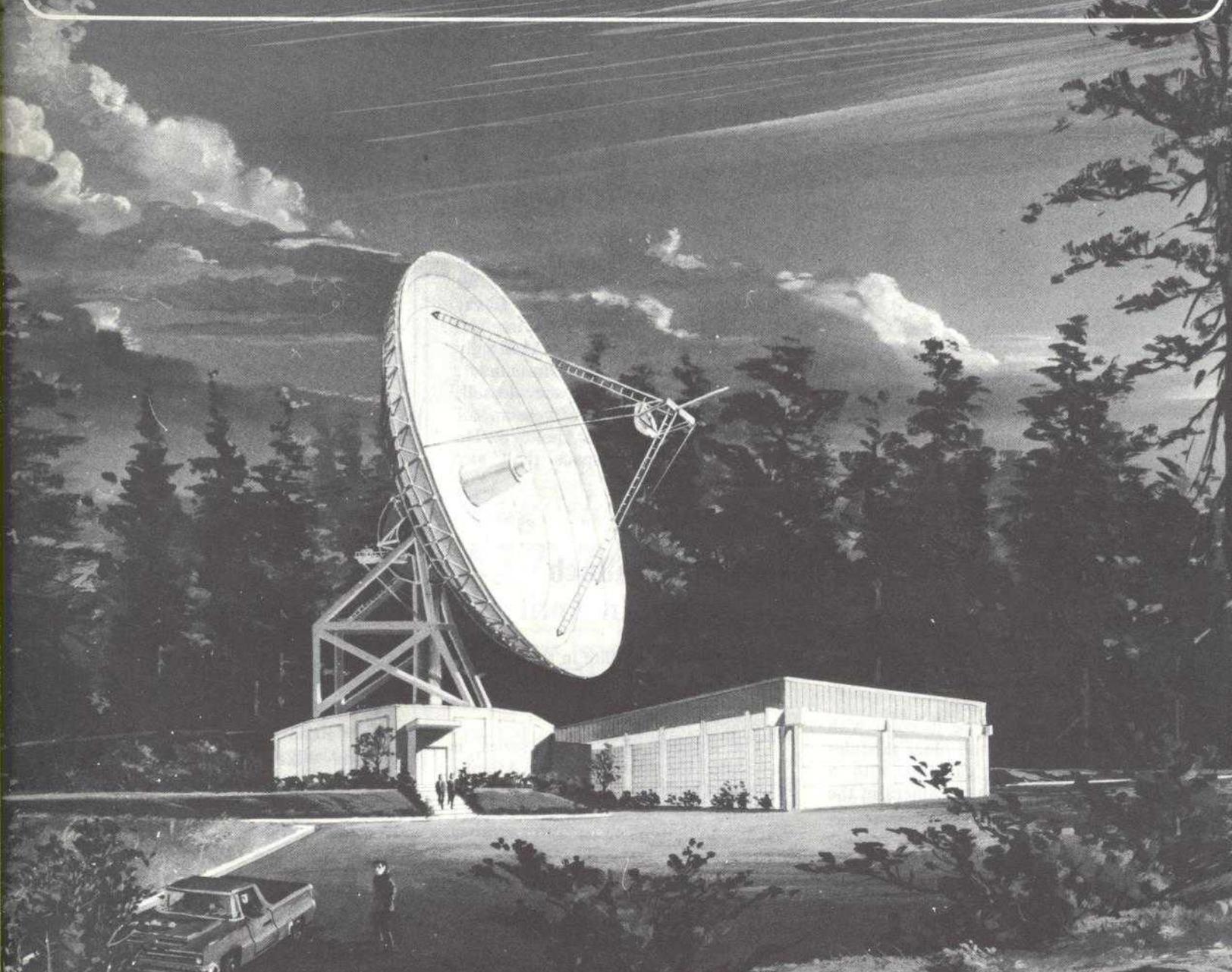


COMSAT NEWS

CIRCULATION COPY

March 1970



The newest U. S. earth station at Talkeetna, Alaska, is shown in the artist's rendering as it will appear when completed. Actual construction at the site, located about 90 miles north of Anchorage, is well along.

The large concrete pedestal, about 50 feet in diameter and 15 feet high, has been poured and the track on which the antenna structure will rotate has been installed on the pedestal roof. The antenna itself, to be 97 feet in diameter, will be erected later this year. The station is

scheduled to begin commercial service in July.

A utility or service building, connected by a passageway to the pedestal, has been erected and finishing work is proceeding on the interior of the building. It will house diesel power generators, heating and air conditioning equipment, a canteen, a garage and other service facilities. The pedestal structure will house the control room for the station. (For further earth station development, story on page 3.)

Heavy TV Coverage Via Satellite Planned for Apollo 13 in April

During the Apollo 13 mission scheduled for launch on April 11 the INTELSAT global satellite network will again play a key role in the transmission of television, voice and telemetry data between the Apollo spacecraft and its crew of astronauts, the lunar surface, and the earth.

Live television coverage of flight activities, as presently planned by NASA, calls for 12 to 15 hours of transmissions to be used for both technical and public consumption, utilizing the combined capabilities of NASA, INTELSAT, and COMSAT.

Prime TV Events

According to preliminary scheduling, the satellites will provide a link in the communications chain which will televise back to the NASA Manned Spacecraft Center in Houston, Texas, the approach to the Fra Mauro lunar landing site, crew activities during the second phase of the exploration of the lunar surface, docking maneuvers of the command and lunar modules following lunar exploration, and post trans-earth insertion photography during the return trip to the earth.

Transmissions will be in color with both the command and lunar modules carrying color TV cameras with a black and white backup camera in the lunar module. All live TV coverage made available to the news media will originate at the Manned Spacecraft Center in Houston.

Whereas, Apollo 12 was involved with lunar exploration in the area known as the Ocean of Storms, Apollo 13 exploration will take place approximately 110 miles west in the vast highland area known as Fra Mauro.

In addition to the televised segments transmitted over the INTELSAT global system, flight support personnel at the Manned Spacecraft Center in Houston plan service via satellite for the entire mission over three voice, three data and two teletype circuits.

Flight Schedule

The Apollo 13 mission, scheduled to liftoff from Cape Kennedy at 2:13 p.m., April 11, 1970 will take 10 days to complete, with Pacific Ocean splashdown set for 3:16 p.m., Tuesday,

April 21. The aircraft carrier U.S.S. Iwo Jima will be the recovery vessel. Present timetables place the lunar module on the lunar surface at 9:55 p.m., Wednesday, April 15. (All these times are Eastern Standard Time.)

According to NASA Public Affairs, it is anticipated that 1,500 to 2,000 media representatives will be covering the mission both at Cape Kennedy and at the Houston Manned Spacecraft Center.

The crew members for Apollo 13 are Spacecraft Commander James A. Lovell, Command Module Pilot Thomas K. Mattingly II, and Lunar Module Pilot Fred W. Haise, Jr. Haise is a civilian and Mattingly is a Navy Lieutenant Commander; neither has flown in space. Lovell, a Navy Captain, is a veteran of Gemini 7 and 12 and Apollo 8. He has more time in space than any other astronaut.

Next III Launch Scheduled In April

The Seventh satellite in the INTELSAT III series is planned for launch from Cape Kennedy no earlier than late April.

The satellite, F-7 in the series, is scheduled for service over the Atlantic Ocean. Operational success with the satellite will permit the INTELSAT III F-2 to become an in-orbit spare.

The F-2 is now satisfactorily transmitting some Atlantic traffic. But the primary traffic load in that region is being served by the F-6. The latter satellite was launched on January 14, 1970, and has performed satisfactorily since being put into commercial service on February 1.

Delta launch vehicle No. 78 is now at Cape Kennedy for the F-7 launch.

For the next launch, COMSAT has negotiated launch insurance similar to that which it obtained on earlier INTELSAT III launches. The insurance was negotiated with essentially the same group of underwriters as participated in the earlier insurance program. It indemnifies COMSAT for \$5 million in the event of launch failures of both the F-7 and the F-8, which is under construction.

The insurance contract provides for premium refunds of varying amounts under certain circumstances.

News at a Glance

- The first Atlas-Centaur vehicle for the INTELSAT IV satellites is being built (Pages 8-9).

- INTELSAT Conference reconvenes in Washington; proposals for system management are offered (Page 4).

- Actions of the ICSC (Page 5).

- Yugoslavia becomes the first East European country to join INTELSAT; member nations now number 74 (page 3).

- Voice of America carries radio broadcast live to Brazil; satellites open new channels for international exchange (Page 13).

- New health benefits are offered to COMSAT employees; expansion of other benefits to come (Pages 14 - 15).

- Scientists hold international medical conference via satellite TV (Page 16).

- COMSAT earnings of 71 cents per share reported (page 17).

- Pulse Code Modulation—what it is and how it works (Pages 18-19).

- COMSAT basketball team takes Plaza championship (Page 20).

- ITU Fellowship recipient from Thailand begins 6-month internship at Paumalu (page 6).

- Andover 'Horn' antenna is scheduled for replacement by mid-1971 (Pages 6 & 7).

- COMSAT Headquarters elects new CEA Board of Directors (Page 12).

March 2, 1970—Year 5, No. 2

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Earth Station Development

The year 1969 closed with the following box score on earth station development: 41 antennas in operation, at 36 earth station sites, owned by 24 countries.

For 1970, the operational dates of new antennas or new earth stations at this point are:

January — None.

February — None.

March — Choconta, Colombia (Atlantic); and Kuantan, Malaysia (Indian).

April — Si Racha #2, Thailand (I); Thermopylae, Greece (A); Buitrago #2, Spain (I); Kum San, Korea (Pacific).

May — Fucino, Italy (I); Arvi, India (I).

June — None.

July — Talkeetna, Alaska (P).

August — Mt. Margaret, East Africa (I).

September — None.

October - December — Baqa, Jordan (A);

November — Lanlate, Nigeria (A); Caracas, Venezuela (A); and Warkworth, New Zealand (P);

December — Singapore (I) and Tanay #2, Philippines (I);



Yugoslavia became the 74th member of INTELSAT on February 24 when the Honorable Bogdan Crnobrnja, Ambassador of Yugoslavia to the United States (right center), presented his country's instrument of accession to the Intergovernmental Agreement, and Prvoslav Vasiljevic, Director General of the Yugoslav Community of PTT (left center) signed the Special Agreement. Carlos Nunez of Mexico, Chairman of the ICSC (left), and Frank E. Loy, Deputy Assistant Secretary of State for Transportation and Telecommunications (right), observe.

Yugoslavia joins INTELSAT; PTT Reps Visit Labs and Cape

The Socialist Federal Republic of Yugoslavia became the 74th member of INTELSAT on February 24 with an investment quota of 0.10 percent.

The Ambassador of Yugoslavia to the United States, Bogdan Crnobrnja, presented his country's instrument of accession to the Intergovernmental Agreement at the Department of State, with Prvoslav Vasiljevic, Director General of the Community of Yugoslav Posts, Telegraphs and Telephones, signing the Special Agreement.

The Yugoslav accession to the Interim Agreements followed approval by the World Bank of a \$40 million loan to Yugoslavia for use in modernizing its communications facilities, and to help finance construction of an earth station for satellite communications at Novi Sad on the Danube River about 40 miles north of Belgrade, the capital of Yugoslavia. It is expected that the Novi Sad station would be completed about the end of 1972.

In connection with the loan, the Yugoslav Government announced a seven year communications development program involving expenditures of about \$470 million. Among other things, the program calls for the installation of 1,000,000 telephones in addition to the present 400,000.

Yugoslavia became a federation of six republics—Serbia, Croatia, Slovenia, Bosnia-Herzegovina, Montenegro and Macedonia—on January 31, 1946.

Following the signing of the INTELSAT documents, four representatives of the PTT Community visited COMSAT Laboratories as guests of Wilbur L. Pritchard, Assistant Vice President and Director of the Laboratories, and Burton I. Edelson, Assistant to the Director. The following day, the group visited Cape Kennedy, Florida, to see the NASA facilities used to launch the INTELSAT satellites.

Accompanying Mr. Vasiljevic, Director General of the PTT Community, were Mr. Stejpan Banek, President; Mr. Branko Petricevic, Secretary General; and Mr. Dusan Milankovic, Head of the Division for International PTT relations. Mr. Milankovic served as the interpreter for the group. Stephen D. Smoke of the Information Office, who speaks Serbo-Croatian, assisted as a COMSAT host at the Laboratories.

The visits to the Laboratories and to Cape Kennedy were arranged by Dr. Mats Nilson, who recently joined COMSAT from General Dynamics. Mr. Nilson will soon begin duty as a liaison officer in our Geneva office.



Dr. Burton Edelson, Assistant to the Director, COMSAT Labs, explains processing equipment to Mr. Vasiljevic during tour of Labs.



INTELSAT Conference Reconvenes in Washington

The Plenipotentiary Conference on Definitive Arrangements for the International Telecommunications Satellite Consortium resumed in Washington on February 16 in the International Conference Hall of the United States Department of State.

Delegates from 65 of the 74 INTELSAT member countries, from 18 observer countries, and from the United Nations and the International Telecommunication Union registered for the meeting.

The INTELSAT Conference on Definitive Arrangements, as it is more commonly known, originally convened on February 24, 1969, in accordance with provisions of the International Agreements for Interim Arrangements that lead to the formation of INTELSAT in 1964.

When the Conference recessed on March 24, 1969, a Preparatory Committee was established to prepare alternative draft articles for definitive arrangements. The Committee met in June, September and November. Its report was then circulated in mid-December to all participating countries for consideration when the Conference resumed.

The current plenary meeting was opened by a welcome from U. Alexis Johnson, Under Secretary of State for Political Affairs.

Abbott M. Washburn, U.S. Ambassador to the Conference and Chairman of the U.S. Delegation, was elected Chairman of the Conference by acclamation. Mr. Washburn replaces Leonard H. Marks who resigned as Conference Chairman upon its recess March 24, 1969. (William Scranton, who replaced Mr. Marks, resigned December 21, 1969.)

Two new vice Chairmen were also elected by acclamation. They were Etienne Vallotton of Switzerland, Vice Chairman of the European Region, and N.C. Schivastava of India, Vice Chairman of the Asia-Pacific Region. They join Jose Luis Alegrett of Venezuela, Vice Chairman of the South American Region, and Abdul Kader Biari of Algeria, Vice Chairman of the Africa Mideast Region.

A. Erdinic Karasapan of Turkey, continued as Chairman of the Credentials Committee.

Also continuing as chairmen of the four working committees were: Eduardo Alejandro Roca of Argentina, Chairman of Committee I on Structure and Organization; Motoo Ogioso of Japan, Chairman of Committee II on Legal and Procedural Questions; Harold White of Australia, Chairman of Committee III on Financial Arrangements; and Ambassador Adolfo Alessandrini of Italy, Chairman of Committee IV on Operational Arrangements.

During the Conference, Robert Lemaitre of France/Monaco became Chairman of the Editorial Committee.

The Conference Steering Committee consists of the Conference Chairman, the four Vice Chairmen, Chairman of the Credentials Committee and Chairman of the Editorial Committee.

Proposals Under Consideration

Among the matters under consideration at the present meeting are three documents known as PC-45, PC-54 and PC-25 along with documents related to it. The first two emerged from the Preparatory Committee meetings; the latter during the present meeting. These documents fundamentally represent differing views on the roles of the United States in INTELSAT, and COMSAT as manager.

(See ICSC Proposals, page 5)

ICSC Proposals

In essence, PC-45 represented the views of some 24 countries, including the United States. It was initiated by the Australian and Chilean representatives. PC-54 represents the views of mainly the western European countries and was backed wholly or in part by some 16 countries. PC-25 was drafted by some 12 countries, including members from both the PC-45 and PC-54 groups, in an effort to reconcile the differences between the sponsors of PC-45 and PC-54.

The present International Agreements for Interim Arrangements, however, remain in effect until superseded by the Definitive Arrangements.

The U.S. Delegation

U.S. Delegates to the INTELSAT Conference are:

Abbott M. Washburn, U.S. Ambassador to the Conference, and Chairman of the U.S. Delegation.

Ward P. Allen, Deputy Assistant Secretary of State for International Organization Affairs.

Ralph L. Clark, Acting Associate Director, Office of Telecommunications Management, Executive Office of the President.

Richard R. Colino, Assistant Vice President-International, Communications Satellite Corporation.

Asher H. Ende, Deputy Chief, Common Carrier Bureau, Federal Communications Commission.

John A. Johnson, Vice President - International, Communications Satellite Corporation.

Frank E. Loy, Deputy Assistant Secretary of State for Transportation and Telecommunications.

James McCormack, Chairman, Communications Satellite Corporation.

William K. Miller, Director, Office of Telecommunications, Bureau of Economic Affairs, Department of State.

James J. Wadsworth, Department of State.

COMSAT personnel, who are serving as advisers to the U.S. Delegation, include Lucius D. Battle, Vice President for Corporate Relations; Thomas E. Donahue, Jr., Director, International Agreement Division; and William D. English, Assistant General Counsel, International Matters.



Engineers at Hughes Jet Propulsion Laboratory in Pasadena, Calif., check the fit of the solar cell casing on the INTELSAT IV satellite now in production. Launching of the Series IV satellite is scheduled by INTELSAT for mid-1971.

Actions of the Interim Committee

The Interim Communications Satellite Committee held its 45th meeting in Washington from January 21 to 28 with Carlos Nunez of Mexico as Chairman.

Since the meeting, the Republic of the Congo and the Socialist Federal Republic of Yugoslavia acceded to the international agreements to become the 73rd and 74th members of INTELSAT. Seven other countries have been granted quotas but have not yet joined INTELSAT. The seven are: Bolivia, Costa Rica, Ecuador, Honduras, Paraguay, Senegal and Zambia.

Among its actions, the Committee:

- Decided to launch INTELSAT III F-7 for location in the Atlantic and then, after making an evaluation of all satellites in the Atlantic, to locate either F-6 or F-7 at 31° west longitude and the other at 17° west longitude while maintaining F-2 as a spare in orbit at 24.5° west longitude.

- Authorized COMSAT as manager to exercise the launch support services option in its contract with TRW for the INTELSAT III F-7 spacecraft at a price of \$202,000.

- Decided that net capital expenditures shall be used as the basis of calculating contributions to the space segment, and that it is not necessary at this time to determine whether contributions will be required during the interim agreements in excess of \$200 million without prejudice to such determination at a later time.

Net capital expenditure was defined as the cumulative capital expenditures of all signatories, less the amounts repaid to them as amortization of capital.

- Authorized COMSAT to enter into negotiations with the stations at Fucino, Carnarvon, Andover and Paumalu to provide TT&C services for the INTELSAT IV F-1 satellite and seek final approval thereon at the 46th meeting.

- Decided that in the future all applications of INTELSAT inventions and data for non-INTELSAT purposes should be subject to payment of a fair and reasonable charge, as determined by the Committee on a case-by-case basis.

- Directed COMSAT to negotiate with Telesat Canada an agreement for the use of INTELSAT foreground data in connection with the procurement of satellites for the Canadian domestic system, and agreed that TT&C support services during launch and transfer orbit phases could be provided to Telesat on a non-interference, fully-cost-reimbursable basis and that INTELSAT would incur no liabilities.

- Approved the 1970 INTELSAT R&D budget recommended by its Advisory Subcommittee on Technical Matters which provided for \$2,250,000 in in-house work and \$1,960,000 in new contract authorizations.

(See ICSC Actions, page 6.)

News and Notes from Paumalu

Paumalu Welcomes Thai Engineer Studying on 6-Month ITU Fellowship

The personnel at the Paumalu earth station recently underwent a change with the temporary addition to the staff of Thongsuk Wongpudee. Mr. Wongpudee is a radio station master assigned to the Thailand earth station and is at Paumalu on a six month fellowship awarded him by the International Telecommunications Union, Geneva, Switzerland.

Thongsuk, which literally translated means "Gold Happy", likes to be called "Gold", a nickname given him by his Thai friends. Thongsuk left Bangkok on January 11 and two weeks later found himself adjusting to a new life in a peaceful apartment in central Oahu in the Hawaiian Islands. He spent 10 days in Washington, D.C. for the orientation and planning discussions with FCC and COMSAT personnel prior to coming to Hawaii. This is 39-year-old Thongsuk's first trip to the United States.

Under the terms of the ITU Fellowship, Thongsuk will study the overall operations and maintenance, including supervisory procedures, of communications satellite earth stations. The fellowship was directed to the United States through the Department of State. The Federal Communications Commission is responsible for planning effective training programs for telecommunications men from developing countries who are sent to the United States for periods of study under sponsorship of the Department of State.

This is the first time in its short history that Paumalu station is hosting a fellowship recipient. Thongsuk explained his reasons for requesting training at the Paumalu station. "Primarily because Hawaii is located close to my country," he said, "and because Hawaii's climate compares quite favorably with ours, I decided to choose this station."

Thongsuk elaborated further by saying that the satellite circuit connection between Sri Racha and Paumalu makes him feel at home being at Paumalu. He added, "The fact that our station in Sri Racha uses U.S. manufactured ground communications equipment made me select a U.S. owned earth station." Thongsuk's 26-week training program at Paumalu will run through July 24, 1970.



Thongsuk Wongpudee, ITU Fellowship recipient, repairs a relay assembly.

Thongsuk's command of the English language is good. He claims to have learned to speak the English language through self-study and enrolling in a language course offered by his employer, The Post and Telegraph Department in Bangkok.

Thongsuk lives in Sri Racha with his wife and five children. He has worked for the Post and Telegraph Department for the past 17 years.

Asked about his future plans, Thongsuk replied by saying he hoped to take his newly acquired knowledge home with him at the end of his stay, and pass whatever information is appropriate on to his fellow employees in Sri Racha.

From page 5

ICSC Actions

- Approved U.S. application for the non-standard earth station at L'Enfant Plaza for conducting experiments through an Atlantic INTELSAT III satellite.

- Authorized COMSAT to negotiate an agreement with the Smithsonian Institution for indefinite loan of the Early Bird (INTELSAT I F-2) model under certain mutually agreeable terms.

- The 46th meeting of the Committee was scheduled to begin on April 8, 1970, in Washington, D.C.

New Antennas For Andover, Kwajalein Atoll

The Corporation is seeking bids for the construction of new antennas at the Andover, Maine, earth station complex and on the Pacific atoll of Kwajalein.

Requests for Proposals were issued during February. Responses were due back for both from industries on March 23.

The RFP for Andover called for a fully steerable "wheel and track" antenna equipped with a reflector 97 feet in diameter or larger, to be located near the front of the present control building. It would have de-icing equipment, no radome.

The new antenna facility was scheduled to be completed by the spring of next year, in time, if all goes well, to operate with the new generation INTELSAT IV series satellite.

The new antenna will represent a technological outdated of the pioneering "horn" antenna, built in 1961/62 for experimental use as part of the Telstar Project. This antenna, protected by its huge bubble-like radome, has been a landmark of the station for many years.

The RFP for the antenna on Kwajalein, part of the Marshall Islands located about halfway between Hawaii and The Philippines, was similar to the Andover RFP.

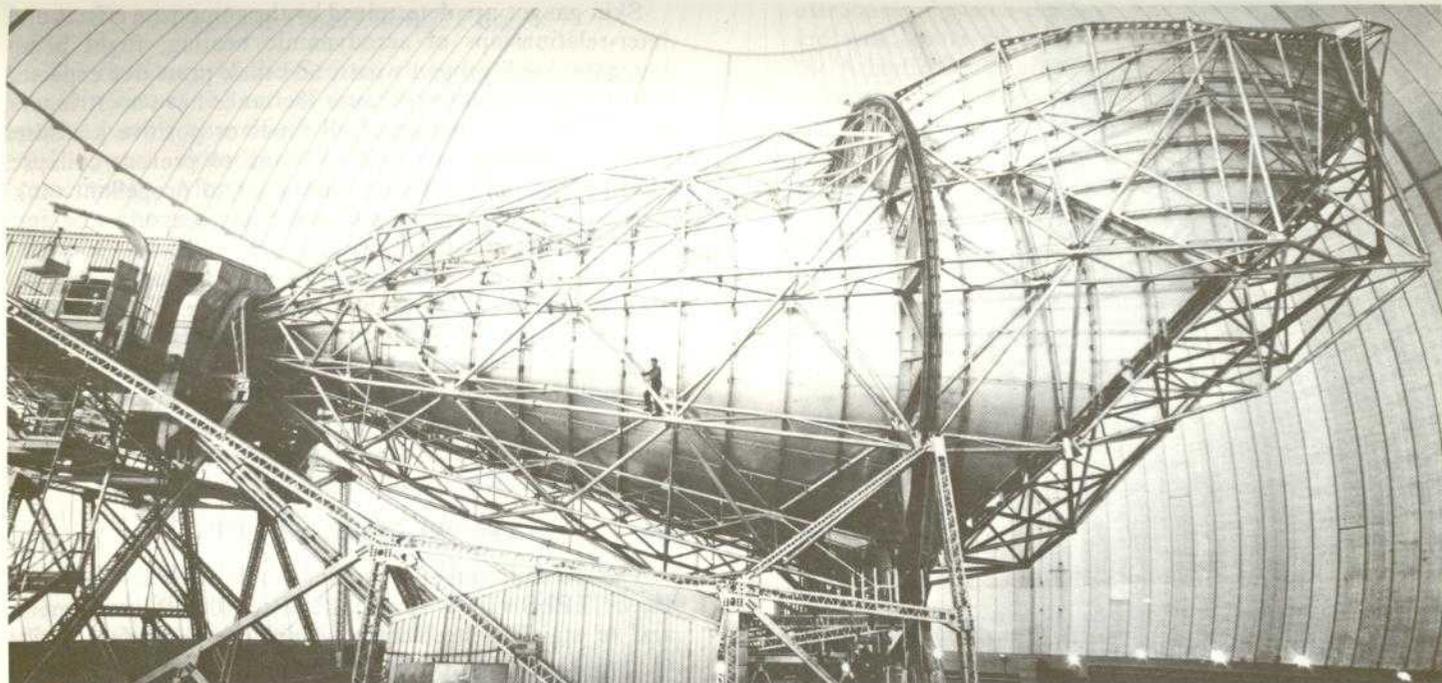
It called for installation of a "dish" reflector approximately 97-feet in diameter, plus supporting equipment, to be located on the small Pacific atoll to serve Defense Department requirements for communications links between Kwajalein and Hawaii and the U. S. mainland.

Comsat has applied to the Federal Communication Commission for authority to build, own and operate the Kwajalein station.

Pocket Guide

An additional 3,000 copies of an updated version of "The Pocket Guide to the GLOBAL SATELLITE SYSTEM" have been received by the Public Information Office.

The Pocket Guide includes an updated chronology of satellite launchings and locations and an added listing of the member nations of the INTELSAT Consortium.



The big horn antenna at Andover, which was used for the first experimental satellite transmissions via Telstar, is scheduled to be replaced in 1971 by an updated 'wheel and track' antenna equipped with a reflector 97 feet in diameter or larger. The horn antenna has been a tourist attraction in Maine since it was built in 1962.

News and Notes from Andover

New Antenna Scheduled for Andover, Famous Horn Becomes Obsolete

By Joanne Witas

The news of the antenna to be built at Andover during 1970 and 1971 was well received at Andover and the surrounding area. The new antenna will enhance Andover operations and reliability.

Not surprisingly, a true heartfelt nostalgia for Andover's old "horn" antenna, now becoming obsolete, has been expressed by many persons. The radome and antenna, being one of Maine's tourist attractions, is visited annually by more than 42,000 vacationers.

Installation of additional transistORIZED multiplex carrier equipment is now in progress in the AT&T test-room. This installation includes additional supergroup connectors, channel banks and a new primary frequency supply. A considerable amount of older vacuum tube carrier equipment has been removed.

During the next six months a new -24+24 volt power plant will be installed, each having a capacity of 800 amperes. The new positive plant will be used for the type 100A switching equipment to be installed for the new back-up radio route, Andover to Portland.

Promotions

Recent promotions at Andover include Stanley Morse and Gerald Michaud from Junior Technicians to Technicians, John Forster from Technician to Senior Technician, and William Hamilton from Senior Technician to Operators Supervisor.

Training

Merle Albert recently returned from a week's testing at the NARDOM plant in Melville, Long Island. During his stay, he participated in testing the high-power amplifier to be used for transmissions at the Alaskan station.

John Forster attended a Hewlett-Packard computer training school in California for two weeks.

Testing of the INTELSAT IV console has been conducted in California by Chuck Lepage. The new system brings about a new TT&C system utilizing a pulse code modulation data format and computer processing. The new console integrates INTELSAT IV into INTELSAT II and III control areas.

ANPA Manger Claims COMSAT As Best Domestic Hope

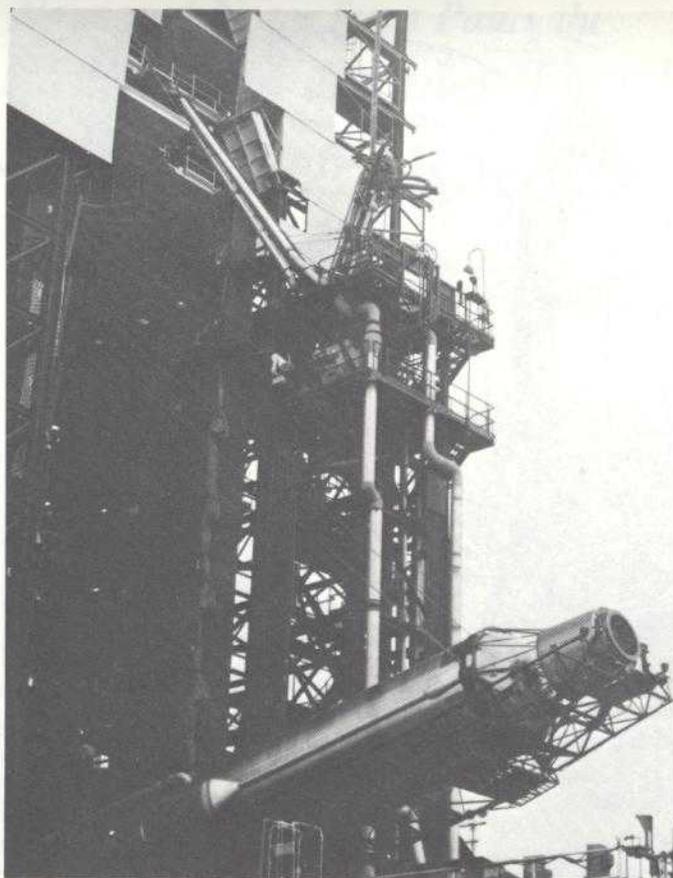
Strong support for COMSAT's domestic satellite role was expressed by Stanford Smith, General Manager of the American Newspaper Publishers Association (ANPA) Conference, at the opening of the ANPA Conference on March 10. Mr. Smith said the proposal from COMSAT is the best hope for the news media.

The conference at Cocoa Beach, Florida, was conducted for publishers and newspaper junior executives from various parts of the country.

In addition to Mr. Smith's appearance, members of the faculty at the satellite communications sessions were Matthew Gordon, COMSAT Assistant Vice President for Public Information, and Donald C. Beelar, attorney for the ANPA and the Associated Press.

The participants visited Cape Kennedy on Thursday, March 12, and received a briefing at Pad 17A, where the INTELSAT satellites are launched for COMSAT by NASA, in addition to visiting the astronaut training facilities for Apollo 13 and the vehicle assembly building where Apollo 14 is being constructed.

Jack King, Chief, Public Information office at the Kennedy Space Center, led the newspaper tour.



An Atlas stage-and-a-half booster of the Atlas-Centaur launch vehicle to be used in lifting the INTELSAT IV communications satellite into space is erected at Complex 36A at Cape Kennedy, Florida.

New Atlas Centaur, Launch Vehicle for IVs, Begins to Take Shape

Atlas-Centaur No. 25, the first Atlas Centaur to be used with the new generation of INTELSAT IV communication satellites, is scheduled to start taking shape as an actual piece of hardware in the General Dynamics Convair Division plant in San Diego, California.

The launch vehicle will have an overall length of 134 feet with a gross weight at launch of 326,600 pounds. Initial thrust will be provided by an unique stage-and-a-half Atlas configuration with all engines igniting on the ground and providing a combined booster-sustainer-vernier-engine thrust of 403,000 pounds. Propellants used are liquid oxygen and RP-1, a liquid similar to kerosene. The Atlas tank (or booster) is of stainless steel construction and measures 10 feet in diameter.

Unique Body Composition

The launch vehicle will have an overall length of 134 feet. The main body of the vehicle with all loads reacted by the skin instead of by conventional stringers and frames. Tanks are fabricated as a series of stainless steel rings welded together to form a cylinder, an approach which lends itself to simplified tank lengthening by merely adding rings and allows simple change of skin thickness. Increased propellant quantity for added performance capability is accommodated by this added tank volume.

Skin gauges are determined by the composite effects and inter-relationships of aerodynamic heating, flight bending, axial load, ground winds, and tank pressures expected for planned missions. Because the tanks have no stringers, they must be supported at all times or positive pressures must be maintained within the tank to prevent collapse. During transport, erection, and prior to propellant tanking, Atlas vehicles are kept under low pressure and supported by stretch slings.

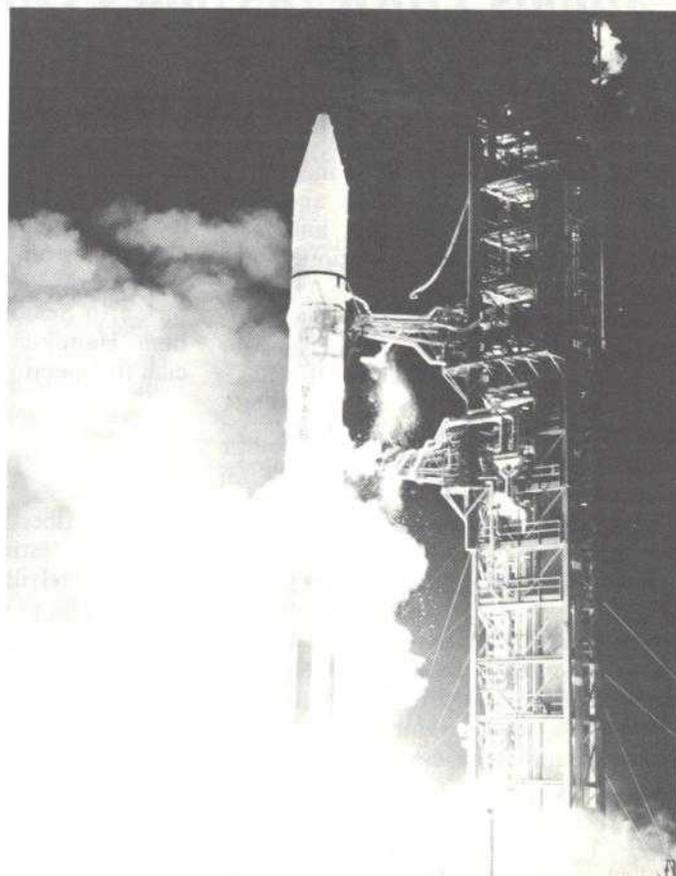
Prior to launch, fuel is tanked and the fuel tank pressure is raised to the flight-pressure level. Before engine ignition, liquid oxygen tank pressure is increased to flight levels and switched to internal supply.

Another unique Atlas feature is the stage-and-a-half concept with all three main engines and both verniers ignited on the ground, allowing comprehensive assessment of vehicle operation prior to committing to launch.

Centaur Stage Supports IV

The Centaur stage, which interfaces with and supports the INTELSAT IV spacecraft, also 10 feet in diameter and of stainless steel construction, has a vacuum thrust of 30,000 pounds of liquid hydrogen. Centaur burnout weight excluding the INTELSAT IV spacecraft and 68-pound adapter, totals 4,526 pounds. The Centaur is capable of two engine starts in space, and up to 25 minutes coast duration between engine firings.

Atop the Centaur, the INTELSAT IV is supported by a truss adapter and conical adapter which interface with the conical adapter of the spacecraft. In flight, the spacecraft is protected by a 10-foot diameter fiberglass nose fairing. The fairing is jettisoned 12 seconds after Centaur engine ignition at an altitude above 400,000 feet.



All three main engines and both vernier engines ignite simultaneously as the Atlas-Centaur, which will carry the INTELSAT IV into synchronous orbit, lifts off the launch pad under the combined booster-sustainer-vernier-engine thrust of 396,800 pounds.

Centaur Operational Phases

The first burn of the Centaur stage lasts approximately six minutes, at the end of which time the Centaur and its payload are in an elliptical parking orbit having perigee and apogee altitudes of 100 and 1200 nautical miles respectively. After coasting in this orbit for nearly 15 minutes the launch vehicle and spacecraft are near the equator and at an altitude of 325 nautical miles. At this time the Centaur engines are restarted for 75 seconds to produce a transfer orbit having its apogee at synchronous altitude over the equator. After engine shutdown the Centaur performs a reorientation maneuver to place the spacecraft in the desired altitudes, and the spacecraft is then separated from the launch vehicle.

Following a coast period in transfer orbit, at about 5 hours and 45 minutes after the launch, the spacecraft will be at the first apogee of the transfer orbit, positioned over the equator and at synchronous orbit altitude. The spacecraft apogee motor can then be fired to circularize and equatorialize the final orbit. Apogee motor firing can be delayed until a subsequent apogee if desired.

Atlas Supports Manned Space Flights

Just as COMSAT and the INTELSAT communications system plays an important part in the on-going manned Apollo program, the Atlas also has its record of manned space flight support, having been the prime launch vehicle used during the early, manned, one-man Mercury flights.

In 1961, a chimpanzee named "Enos" was successfully launched from Cape Kennedy for a two-orbit flight in a Mercury spacecraft to test the feasibility of launching a man on a three-orbit flight. The following year, Astronaut John Glenn in his "Friendship 7" spacecraft, so named to symbolize the collective efforts of the seven original

astronauts, became the first American to orbit the earth. He was recovered in the predetermined impact area in the Atlantic Ocean after three orbits.

Glenn was followed by M. Scott Carpenter the same year in a flight similar to Glenn's aboard the "Aurora 7" Mercury spacecraft launched by an Atlas, essentially to prove the repeatability of the Glenn flight. Again in 1962, Astronaut Walter M. Schirra, Jr., in his "Sigma 7", completed a six-orbit flight described by both the space agency and the press as "flawless."

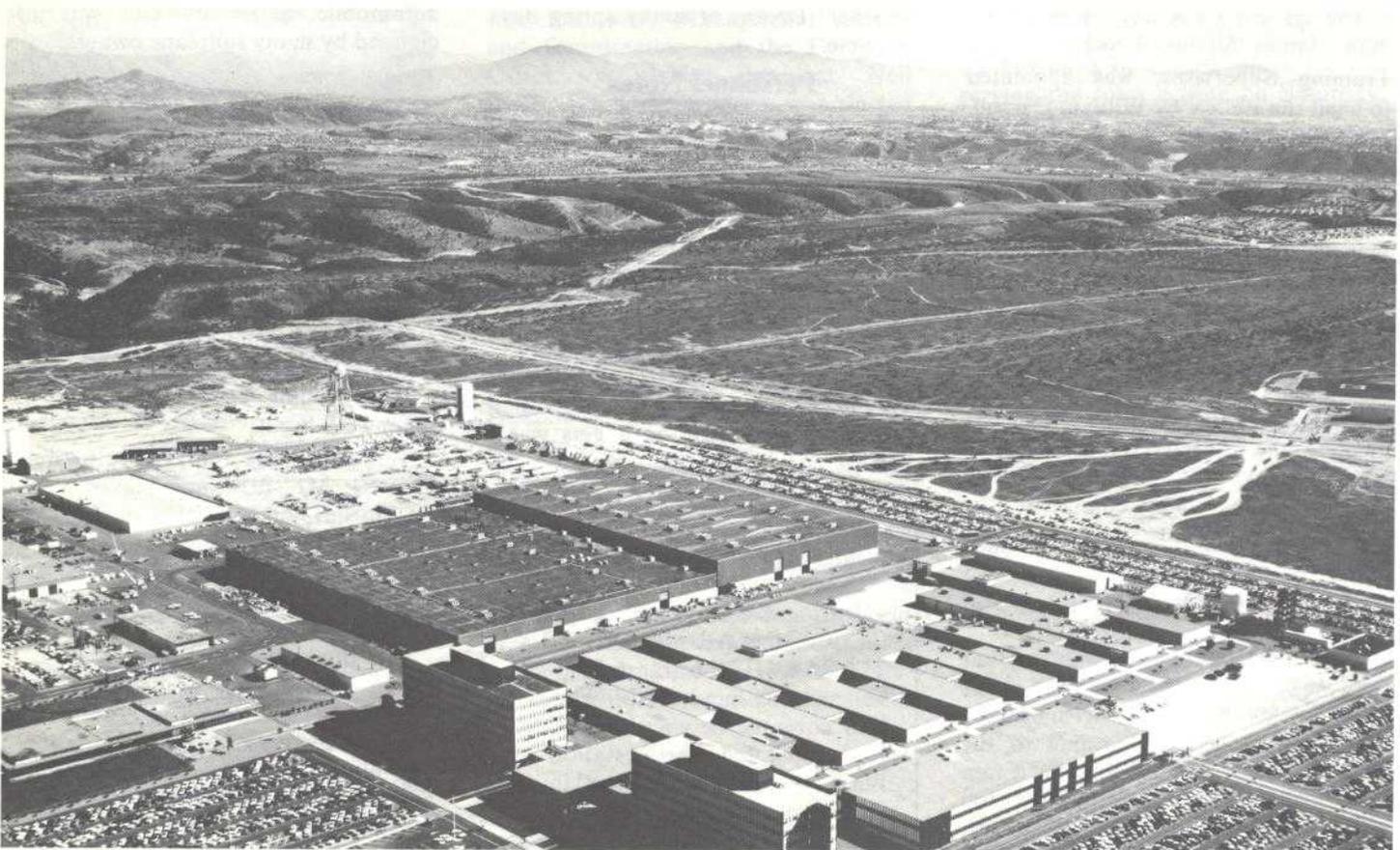
Completion of the Mercury-Atlas program was achieved with the flight of Astronaut Gordon Cooper in 1963 when his "Faith 7" spacecraft completed 22 orbits in a flight lasting 34 hours and 20 minutes and impacted in the Pacific Ocean. As was the case of Schirra's flight, Cooper's was referred to as a "text book" flight.

In addition to manned space flight, the Atlas launch vehicle has also been used to launch such payloads as the first communications satellite Project Score, Ranger, Mariner, Surveyor and Lunar Orbiter.

INTELSAT IV Launch Schedule

The Atlas-Centaur for the first INTELSAT IV launch will be transported to Cape Kennedy, Florida during the latter part of 1970. The INTELSAT IV's will be launched from Complex 36 at Cape Kennedy beginning in the first half of 1971.

COMSAT technical liaison with General Dynamics and NASA's Lewis Research Center for Atlas/Centaur support efforts is under the direction of Martin J. Votaw, Director, Space Segment Implementation Division. Included on the space segment team are Allan M. McCaskill, Manager, Launch Vehicle System Department; and Frederick N. Ormsby, Member, Technical Staff, Launch Vehicle Systems Department.



This is an aerial view of the General Dynamics Convair Division Kearny Mesa Plant in San Diego, Calif., where the Atlas-Centaur launch vehicle will undergo assembly and checkout prior to transfer to Cape Kennedy.



Mrs. Katherine Graham (right), Publisher of the Washington Post, was accompanied by Paul Ignatius (center left), President of the Washington Post, and 11 other officials of the newspaper on a visit to COMSAT Headquarters on Friday, February 27. The visitors were shown the three-screen slide presentation, "The History of Satellite Communications", and accompanied on a tour of the Operations facilities by Chairman James McCormack and President Joseph V. Charyk, who also presented a briefing. Afterwards, a luncheon was served.

News and Notes from Etam

Etam Names New CEA Chairman

The ETAM CEA has a new Chairman. James Silvius, Procedures and Training Supervisor, was appointed to head the ECEA by William Carroll, Station Manager.

Andros Thomson, who served as chairman of the ECEA during 1969, was commended for his fine job. During the year, ECEA activities included a homemade ice cream party, two picnics, Thanksgiving dinner and the children's Christmas party.

The financial statement for 1969 has been prepared and work has begun on the 1970 budget. At the next meeting, the projected budget for 1970 will be drawn up and submitted for approval. Ideas and comments for social activities this year are being solicited.

Winter Wonderland

We all talk about the weather, but not many of us do anything about it. It seems as though it snows 24 hours a day here. According to the State Road Commission, the Etam area had received an estimated 100 inches of snowfall by mid-January, and there had been measurable precipitation every day since November 30. So what can we do about the

weather? Dream of sunny spring days to come.

Personnel Notes

Roger Parsons, Station Engineer, has a very interesting sideline. He raises beef cattle on a farm near Oakland, Maryland. Early in the fall he let it be known to station personnel that he would supply halves or quarters of beef to any interested persons. Roger was able to get orders for all his available beef and recently completed delivery of top grade meat. We expect him to start wearing a big hat just as soon as it gets warm enough for him to discard those red ear muffs!

Eclipse Coverage

During the March 7 eclipse of the sun, the Atlantic Ocean INTELSAT III, F-6 transmitted one hour and 39 minutes of live television coverage between the COMSAT operated earth station at Etam, W. Virginia, and the United Kingdom station at Goonhilly Downs. The National Broadcasting Company live coverage originated in Mexico.

George Hart, 46; Technical Staff

George Hart, a member of the COMSAT Technical Staff, died January 30 at his home in Middleburg, Virginia.

He joined COMSAT almost five years ago and spent the past four evaluating the requirements of television broadcasters and CATV interests for satellite facilities.

He performed most of the early analysis of locations for receive-only earth stations needed to serve broadcasters in a domestic service. One of his efforts, a map of the U.S. marked with these locations, became well known as the "measles" chart.

He also performed extensive analyses of satellite system configurations for developing nations.

Mr. Hart, 46, was born in Ireland and flew combat missions during World War II for the Royal Air Force. He came to the United States shortly after that war and his interest in aviation continued. He earned a license to pilot sailplanes and spent hours soaring over the Virginia countryside.

He designed and fabricated a new type of trailer to be used in towing a dismantled sailplane behind an automobile, a device which was acclaimed by many sailplane owners.

Robert W. Briskman Receives NASA Award

Robert W. Briskman, manager of COMSAT's Domestic and Special Projects Office-Technical, has received a certificate and pin from the National Aeronautics and Space Administration for his work, while a NASA employee, leading up to the Apollo 11 moonwalk flight.

While working for NASA between 1959-64, Mr. Briskman played a key role in development of a unified "S" band system that allows ground stations to talk with the astronauts, and to receive tracking and telemetry data on earth.

Mr. Briskman's certificate read:

"In appreciation of dedicated service to the nation as a member of the team which has advanced the nation's capabilities in aeronautics and space and demonstrated them in many other outstanding accomplishments, culminating in Apollo 11's successful achievement of man's first land on the moon, July 20, 1969."

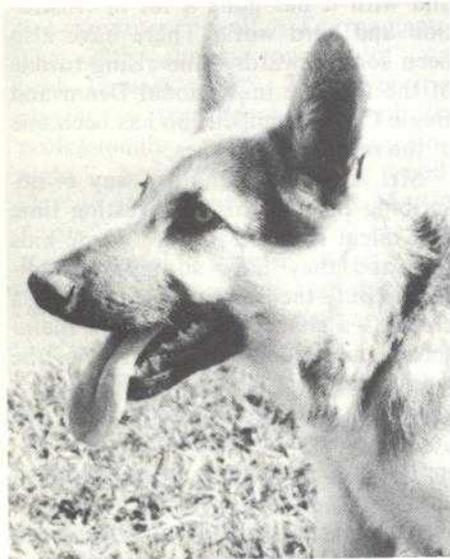
Ecoss de la Montana Cayey Host Greets IEEE Members

By M. Lee Dorsey

The members of the Puerto Rican and Virgin Island Chapters of Institute of Electrical and Electronic Engineers (IEEE) visited the station on Monday, January 12. Since that day is a local holiday, the members were accompanied by their families, about 90 persons in all.

They were greeted by Station Manager, Juan R. Castanera, who gave a presentation and escorted them through the station. The tour was followed by a luncheon sponsored by COMSAT.

In keeping with the local documentary, "On Sundays, What Shall I Do," featuring the Cayey Earth Station, a group of 92 persons visited the station as part of a tour sponsored by Island Tours, Inc. The Silver Team, headed by Bob Smith, guided the visitors through operations.



New 'Antenna' for Cayey

The Cayey Station has a mascot, a female German shepherd puppy donated by Juan Castanera. 'Antenna', so named for the way her ears perk up when she is called, is housed in a comfortable doghouse built by Arsenio Reyes and Luis Maldonado, and is located on the side of the building.

Everyone is taking good care of Antenna and enjoying her company.

Personal Notes

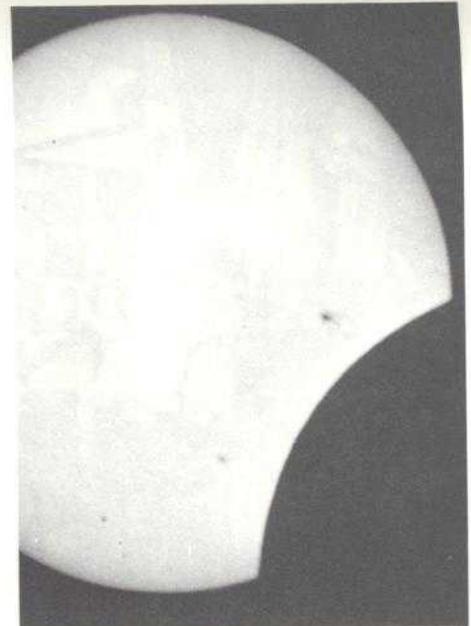
December was a good month for birthdays. Everyone helped celebrate the birthdays of Arsenio Reyes, Jose M. Negron and Juan Sierra at a luncheon held on December 10.

Only one person had his birthday celebrated in January. Otto R. Irizarry stole the show at the party of the month, at which a delicious meal was served.

On January 26, Mrs. Awilda Irizarry, wife of Otto R. Irizarry, Technician, gave birth to Otto Jr. The Irizarry's have two other children, both girls.

Safety Seminar

A safety seminar on Resuscitation and Bleeding Control was conducted by the Accident Prevention Division, P.R. Department of Labor. Station personnel were invited to attend the training sessions conducted by Natividad Sanchez and Daniel Riviera held on February 4 and 27.



Bill Young, who heads the CEA Astronomy Club, took pictures of the solar eclipse on March 7. With the aid of his telescope, he was able to photograph the sunspots.

CEA Elects New Officers for 1970; 15 Clubs Recruiting New Members

New officers for the CEA were recently elected by the employees for 1970. Betty Stover, representing International, General Counsel, Corporate Relations, Management Review and Coordination and the Executive Office was elected President. Neil Helm, candidate at-large, was elected as Senior Vice President and Treasurer. The new Secretary is Beverly Nirkowski, candidate at-large.

Other officers for the coming year are Pat Lamphear (Operations) Assistant Secretary and Membership Chairman; Judy Stotler (Finance and Administration) Vice President, Social Activity; George Domurot (Finance and Administration), Vice President, Athletic Activity; Perry Klein (Technical), Vice President, Special Arrangements; Drew Walker (Technical-Labs), Vice President, Athletic Activity, and Robert Cool (Technical-Labs), Vice President, Social Activity.

A luncheon for the past president and the new board members was held on Wednesday, February 25 at the Officers Club in Anacostia. On that day, the activities of the 1970 CEA were officially initiated.

Current Activities

Pat Lamphear, Operations, is conducting the yearly membership drive. Just two dollars will start any employee on his way to many social and recreational activities conducted by CEA.

reational activities conducted by CEA.

Some of the clubs formed through the CEA have already held their initial meetings. The Astronomy Club, headed by Bill Young, Technical, met on March 3 to discuss plans for observing the solar eclipse on Saturday, March 7.

Lou Early, Corporate Relations, has been organizing meetings for the members of the Boating Club, who have already seen one marina movie this season, 'Moebius Flip'.

Arrangements are now in progress for the formation of the CEA's Talent and Drama Club. A variety of interests and special talents have been made known throughout COMSAT. A meeting will be called sometime in mid-March for all who are interested. If you have talent (which might include anything from bird calls to Shakespeare), please give your name to Kitty Stephenson, Rm. 7051.

All employees are invited to join the CEA and to participate in the numerous activities open to members.

The activities all come under the direction of the CEA but are organized and conducted by the activity members. See your CEA representative for a list of activities and membership card.



The VIP Drum and Bugle Corps of Anacostia, founded by a COMSAT employee, Melvin Harley, performed on March 3 at a Washington Movie Theater for the premier of 'Patton', a film based on the career of General George S. Patton during the Second World War.



Melvin P. Harley Sees VIP Corps Rise to Top

The VIP Drum and Bugle Corps was all snap and polish and pride as they performed for the premier of the new movie 'Patton'. Neither the cold nor the rain was able to dampen their excellent performance—but then again the corps of 135 youths is used to working against great odds.

The VIPs got off to a shakey start in 1965 when Melvin Harley, General Services, talked Father St. Amand of Our Lady of Perpetual Help Church, Anacostia, into getting together a drill corps to give the kids something constructive to do. This meant raising money, getting instrument and drill instructors, buying instruments, long nights of rehearsal, dedication, time, effort. And much more.

Five years have passed since then and with it has gone a lot of frustration and hard work. There have also been some rewards—and rising to one of the top five in National Drum and Bugle Corps Competition has been one of the most obvious ones.

Mr. Harley has another way of describing the rewards of investing time and talent in these youth. "These kids try—and they have so many handicaps. But the corps gives them a chance—a chance to care about themselves and belonging to the rest of the world—not just Anacostia. They get a chance to travel to different cities, and you know, out on the field, drilling, being judged, they get a little feeling of glory."

Mr. Harley added, "We've been able to take numerous second and third place trophies in national competition, but we just can't afford the proper uniforms and horns to get that number one rating. We're not giving up, though. Even with the frustrations, it's worth it."

Social Affairs

The COMSAT/AT&T Wives had luncheon at the Japanese Restaurant, "Ginza." Later they all went on a sightseeing tour of Monterey.

Attending the Luncheon were Mmes. Larry Baley, Jimmy Clark, Larry Cisneros, and Mrs. Mechlenburg, Mrs. Cisneros' mother, was a guest. Also attending were Mmes. Don Curtis, Jack Inman, John Martin, Warren Neu, Walter Robinson and John Scroggs.

News & Notes from Jamesburg

Proposals for New Dam Offered; Plans May Affect Jamesburg Site

By M. Lee Dorsey

The California-American Water Company has released news concerning plans to build a new dam on the Carmel River at one of four proposed sites. One of the proposed sites would be just below the Jamesburg Earth Station in the Cachagua Valley.

If this proposed dam is built in the Cachagua Valley a large portion of the valley would be under water. Part of the Jamesburg Station site would be inundated by the first level of dam construction proposed for completion by 1975; and with construction of a second increment of the dam by 1985 the reservoir high water level would be only 43 ft. below the foundation of our Jamesburg station. We would be surrounded by water on three sides.

If the proposed dam is built in the Cachagua Valley, a recreation park around the reservoir would be built, so perhaps we will have fishing, boating and picnics in our own backyard by 1975 or so.

Visitors

Mr. M. L. Rosenbluth, Manager, Plant Operations, visited the Station. The Station Manager and staff reviewed station operations and practices with him.

VIP tour this month from AT&T/PT&T included some 12 VIP's from

the San Francisco Bay area. Among the VIP's were the Assistant to the President of the University of California at Berkeley; and the Administrative Assistant to the Mayor of Oakland.

Sixteen first and second line supervisors from the Pacific Telephone and Telegraph South Bay District were given a guided tour of the station.

Also, 21 IEEE Student members from the University of Santa Clara visited the station. They were given a briefing by the Station Manager and Electronics Engineer, then conducted on a tour of the station.

Personnel Notes

Leland Cloyd has joined COMSAT as our Utility Man. Mr. Cloyd and his wife, Opal, make their home in the Carmel Valley Village. They have two children, but Lee says they are grown up now and away from home.

Harold Ford, Senior Technician, was transferred to the COMSAT Labs. A farewell party was held at the Casa Carmela. The Jamesburg CEA presented a 8x10 framed color photograph of the station to Harold as a farewell gift.

Messrs. Isobe, Chikamori, Kobayashi and Sato of Nippon Electric Company departed this station for Japan this month.

Jamesburg Staff Finds Peninsula a Scenic Delight

By M. Lee Dorsey

Our earth station is located in the Carmel Valley and is considered a part of the Monterey Peninsula. The station itself is located in what is called the Cachagua area.* The station is surrounded by large ranches with plenty of cattle and horses.

Our next door neighbor is the famous western painter, Jack Swanson. He and his family live on their ranch, "Whiffletree," which is stocked with many fine horses which Jack Swanson uses as his subjects. Mr. Swanson's painting "Wild Horse Country," is in the permanent collection of the Cowboy Hall of Fame in Oklahoma City.

Of course, with Pebble Beach only 27 miles away, we are always interested in the "Crosby National Pro-Amateur Golf Tournament." The 29th annual tournament was held January 22-25. The celebrities playing in the tournament with the professionals read like "opening night." A few regulars who usually play in this event are Dean Martin, Andy Williams, Phil Harris, Howard Keel, Arnold Palmer, Clint Eastwood, Don Drysdale, and this year, Glen Campbell, who was paired with professional, Bobby Nichols.

The peninsula has its share of year round celebrities who make their home at least part of the year here. Kim Novak lives in the Carmel Highlands; Clint Eastwood and wife live on Pebble Beach; Greer Garson makes her home in Carmel.

Because we still are most fortunate in having thousands of acres of unspoiled ranch land in this area, the Hollywood and TV-motion picture people use the Carmel Valley and other points of interest to film a lot of westerns. Just recently the TV program "Here Comes Bronson" was filmed in the Valley and on Cannery Row.

With the Pacific Ocean, the charm of Carmel and Pebble Beach, and the vast ranch lands of the Carmel Valley, the Monterey Peninsula is one of the most interesting and truly beautiful places to live in the world.

*The word "Cachagua" is pronounced "Kah-chah-wah," and means "hidden water."



John Hutchins (left) and Carlos Alberto Coelho Discuss Satellite Service to Brazil.

VOA Broadcasts Live to Brazil

Brazilian radio audiences recently heard the benefits of satellite communications discussed over a two-way telephone circuit via satellite between Washington and Rio de Janeiro.

The telephone conversation on February 20 was taped and transmitted from the studios of the Voice of America to Brazil. The program was part of an every-Saturday VOA broadcast to Brazil by John Hutchins, Professor of Portuguese at the U.S. Naval Academy and a well-known "ham" radio operator (W30BD Annapolis).

The telephone call was placed by Mr. Hutchins and Col. Carlos Alberto Coelho, permanent Brazilian delegate to the Interim Communications Satellite Committee (ICSC). From a VOA studio in Washington, they talked with Jose Nunez Camargo, Vice President of the Brazilian Telephone Company in Rio de Janeiro.

In the three-way telephone conversation, the men praised the clarity of the satellite telephone circuit. They discussed the importance of satellites to South America and the rest of the world in bringing men closer together through easy, efficient communications. Mr. Hutchins said they remarked on the "thrill of talking to people thousands of miles away as though they were next door."

The men also discussed Brazil's current program for improving its internal communications system and

noted that Brazil's use of the satellite system will increase sharply as soon as a microwave link is completed from the earth station at Tangua to the city of Recife, Fortaleza and the rest of the Northeast of Brazil. The microwave link between the Tangua earth station and Rio de Janeiro provides excellent circuits, they noted.

The VOA radio transmission was broadcast by at least four radio stations in Brazil. Other stations are expected to broadcast VOA tapes of the program. The program also was heard live by many "ham" operators in Brazil.

Labs Chess Team Defeats Plaza

Recently the Plaza Chess Club was challenged to a match by COMSAT Labs. On their home ground, the 5-man plaza team went down to defeat by a score of 4½ - ½ (based on the system of 1 point for a win, 0 for a loss and ½ for a draw).

The rematch was played at Clarksburg several weeks later. On six boards, the labs team won again by a resounding score of 5 - 1.

A plaza team spokesman said, "It's beginning to look as if they're a little stronger than we are. We're considering a merger."



On January 23 the COMSAT Medical Unit, under the direction of Miss Hazel Durant, sponsored a blood drive in conjunction with the American Red Cross.

More than 90 COMSAT and BELLCOM employees gave pints of blood, enabling their families in time of need to obtain free blood plasma from hospitals participating in the Red Cross blood program.

The Red Cross mentioned that the planning and facilities at COMSAT for the drive were excellent.

B L O O D D R I V E

New, Improved Health Benefits For Employees

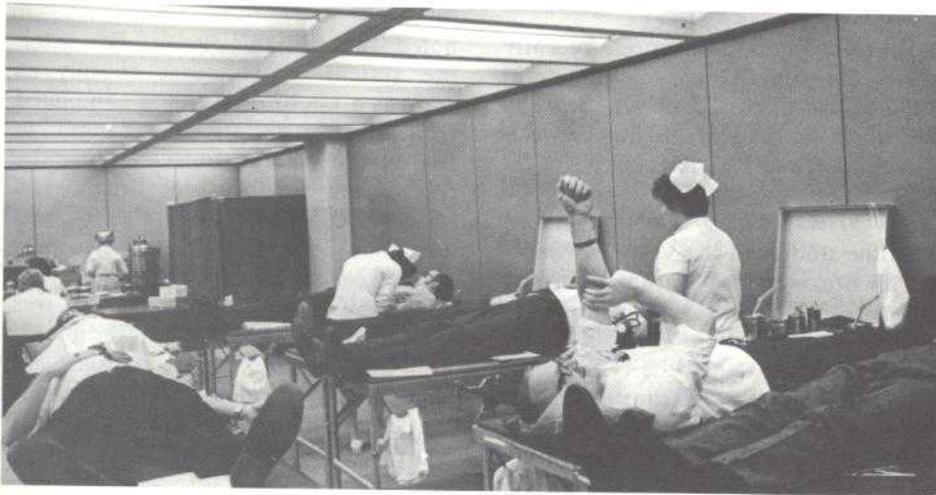
A new and improved Group Health and Long Term Disability Insurance Benefits Program went into effect on March 1, 1970.

The improvements have substantially increased the monetary benefits available; have removed or lessened many of the restrictions on receipt of benefits; and have integrated the various benefits so that they become additive in relation to the increasing seriousness of an injury or illness.

There are also a number of new benefits available such as recovery in an extended care facility after hospitalization if necessary; a medical accident insurance; treatment by a clinical psychologist upon prescription by a Doctor of Medicine; and a substantial liberalization of the term dependent.

In the future, a dependent will be defined as a spouse that is not divorced or legally separated; each child who is not married or employed on a regular full-time basis, who is dependent upon the employee for support, and who has not attained the age of 26. However, if a child, on reaching age 26, is incapable of self support due to mental retardation, or physical handicap, he shall be considered a dependent during the continuation of the incapacity. All children will be covered from birth.

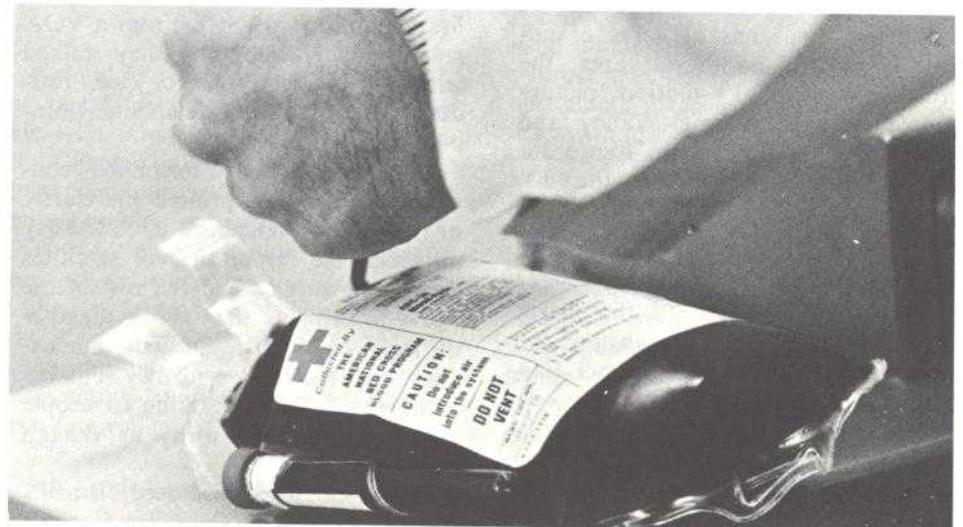
These benefits should help to ease the burden of the rising costs of hospital and medical services and maintain the family income during periods of injury and/or illness.



The employees lounge acted as the donation center for the more than 90 donors.



Nurse puts finishing touches on pint of blood donated by John Chontos.



The final product . . . one pint of human blood that could save a life.

Old Program	GROUP HEALTH INSURANCE PROGRAM	New Program
HOSPITAL EXPENSES (Excluding Maternity)		
Room and board: \$40 maximum per day up to 120 days; and special services up to \$450.		First \$1,500 per confinement of all semiprivate room and board charges, and special service charges will be paid in full. If intensive care is required, an additional \$1,000 will be available for charges under this coverage. Additional charges will be covered by the Major Medical Plan without need to satisfy the deductible normally required. For a patient not requiring the extensive care of hospital confinement, but needing attention not available at home, benefits for recovery in an extended care facility are available upon direct transfer from a hospital after three days confinement.
New benefit . . . new benefit . . .		
SURGICAL EXPENSES		
Surgical Schedule: \$400 maximum		Surgical Schedule: \$750 maximum. Additional charges will be covered by Major Medical Plan without need to satisfy deductible normally required.
IN-HOSPITAL PHYSICIAN EXPENSES		
Maximum daily benefit: \$5		First day, \$18; second and third days, \$12; succeeding days, \$6, up to...
Maximum benefit: \$600 per confinement.		\$720 maximum benefit per confinement.
MATERNITY BENEFITS		
Maximum hospital: \$175		\$250
Maximum obstetrical		
Normal delivery \$100		\$150
Caesarean section 200		300
Miscarriage 50		75
LABORATORY AND X-RAY EXPENSES		
Maximum benefit: \$50 <i>per schedule</i> for injuries resulting from one accident, or any one illness.		<i>All charges up to \$50</i> for injuries resulting from any accident, or any illness during a six consecutive month period will be paid in full. Additional charges are covered by Major Medical Plan, but satisfaction of the deductible will be required.
ACCIDENT INSURANCE		
New benefit . . . new benefit . . .		Up to \$25 per accident, and up to \$50 per year for medical treatment and supplies required as a result of an accident to the employee or his dependents not covered elsewhere. Additional charges are covered by the Major Medical Plan, but the deductible will apply.
MAJOR MEDICAL EXPENSES		
Deductible was 1 percent of base annual salary with a \$50 minimum and a \$200 maximum.		Deductible becomes 1 percent of base annual salary with a \$100 maximum per person, and a maximum of two deductibles per family.
Maximum lifetime benefit: \$20,000		\$25,000
Psychiatric coverage. Maximum Benefit: \$10 per visit; 3 visits per week; \$500 per year.		\$20 per visit; one visit per day; \$750 in any 12 consecutive months.
New benefit . . . new benefit		Clinical psychologist may be used if prescribed by a Doctor of Medicine.

Old Plan	LONG TERM DISABILITY INSURANCE PLAN	New Plan
50 percent of base monthly salary inclusive of all other disability benefits to which employee might be entitled from any Workman's Compensation Law or Act, Primary Social Security Benefits, State Cash Sickness Plans, or any other Employer or Government sponsored plans to which the employee contributes.		60 percent of base monthly salary with a maximum limited to 70 percent inclusive of all other disability benefits to which the employee might be entitled from any Workman's Compensation Law or Act, Primary Social Security Benefits, State Cash Sickness Plans, other Employer or Government sponsored plans to which the employee contributes, or the COMSAT Retirement Plan.
Maximum monthly benefit: \$1,000		\$2,000

PARKING GARAGE SAFETY

Several incidents of personnel slipping on oil, grease, or wet spots on the L'Enfant Plaza garage floor have been reported. Any slip and fall can result in a serious injury, so employees are asked to take precaution.

COMSAT has provided this parking area for the convenience of its employees and is working with APCOA to maintain it in as safe a condition as is reasonably possible.

There are several things that can be done to prevent injury in the garage:

- (1) Watch where you are walking, look for oil, grease, and water spots.
- (2) Walk on the side of the drive areas. Most oil and grease spots are in the parking spaces. Do not cut across these spaces when they are empty.
- (3) Report slippery spots to the Facility Manager. Extension 6633. The columns will be painted with a letter and number so that the area may be identified. These spots will then be treated with an absorbent compound and cleaned up.
- (4) If your car is leaking oil, have it repaired.
- (5) Drive very slowly in the parking garage.
- (6) Turn on your headlights when entering the garage, so that you can be seen and can see others easier.
- (7) Report all accidents to the Safety Manager Ext. 6066.

Employee Seeks Identification of Man Who Helped Him

On January 13, John Hill, Director, Planning Services Division, slipped and fell in the COMSAT garage while getting into his car about 5:45 p.m. The mishap resulted in a fractured elbow.

Another COMSAT employee, who did not identify himself, helped Mr. Hill up and on his way. Mr. Hill would be appreciative if the person who helped him would contact him to verify the circumstances of the accident.



John L. Martin, Jr. Joins Corporation

John L. Martin, Jr., Major General, U.S. Air Force, Retired, has joined the COMSAT as Special Assistant to the President. He comes to COMSAT from Andrews Air Force Base, where he was the Assistant for Systems Acquisitions Management under the Commander of the Air Force Systems Command. He retired from the Air Force on February 1, 1970, after nearly 30 years of service.

Prior to that, from 1964 to 1969, Mr. Martin served as the Director of Special Projects in the Office of the Secretary of the Air Force in Los Angeles. There he also served as Deputy Commander of the Air Force Satellite and Missile Systems Organization.

From 1958 to 1964, Mr. Martin was assigned to the Pentagon, where he spent two years in Research and Development. He then joined the Special Technical Staff of the Secretary of the Air Force, where he later became the Director, Office of Space Systems.

Mr. Martin also served as Chief, Flight Control Laboratory at Wright Field, Ohio.

Having attended Clemson College, Mr. Martin interrupted his studies to enlist as a Flying Cadet in the Army Air Corps in 1940. After the war, he completed his bachelor's degree at the Polytechnic Institute of Brooklyn in Aeronautical Engineering in 1948. In 1951, he received an M.S. in Aeronautical Engineering from the Massachusetts Institute of Technology.

The Martins have two children, John III, 22, and Theresa, 20. The Martins reside in North Arlington, Va.

Medical Scientists Hold Conference Via INTELSAT

The INTELSAT global communications satellite network will carry three hours of closed circuit, televised, medical discussion March 13, involving top medical scientists in the fields of aerospace medicine, cancer research and tuberculosis research.

Originating at the NASA Manned Spacecraft Center in Houston, and sponsored by the Chemical Institute of Brasle (CIBA) in Switzerland, the intercontinental conference will be carried over the recently launched Atlantic Ocean INTELSAT 111 (F-6). The broadcast will use the COMSAT earth station at Etam, West Virginia, for receipt and transmit on the U.S. Mainland, and the Federal Republic of Germany's Deutsche Bundespost operated earth station in Raisting, Germany, for receipt and transmit on the European continent.

The program will begin with an exchange of greetings over the INTELSAT between Professor A. Schretzenmayr, President of the German Senate for Post-Graduate Medical Instruction, Dr. Gerald D. Dorman, President of the American Medical Association, and Professor E. Fromm, President of the College of Physicians of the Federal Republic of Germany and of the German Medical Council.

Sajjad Durrani, COMSAT Labs, Elected to URSI

Dr. Sajjad H. Durrani, COMSAT Labs, was recently elected to membership in the International Scientific Radio Union (URSI) by the members of the United States National Committee of URSI. There are six Commissions of the URSI, and Dr. Durrani was elected to Commission 2, Radio and Non-Ionized Media.

Election to the Union is based on the candidate's familiarity and research in radio sciences. Dr. Durrani was elected to Commission 2 on the basis of work he has done on air to undersea propagation, radar returns from rough surfaces and multipath problems in satellite communications.

1969 Earnings Of 71¢ a Share Are Reported

COMSAT realized net income of \$7,129,000 or 71 cents per share in 1969 compared to \$6,841,000 or 68 cents per share in 1968.

Net operating income for the year increased substantially, amounting to \$1,832,000 compared to \$988,000 for 1968.

With continued growth in the use of the satellite system, revenues increased to \$47,034,000 compared to \$30,495,000 for 1968. At December 31, 1969, COMSAT was leasing full-time to its customers the equivalent of 1,435 half circuits, a gain of 494 over the 941 being leased at December 31, 1968.

As indicated earlier, net income for 1969 was held down by increased depreciation charges associated with the expansion of the system of satellites and earth stations, and by the temporary interruption of service on the IN-TELSAT III (F-2) satellite over the Atlantic Ocean during July 1969.

Operating expenses for 1969 were \$45,202,000 compared to \$29,507,000 for 1968. Of this amount, depreciation and amortization amounted to \$17,481,000 in 1969 compared to \$9,579,000 in 1968.

Other income, consisting of interest from temporary cash investments (net of Federal income taxes) and interest during construction, was \$5,297,000 compared to \$5,853,000 in 1968. The decrease was attributable to a lower level of temporary cash investments resulting from the investment of portions of these funds in the satellite and earth station system.

At December 31, 1969, COMSAT held approximately \$101,000,000 in investments, with an effective annual yield of approximately 7.2 percent. A year earlier, COMSAT held approximately \$133,000,000 in temporary cash investments.

Advertisements

For Sale: Lake of the Woods property, Breezewood Section. Wooded, paved roads, water sewers, 18 hole golf course, club house, water skiing, tennis, swimming pools, horseback riding, large lake, country club atmosphere. Within one hour of D.C. Contact Norm Sefton ex. 6610.

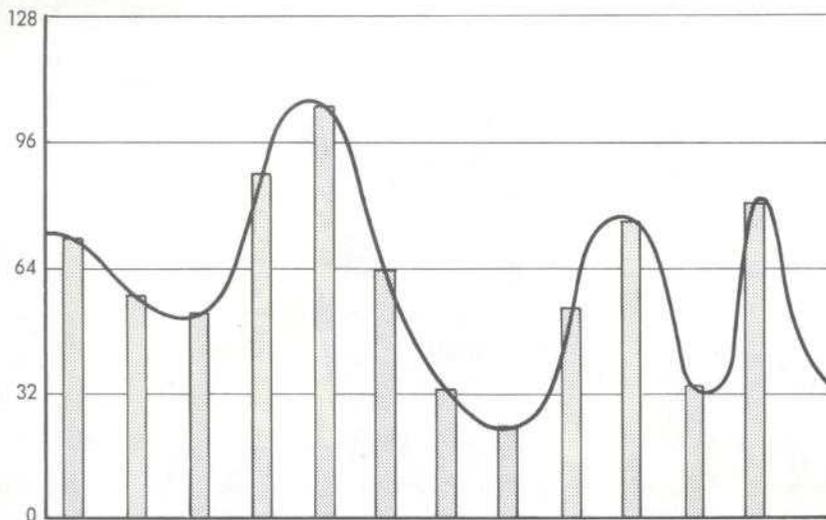
For Sale: 1965 Early Bird, custom make model, beautiful blue finish, two engines, two batteries, two-way AM-FM radio. Looks and runs like new. Must be seen to be appreciated. Low Mileage (294,661.616.92 statute miles as of March 1, 1970). Driven by school teacher. Contact S.H. Reiger.



Five Year Service Awards were presented by Dr. Charyk on February 10. Receiving awards at that time were: (first row, l. to r.) Mrs. Jean Sephton, Finance and Administration; Miss Ruth Kupperschlag, International; Miss Lenke M. Marko, Operations; and Mrs. Lee Twombly, General Services; (second row, l. to r.) George T. Domurot, General Services; Gen. George P. Sampson, Vice President, Operations; Lawrence M. Devore, Assistant General Counsel; Arnold W. Meyers, Operations; John A. Loutit, Technical, and Hassan Vaezi, General Services.



Dede Runfola, Purchasing, received a free share in the COMSAT Federal Credit Union for being the 1,000th member to join. Credit Union President, Robert Swensen, assisted by other Credit Union officers, Mrs. Mary Downs, Manager, and James Kilcoyne, Vice President, presented the share certificate.



G-5171

Analog voice wave is sampled and quantized into 128 levels.

MODULATION (Part II)

PULSE CODE MODULATION

Talking in Binary Numbers

Imagine talking into a machine which slices your voice into thousands of pieces every second, then sends the pieces one by one to another machine that puts them all back together. Instantly. That's the basic idea behind PCM—Pulse Code Modulation.

Although it was invented in 1939, PCM was not practical before the development of transistors and high-speed digital processing techniques. Now that the associated technology is here, PCM's potential advantages are being actively explored.

How it Works

In PCM telephony, the voice is first converted into analog electrical voltage in the telephone itself. Next, the voltage is sampled at a rate at least twice the highest frequency to be transmitted. This process converts a complex waveform into a series of distinct amplitude levels. It has been proved mathematically and by experiment that so long as the sampling rate is at least twice the wave frequency, the original voice wave can be satisfactorily reconstructed at the receiving end.

Now we have in place of a continuous wave a rapid, evenly spaced series of sampling pulses of varying amplitude. The problem is to transmit these samples efficiently through a wire or space. This is where digital processing comes in.

Each sample level is converted into a binary number; that is, a short burst of off-and-on pulses. It's easy to see that if there were an unlimited number of numerical levels available, the voice signal could be reproduced exactly. For practical purposes, however, it has been found that 128 different levels will serve to transmit the human voice satisfactorily.* Fewer levels will do for some applications. One hundred twenty-eight levels can be converted into binary numbers by what is called a seven-level code ($2^7 = 128$). All the combinations of a sequence of seven 1's and 0's result in 128 possibilities.

It is this series of binary numbers which is transmitted in the form of electrical pulses. Decoding equipment

*Sampling levels which fall between any two of the 128 levels are converted as the nearest level. The resulting inaccuracies, which are very small, are called quantizing errors.

at the receiving end reverses the process: the binary code is converted back into sample amplitudes, from which an analog voice signal is reconstructed, and the transmission is complete.

PCM's Advantages

One chief advantage of PCM over amplitude modulation and frequency modulation is that it can be received virtually as "clean" as it was sent. In amplitude modulated systems, incidental noise tends to be cumulative: when you amplify the signal you also amplify the noise. In frequency modulated systems, much of the noise can be clipped off the signal. In PCM, if the signal is being sent and received on a fairly wide frequency band the noise can be ignored. The repeaters in a pulse-code-modulated telephone circuit, for example, screen out all noise and accept only the stream of pulses, usually called the "bit stream." Each repeater then creates a fresh bit stream. There is a problem here, however. If the regenerating device receives or makes an error—a 1 which ought to be a 0, or a 0 which ought to be a 1—it will faithfully transmit that error all down the line. In other words, noise can be screened out, but digital errors are cumulative and they are heard as noise. Thus PCM repeaters must be spaced carefully to prevent excessive "erosion" of the signal.

Another major advantage of PCM derives from its digital form. Information which either already is or can easily be converted to binary form can be transmitted via PCM at extremely fast rates. Transmission rates of 50 million bits per second are not uncommon, and rates of 100 million bits per second and more are under study. Because each digital bit in data transmission is so important (just think what a mistake in one number could do to your bank statement!), it may be necessary to take steps to prevent errors, like inserting extra error coding bits or resorting to redundancy techniques.

The chief drawback in PCM is that in order to get a perfectly clean bit stream through all of the ambient noise and distortion in the transmission medium, this technique generally requires a wider bandwidth than either AM or FM.

Research for the 70's

Since its organization three years ago, COMSAT Laboratories has been deeply engaged in developing pulse code modulation systems and efficient high-speed digital transmission techniques.

A successful frequency-division multiple access (FDMA) system using PCM, called SPADE, has been approved by the ICSC for field testing in the Atlantic area with the INTEL-SAT IV satellite. SPADE will permit users to share a limited number of frequencies in the satellite to accommodate their light traffic requirements.

MAT-1, a 50-million-bit/second time-division multiple access (TDMA) system, is still in the experimental stage. This system will allow a large number of users to speak over the same frequency band simultaneously. William G. Schmidt, Manager of the Switching and Multiplexing Techniques Branch, Communications Processing Lab, says, "I would like to see a PCM/TDMA system in operation by 1973." Mr. Schmidt presented a paper on MAT-1 at the Digital Satellite Communications Conference in London in November.

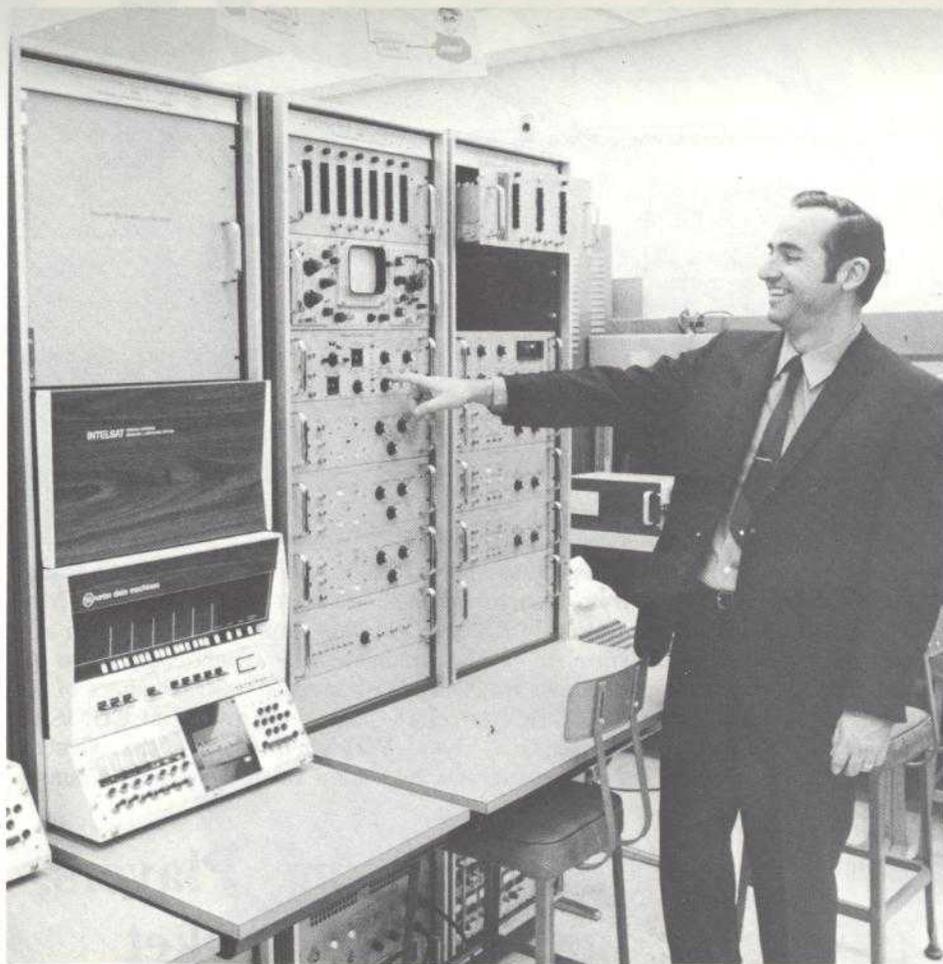
Another potentially advantageous application of PCM is in television transmission, especially in color. Experiments now going on at COMSAT Laboratories suggest that the use of PCM in television will allow for more efficient use of the television frequency spectrum.

Still in the future is the application of PCM to TASI—Time Assignment Speech Interpolation. This concept is now used in cable telephone traffic, but with analog modulation. In TASI, the "free" time on one channel while the speaker is listening to an active speaker on the other channel in a telephone circuit is used to carry another conversation. The aim is to squeeze more use from the frequency spectrum.

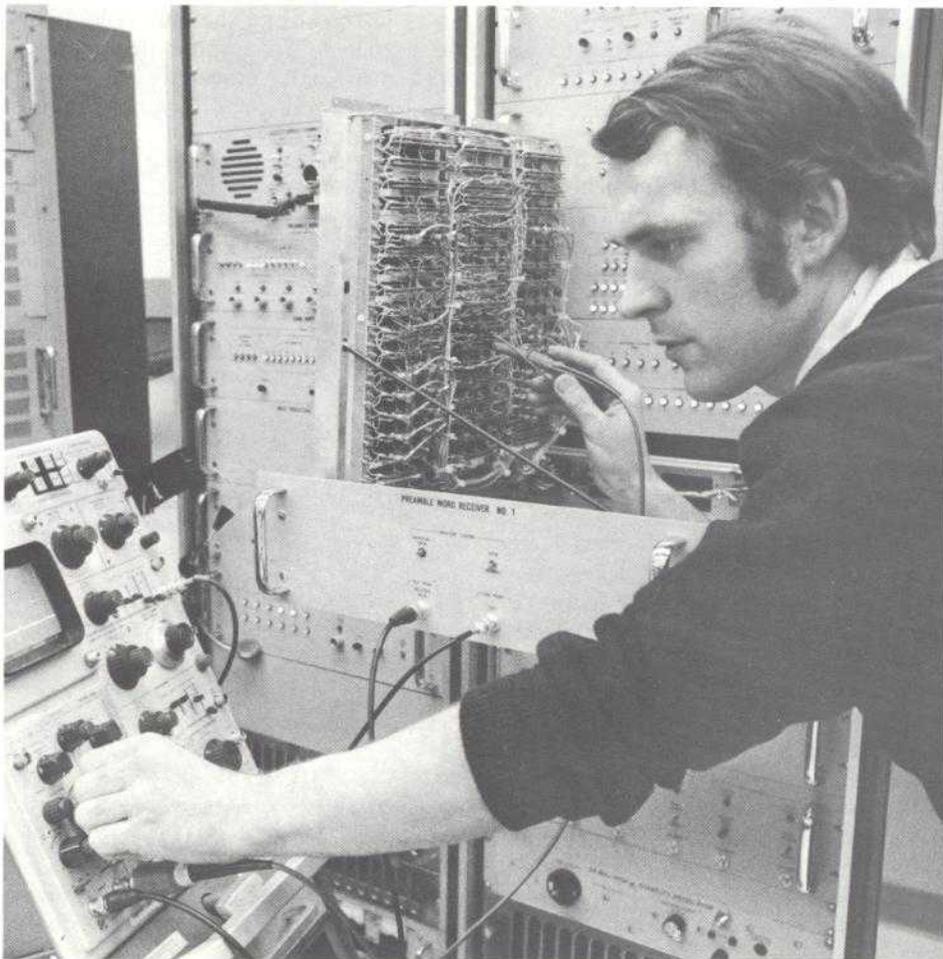
London Digital Conference Forecasts PCM Use

In November 1969, over 500 communications engineers, manufacturers, users, and policy makers gathered in London for an International Conference on Digital Satellite Communications, co-sponsored by INTELSAT and the UK's Institution of Electrical Engineers. Dr. Charyk, COMSAT President, delivered the keynote address for the conference, and a number of COMSAT personnel delivered technical papers. The conference proved to be educational for the attendees and gave them an opportunity to discuss both the state-of-the-art and future applications of digital transmission.

Although PCM is not used in any international traffic as yet, the London conference made clear that its day is soon coming.



William G. Schmidt points out features of SPADE equipment.



Hans Klose tests MAT-1 circuitry.

'COMSAT Five' Goes Undefeated

COMSAT's undefeated basketball team, and L'Enfant Plaza League kings, will place its 13-game winning streak on the line March 26 in the annual D.C.-wide "Tournament of Champions."

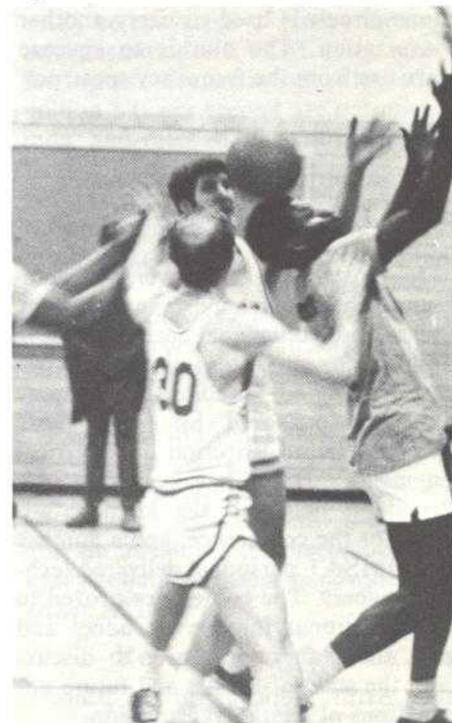
The team's first round game in the D.C. Recreation Department single-elimination tourney will be against an opponent to be determined at a pairing later this month.

Under the direction of Player-Coach Melvin Harley, a Service Centers employee, and Assistant Mentor Orlando Anderson, Reproduction, the seven-man team includes Co-captains James Laney and Ronald Tate, both of Reproduction.

The CEA-sponsored five raced through a 10-game L'Enfant Plaza League schedule unblemished and ran its record to three other victories in non-league play.

Other Plaza firms in the D.C. Recreation-operated league included Boeing, METRO and Bellcom. Two other loop members, Court of General Sessions and Smith-Corona, were outside-the-Plaza location members. League contests were played at the Randall Junior High School gym, 1st and Eye Streets, S.W.

Harley said "the players really look forward to continued fan support during tournament action."



You might think it's soccer, but sometimes that basketball takes some crazy bounces.



The Irving Novgrad Tennis Trophy was presented for the first time by Chairman James McCormack (third from left) to the members of the winning team. Mrs. Novgrad attended the presentation in honor of her late husband, who was an avid tennis player. The 20-year traveling trophy commemorates tennis competition between COMSAT Headquarters and the Labs. Also present were members of the winning 1969 Headquarters team: (left to right) Carl Wenrich, now of COMSAT Labs, Dick McBride, Technical; Dan Flynn, Personnel; Frank Osha, General Counsel; R. Ed Jordan, Computer Division, and Alan Kasper, General Counsel. Headquarters won five of seven matches.

Early Spring Favors Tennis Players, Taking to Court Is Their Racket

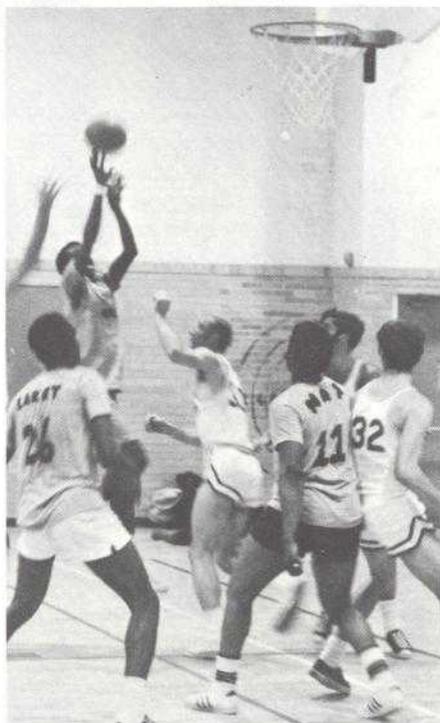
To some people the return of the red breasted robin is a certain sign of spring. But to others, a more certain indication is the twang of the tennis racket breaking the silence of the spring thaw.

It's true that when tennis players set forth spring can't be far behind. It is also true that when tennis players set out for the courts, the CEA is right behind them with a diversified program for all. This year, the program includes four tournaments and continuous ladder play.

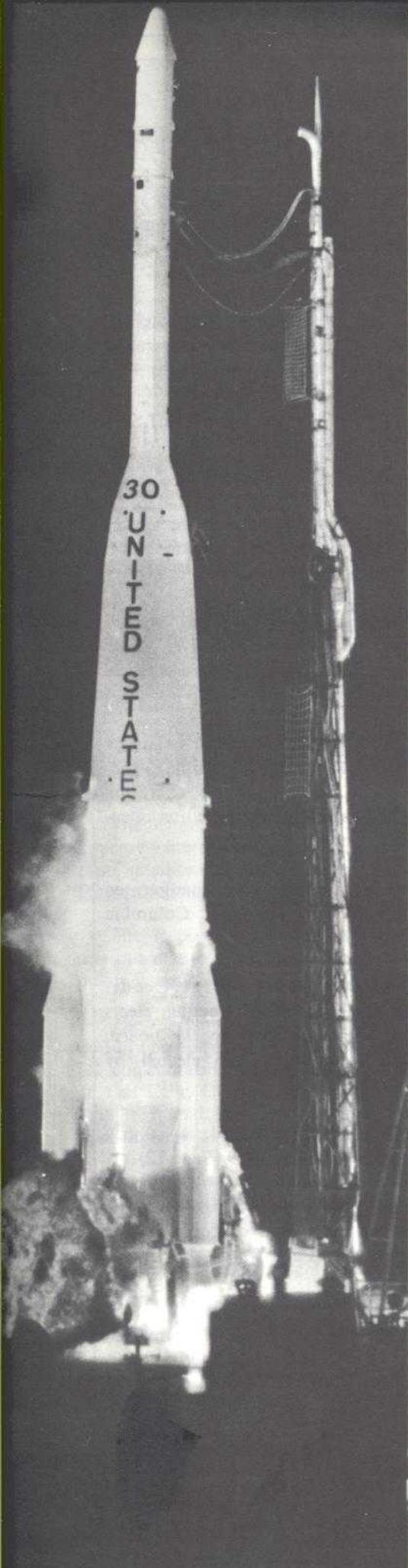
The season's ice breaker will be a round robin tournament designed as a mixer and a chance for players to warm-up on the courts.

Later, after the tennis ladders have established the ranking of players, the Plaza and the Labs will enter teams in competition for the second year of the Irving Novgrad Trophy. The defending champions from the Plaza will be looking for a repeat performance but will be doing so with the loss of three of the top five players from last season. Four more tournaments will be played later in the summer to determine the singles and doubles champions. Last year Carl Wenrich won the singles trophy, and the team of Jay Levatich and George Szarvas captured the doubles crown.

There were approximately 40 employees participating in the tennis program last year and the club is looking for even a larger turnout this season. Both men and women are invited to join by contacting Jay Levatich (Labs) or Dick McBride (Plaza).

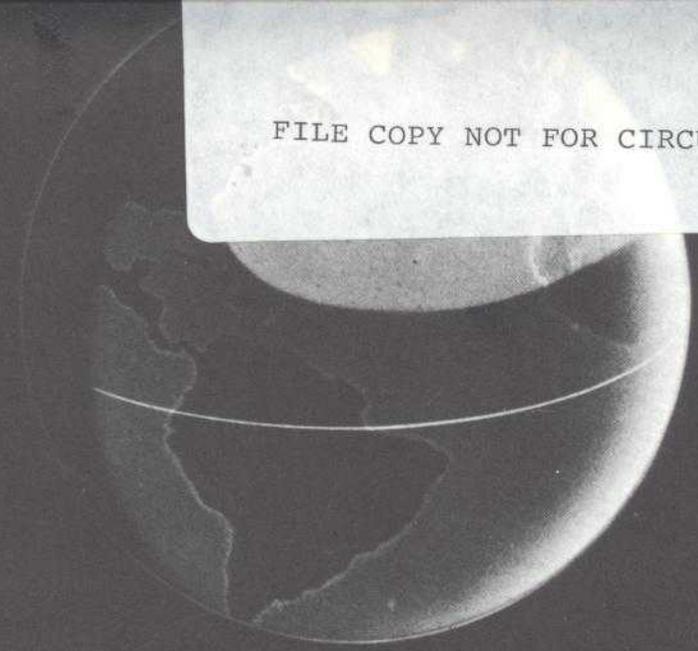


Another two points for COMSAT's undefeated CEA-sponsored basketball team which has rolled to 13 straight victories this season.

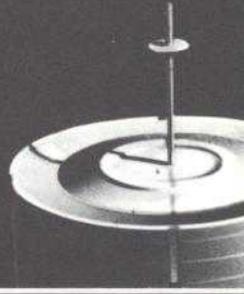


Early Bird launch

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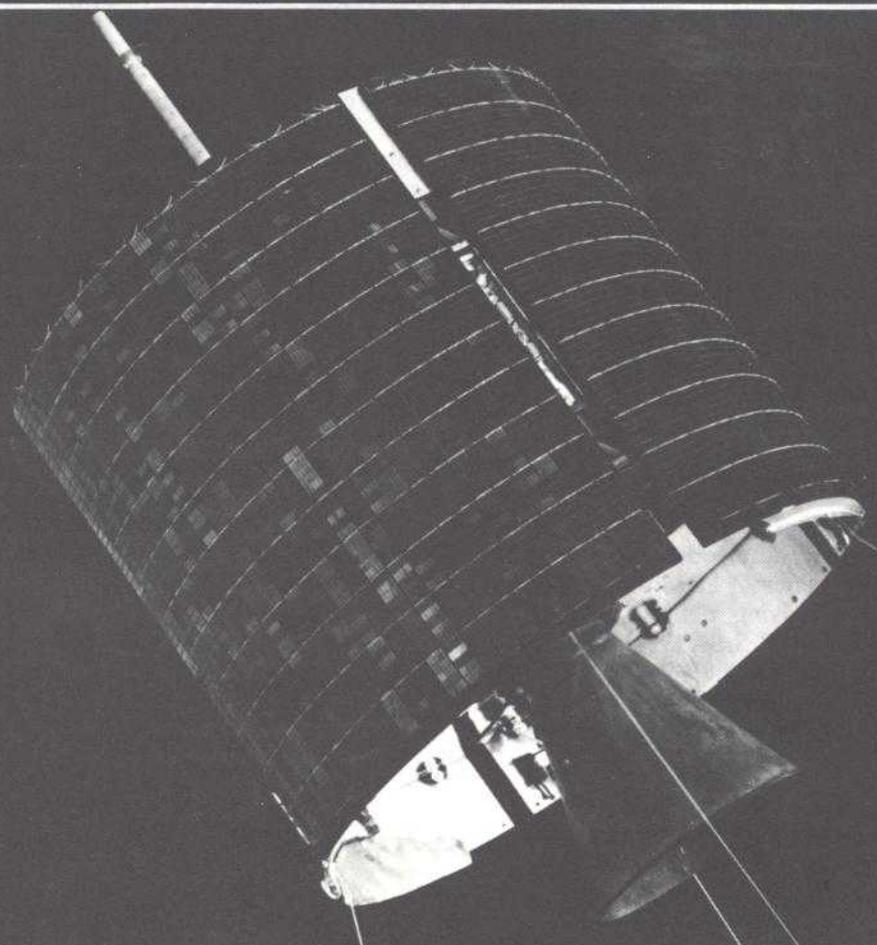


Area serviced by Early Bird.



COMSAT NEWS

April 1970



Early Bird, a forerunner of the global sys

News at a Glance

- FCC asks for domestic satellite service applications from all interested parties; type of service still undecided (Page 3).

- Pioneer commercial satellite, Early Bird, marks fifth anniversary; still capable of service (Pages 4-5).

- Preparations for INTELSAT III launch completed; satellite readied for April 22 launch (Page 11).

- Twelve directors to be elected at seventh Annual Shareholders Meeting in May (Page 6).

- International medical conference held via satellite TV, which promises improvements to medical exchange (Page 9).

- A team of Nigerian engineers undergoes extensive training program in preparation for operation later this year of earth station opening in Lanlate (Page 8).

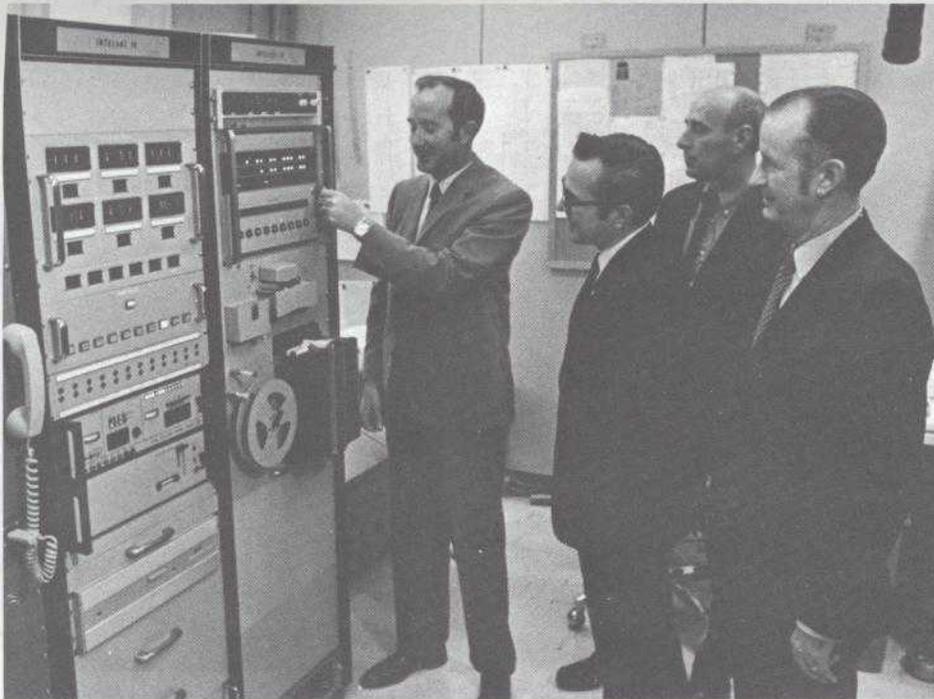
- New antennas are inaugurated in Malaysia, Thailand, Columbia (Page 15).

- COMSAT Federal Credit Union holds annual meeting, elects three new members to the board; executive officers are elected by board (Page 10).

- Earth Stations draw nearly 60,000 visitors in 1969 (Page 12).

- CEA plans spring party as opener for employee social events of the year (Page 7).

- COMSAT basketball team loses in second round of DC play-off (Page 16).



The INTELSAT IV console recently installed at COMSAT Headquarters received initial inspection from Charles Johnson (left), Space Craft Implementation, West Coast Office. Accompanying him (left to right) were John Swancara, Maurice Storm and Charles Russell, all Systems Engineers with Hughes Aircraft.

IWG Established to Continue Work Begun at INTELSAT Conference

An Intersessional Working Group (IWG) is being established as a follow-on to the Plenipotentiary Conference on Definitive Arrangements.

Plans for the committee were made by the Conference prior to its recess on March 20 following a month-long series of meetings in Washington.

The IWG is to be comprised of representatives from all INTELSAT member countries who desire to participate. Present plans are for the group to meet in Washington, D.C. from May 18 to June 12.

The IWG has been asked to prepare a single set of recommended texts of draft intergovernmental and operating agreements embodying definitive arrangements for INTELSAT for consideration by the Plenipotentiary Conference when it reconvenes again in Washington, tentatively in September.

The IWG, through negotiation, is to resolve differences of views and eliminate alternative approaches to the greatest extent possible. However, if the IWG is unable to resolve differences of views and eliminate alternative approaches, the alternative approaches will remain before the Conference.

A package was proposed by the delegations of Australia and Japan during the final days of the Conference. This proposal, as set forth in Document 93, related to the major issues of management arrangements, voting in the Board of Governors, determination of investment shares, and structure.

In presenting the package to the Conference, the delegations of Australia and Japan stressed that it represented a delicate balancing of issues and therefore had to be accepted as a whole. They emphasized that any attempts at modification would result in its destruction.

The package met with mixed reactions, and some which clearly indicated different interpretations. There wasn't sufficient time, however, to explore thoroughly the reaction to the Australian-Japanese proposal before the Conference adjourned.

The Conference, therefore, established the Intersessional Working Group to carry forward its work. As a basis for its work, the IWG will use the Australian and Japanese proposals.

April 1970—Year 5, No. 3

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FCC Seeks Domestic Satellite Service Applications, Policy Statement Leaves Several Issues Unresolved

The Federal Communications Commission issued policy statements on the long-pending domestic satellite case on March 24, but a number of complex issues remained to be resolved.

The Commission, in a formal Report and Order, invited all interested parties to file applications to provide domestic satellite services. At the same time, in an accompanying Notice of Rule Making, the Commission asked for comments on a number of issues.

In light of the many issues raised by the FCC action, COMSAT said that it would thoroughly study all the matters and would file an appropriate application to promote domestic satellite services as soon as possible.

COMSAT Responds

In a letter dated March 25 to FCC Chairman Dean Burch, COMSAT President Joseph V. Charyk said:

"The Commission's policy statement issued yesterday appears generally to support our own long-held conviction that satellite communications offer significant benefits for domestic services.

"The Report and Order and Notice of Rule Making sets out many fundamental technical, legal, economic and policy issues.

"The Communications Satellite Corporation wishes to be fully responsive to the Commission, and is giving careful consideration in its response to the complex issues. In this light, COMSAT hereby notifies the Commission that it intends to file a comprehensive application to provide domestic satellite services as soon as possible."

The Commission explained that it had been unable to determine whether a domestic satellite program could best be developed by authorizing a multi-purpose system, by specialized systems (more than one system), by a combination of a multi-purpose system and specialized systems, or through an "open entry" policy.

Chairman Burch told a news conference at the FCC on March 24 that he hoped these and other questions would be answered by the kind of information that is supplied in applications and comments by those who file.

Burch said Commission statements meant that, "we have not closed out any options at this particular time."

In answer to a question, he said he did not know when the Commission might reach a final decision. He explained that it might be by the end of this year, or it could take until the end of next year, depending upon technical or economic conflicts between applications.

Inclusive Applications Expected

The Commission indicated that applications should include comprehensive proposals covering, in detail, such matters as:

- technical description of satellites and earth stations.
- location of stations and interconnection arrangements.
- complete legal, financial and technical qualifications of the applicant.
- public interest consideration.
- whether the system would be capable of providing service to Hawaii and Alaska as well as the continental U.S.
- whether channels would be provided instructional broadcasters without charge.

In the Notice of Rule Making, the Commission asked applicants to comment on a series of issues, including suggestions on what policies the Commission might take in the event conflicts arise in such areas as proposed orbital locations and frequency usage; what role AT&T should play in the domestic satellite communications field; interconnection and access to earth stations; and suggestions as to policies that might be adopted with respect to procurement.

Previous White House Memorandum

The lengthy FCC statement was issued approximately two months after the release of a White House memorandum on domestic satellite services.

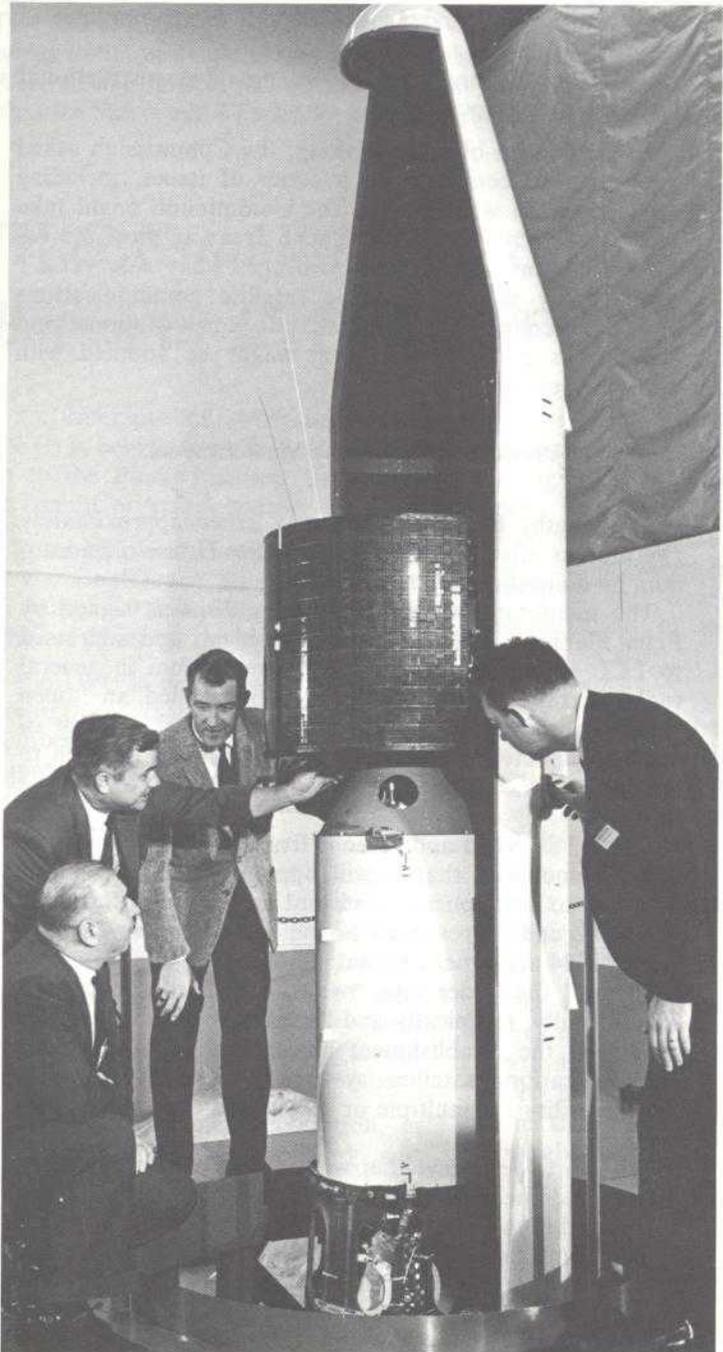
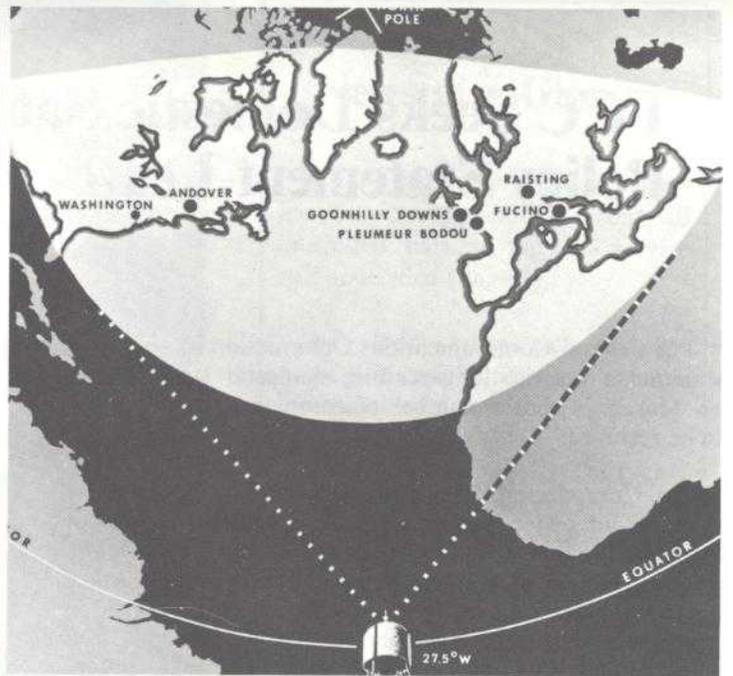
The memorandum, dated January 23, was signed by Peter Flanigan, assistant to the President, and addressed to FCC Chairman Burch. The memorandum in general took what one broadcasting executive called an "open skies" approach by recommending that establishment of a domestic satellite system or systems should be open to anyone technically and financially qualified to do the job.

The FCC invited applications from all qualified parties. But it announced that it will apply the test of "public interest" to an applicant, and that authorizations granted would be under provisions of the basic Communications Act of 1934 and other relevant statutes.

"Thus," the Order said, "we will consider applications by all legally, technically and financially qualified entities proposing the establishment and operation of domestic communications satellite systems designed to provide the capability for multiple or specialized communications services.

"In short, we believe that we can best render the public interest judgments as to what system or systems are to be authorized in the context of specific proposals."

The domestic satellite services issue has been formally pending before the Commission as a docket case since August 1966 when a formal Notice of Inquiry was issued by the FCC.



Early Bird, Pioneer Satellite, Completes Fifth Year in Orbit

By April 6, she had traveled 300,592,324 miles, even though she was only expected to go some 5,009,872 miles. And defying the growth pattern normal for a five-year-old, she has lost some weight, about nine pounds.

She is Early Bird, the world's first commercial communications satellite, launched from Cape Kennedy the evening of April 6, 1965. This April marks her fifth anniversary in space.

Five years ago, Early Bird (INTELSAT I) ushered in a new era in communications. Stationed 22,300 miles above the Atlantic Ocean in a synchronous orbit, Early Bird served as the first commercial space link between North America and Europe.

Although now "retired" and no longer used except for emergency service, Early Bird today is still lively, still in orbit and still capable of providing useful communications services.

Engineers calculate that the satellite, moving at an orbital speed of about 6,900 miles an hour to keep pace with the earth's rotation, has traveled more than 300 million statute miles in space since it as launched.

The original in-orbit weight of 85 pounds has been reduced due to the expenditure of about nine pounds of on-board fuel used over the five years for positioning and station-keeping maneuvers.

During an eventful lifetime of service, the small satellite participated in many historical communications accomplishments. It provided the first commercial space telephone service between the United States and Europe. In 1965 it was used to transmit high-quality facsimiles of weather maps between Washington and Paris at speeds eight times faster than conventional means then in use.

The satellite received and transmitted more than 235 hours of television—and the first commercial transatlantic live television transmission.

On May 2, 1965, a one-hour TV inaugural program was seen "live via Early Bird" by viewers in some 22 countries.

Other early TV events included Pope Paul's historic U.S. visit in October of 1965, the U.S. Gemini manned space missions in 1965 and 1966, and hundreds of other programs giving millions of persons in North America and Europe an opportunity to see history in the making.

(Upper) Former Vice President Hubert H. Humphrey speaking at the time of the Early Bird launch at COMSAT Headquarters in Washington. Map shows area covered by Early Bird.

(Center) Inspection of Early Bird model positioned in the third stage of the Douglas Thrust Augmented Delta. Pope Paul VI takes part in Early Bird television inaugural, May 2, 1965.

(Lower) Former President Lyndon B. Johnson inaugurated commercial satellite telephone service, June 28, 1965, and was the subject of frequent TV news coverage via Early Bird.



President Joseph V. Charyk spoke at the National Association of Broadcasters Convention in Chicago on April 6. He was a member of a four man panel on satellites, which followed speaker Arthur C. Clarke, British space writer. To the right of Dr. Charyk is Alan R. Cooper, NBC Vice President of Planning, another panelist.

Twelve Directors To Be Elected At Annual Shareholders Meeting

COMSAT shareholders will elect 12 directors at the seventh Annual Meeting of Shareholders to be held in May.

Eight directors will be elected by the Series I (public) shareholders and four will be elected by the Series II (carrier) shareholders.

The eight nominees for election as Series I directors are:

Philip W. Buchen, Joseph V. Charyk, William W. Hagerty, George L. Killion, Joseph H. McConnell, James McCormack, Bruce G. Sundlun and Leo D. Welch.

The four nominees to date for election as Series I directors are:

George S. Beinetti, President of Rochester Telephone Corporation, Rochester, N.Y.; James E. Dingman; Richard R. Hough, Vice President, Long Lines Division, American Telephone and Telegraph Company, and Horace P. Moulton.

Under the Communications Satellite Act of 1962, the President of the United States appoints three directors with the advice and consent of the Senate. The two whose terms do not expire this year are Frederic G. Donner and George Meany. William W. Hagerty, whose term expires at the 1970 annual meeting, is being proposed for election as a Series I director. President Nixon has not yet ap-

pointed someone to fill the vacancy to be created by Dr. Hagerty's shift.

In addition to electing directors, the shareholders will vote on the appointment of independent public accountants for the coming year. The firm of Haskins & Sells, which has served as COMSAT's independent public accountants since 1963, has been proposed for reappointment.

One shareholder proposal is on the agenda. It was submitted by Evelyn Y. Davis of New York City and would restrict the Corporation from making any charitable contributions "except in the direct furtherance of the business interests" of the Corporation.

The Board of Directors has recommended against the adoption of this proposal, pointing out that the amount of money contributed by the Corporation last year was modest (about \$9,200), that it is standard practice among American corporations to support appropriate civic and charitable organizations and that it would be difficult to determine in every case which contribution might be in "direct furtherance" of the Corporation's business.

The Proxy Statement and Notice of the Meeting was mailed on April 7 to the Corporation's approximately 125,000 Series I shareholders of record and was distributed also to the

ICSC Elects New Officers

The Interim Communications Satellite Committee, governing body of the International Telecommunications Satellite Consortium (INTELSAT) currently meeting in Washington, D. C., has elected its new officers for the next term of office beginning July 1.

Mr. John A. Johnson, Vice President-International of the Communications Satellite Corporation (COMSAT) and the United States Representative to INTELSAT since INTELSAT was established in 1964, has been elected Chairman of the Committee. Mr. Johnson is currently serving as Vice Chairman of the Committee and has formerly served as Chairman. Mr. Carlos Nunez A., the Representative of Mexico, is the incumbent Chairman of the Committee.

Mr. Yves Fargette of France has been elected to the position of Vice Chairman for the coming term. Mr. Fargette is Regional Director in the French Ministry of Posts and Telecommunications and represents both France and Monaco in the Committee.

The Interim Communications Satellite Committee consists of 18 representatives who represent 49 of the 75 countries that are members of INTELSAT. The consortium owns and operates the INTELSAT global system of communications satellites positioned over the Atlantic, Pacific and Indian Oceans.

As contrasted with the joint ownership of the satellite system, the earth stations which work with the satellites are owned and operated by the designated telecommunications entities in the countries where they are located. At the present time, earth stations are operating in 26 countries of the world. It is expected that there will be stations in about 35 countries by the end of this year, and in nearly 50 countries by the end of 1972.

COMSAT shareowners whose shares are held by brokerage houses. Series II Proxy Statements will be mailed at the end of April.

COMSAT's present Series I directors are:

Philip W. Buchen, Joseph V. Charyk, George L. Killion, Joseph H. McConnell, James McCormack, Rudolph A. Peterson, Bruce G. Sundlun and Leo D. Welch.

The present Series II directors are: Harold M. Botkin, James E. Dingman, Douglas S. Guild and Horace P. Moulton.

Infrared Earth Sensor To Be Designed For INTELSAT

COMSAT, on behalf of INTELSAT, announced its intent to award a contract to Barnes Engineering Company, Stamford, Connecticut, to design a static infrared earth sensor. To be completed within 12 months, the contract is for \$39,700.

Sensors are used on communications satellites to aid in maintaining the spacecraft in the correct attitude. Infrared earth sensors respond to radiation from the earth's atmosphere. The static device to be designed by the Barnes organization will sense the atmosphere at eight areas around the earth.



The CEA board of directors is initiating plans for employee activities in 1970. Newly elected board members are (left to right) Beverly Nitkowski, secretary; Judy Stotler, vice president—social; Robert Cool, vice president—social; Betty Stover, president; Perry Klein, vice president—special activities; Pat Lamphear, assistant secretary and membership chairman, and Neil Helm, senior vice president and treasurer. Missing from the photo is George Domurot, vice president—athletics.

Headliners from CEA

Spring Plaza Party Launches CEA Social Calendar, To Be Followed by Annual COMSAT Picnic in June

By Beverly Nitkowski

A recent survey taken through a flyer distributed to all employees showed a great interest in cocktail parties. So, popular demand suggested the CEA board's first endeavor in the social circle for 1970—a Plaza cocktail party. After several weeks of meetings and telephone calls, the necessary preparations were made to make this first social function great fun.

Beginning at 6:00 p.m., Friday, April 24, in the Plaza courtyard, CEA members can dance to the music of a four-piece combo, enjoy fine food, and relax with a glass of their favorite beverage. Can you think of a better way to end a hard day at the office?

Contact your CEA representative for tickets.

Plans Begun For Annual Picnic

Judy Stotler and Bob Cool, CEA's social vice presidents, are working very conscientiously on the annual CEA picnic. The picnic this year, as in the past years, will be held at Smoky Glen Farm, Sunday, June 7. The agenda includes pony rides, Wilson Fun Services, plenty of good food and beverages, games, and a special surprise for everyone to enjoy.

Entertainment will be provided by the CEA talent group under the capable and talented direction of Kitty Stephenson.

Be sure to watch for flyers announcing ticket sales or contact your CEA representative.

60 Fans See Senators Opener

Sixty CEA members attended the opening game of the Washington Senators on April 6 at Robert F. Kennedy Stadium.

Potpourri

Bill Young, the CEA's astronomy president, has a good start on a fine club. The club, although only 17 members strong, has already experienced a star party and several interesting meetings at which time various slides and equipment were viewed.

A number of projects are undergoing initial stages right now, including timing the occultation of stars by the moon, variable star observation, INTELSAT apogee motor firing observation, and Apollo optical tracking. The club is anticipating construction of a permanent observatory.

Regular meetings are held at 8:00 p.m. on the Friday before each new moon at the Labs. For further information, contact Mr. Young.

The amateur radio club is happy to announce that their Plaza station is completed. Both Plaza and Labs stations are now on the air. Club members are hoping to have staff

members talk to their families overseas via CEA radio club equipment. Cal Cotner, the voice of COMSAT, will be happy to answer any questions or enroll you in this active club.

Fashion Survey: which way shall we go—mini, maxi or midi? Tell Bev Nitkowski, Extension 6141, your decision.

You don't have to wait to go to the pool anymore to play ping pong. J. Kaiser who heads the CEA Ping Pong Club has announced that a beautiful new table has been set up at the Labs and is in use.

The Bridge Club needs support. Call Marion Timmons, Extension 6186, now.

The Red Baron flies again. Interested pilots, contact Charles Heise, Labs, for further information concerning the CEA Flying Club—then you'll have the perfect excuse to go out and buy that Piper Cub that you've been wanting.

For Chess Club information, see or call Hermes Sanchez, Extension 6804.

If you're not yet a CEA member, call Pat Lamphear, Extension 6219. You won't want to miss out on any activities so join today.

Any suggestions for a new club? See your local CEA representatives.

Visiting Nigerians Undergo Extensive Training Course

Five Nigerian engineers are undergoing extensive technical training in the United States in preparation for the entry of their country as an active participant in space age communications later this year.

The five engineers will form a cadre of experienced and able telecommunications experts when Nigeria opens a new earth station for sending and receiving communications via satellite.

The modern facility, located near Lanlate about 100 miles north of Lagos, is expected to go into service in late 1970. It will link Nigeria directly for the first time to the most advanced commercial communications systems now operating on a global scale. The station will be capable of handling most forms of high-quality satellite communications—telephone, facsimile, data, and telegraph—between Nigeria and other countries in Africa, Europe, the Middle East, North America and Latin America.

The five Nigerians include O. Fatimilehin, R. Adewale, F. Akindele, S. Adebayo and A. Adebimpe. The group, which arrived in February and departs in June, is receiving valuable training and actual experience at a number of locations.

Visit Andover and Etam

They began their training at COMSAT Headquarters. After a detailed orientation, the men took on-the-job training at the Andover and Etam earth stations.

The COMSAT training extended over a six-week period and emphasized technical instruction in satellite system operating procedures. Instruction at the station cites included training in operation and maintenance of such elements as multiplex equipment, servo drives for antenna, high-power amplifiers, cryogenically-cooled low noise receivers, monitoring and testing and other operations.

The training also covered administrative aspects of operating an earth station, such as purchasing, assignment of manpower to shifts, etc. The trainees actually worked on shift duty during a portion of their station assignment.

Later, the group will have additional training at manufacturers' plants in Massachusetts and California. They will participate in equipment operational aspects, in-plant testing of equipment and other aspects. The group also plans to visit a manufacturer in Milan, Italy.

Largest Training Group

A COMSAT spokesman said that while other engineers and technicians from abroad have received some routine training by the Corporation in the United States, the program arranged for the Nigerian group was by far the most extensive one to date.

Mr. Fatimilehin characterized the training at COMSAT in an interview as, "most successful and helpful."

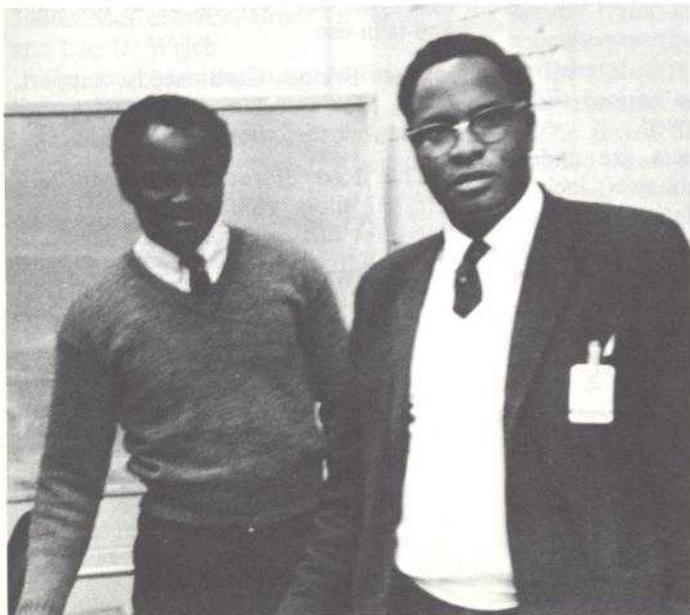
The group was taken on a tour of COMSAT Laboratories before leaving Washington. All five hold engineering degrees. Two graduated from Nigerian colleges; three were educated in England and received their degrees there.



A. Adebimpe (left) and S. Adebayo check equipment.



D. Fatimilehin (left), R. Adewale (center) and F. Akindele stop for a moment before visiting the Andover antenna seen in the background.



S. Adebayo (left), and A. Adebimpe leaving classroom after training.

Satellite TV Demonstrates Better Medical Exchange

A three-hour international telecast on March 13 helped foster improvements in medical knowledge exchange. INTELSAT satellites and NASA facilities in Houston combined for the "Medicine from Continent to Continent" program between scientists in Houston and Davos, Switzerland. The general topic of discussion was space medicine and its application to the everyday medical world.

The program represented one of the most complex medical agendas ever assembled for intercontinental discussion, and allowed for the maximum utilization of the unique satellite communications network. The program was arranged by CIBA, Ltd., of Basel, Switzerland, a diversified chemical company with its subsidiary located in Summit, New Jersey.

Originating in the studios of the Houston Manned Spacecraft Center, the international network supplied audio and video transmission from the American mainland to Europe, and a two-way voice exchange between both continents. The transmissions were carried by land lines to CBS facilities in New York and the COMSAT operated earth station at Etam, West Virginia, then through the INTELSAT III F-6 stationed over the Atlantic.

In Europe the signal was received by the German earth station in Raisting, and sent via land lines to Davos, Switzerland, for further land-line distribution to ten other European cities. In Houston, camera crews of the NBC affiliate KPRC-TV with the cooperation of the NASA Public Affairs Office, Broadcasting Services, provided on-the-scene technical assistance.



Jules Bergman, science editor for the American Broadcasting Company, looks over the INTELSAT display at Houston.

American and European medical authorities discussed current aspects of space medicine, early cancer detection, and basic research in space medicine as it related to everyday medical practice.

The European receiving center was the popular resort of Davos where the Eighteenth International Congress for Post-Graduate Medical Instruction was in progress. The Congress was organized by the West German College of Physicians.

The advanced medical discussion was witnessed by 30,000 European physicians and allowed for two-way projection and discussion in auditoriums in Germany, Austria and Switzerland, and program reception in the cities of Badastein, Berlin, Berne, Bochum, Cologne, Frankfurt, Hamburg, Munich, Stuttgart and Vienna. Eidophor, a large-screen projection unit developed by CIBA, provided large-screen projections of the U.S. originated demonstrations to the European audiences.

Among the American physicians taking part in the program were Dr. Gerald D. Dorman, president of the American Medical Association; Dr. Charles A. Berry, director of NASA Medical Research and Operations at the Manned Spacecraft Center in Houston; Dr. George L. Wied, professor of obstetrics and gynecology, University of Chicago; Dr. Paul H. Hollinger, professor of bronchoesophagology, University of Illinois; Dr. Franklin S. Alcorn, assistant professor of radiology, University of Illinois College of Medicine; Dr. Eugene F. Lutterbeck, assistant professor of radiology, Northwestern University Medical School; and Professor Hans G. Clamann, chief scientist, Headquarters Aerospace Medical Division, Brooks Air Force Base, San Antonio, Texas.



Dr. Charles Berry, director of medical operations, Manned Spacecraft Center, Houston, replies to question from a European scientist.



Randall I. Williams, newly elected president of the COMSAT Federal Credit Union, speaks to members at annual meeting.



Robert Swensen, past president, presents Mrs. Karen Woods with a \$50 share certificate won in the drawing.

Credit Board Elects Officers

Elected to a one-year term as president of the COMSAT Federal Credit Union was Randall I. Williams, Management Review and Internal Audit, who retired as chairman of the supervisory committee. He succeeds Robert Swenson, manager, Engineering Economics Department, as president.

Other officers were also elected at the April 1 board meeting. James Kilcoyne, Information, was re-elected as vice president and will continue as the chairman of the credit committee.

Also re-elected was Lawrence Kopp, manager, Graphics, as secretary, who in addition serves as the chairman of the publicity committee. Both Mr. Kilcoyne and Mr. Kopp have served one year on the Credit Union board and have two remaining years to serve.

William Kaht, Engineering Economics Division, was re-elected as treasurer at the annual meeting held on March 26. His position was approved at the April 1 meeting. Mr. Kaht served three years on the board of directors, but did not choose to run for re-election in 1970.

Appointments made at the meeting included Paul Rankin, Rates and Revenue Requirements, as chairman of the supervisory committee, and Theodore Gottry, Analysis and Traffic, as head of the newly created special projects committee.

Credit Union Holds Annual Meeting, 3 New Members of Board Elected

The annual meeting of the COMSAT Federal Credit Union was held on March 26 in the COMSAT Visitors Center. All members of the board of directors and other officials of the Credit Union were present, along with 60 members of the organization.

After the minutes from the last annual meeting were approved by the membership, the outgoing president, Robert Swensen, gave a report of the growth of the Credit Union during 1969. The year opened with a holding of \$150,000 in shares and closed with a total of \$450,000. The amount on loan increased from \$200,000 to \$450,000 at the end of the period. Net income was \$27,000. Membership increased from 500 to 770.

William Kaht, treasurer, reported that assets grew to over half a million dollars in 1969. He also stated that the gross income for the year was \$33,000.

James Kilcoyne, chairman of the credit committee, reported 510 loans were granted during the year for a total of \$578,000, an increase over 1968 of \$236,000.

The supervisory committee report, given by Randall Williams, showed that all accounts and records were in order. He also commented that the National Credit Union Administration

has given a Thrift and Honor Award to the Credit Union for fast growth and efficient operation.

Following the reports to the members, elections for the year 1970 were held. Elected for three-year terms to the board of directors by unanimous vote were Randall I. Williams, Paul D. Rankin and Theodore A. Gottry.

Elections for the credit committee were also held. Gene E. Christensen and Carl L. Sederquist were each elected for three-year terms.

Participants at the meeting expressed their thanks to Mr. Swensen for outstanding contributions to the Credit Union during his three years as a member of the board, and especially for his work in 1969 as president.

A drawing for \$50 worth of shares was made. All members of the Credit Union were eligible to enter the drawing. The winner was Mrs. Karen Woods, Rates and Review Requirements. Afterwards, the surprised winner commented on her good fortune and hinted about her plans for the certificate when she said: "I'd just like to keep my husband from finding out."

The meeting concluded with a wine and cheese sampling party, which was attended by 75 guests.



Ed Jordan and Elizabeth Preston were two members who enjoyed the wine and cheese party following the meeting.

INTELSAT III Prepared for April 22 Launch

Pre-launch preparations are entering final stages for the launch of the INTELSAT III F-7 from Cape Kennedy on the evening of April 22.

The satellite was scheduled to be mated atop Delta Launch Vehicle No. 78 on April 16, and the countdown is scheduled to begin on April 20. Subsystem checks on the vehicle were completed about April 11 and major tests, such as simulated flight and interface checks, were completed the following week.

As is normal for INTELSAT launches, the first and second stages of the vehicle were erected on pad 17A about five weeks ahead of launch. Upon the completion of third-stage assembly, the third stage of the vehicle was erected about 9 days ahead of launch.

The F-7 satellite is intended for commercial service over the Atlantic Ocean where it will supplement the INTELSAT III F-6 which went into commercial service on February 7. A successful mission with the F-7 will permit an earlier generation satellite now in service over the Atlantic, the INTELSAT II F-3, to be placed in orbital reserve.

The INTELSAT II F-3 was placed back in service in March when the despun antenna of the INTELSAT III F-2 stalled again. Earlier the primary Atlantic traffic load had been taken off the INTELSAT III F-2 and put on the INTELSAT III F-6. The INTELSAT II F-3 is supplementing the F-6 by providing a limited amount of Atlantic service.

As with earlier INTELSAT III launches, the F-7 launch and a contemplated F-8 launch are insured. The coverage provides a \$5,000,000 benefit to COMSAT in case of back-to-back failures with the F-7 and F-8. The premium cost of this insurance is a variable amount depending on whether both the F-7 and the F-8 launches are attempted and on the results of these launches.

Advertisements

To Rent: S.W., 301 G Street; Large efficiency, a/c, 8th floor balcony, swimming pool, parking. Contact Marvin Jauer, Ext. 6152 or evenings, 347-2779



Members of the Andover CEA enjoy the first party of the season.

News and Notes from Andover

Andover Updates Safety Program

By Joanne Witas

A ten-hour first aid training school sponsored by the American Red Cross was recently held for the personnel at the Andover station as a part of the safety revision program. A number of persons attended the seminar designed to improve personal aid during emergency situations. These people were: Ray Knight, Dave White, Neil Merrill, Michael O'Hara, Stanley Morse, Lawrence Wood, Arthur Haseltine and Joanne Witas.

In addition to periodic specialty programs, the Andover safety committee meets monthly to consider improvements and to review suggestions made by station personnel.

Equipment Revision

Ernest Steinbrecher and David Reiser of COMSAT Labs have been at Andover to install and check out the power monitor system. Some of the station employees have attended power monitor training classes given previously by Mr. Steinbrecher.

Charles Johnson, COMSAT, West Coast Division, and Maurice Storm, John McGowan and Gordon Wilger of Hughes Aircraft have been in Andover to install and test the INTELSAT IV console. Mr. Johnson is the COMSAT representative in charge of the acceptance tests. Testing at the time of installation was favorable.

Richard "Sven" Engblom, administrator, spent the week of March 9 at Headquarters.

Herman Sauret, facilities engineer, and his family have returned to Andover after a family visit in Huntsville, Alabama.

The Bill Merrills have the congratulations from the Andover gang for the birth of their first daughter. The Merrills also have two sons.

CEAA Swings Out

The CEAA is keeping its social schedule tuned up. On February 27 a dance and smorgasbord were held at Louie's barn. Dave Reiser, Labs, made a fun guest of honor, and helped make the party a booming success for everyone.

Zambia Accedes

The Republic of Zambia became the 75th member nation in INTELSAT on March 20 when Ambassador M. Mainza Chona deposited the instrument of accession on behalf of his government and signed the INTELSAT Special Agreement for the General Post Office, Zambia's designated entity. Zambia has a quota of .05 percent.



Paul Eckley displays his rendering of pioneer satellite, Early Bird.

Time and a Lot of Creativity— Tools to Make Unusual Rendering

A creative idea, a couple of old maps, a lot of time and a lot of talent re-creates the Early Bird story five years later.

If you don't think it's so, just step into the fourth floor office of Paul W. Eckley, Jr., and see for yourself.

A rendering by COMSAT's director of management services shows the little satellite pioneer and the Atlantic Basin area it served.

An artist even before graduating from the famous Art School of Pratt Institute in New York 30 years ago, Mr. Eckley calls his Early Bird rendering "the story of international cooperation."

The painting's basic elements are two maps to show the area covered by the 240-circuit pioneer, flags of the 45 nations who were INTELSAT members the day the satellite was launched, and Early Bird itself.

Mr. Eckley said he had the idea to do such a painting for the last three years, or so, but like many things "just kept putting it off."

He took the first step to turn the idea into reality in January. First, he got the maps, mounted them, then applied 10 coats of varnish after duty hours here at the Plaza.

But the creative work had only begun. He took the varnished maps home to begin evening and weekend work. This included sketching, then painting, each nation's flag in an alphabetical, yet tasteful arrangement.

But Mr. Eckley thought the flags, many of which had much white in them as one of their natural colors, were too bright and over-powering. To tone them down he applied eight more coats of varnish.

Finally, he tediously sketched Early Bird, then painted it its natural dark blue color.

The retired Air Force officer, and World War II pilot, estimates he put between 80 and 100 hours of time into his rendering. "I never imagined it would take that long," he said.

Nearly 60,000 Visit Earth Stations

The Andover earth station, the oldest in the U.S., still is first in popularity with visitors.

Statistics maintained by Operations show that about 37,100 persons visited the Andover site in western Maine last year. And this year may be the last chance for many persons to make a sentimental trip to Andover to see the big radome-protected "horn" antenna in operation. It is due to be replaced by the spring of next year by a new "dish" antenna to be erected near the front of the existing control building.

Here are some statistics on earth station visitors for 1969:

Andover—37,100, with visiting hours daily June through October. Andover has a Visitors' Building, vis-

Honorary Degree Awarded to Lucius D. Battle

Lucius D. Battle, Vice President, Corporate Relations, returned to the University of Florida at Gainesville to receive an honorary doctor of laws degree in March from his alma mater and deliver the commencement address to 1,000 graduating members of the senior class.

The 1939 graduate of the university took a positive approach to the world's ills in pointing to progress that has been made against urgent problems in food, population control, the arms race and the new field of satellite communications.

Mr. Battle commented, "Clearly I believe we can take pride in the fact that one more graduating class lives in a world without nuclear war."

He added that "rumors of war, bush wars and outbreaks in the Far and Middle East are events that could have led to full scale war. But the fact that we continue year after year without major catastrophe is at least encouraging."

Mr. Battle refused to partake in what he termed the "favorite indoor sport" of berating the young for their appearance or morals. Instead, he encouraged them.

"The important thing is that the energy of dissent become the constructive force of creativity and that the young men and women of today recognize that it is not enough to oppose—it is essential to propose, to endorse, to carry out a program," he said.

ual displays and guided tours through the season.

Brewster—8,500 visitors. Brewster is open daily April through October, and, like Andover, has a Visitors' Building, a slide presentation and guides.

Jamestown—6,000 visitors; the station is open to visitors Saturday and Sunday afternoons, 1 to 3 p.m.

Cayey—4,000 visitors; the station is open to visitors only by appointment, or by advance arrangement.

Paumalu—1,700 visitors; the public is admitted by appointment on weekdays only, 9 a.m. to 4 p.m.

Etam—1,100 visitors; tours are conducted on Wednesday from 2 to 4 p.m., April through October, and other visits are by appointment.

From Paumalu

Paumalu CEA Elects Officers

The Paumalu CEA held its annual election of officers on March 4-5. Elected to head the station's CEA for the next 12 months was Ken Elder, operations supervisor. He succeeds Ken Yamashita, TT&C supervisor.

Others elected to serve as officers include Stan Holt, vice-president; Thelma Park, secretary; and Charlie Wong, treasurer. Selected by their respective team members to serve as their representatives to the CEA were Harvey Fujimoto, Richard Coleman, John Stanko, and Norman Kato.

The PCEA officers are currently planning for the 1970 social activities and according to Mr. Elder, a COMSAT family meeting during the summer is the first activity being drawn up.

Traffic and Operations Conference

On Saturday, March 21, the Paumalu station hosted 25 delegates attending a conference of traffic and operations representatives from Pacific and Indian Ocean regions. The Honolulu conference attracted traffic and operations representatives from approximately 20 countries which have satellite earth stations or are planning to build them.

Following a general briefing of the Paumalu station's activities by Glenn Vinkvist, station manager, the group was divided into two groups and given station tours by Dan Geer, assistant manager, and John Gray, electronics engineer.

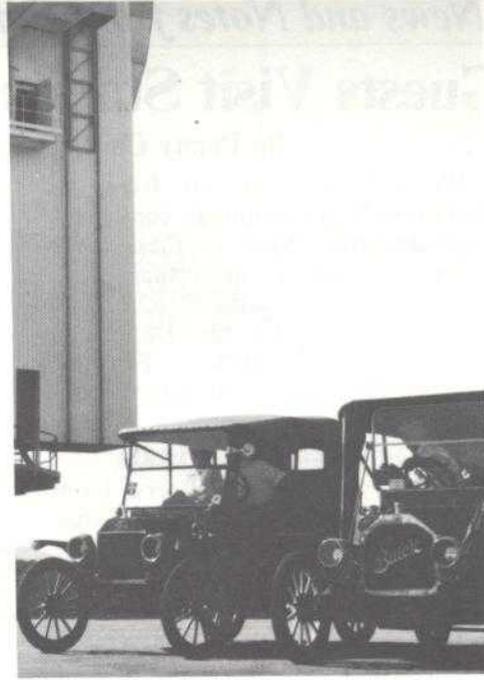
Paumalu Training Program

Terrance Nevin from operations crew No. 1 has completed a training program for the Philco antenna as part of an on-the-job course for technicians and maintenance personnel at Paumalu. Two technicians attend classes each week in the theory of operation and actual maintenance of the antenna. Sixteen additional persons have also completed the course.

This training program has proven to be so successful that tentative plans have been made to conduct a similar kind of class on digital techniques following the conclusion of the antenna training.



The old and new met when members of the Salinas Antique Auto Club paid a visit to the Jamesburg station.



News and Notes from Jamesburg

Visitors See Jamesburg Operations

By M. Lee Dorsey

Jack Hershey of Philco-Ford brought two guests from Israel to tour the station. They were G. Shekel, engineer, I/C International Radio Communications, and C. Davidi, engineer, I/C Emek Haela Satellite Earth Station.

Israel plans to build its own earth station, the Emek Haela, in 1972.

Seventeen VIPs were given a tour of the station by the station manager, John Scroggs, and the assistant station manager, Michael Downey. Among them were the chief of the San Francisco Fire Department, two vice presidents of Wells Fargo Bank, and two San Francisco radio-TV station managers.

Joe DeLeon, staff supervisor from traffic department of AT&T, brought as his guests Robert Mitchell, assistant vice president-public affairs, and John Benfield, manager for public affairs, Pacific Northwest Bell; Robert Timm, Public Utilities Commission chairman, Washington State; and Don Moos, Department of Agriculture, Washington State.

Yesterday Challenges Today

Salinas Antique Auto Club Members drove their antique cars from Salinas to our station, a trip of about 80 miles round trip. The antique cars stood up well against our background of modern technology.

Other Visitors

Kenneth Day and James Shreve from COMSAT Headquarters arrived at the station this month to conduct an internal audit.

Activation

Michael McClure, oldest son of Harold McClure, senior facilities mechanic, joined the U. S. Coast Guard this month. Michael will be stationed at the Alameda Training Station in Oakland, California.

Spring Showers

Mrs. Albert Eleshio hosted a dual baby shower for Mrs. Larry Baley and Mrs. Jim Clark this month at her home. Attending the shower were Mmes. Larry Cisneros, Michael Downey, George Ford, Mel Stauffer and Donald Tucker. Quite a few ladies, who were unable to attend the shower, arranged to send their gifts via Al Eleshio.

Quite a Quail

Assistant Station Manager Michael Downey has one of the most interesting pets. It is a quail, named Robbie. Robbie was found sitting on their fence by Mike's daughter, Maureen. Maureen took the quail into the house, and Robbie has the run of the house now. He is completely house-trained and eats bird seed and chicken mash.

Guests Visit Station, Liven Pace

By Penny Chidester and Deloris Goodwin

We had many visitors from the INTELSAT international conference in Washington. Most of these came down on weekends when there were no conference meetings scheduled. Visitors came from the Dominican Republic, Guatamala, Ecuador, Hong Kong, India and other countries.

Rainmakers Visit Etam

Recently the rainmakers from COMSAT Labs, Anthony Buige, Wallace Mercer and David Lewis, visited the station to install a second device concerning precipitation.

This is a rain attenuation experiment which uses the receive beacon signal from the satellite. They are still busily engaged in the precipitation scatter experiment with two antennas on top of Kingwood High School.

H. William Wood, Assistant Vice-President, Operations, visited the station in March. On the evening of his visit, Mr. Wood attended the annual dinner meeting of the Preston County Chamber of Commerce, along with William Carroll, station manager. Mr. Wood made a short talk at this dinner. One item of interest mentioned by him was that the number of circuits through all three of the satellites in operation has reached 1,500. Of this number, 765 are through the Etam Earth Station.

Activities of ECEA

The Etam COMSAT Employees Association (ECEA) is working toward building a larger "nest egg" to carry on the activities planned for 1970. Plans for the first picnic to be held during the month of June are being formulated by the picnic chairman, Jim Evans.

The ECEA sponsored a raffle during February with the lucky winner being Darrell Riddle. It was just what he needed—a case of Michelob beer. Now Darrell can really entertain his neighbors along the river.

Personals

Mr. and Mrs. James Silvius are the proud parents of a son born in January at the Preston Memorial Hospital in Kingwood. James Christopher weighed in at 8 pounds, 10 ounces, and he is the Silvius's fourth child. Mr. Silvius is the procedures and training supervisor at this station.

A Race(y) Pastime

The Radio Amateur Club of Etam (RACE) is pleased to report that three of its club members have recently obtained their novice radio licenses. Another member plans to take the general license examination in the near future.

In the Future— Space Station Communications

COMSAT Labs has recently completed a study of a relay satellite system which would be capable of meeting the communications requirements of NASA's Space Station Program. The work was conducted under contract with McDonnell Douglas Astronautics, contractor for a comprehensive space station study for NASA's Marshall Space Flight Center, Huntsville, Alabama.

The space station program is one of NASA's major projects for the 1970's and is being studied for possible operation later in the decade.

The space station would carry 12 astronaut-scientists in an orbit of about 300 statute miles above earth, and would have extensive laboratory equipment on board. Three additional space stations could be added to form a five-story space base capable of carrying 50 men. The program will run for 10 years.

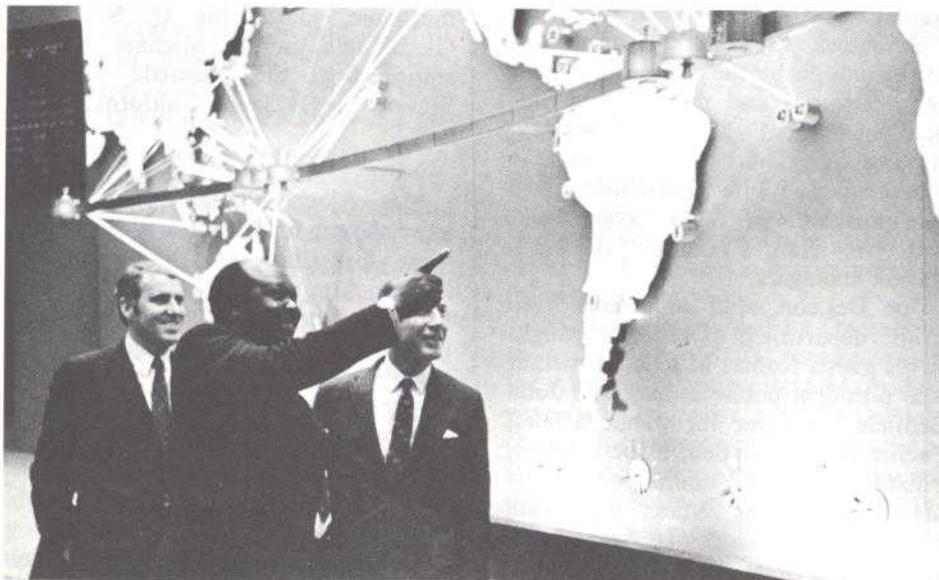
Individual crewmen would serve for periods of six months, returning to earth by a space shuttle, which would also deliver supplies and replacements to the station base.

One of the major requirements for the program would be continuous real-time communications—voice, data and television—between the space station and the mission control center. Of these, the most difficult requirement is the provision of two-way television channels.

Present commercial TV transmission via satellite is between earth stations which have large antennas, typically 97 feet in diameter, and high-powered transmitters of one kilowatt or more. The problem would be more complex if one of the points were to be a space station with a much smaller antenna, perhaps only 15 feet in diameter, and much less transmitting power, perhaps about 100 watts.

The COMSAT study examined several methods of providing the desired communications channels to and from the space station. One possible method would employ commercial communications satellites. It was found that future INTELSAT IV satellites are technically capable of providing voice and data, but not TV in their presently contemplated operational configurations.

(See space station, page 15.)



H.Z.E. Ramogo (center), General Manager of the East African External Telecommunications Company Ltd., met with INTELSAT and COMSAT officials while on a familiarization visit to the U.S. He is responsible for all international telecommunications facilities for Kenya, Uganda and Tanzania, which are cooperating to establish the EXTELCOM earth station in Kenya. Accompanying Mr. Ramogo are Tony Bingham (left), International Development, and H. William Wood, Assistant Vice President—Operations.



The Spanish colonial architectural style of the control building at the new Columbia earth station makes it one of the system's most beautiful. A formal inauguration was recently held to dedicate the station.

From Page 14

Space Station

Another method would use a "dedicated system" of satellites, a system of relay satellites designed exclusively for the program. Such a system could also use existing commercial communications facilities to interconnect the mission control center with overseas earth stations or to provide service during the restoration period in the event of failure of one of the relay satellites.

Still another method would use a "shared system" of satellites, a system that shares relay satellites with the space station and other users. The other users might include large earth stations of the type currently employed, or smaller receive-only earth stations of the kind proposed for isolated communities.

The study concludes that a shared system offers the most economical solution to the space station requirements.

The study was conducted under the direction of George R. Welti, manager, system analysis lab. Dr. S. H. Durrani, also of the systems analysis lab, was the principal investigator. Significant contributions were also made by Chester Pentlicki, Jorge Roza, Jorge Fuenzalida and Dr. J. Avoub

3 New Antennas Are Inaugurated In Malaysia, Thailand, Colombia

Television programs transmitted via satellite from Washington, D.C., the Vatican in Italy and Expo 70 in Japan highlighted the formal inauguration March 25 of Colombia's new earth station at Choconta.

In April, formal inaugural ceremonies also were held for the new Kuantan earth station in Malaysia, and for a second large antenna for Indian Ocean service at the Si Racha earth station in Thailand.

Chairman James McCormack, participating in the Colombian earth station dedication, sent greetings and congratulations via satellite TV from a downtown Washington studio.

"A reliable system of satellite communications now truly reaches around the world, to every continent, serving millions of people," Mr. McCormack said.

"Through its new station, Colombia now has a doorway to this global system. I salute you on this significant occasion. We at COMSAT extend best wishes for the future."

From Italy, Pope Paul sent greetings and gave a TV blessing to the new station. From Japan, the pictures of Expo 70 were transmitted on a double hop, using the Indian and Atlantic Ocean satellites and the West German earth station.

On April 1, Thailand inaugurated its new Indian Ocean antenna with an inaugural TV program to Europe involving filmed news segments, classical Thai dances and segments from various popular Thai TV programs.

On April 6, Malaysia formally inaugurated its new station at Kuantan, which is located about 100 miles east of the capital city of Kuala Lumpur.

The Kuantan inaugural featured exchanges of TV programs between Malaysia and Japan via the Indian Ocean INTELSAT III satellite. Segments were transmitted in both monochrome and color, and reports later indicated that reception in both countries was excellent.

COMSAT President Joseph V. Charyk sent congratulations to Malaysia in a special message. On behalf of INTELSAT and COMSAT, Dr. Charyk said, "I extend warmest greetings and best wishes for the future."



The following persons received their five year service awards from President Charyk (center): (front row, left to right) Ralph Hill, Carl Johnson, Kathleen Wilson, Françoise Renard, Frederick Ormsby, Nathan Tonelson; (second row) Paul Eckley, James R. Dunn, Richard R. Colino, Robert George, Francis Burkitt, Robert Button, and H. William Wood.

Cagers Late Rally Falls Short, Lose in 2nd Round of Play-off

After trouncing its first opponent in the D.C.-wide "Tournament of Champions," COMSAT's basketball team fell one point short in its second round game, and the defeat stopped the CEA-sponsored five's winning streak at 14 straight.

But the high-scoring COMSAT cagers will not be putting their shirts and shoes into lockers until the normal season rolls around again late next fall.

The Melvin Harley-coached club plans to continue practice and enter the D.C. Recreation Department-operated summer league.

The summer circuit is divided into two halves, and the second one, which begins in July, will prove to be the real test for the COMSAT cagers.

They will be pitting their abilities and skills against some of the best Washington metropolitan collegiate basketballers, and even National and American Basketball Association professionals, who live in this area and regularly play in the nationally famous D.C. summer loop.

The COMSAT team, undefeated champions of the L'Enfant Plaza League, dropped from the well-known "Tournament of Champions" when a late last-period rally couldn't quite overcome the Library of Congress.

In a battle which saw the lead change hands 15 times, Library of Congress pulled to a 14-point advantage with five minutes to go, before COMSAT's rally narrowed the final margin to 81-80.

COMSAT easily rolled to its first tourney game triumph by 75-42 over the National Institutes of Health.

Co-Captain James Laney, 6' 4", Reproduction, lead the COMSAT scorers in both tourney games with a combined total of 50 points.

Co-Captain Ronald Tate, also of Reproduction, tossed in 14 points against NIH and 24 against the Library of Congress, while Player-Coach Harley, Service Centers, registered 28 in the two contests.

News of People At Headquarters

By Judy Holmes

Five COMSAT employees have been very much involved with the Rockville Little Theatre, which recently presented the musical comedy, "Pajama Game". Kitty Stephenson, Legal, played the leading role of Babe Williams (which was played by Doris Day in the movies), and Chris Seville, Operations, and Jackie Brown, Personnel, both appeared in the chorus. Chris also served as production assistant of the show.

Don Rivera, Labs, did the art work on the show posters and on the programs. Pep Wurtzel, Labs, was the lighting coordinator for the show and, in fact, is lighting coordinator for all Rockville Little Theatre productions.

Incidentally, Jackie met her fiance through her participation in the show.

On March 25 Pep Wurtzel gave a talk to the drama class of Richard Montgomery High School in Rockville on set and lighting design for amateur theater. Pep has 25 years of experience with lighting coordination in little theater.

Birth Announcements

A baby boy to the Robert Georges, Computer Division, on March 3; a baby boy to the George Browns, Labs, on March 4; a baby girl to the Dave Collins', Labs, on March 17; a baby boy to the Bill Windells, Labs, on March 29; and a baby girl to the Frank Manns, Labs, on March 30.

Personals

Harry Tollerton, International, wed the former Kathryn Rafferty on March 14. The newlyweds honeymooned in Bermuda.

Linda Maldonada, Corporate Relations, and Bill Arnold, Technical, were married on March 21.

Debbie Lawhorn, Technical, was married on February 7 to Ronald Sanders, and honeymooned in Virginia.

Sandy Fox, Technical, spent her first wedding anniversary in the hospital, but she is doing well following successful surgery.

COMSAT NEWS

May 1970

*Seen by the
DIRECTOR*

Plaza Headquarters Goes on Display for COMSAT's Seventh Annual Shareholders Meeting (See Report, Pages 10, 11).



Recent Actions Taken by ICSC

The Interim Communications Satellite Committee held its 46th meeting April 8 to 15 in Washington with Carlos Nunez of Mexico as Chairman.

At the time of the meeting, membership in INTELSAT numbered 75 countries with quotas approved for six additional countries that have not yet acceded to the interim agreements. These include Bolivia, Costa Rica, Ecuador, Honduras, Paraguay and Senegal.

Among its actions, the Committee:

- Elected John A. Johnson, COMSAT Vice President-International, as its new Chairman for a one-year term beginning July 1. Yves Fargette, representing France/Monaco, was elected Vice Chairman for the same period.

- Deferred until its next meeting in June a decision on whether to launch the INTELSAT III F-8 spacecraft, but authorized the Manager to take such actions as might be necessary to meet a July 8 launch date if the Committee decides to launch the satellite.

- Authorized the Manager to make space segment capacity available on the forthcoming Atlantic INTELSAT IV satellite for demand assignment (SPADE) channels upon appropriate application. Channel charges initially would be at the same rate as pre-assigned circuits. The Committee, however, requested its Advisory Subcommittee on Finance to conduct a study of alternative charges for SPADE channels based on a fixed-access channel, a per-minute charge, and a combination thereof.

- Authorized the Manager to execute an agreement with the Smithsonian Institution for loan of the unlaunched Early Bird (INTELSAT I F-2) satellite for exhibition, probably in the Arts and Industries Building in Washington.

- Among other station approvals, granted access to a non-standard Mexican earth station to operate with the INTELSAT III satellites from May 30 through June during the World Cup soccer games in Mexico City.

- Approved the selection of the present sites at Andover, Fucino, Carnarvon and Paumalu for INTELSAT IV tracking, telemetry and command (TT&C) services.

(See ICSC Actions, Page 4.)



James J. McTernan, Jr.

COMSAT Elects Financial Officer

James J. McTernan, Jr., joined COMSAT April 20 as Vice President-Finance and Administration following his election earlier in the month by the Board of Directors.

He succeeds A. Bruce Matthews who resigned in January to become Executive Vice President of Bliss & Laughlin Industries, Inc.

Mr. McTernan, 48, was previously an assistant vice president of the Penn Central Company. He joined the New York Central Railroad Company in 1957 as assistant comptroller.

Later he served as director of budgets and cost controls and as assistant to the vice president-finance. He became an assistant vice president following the merger of the New York Central and Pennsylvania Railroads.

He received a B. A. in economics from Yale University in 1946, then joined the General Electric Company as a business training student. Later he became a member of its traveling auditor staff. He has also served as manager of general accounting for the Packard Motor Car Company and comptroller of the Studebaker-Packard Corporation.

Mr. McTernan and his wife, the former Majorie M. Kidney, are the parents of three children, Mark, Patricia and Kevin.

News At A Glance

- Shareholders elect 12 directors at seventh annual meeting (Page 10).

- James McCormack resigns as Chairman of the Board; Joseph H. McConnell is elected as new Chairman (Page 10).

- President Charyk presents statement to the shareholders (Page 11).

- INTELSAT III F-7 placed into full-time commercial service after correction of imperfect orbit (Page 3).

- James J. McTernan, Jr. elected by Board of Directors as Vice President—Finance and Administration. He replaces A. Bruce Matthews, who resigned to join Bliss & Laughlin Industries, Inc. (Page 2).

- COMSAT proposes advanced aeronautical satellite services for commercial use; cost of program estimated to be \$55 million. (Page 4).

- Advances in echo control—echo suppressors and echo cancelers—what they are and how they work (Page 14).

- Apollo 13 splashdown receives world-wide coverage via INTELSAT network (Page 6).

- COMSAT to participate in Project SOC, a specialized secretarial training program, for second year (Page 16).

- Miss Jennifer Getsinger named winner of COMSAT scholarship aid (Page 9).

- COMSAT lets contract to Nippon Electric Company for SPADE equipment, scheduled for operation in early 1971 (Page 8).

- CEA Spring Plaza Party a success—plans move ahead for picnic, June 7 (Page 16).

May 1970—Year 5, No. 4

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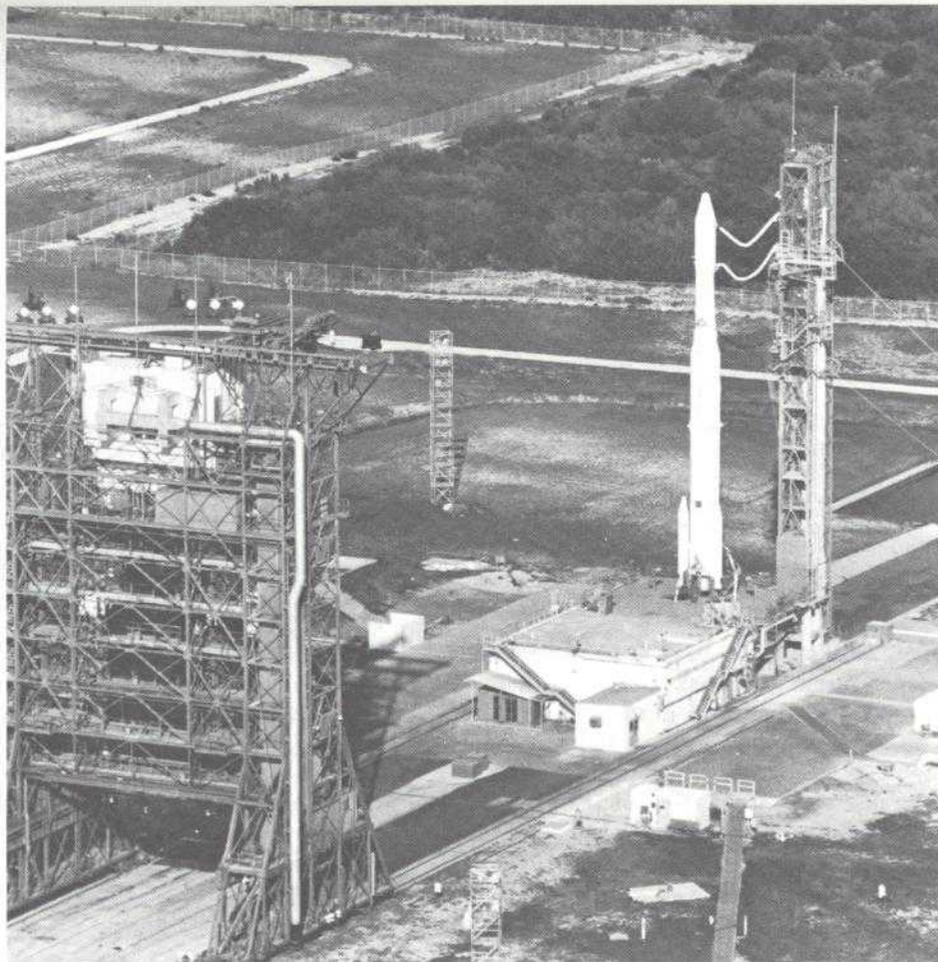
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Launch Site at Cape Kennedy

The service tower at Cape Kennedy's Launch Complex 17-A is rolled back prior to launch on April 22. The umbilical cords connected to the launch vehicle are ejected at liftoff.



James P. Wilde of COMSAT's West Coast Office checks the computer testing the INTELSAT III before launch at Cape Kennedy.



INTELSAT III Goes Into Service After Correction of Imperfect Orbit

The INTELSAT III (F-7) satellite was placed into full-time Atlantic service on May 8 and is now providing regular communications between the U.S., Europe, North Africa and the Middle East.

The new satellite is the ninth to have been placed in full commercial operation since COMSAT was established.

Earlier in May the NASA communications traffic was transferred to the new satellite from the INTELSAT II F-2.

The new satellite was launched from Cape Kennedy on April 22. Because of what NASA called a launch vehicle underperformance, the satellite initially failed to reach its intended transfer orbit.

But COMSAT engineers maneuvered the satellite into a higher transfer orbit by activating the on-board hydrazine thrusters, which are normally used to help keep the spacecraft on station after it is positioned in space. This maneuver, together with a successful apogee motor firing and additional hydrazine maneuvers, re-

sulted in a synchronous orbit that permitted the satellite to commence commercial service.

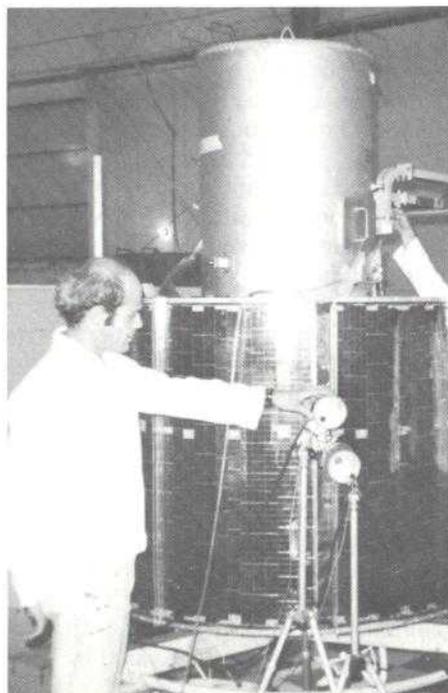
Although more than half of the on-board hydrazine was used for the maneuvers, engineers estimate that sufficient fuel remains to keep the satellite positioned for Atlantic service for a number of years.

The newest satellite, like others in the INTELSAT III series, has a design capacity to carry 1,200 voice circuits simultaneously, or four color TV channels, or a combination of TV, voice, data and other communications traffic.

Stationed over the Atlantic at 19° west longitude, the new satellite's apogee is 22,232.95 statute miles and its perigee 22,211.10 statute miles.

NASA launched the satellite for COMSAT as manager for INTELSAT, which owns the satellites in the global system.

The five INTELSAT satellites in regular service today are operating with a total of 47 antennas at 40 earth stations in 28 countries.



Eugene T. Jilg, also of COMSAT's West Coast Office, inspects the INTELSAT III satellite before launch.



Dr. Vikram Sarabhai, Chairman of the Indian National Committee for Space Research and Chairman of the Indian Atomic Energy Commission, visited Dr. Charyk on April 30. They discussed the possibilities of using either INTELSAT or COMSAT services for an Indian domestic satellite system. These requirements would develop after completion of the NASA-Indian Government ATS-F&G experiments in 1973.

COMSAT Proposes Advanced Aeronautical Satellite Services

An aeronautical satellite system, providing high-quality voice and data communications services for aircraft flying major Pacific and Atlantic air routes, is being proposed by COMSAT.

President Joseph V. Charyk outlined the proposal at the Corporation's annual shareholders' meeting May 12 in Washington. He estimated the new program could amount to an investment of up to \$55 million.

COMSAT submitted the proposal to the Federal Aviation Administration (FAA) and to Aeronautical Radio, Inc. (ARINC) which provides operational communications for airlines.

The services proposed would be provided by specialized dual-frequency satellites stationed in synchronous orbits at 22,300 miles altitude capable of providing channels simultaneously in two frequency bands: the VHF band (118-136 megaHertz) and UHF band (1540-1660 megaHertz).

The VHF channels would make possible for the first time reliable direct voice communications between pilots and ground controllers on trans-oceanic flights, provide needed improvements in vital air traffic control communications and improve airline operational communications.

At the same time, the inclusion of UHF channels on the same spacecraft would permit the FAA and NASA to conduct extensive tests and experiments in an operational environment. This could be done without waiting for further government research and development work on satellites or satellite equipment.

COMSAT is prepared to finance, build and operate the system, and provide the services on a fixed charge basis. No user payments would be made to the Corporation until the services were available. The system could be in commercial operation within about two years after COMSAT selects equipment contractors through competitive bidding.

The plan outlined by the Corporation provided options for Atlantic and Pacific Ocean operation and for Pacific operation only.

Under the two-ocean approach, two satellites would be positioned in synchronous orbits initially over the Pacific. The second satellite would be moved to the Atlantic after completion of certain experiments expected to take about one year. These would include communications and propagation tests, ranging tests and other experiments to determine the best

From Page 2

ICSC Actions

- Approved the nomination of Neil White of the UK to work with the Manager's technical staff for a period of one year, and the extension of F. John D. Taylor, currently working with the Manager's technical staff, also for a period of one year. There are presently 18 signatories' nominees on the Manager's staff.

- Approved the Manager's actions in making more voice channels available in the INTELSAT III F-6 satellite by using a power available in excess of the original specifications, and by reducing the corresponding guard-bands.

- Authorized the Manager to amend the contract with Hughes Aircraft Company to incorporate agreed upon incentive payments. Cost of the four additional INTELSAT IV spacecraft (F-5 through F-8) would approximate \$34.6 million, provided all four spacecraft were launched and operated successfully over their full seven-year design life.

- The 47th meeting of the Committee was scheduled to begin June 16 in Washington.

characteristics for a follow-on generation of aeronautical satellite services.

A one-ocean system would include a single synchronous orbit satellite over the Pacific only.

Capacity of a two-ocean system would depend on the mix of VHF and UHF channels required by the customers.

Each satellite would have a design lifetime of five years, the period of service covered by the proposal. It would be launched by a 1972 version of the Thor Delta rocket having about twice the payload capability of present Delta vehicles, thus permitting a larger satellite with both VHF and UHF components to be lifted to synchronous altitudes.

COMSAT proposed that the use of the UHF channels would permit the FAA and NASA to conduct important research and development work required for definition of the communications characteristics to be provided by follow-on satellite systems.

At the same time, the use of the proposed VHF services by ARINC and FAA will permit early relief of existing airline and air traffic control communications problems, through the use of presently available technology.

The program would be subject to authorization by the Federal Communications Commission.

News and Notes from Etam

International Traffic Increases

By Penny Chidester & Deloris Goodwin

In early May, Etam was handling a heavy volume of international traffic. Sixteen countries reserved a total of 859 circuits. In order to handle the volume, it was necessary to place into service equipment that was normally on stand-by status. The initiation of new earth stations produced an increase in circuit demand.

Distribution of circuits handled by Etam was as follows:

Argentina - 20; Brazil - 23; Chile - 14; Colombia - 17; England - 239; France - 86; Germany - 95; Greece - 12; Iran - 4; Italy - 92; Lebanon 4; Peru - 17; Puerto Rico - 169 and Spain - 50.

Visitors

The calibration team of Charles Franklin and M. R. Atwell arrived at Etam in early April for a periodic calibration of testing equipment. They made adjustments and repairs.

George Hickmott and V. N. Sawant of Headquarters visited the station April 15 along with two visitors from Venezuela.

The station was also visited by Sid Browne of Headquarters and P. J. Bartholme of Holland on April 21. They were given a tour of the station by William Carroll.

ECEA Activities

The first employees' picnic of the season is tentatively planned for June 20 at Mountaintop Vacationland near Terra Alta, West Virginia. Committee plans are to be submitted at the May meeting.

Personnel Notes

Carl Gleason, senior technician, has been transferred to the Talkeetna, Alaska, station. A farewell party was given for him by station employees on his last day at the station. Good luck, Carl, in your new assignment.

Promotions

Two employees have recently been promoted. They are Spencer Everly and Lynn Rector, both from technician to senior technician.

Advertisements

Attention Tennis Fans—Wilson Metal Frame for sale. Model T2000. Grip, 4 5/8", Medium weight. Reasonable. Call Kay Smith, Ext. 6100.

1967 Ford Galaxy 500 hardtop, original owner; 30,000 miles, a/c, power steering, power brakes, automatic; heater, radio, new tires, snow tires—perfect condition. \$1375. Call Ext. 6045 or 356-1718.



James Silvius (left) presents April Safety award to Darrell Riddle.

Safety Awards

Chester Randolph won the February safety award for his suggestion that a yield sign be placed on the site driveway to caution drivers entering state route 78.

Carl Cooper won the March safety award for his suggestion that the facilities eye wash be flushed periodically to prevent discoloration or contamination by foreign matter.

Winner of the April safety award was Darrell Riddle for his suggestion that guard shields be installed on exposed terminals on Truck Appearance Frame 589.

Each award winner received \$5 for his suggestion.

A CEA Reminder

Only CEA members can participate in CEA sponsored activities and social events. There are more than fifteen clubs and athletic events currently available to interested members.

So if you are not yet a member, contact Pat Lamphear, Plaza, or Bob Cool, Labs. And hurry, you don't want to miss the picnic, June 7.

Earth Station Development

The number of countries having earth stations, the number of stations and the number of antennas as of May 1 were:

Countries	---28
Earth stations (sites)	---40
Antennas	---47

The totals at the end of this year are expected to be:

Countries	---37
Earth stations (sites)	---46
Antennas	---54

COMSAT Labs Holds Meeting For Scientists

More than 40 members of the Baltimore-Washington section, Society for Applied Spectroscopy, toured COMSAT Laboratories and heard a University of Washington professor discuss air pollution research when the group held its April meeting at the Labs.

Among tour highlights was an explanation of the MAT-1 experiment by William Schmidt, RF processing lab branch manager, and a visit to the chemical processing lab, materials technology branch.

The tour was conducted by Dr. Peter F. Varadi, manager, materials technology branch, and a society member. Dinner at the labs' cafeteria followed the tour.

Society members were welcomed to the labs by Dr. Burton Edelson, assistant to the director, who also explained the labs' role in the development of satellite communications.

The meeting's talk on pollution, titled "Spectroscopy in Atmospheric Chemistry," was delivered by Dr. R. J. Charlson.

Among society members attending were scientists from the National Bureau of Standards, NASA and the Naval Research Laboratory.

Satellites Show Apollo Splashdown World-Wide

The awaited climax of the Apollo 13 splashdown on April 17 was transmitted world-wide via the Jamesburg earth station and the INTELSAT commercial communications satellite system.

Though it began as a "routine" trip to the moon with only moderate news media participation at Cape Kennedy and the Houston Manned Spacecraft Center, the Apollo 13 mission turned into near catastrophe the third day into the flight when backup command module pilot Astronaut John L. Swigert, Jr. reported an explosion in the spacecraft 200,000 miles in space.

The flight became a ground controllers' battle to retrieve the astronauts from space and stimulated world-wide interest.

News representatives at the Manned Spacecraft Center almost doubled in number between the time of Swigert's alarm and the successful splashdown. During the early satisfactory phase of the flight, less than 400 newsmen and industry representatives were in attendance at Houston. At splashdown, almost 750 were in attendance.

Prior to launch, attendance at Cape Kennedy was reflected in the routine treatment of Apollo 13 by the news media. Only slightly more than 1,100 domestic newsmen, foreign newsmen and industry representatives registered to cover the event.

Receive Time

Satellite TV transmit time for Apollo 13 was only 65 percent as great as that for Apollo 12. A major portion of the Apollo 13 coverage was concerned with recovery. During the flights of Apollo 11 and 12, major television emphasis had been on lunar exploration.

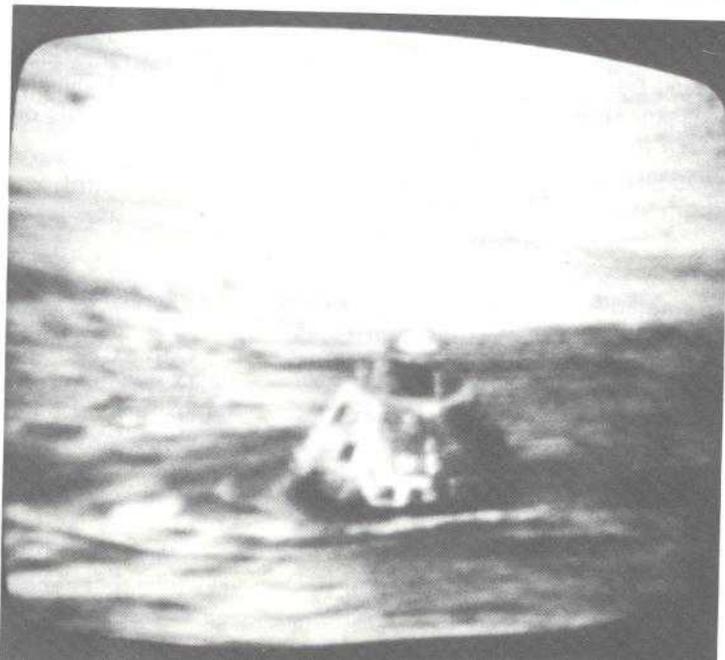
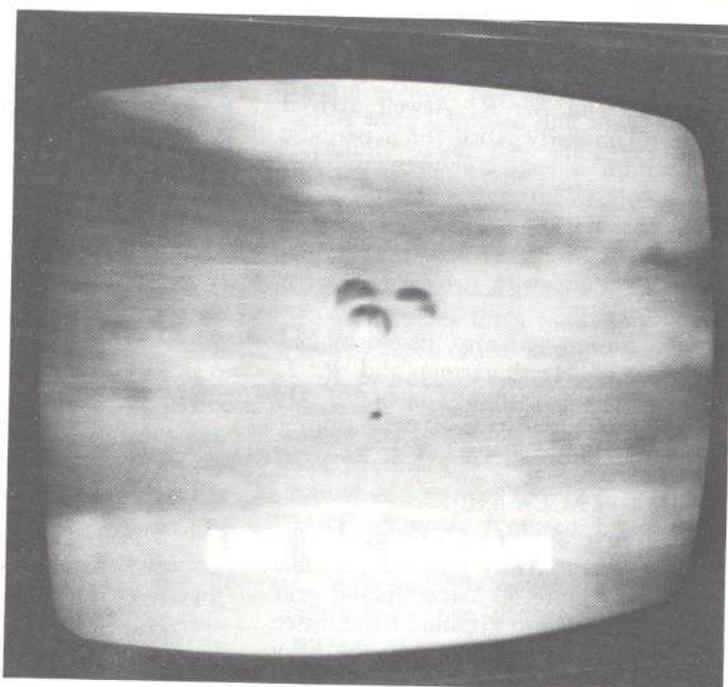
The half-channel hours (transmit and receive) for Apollo 13 totaled 85.35 compared to approximately 129 for Apollo 12 and 300 for Apollo 11.

A comparison of transmit and receive hours (half-channel) for the three lunar flights beginning with Apollo 11 is as follows:

	Apollo 11	Apollo 12	Apollo 13
Transmit Time	91.24	41.43	32.23
Receive Time	208.44	87.12	53.09
Total	299.68	128.55	85.32

Leading in receive hours originating from the recovery carrier U.S.S. Iwo Jima in the Pacific Ocean and the U.S. mainland was Europe followed in order by Australia, Japan and the U.S.

During the mission, one double-hop transmission was made over the Pacific and Indian Ocean satellites via Japan totaling approximately one-half hour. This transmission went to the United Kingdom and Germany via the Jamesburg earth station thence via the Pacific satellite to Ibaraki, Japan, land lines to Yamaguchi, Japan, then up to the Indian Ocean satellite.



MISSION

APOLLO 13

(Upper left) Apollo 13, launch from Cape Kennedy on April 11, 1970.

(Center left) Splashdown on April 17, four days ahead of schedule, was carried world-wide via the INTELSAT global system.

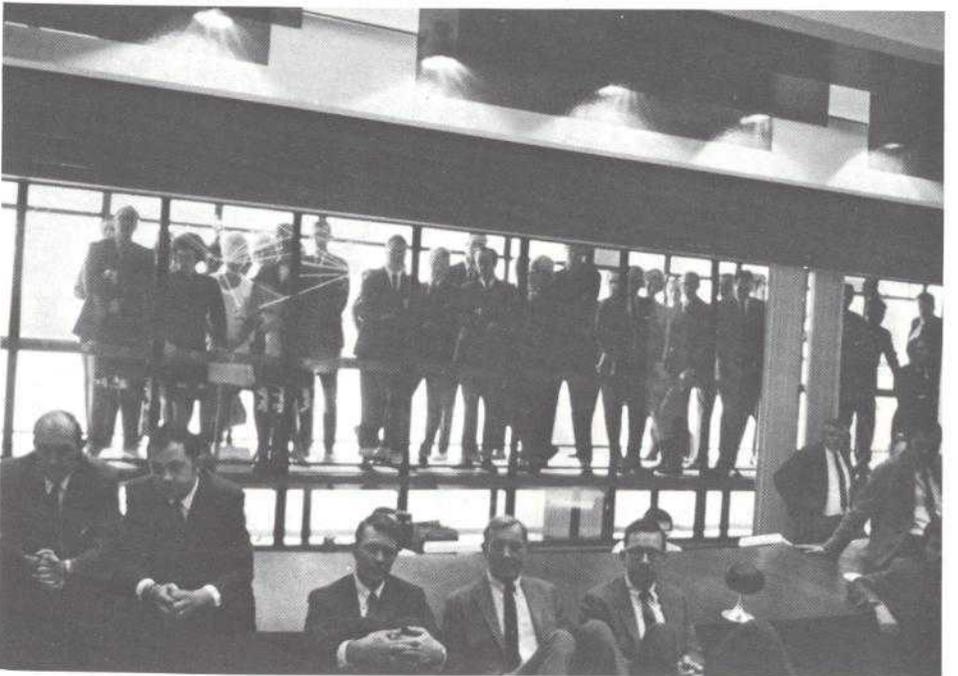
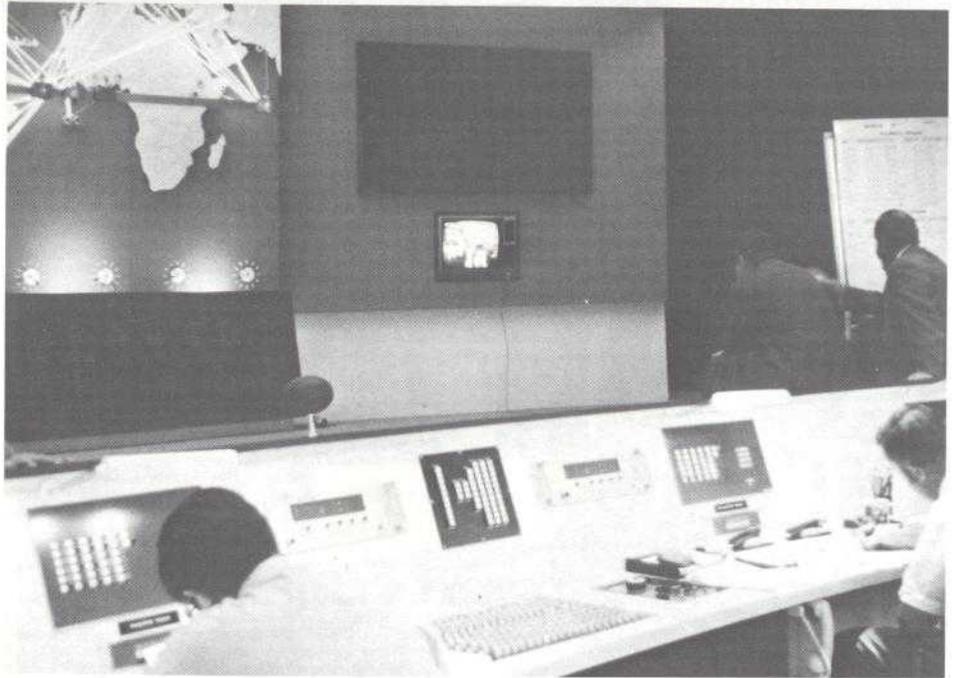
(Lower left) The spacecraft, with three astronauts on board, makes a safe landing in the Pacific.

(Upper right) Operations staff command satellite circuits, making it possible to televise splashdown to a global audience.

(Center right) COMSAT and INTELSAT employees waiting and watching the last few crucial moments before splashdown safely.

(Below, left) Astronauts Lovell, Swigert and Haise step out of helicopter on to deck of recovery ship, "Iwo Jima."

(Below, right) Apollo 13 astronauts join in prayer, giving thanks for safe return.



COMSAT Lets Contract for SPADE Gear

COMSAT has contracted for demand assignment equipment designed to make more efficient use of the satellite system by routing some communications between countries via circuits kept in a common pool.

The contract is with Nippon Electric Company of Tokyo and was filed with the FCC by COMSAT, acting as manager on behalf of the joint U.S. earth station ownership group.

The award was for \$313,000, which covered installation of one 24-channel unit at the Etam, West Virginia, earth station.

The SPADE equipment will provide "demand assignment multiple access" service via the satellite system.

Demand assignment promises to be a major step forward in realizing the potential of satellite communications since it exploits one of the most significant advantages of the satellite over terrestrial linkages: complete flexibility in interconnection.

The ends of communications links through satellites need not technically be tied down, and capacity devoted to any one link need not be fixed.

(See SPADE, Page 18)



Jay Levatich, standing next to the 16-foot Labs antenna, indicates its size.

Labs Antenna Used for Research

A 16-foot antenna perched atop COMSAT Labs has become a familiar sight to travelers on Route 70s, but few know its purpose.

For those with great imaginations, the antenna may represent communications with the unknown, the TMA-1 of "2001: A Space Odyssey." But to Jay Levatich, manager of the propagation branch, the antenna is the life-line of a current experiment in attenuation measurement.

Attenuation

The experiment's purpose is to collect data on 15 gigahertz (GHz) atmospheric attenuation and coherence bandwidth. Attenuation is the process of deterring signal strength. It is caused by an object blocking the signal path, resulting in a weakening of signal impulses received by the antenna. In some cases, attenuation can block signal reception altogether.

ATS-5 Satellite

The ATS-5 satellite is being used as a source of transmissions, which

are received by the antenna, then transferred to a computer deck to record the data for analysis.

According to Mr. Levatich, attenuation occurs in varying degrees. His major concern at this point is the attenuation caused by clouds, storms, or other atmospheric conditions. He is attempting to determine how and to what degree increased storm conditions increase attenuation.

In order to have accurate measurements, meteorological instruments have been integrated with the experiment. Two weather radars and a number of rain gauges are being used to measure atmospheric conditions, storm location and rain rate.

Results

Mr. Levatich reports that "rough correlation between radar data, rain intensity and attenuation appears to be good. Better conditions for measurement are expected during the local thunderstorm season, during the months of June, July and August."



Jay Levatich

Miss Getsinger Wins COMSAT Scholarship Aid

The daughter of a COMSAT Laboratories branch manager, who will graduate as the valedictorian of her high school class, is the winner of the Corporation's second annual Merit Scholarship.

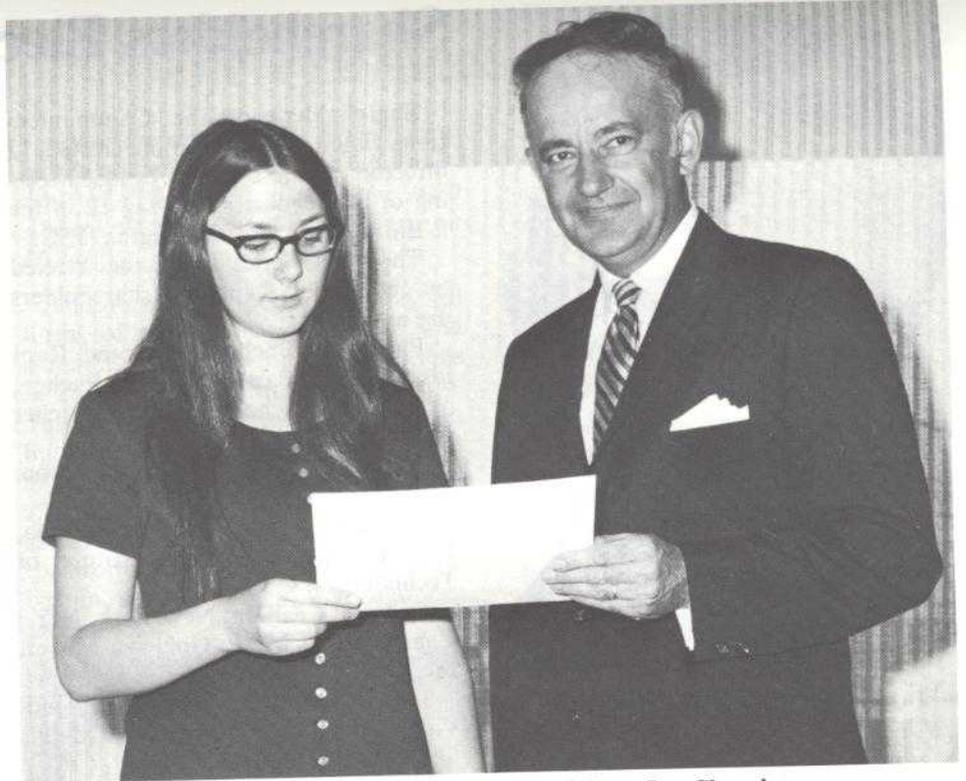
She is Jennifer Getsinger, 17, a senior at Walt Whitman High school in Bethesda and a daughter of Mr. and Mrs. William A. Getsinger of Bethesda. He is manager of the RF transmission labs' low noise receivers branch.

Miss Getsinger plans to use the COMSAT award to attend Radcliffe College, Cambridge, Mass. The scholarship provides a stipend for each of her four undergraduate years of study.

While undecided on the area of studies she will pursue, Miss Getsinger said she "enjoys cultural anthropology just about as much as anything else right now."

Dr. Joseph V. Charyk, COMSAT President, presented Miss Getsinger with a certificate of merit on behalf of the Corporation. He called attention to her outstanding scholastic academic record, including her rank as first in a class of 683 students. She was accompanied at the presentation by her parents.

Dr. Charyk also mentioned her participation in many co-curricular activities, including the National



Jennifer Getsinger receives her scholarship award from Dr. Charyk.

Honors Society, National Thespian Society, Quill & Scroll, French Honors Society and modern dance.

In addition to Jennifer, the Getsingers are the parents of John, 22, who plans to return to Harvard Law School in the fall; Margaret, 19, who attends Skidmore College, and Valerie, 11.

Sons and daughters of COMSAT employees are eligible for the scholarship. Qualifying exams are conducted by the independent National Merit Scholar Corporation. Results of the testing are certified to COMSAT by NMSC. No COMSAT employee or officer plays any part in the selection.

Greeks Dedicate Earth Station

Premier George Papadopoulos and other Greek dignitaries participated in the formal dedication ceremonies on May 6 of the new Greek earth station at Thermopylae.

A one-hour color TV program produced by National Educational Television (NET) highlighted the ceremonies. The program featured the Los Angeles Philharmonic Orchestra playing Igor Stravinsky's "The Rite of Spring".

Transmitted from studios in Washington, the program was carried via land lines to Etam, West Virginia, and from there relayed via INTELSAT III satellite to the station at Thermopylae. COMSAT made the arrangements for transmission.

The Greek station was the sixth new antenna to begin service in the global system so far this year. Forty-seven antennas at 40 earth stations are now in service.

News and Notes from Andover

Andover Assists in Correcting III

By Joanne Witas

The initial low orbit of INTELSAT III F-7, launched on April 22, demanded long hours of complicated commands from TT&C and STCC personnel at Andover. Attempts to normalize the orbit were successful and the spacecraft is functioning in synchronous orbit.

Andover received 523 first day covers for the flight of Apollo 13 from collectors around the country. The Andover Post Office was never as busy as it was on April 11, trying to get the covers out.

Promotions

Three men were promoted from junior technicians to technicians during April. Donald Bachelder, Jack

Conner and Bruce Simmons are congratulated by all of us.

Luncheon

Station Manager Donald Fifield, was guest speaker at the annual Chamber of Commerce meeting held at the Madison Motel on April 23. Approximately 70 local businessmen attended the luncheon meeting.

Mr. Fifield spoke on the history, activities and future of the Andover earth station. He also discussed the impact of the new antenna on the community.

Social News

Dan Grenier, technician, was married on April 18 to Miss Carol Hallee. Mrs. Grenier was employed by

Carey's Fuel, Rumford, prior to their marriage. The Greniers will reside in Mexico. Mexico, Maine, that is!

Herman Sauret, facilities engineer, and his wife, Harriet, spent the weekend of April 11 on Long Island, New York. The occasion was the 50th anniversary of Harriet's parents, Mr. and Mrs. Earle Edwards.



James McCormack

Mr. McCormack Runs Meeting For Last Time

James McCormack, Chairman and Chief Executive Officer of COMSAT for the past five years, received a standing ovation from shareholders and guests at the conclusion of the 1970 Annual Meeting, the fifth over which he had presided and his last as Chairman.

As Chairman of the annual meetings during an era when these essential corporate gatherings became more difficult for presiding officers everywhere, Mr. McCormack conducted the COMSAT meetings with urbanity and restraint.

COMSAT's 1970 annual meeting opened at 2:30 p.m. and was adjourned at 4:55 p.m. The two hours and 25 minutes duration was record brevity for COMSAT shareholder meetings.

Approximately 270 persons, including 156 shareholders plus guests and employees on duty attended, the fewest number of persons yet at a COMSAT shareholder meeting.

The new Chairman of the Board is Joseph H. McConnell, President of Reynolds Metals Company.

Mr. McConnell joined Reynolds Metals in 1955 as General Counsel. He became Executive Vice President in 1959 and President and Chief Administrative Officer in 1963.

He is a former President of Colgate-Palmolive Company and served ear-

Shareholders Elect 12 Directors

Shareholders of the Communications Satellite Corporation elected 12 directors at the seventh Annual Meeting of Shareholders on May 12 in the L'Enfant Theatre, Washington, D.C.

The eight Series I directors elected by the Series I (public) shareholders are as follows:

Philip W. Buchen, of Grand Rapids, Mich.; Partner, Law, Buchen, Weathers, Richardson & Dutcher (Attorneys).

Joseph V. Charyk, Washington, D.C.; President of COMSAT.

William W. Hagerty, Philadelphia, Pa.; President, Drexel Institute of Technology.

George L. Killion, New York, N.Y.; Chairman, Metro-Goldwyn-Mayer, Inc.

Joseph H. McConnell, Richmond, Va.; President, Reynolds Metals Company.

James McCormack, Washington, D.C.; former Chairman and Chief Executive Officer of COMSAT.

Bruce G. Sundlun, Washington, D.C., and Providence, R.I.; Partner, Amram, Hahn & Sundlun (Attorneys).

Leo D. Welch, New York, N.Y.; former Chairman and Chief Executive Officer of COMSAT.

liar in several executive positions with the Radio Corporation of America, including Vice President in charge of finance and Executive Vice President. For four years (1949-52) he was President of the National Broadcasting Company.

He served, with the rank of Ambassador, as Chairman of the U.S. Delegation to the Extraordinary Administrative Radio Conference, which was held at Geneva, Switzerland, in 1962.

He was first elected to the COMSAT board by the Series I public shareholders in 1969.

Mr. McConnell also is a director of Reynolds Metals, Reynolds T. I. Aluminium Ltd., British Aluminium Co. Ltd., Basic, Inc., Cleveland Ohio, and First and Merchants National Bank, Richmond, Virginia. He is an honorary trustee of Manufacturers Hanover Trust Company of New York, is on the board of Canadian British Aluminium Co. Ltd., and is Rector of the University of Virginia.

He was born in Chester, South Carolina, on May 13, 1906. He was graduated from Davidson College with a B.A. in 1927 and from the University of Virginia Law School in 1931.

At its annual organization meeting following the shareholders meeting, the Board of Directors elected Joseph H. McConnell as Chairman of the Board, succeeding James McCormack, who had served as Chairman of the Board and Chief Executive Officer for the past five years. On his doctor's advice, Mr. McCormack had asked to be relieved of his executive responsibilities.

Mr. McConnell will continue as President of Reynolds Metals Company and will serve as Chairman of the Board at COMSAT. Dr. Joseph V. Charyk will continue as President of COMSAT.

Seven of the eight Series I directors were reelected. One of them, Dr. Hagerty, is a new Series I director. For the past five years he had served as one of the three directors appointed by the President of the United States with the advice and consent of the Senate. He had informed the White House that he was not a candidate for reappointment upon the conclusion of his term as a Presidentially-appointed director in order to stand for election as a Series I director.

As a Series I director, Dr. Hagerty succeeds Rudolph A. Peterson, of San Francisco, Chairman of the Executive Committee of the Bank of America and former president of that institution. Through a technicality, Mr. Peterson became ineligible to stand for reelection as a Series I director. This (See Shareholders, Page 11)



Joseph McConnell

Shareholders

disqualification resulted from his membership on the board of directors of Time, Inc., which happens to own a small microwave organization in California. Time, Inc., is thereby a communications common carrier. Under the Articles of Incorporation any director or officer of a communications common carrier is ineligible to own COMSAT Series I stock. Further, any person ineligible to own Series I stock is prohibited from serving as a Series I director.

The four Series II directors elected by the Series II (communications common carrier) shareholders were:

George S. Beinetti, Rochester, N.Y.; President of Rochester Telephone Company.

James E. Dingman, New York, N.Y.; Business Consultant and former Vice Chairman of the Board of American Telephone and Telegraph Company.

Richard R. Hough, New York, N.Y.; Vice President—Long Lines Division, American Telephone and Telegraph Company.

Horace P. Moulton, New York, N.Y.; Vice President and General Counsel, American Telephone and Telegraph Company.

Two of the four Series II directors are new to the COMSAT Board. They are Mr. Beinetti, who fills the seat formerly held by Douglas S. Guild, President of Hawaiian Telephone Company who on his doctor's advice declined to stand for reelection, and Mr. Hough, who fills the seat formerly held by Harold M. Botkin, New York, N.Y. Assistant Vice President of American Telephone and Telegraph Company.

The approximately 100 communications common carriers, owning about 38 percent of the total COMSAT stock outstanding, are entitled to elect four directors under a 1969 amendment of the Satellite Act which made carrier representation on the board approximately proportionate to their shareholdings.

Each of the Series I directors received approximately 4.8 million votes under the applicable cumulative voting procedures. Each of the three A T & T representatives received approximately 3.9 million votes, and Mr. Beinetti received approximately 2.6 million votes.

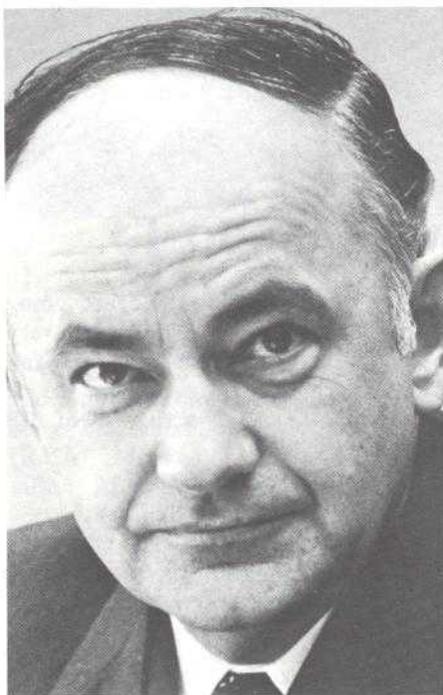
President Nixon has not yet nominated anyone to fill the vacancy among the Presidentially-appointed directors. The two such directors

(See Shareholders, Page 19)

The President's Statement

Following are excerpts from the remarks of Dr. Joseph V. Charyk, President of COMSAT, before the 1970 Annual Meeting of Shareholders on May 12:

Today, satellite pathways relay all forms of communication directly and simultaneously between earth stations in 28 different countries of the world. This will expand to some 33 countries by the end of this year, and perhaps as many as 54 countries by the end of 1972. As of today, there are over 1,600 satellite circuits in operation around the world, more than triple the number in service only a year ago last December.



Joseph V. Charyk

A failure in the third stage of the Thor-Delta launch vehicle reminded us last July that this is still a high-risk business and only a few weeks ago underperformance on the part of a similar launch vehicle placed our latest INTELSAT III satellite in a transfer orbit with an apogee substantially below the required altitude. Judicious use of the onboard propulsion system has now placed the satellite in the desired orbit over the Atlantic where it is in operational service, and fortunately with enough residual propellants to operate under normal conditions for at least several years.

Development of the INTELSAT IV series of satellites is well advanced. The first of these is scheduled for launch early next year. These satel-

lites will have several times greater capacity than the IIIs—12 TV channels as contrasted with 4, or 3,000 to 9,000 circuits depending on the mode of operation.

The earth complex on United States territory continues to develop. Since last year a satellite station on Guam has become operational...A new station in Alaska...is scheduled to begin operations about the first of July. We have also applied to the Federal Communications Commission for permission to build a station at Kwajalein in the Pacific...we are proposing to add a new, modern antenna at Andover, Maine, to replace the early experimental horn.

For several years, we have also been investigating ways to broaden our areas of activity into new forms of communication service. One that we believe to be of particular importance is the application of communication satellite technology to aeronautical communications. We have submitted a proposal to the Federal Aviation Administration and Aeronautical Radio, Inc., to provide aeronautical mobile communications services via dual frequency (VHF and UHF) satellites in the Pacific and Atlantic Ocean areas.

We are planning in the near future to file an appropriate application (for domestic service authorization) and are hoping that at long last this may become the vehicle for a key role for COMSAT in providing domestic communications satellite services.

Basic to all that we have done in the areas I have covered, as well as what we hope to do even further in the future, is our research and development staff which was consolidated last September at our new COMSAT Laboratories in nearby Clarksburg, Maryland. This group has already developed new demand assignment and digital multiple access techniques that will become operational with the INTELSAT IV satellites.

The first quarter of 1970 showed a continuation of the growth in traffic achieved during the fourth quarter of 1969. Net operating income for the quarter was 18 cents (per share). Other income, predominantly interest on our temporary cash investments, was 15 cents, giving us total earnings of 33 cents for the quarter. This is the

(See President's Message, Page 12)

President's Statement

first quarter in which our net operating income, resulting from the sale of communications services, has exceeded that from all other sources.

The growth in satellite traffic between the United States and Western Europe for the balance of the year is affected in a significant way by the fact that a new cable, with a capacity of the order of 800 circuits, has recently gone into service. A number of circuits in the cable, on the order of 270, have already been activated. At issue before the FCC is the question of the sharing of traffic between the new cable and the satellite system.

In the Pacific we are projecting an increase during the remainder of the year, in particular when the Alaska earth station becomes operational in July.

As for our balance sheet, our net property as of the end of April was \$150 million and we had \$98 million in cash and temporary cash investments. Our interest income on the latter is now running close to 8 percent.

We look forward then with enthusiasm and with the hope that in the near future we can broaden the scope of our Corporation's activities into these new and promising areas so important to COMSAT's future.



Jamesburgers enjoy the first outdoor barbeque of the warm weather season.

News and Notes from Jamesburg

Staff Keeps Vigil Over Apollo 13

By M. Lee Dorsey

Jamesburg played a dual role in bringing communications through for the Apollo 13 mission. Our station was the key facility for the reception of TV coverage from the WUI/GE transportable on the aircraft carrier Iwo Jima for the splashdown. During this critical TV coverage, Jamesburg gave priority to the preparation of this important program. Key Jamesburg employees went to work before dawn on the day of the splashdown in order to be on hand when needed.

Visitors

AT&T and Mountain Bell visitors included Mike Forney, area information supervisor; Don Cline, general information manager for Mountain Bell, and Jack Shea, news supervisor for Mountain Bell. They toured the station on April 10.

Personnel

Jim Shaff, technician, was transferred to COMSAT's new earth station at Talkeetna, Alaska. A farewell party was given by the JCEA at the local Casa Carmela Restaurant and a framed color photograph of the Jamesburg station was presented to Mr. Shaff by the JCEA president, Harold McClure.

Mr. Shaff was our JCEA vice president in charge of social activities and

a very popular fellow. We are going to miss him, but we wish him the very best at the Talkeetna station. Stan Nubin, technician, was appointed vice president of social activities to fill the vacancy.

COMSAT'S Employment Policy

The Corporation has a clear, unequivocal policy on Equal Employment Opportunity. This policy has been practiced since the Corporation was formed.

In a previous notice to all employees, COMSAT's management has stated:

It has been the policy and intent of the Corporation to provide opportunities for employment, and for transfer and promotion consideration, without discrimination and in light solely of the Corporation's personnel needs and the use of the best qualified people to meet them. This will continue to be its policy in the future.

COMSAT is an Equal Opportunity Employer. It recognizes the moral requirement as well as the legal one to provide work and promotional opportunities for qualified persons on a non-discriminatory basis.

The Corporation realizes that minority groups throughout the country have a particular problem in obtaining adequate employment opportunities. COMSAT has taken positive action to provide these opportunities and will continue to fulfill this obligation as a good business citizen.

I wish each member of management to dedicate himself to utilizing every means to assure that equal employment opportunity is practiced within his area of responsibility; to make special effort to encourage minority group employees to avail themselves of educational and training programs; and in matters of employment, transfer and promotion, to provide opportunities based on individual merit and ability without regard to race, creed, color, sex or national origin.

Joseph V. Charyk
President

News of People At Headquarters

By Judy Holmes

Mary Lane, Technical, was awarded the scroll and pin of the Tau Chapter of Alpha Sigma Lambda, national honorary society for evening students at the University of Maryland. This scholastic award is presented for high academic achievements with a minimum quality point index of 3.5.

Barbara Bieri, Operations, was engaged to Pat Hurley on February 28; an August wedding is planned. Incidentally, Barbara lost her diamond ring only eight days after receiving it, but the engagement is still on.

Diana Brimhall, International, was married in March to Wes Chrysler. They honeymooned at Lake Tahoe.

The Service Bureau gave a going-away luncheon for Pat Zarecor at the Gangplank on April 3. Pat is taking a maternity leave. A gift of pierced earrings was given to her and one share of COMSAT stock was presented for the expected new arrival.

Family Additions

Marty Fliesler, patent attorney, and his wife, Roselle, have a new addition to their family. She is their first child, Stephanie Ann, born March 29.

Marcellus Snow, International, and his wife are the parents of a baby boy, born April 9.

Ron Kos, Finance, and his wife are the proud parents of their first child, a baby girl born on April 10.

Robert Adams, Operations, and his wife are the parents of a baby girl born on April 23.

James T. McKenna, information office, and his wife Marlee are the parents of a boy, born May 17. He is their first child.

Fund Raising

COMSAT Employees have donated \$99 to the VIP Drum and Bugle Corps, founded by Melvin Harley, General Services. In the past five years the VIPs have risen to one of the top five junior corps in the nation. The donations were made in response to an article in the March issue of COMSAT News and a subsequent solicitation of donations by interested employees.

The corps is trying to meet its \$50,000 budget for 1970. Anyone interested in contributing may contact Judy Holmes, Ext. 6854.



Walter McKee

In the Spotlight

Walt McKee, Technical, as a father and interested citizen has been a member of the Randolph Civic Association (RCA), Montgomery County, Rockville, Maryland, since 1961. He served as treasurer in 1967-68 and is president this year.

The RCA meets the first Thursday of every month and after general business has been discussed a guest speaker gives a talk on a topical subject.

Speakers are for the most part from Montgomery County area. The Montgomery County Police Department has been an excellent source for speakers. Recent talks by them have been given on "Drug Abuse" and "Home Protection".

Other speaker sources have been Montgomery County Recreation Department, the Park and Planning Commission and County Community Development Department. Topics range from locally available sports and recreational activities to public housing and changing times in Montgomery County.

Membership

There are approximately 1,350 homes in the RCA area, and the association has a dues-paying membership of about 500 families. The RCA belongs to the Montgomery County Civic Federation, which meets once

a month to discuss mutual problems and combine the efforts of various civic associations on countywide projects.

The RCA publishes a monthly magazine, "The Echo", which is delivered by boy scouts to all area residents. Mr. McKee writes a column, "Message from the President" in which he discusses current business, results of hearings directly affecting the RCA area and "personal philosophy to a captive audience" when he thinks its needed.

Facing Problems

Zoning is one of the most urgent problems before the association. Disputes between residents and commercial-industrial entrepreneurs are commonplace. In these disputes, the association attempts to form a unified proposal to represent residents' views.

Other continuing activities of the RCA include the sponsorship of 14 scouting units, parties for area youngsters, and a fall and spring dance for adults.

Reflecting on his participation in civic activities, Mr. McKee said, "I never realized how much time could be involved in a group like this until I accepted the job as president this year. Aside from projects of a positive nature that we have initiated, it seems that we have had to be constantly on the alert to assess the impact of outside influences which might have an adverse effect on the residential character of the community. Although it has been time consuming, this job has been a rewarding experience. It has more than ever convinced me that civic associations are a real necessity for a healthy community."

Mr. Rauschenbach Joins Corporation

Gustave J. Rauschenbach has been named Director for Congressional Relations and Corporate Development effective May 18, 1970. Mr. Rauschenbach comes to COMSAT from TRW Systems where for the past six years he has been Director of the Washington office.

Mr. Rauschenbach has served as Marketing Manager with the Aeronutronic Division of the Ford Motor Company; Director of Sales for the Denver Division of Martin-Marietta; and Administrator, Flight Test, for North American Aviation. He is a graduate of New York University, with degrees in Aeronautical and Mechanical Engineering.

Advances in Echo Control

If you listen to very much local radio, you must have heard frenzied commercials which go something like this:

"Come to Glotz's Bargain City-ity-ity-ity! Do it-it-it today-ay-ay-ay-ay!"

This deliberate echo is put there to grab your attention and then to impress the message on your mind by repetition and downright irritation.

Without any kind of echo control, the same kind of thing would happen in long-distance (over 1,000 miles) telephone circuits, and it could be very disturbing. Over such a circuit a speaker might hear his own last question coming back at him along with the answer.

Echo in telephone circuits comes about because long-distance telephone networks combine four- and two-wire systems. The trunk circuits from one switching center to another are four-wire, two for each direction of transmission.* The connections between your home telephone and the local

telephone office are two-wire, i.e., both directions over the same pair; and the telephone handset itself is a four-wire system again. Echo is produced by the devices which convert from four to two wires (or vice versa), called "hybrids."

You might say, "If that's where the problem is, the answer is easy. Convert all the two-wire links to four-wire." But most of the wiring in the telephone network runs from the millions of individual handsets to local switchboards and exchanges, and the cost of doubling all those connections would be astronomical.

As a telephone signal is received over a four-wire circuit and enters the hybrid for conversion to two-wire for local switching, part of the incoming energy jumps across the coils of the hybrid and goes out again over the return path. Unless it is interrupted somehow this signal is heard by the speaker—after the time delay over the entire circuit—as echo.

There is a small amount of echo, called sidetone, in the telephone handset as well, but it is not bothersome because it is instantaneous. Sidetone supplies the sense of life, or "presence," to your telephone; without it

you would think the phone was dead. As circuits become longer and longer, however, uncontrolled echo becomes increasingly apparent and annoying. In circuits involving long overland and satellite links, the combination of long (up to half a second) delay and echo could cause a very unsatisfactory conversation.

That is why all lengthy telephone circuits today include echo control devices.

Echo Suppressors

The echo control devices in use today in commercial telephone networks are all more or less complex variations of a fairly simple switching principle called echo suppression. The basic idea of the suppressor is to stop echo by breaking the electrical path it travels.

When Mr. Doe is talking and Mr. Ray is listening (figure 1), the lower circuit, which would carry Ray's voice, is not in use and would only serve to transmit echo back to Doe. Breaking the lower circuit has no effect on Doe's transmission, since only the top circuit serves to transmit Doe's voice to Ray. As long as Ray listens while Doe talks and Doe listens while Ray

*The term "four-wire" is literally true for only the end sections of the circuit, which terminate in the toll switching center; the remainder of the circuit is often referred to as "equivalent four-wire."

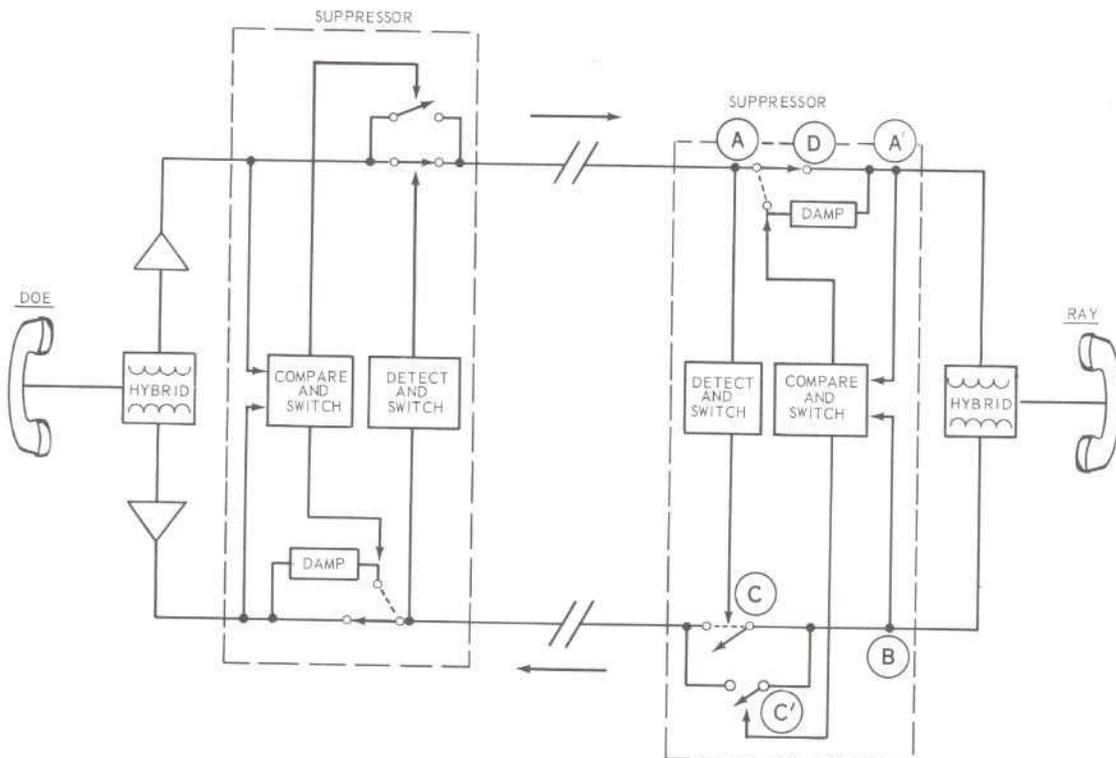


Figure 1. Long-distance telephone circuit with echo suppressors. When either party is talking alone, the suppressor at the opposite end opens the return path so no echo can be transmitted.

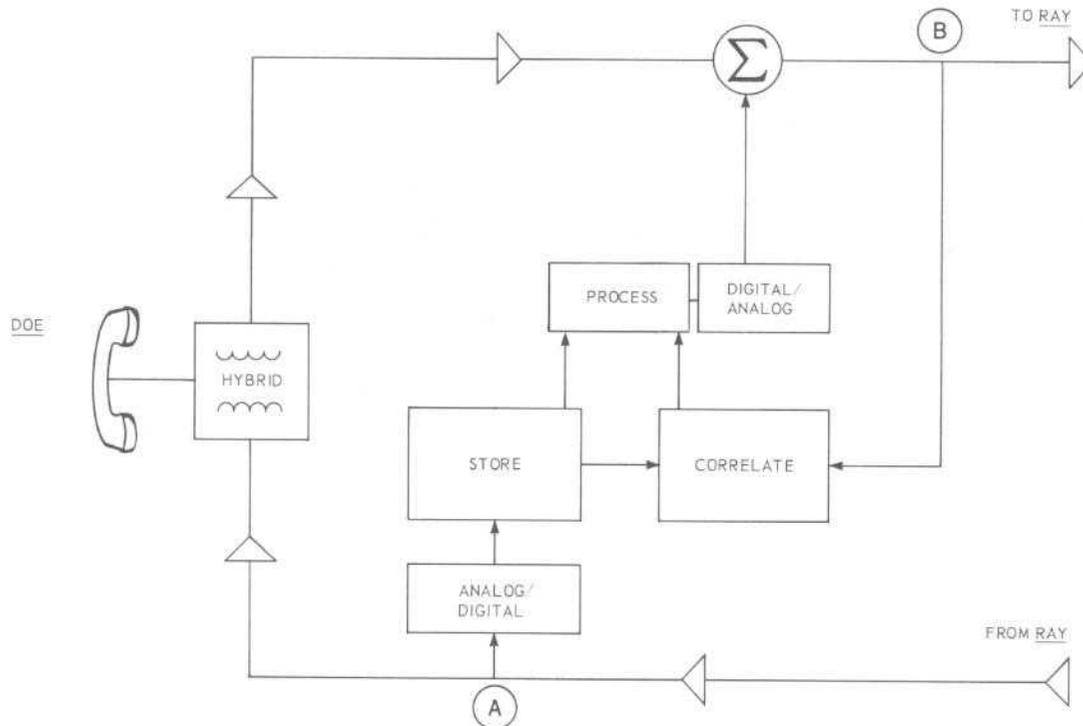


Figure 2. Echo canceler. In this layout, only the major functions are shown.

talks, a simple voice-operated switch at each end of the circuit will effectively stop all echo.

The trouble is that people are not as orderly as that in their conversation. The next time you are involved in a long and boring telephone conversation, try analyzing the way two human beings who cannot see each other actually converse. Sometimes there are complete silences. Sometimes both parties talk at once. Very frequently one speaker will begin to talk before the other is finished. Sometimes one speaker will actually shout the other down.

All of the refinements in echo suppressors which tend to make them large, complicated and expensive are ways of accommodating these disorderly human speech patterns.

A little of Doe's speech (upper line, figure 1) is siphoned off at points A and A' by the suppressor at Ray's end of the line. This energy is used for two purposes; one is to break Ray's circuit to Doe at point C, and the other is to compare it with a sample (B) of what is going out over Ray's line (bottom). So long as the energy on Ray's circuit is at a very low level, the suppressor assumes that it is Doe's echo and keeps the circuit broken (C). When Ray begins to talk, however, the suppressor must make a decision as to whether what is now coming over the lower line is really Ray's speech or simply a loud echo from Doe. If

the suppressor decides that it is speech, it restores the circuit from Ray to Doe by operating a second switch at C' and simultaneously switches on a damper (D) to cut down Doe's volume (and at the same time, Ray's echo). The two switches at C and C' are necessary because one is specially designed to break the circuit, while the other is designed to complete it and allow speech to pass as rapidly as possible.

When Ray is established as the speaker, the suppressor at Doe's end of the line takes over most of the work. Every very long telephone circuit (satellite or cable) requires two suppressors working in tandem.

Since even the best suppressors make occasional mistakes and it takes an instant for the switches to operate, long-distance telephone users may experience brief episodes of dampened speech and chopping of initial syllables. Inevitably some spurts of echo get through, and all these factors, plus system noise, add up to less than perfect quality in today's long-distance telephone circuits.

The search goes on for a foolproof way of removing echo under practical conditions. One device which may someday replace or supplement the suppressor is called the echo canceler.

Echo Cancelers

Unlike the echo suppressor, the echo canceler is a highly sophisticated electrical device. The paradox is that eventually it may be made smaller, cheaper, and more reliable than the suppressor.

The echo canceler works full time. Once a long-distance circuit has been established, the echo cancelers at each end remain on until the circuit is broken; thus there is no chopping of syllables as switches open and close. Shown in figure 2 are the major operating elements in a specific kind of canceling device. As Ray's speech arrives at Doe's end of the line, it is sampled at point A every 125 microseconds*, converted to digital form and sent to STORE. Meanwhile Ray's speech continues toward the 4-to-2 wire hybrid, where some echo leaks into the return path along with whatever Doe may be saying. At point B (top of diagram), a sample of the outgoing signal is taken from the return path, also every 125 microseconds, and sent to CORRELATE. The CORRELATE subsystem compares this sampled signal with an input from STORE. Both STORE and CORRELATE send signals to PROCESS, where a model of the echo is constructed in digital form. After being con-

(See Echo Control, Page 19)

* microseconds = millionths of a second

Project SOC Cited by HEW

COMSAT has been cited by the Department of Health, Education and Welfare for its outstanding participation in Project SOC, a clerical training program it participated in from June to December, last year.

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

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

Project SOC is a specialized training program for women between the ages of 16 and 24. The goal of the program is to help participants develop marketable job skills leading to full time employment.

HEW funded Phase I of the 1969 program under the Manpower Development Training Act. This phase consisted of 26 weeks of classroom training.

COMSAT conducted Phase II, 26 weeks of on-the-job training under the supervision of the personnel office. William Lockett and Paul Gaffney, both of personnel, coordinated the training.

Phase III was designated as full-time employment. Out of the 22 women participants, five were subsequently employed by COMSAT on a full-time basis. Of the remaining, 15 were employed elsewhere.

As a result of last year's program, COMSAT plans to participate again this year.



Employees attending the Spring Plaza Party received a friendly welcome.

Headliners from CEA

CEA Plans for Annual Picnic June 7

By Beverly Nitkowski

Plans for the annual CEA picnic on June 7 at Smokey Glen Farm in Montgomery County, Md., are progressing rapidly.

Tickets went on sale May 20—\$1.00 for adults and 50 cents for children. Music, games, prizes, pony rides are all a part of the fun. Check all bulletin boards, watch for flyers, or see your CEA representatives.

Potpourri

The COMSAT Amateur Radio Club is coming in loud and clear. Members recently contacted the Cape Kennedy and ARINC radio clubs. Cal Cotner keeps his enrollment book handy.

Fashion Survey Results: 100 Percent Mini

We are certain that if the midi or maxi suddenly takes over, there will be a lot of women caught short with a closet full of blouses.

The chess club meets regularly. For information, call Hermes Sanchez, Ext. 6804.

On April 11 the astronomy club was the guest of Father Heyden of Georgetown University at the Georgetown University Observatory and saw the LOX dump of Apollo 13 a few hours after launching.

On April 12 several members of the club viewed the beautiful trio, Mercury, Venus and Saturn. In addition, the first measurement of star occultation was made. The transit of the sun by

Mercury was observed on May 9, followed by a grazing occultation party on May 10.

At a recent regular meeting, Mr. Westerhout of NASA delivered an enlightening speech on difficulties with the model of spiral arm galaxies.

Peter Hartwell, Ernest Steinbecher and Bill Young are members of the National Capital Astronomers, a division of the Washington Academy of Sciences.

Racket Club

Dick McBride and Jay Levatich are well on their way in the tennis spotlight. Arbitrary ladders have been distributed to everyone who expressed an interest in playing this season. A round robin mixer was held May 23 for a season opener. Both the Plaza and Labs teams are looking forward to an exciting season with hopes of challenging other teams in the area. Q: Who will get the Irv Novgrod Award?

Table Tennis

A table tennis club was recently organized, and officers are at work arranging for the enjoyment of this sport at the Plaza and Labs.

The club has two tables, one located in the Labs basement, acquired with CEA funds, and the other, donated by Nicole Andrews, International, is planned for set-up at the Plaza.

Rules have been established to govern playing hours and procedures. To join, contact J. Kaiser, Plaza, or J. Ayoub, Labs.



Dancing to continuous music was a part of the fun.



Spring Plaza Party



A Huge Success

After a drab, rainy week the weatherman pulled through again—sunshine and pleasant weather appeared late in the afternoon just in time for the Spring Plaza Party on May 1. Several weeks of planning and hard work had been spent on the arrangements.

The dinner table, set in white, was adorned with two lovely bouquets of fresh spring flowers and a silver candelabrum. Hot and cold hors d'oeuvres were served promptly at 6:00 p.m. and continued throughout the evening. Four bartenders graciously accommodated the 450 guests.

In addition, splendid entertainment was provided by Bill Hershey's five-piece combo. Two songs, "Don't Blame Me" and "Goody Goody", were sung by COM-SAT's Kitty Stephenson. Door prizes— theater tickets and bottles of cheer—were an added attraction.

The CEA board of directors expressed its thanks to Paul Eckley, Russell Elm, Ray Scarborough, Kitty Stephenson, Dee Lancaster, Ruth Peed, Joyce Cromer, June Burton, Bert Runfola, Sophie Zawistoski, Jackie Brown, Marion Timmons, Elizabeth Preston and others who helped to make the party a success.

SPADE

Through SPADE, any two stations working with the satellite will be able to talk to each other without installing additional equipment, and the capacity of the satellite may be split up according to the needs which exist at any time.

Present Operations

At present satellite capacity for traffic between earth stations in the INTELSAT global network is pre-assigned, or fixed, by plan. Earth station equipment, such as receivers and filters, must be made available and configured specifically for this pre-set frequency plan. Changes in links between earth stations must be arranged well in advance, a period of weeks and frequently months since negotiations and equipment modifications are involved.

SPADE Flexibility

SPADE, through the demand assignment concept, provides an automatic system for the assignment of radio links, each carrying only one channel between earth stations on demand—within a fraction of a second.

The satellite capacity is utilized for that link as long as required, and when no longer needed the same capacity is freed for assignment to another pair of stations. This allows users of satellite services to share a pool of frequencies. It promises to make satellite telephony and telegraphy circuits, particularly those which are lightly loaded, much more economical. This has particular application for small or developing countries.

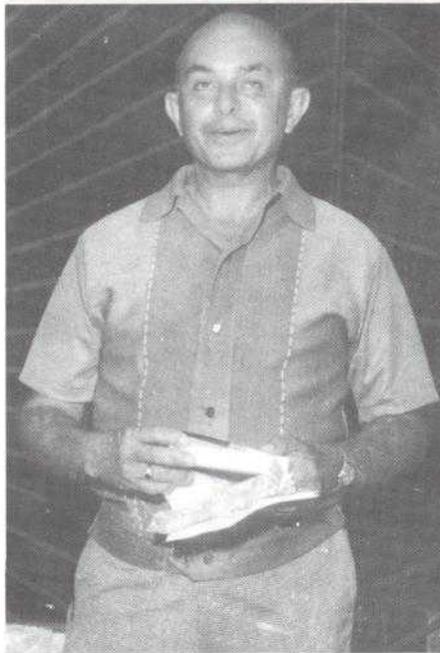
The flexibility of SPADE derives from its use of a single channel per radio-frequency carrier. Its economy in use of satellite capacity stems from the use of voice operated carrier on-off switching and digital (PCM/PSK) coding and modulation.

Plans for Use in 1971

The equipment at Etam will be for communications between the U.S. and countries in the Atlantic area in Africa, Europe, and Latin America who have agreed to install the equipment and participate in the system. The SPADE operational system is scheduled to be placed in use in the Atlantic region beginning early next year.



Miss Ada Gonzales receives a gift from fellow employees.



Mike Lopez was given a farewell party by his co-workers.

Ecoss de la Montana

By Luis Rodriguez

Miss Ada Gonzalez, secretary and the only woman at the station, was honored at a luncheon celebrating Secretaries Day, April 22. She was presented with a gift as an appreciation from her fellow workers.

The luncheon also celebrated the birthdays of Efrain Flores and Don Emilio.

A farewell party for Mike Lopez, accounting and personnel clerk, was held at the Luis Medina home and sponsored by the CCEA. Food and festivity for the occasion were prepared by Mrs. Medina and Mrs. Emilio.

Paul J. McGranaham recently was promoted to operations supervisor.

About 60 students from the Dominican Republic School of Music, visiting Puerto Rico as part of a cultural exchange program, toured the station on April 23. They were inquisitive and seemed interested in the operations of the satellite network.

CCEA Plans Picnic

The CCEA board of directors met on April 24 and discussed plans for a station picnic to be held on May 28. The location chosen was Camp Guavate, a popular resort area in the mountains overseeing the station.



Six employees recently received five year service awards from Dr. Charyk (center). They are (left to right) George A. Lawler, Robert Strauss, Richard W. Stone, James P. McLarkey, William Kaht and Hale L. Montgomery.

(From Page 15)

Echo Control

verted to an analog signal, the model is sent to the subtractor (Σ) where it is subtracted from the outgoing signal, thereby canceling out Ray's echo without interfering with Doe's speech. In the first few milliseconds of Ray's speech the model is far from perfect; however, it is still accurate enough to reduce the echo considerably. The speed of the digital processing is so fast that the model is approaching 100 percent accuracy within about a second.

A strong potential advantage of echo cancelers is that it should be possible to produce them as integrated circuits. According to Dr. Joseph Campanella of COMSAT Laboratories, there is no reason why the entire canceling device could not eventually be put on an electronic chip the size of a credit card. The convenient size and ease of replacement of such a miniaturized canceler would be very attractive.

INTELSAT Work In Cancelers

Dr. Campanella, Henri Suyderhoud and Mike Onufry of the Baseband Processing Branch, Communications Processing Lab, recently began to test and study a prototype echo canceler built by Nippon Electric Company under an INTELSAT contract. They look forward to the day when some form of digital canceling device, fully compatible with the digital transmission techniques of the future, will totally eliminate any annoyance to the telephone user from the presence of echo in long-distance circuits.

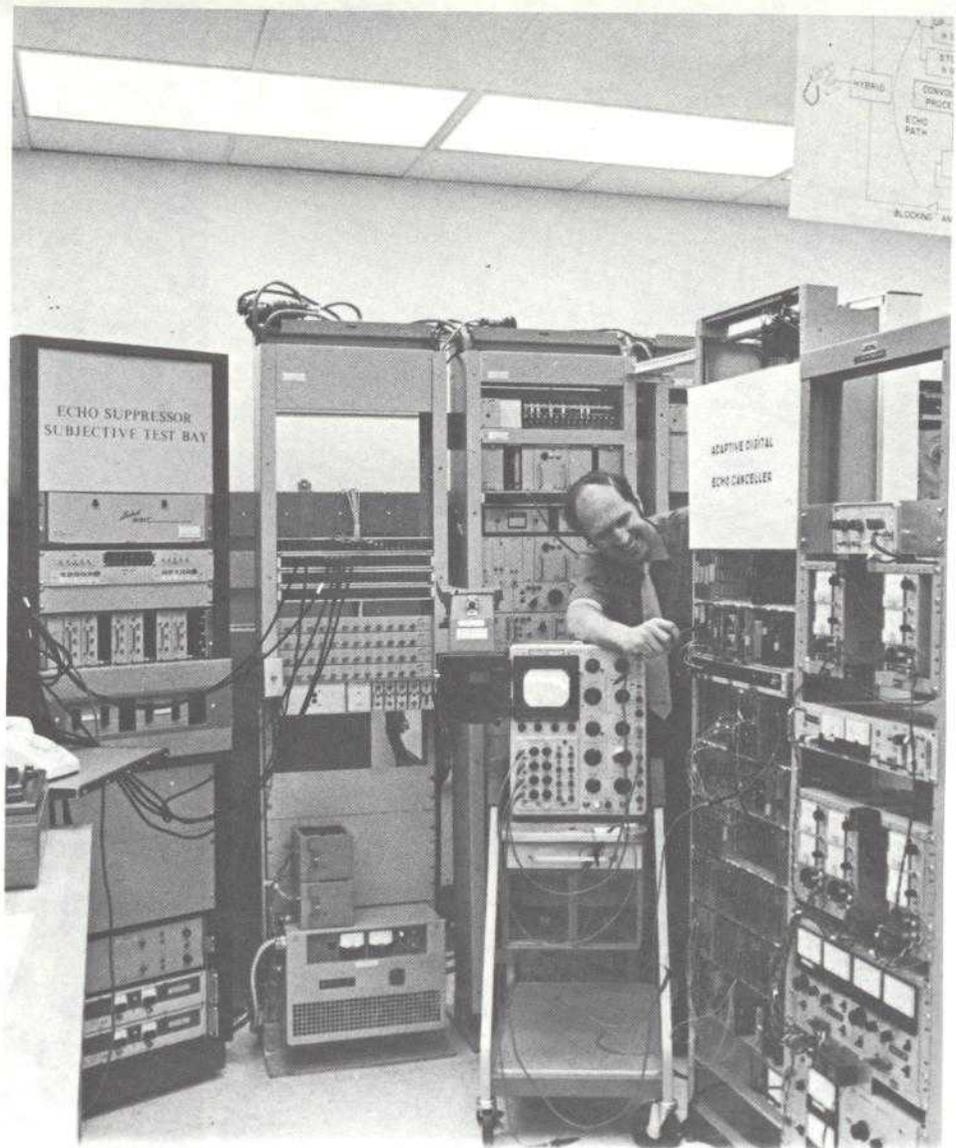
From Page 11

Shareholder

whose terms do not expire this year are Frederic G. Donner, New York, New York, director and former Chairman of the Board of the General Motors Corporation and Chairman of the Alfred P. Sloan Foundation, and George Meany, Washington, D.C., President of the AFL-CIO.

In other business, the shareholders rejected a shareholder's proposal which would have restricted charitable contributions by the Corporation except in the direct furtherance of the Corporation's business.

The shareholders also reappointed the public accounting firm of Haskins & Sells as the Corporation's independent public auditors for the coming 12 months.



Henri Suyderhoud surrounded by echo control equipment at COMSAT Laboratories.

Plaza, Labs Launch Softball Season

The call, "play ball," is becoming a familiar sound in Washington now that spring is here. And COMSAT softball players are answering the challenge along with everyone else.

The season's softball openers were played on April 27 at the Labs and May 5 at the Plaza. Unfortunately, both teams are off to a losing start, but they are confident that things will

pick up as the season progresses.

All games start at 7:00 p.m. For information concerning field locations, call George Domurot, Plaza Ext. 6614, or Tony Buige, Labs Ext. 4479.

LABS TEAM

First Half

May	18	Naval Ordnance Labs #2
	25	S&L Construction
June	1	Burn Brae Dinner Theatre
	9	Control Data Corp.

Second Half

June	15	CISCO
	22	American Research Bureau
	29	Green Gardens
July	6	Naval Ordnance Labs
	13	S&L Construction
	20	Burn Brae Dinner Theatre
	27	Control Data Corp.

PLAZA TEAM

First Half

May	19	WHCC&Y
	26	Deleuw-Cather
June	2	Smithsonian

Second Half

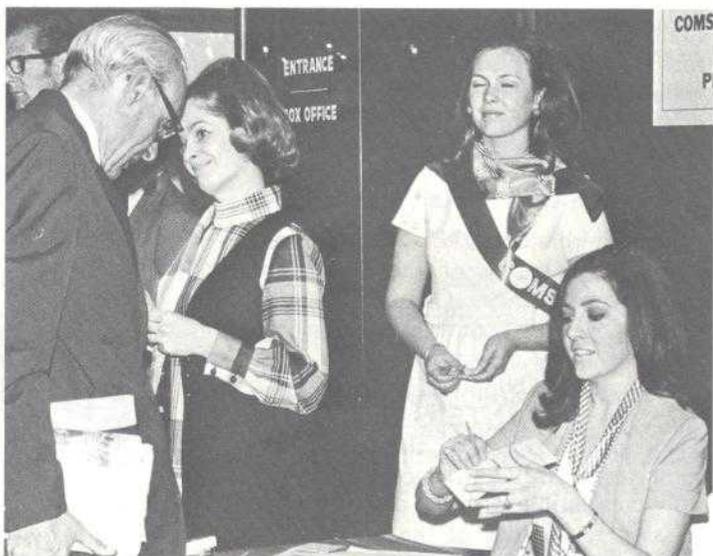
June	9	SEC
	16	Bellcom
	23	WHCC&Y
	30	Deleuw-Cather
July	7	Smithsonian



Shareholders were given a tour, which included the slide presentation "History of Satellite Communications," models of INTELSAT satellites, the Operations Center and the 16 foot antenna outside the COMSAT Building (above).



Visitors were greeted upon entering the COMSAT Building, where they were offered literature about COMSAT.



Employees registered shareholders, guests and reporters at the L'Enfant Plaza Theatre.



The meeting, lasting two hours and 25 minutes, included the President's message and a question and answer session.



Chairman James McCormack and President Joseph V. Charyk conducted the meeting.