion of coverage to include Hawaii, Puerto Rico, and the Virgin Islands; the earlier revised filing provided for coverage only of the 48 states and Alaska. Performance standards were changed to provide 1,200 voice circuits in one direction (instead of 900) through each transponder (radio repeater) in the 24-transponder satellites.

Overall, the spacecraft will be about 18 feet high and weigh about 3,100 pounds at liftoff. They are to be launched by Atlas-Centaur launch vehicles.

Two transmit and receive antennas, or "dish" reflectors, each five feet in diameter, one horizontally polarized and the other vertically polarized, are to be mounted atop



The above rendering depicts one of AT&T's proposed earth stations.



A concept of the proposed COMSAT satellite suspended in space.

the spin-stabilized body of the spacecraft.

The satellites also will contain a millimeter wave experimental package, permitting tests and development of higher frequencies near 18 and 30 gigaHertz for possible future commercial satellite application.

AT&T said the satellite system would be integrated into its nationwide telecommunications network. The system would have the technical capability of providing service to Alaska, Hawaii, Puerto Rico, and the Virgin Islands, and AT&T said, it is negotiating arrangements with appropriate authorized carriers to provide service to these off-shore locations.

Initially, service to the 48 contiguous states would be limited to message telephone service, Wide Area Telecommunications Service (WATS), and service to the U.S. government.

The system would be capable of providing other communications services, but the FCC has denied AT&T permission to offer private line serv-

ices—except those for the federal government—in the 48 contiguous states for a period not to exceed three years from the date the system is put in service.

In describing the system, Richard R. Hough, President of Long Lines, said:

Combining the satellite system with our microwave and coaxial cable facilities will further increase the reliability and flexibility of our nationwide network. Furthermore, as new high-capacity transmission systems—such as satellites and coaxial cables—are placed in service, they help reduce costs to our business and the public.

AT&T said it is the largest user of the INTELSAT global satellite system and has played an important role in the development of satellite communications. It said satellite communications were made possible by Bell Laboratories developments such as the transistor, the solar battery, and the traveling wave tube which boosts signal strength 10,000 times.



Mr. Acheson



Mr. Johnson



Mr. Sampson

COMSAT announces reorganization; names three senior vice presidents

In organizational changes to strengthen its new roles in domestic and international satellite communications, COMSAT has:

- Formed a new subsidiary, COMSAT General Corporation, for all of COMSAT's U.S. domestic satellite programs and other new business opportunities;
- Formed a new International System Division under which COMSAT's activities related to the INTELSAT global satellite system will be consolidated;
- Elected three vice presidents to

the new position of senior vice president and made other executive reassignments in support of the organizational changes.

COMSAT President Joseph V. Charyk announced that the new senior vice presidents elected by the Board of Directors are David C. Acheson, Senior Vice President and General Counsel; John A. Johnson, Senior Vice President; and George P. Sampson, Senior Vice President in charge of the International System Division.

Dr. Charyk also announced that

John A. Johnson has been elected President of COMSAT General Corporation, the new subsidiary. Joseph H. O'Connor, formerly COMSAT Assistant Vice President-Financial and Economic Analyses, has been elected Vice President and Treasurer of COMSAT General; John L. Martin, Jr., formerly COMSAT Assistant Vice President-Domestic and Aeronautical Systems, has been elected Vice President of COMSAT General; and Jerome W. Breslow, an Assistant Secretary of COMSAT, has been elected to the additional office of Secretary of COMSAT General.

Dr. Charyk said that COMSAT General Corporation, headed by Mr. Johnson as President, will carry out all of COMSAT's activities in U.S. domestic programs, including provision of COMSAT satellite capacity to American Telephone and Telegraph Company and COMSAT's participation with Lockheed Aircraft Corporation and MCI Communications, Inc., in a separate corporation (CML Satellite Corporation) to develop a multipurpose domestic satellite system.

Dr. Charyk also said the role of COMSAT General will be broadened to include the development of other new COMSAT business opportunities.

Under the new International System Division, headed by Mr. Sampson, COMSAT will consolidate all of its activities related to the INTELSAT global satellite system. These include the provision of services through the



Mr. O'Connor



Mr. Martin

global system and the U.S. earth stations, COMSAT's role as manager for INTELSAT, and COMSAT's role as the U.S. participant in INTELSAT.

Reporting to Mr. Sampson will be three COMSAT Assistant Vice Presidents. They are Richard R. Colino, Assistant Vice President for International Affairs; Martin J. Votaw, Assistant Vice President for Technical Development and Support; and H. William Wood, Assistant Vice President for International System Operations.

The Federal Communications Commission's (FCC) Order last December 22, which authorized COMSAT to provide domestic satellite capacity to AT&T and to participate in the CML joint venture, also required



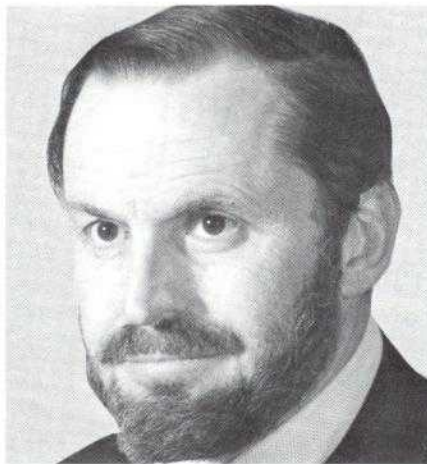
Mr. Breslow

COMSAT to establish a subsidiary to carry out its domestic programs.

In view of the FCC requirement and the entry into force of definitive arrangements for the International Telecommunications Satellite Organization (INTELSAT), Dr. Charyk said, "we feel that it is timely for us to make the appropriate organizational moves to consolidate and strengthen our total role in the INTELSAT program and to establish a directed, vigorous effort to open up new business opportunities for COMSAT elsewhere."

Dr. Charyk said the organizational changes and new structure "establish a solid framework upon which COMSAT can build and look ahead to new responsibilities and opportunities."

In other organizational changes, Dr. Burton I. Edelson, Jr. was elected



Dr. Edelson

a COMSAT Assistant Vice President and named Acting Director of the COMSAT Labs, succeeding Wilbur L. Pritchard who recently resigned.

Also at the Laboratories, Louis Pollack has been appointed Director, Technology Division, succeeding John G. Puente, who resigned. Arnold L. Berman, formerly manager, Transponders, will succeed Mr. Pollack as Director, RF Transmission Laboratory.

Emeric Podraczky has been appointed Director, Systems Division, succeeding Reinhard Stamminger, who resigned. Mr. Podraczky also continues as Director, Special Projects Division.

Dr. Charyk honored

COMSAT President Joseph V. Charyk was honored by the National Aviation Club at a special buffet reception on April 11.

He was selected as the recipient of the club's "Distinguished Aviation Aerospace Service Award" in recognition of his continuing and distinguished contributions to the fields of aviation, aerospace, and in particular, satellite communications by COMSAT.

GTE Labs awarded circuitry contract

GTE Laboratories of Waltham, Massachusetts, has been awarded a contract by COMSAT on behalf of INTELSAT to design, fabricate, test and deliver three prototype large-scale integrated circuits for use in a single-channel-per-carrier digital satellite communications system.

Revenues up, net income of \$2.50 per share reported

COMSAT recently reported net income of \$24,967,000 for 1972, as compared with \$22,537,000 for 1971. This equalled \$2.50 per share, as compared with \$2.25 per share for 1971. The 1972 results included the write-off of \$2,839,000, equal to 15 cents per share after taxes, of domestic satellite system development costs not associated with the domestic service programs COMSAT has been authorized to participate in by the Federal Communications Commission.

Revenues for 1972 amounted to \$105,965,000, an increase of 20 percent over the \$88,385,000 for 1971. The increase resulted from continuing growth in use of the satellite system. At December 31, 1972, COMSAT was leasing 2,971 commercial full-time half circuits to its carrier customers, an increase of 434, or 17 percent over the number being leased at the end of 1971.

Operating expenses in 1972 totaled \$84,537,000 compared with \$71,966,000 for 1971. The higher 1972 expenses were more than accounted for by increases of \$4,630,000 in provision for income taxes, and \$8,209,000 in depreciation and amortization principally associated with entry into service of the INTELSAT IV series of satellites.

Net operating income for 1972 totaled \$21,428,000, an increase of 30 percent, equal to 50 cents per share, over the \$16,419,000 recorded in 1971.

Total other income, after provision for income taxes, declined from \$6,118,000 in 1971 to \$3,539,000 in 1972, principally as a consequence of the write-off of certain domestic satellite system development costs.



Temporary Chairman John A. Johnson (center, right) greets the Board of Governors as COMSAT President Joseph V. Charyk (on Mr. Johnson's left) looks on.

PHOTO BY J. T. McKENNA

Board of Governors holds first meeting

The Board of Governors of the International Telecommunications Satellite Organization (INTELSAT) held its first meeting at INTELSAT headquarters in Washington, D. C., March 14 to March 28.

Under the INTELSAT definitive agreements which entered into force on February 12, the Board of Governors succeeds the Interim Communications Satellite Committee which had served as the policy making body of INTELSAT under interim agreements since August 1964.

At its meeting, the Board of Governors considered a number of matters associated with implementation of the new definitive agreements and with the continuing business of INTELSAT.

Among its major actions, the

Board:

- Elected Mr. Ernst Eliassen of Canada as Chairman and Mr. Bernhard Seidel of Germany as Vice-Chairman. (*Separate article on Page 8.*)

- Approved the contract to procure three INTELSAT IV-A satellites for use beginning in mid-1975, as well as launch services from NASA for these satellites. (*Separate article on Page 9.*)

- Solicited nominations for the Secretary General, who will be responsible to the Board of Governors for financial, administrative and other services, as defined by the INTELSAT Agreement.

- Adopted provisional Rules of Procedure.

- Established a standing Advisory Committee on Finance, with Messrs. Nash, of the United Kingdom, and Caruso of Italy, being elected as Chairman and Vice-Chairman, respectively. A standing Advisory Committee on Technical Matters was established, with Messrs. Quaglione of

Italy and Withers of the United Kingdom being elected as Chairman and Vice-Chairman, respectively. Richard R. Colino, an Assistant Vice President in COMSAT's International System Division, was elected as Chairman of a standing Advisory Committee on Contracting and Patent and Data Matters, with Mr. Fiorio of Italy being elected Vice-Chairman. Finally, a Special Committee on Long-Range Planning was established, with Messrs. Gosewinckel of Australia and Doran-Veevers of Canada as Chairman and Vice-Chairman, respectively.

- Decided to establish the INTELSAT Headquarters on the seventh floor of the L'Enfant Plaza East Building, construction of which is nearing completion.

- Adopted financial procedures allowing Signatories to request increased or decreased investment in INTELSAT and establishing interest rates associated with transfer of investment shares, late payments, and purchase of shares from former members of INTELSAT.

In addition to the Board of Governors, other components of the four-tier structure of INTELSAT are the Assembly of Parties (governments), Meeting of Signatories (governments or telecommunications entities), and an Executive Organ responsible to the Board of Governors.

The definitive arrangements, as do the interim arrangements, consist of two separate but interrelated agreements: the Agreement, concluded among governments, and the Operating Agreement, concluded among governments or their designated telecommunications entities, public or private.

The Board of Governors has the primary responsibility for the design, development, construction, establishment, operation and maintenance of the INTELSAT space segment (the global satellite system), and for carrying out other activities undertaken by INTELSAT pursuant to determinations made by the Assembly of Parties and Meeting of Signatories in certain specified instances as set forth in the Agreement.

The Signatories to the Operating Agreement are the investors in INTEL-

SAT and their investment shares are determined on the basis of their respective percentages of use of the system. In this connection, the Signatories' investment shares have just been revised to reflect the Signatories' respective current usage of the system and, hereafter, will be so revised on an annual basis.

The Board of Governors is composed of Signatories to the Operating Agreement represented either individually or in groups, provided the individual or group investment equals or exceeds a specified investment share figure to be determined by the Meeting of Signatories.

Prior to the first convening of the Meeting of Signatories, this specified investment share figure will be equal to that of the investment share of the Signatory holding place number 13 in the numerical order of investment shares.

In addition, there will be some representatives on the Board, each representing five or more Signatories from an International Telecommunication Union (ITU) region, irrespective of their combined investment shares.

With certain specific limitations, voting will be proportional to investment.

The Executive Organ will be headed initially by a Secretary General who will be responsible to the Board of Governors for the performance of financial and administrative services. Initiation of the process for selection of the Secretary General was a major order of business of the Board of Governors at its March 14 meeting.

COMSAT will furnish technical and operating management services under a contract with INTELSAT which has a firm six-year term, from the time the agreements enter into force or until February 1979. These services will be performed under policies of the Board of Governors.

The Agreement calls for a Director General to be appointed no later than December 31, 1976. He will be responsible to the Board for all management services, including supervision thereafter of COMSAT's performance of technical and operating management services.

After the expiration of the six-year term of the management contract with COMSAT, the INTELSAT organization will continue to contract out to one or more competent entities, technical and operational management functions to the maximum extent practicable with due regard to cost and efficiency.

The Assembly of Parties will be composed of a representative of the government of each member state, and will meet every two years unless it determines otherwise from meeting to meeting. It must have its first meeting within one year of the time the agreements enter into force, i.e., by February 12, 1974.

The Meeting of Signatories will be composed of representatives of Signatories. It will meet annually, and must have its first meeting within nine months after entry into force, i.e., November 1973.

The Assembly of Parties will provide a forum for governments to consider matters of concern to them while the Meeting of Signatories will consider operational matters and other matters of interest to investors and participants in INTELSAT.

Voting in both the Assembly of Parties and the Meeting of Signatories will be on the basis of one member, one vote.



Alternate U.S. Governor Richard R. Colino (right) talks with Africa Group Governor H. Z. E. Ramogo.



Mr. Eliassen



Mr. Seidel

Eliassen and Seidel elected to head Board of Governors

The Board of Governors of the International Telecommunications Satellite Organization (INTELSAT), elected Ernst Eliassen of Canada as its first Chairman on March 15. Bernhard Seidel of Germany was elected Vice Chairman.

Under the definitive agreements which entered into force on February 12, the Board of Governors succeeds the Interim Communications Satellite Committee (ICSC) which had served as the policy making body of INTELSAT under interim agreements since August 1964.

Mr. Eliassen and Mr. Seidel had served as Chairman and Vice Chair-

man, respectively, of the ICSC for the term beginning July 1, 1972 and extending through the 63rd and final meeting of the ICSC held in January of this year.

Mr. Eliassen is Senior Vice President of Canadian Overseas Telecommunications Corporation in Montreal. He was a member of the Canadian delegation to the ICSC from 1965 through 1972 and served as Vice Chairman of the ICSC in 1971-72.

Mr. Eliassen holds a Master of Science in engineering from the Polytechnic University of Copenhagen.

Mr. Seidel was the representative of the Federal Republic of Germany to the ICSC from 1966 through 1972. He is Ministerialrat of the Bundesministerium für das Post-und-Fernmeldewesen in Bonn, and holds a graduate engineering degree from the Technical University of Berlin.

Contract awarded for electric thrusters

INTELSAT has awarded a \$265,000 contract to Electro-Optical Systems, Pasadena, California, for a prototype electric thruster for north-south stationkeeping on future commercial communications satellites.

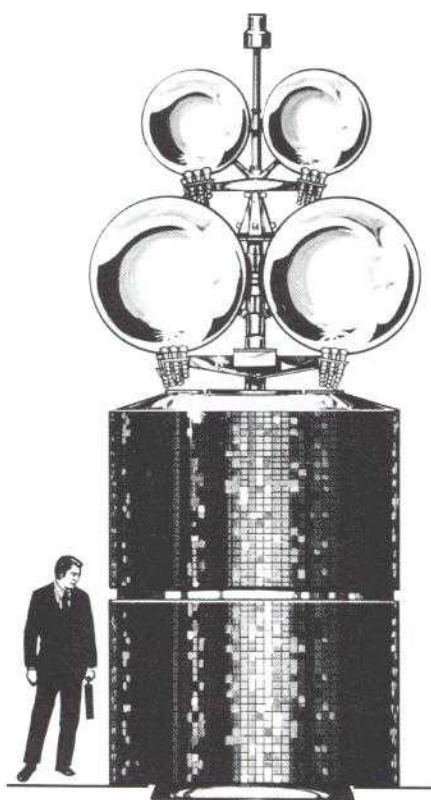
Development of electric thrusters seems to promise a three-to-one reduction in weight requirements, as compared to the hydrazine thrusters presently used for north-south stationkeeping.

Present hydrazine thrusters generate relatively high thrust and are activated occasionally for very brief periods. Electric thrusters will generate a low thrust, which will be activated frequently for an hour or so at a time. Electric thrusters will operate off available power supplies and batteries. They may find an application in communications satellites later in this decade.

North-south stationkeeping (that is, correction of the latitude of the orbit to keep the satellite over the Equator) requires several times as much propulsion as east-west stationkeeping (correction of the longitude of the orbit). Consequently, the improvement of north-south stationkeeping systems, which at present must store heavy quantities of hydrazine, could result in significant weight savings.

1972 annual report mailed to shareholders

COMSAT's 1972 Annual Report has been recently mailed to all shareholders of record. The report, which has "COMSAT AT 10" as a subtitle, includes a review of 1972 operations, present opportunities, and highlights of COMSAT's first 10 years.



An artist's concept of the 22-foot tall IV-A satellite.

INTELSAT approves IV-A satellites for \$72 million

The Board of Governors of INTELSAT approved on March 22 a \$72 million contract with the Hughes Aircraft Company for INTELSAT IV-A satellites for use beginning in mid-1975. Hughes will deliver three satellites.

The total cost of the program, including Atlas-Centaur vehicles and launch services, is expected to be approximately \$140 million. COMSAT's share of that would be about 39 percent, or approximately \$54 million.

The contract will be administered by COMSAT as Manager for INTELSAT.

Each of the IV-A satellites will offer almost twice the communications capacity of an INTELSAT IV satellite, four of which provide the present global service.

The new satellites, a derivation of the highly successful IVs, will have 20 transponders, as compared to 12

in the IVs. A maximum of 16 transponders in each IV-A will be available for spot-beam operation, as compared to eight in the IVs. The remaining four transponders in each IV-A will be used in global mode coverage. (The spot beams will concentrate satellite power on continental land masses, while global beams cover approximately a third of the earth.)

The IV-A satellites will employ frequency reuse through spot-beam separation, an improvement upon the INTELSAT IV spot-beam capability. Beam separation will permit communications transmissions in different directions on the same frequencies by using different transponders, thereby reusing, or making double use of, the same frequency. Thus, the combination of spot beams and frequency reuse will significantly increase communications capability and will make more efficient use of the frequency bands presently used for satellite communications.

The IV-A satellites are needed to meet forecast traffic and system requirements in the Atlantic region in 1975 and thereafter. Over a year and a half ago the traffic analysis and planning staff in COMSAT's Communications System Management, which forecasts long range needs of INTELSAT and develops systems plans to meet such needs, began to piece together a picture of Atlantic region requirements for the 1973-1976 time frame.

It became clear that the Atlantic, the busiest of the three regions in the global system, would require a satellite of higher capacity than the IV earlier than initially anticipated. This need could occur as early as the second quarter of 1975, and almost certainly will occur by the end of that year. The United Kingdom entity in INTELSAT (the British Post Office) performed similar analyses which confirmed COMSAT's conclusions. This confirmation helped to motivate prompt action by INTELSAT.

INTELSAT decided to have the requirements for additional capacity studied—overall by COMSAT, the Manager—and separately with respect to satellite capabilities by established satellite developers and manufacturers. Subsequently, study contracts were awarded to Hughes Aircraft Company and Lockheed Missiles and Space Company.

Hughes was awarded a contract to study a design derived from the INTELSAT IV and Lockheed was awarded a contract to study a fundamentally new design, but one that was achievable in a relatively early time frame. These two concepts were dubbed, respectively, INTELSAT IV $\frac{1}{2}$ (now INTELSAT IV-A) and "early version" INTELSAT V.

These studies were completed in the fall of 1972. After evaluating each of the detailed study reports, COMSAT and the Technical Advisory Subcommittee of the ICSC concluded that both companies offered attractive designs. However, there was higher confidence that Hughes would be able to deliver, on time, a suitable spacecraft to meet the 1975 traffic requirements.

Mainly, this conclusion was based on the fact that the Hughes design is a derivative of INTELSAT IV, a satellite which has already demonstrated a high degree of successful and reliable operation.

The ICSC agreed with these conclusions. In one of its last major decisions, the ICSC (at its 63rd and final meeting) decided that the satellite program to follow the INTELSAT IV satellites would consist of three INTELSAT IV-A satellites. The ICSC also decided that the satellites should be procured "... for delivery in a time frame consistent with an operational capability in mid-1975."

After the Board of Governors succeeded the ICSC, the approval of the contract was one of its first major decisions. The \$72 million contract price, which had been negotiated with Hughes, includes development costs, supporting items and services, and allowance for full performance incentives.

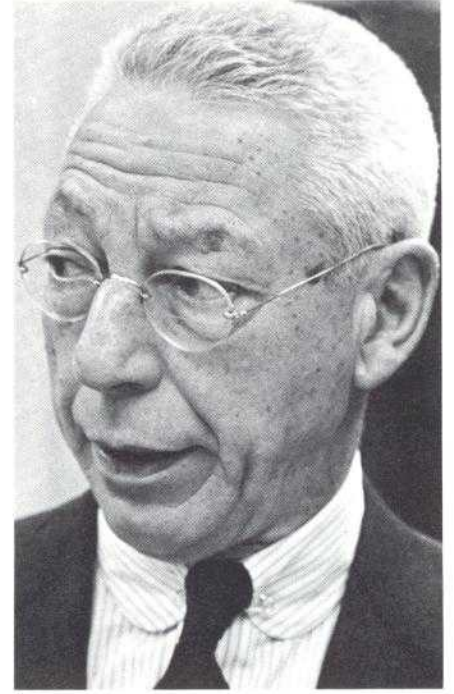
Under the terms of the contract, Hughes will deliver the first spacecraft within 25 months after receiving authorization to proceed with the work. This schedule provides reasonable assurance that a launch can be made in the second or third quarter of 1975. The IV-A is intended to serve first the needs of the Atlantic region. Upon the advent of INTELSAT V, plans for which are in motion, the IV-A can be relocated for operation during its remaining lifetime in the Pacific Ocean region.



Mr. Dingman



Mr. Hough



Mr. Moulton

AT&T directors to be replaced at annual meeting

The three current Series II (carrier) directors on the COMSAT Board of Directors will be replaced at the forthcoming COMSAT Annual Meeting of Shareholders. AT&T recently announced that it planned to sell its 2,895,750 shares of COMSAT stock in the near future.

AT&T will sell its shares through a public offering by means of a prospectus to be issued by COMSAT. A registration statement, including the prospectus, is expected to be filed by COMSAT with the Securities and Exchange Commission.

In a statement on March 21 announcing the decision to sell, Robert D. Lilley, President of AT&T, quoted the FCC order of Dec. 21, 1972 in the domestic satellite proceeding:

"Conditions have changed markedly from 1964 and stock ownership by AT&T in COMSAT is no longer necessary to further the policies of the Communications Satellite Act. Since that time, COMSAT has developed its own expertise and is a viable entity in its own right, thus obviating the need for the internal guidance and assistance of AT&T and other carriers."

Mr. Lilly also said: "We believe our ownership of COMSAT shares and membership on its board have contributed to the progress of that enterprise and to the satellite art. However, we recognize that the time has come when it is appropriate for us to withdraw from this participation."

The sale, and the timing of it, will produce an unusual situation regarding the election of directors at the COMSAT Annual Meeting of Shareholders, which will be held at 2:30 p.m. EDST, May 15, in the American Theatre (formerly L'Enfant Theatre). Because the record date for the meeting was March 26, AT&T will be holder of record of 2,895,750 shares for voting purposes at the meeting. Accordingly, AT&T is in the position to nominate and elect three directors at the forthcoming meeting even though it soon will cease to be a shareholder. However, AT&T has advised that it will nominate and vote its shares for three persons to be designated by the Series I and Presidentially appointed directors. The deadline for nominations is 10 days prior to the meeting.

Since 1964, when COMSAT's public stock offering was completed, AT&T has owned 2,895,750 shares of Series II (carrier) stock, or about 29 percent of the total of 10,000,014 shares out-

standing of both Series I (public) and Series II.

The sale of the AT&T shares, assuming they are purchased by public investors and thereby become Series I shares, will reduce carrier holdings of COMSAT shares to about 26,000 owned by some 60 communications common carriers. In 1964, five million COMSAT shares were owned by 163 carriers. The number of these Series II shares has gradually declined and the number of Series II directors on the COMSAT board has declined proportionately.

If 26,000 is the number of Series II shares remaining after the AT&T sale, the carriers will no longer be eligible separately to elect directors. Under the Communications Satellite Act of 1962 as amended, Series II shareholders must hold at least 8 percent of the total outstanding shares in order for the Series II holders to elect one or more directors separately. When the percentage falls below that level, the Series II shareholders participate with the Series I shareholders in the election of directors.

The three present AT&T directors on the COMSAT board are Richard R. Hough, a vice president of AT&T and President of its Long Lines Department; James E. Dingman, former Vice Chairman of the Board of AT&T; and Horace P. Moulton, former Vice

President and General Counsel of AT&T. Mr. Dingman and Mr. Moulton have served since 1964. Mr. Hough has served since 1970 when he succeeded the late Harold M. Botkin, an assistant vice president of AT&T who had served since 1964.

Even if AT&T had not decided to sell its COMSAT shares, it would have had to replace the three directors, as a result of the Federal Communications Commission (FCC) Order in the domestic satellite proceeding. The Order, calling for an "arm's length relationship" between COMSAT and AT&T in domestic services, said that directors elected by AT&T to the COMSAT board no longer may be past or present officers or directors of AT&T or persons having an affiliation with AT&T. Such replacement was a condition for FCC approval of COMSAT and AT&T programs for domestic satellite services. The FCC Order also said that if in the future AT&T wishes to provide competitive, private line, services (as distinct from its non-competitive services), it must divest itself of its COMSAT stock.

In addition to AT&T, the largest holders of Series II shares were International Telephone and Telegraph Company (1,050,000 shares sold in successive installments in 1967, 1968 and 1971); RCA Corporation (250,000 shares sold in 1970); and General Telephone and Electronics Corp. (350,000 shares sold in 1970).

In other business at the COMSAT Annual Meeting, eight present Series I directors and one new director candidate will be proposed for election by the Series I shareholders and the reappointment of the firm of Haskins & Sells as COMSAT's independent public accountants, and an amendment to the Articles of Incorporation will be voted on by holders of both series of shares.

The Series I directors proposed for reelection are Philip W. Buchen, Joseph V. Charyk, Gordon Edwards, William W. Hagerty, George L. Killion, Joseph H. McConnell, Bruce G. Sundlun, and Leo D. Welch. The ninth Series I candidate will be named in the Proxy Statement for Series I shareholders in place of James McCormack who will be resigning from the Board. (*Separate article on Page 12.*)



CML directors and staff at work during the first board meeting.

Directors elected to CML board

Twelve directors have been elected to the board of CML Satellite Corporation, the separate company established by COMSAT, Lockheed Aircraft Corporation, and MCI Communications Corporation to provide multipurpose U.S. domestic satellite services.

COMSAT, Lockheed, and MCI each has a one-third interest in the new company, and each has elected four directors to the board. Another four directors are to be elected jointly by the three parties.

The 12 present directors are:

COMSAT: Joseph V. Charyk, John A. Johnson, Joseph H. McConnell, and James J. McTernan, Jr.

Lockheed: Stanley W. Burriss, Vernon A. Johnson, Reginald R. Kearton, and James W. Plummer.

MCI: Alexander Buchan, William G. McGowan, Stanley B. Scheinman, and Carl M. Vorder Breugge.

The board held its first meeting on February 13 at its headquarters, 1900 L Street, N.W., Washington, D. C.

Those present for the first meeting included David C. Acheson, COMSAT Senior Vice President and General Counsel; Marvin R. Jawer, COMSAT Assistant Secretary and Attorney and Secretary of CML; and George P. Sampson, COMSAT Senior Vice President (International System Division). Subsequently, Mr. Sampson was succeeded on the CML board by John A. Johnson, COMSAT Senior Vice President and President of COMSAT General Corporation.

COMSAT General is the wholly-owned subsidiary through which COMSAT will participate in U.S. domestic services and other new programs outside of the INTELSAT system.



Mr. McCormack

James McCormack to retire from COMSAT board

James McCormack, former Chairman and Chief Executive Officer of COMSAT and a member of the Board of Directors for more than seven years, will be retiring as a director of the Corporation upon the election of directors at the Annual Meeting of Shareholders on May 15, 1973.

Mr. McCormack will continue as a consultant to COMSAT under a five-year contract which began in 1970. His retirement from the board is one of several changes in board membership that will occur at the annual meeting, to be held at 2:30 p.m. EDT on Tuesday, May 15, in the American Theatre (formerly the L'Enfant Theatre). The Notice of the Meeting and Series I Proxy Statement mailed to shareholders describes the nature of the changes, including the departure from the Board of the current Series II directors. (*Separate article on Page 11.*)

Mr. McCormack was first elected

to the COMSAT board in October 1965. On December 1, 1965, he became Chairman and Chief Executive Officer of COMSAT, a position which he held for more than four years, until the 1970 Annual Meeting of Shareholders.

Before joining COMSAT, Mr. McCormack was for ten years a resident of Boston where he was a Vice President of the Massachusetts Institute of Technology, President of the Greater Boston Chamber of Commerce, and Chairman of the Massachusetts Bay Transportation Authority.

He retired from the United States Air Force in 1955 as a Major General. He is or has been a director of Eastern Air Lines, Bulova Watch Company, New England Telephone & Telegraph Company, State Street Bank & Trust Company, and the Federal Reserve Bank of Boston; President of the Institute for Defense Analyses; and a trustee of Mitre Corporation and Aerospace Corporation.

At the time of his retirement from military service, he was Director of Research and Development in Air Force Headquarters. His prior assignments had included Director of Military Applications of the Atomic Energy Commission from 1947 to 1951.

After leaving the military service, he served as a consultant to the White House, State Department, National Aeronautics and Space Administration, Civil Service Commission, Department of Defense, and Departments of the Army, Navy, and Air Force. In 1956 he organized, and until 1958 was the first President of, the Institute for Defense Analyses, a consortium of ten universities supporting the Department of Defense and other federal agencies in science and technology. He helped organize Educational Services, Inc., which has played an important role in revision of school curricula.

Mr. McCormack was born in Chatham, La., on November 8, 1910. He was graduated from the United States Military Academy in 1932 and was a Rhodes Scholar at Oxford University, from which he received a Master of Arts degree. In 1937 he was awarded a Master's degree in engineering from MIT. He holds five honorary doctorates.



General Counsel's office announces promotions

David Acheson, Senior Vice President and General Counsel, recently announced the promotions of Robert B. Schwartz (left) to Assistant General Counsel, Corporate Matters, and James A. Amdur to Assistant General Counsel, Tax and Administration. Mr. Schwartz will continue to serve as Corporate Secretary.



COMSAT team reviews earth station operation

In preparation for a recent NICATELSAT Board of Directors meeting, four COMSAT staff members flew to Managua, Nicaragua, to review the station's first month of commercial operations. In the photo above, Ed Slack, Finance; Don Owen, International System Division; Bill English, Legal; and George Christie, International System Division (left to right), complete their work, prior to reporting that all aspects of NICATELSAT operation are in excellent shape.

COMSAT birthday receives wide press coverage

The Wilmington, Delaware, *Evening Journal's* headline referred to COMSAT as "one of mankind's biggest success stories." The Orlando, Florida, *Sentinel Star* in a feature article stated that COMSAT had showed "tremendous technological growth" in the first 10 years of its existence.

Newspapers around the nation took note of COMSAT's birthday by publishing stories highlighting the Corporation's accomplishments since February 1, 1963.

Vern Haugland, long-time national Aviation & Space Editor for the Associated Press (AP) led the way with his by-lined account of COMSAT's growth that was transmitted via the AP news wire network to more than 500 newspapers across the country.

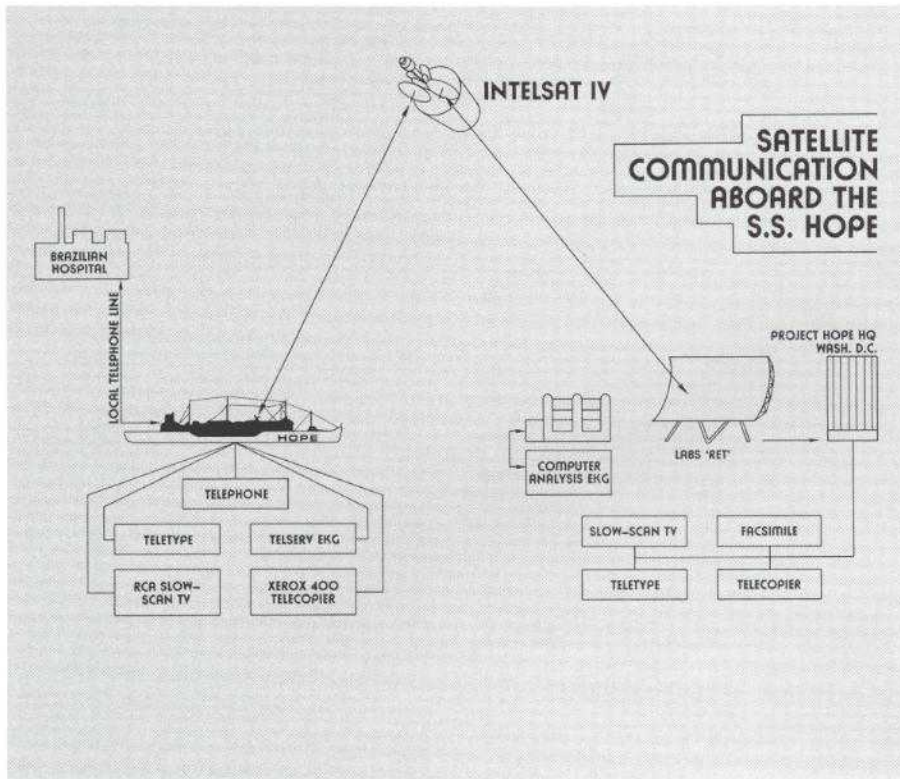
As he summed it up, "COMSAT is 10 years old and proud."

Plaza headquarters stumps librarian

As part of COMSAT's anniversary celebration, "COMSAT AT 10" calendars were distributed to selected members of the business community.

The librarian of an Atlanta, Georgia, investment firm wrote a very nice thank-you note for her copy of the calendar. She said that it had been placed in a prominent location in the library and had become quite a conversation piece because no one could identify "the building pictured in between the Capitol Building and the Leaning Tower of Pisa." Could COMSAT help?

Of course, she received a speedy reply, letting her in on the secret. (The building is COMSAT Headquarters.) Now she challenges visitors to identify the building with the fountain in front.



Project Hope satellite link is a success

The *S.S. Hope* is once more at anchor off the northeast coast of Brazil. On board is a small 8-foot diameter antenna that is successfully exchanging medical data, via an Atlantic INTELSAT IV satellite and a 15-foot earth terminal at COMSAT Labs, with the Project Hope headquarters in downtown Washington, D. C.

Now in its second month of operation, the experiment utilizes not only the INTELSAT satellite system but a Teleserv electrocardiogram unit, an RCA slow-scan television unit, and a Xerox 400 telecopier, all of which are in daily use for the transmission of medical information.

As a matter of fact, the ship had hardly arrived at its dock when the *Hope's* medical staff was faced with the need to perform corrective surgery for a detached retina. The patient was a member of the ship's administrative staff. The *Hope's* ophthalmologist diagnosed the problem and then conferred via satellite with eye specialists in the United States. Diagrams of the damaged eye were

transmitted via satellite to specialists in Atlanta, Georgia. After reviewing the graphic presentation of the problem and after further discussion with the *Hope's* medical staff, the decision was made to fly an eye surgeon and his colleague to the ship to perform the delicate operation. The three-and-one-half hour operation was successful and the patient is now well on the way to recovery and normal use of the eye.

The *S.S. Hope* arrived in Maceio, capital of the state of Alagoas, Brazil, on February 15. The ship has a medical staff of 150 persons including 25 doctors who rotate with a new group of physicians every two months. The doctors serve on the *Hope* without pay. The remainder of the staff are nurses, medical technicians, and administrative personnel.

Each doctor, nurse, and medical technician has a Brazilian counterpart. These teams of Brazilian and U.S. personnel work, teach, and learn together aboard the ship.

The ship is basically a 106-bed hospital with three complete operating rooms, laboratories, and specialized facilities including a well-equipped dental clinic.

The usual mode of communications between the ship and other countries

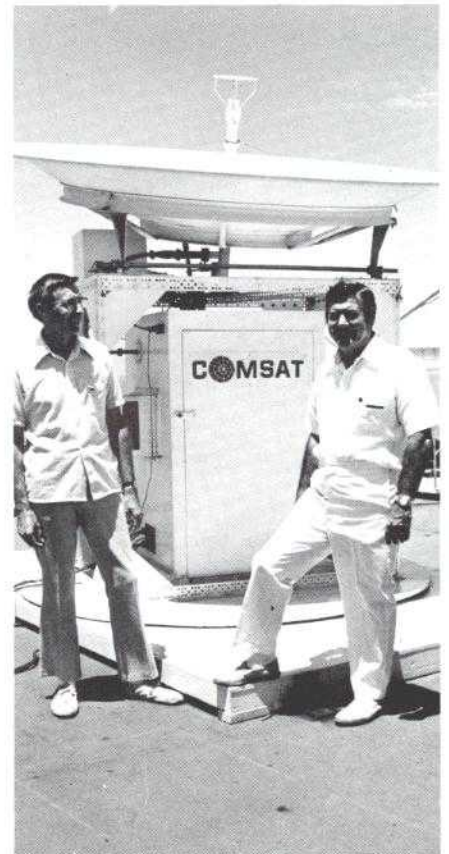
is by HF radio via a network of dedicated private citizens who handle the high frequency radio traffic over the U.S. Navy MARS Radio network. Ham radio frequencies are also used at times.

The introduction of a satellite link between the ship and the *Hope* headquarters in Washington, D. C., inaugurates a new mode of communications with small antennas in remote locations. It permits the transmission of voice, facsimile, data, teletype, and high resolution slow-scan television.

Each of these modes demonstrates some new aspect of transferring medical information rapidly.

The voice link allows rapid consultations between doctors on the *Hope* and medical experts almost anywhere in the world.

The teletype link can access computers for teaching and diagnostic information and makes it possible to obtain information from medical libraries, including such institutions as the National Institutes of Health in Bethesda, Maryland.



Project manager Kim Kaiser (left) and the *Hope's* Dr. Walsh stand beside the shipboard antenna.



Lucius D. Battle, COMSAT Vice President-Corporate Affairs (left), discusses a recent Project Hope demonstration with Dr. William B. Walsh, President, People to People Health Foundation, Inc.



COMSAT team members John McClanahan (left) and Dave Reiser (center) discuss a heart tracing received via satellite with Georgetown University's Dr. Proctor Harvey.

PHOTOS BY J. T. MCKENNA

The Xerox telecopier is capable of transmitting almost any sketch or diagram of a printed page in about six minutes.

The slow scan television, a new RCA development, transmits and receives a still, television-quality picture via a single satellite channel. This system is being used to conduct conferences and seminars with the participation of doctors and medical school professors aboard the ship and at the Project Hope headquarters.

The equipment on the *Hope* is quite simple when compared to standard earth stations. It consists of an antenna with an 8-foot-diameter (2.4-meter) parabolic reflector, pointed toward the INTELSAT IV satellite over the equator at 34 degrees West longitude, a low noise parametric amplifier, and up and down converters. The baseband signals are modulated by an FM modulator at an intermediate frequency of 70 MHz, then sent to the transmitter located just under the antenna on the top deck of the ship, thence to the satellite, and on to the Reliable Earth Terminal (RET) at COMSAT Labs.

Three channels multiplexed onto a single FM carrier are being used in the experiment. One channel handles most of the experimental traffic, one is a spare, and the third is an engineering order wire between the ship and Clarksburg.

The RET at the Labs represents a new approach in earth stations. This experimental unit utilizes, for the first time, a new station concept which consists of a fixed, torus reflector, a movable feed system that enables pointing of the beam and tracking of the small residual motion of a satellite in its nominally stationary orbit.

Project manager Kim Kaiser and team members Dave Reiser, who sailed with the *Hope*, and John McClanahan, who kept the "home fire burning", have worked long hours under difficult conditions to insure the success of the experiment.

As a result, the COMSAT-*Hope* experiment is demonstrating a new capability for reliable long-distance communications and rapid consultation among medical teams in remote areas, and doctors, medical laboratories, and specialized research centers throughout the world.

The history of a unique piece of legislation

BY JAMES P. BRADLEY

For many people the legislative process of Congress is complicated, baffling, and difficult to understand. It would appear that day after day Congress, as it promotes the general welfare, grinds out new laws in a never ending stream. Not so.

In the 92nd Congress, 17,200 bills were "dropped in the hopper" for House consideration—most of them private in nature. Of this number 3,000 passed and were sent to the Senate—there to be acted on or die on the vine. After favorable Senate action, these acts were sent to the President for his approval or veto. Many of them never saw the light of day, for which we can be eternally grateful.

Managing and guiding major legislation successfully through Congress is an art. It calls for the complete mastery of the legislative and parliamentary process, hard work, and professional handling. Especially was this true of the Communications

■ *Mr. Bradley is a veteran Capitol Hill staff member and was in the office of Coordinator of Information, House of Representatives, at the time the Communications Satellite Act of 1962 was passed.*



Senator Pastore (second from right) with Nick Zapple (right) at his side during hearings on the Communications Satellite Act.

Satellite Act of 1962. It was shepherded through the whirlpool of the Senate by an accomplished artisan, John Orlando Pastore (D-R.I.), Senior Senator from our smallest state. Among his colleagues in the communications field of radio, television, and telecommunications, Mr. Pastore is an acknowledged authority. (*N.B.* The Italian word for shepherd is *pastore*.)

On April 2, 1962, Mr. Oren Harris (D-Ark.) introduced H.R. 622, which was to become the Satellite Act. Then followed 11 days of hearings before the Committee on Interstate and Foreign Commerce of which he was Chairman. This action resulted in 716 pages of testimony. Two days of floor debate occupying 50 pages of the Congressional Record preceded the roll call vote. On May 3, 1962,

the bill passed (354 yeas, 9 nays) and was referred to the Senate Committee on Commerce. (*N.B.* Mr. Harris is presently a Federal judge in Arkansas.)

On June 14, 1962, Senator Pastore, Chairman of the Subcommittee on Communications, commenced the long and tedious task of debate on H.R. 11040, as the Satellite Act was designated at this point. At his side on the floor was his able committee counsel, Nicholas (Nick) Zapple. Both had done their homework. Both knew the Senate—and the opposition. Both had struggled through 34 days of hearings before various committees.

For two months the debate raged. The galleries were jammed as press and broadcast correspondents covered every word. Saturday and night sessions were common. Smack in the

middle of the activity in the well of the Senate was the dedicated, professional floor manager, Mr. Pastore, fighting off amendments, keeping the resolution alive, although he was vehemently opposed by a small band of senators who claimed:

- The Satellite Act was a giveaway by Congress.
- It would create a protected Government monopoly.
- Commercial communications satellites should be another TVA project.
- The government should keep the control.
- Reservations should be made for reduced channel rates for future Government use.
- Research and development money spent by the Space Agency should be a "credit" against future expenditures by Government agencies.

On and on the debate raged with Senator Pastore pressing forward and not giving an inch as he tackled the opposition individually and collectively. His courage was obvious. Mr. Pastore wasn't born on St. Patrick's Day (March 17) for nothing.

By then the opponents were openly filibustering against the Act. The whole legislative calendar was starting to weaken as the filibuster continued. Federal employee payroll appropriations were endangered. The vital proposal to increase the debt ceiling was stifled. The deadline for continuing resolutions involving important money matters was fast approaching.

Then it happened. On August 11, Mr. Mansfield (D-Mont.), Majority Leader, introduced the cloture motion—signed by 23 Members.

The Senate has been called "the greatest deliberative body in the world." One jealously guarded Senate rule is the one for unlimited debate. A Senator can talk as long as he wishes, providing he is germane, on his favorite issue. If a group of Senators join him, this can develop into an endless filibuster. Senators from smaller states maintain it protects them from being swallowed up by the larger, more powerful interests. The only way a filibuster can be broken is by cloture—devised from the French *cloture* meaning to close



The Communications Satellite Act of 1962 was passed by Congress on August 27, 1962, and signed by President Kennedy four days later.

(or shut off) debate. Cloture is rarely used; to go into effect, it must be affirmed by a two-thirds vote of Senators present. This, in itself, is hard to come by.

The eyes of the country followed the battle. Editorials, telegrams, mail, phone calls flooded the Capitol from all compass points—most in favor of cloture, many against.

Two more days and nights of debate on the cloture motion followed. On August 14, the cloture motion was sustained. For all practical purposes the filibuster was ended. The back of the opposition was broken. The opponents were on the run and all efforts to kill the original resolution or send it back to committees for the next session were doomed. (*N.B.* Nick Zapple had counted the votes of the Senate correctly—the cloture vote had three to spare.)

The final three days of debate on the original bill were finally over. Then, the calling of the roll (a simple majority was needed) for final passage.

It was early in the evening of August 17, 1962, and as the clerk called the names of the Senators—ever so slowly—Mr. Pastore was receiving

the warm, well-earned congratulations of his peers—for a masterful performance.

H.R. 11040 had gone before five Senate committees plus the policy committee. It had survived 34 days of hearings and 21 days and nights of actual debate, resulting in 3,000 pages of testimony and related material. It consumed 500 pages in the Congressional Record.

After pro-forma changes—mostly administrative—jointly agreed to by House and Senate leaders, the Act was forwarded to the President for his approval—a foregone conclusion because it was an Administration measure.

On August 31, 1962, John F. Kennedy signed Public Law 87-624 and COMSAT was born. Invited to the White House for the historic event were Speaker John W. McCormack, Chairman Oren Harris, Senators Warren Magnuson, John Pastore, Richard Russell, Hubert Humphrey, and the Majority Leader Mike Mansfield.

In a touching tribute for a job well-done, President Kennedy presented Mr. Pastore with the actual pen he used.

JEANNETTE M. LOOMIS



MATTHEW GORDON



JOSEPHINE CHAPMAN



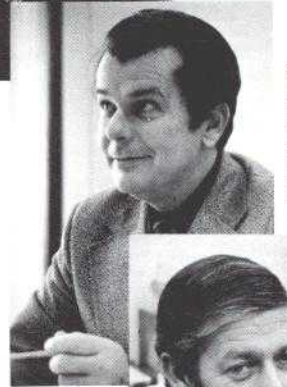
JOSEPH R. WORTHMILLER



SIDNEY METZGER



WILLIAM L. CALLAWAY



JOSEPH V. CHARYK



LEWIS C. MEYER



JAMES B. POTTS



SIMON B. BENNETT



EMERIC PODRACZKEY



LOUIS B. EARLY



RUTH O'DONNELL



MARTIN VOTAW

Shown here are employees who have been with COMSAT from the beginning.

TEN YEARS with COMSAT



JOHN A. JOHNSON

1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974

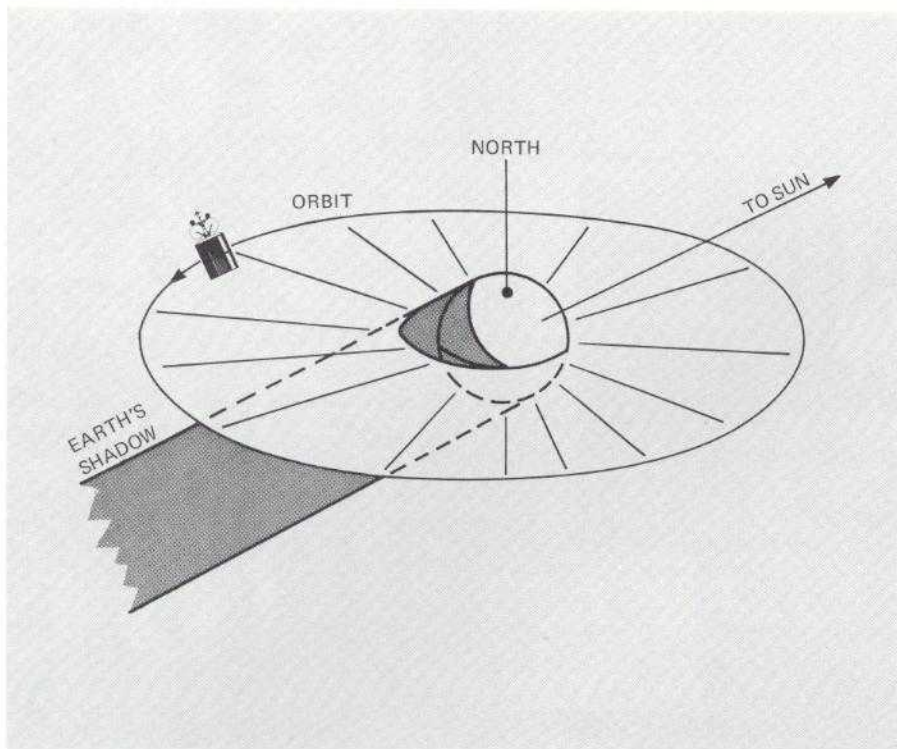


Figure 1. Earth's shadow geometry in the summer season.

In the shadows of the earth and moon; it happens every year

BY WILLIAM D. KINNEY

Almost every science course taught in elementary school includes the subject of eclipses. At an early age most of us are taught that eclipses of the sun and moon are natural phenomena caused by either the passage of the earth through the moon's shadow (eclipse of the sun) or the passage of the moon through the earth's shadow (eclipse of the moon).

The INTELSAT communications satellites also experience eclipses caused by their passage through the shadows of the earth and moon. When the satellites are in shadow the electrical power normally provided by the solar array is provided by onboard batteries so that communication through the satellite is not interrupted.

Eclipses caused by passage through the earth's shadow are closely related to the seasons of year as illustrated in Figures 1 and 2. Figure 1 shows the

situation during the summer months when the line connecting the earth and sun lies north of the earth's equator. A synchronous satellite essentially moves around the earth's equator in a circular orbit with a 26,200 mile radius. Thus, in the summer season, the satellite passes above the earth's shadow when it is in opposition to the sun.

During the winter months the line connecting the earth and sun lies below the equator. During this season the satellite passes below the earth's shadow during each revolution around the earth.

The spring and fall seasons are characterized by the earth-sun line lying nearly in the earth's equator. The sun lies exactly in the equator at the spring and fall equinoxes which occur on March 21 and September 23. Figure 2 illustrates the situation at these times. As can be seen, the satellite orbit plane bisects the shadow causing the satellite to pass through the center of it on each orbital revo-

lution. The eclipse duration is a maximum at this time and equals about 70 minutes.

The four INTELSAT IV satellites currently in orbit travel essentially the same orbit path around the earth with a fixed distance between them as illustrated in Figure 2. Thus, all of them do not experience eclipse at the same time. Instead, each satellite enters and leaves the earth's shadow with a nearly fixed time relationship with respect to each other.

Figure 2 shows the special condition when the sun is exactly on the earth's equator, but a portion of earth's shadow will intersect the orbital path whenever the sun is within 8.5 degrees of the equator, a condition which is satisfied for a continuous period of time centered about the spring and fall equinoxes. The spring eclipse season begins in late February and continues until about mid-April. The fall season extends from late August to mid-October.

Eclipses of synchronous satellites by the moon's shadow are less frequent and of shorter duration than those caused by the earth's shadow. Their occurrences are linked to the phases of the moon rather than the seasons of the year and are possible every month near the time of new moon.

■ Dr. Kinney is manager, astrodynamics department, International System Division.

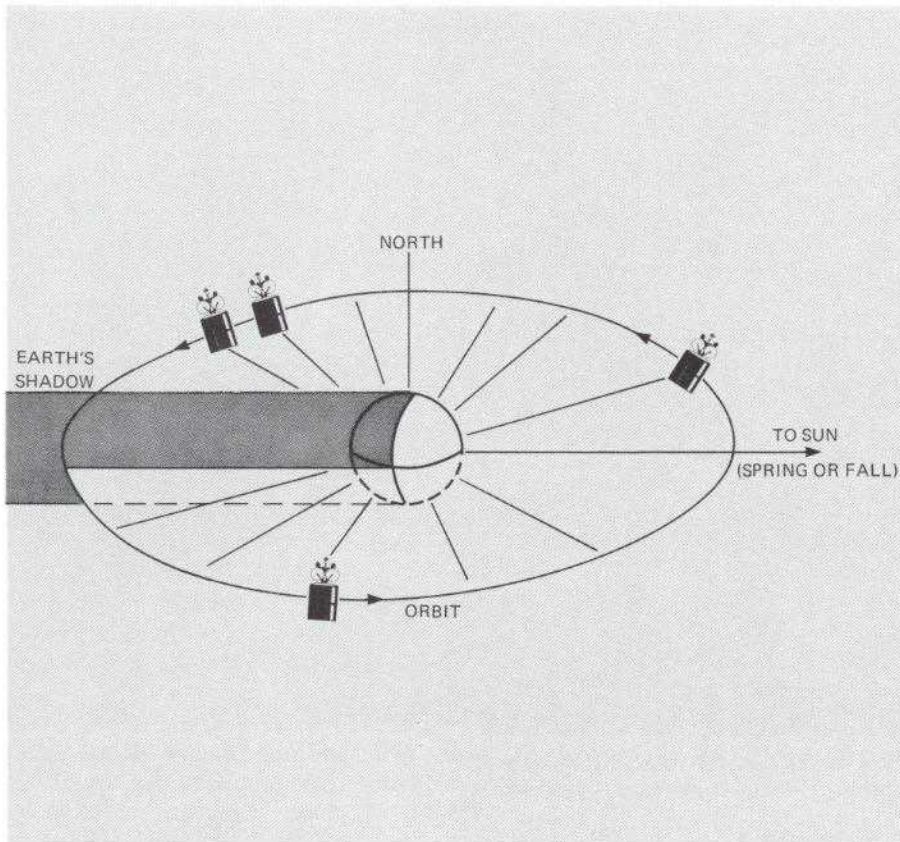


Figure 2. Earth's shadow geometry at the spring and fall equinoxes.

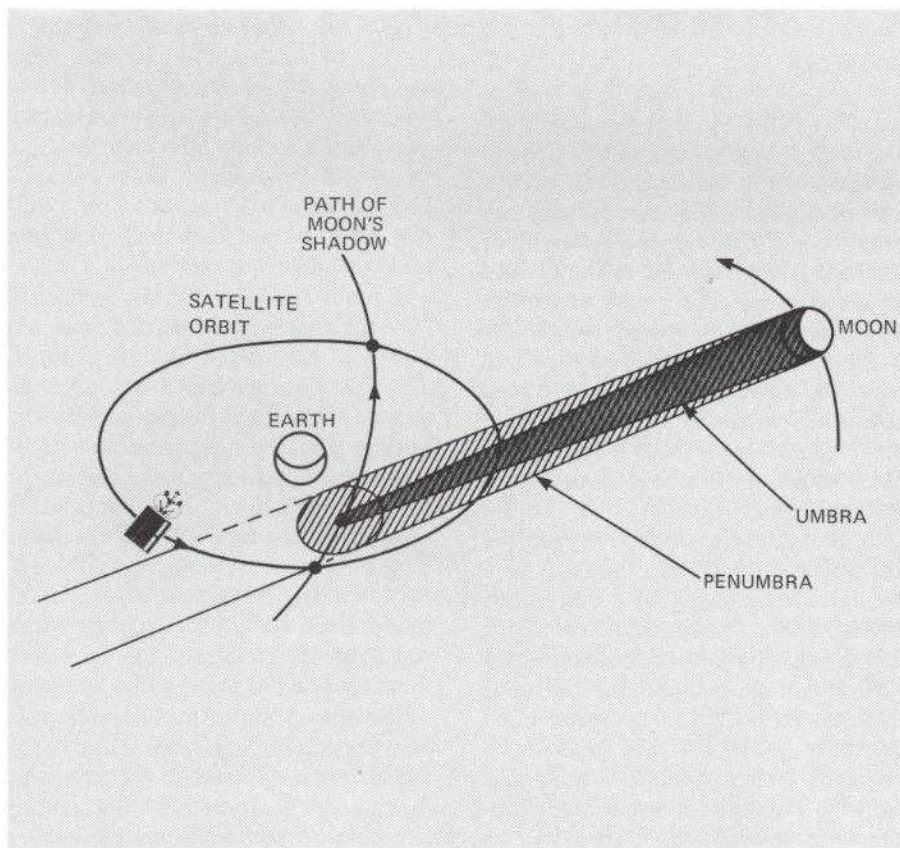


Figure 3. Moon's shadow geometry near new moon.

SKETCHES BY ROY TURRENTINE

Figure 3 illustrates the basic phenomenon, and in this case, the moon's shadow is shown divided into the umbral and penumbral regions, a distinction which was not of great importance in the previous discussion. In the umbral region, the sun's disc is completely covered by the moon, whereas in the penumbral region, it is only partially covered. Another feature is illustrated in the figure, namely that the moon's shadow moves across the orbit plane at an appreciable rate as the moon moves in its orbit around the earth. For an eclipse to occur, the shadow not only has to intersect the orbit path but the satellite has to be at the point of intersection at that time.

Each of the INTELSAT IV satellites has experienced one partial moon eclipse in the last six months. The date of each occurrence, the duration, and the fraction of the sun's disc obscured are summarized in the accompanying table.

Spacecraft	Date	Duration	Maximum % Obscured
F-2	4 Jan 73	40 min	54.6
F-3	4 Jan 73	40 min	41.5
F-4	8 Aug 72	60 min	51.8
F-5	3 Feb 73	50 min	47.6

The shadowing of the INTELSAT IV satellites causes no interruption in communications traffic, but there is a closely related phenomenon which does. In the context of the previous discussion, the phenomenon can be described as an eclipse of the sun by the satellite as seen by an observer on the earth, in particular a ground antenna in the communications network. When the line of sight from an antenna to the sun is within approximately 1 degree of the line of sight to the satellite, the radiant energy received from the sun interferes with the communication signal and causes traffic to be interrupted. Each antenna will receive some sun interference on four to five successive days during the spring and fall eclipse seasons, the maximum duration being approximately eight minutes. The times of interference for each antenna in the network are predicted well in advance of their occurrence so that the necessary precautions can be taken.



An aerial view of Managua, Nicaragua, with the earth station antenna visible as a spot in the center of the picture.

PHOTOS BY DON OWEN

A first-hand report from Managua: earth station service survives quake

BY JUAN R. CASTANERA

On Friday, December 22, we had our Christmas party. Everybody was in a happy mood as they enjoyed Nicaraguan-style barbecued meat, cooked in an open pit, and served with cold beer. The party was over by four o'clock and everyone headed home to wrap those last few gifts and to enjoy the long holiday weekend.

No one would have guessed at that time that tragedy was only eight and a half hours away. At 10:30 p.m., the first small tremor was felt, but this did not scare anybody as these are common in Central America. At 12:30 a.m. the big earthquake hit. In 27 seconds the center of what had been a major city, with a population of 400,000, was almost totally destroyed.

I was awakened by the violent motion of the earthquake and the rumbling noise associated with it. My wife, who minutes before had gone

to the bathroom, was screaming as she tried to get back to our bedroom. Because of the violence of the earth's movements, she fell several times before she got back in the room. Our electricity failed almost instantly, and in the darkness we could not reach the children's bedroom until the tremors finally ceased. Only then was I able to move the family out of the house to relative safety. I told them not to move and then I ran to the back of my yard to see if the earth station was all right.

It was really a surprise to see the antenna still standing half a mile away, illuminated by emergency battery-operated lamps. These lights lasted only about ten minutes though. This meant that something had gone wrong. Either the generators had failed to start or they had been damaged by the quake. There was no way I could tell what had happened to the personnel on duty.

A few minutes later, I saw the lights of a car trying to leave the

station, but it soon turned around and went back. This meant two things: At least people were alive there, but the road was blocked by rocks. At that time, I decided the only way to get word of the earthquake back to COMSAT Headquarters was to try to get my ham equipment on the air using the car battery for power.

I tried to get back into the house to get to my transceiver when the second earthquake hit. After that, a third one followed. It took me two hours to find the tools and cables necessary to hook up the transceiver to my car battery. The floor of the hamshack was a confusion of tools, cables, books, and radio parts.

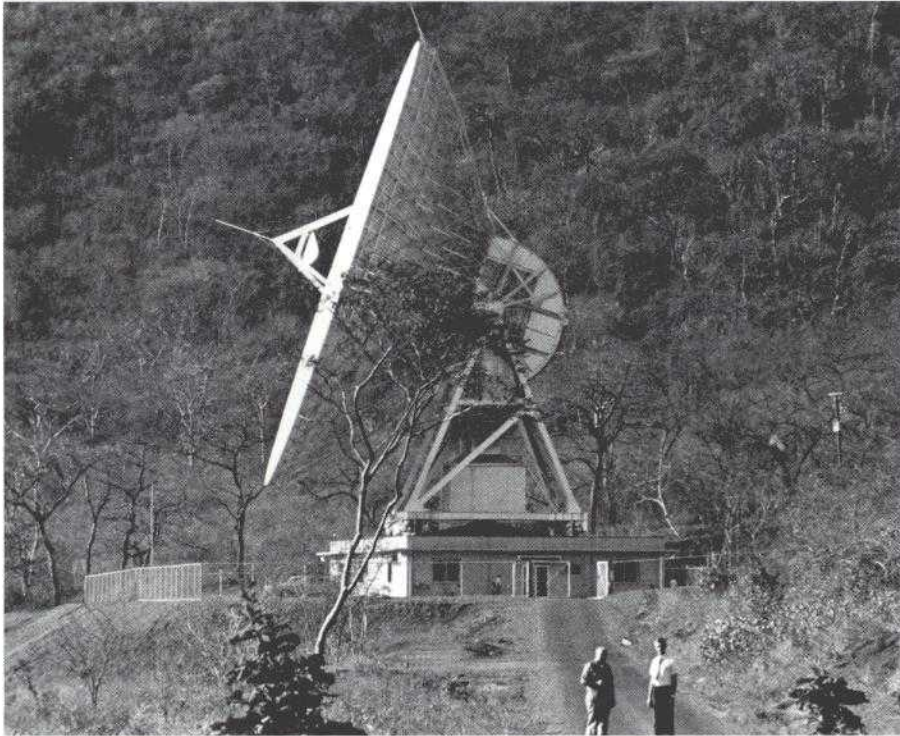
At 2:30 a.m., I was able to raise Don Wilkes (K3FHP) a radio amateur in Bethlehem, Pa. He then called the Operations Center in Washington, D. C., to pass on the information of the quake. While I was talking to Don, Paul Winchester, Ray Hashberger, and Don Smith arrived at my place. Don had checked on Jim Clark and his wife on his way to my home.

I immediately informed the Operations Center that all the COMSAT personnel were all right and asked them to inform all of our families before the news hit the radio and newspapers. I also told Headquarters that we would get back to them via ham radio when we found out how badly the earth station had been damaged and if service was available.

By this time we could see fires in Managua and we heard frequent explosions. It was a real nightmare. The earth never ceased to shake, although not with the same violence as during the first three tremors. We decided to try to reach the station by foot. Ray Hashberger and Don Smith volunteered to try and make it down to the antenna. I remembered I had two Japanese walkie talkies. I finally found them in the mess that was on the floor of my hamshack. I tested them and found them to be working.

Hash and Don put on boots and with flashlights and guns (the site is full of snakes) started on their way down to the site while maintaining communications via the walkie talkies. At 4:30 a.m., they arrived at the station and found that all the personnel

■ *Mr. Castanera is manager of the NICATELSAT Earth Station.*



Station manager Castanera (left) and Dr. Robert C. Barthle, Director U.S. Systems Management, stand in front of the earth station.

were unharmed and that the building showed very little damage. The midnight crew was all outside the building and the diesel generators were happily perking way. Unfortunately, the main circuit breaker failed to operate properly and there was no emergency power for our equipment, so we were off the air until 5:10 a.m. when we re-established communications with Etam.

After we got the word from Hash and Don that all was well, Paul and I started down to the station, arriving there as the sun came up. I could tell at once that the microwave link into town was out and, of course, there was no way of knowing if the communications center in town even existed any more. The first word we had came from one of our Nicaraguan technicians who arrived at the earth station on his motorcycle and said the Post Office and Communications Building was still standing. His report on the conditions in the center of town was rather ghastly. He said the sidewalks were covered with dead bodies, and many major buildings were destroyed.

I tried to get into town that morning but could not make it. The roads were impassable and the exodus of

people coming out of the city was tremendous. Thousands, many of them hurt, using any available transportation and on foot were evacuating the city.

We finally got the microwave link into town back in operation on the afternoon of December 23. We also learned that the Post Office building was operating on emergency power. Although the building was still standing, it had suffered considerable damage, and it was not yet known whether it was safe or would have to be demolished. Telcor, the local telephone company, started running lines from our equipment on the fourth floor of the building to a plaza in front of the building, where temporary World War II field-type army switchboards were installed.

It was also during the afternoon of December 23 that newsmen started to find their way to the station. Associated Press (AP) and United Press International (UPI) were the first to show up. In the days that followed news correspondents and photographers from all parts of the world visited the station. Since all the hotels had been destroyed or damaged, the newsmen slept in the administration section of our building, using air

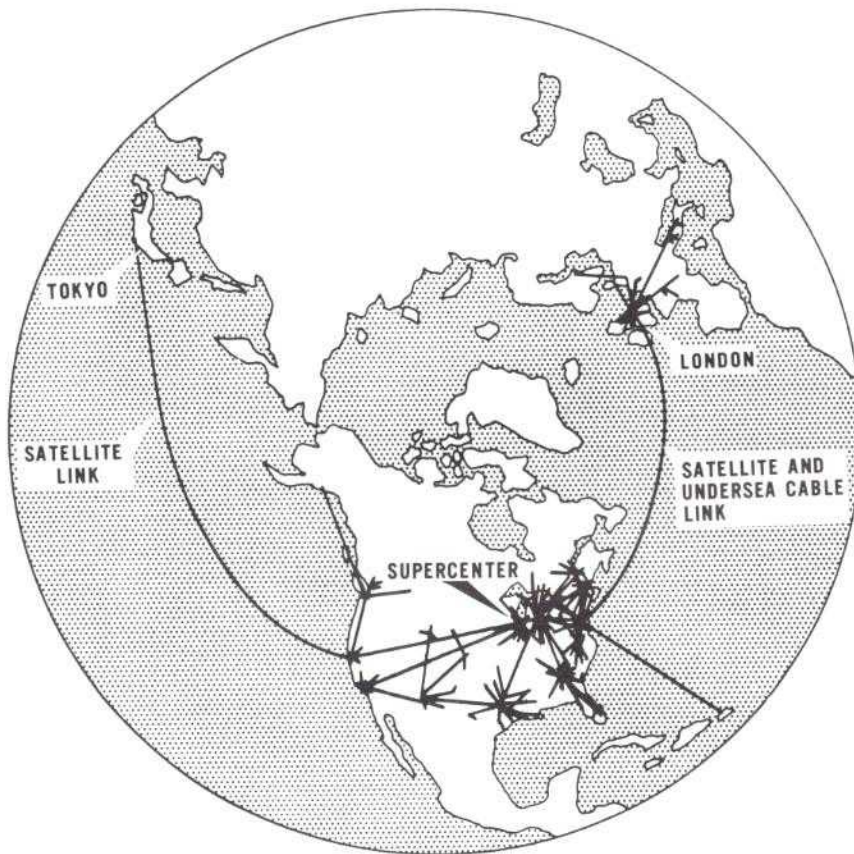
mattresses, sleeping bags, or the plain floor. Our ladies' lavatory was converted into a temporary darkroom where photos were developed for facsimile transmission via satellite to the outside world.

Our staff worked long hours, acting not only as technicians, but as telephone operators as well, handling four and five simultaneous calls to different parts of the world. We soon learned that conditions in Managua deteriorated very fast. There was no food or water. Looting started and martial law was declared within 24 hours. Because of these conditions, I got our staff together and we decided, in order to devote ourselves more fully to our jobs, that the best thing to do was to evacuate our families. U.S. Air Force planes were evacuating all U.S. citizens who wanted to leave. Our families flew out Christmas morning on a C-130 transport for Tampa, Florida, where they were met by Headquarters' Bill and Leona Hudgins.

In the days that followed, our station became a regular madhouse. AT&T arrived on scene with their mobile microwave vans. Direct private lines were established from the U.S. Ambassador's residence (being used as the Embassy since the Embassy building was destroyed by the earthquake) and from General Somoza's headquarters to Washington, D. C., via satellite. Lt. Col. Charles H. Scott and his Army communications outfit from Panama spent much of their time at our station using our facilities to talk to the Pentagon and the Canal Zone.

Since our station was one of the few places in the area that had water, all our guests, including many of the U.S. Army communications unit, were showering and washing their clothing with our water.

In the weeks that followed, things gradually returned to a more normal status. Two communications centers were established outside of town; as more and more circuits were re-established, we started to eliminate the temporary telephone facilities we had set up at the station. The last temporary channel was removed in early March and telephone switchboards were re-installed at the Post Office building in Managua.



The MARK III network provides international business and industry with a full range of computer services via satellite.

GE's Information Services Network expands "time-sharing" via satellite

BY JAMES H. KILCOYNE, JR.

The General Electric Company recently announced the completion of an international computer services network interconnecting 291 cities in Japan, Western Europe, and North America.

Known as the MARK III Information Service, the network now spans more than two-thirds of the globe and provides integrated international computer services across 17 time zones.

The computer SUPERCENTER, providing what GE calls "computer power" for the entire network, is located in Cleveland, Ohio, with a remote concentrator in London, England, distributing services to Europe.

This concentrator is served by a 9,600-bit-per-second circuit via an

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

Atlantic INTELSAT IV satellite and an undersea cable link.

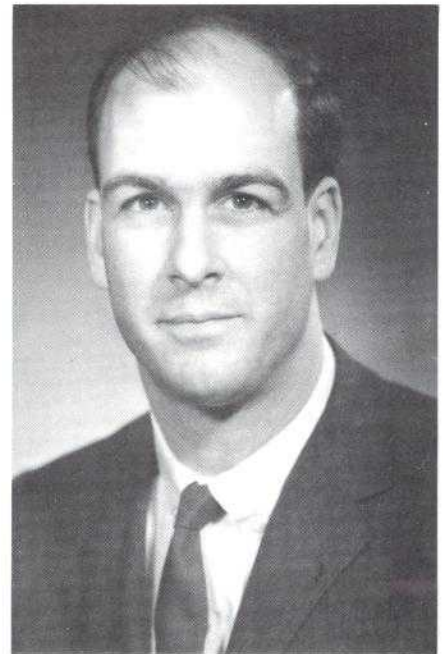
The recent expansion to Japan culminates several years of technical development, planning and international negotiation. As a result of these efforts, G.E.'s "computer power" is being transmitted across the Pacific via an INTELSAT IV satellite circuit which went into service in early March to Tokyo for distribution in Japan.

General Electric, a pioneer in developing international computer time-sharing, introduced its services to Europe in February 1970. With its recent trans-Pacific expansion, G.E. is considered to be one of the world leaders in this field.

Looking to the future, a GE spokesman recently stated that "further expansion of the GE network into Latin

and South America, as well as further expansion within Western Europe and Asia, are currently in the planning stages."

COMSAT's Marketing staff and Service Bureau have both played important roles in the coordination of this international data transmission network in the past and are ready to be of assistance as the network continues to grow in the future.



Mr. Nye

David Nye named as COMSAT's new Personnel Director

David S. Nye of Mobil Oil Corporation's International Division has been named COMSAT's new Director of Personnel, succeeding Thomas W. Harrington who recently resigned.

Prior to joining COMSAT, Mr. Nye was Policy Development Advisor for Mobil Oil Corporation's International Division with headquarters in New York. During his 15 years with Mobil Oil he administered programs for salary and benefits, training and manpower development, and equal employment opportunities.

Mr. Nye is a graduate of Cornell University with a degree in industrial and labor relations. He, his wife, and their two children have been residing in Riverside, Connecticut.



COMSAT President J. V. Charyk (left) and Acting Labs' Director B. I. Edelson view a rewiring.



The Labs' Dr. Leonard Golding (left) discusses DITEC with a potential user.

COMSAT displays digital TV to broadcasters

COMSAT demonstrated its new Digital Television System (DITEC) at the National Association of Broadcasters Convention held at the Sheraton Park Hotel in Washington, D. C., March 25 to 28.

Live and preaped telecasts were transmitted by this new technique. The demonstration utilized a DITEC encoder unit at the Andover Earth Station, an Atlantic INTELSAT IV satellite, a 15-foot-diameter parabolic receive antenna on the hotel's front lawn, and the DITEC decoder housed in a COMSAT trailer on the hotel driveway.

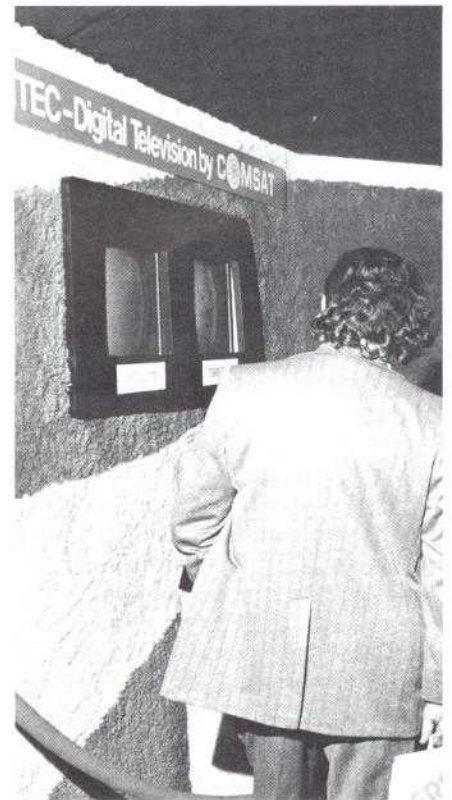
Applicable to both color and black and white, the encoder converts standard television signals into digital form for transmission via satellite. The decoder then reconverts the digital information to a conventional composite video and audio signal for normal viewing.

DITEC promises substantially reduced transmission costs because it permits the transmission of two network quality channels through a single transponder.

Visitors to the COMSAT exhibits expressed great interest in this new development as they viewed the demonstration on monitors in the trailer as well as in the main exhibition hall.



COMSAT hostess Joan Middleton stands in front of the DITEC antenna on the lawn of the hotel.



A spectator at the COMSAT booth compares satellite and terrestrial TV reception.

COMSAT staffers win NASA's Snoopy award

The National Aeronautics and Space Administration (NASA) presented individual and group Manned Flights Awareness "Snoopy" awards to COMSAT personnel during a formal presentation ceremony at the Goddard Space Flight Center, Greenbelt, Md., Friday, March 16.

The coveted "Snoopy" award is a silver pin in the form of "Snoopy," the precocious puppy of the popular "Peanuts" comic strip, garbed in space helmet and suit ready to combat carelessness. This individual award, given only to those persons who have rendered outstanding service to flight crew safety or mission success, was presented to William Lee, Manager, INTELSAT operations.

Group awards were also made to members of the COMSAT Operations Center teams and to the Andover, Brewster, Etam, Jamesburg, and Paumalu Earth Station teams. These awards, in the form of certificates of appreciation, cite the outstanding job accomplishments of each group.

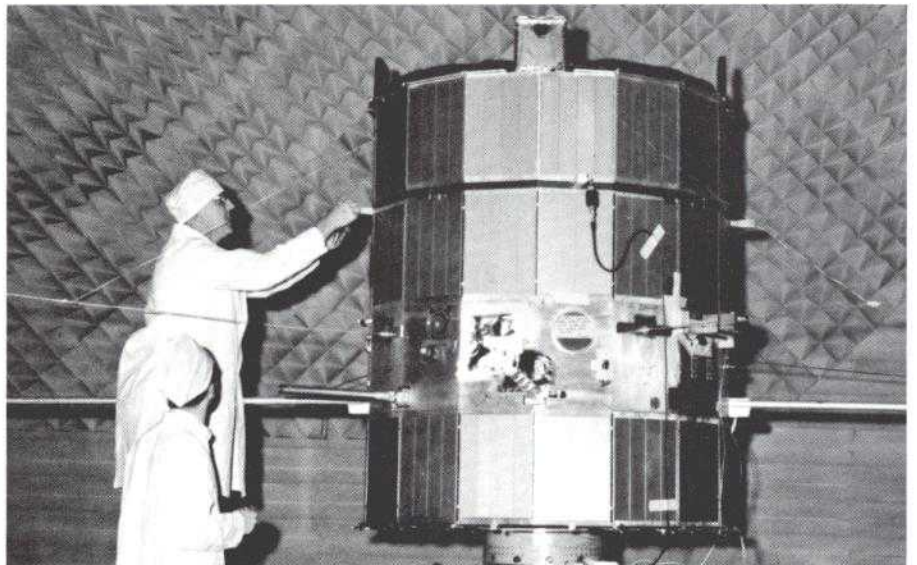
Present at the ceremony representing the Operations team were Lawrence C. Adams, Lawrence W. Covert, Joseph A. Kearns, Jr., Samuel F. McNeil, Jr., and Donald S. Ross. Accepting the award for the earth station teams was Dr. Robert C. Barthle, Director, U.S. Systems Management.



An Elvis Presley special: aloha via satellite

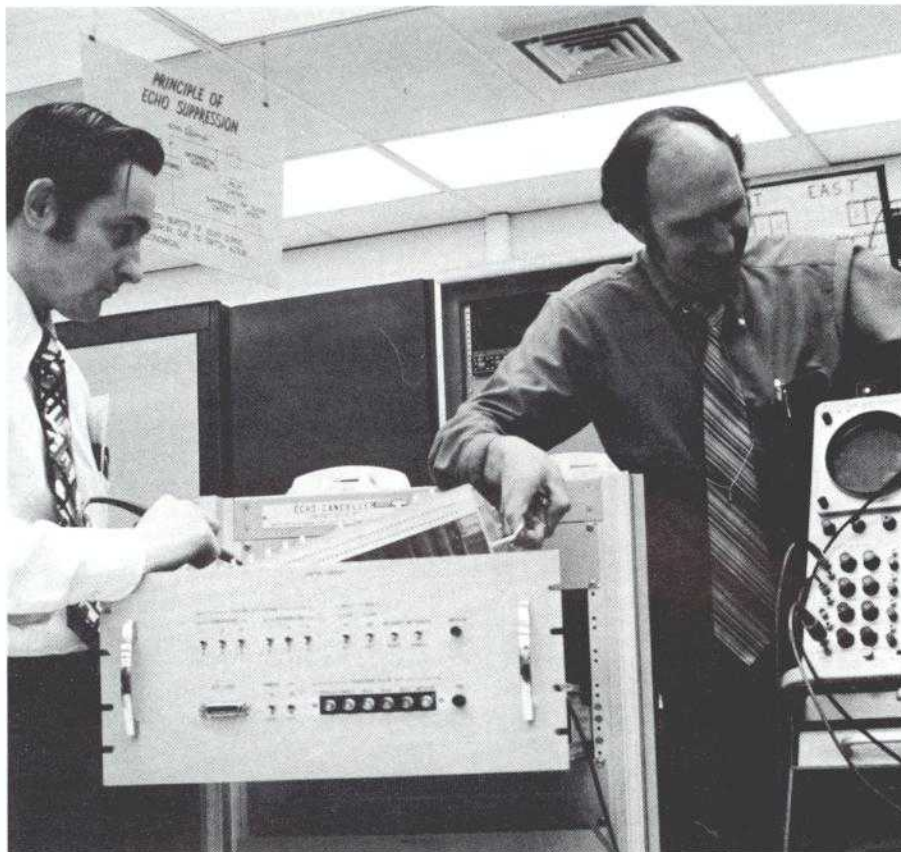
Responding to a request from the National Broadcasting Company, COMSAT's Information office provided 16-mm satellite film animation and other visual materials to NBC for use with a recent Elvis Presley TV special. According to Dean Reed, an NBC executive, the one-hour Presley special was beamed from Hawaii "live via satellite" to 34 countries in the Far East. The telecast was preceded by a film sequence which illustrated the operation of the global satellite system. Subsequently, an "Elvis via Satellite" record album was produced showing an INTELSAT IV satellite on the cover. Within the first 10 days of the album's release, more than a million copies had been sold and Elvis had another "Gold" record to add to his collection.

PHOTO BY ALLAN GOLFUND



Labs anechoic chamber used to test NASA satellite

NASA's Interplanetary Monitoring Platform (IMP-S) satellite was tested in the COMSAT Labs anechoic chamber during March. The first of the IMP series of satellites was launched in 1963, and since then they have greatly expanded man's knowledge of solar-lunar-terrestrial relationships. In the photo above, two NASA engineers are shown at work.



Mike Onufry (left) and Henri Suyderhoud test an echo canceler unit.



Eric Kauffman (left) and Dan Fischer make a final adjustment.

Echo cancelers now being tested via satellite

The first phase of the INTELSAT-sponsored echo canceler field trials is presently under way between the United States and the United Kingdom.

Satellite circuits equipped with digital echo cancelers, developed by COMSAT Laboratories, are being compared to circuits equipped with conventional echo suppressors. The method of comparison consists of customer-call-back interviews by trained personnel who ask a standard set of questions requesting basic information as to circuit quality and ease of hearing.

The results are then statistically quantified by computer and the circuits equipped with cancelers are compared with those equipped with suppressors.

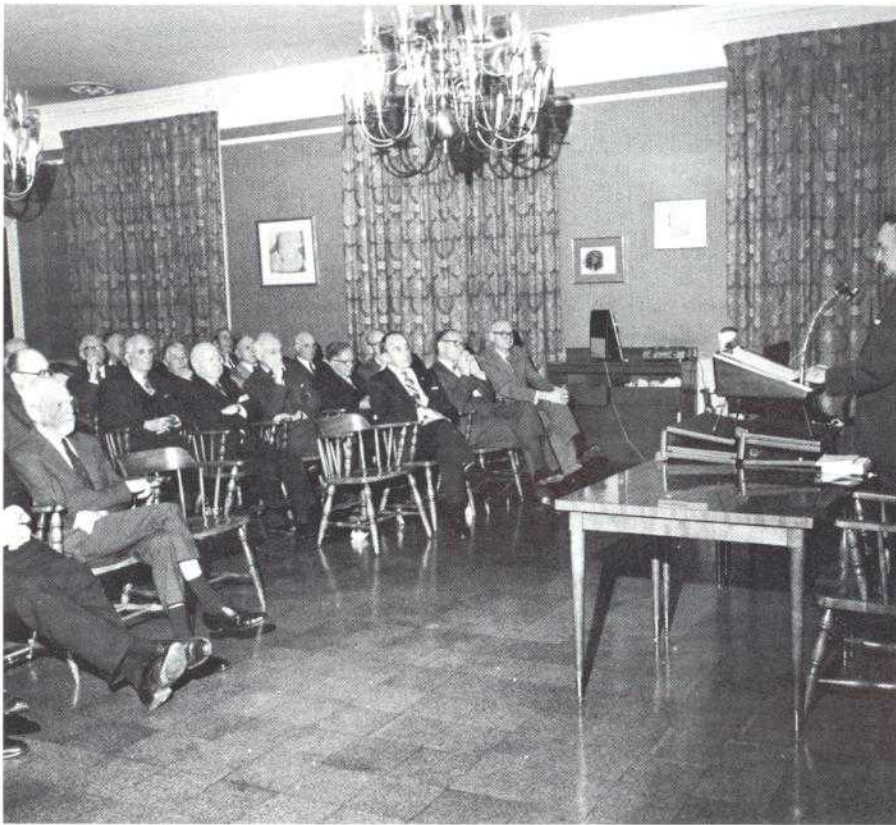
Dr. S. J. Campanella, who has direct responsibility for the field tests, recently stated that the initial results for the first six weeks of testing indicate that the four prototype echo cancelers, now in use in the INTELSAT network, appear to be the answer to echo control.

Atlantic representatives meet in Lima

The Atlantic Region Operations Representatives conference was held in Lima, Peru, from January 30 through February 2. Forty-two delegates, representing 34 administrations and COMSAT as Manager, attended the sessions held in the Crillon Hotel in downtown Lima.

The major items on the group's agenda included operational and contingency planning for the 1973-1975 time period, discussions regarding initial testing and operation of the SPADE system, and the development of an operational plan for the introduction and use of the INTELSAT IV-A satellites.

The Manager indicated that a complete INTELSAT IV-A plan for the region would be developed as soon as traffic data became available from the Global Traffic Meeting to be held in Rio de Janeiro in April.



Dr. Charyk speaks to Foreign Affairs Institute

COMSAT President Joseph V. Charyk addressed members of the Washington Institute of Foreign Affairs at the Cosmos Club in Washington, D. C., on February 6. Dr. Charyk's subject was COMSAT AT 10. He spoke of COMSAT's modest beginnings in 1963 at Tregaron, the Corporation's first home in northwest Washington, D. C., the launch of Early Bird in 1965, and the development of today's global communications satellite system using high-capacity INTELSAT IV's stationed over the Atlantic, Pacific, and Indian Oceans.

Highlights of ICSC actions at 63rd meeting

The Interim Communications Satellite Committee (ICSC) held its 63rd and final meeting from January 24 to February 1 in Washington, D. C. Eighteen members, representing 48 of the 83 members, were present.

The interim agreements expired on February 12, and the first meeting of the successor Board of Governors of INTELSAT under the definitive arrangements met on March 14.

Among its actions, the Committee:

- Decided by vote that the satellite program to follow the INTELSAT IV satellites will consist of three INTELSAT IV-A satellites as defined in the negotiated specifications. These satellites

are to be ordered for delivery in a time frame consistent with an operational capability in mid-1975.

- Requested COMSAT as the Manager to enter into further negotiations with Hughes Aircraft Company in order to obtain certain changes in the terms and conditions of the draft contract amendment previously presented to the Committee for procurement of three INTELSAT IV-A satellites.

- Adopted the INTELSAT budget for 1973 as recommended by the Advisory Subcommittee on Finance, with the understanding that the budget would be subject to revision by the Board of Governors, particularly with regard to provision for additional expenses arising from the implementation of the definitive arrangements. The 1973 budget, as approved, envisions \$59,888,000 in capital expenditures, \$65,536,000 in operating expenses and depreciation, and

\$97,050,000 in operating revenues.

- Approved a reduced rate adjustment factor of five for the National Aeronautics and Space Administration (NASA) shipboard earth station. This action will not be considered as a precedent for deviating from the established INTELSAT policy of providing services in accordance with appropriate CCITT-CCIR recommendations. This reduction in charge results from upgraded performance of NASA shipboard terminals. Since the request for reduced charges was in many ways a result of unique conditions, the Committee viewed the rate adjustment as an exceptional case.

- Agreed to deliver to the Smithsonian Institution the INTELSAT III cut-away engineering model at an estimated total cost to INTELSAT of \$7,500.

- Granted formal approval to the Abidjan (Ivory Coast) and Philibert Tsiranana (Malagasy Republic) earth stations to operate with INTELSAT IV satellites.

- Approved an extension of the term of Mr. Feve, a nominee of the French signatory, until June 29, 1973, to work on the technical staff of COMSAT as Manager.

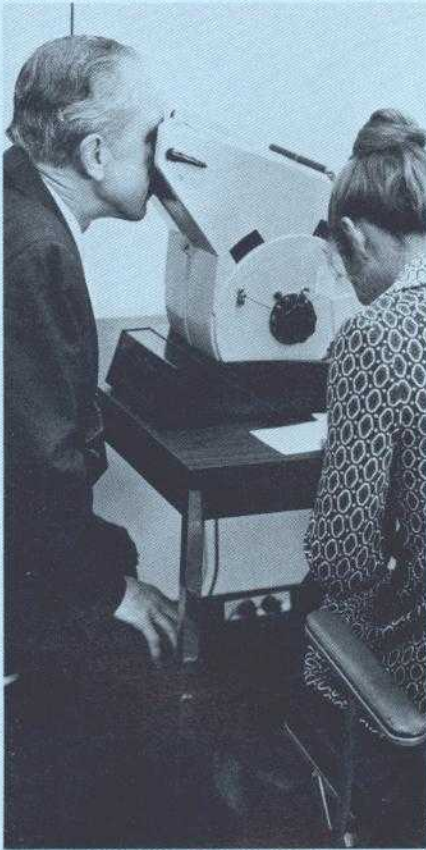
Sampson named AFCEA man of the month

George P. Sampson, COMSAT Senior Vice President, International System Division, was recently honored as the Armed Forces Communications and Electronics Association's (AFCEA) Chapter Man of the Month.

AFCEA, a national society composed of companies and individuals interested in preparedness and national security, selected Mr. Sampson for the honor as a result of his more than 30 years of distinguished service in the field of communications.

Mr. Sampson is serving his second term as a national director of the association and has long been active in the local chapter of the organization.

A veteran of 23 years of active Army duty and a retired Major General, Mr. Sampson joined COMSAT as Vice President, Operations in 1965.



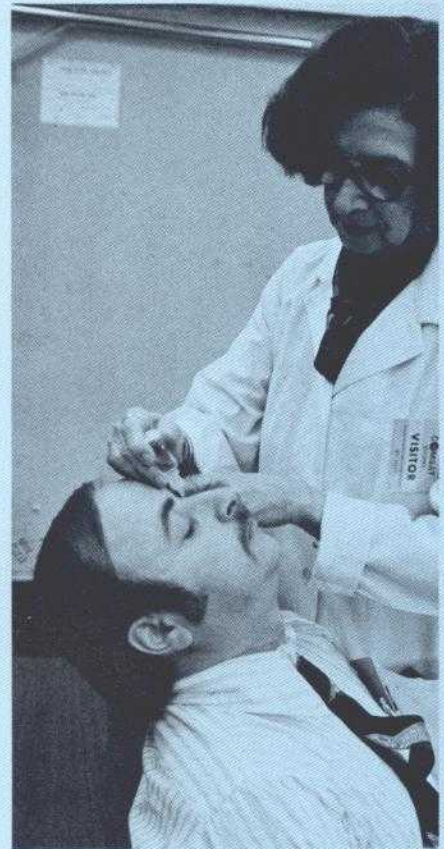
An eye check is part of the test.

COMSAT EMPLOYEE NEWS

Glaucoma detection tests

As part of COMSAT's continuing Employee Health Program, glaucoma detection tests were made available to interested employees on March 20.

Sponsored by the Prevention of Blindness Society, a UGF agency, eye examinations were given to more than 135 employees.

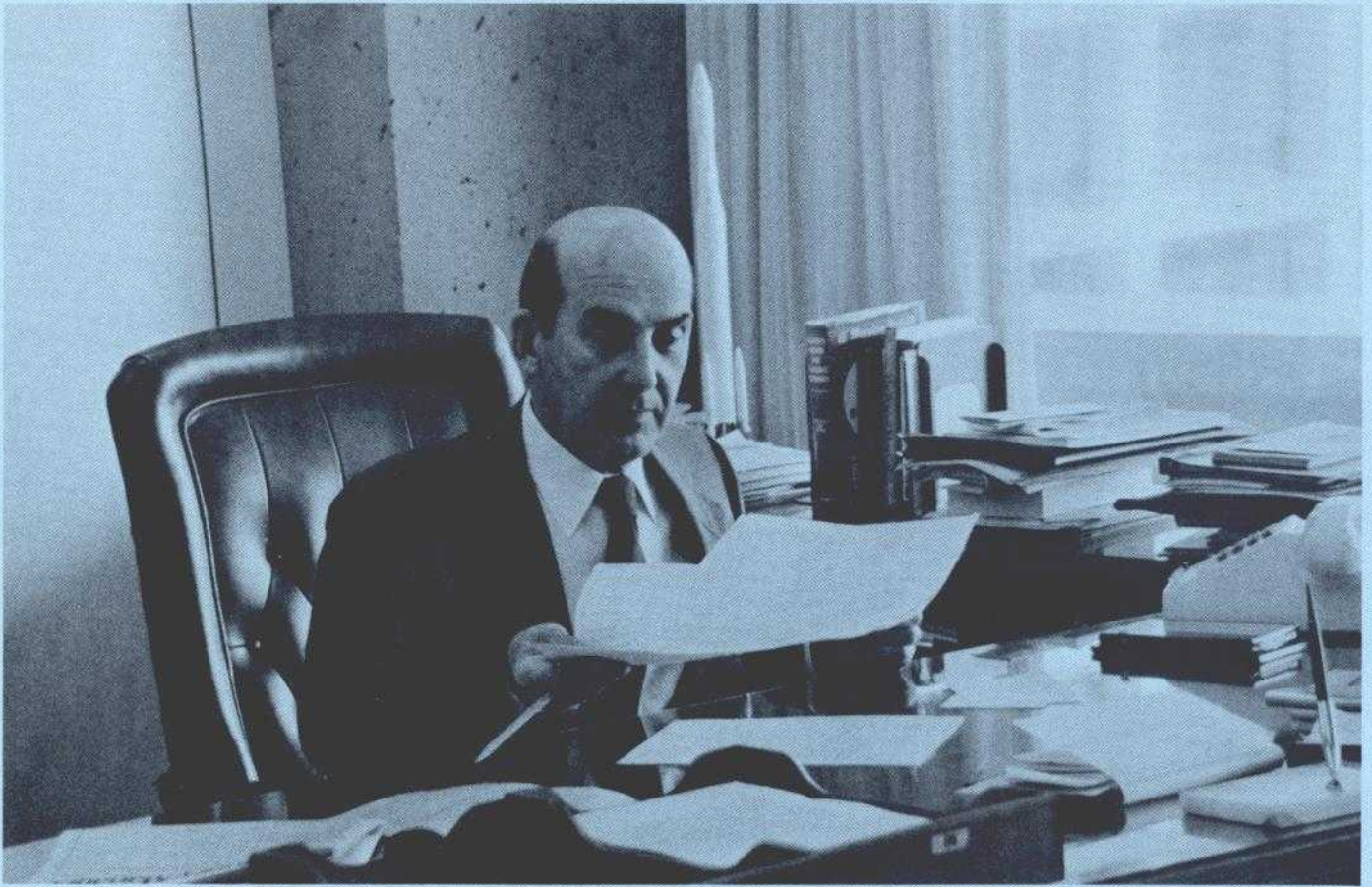


Drops are used prior to the test.



The actual test is painless and takes only a few seconds.

PHOTOS BY J. T. MCKENNA



Corporate Treasurer Frederic M. Mead completes his review of daily cash availability and requirements.

Treasurer's office supervises corporate finances

The office of the Treasurer is responsible under the Vice President, Finance, for the management of the Corporation's money, including daily investment, collection, and disbursement of all funds. It serves as liaison with banking institutions and the financial community.

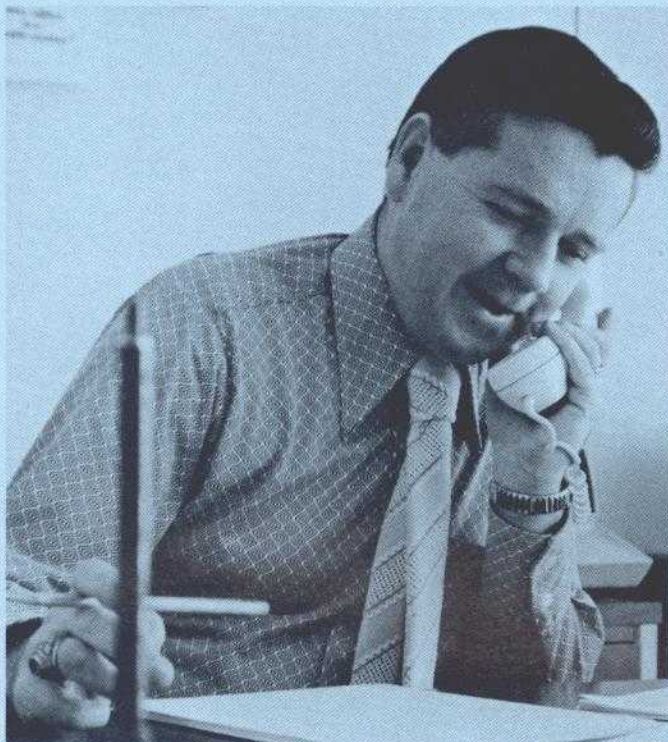
The office is also responsible for the supervision of the insurance program and monitors the pension trust and thrift and savings plans.



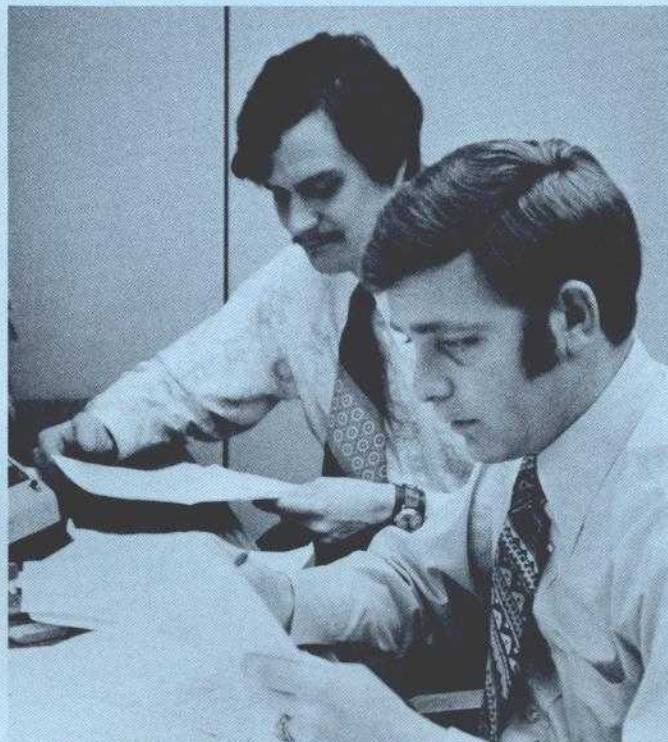
Pearl Coleman types a letter.



Paula Gowanlock takes a breather.



Investment manager Paul Cooke discusses possible stock purchases each morning.

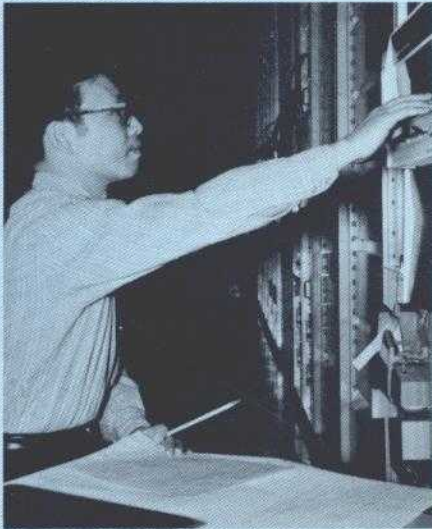


Treasury supervisor R. A. Winkler (right) and Chris Simpson review daily cash requirements.

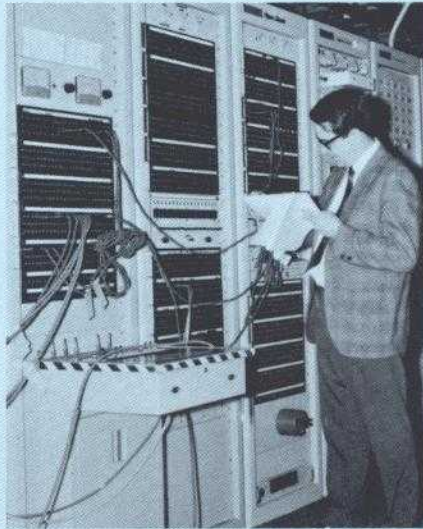


Cashier Marva Stevens prepares travelers cheques for E. C. Perez's overseas trip.

PHOTOS BY J. T. McKENNA



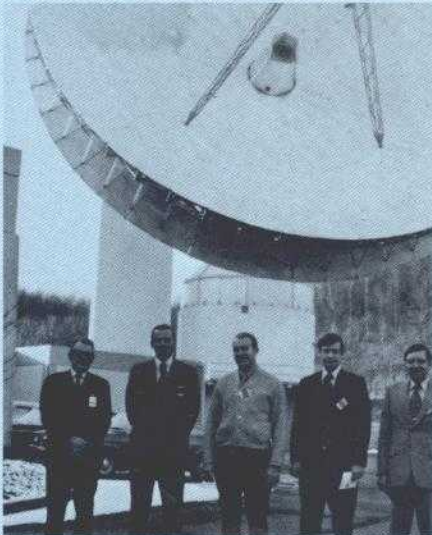
Jiausen Jih checks a SPADE terminal adjustment.



Will Zarecor records SCPC data.



SPADE programming changes are made by Dennis Beaufort.



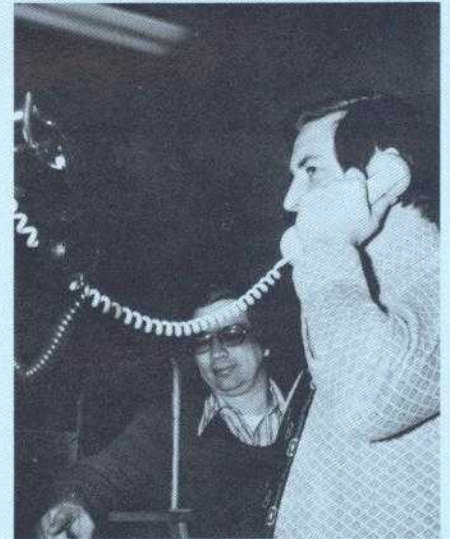
Bill Alvis (left) escorts a group of visitors around the station.

An unusual day at Etam

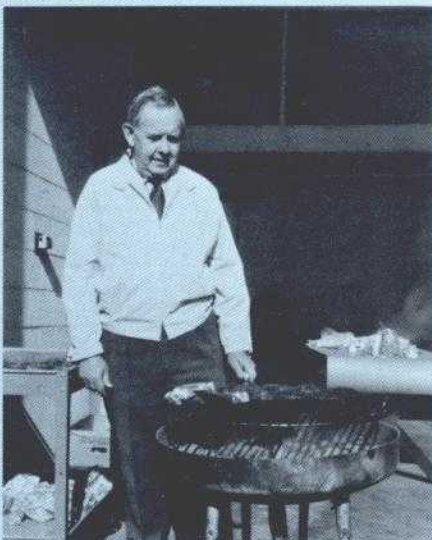
January 17 was an unusual day in many ways at the Etam Earth Station.

The thermometer recorded a very pleasant 59 degrees, SPADE training was in full swing, single-channel-per-carrier (SCPC) specifications were being prepared, a group of Navy communicators toured the station, and chef Chet Randolph was busy at the grill.

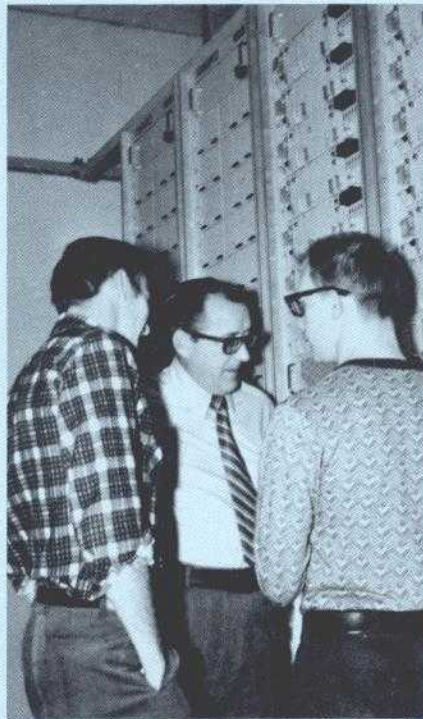
Shown on this page is a pictorial account of some of these activities.



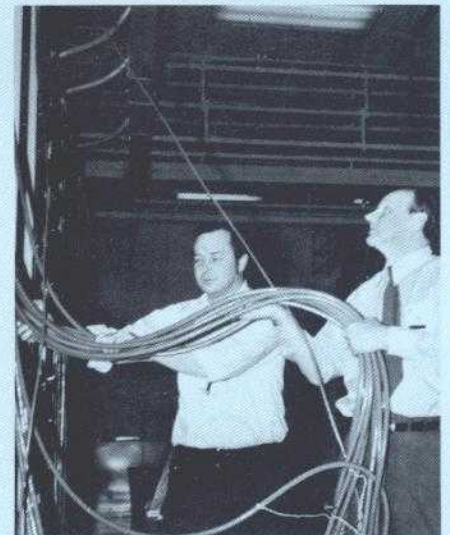
Ivor Knight (right) and Carl Sederquist monitor a test loop.



Chet Randolph swings into action.



Mike O'Hara (center) discusses SPADE with Don Gaston (left) and John Formella.



Gerry Reeves (left) and Rupard Hobbs rearrange cable.



Ed Wright signs in as Ted Gottry and Pat Irby watch.

Credit Union reports continued increases during 1972

BY BETTY GARRISON

The sixth annual meeting of the COMSAT Federal Credit Union was held on Tuesday, March 20, on the eighth floor of the COMSAT Headquarters Building.

More than 100 members attended the meeting, heard reports from the officers and then elected new members to the Board of Directors and the Credit Committee.

Jim Kilcoyne, president, reviewed the highlights of the Credit Union since its birth on October 26, 1967. He reminded the membership that shares have grown from \$151,939 at the end of 1968 to \$1,608,063 at the end of 1972, while loans outstanding increased from \$197,300 at the end

■ *Mrs. Garrison is a staff assistant in the office of the General Counsel and is secretary of the COMSAT Federal Credit Union.*

of 1968 to \$1,314,716 at the end of 1972. Credit Union membership totaled 1,096, at the end of 1972, of whom 898 were current COMSAT employees.

Mr. Kilcoyne stated that much of this growth is directly attributable to the efforts of the Credit Union's first full-time professional manager, Ted Gottry.

Paul Rankin, treasurer, reported that \$75,708 in dividends were paid to shareholders during 1972, an increase of 41 percent over the \$53,900 paid in 1971. Gross income for 1972 amounted to \$115,695, an increase of 27 percent over 1971's figure of \$91,300.

Mr. Rankin also stated that the delinquency rate of 1.48 percent at the end of 1972 was well below the national average of about 3 percent for credit unions.

The vice president and credit committee chairman, Joe Wellington, reported that there was only a 2 percent increase in the total number of loans (786 in 1972 compared to 771 for 1971) approved in 1972, but that the total dollar value of these loans was \$1,507,994, a 33 percent increase over the \$1,134,716 loaned in 1971.

CEA board elects Dave Burks and other new officers

The CEA Board of Directors has elected Dave Burks, International System Division, as president for the coming year. Bill Burch, COMSAT Labs, will serve as vice president, while Legal's Alan Kasper will be secretary, and Dennis Fruhwirth, Finance, will be treasurer.

In addition, board members will chair various working committees. Athletics co-chairmen will be Bill Burch and Alan Kasper with Dave Reiser, COMSAT Labs, and Bob Swensen, COMSAT General, acting as social co-chairmen. Blaine Shatzer, COMSAT Labs, will head clubs and special activities. Bill Burch will assist Lisa Cook, International System Division, with membership matters and Linda Kortbawi, Finance, will again be responsible for jewelry and patches.

Credit Union board elects officers for 1973

Jim Kilcoyne, Corporate Affairs, was re-elected to his third one-year term as president of the COMSAT Federal Credit Union at a board meeting following the annual membership meeting held on March 20.

Finance's Joe Wellington was re-elected as vice president and credit committee chairman, and Betty Garrison, Legal, will serve another year as secretary. Sam Scialabba, Finance, was named treasurer succeeding Paul Rankin, Finance, who completed his term as a member of the board.

Earlier, the membership elected two new board members, Laura Weber, Administrative Services, and Bob Swensen, Domestic and Aeronautical, to three-year terms of office.

The members also elected two new members of the credit committee, Marion Timmons, Legal, and A. C. Walle, International System Division.

5 year awards

The following personnel received five-year service awards during March and April.

Administrative Services: Burton O. Lewis, Jr., John M. Newman, and Edward A. Stoner, Jr.

Andover: David J. Belanger, Phillip S. Morales, John J. Vienneau, and Lawrence V. Wood, Jr.

Bartlett: Carl D. Gleason and James F. Shaff.

Cayey: Arsenio Reyes-Rivera and Robert N. Smith.

Corporate Affairs: Marie M. Hixon and James L. McKenna.

Domestic and Aeronautical: Thomas O. Calvit.

Etam: William G. Bell, Crawford E. Booth, Henry W. Bulk, Carl C. Cooper, Richard W. Dean, Spencer K. Everly, Jr., John R. Formella, Don C. Gaston, Leonard W. Gifford, William C. Mayes, Victor E. Molek, Roger E. Parsons, Lynn Rector, Gerald L. Reeves, Samuel T. St. Clair, and Andros X. Thomson.

Finance: Mary G. Hilliard and Nancy D. Wisner.

General Counsel: Robert D. Bourne.

International System Division: Walter J. Gribbin, Peter L. Hartwell, Michael G. Hoehne, John B. Jenkins, Reta D. Long, Seymour Lynn, Edward J. Roman, Alan L. Verbin, and Malvin B. Williams.

Jamesburg: Charles M. Andersen, Larry D. Baley, George H. Ford, William M. Hartke, Earl J. Jones, Jack Ramey, William A. Scott, Joseph O. Speak, and Donald J. Tucker.

Laboratories: Morris R. Atwell, Francis X. Coffey, William A. Cox, John E. Ebelink, Russell J. Fang, Jorge C. Fuenzalida, Harold I. Gerson, Carl R. Maag, Jr., Christoph E. Mahle, and Stanley H. Schachne.

Managua: Jimmy L. Clark.

Paumalu: Paul A. Koike and William D. Osborn.



Bartlett Tower is 70 feet tall.

Talkeetna's answer to a fading TV picture

By PATTI MCKENNA

Cheechakos (defined as newcomers to Alaska) are spoiled in many ways. For instance, they take for granted such simple things as uninterrupted television and FM radio programs. Sourdoughs (defined as oldtimers in Alaska), on the other hand, know

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

better.

At COMSAT's Bartlett Park we are some 85 line-of-sight miles away from the closest TV station transmitter, which is in Anchorage. Because of distance and weather, signals to the Talkeetna area are subject to deep fades which often completely eliminate part or all of our three TV channels and three FM radio stations. Even worse, at times these fades are selective enough to cut off only the sound on a given TV channel.

To eliminate this problem, a number of individual antenna projects have sprung up in Bartlett Park over the last two years. These have ranged from a 300-foot rhombic to 18-element log periodics placed in the top of a 60-foot fir tree.

Since none of these proved to be really successful, Merle Albert and Dennis Hill, two of Talkeetna's most intrepid technicians, decided to put their heads together and design and build a centralized antenna system for the entire housing area.

This team found a number of steel triangular-shaped tower units in 10-foot lengths. Then the fun really began.

Assembling the sections close to ground wasn't too bad but getting the high-up units in place was a real test of ingenuity. A small derrick was put together using a piece of 2" x 4" lumber with a pulley on it. As each section of the tower was installed, the block and tackle was moved up and used to hoist the next section.

All went fairly well up to the 50-foot level. At this height, most of the Bartlett warriors found that they were lovers not climbers. As a result, construction was stopped at the 70-foot level for three reasons (in no special order); we ran out of (1) money, (2) tower sections, and (3) courage.

Placing the antennas on the tower was difficult, but finally the 10 element arrays were in place for Channels 2, 11 and 13 and for the FM stations.

"System" performance is considered good these days with only an occasional fade as more and more houses hook up to the Bartlett Tower.

At last we are seeing and hearing all of the TV programs that the "lower 48" views, even if they are transmitted from Anchorage a week late.



Rutter discusses compensation techniques

Personnel's Jack Rutter recently conducted a discussion of industry compensation techniques for military personnel attending the "Homelight III" job seminar held at the Crystal City Marriott Hotel in Arlington, Va. The seminar, conducted periodically across the nation, brings together business representatives and retiring or discharged military personnel seeking civilian employment. More than 600 persons heard Mr. Rutter speak.

Life at the Labs

BY CAROL LOUTHAN

On one of my recent lunchtime strolls around the grounds, I suddenly realized that Spring was just around the corner. Employees were pitching horseshoes, playing basketball, jogging, and practicing softball in anticipation of the upcoming season.

Vacations are already in the news at the Labs, too. Dell Brantley recently returned from a week's visit with her daughter in Mississippi. My son, Christopher, and I spent 10 days in Florida. Top billing for three-year

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

old Chris was a visit to Disney World, where he met Mickey Mouse and Donald Duck.

Congratulations are in order for our new parents. Leading the list are Jan and Ron Sentell whose son, Mark Wyatt, was born December 16.

Susie and Tom Bowersox have new twin daughters. Brandy and Maggie were born March 2 at Holy Cross Hospital.

Natahalie Abu-Taha, daughter of Ali and Greta Abu-Taha, was born at Montgomery General Hospital on March 5.

Bill and Phylis Fallon are the parents of a new baby boy. Shaun Patrick was born March 12 at Providence Hospital.

Ruth Swart left COMSAT in Janu-

ary to become a full-time mother to her new daughter. Ruth and husband John will soon be moving to Virginia.

We are all glad to see Jo Ann Wagner back at work after a very lengthy illness. Jo Ann was hospitalized for almost three months.

Belated congratulations to the "WOMBATS" who finished in the top position for the first half of the bowling season. The "WOMBATS" include Helen Caviston, Paul Fleming, Hank Mueller, and Denise and Paul Lucas.

At Andover

BY JOANNE WITAS

On February 18 the CEEA sponsored its Annual Winter Party. The gala affair was held at the Mexico Chicken Coop with about 70 people on hand. Prime roast ribs of beef were enjoyed by all, with music by the Coop band.

Telstar High School, in nearby Bethel, is offering its Co-op Student Training Program again this year. This curriculum offers junior and senior students a chance to earn a salary and to gain work experience at the same time. The Andover Earth Station is one of many local businesses and professional organizations in this program.

Working here at the station is junior John Snyder. He works one day a week and reports to Ralph Summerton, our electronics supervisor. He is the son of Mr. and Mrs. Eddie Snyder of Andover. Ed is AT&T's plant operations manager here at Andover.

Christine Frazier, a senior and the daughter of Mr. and Mrs. Harold Frazier (he is one of our senior technicians), is in the program. She works two days a week for a doctor in Rumford as a secretary.

Station manager Don Fifield was recently the guest of honor at a meeting of the Mexico Lions Club. He was presented with a certificate of appreciation for a donation made to the club by COMSAT. Money raised by the group was used for eye care among the needy families of our area.

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

A look at Paumalu's Lily

By ROBERT N. KUMASAKA

Mrs. Lily Miram is Paumalu's proof that a married woman, gainfully employed outside the home, can at the same time be a good wife and mother. She has successfully balanced the responsibilities of a home and a career for more years than she likes to remember.

A Paumalu employee since August 1966, and the station's only female, she is considered a pioneer at the

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



Paumalu's Lily Miram.

station. She recalls those busy days when the first permanent antenna as well as the transportable units were under construction.

There were three women on the payroll during that period, but since

mid-1969 Lily has been the only female member of the Paumalu staff. Her job title of accounting-personnel clerk does not accurately describe the variety of work she performs. At one time or another she has been a receptionist, secretary, PBX operator, Credit Union helper, sign painter, engineer's aide, and even on occasion chief cook for our station personnel.

A native of the garden isle of Kauai, Lily received her education there, and later moved to Honolulu where she completed her business school education. She previously worked for the Hawaii State Government and several private companies, including the Polynesian Cultural Center, prior to joining COMSAT.

Lily, her husband Augie, and son Lee live about three miles from the station near the world famous Sunset Beach surfing area. Two pets, an English bull dog and a dachshund, complete her household. Her week-ends are spent entertaining friends and relatives and accomplishing a lot of household chores which go undone during the week. She readily admits that her favorite free-time activity is playing Mah-Jongg, the famous old Chinese game.



John J. Peterson (left) and Jackson M. Cooper, owner of the Reprint Book Shop in the L'Enfant Plaza shopping mall, display the cover of Peterson's book which will be available for sale the week of April 16.

Information's Peterson writes book on Guard

John J. Peterson, a COMSAT information officer has written a book, entitled *Into the Cauldron*. The book reviews the role played by the National Guard in the civil disorder of the late 1960's following the assassination of Dr. Martin Luther King in April 1968. The book is being published by Clavier House, Clinton, Md.

The book focuses on the experiences of the individual guardsmen who found themselves on the streets of one city, Baltimore, Maryland, during the height of the disorders.

Based on official records and on taped interviews with those who were actually on the scene, it is a story told by the participants themselves.

The author is a retired Army military police officer, a former newspaper reporter, and former Special Assistant to the Chief of Astronauts at the Johnson Manned Spacecraft Center in Houston, Texas. He joined COMSAT in 1969.

News and notes from Jamesburg

By M. LEE DORSEY

February and March were extremely busy months for us at Jamesburg. The release of American POW's kept us busy handling the TV news programs, which totaled some 18 hours and 28 minutes.

Our new single-channel-per-carrier (SCPC) equipment also kept us on our toes. It is used to provide the new high-speed data service between the NASA Ames Research Center at Mountain View, California, and the University of Hawaii. This very sophisticated piece of equipment does things like send data at speeds up to 56,000 bits per second. This is equivalent to about 70,000 words per minute and that's fast! Because the SCPC is so sophisticated, our operations teams have dubbed it the "intensive care unit."

Our really big news, though, is that we recently celebrated the first anniversary of Larry Cisneros' conversation with the People's Republic of China via satellite. Barely a year ago, February 4, 1972, the entry in our log read as follows: "This station made initial contact with PRC/T at 0408 GMT." In fact, Larry Cisneros had become the first person in the United States to talk via satellite with mainland China.

To commemorate this historic event, George A. Lawler, COMSAT's Director of Marketing, had certificates prepared for those Jamesburg employees who talked with China during February 1972.

A special certificate was presented to Larry identifying him as the first such person. Others who received similar recognition were Charles M. Andersen, Michael J. Downey, George H. Ford, Robert M. French, William M. Hartke, Jack H. Inman, Earl J. Jones, Wilfred S. Nubin, Jack Ramey, William A. Scott, John P. Scroggs, Joseph D. Speak, Melvin M. Stauffer, and Donald J. Tucker.

A wedding, new grandchildren, a Mexican vacation, and the first

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



This is the certificate presented to Larry Cisneros in recognition of his satellite conversation with mainland China on February 4, 1972.

COMSAT-AT&T wives' luncheon were also very much in the news at Jamesburg.

Senior technician Joseph D. Speak's son, Pfc. Jerald L. Speak, and Susan Jones were married on February 18 in Pacific Grove, California. Pfc. Speak is with the U.S. Infantry, 35th Division, in Hawaii.

Facilities engineer W. D. "Robbie" Robinson has a new grandson named Adam Andrew Levering. Robbie's daughter, Mrs. Richard Levering, reports young Adam arrived on February 27. Electronics engineer Jack H. Inman also became a grandfather (this is Jack's second grandchild). Jack's new grandson, named Jason Nathaniel King, arrived on February 15. Jack's daughter, Mrs. Larry D. King, and baby Jason are doing very well.

Storekeeper Albert F. Eleshio and wife, Barbara, took a hunting and fishing trip down Mexico way. Both came back with beautiful tans.

The first COMSAT-AT&T wives' luncheon was held at the home of

Mrs. John Scroggs. This was a "let's-get-acquainted-again" luncheon, and we especially extended a warm welcome back to Mrs. Downey after her long convalescence. On hand were Mmes. Diane Bradshaw, Sandee Cisneros, Dorie Ford, Timy Inman, Susie Nelson, Mamie Nubin, Ruth Stauffer, and Eunice Tucker.

Hastings elected space club officer

Larry G. Hastings, Senior Information Officer, was elected a Vice President of the National Space Club at its annual meeting. Mr. Hastings has been active in the National Space Club since 1960 and served on a number of its committees.

He established the club's annual press award and was chairman of the committee which worked with the U.S. Post Office and the Congress in the design, selection, and issuance of a commemorative stamp honoring the late Dr. Robert H. Goddard, the "Father of American Rocketry."