PEACESAT
C.H. BALAZS FILE

Saturday May 21, 77 5-B

Satellite Helps Solve Problems in the Pacific

By Hal Glatzer
Special to the Star-Bulletin

Inside a temporary building on the University of Hawaii campus is a one-room United Nations.

Social workers and businessmen, hoteliers and doctors, students and teachers from around the Pacific basin assemble weekly to meet each other—not face-to-face but voice-to-voice—to share and solve their problems together.

What else would you do with a used satellite?

The National Aeronautics and Space Administration had a used satellite seven years ago when John Bystrom, a UH communications professor, and Gov. John A. Burns petitioned the Federal Communications Commission to let Hawaii experiment with international educational and social services.

IN 1971 NASA's ATS-1 stopped taking weather pictures, and the Pan-Pacific Education and Communication Experiment by Satellite (PEACESAT) was born.

For less than $7,500 each, terminals were set up in nine countries and exchanges, like "conference calls," began among them.

A country, an island or a village anywhere in the Pacific does not need telephone service or even electricity to participate; with battery or generator power, and a jeep-borne radio rig, a jungle camp in Papua, New Guinea, is functionally equal to a fixed studio in Wellington, New Zealand. Without expensive undersea cables or multimillion-dollar satellite antenna "dishes," simple PEACESAT ATS-1 relays everybody's calls to everyone else.

Bystrom sees PEACESAT as "the Model-T Ford of telecommunications," its inexpensive technology well within the reach of even the poorest countries.

PEACESAT—A control technician modulates the voices as University of Hawaii students, in the studio, talk to foreign countries via the satellite PEACESAT hookup.

The PEACESAT Project

(Pan Pacific Education and Communication Experiments by Satellite)

WHAT IS IT?

PEACESAT is a demonstration project in which selected educational and public institutions in the Pacific Basin are linked by means of communication satellite relay. The project is a joint activity of the Program in Communication and the School of Engineering at the University of Hawaii, Manoa Campus.

PEACESAT terminals are located at the University of Hawaii, MANOA and HILO, MAUI Community College at Kahalui; the University of the South Pacific at Suva, FIJI; Wellington Polytechnic Institute at Wellington, NEW ZEALAND; the USP Center at Nuku'alofa, TONGA; Papua New Guinea University of Technology at Lae, PAPUA NEW GUINEA (to be connected to the University of Papua New Guinea at Port Moresby); the Department of Education, Educational Television Center at Pago Pago, AMERICAN SAMOA; and the Broadcast Center in SAIPAN, Trust Territory of the Pacific Islands.

WHY DO WE HAVE IT?

It is impossible for many of the peoples of the Pacific Basin to sustain adequate levels of education, health care, and technically based services. Inadequate communications service constitutes a principal barrier to community development. PEACESAT objectives are to increase the quality of education in the Pacific by facilitating the sharing of scarce, costly resources; to improve professional services in sparsely populated areas through telecommunication support; and, generally to assist in applying the potential of satellite technology for peaceful world development.

WHO DEVELOPED IT?

The idea of using satellite relay to facilitate communication for educational, health and community services in remote areas of the Pacific Basin was proposed in 1969 to NASA by Dr. John Bystrom, Professor of Communication at the Manoa Campus of the University of Hawaii. A start on the project was made in December 1970 when President Harlan Cleveland approved a grant from the University's Innovative Program. In February 1971, NASA approval for use of the ATS-1 was granted. Dr. Paul Yuen, Professor of Electrical Engineering, and Katashi Nose, Associate Professor of Physics, developed the ground terminal equipment.

WHO RUNS IT?

The project is administered by the University of Hawaii with the assistance of the Governor's Committee on Pan Pacific Educational Communications, appointed by Governor John Burns and headed by UH President Harlan Cleveland. A Faculty Advisory Committee assists development at the University of Hawaii. Recommendations for long range planning in the medical research are provided by a Medical Communications Study Advisory Committee. Project Director is Dr. John Bystrom. Technical design and development is under the direction of Dr. Paul Yuen. Key to the system is a small inexpensive ground terminal designed and constructed at the University by Professor Katashi Nose.

The educational institutions which have terminals each have their own autonomous staff and organization which operate the equipment and develop educational uses of the system.

WHO PAYS FOR IT?

Initial funding was provided by a grant from the University's Innovative Program. Funding for the past year came primarily from the State Legislature which showed its support of the project by appropriating $75,000 in April 1971. In addition a $50,000 contract was awarded to the University of Hawaii for a study of medical networking in the Pacific, incorporating demonstrations of library and professional exchanges. Funds from this contract are being used in establishing the Trust Territory terminals and developing medical and library exchanges. The educational and other organizations which operate terminals outside Hawaii are responsible for funding their own operation. The Carnegie Corporation of New York and the McKenzie Foundation of New Zealand have contributed directly to the operation funds of the Fiji and New Zealand terminals. These funds have provided for a working system.

Users are not charged and the cost to participating institutions is relatively small. The ATS-1 satellite is supplied by the National Aeronautics and Space Administration (NASA) at no charge. Another factor contributing to low cost is the heavy use of student operators and technicians.

WHAT DOES IT DO?

During its relatively short existence, the PEACESAT system has been utilized in a wide variety of educational and scientific exchanges. Doctors of the Pacific Research Section of the National Institute of Health consult with doctors at the National Library of Medicine, Bethesda, Maryland. The Hawaii Cooperative Extension Service uses the system to conduct seminars with their Hawaii agricultural agents and counterparts from around the Pacific Basin.

Faculty and students at the various campuses of the system have utilized communication channels made available by PEACESAT. A few among the many disciplines they represent are English, Indonesian, Spanish, political science, mathematics, music, accounting, physics, journalism, oceanography, computer science, drama, urban planning and speech-communication. It was the PEACESAT system which carried the world's first regularly scheduled class of instruction via satellite.

Within the Pacific Basin, keen interest has been shown the development of this project, as evidenced by discussion of PEACESAT at meetings of the South Pacific Forum and the South Pacific Commission.

Currently, the system operates 12½ hours per week with all terminals free to participate and with exchange content determined by the interest of the participants. Hours available for satellite exchange activities are 9:00 - 10:00 A.M. and 4:30 - 6:00 P.M. Monday through Friday. (HST)

WHAT ARE THE CRITERIA FOR USE?

There is no set rule about use of the system. However, the following general guidelines are followed:

(1) The request must be a joint request. More than one location must desire to discuss a particular topic. Two-way exchange is emphasized.

- It is wise to discuss planning at least three weeks in advance of an exchange; however, the system can be available on short notice for vital information exchanges.
- The process of establishing an exchange relationship usually begins with an "Exchange Inquiry". A potential user arranges to have an inquiry sent over the system asking for response from interested persons at other locations. The initial inquiry may be a call for further discussion with particular persons at other locations. This can be arranged. Scheduling of regular exchanges will be made only upon joint request of all locations involved.

(2) Any planned exchange should require the use of instant two-way communication. The use should be of benefit to each institution participating in the exchange. PEACESAT is not designed for one-way information dissemination.

(3) All activities should have a definite educational or social purpose. Only non-profit organizations and institutions may use the system.

WHERE ARE THE EXCHANGE FACILITIES AT MANOA?

The PEACESAT Exchange Center is located in 212 George Hall (ground floor entrance, Diamondhead side).

HOW CAN AN INTERESTED PERSON CONTACT PEACESAT TO USE THE SYSTEM OR TO OBTAIN ADDITIONAL INFORMATION?

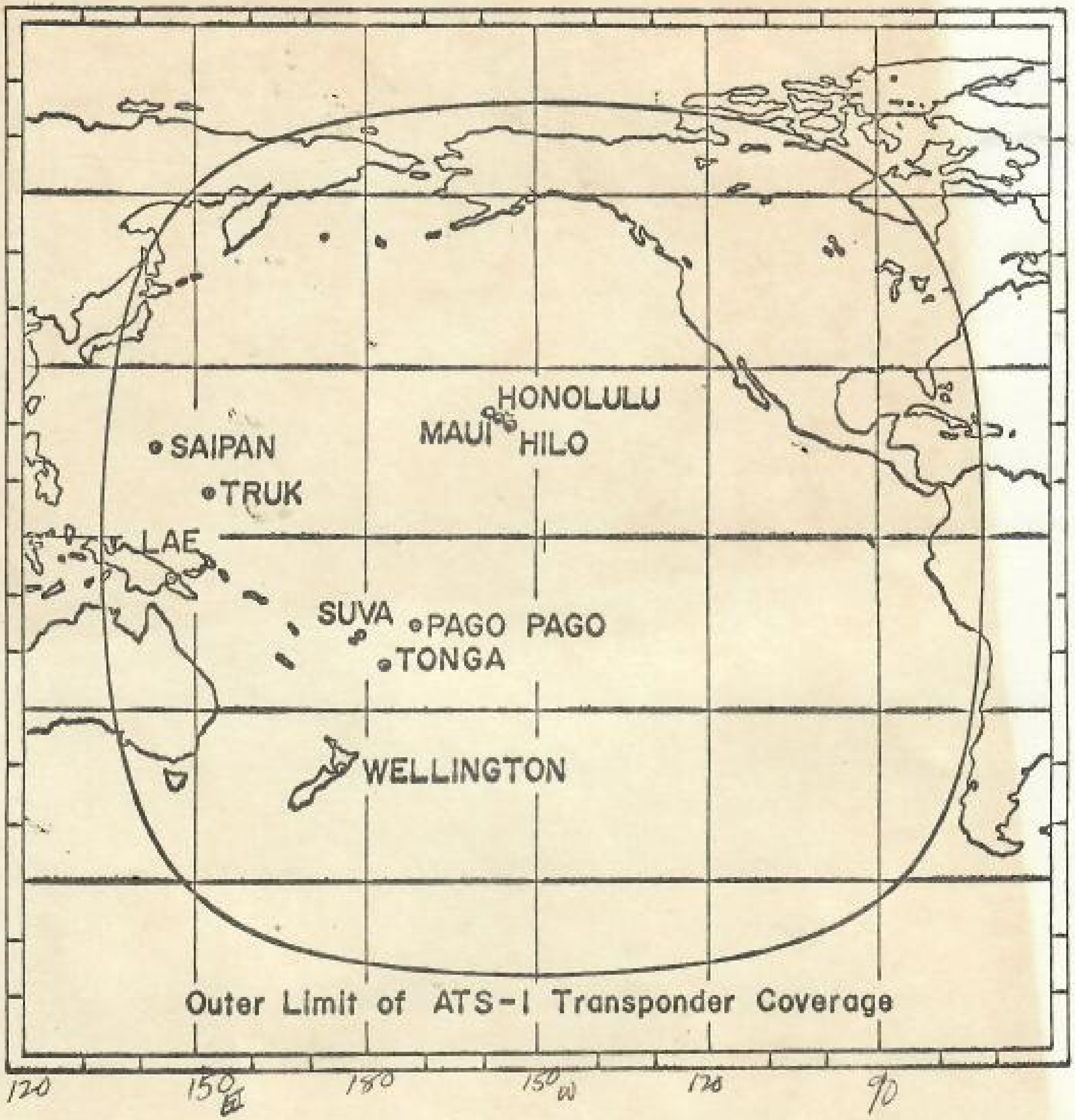
Users call: Terminal Manager
Phone: 948-8771

Others Write To: Director, PEACESAT Project
Communication Program
University of Hawaii
Honolulu, Hawaii 96822

SUMMARY

If an effective system of sharing by long distance telecommunications transmission is developed between universities, educational institutions and professional services of the nations of the Pacific, it will benefit not only the people living there but will serve as an example to the world. The demonstration will have implications for India, South America and Africa.

It has, however, special meaning to the Pacific Basin. A satellite system makes possible instant dialogue between areas and institutions which would otherwise be outside the mainstream of social development. With telecommunications, distances can be bridged. Men can keep up with change. The benefits of industrialization can become more widely available and living conditions for the people greatly improved.



Map Showing ATS-I Transponder Coverage and Stations in PEACESAT Network

SundayFocus editoria

Star-Bulletin & Adv

Telecommunicatio

The writer is a journalist who specializes in news and issues of telecommunication. He also works as an education specialist at the University of Hawaii Social Science Research Institute.

By HAL GLATZER

Two streams of current events are carrying progress in telecommunications around the world. One is the dramatic, but often inexpensive improvements in the technology of processing and transmitting electronic signals; the other is a recognition by governments that improved telecommunication services can narrow the gap between industrial and developing nations.

The most significant scientific step is the steady conversion to digital equipment, while the leadership in introducing up-to-date telecommunication equipment is passing from the U.S. and Europe to the less-developed nations of Africa, the Middle East and Asia.

WHEN TWO SHIPS signal Morse Code by flashing lamps on and off—that is digital communication. In the same way, two computers signal one another over special telephone lines by trading coded "on" and "off" pulses of electricity billions of times a second. If there are several computers on the line, each one has an address—like a zip code—which permits it to read only those messages intended for it.

The "packets" of information, like letter mail, need not be restricted to "computer" data uses. Telephone voices, television pictures and sound, facsimile letters and charts . . . anything, in fact, that can be electronically recorded, can be sent digitally.

Whether carried by cable, microwave or satellite, digital signals are cleaner, more reliable and, in volume, cheaper than those sent over the (analog) telephone circuits now in place.

Developing countries are exploiting the digital revolution. Unencumbered by older telephone or television equipment which must be amortized, the young nations are buying sophisticated new hardware which will be cheaper to install and maintain, and which offer faster and more versatile services.

proved literacy. The six VHF channels in the system also carry Samoa's legislative debates to over 90 per cent of the population.

TELECONFERENCE IN ALASKA

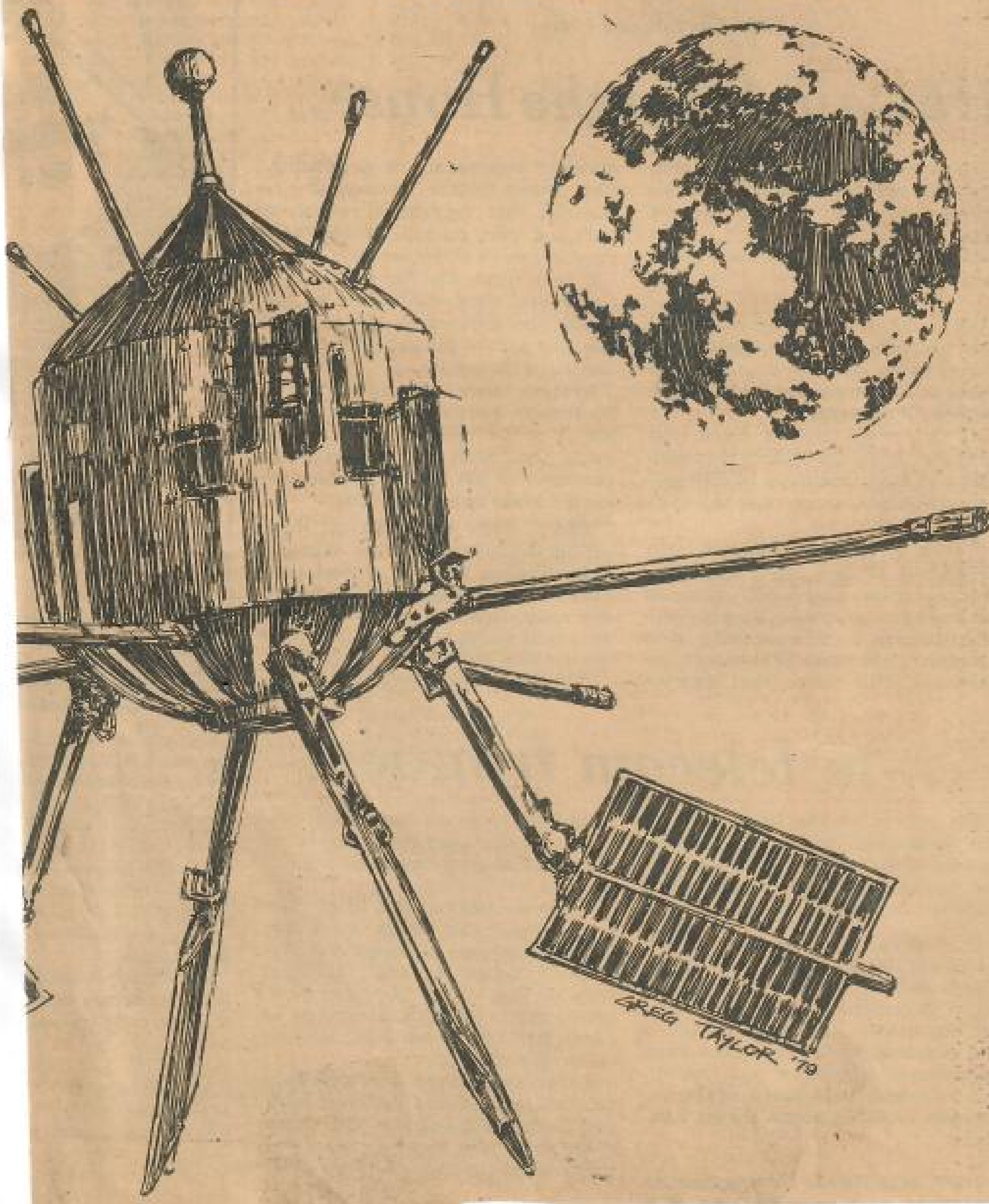
With a small but widely-scattered population, citizen participation in Alaska's government is difficult: local travel is airborne and expensive. Through the state's Office of Telecommunication, audio and video conferences by satellite have brought public input to the legislature. Public acceptance is rising as more and more people give testimony by television. After demonstration projects showed the advantages of teleconferencing, Alaska has begun to lease commercial satellite circuits for the purpose, and has extended audio conferencing to its congressional delegation in Washington, D.C.

DOMESTIC SATELLITE FOR INDONESIA

Algeria was the first country to have a domestic satellite telephone network by leasing a circuit from

rtiser Prepared by the staff of The Honolulu Advertiser Feb. 4, 1979

ns: A Pacific view



TO UNDERSTAND the state-of-the-art, to learn from specialists in the social and political sciences of telecommunication—as well as from engineers—315 people from 18 nations and 23 American states gathered here in early January. Six meetings were held; the largest was the 1979 Pacific Telecommunications Conference (PTC '79) which convened 19 workshops over two days ranging over topics from economics, electronics and statistics to policy planning and privacy.

A few days earlier the 12th annual Hawaii International Conference on System Sciences (HICSS) discussed the applications of computer technology to one specialized field—medical information processing. HICSS is a forum for professionals in the information electronic and decision sciences.

Following PTC '79, users of NASA's first and latest applied-technology satellites discussed their respective activities. PEACESAT terminal operators from Canada, Alaska, New Zealand, the Cook Islands and Hawaii met face-to-face, many for the first time, after years of voice-only teleconferencing around the Pacific. Public Service Satellite Consortium board members affirmed support for educational television projects in the South Pacific and the planning for Australia's domestic satellite. IBM World Trade-Americas/Far East Corporation officers from Latin America, Asia and the U..S. met privately following their participation in PTC'79.

And some 45 delegates met to plan the next Pacific Telecommunications Conference—scheduled for January 7, 8 and 9, 1980—and to consider creation of a permanent organization. Such a body, according to PTC'79 co-chairman Richard Barber, of the University of Hawaii, would provide "an open, non-political channel for exchange of information and views among carriers, suppliers, users, governments, professional groups and others in the Pacific area."

PTC'79 was distinguished by a wide range of intriguing subjects under discussion, and was unique in having published its proceedings before—rather than after—the papers were presented. This gave delegates an opportunity to preview workshop session materials before participating. Most of those reported developments will change and enhance the Pacific way of life and commerce.

Here are some of them:

EDUCATIONAL TELEVISION IN SAMOA

According to H. Rex Lee, former governor of American Samoa, medical programs have mobilized the islands against diseases and in-school materials have im-

INTELSAT. Now some 17 countries enjoy similar services. In Indonesia, however, a wholly-owned satellite called PALAPA relays local telephone calls, television programs, data from the national oil, mineral and timber industries, and military communications. In combination with the nation's terrestrial microwave and telephone links, 60 per cent of the population now has television reception, while major expansions of telephone exchanges, telex networks and trunks are being installed across the archipelago, overseen by Dr. Ing Suwarso, of Pansystems.

WORLDWIDE PUBLIC DATA NETWORKS

New international technical standards for transmitting data over digital circuits insure that most computers—whether they are built in Japan, the U.S. or Europe—can now "talk" to one another. Using the "X.25" and other interfacing rates of speed, customers can virtually dial-up, as they would a telephone, and exchange data, according to Dr. Hiroshe Inose, of the University of Tokyo. These circuits, says an IBM World Trade officer, are probably more private and secure from unauthorized interception and decoding than any other commercial media in the world.

DISTRIBUTED PROCESSING IN HONG KONG

A pilot project links computers at two Hong Kong universities, according to Jerome J. Day, Jr. of the Computer Services Centre there. Restricted by regulatory laws from using public telephone lines for data, the schools leased only as many private circuits as they needed to create "nodes" to buffer the data flows, then connected their remote terminals into the nodes, rather than to the main-frame computers. This low-cost alternative is unique in developing countries and serves as a model for increasing their computing power without massive expenditures.

"TRADITIONALLY," he says, "only the multinational commercial market or the military have been able to develop and use satellites. If social services, health care or educational institutions wanted to use them to solve local or international problems, they had to fit their needs into the existing commercial network or do without.

Costs are high because only the heavy traffic generated by high-density, well-developed communities can pay for the services.

"We feel that we can generate traffic in smaller populations if they are spread over a large enough area, like the Pacific Ocean for instance," Bystrom says, "and in any case, you can't get medical diagnoses in or out of a village that has no telephone lines in the first place, or a country too poor to install them."

Hunger and disease do not respect national boundaries but telecommunication regulations do.

LOCAL AUTONOMY must be respected for any international agreement to work. By not imposing upon those countries a system beyond their control or their ability to pay for it, PEACESAT has demonstrated that nonprofit service or educational needs can be met by satellite technology.

Disease control, medical or teacher training, food production techniques, even tourism policy-making ideas have been shared in six years of operation.

Bystrom hopes that eventually the commercial carriers will offer comparable voice circuit service at discount rates for educational and social needs.

Although international regulations now favor the commercial development of satellite technology, there is a larger context in which satellites are only one part.

Like oil, minerals and other natural resources, there is only "so much" of the electromagnetic spectrum which can be used for radio, television, microwave and other electronic communication systems.

MANAGING THIS scarce resource is the job of the International Telecommunications Union, a world organization which was formed 112 years ago this week to set standards for then-new undersea telegraph cable services.

As the oldest of the organizations in the United Nations system, the telecommunications group sees itself as "an important channel for the transfer of technology...(and) accumulated knowledge to the developing areas of the world, thus enabling those countries to generate their own future development....By bringing people closer together, telecommunications...levels out inequalities without leading to uniformity...."

Since hundreds of voice circuits can be carried on the same satellite relays with a television channel, but not both at once, there is a need to insure that PEACESAT and other noncommercial services can use some of them for the worldwide telephony.

In 1979, the telecommunications alliance will recommend new allocations of the spectrum, including many new satellite frequencies.

By stressing equal opportunities for conference-calling, low price of equipment, and the serving of humanitarian and educational needs, PEACESAT is a project which embodies the intents of the international telecommunications organization.

ns: A Pacific view

by computers, to guarantee delivery to the correct address.

OFFICE SUPPLIES

Word-processing computers such as those used by newspapers to edit and store articles, are now available to businesses at modest cost for letter and report-writing. In Japan, a modified Telex terminal has been demonstrated by Kasunori Konishi, which can edit copy almost as well as a word-processing computer but which can also send the completed text out as a standard Telex message.

Newly-installed private branch telephone exchanges (PBX) are increasingly built all-digital to offer "follow-me" and conference calls, and interfacing for office computers at little additional cost.

DATA AT HOME

The British Post Office, which is also the telephone company, is presently market-testing a system called Prestel. A subscriber dials up a computer over a home telephone and reads prepared information over a modified television set (which need not be bought; most U.K. viewers rent their TVs). Fees for viewing each page of data are added to subscribers' telephone bills, while the providers (such as airline schedulers) pay the Post Office for placing the pages.

Canada has expressed interest in plugging in to Prestel, and Australia will decide this year whether to join or to create its own. In Japan, a similar system called CAPTAIN, is just now being made available. Its 100,000 experimental pages include news, public affairs, education announcements, amusements, and home-service information.

"ADVANTAGES OF BEING DISADVANTAGED"

According to two Australian economists, telecommunications progress is easier to justify, financially, in developing countries than in industrial ones. The former do not, typically, have large investments in older equipment, or commitments to domestic suppliers. They are freer to choose from among the hardware offerings by manufacturers from around the world which are likely to be cheaper and more reliable, once in place, than the older systems with which industrial nations find themselves stuck.

Once the decisions are made to upgrade (or introduce) a telecommunication infra-structure, the development process becomes the subject of intensive scrutiny in academic circles. Some services, such as medical or civil defense communications, are considered universally valuable. Others, including military channels, and entertainment television programming, may contribute to what one conference participant called "electronic colonialism". Nonetheless, according to others, it is the governments of these countries, themselves, who have made telecommunication development a priority, and it is they and their people who will benefit from the installations.

HAWAII's ROLE

For teleconferencing, Hawaii's position in mid-ocean, and experience with PEACESAT and ALOHA experiments, is crucial. Already one transnational corporation is opening an office here so that its staff can communicate with New York and Tokyo in the same working day. Hawaii can also become a clearing-house for international telecommunications development, a place where suppliers and users, researchers and disseminators can meet to share information about Pacific problems, needs and markets. PTC'79 delegates tapped co-chairman Richard Barber to head a working committee for exploring ways to sustain the momentum generated by the conference. His office is in the Social Science Research Institute at the University of Hawaii.

Will head a working committee for exploring ways to sustain telecommunication momentum.

Richard Barber

When International specialists can meet non-specialists, professionals can meet outsiders, and physical, and social and political scientists can meet one another, then telecommunication planning and policy-making can grow on a global scale.

Telecommunicatio

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ment, said, "ATS-1 has done more for the Pacific than SITE did or India using the more expensive ATS-6."

At 17 terminals in 15 countries are pioneers in teleconferencing: nurses, teachers, social workers, planners, students and scientists who regularly hold telephone-quality conference calls around the Pacific using inexpensive two-way radio sets and antennas. Keeping space in the radio spectrum open for PEACESAT's low-powered transmissions will be an ongoing problem for user countries.

ATS-6: NASA's big ATA-6 satellite, formerly used for the SITE project in India, has been repositioned over the Pacific for American experiments. The potential for Micronesian telecommunication projects over ATS-6 led Christopher Plant, of Simon Fraser University, Canada, to ask if "telecommunications are being used to further the dependency of that region on the U.S."

The Public Service Satellite Consortium (PSSC) is an organization of ATS-6 and other satellite users. According to outgoing president John Witherspoon, a television studio and an earth station antenna will shortly be dismantled in North Carolina and reassembled in Suva, Fiji, to relay electronic classrooms to University of the South Pacific locations in Tonga, the Cook Islands and Western Samoa.

Dr. Norman Abramson, of the University of Hawaii, said that the PSSC has aided the development of his ALOHA packet broadcasting experiment at the UH Electrical Engineering department. Elsewhere, medical societies, boards of education and other universities link up electronically for video and audio conferencing over ATS-6.

TRANSNATIONAL ENTERPRISE

The most eager customer for international telecommunications are the transnational corporations with offices distributed around the world. Global mineral extraction industries helped Indonesia to afford its satellite, and are paying much of the cost of building telephone systems in Nigeria and Kuwait. George Lissandrello, of IBM World Trade, remarked that (despite his company's leadership in the supply side) IBM is the world's second-largest user of telecommunication services, after the U.S. Government.

NEW "GATEWAYS" TO THE U.S.

Since 1943, Hawaii has been an "international" place for telegraph (record) service, but a "domestic" point for telephone, data, video and other services. Section 222 of the 1934 Communications Act prohibited the "international record companies" (IRCs) RCA Globcom, ITT Worldcom and Western Union International from serving Hawaii. In 1977 the FCC relaxed the rules, permitting them to offer Mailgram service, and recently announced that Graphnet may compete for data carriage.

Only five "gateway" cities had been designated for international-to-domestic connections, but the steady pressure of applications has eroded the grip of those installations.

Some of Hawaii's military communications are now carried over an RCA satellite via Barking Sands, and the American Satellite Corporation and Western Union International expect to connect California and Barbers Point with a wideband data link. The experience of the Robert Wold company in bringing network television programs into the state shows that the regulatory structure is giving way to economic competition.

H. Rex Lee

Former governor of American Samoa praises use of telecommunications in Samoa's educational system.

ELECTRONIC MAIL

Digital networks can transmit facsimile images of letters, drawings, photographs, etc. with speed and quality approaching that of xerographic reproduction. Some corporations already subscribe to private channels for intra-company communication, but development of public networks has been hampered by opposition from the U.S. Postal Service, which wants to offer it first. In Alaska, an electronic mail experiment is being installed now, in 60 locations, for the Department of Education. Telephone-like connections are switched

S-B Nov 25, 1976

Communications System Links 'Space Junk'

By Phil Mayer
Star-Bulletin Writer

If you were 22,300 miles above Christmas Island, which is 1,500 miles south of Honolulu, you would not be alone.

You would be up there with a glass-covered barrel which has been there since 1966.

Because of the special geometry of space, both of you would be the same distance from Honolulu as you would be from Fiji.

Honolulu to Fiji via that satellite would be 44,600 miles —22,300 miles up and 22,300 miles down—although Fiji is 2,500 miles from Honolulu by boat or plane.

SIMILARLY, your neighbor in space, which since 1971 has been called PEACESAT, is a total of 44,600 miles up and down from 14 other places, even from Maui which is only 98 miles from Honolulu.

At each of these places there is a PEACESAT communications terminal which, via a conference room and a closet-sized collection of electronic gear in one of those permanently "temporary" wooden buildings on the University of Hawaii's Manoa campus, is no more than ¼th of a second from any other.

The Honolulu terminal, however, is the system's traffic cop—a role made necessary by keeping the PEACESAT system so simple and relatively inexpensive that no terminal can transmit and receive simultaneously.

The information above is all you

John Bystrom

need to know that is really unusual about PEACESAT except that it is the least-known and most heartening story of the space age.

The PEACESAT project (Pan Pacific Education and Communications Experiments by Satellite) is the brain-child of one man, John Bystrom, now a professor of communications at the University of Hawaii.

IN 1966 when PEACESAT was

rne Islands

Is Salvaged for UH Project

launched atop a rocket from Cape Kennedy, Bystrom was in Washington as an assistant to the Secretary for Health, Education and Welfare.

At that time, PEACESAT was known as ATS-1—one of two Applications Technology Satellites which the National Aeronautics and Space Administration successfully orbited to observe weather patterns.

By the time ATS-1 had been positioned and was at work over the Pacific and ATS-3 was doing its job over the Atlantic, the American people had spent $7 million on each—$3.5 million for each of the satellites and $3.5 million for each launch and rocket.

But by 1969, both satellites had done everything NASA wanted them to do and were about to be declared "surplus."

The two satellites—each with its sun-powered electrical system functioning, and orbiting perfectly—would have become junk in space.

BUT BYSTROM, by then at the University, got NASA to agree that before ATS-1 was written off, he be allowed to try to get the State of Hawaii to fund his PEACESAT project.

In 1971, the State Legislature—at the urging of now-retired State Sen. Nadao Yoshinaga—appropriated $75,000 for PEACESAT, of which $60,000 was released including $25,000 for the first five terminals which were put together by Paul Yuen and Katashi Nose of the University Physics Department.

These and other terminals, built for about $5,000 each on the Manoa campus were later sold for use in the PEACESAT system.

Income from the sale of terminals and other equipment funded PEACESAT through 1973 when a by—then much impressed Gov. John A. Burns "found" $30,000 in his office budget to keep things going.

Then the Legislature appropriated $42,000 for PEACESAT for each year, 1975-76 and 1976-77.

Dots indicate location of present PEACESAT terminals. Note, at upper right, position of the PEACESAT satellite over Christmas Island.—Star-Bulletin map by Ray Higuchi.

BUT THESE appropriations fund something which is much more than the original PEACESAT.

Although Bystrom always talked of an international PEACESAT, the first terminals were set up at the University in Hilo and at Maui Community College.

Thus Hawaii became the first state to have its own intra-state satellite communications system which was used to teach a couple of courses and set up inter-library book exchanges.

At first, PEACESAT operated only three hours a week, which was 45 minutes a day, four evenings a week.

AT present, it is on the air 20 hours a week: From 5 to 6 p.m. Monday; 5 to 7 p.m. Tuesday, Wednesday, Thursday and Friday; 3 to 5 p.m. Saturday and 3 to 8 p.m. Sunday.

AND PROGRAMS have been scheduled through the middle of December.

But what are PEACESAT programs and how are they set up?

Each Sunday, from 5 to 6 p.m. there is a "meeting" via PEACESAT of all the terminal managers. Each manager proposes broadcasts in which all terminals will participate and/or those in which only a few terminals will take part.

An example best tells the story.

A dentist in Apia, Western Samoa, asked the terminal manager there to arrange, if possible, an electronic meeting of dentists to discuss a problem with which no one could help him locally.

THE TERMINAL managers each got at least one dentist.

So there were dentists talking shop in that University conference room for an hour beginning at 5 p.m. on a Monday evening, and at:

—4 p.m. Monday in Apia.

—3 p.m. Tuesday in Suva, Fiji which is on the other side of the international date line.

—3 p.m. Tuesday in Wellington, New Zealand.

—1 p.m. TUESDAY in Lae and Port Moresby, New Guinea.

—4:30 p.m. (that's right) Monday in Rarotonga, in the Cook Islands. (For many years, Hawaii was 2 ½ hours "earlier" than the Mainland west coast.)

—4 p.m. Monday on Niue, an island inhabited b 4,000 persons which also may be the world's smallest independent nation.

—4 p.m. Tuesday in Tonga.

—2 p.m. Tuesday in Noumea, New Caledonia.

—1 p.m. Tuesday in Honiara in the British Solomon Islands.

—3 p.m. Tuesday in Tarawa in the Gilbert Islands. 2

ALTHOUGH NO dentist from Maui took part and Hilo has decided it no longer needs to be part of the system, PEACESAT could have included a dentist from Washington, D.C. (at 10 p.m. Monday) in the conference.

And next month, a PEACESAT terminal will be operational at the University of California's branch at Santa Cruz which make each of the UC campuses a PEACESAT member because the campuses are already linked by special telephone lines.

Also, an Alaskan dentist could have taken part in the conference because, although Alaska has been in and out of PEACESAT from the start, the state does have a satellite system that sends medical advice even to its most remote towns.

It is a PEACESAT rule that any broadcast may be interrupted for emergency medical information.

Oddly, the most recent example of this originated in Alaska where the intra-state satellite system, for some reason, failed a doctor with a dying patient.

BECAUSE THE operator of the Alaskan terminal the doctor was using knew how to "cut into" the PEACESAT network, the Honolulu terminal, managed by Carol Misko, was able to get a doctor at Straub Hospital to advise the doctor in Alaska by telephone via PEACESAT without the Honolulu doctor having to leave his post in the Straub emergency room.

Recently, PEACESAT, with the exception of the Honolulu terminal, has been handling local news.

Until this began, most terminal areas didn't know what was going on elsewhere unless it was of international importance.

These broadcasts, each by a local newsperson at each terminal, are transcribed at most terminals and compiled into news letters which the Various governments distribute.

However Fiji recently refused to take part in the news exchange, saying that to do so would compete with Fiji's regular international communications companies.

FIJI URGED other terminals to pull out, too.

But the Prime Minister of the Cook Islands mounted a campaign by letter to keep the news round-robin going. And it still is.

There have been other disagreements.

But that fact pales when one realizes:

That PEACESAT "barrel" which has been spinning 100 times each minute over Christmas Island for more than 10 years can serve the people of 42 per cent of the earth's surface.

THAT THE service area's eastern boundary would be a line drawn through Washington and Cleveland and the western boundary is the border between Papua, New Guinea and Indonesia.

That PEACESAT's reach north and south is almost to the poles.

That the system is the first educational satellite project in the world.

That no federal funding has ever been sought for PEACESAT.

And that PEACESAT doesn't shy at alotting time, as it did last week to a discussion among elementary school children of this question:

"What is an Aloha shirt?"

A T S - 1

1. INTRODUCTION

Late in 1966, the National Aeronautics and Space Administration initiated the Applications Technology Satellites (ATS), program with the successful launch of ATS-1 into geostationary orbit to begin fulfilling an objective of providing space technology that is common and unique to general satellite applications. It is being used as a test platform for conducting space applications experimentation to provide data that is useful in operational evaluation and research in communications, navigation, meteorology, and the space enviroment at equatorial synchronous altitude.

ATS-1, built by Hughes Aircraft Company for NASA's Goddard Space Flight Center, is a spin-stabilized, drum-shaped spacecraft 58 inches in diameter by 60 inches in length. At launch it weighed 1,547 lbs., and after firing its on-board apogee "kick" motor for establishing itself into synchronous equatorial orbit, reduced its weight to 775 lbs. Launch of the omnibus vehicle was at 9:12 p.m. EST, on December 6 from Cape Kennedy aboard an Atlas-Agena booster. Both stages operated normally in driving the ATS-1 into an initial orbit having a perigee of 114.3 miles, an apogee of 22,862.3 miles, and an inclination to the equator of 31.2 degrees.

After coasting in this transfer orbit for 1½ revolutions, or about 16½ hours after launch, the spacecraft was commanded to fire its "kick" motor having 6,250 lbs. of thrust, as it passed through apogee for the second time. The resultant velocity increase and vector change raised the spacecraft's perigee and steered out the inclination angle to 0.23 degrees with early tracking indications showing that the ATS-1 had achieved a final orbit of 22,277.0 by 22,922.0 miles. When it reached 151 degrees West longitude, or about over Christmas Island, small hydrogen peroxide thrusters were fired to add a small velocity increment to stop the westward drift.

From that altitude and longitude, the spacecraft is visible to ground stations in such scattered locations as Rosman, North Carolina; Mojave, California; Cooby Creek, Australia; and Kashima, Japan. This wide coverage enables it to "see" and communicate with 42 percent of the Earth's surface, an area extending roughly from 50° North to 50° South and from 75° West longitude westward to 135° E longitude.

2. GEOSTATIONARY ORBIT

A. General

Geostationary orbit of a satellite is advantageous for applications that require continuous, wide-area coverage and a closely-spaced sequence of observations of a specific area. Presently, ATS flight programming is directed toward developing a station-keeping capability and a modest pointing accuracy, adequate for coverage of the Earth's disk. Two principal perturbing forces affect a geostationary satellite in orbit: one causes the satellite to drift east or west in the equatorial plane (except at two stable points), due to the elliptical equatorial section of the Earth; the other causes the satellite to drift north or south of the equatorial plane, due to gravitational forces on the satellite by the Moon and Sun. Countering these forces by the use of thrust on a satellite is called station-keeping. East-west station-keeping has been demonstrated by SYNCOMS II and III, and INTELSAT I; however, north-south station-keeping requires approximately 20 times more energy than east-west station-keeping. ATS-1 is serving as a demonstration test-bed for north-south station-keeping.

B. Spin Stabelization

Once on station, it was necessary to induce the satellite to spin since ATS-1 utilizes the gyroscopic effect to achieve rigidity in space. A nitrogen spin-up unit was used with the spacecraft reaching a spin rate of 97 rpm versus a designed objective of 100 rpm along its cylindrical axis.

C. Station-Keeping

On-board the ATS-1 are two hydrogen-peroxide (H_2O_2), thrust systems used for initial placement on-station and subsequent maintenance of that position. One of the thruster jets in each H_2O_2 system fires parrallel to the satellite spin axis while the other fires perpendicularly. Station-keeping is a continuing problem because the forces at work in space are in constant change. Irregularities in the Earth's gravitational pull cause orbital drift while the Sun and Moon exert pulls which affect the satellite in an uneven manner. Even the tiny push of sunlight against a spacecraft tends to disrupt its delicate system of balance. Such factors cause wobble, and much as the child's top wobbles in a drunken dance just prior to toppling over, the satellite wobble portends a drift off-station. Fiery death in the Earth's atmosphere will eventually result.

D. Nutation

Nutation is wobble about the spin axis of the satellite. The importance of rigidity in space to keeping ATS-1 on-station was mentioned in the preceding section. The ATS-1 is equipped with a passive nutation damper. This is a 19-inch long, 3/8 inch diameter tube filled with mercury. Alignment is parallel to the spin axis and any wobbling should cause the mercury to slosh back and forth, dissipating the nutation. ATS-1 has an active nutation sensor system consisting of two ultrasensitive low-frequency piezo-electric accelerometers mounted near the spacecraft periphery with the sensing axes parallel to the spin axis. Placement of the accelerometers is approximately 90° apart around the circumfrence of the satellite to detect any ellipticity in the nutation cone that could result from slight differences in pitch and yaw motions of inertia. This sensor is capable of measuring nutation angles from 0.001° to 5°. Spacecraft nutation was just below the sensor threshhold limit when the sensor response tests were scheduled, therefore, to test the sensor response, the H_2O_2 axial jets were operated to deliberately induce nutation. Sensor data indicated that the nutation angle dropped from 0.20° to 0.09° within three minutes.

3. STRUCTURE AND ELECTRICIAL POWER

The spacecraft is generally cylindrical with a 147-cm, (56 in.), diameter and 135-cm (53 in.), length. Composing the primary structure is a central thrust tube with adapter attachment provisions at the aft end. Both the spin axis and cylinder axis coincide on the ATS-1. Completely covering the cylindrical surface are solar cells except for openings for the experiments. Protruding from one end of the cylinder are the microwave antennas; and the nozzle of the apogee kick motor from the opposite end. Eight whip antennas are spaced equally around the periphery at each end of the structure, with those at the apogee kick end for VHF and those on the other end for telemetry and command purposes. These features are illustrated in figure on next page.

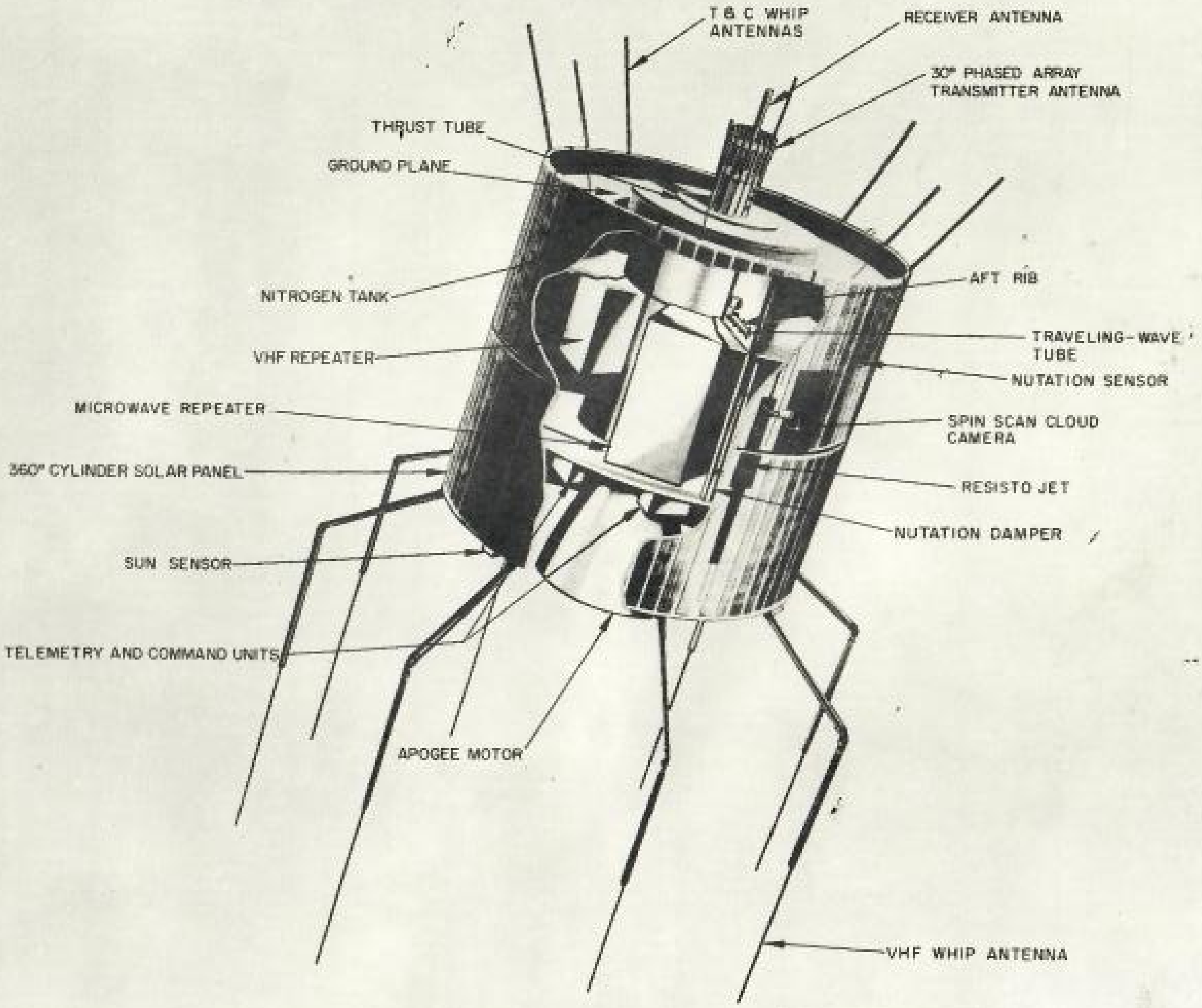
Making up the power supply are solar cells, storage batteries, and voltage regulators. Solar energy is converted to electrical energy by 22,000 N-on-O silicon solar cells, initially supplying 185 watts of power at a rated voltage of 26.9 volts. Two 22-cell nickel-cadmium batteries comprise the electrical storage system with each battery providing 6 ampere-hours for a total storage capability of 12 ampere-hours. Power is supplied by the batteries when the satellite is out of direct sunlight for about one hour per day or when transient peak loads are required.

4. ANTENNAS

The ATS-1 made the first use of an electronically despun antenna. This antenna consists of 16 elements interconnected to produce a directed beam of radiation toward Earth. As the satellite rotates, the phase of the signals radiated by the individual elements is electronically shifted so that the beam remains directed toward Earth in constrast to the "pancake" shaped pattern produced by a single-plane omnidirectional antenna which wastes most of the RF power, only 5-10% of the energy reaching the surface of the Earth. The Hughes despun antenna still has a backlobe, but it is about 10 decibels less than the front lobe. Total losses in the antenna system, including loss in the power splitters and the pattern gain of the antenna, run about 4 db. It focuses about 40% of the transmitter power on Earth in an elliptical beam diverging about 18° north and south, and 23° east and west. Net gain of this beam is about 15 decibels above isotropic for a 1.5 percent bandwidth at 4 gc. This is over an order of magnitude greater than a system without a despun antenna.

In order to provide for a despun antenna pattern without moving parts, an electronically phased arrary system was developed. The phased array antenna system produces an electronically controlled, conically shaped beam at 4 Ghz which is rotated at a speed equal to, but in opposite sense to, the spacecraft spin; hence the name, "despun" antenna.

Output multiplexier RF energy is fed to a power divider where it is split into eight equal amplitude signals to drive the eight ferrite RF phase shifters. A circular waveguide is used in the ferrite section where the RF energy's phase is shifted by a magnetic field which is applied transversely across the waveguide. Modifying the magnetic field is the Phased Array Control Electronics (PACE). This array consists of sixteen collinear stacks of linearly polarized radiators arranged as elements of a two-wave length diameter cylinder about the spacecraft spin axis. Azimuthial positioning of the conically shaped beam is effected through PACE control of the phase shifter drive durrents. Programming of the currents are referenced to the spacecraft mounted solar sensor output. Additional control can be exercised through the command system.
NOTE: There is some indication that one of more of the ferrite RF phase shifters are defective resulting in a characteristic spin modulation tone.



APPLICATIONS TECHNOLOGY SATELLITE ATS 1

Also aboard the ATS-1 is an eight-element VHF-phased array. Control signals to form and despin the VHF-phased array beam come from the electronics used to control the despun microwave antenna. Gain of the VHF-despun antenna is about 8.5 decibels.

Even with a comparatively high-powered satellite like ATS-1 (about 175 watts effective radiated power) the power delivered to ground stations is less than 140 dbw. Therefore, a good receiver and antenna combination are required to pick this very weak signal out of the background noise.

Another problem with reception is a phenomenon known as Faraday rotation. If it were not for the atmosphere, signals to and from a satellite would retain their original polarization. The plane of polarization of a signal passing through the ionosphere, however, will be rotated proportionally to the integrated electron density and the square of the wavelength. This is referred to as Faraday rotation. For average situations, rotation at vhf frequencies is 6 to 7 radians. Two to three rotations may be observed at a ground station during a 24-hour period. The polarization rotates clockwise about 2½ revolutions in 12 hours and then unwinds the same amount. This creates a need for an antenna capable of receiving signals that have a slowly rotating plane of polarization.

The solution to Faraday rotation is to make the antennas insensitive to signal polarization. A circularly polarized antenna theoretically fills this requirement. In practical terms the ground antennas (Yagis) used at PEACESAT terminals are equipped with rotators to permit adjustment from a remote location to compensate for changing polarization.

5. TRANSPONDER

The solar-enerigized (with back-up batteries) transponder receiving a weak ground signal and re-transmitting a boosted signal shifted in frequency to avoid input-output coupling, is the basis of the active communications satellite. The ATS-1 uses three transponders. Two for microwave communications and one for VHF communications.

6. COMMUNICATIONS EXPERIMENTS

The spacecraft communications system consists of microwave communications transponders with traveling-wave tube, final-power amplifiers, providing multiple-access and frequency translation.

The spacecraft communications system consists of microwave communications transponders with traveling-wave-tube, final-power amplifiers, providing multiple-access and frequency translation modes of operation and employing directive antennas for reception and transmission. A VHF communications transponder with a directive antenna array for reception and transmission is also included.

A. Microwave

The satellite carries two microwave transponders, primarily for redundancy, which can run separate experiments simultaneously. The transponders carry a pair of Hughes-built traveling-wave tube final-power amplifiers, each able to deliver 4 watts of radio-frequency power to the antenna. Frequencies will be in the 6 gigahertz band for the uplink and 4 Ghz for spacecraft-to-ground transmissions. The transponders will operate in three different modes.

(1) Multiple access with frequency-division single sideband transmissions accepted and retransmitted as a single phase modulated carrier. Objective is to evaluate a single sideband/phase modulation technique to permit as many as 1,200 one-way or 600 two-way voice circuits simultaneously.

(2) Second mode is a wideband frequency modulation (FM) system which takes transmissions received, converts to an intermediate frequency, amplifies and translates to the downlink R-F carrier frequency and retransmits. This frequency translation system is designed primarily for color television or such other wideband applications as high-speed data transmission in which one ground transmitter takes over the complete channel. Wideband circuitry is used throughout the signal chain to furnish a 25-Mhz usable band.

(3) Transmitting wideband spacecraft sensor data to ground stations. The third mode is used to transmit cloud-cover pictures taken by the spacecraft's spin-scan camera.

(4) Multiple Access Experiments

The multiple access experiment was the first real demonstration of a "telephone switchboard" technique that is vital for any communications satellite operating simultaneously with more than two ground stations. With the ATS system, more than a thousand telephone quality channels can be handled. About a dozen ground stations would be used to transmit simultaneously into to the ATS equipment.

During the ATS experiments, Rosman Nic., with an 85 foot antenna was the only ATS ground station that had sufficient gain to utilize the full multiple-access mode bandwidth of 600 duplex channels (1,200 total). The two 40 foot stations at Mojave, California, and Toowomba, Australia handled up to 120 duplex or 240 channel operations. An automatic level controlled 1- to 4-kilowatt single sideband transmitter on the ground sent up the frequency-division multiplex channels using a 5.6 Mhz base bandwidth. Narrow bandwidth is utilized by the system by going single sideband where just one sideband of a normal AM signal is transmitted without the carrier and opposite sideband. ATS-1 amplifies linearly in the intermediate frequency. According to a NASA spokesman--"there are no cross modulation products to foul things up."

Signals are converted by the ATS-1 transponder into phase modulation of a single carrier. All ground stations receive the composite 25-Mhz wide signal with each demultiplexing the PM signal to receive the channels in which it is interested. In ATS-1 tests, the three ground stations at Rosman, Mojave and Toowomba loaded the base band.

With this multiple-access approach, small and large stations alike can work together through ATS as long as everyone keeps his link narrow.

(5) Color Television Relay Experiments

A wideband 10-kilowatt f-m transmitter is used for the uplink. Color transmission went only to the Rosman station since Mojave's and Toowoomba's smaller antennas are only feasible for black-and-white experiments. Good quality television signals have been received at all NASA's ATS ground stations and in Japan. Experimentation has consisted mainly of back-to-back transmission of test patterns and frequency response measurements. Good-quality spin-scan camera transmissions, in the wideband mode, have also been demonstrated.

(6) Transmission of Spin-Scan Camera Photographs in Wideband mode.

The first pictures from a synchronous orbit were taken by ATS-1 with a new camera system that uses the satellite spin to provide horizontal (east-west) line scan and a mechanical step motor provides the vertical (north-south) scan. Previous space television systems had counteracted satellite spin with complex despinning or image motion techniques.

Hughes' Santa Barbara Research Center developed a new mechanical scan camera which was simpler and more reliable than then existing systems. It had scan stability, wide coverage and high resolution, and was adaptable for infrared. A 5-inch Cassegrain-type reflecting telescope passes light through a .001 inch pinhole aperture onto a photomultiplier light detector tube.

Since the satellite is spinning at 100 revolutions per minute, the camera scans 100 horizontal lines each minute. The pivot-mounted telescope tube is stepped vertically by a sun sensor which generates a signal to switch on a motor momentarily to index the camera down to the next scan line. Scanning a line 2.2 miles wide on earth, the system produced an earth picture showing details as small as two miles. The camera takes 20 minutes to scan its 2,000-line picture, which is transmitted to earth stations by the ATS microwave transmitter. Area covered by one picture extends from about 50 deg. N. Lat. to 50 deg. S. Lat. and from approximately 75 deg. W. Long to about 135 deg. E. Long-about 300 million sq. mi.

B. VHF COMMUNICATIONS EXPERIMENT

The VHF Communications Experiment had the following objectives:

(1) Determination of the feasibility of communications between moving aircraft and a satellite.

(2) Evaluation of electro-magnetic propagation through the ionosphere by performing VHF and microwave polarization, range and range rate measurements simultaneously.

(3) Determination of the feasibility for the transmission of the meteorological data via the spacecraft utilizing the present Automatic Picture Taking (APT) ground stations, initially developed for NASA's meteorological satellites.

The VHF communications transponder is an active frequency translation repeater which received in the 149 mc range and transmits in the 135 mc range without a change in modulation. The electronic phased array antenna system comprised a major part of the experiment. The control signals which form and despin the phased array beam will be derived from the existing Phased Array Control Electronics (PACE) system carried aboard the ATS-1 "spinner" to control the despun microwave phased array. Characteristics of the VHF Transponder are shown below.

ATS-1 VHF Communication Transponder Characteristics

Transponder type:	Active, frequency translator
Carrier frequency:	Receive 149.22 mc Transmit 135.60 mc
Bandwidth:	100 KC
Antenna type:	8 element phased array
Antenna gain:	8.5 db
Transmitter power output:	Per element 5 watts Total 40 watts
Receiver noise figure:	2.5 db
Weight:	20 pounds
Efficiency:	40 percent
D.C. Power:	90 watts

Two-way voice communications between aircraft in flight and the ATS ground control station and between two aircraft have been conducted successfully.

The ATS-1 VHF transponder has been used to relay, in facsimile format, processed weather data consisting of maps and NEPHANALYSES, and spin-scan camera pictures from the ATS Mojave ground station to the local Automatic Picutre Transmission APT ground stations within the satellite's communications range. The data format is compatible with the APT picture data rates and signal strengths; and with minor modifications, any ground station equipped to record APT cloud cover pictures can receive these transmissions. Fortyeight APT ground stations participated in the test transmissions, and most received good quality weather facsimile pictures.

C. Other Experiments

ATS-1 carries six scientific experiments that provide data on the orbital enviornment and the effect of this environment on the satellite. These experiments also provide data to study magnetic storm disturbances at one longitude.

The enviornmental measurement experiments are performing as planned and data are being collected on a continuing basis. NASA collects and records the data; scientific investigators analyze and interpret them. Evaluation of environmental effects on satellite performance and lifetime requires measurements over an extended period. Thus, additional data are required to define the space environment of the geostationary orbit and to determine its effects on satellite components.

Suprathermal Ion Detector

The suprathermal ion detector experiment measures positive ions from 0.25 to 50 eV per unit charge in 20 different energy channels. The experiment's primary objective is to determine particle flux as a function of the ion direction of arrival. The principal investigator is J. W. Freeman, Jr., of Rice University.

Omnidirectional Electron-Proton Detector

This sensor detects electrons in the 0.1- to 1.4-MeV energy range and protons in the 5- to 40-MeV range to detemine the omnidirectional fluxes and particle spectra. The principal investigator is G. A. Paulikas of Aerospace Corp.

Electron Magnetic Deflection Spectrometer

The electron magnetic deflection spectrometer measures the electron flux in the energy intervals 45 to 150 keV, 150 to 500 keV, and 500 keV to 1.0 MeV. The principal investigator is J. R. Winckler of the University of Minnesota.

Multiple-Element Particle Telescope

A silicon junction particle telescope detector measures electrons, protons, and alpha particle spectra in the following energy ranges:

Particle	Energy, MeV	Number of Ranges
Electrons	0.4 to 1.2	2
Protons	0.7 to 100	6
Alpha	1.8 to 85	5

The principal investigator is W. L. Brown of Bell Telephone Laboratories.

Magnetometer

The magnetometer experiment provides measurements of the magnetic field enviornment that can be used for resolving the field into two orthogonal components--one parallel to spacecraft spin axis and one perpendicular to the spin axis. The principal investigator is P. J. Coleman, Jr., of the University of California, Los Angeles.

Ionospheric Beacon

The ionospheric beacon experiment provides data to determine the magnetospheric electron density by measuring the variation in received signal-polarization from two phase-coherent beacon signals in the satellite (one at 135.6 MHz and the other at 406.8 MHz). The principal investigators are O. K. Garriott and O. G. Villard of Standford Univ.

SATELLITE TERMINAL DIRECTORY
February 1976

Honolulu (HAWAII)

Carol Misko
Engineering Quad, #31
University of Hawaii
Honolulu, Hawaii 96822

Honiara (SOLOMON ISLANDS) Andrew McKeown

Mostyn Habu
University of the South Pacific
Centre
P. O. Box 460
Honiara, Solomon Islands

Lae (PAPUA NEW GUINEA)

Steve Seumahu, Peter Slavik
School of Electrical Engineering
Papua New Guinea Univ. of Technology
P. O. Box 793
Lae, Papua New Guinea

Niue (NIUE ISLAND)

Rodney G. Spooner
Education Centre
P. O. Box 32
Alofi, Niue

Noumea (NEW CALEDONIA)

Pat Mahony
South Pacific Commission
B. P. D 5
Noumea, Cedex
New Caledonia

Port Moresby (PAPUA NEW GUINEA) Schmidt

Coleman Moni
National Broadcasting Commission
P. O. Box 1359
Boroko, Papua New Guinea

Port Vila (NEW HEBRIDES)

Roslyne Pedro
Kawenu Training College
Port Vila, New Hebrides

Rarotonga (COOK ISLANDS) Don John Scandon

Stuart Kingan, Tereapii Kingan
Scientific Research Division
Box 66, Premier Department
Cook Islands Government
Rarotonga, Cook Islands

Saipan (TTPI)

George Callison, Elias Thomas
Special Assistant/Dir. Public Affairs
Office of the High Commissioner
Trust Territory of the Pacific Islands
Saipan, Mariana Islands 96950

Suva (FIJI) Bob Stone Bill Travis

Gilda Benstead
Extension Services
P. O. Box 1168
University of the South Pacific
Suva, Fiji

Tarawa (GILBERT ISLANDS)

Temaroiti Rameti
USP Centre
P. O. Box 275
Bikenibeu, Tarawa
Gilbert Islands

Tonga (KINGDOM OF TONGA) Wilkinson Bill Zoochie

Kaveinga Havea, 'Anau Fanua
University of the South Pacific
Centre
Nuku'alofa, Tonga

Wellington (NEW ZEALAND) Doug Gordon

Mr. Anthony Hanley
Department of Education
Private Bag
Government Buildings
Wellington, NEW ZEALAND

Elsa Flavell
PEACESAT Manager, Private Bag
Wellington Polytechnic
Wellington, New Zealand

John Bystrom
Director, PEACESAT

Telex: 723-597
Phone: (808) 948-8848 (office)
(808) 373-3795 (home)

George

June 7 - 5:00 pm

Open for Series

Tentative Guideline Agenda For The First Session Of The Peacesat Marine Turtles Series

Scope and Format - General Background Outline Reports For Areas or Regions

Travis-Bell Handbook ?

Tuamotu project?

- I. Species
  - A. Population numbers - size ratios
  - B. Distributions
  - C. Nesting
  - D. Population trends - status
- II. Feeding Pastures
  - A. Existence and extent
  - B. Composition
- III. Exploitation
  - A. Animals
  - B. Eggs
  - C. Products
  - D. Methods
  - E. Nature
    - 1. Licenses
    - 2. Seasons
    - 3. Poaching
  - F. Markets
- IV. Conservation - Protection
  - A. Legislation
    - 1. Products
      - a. Import regulations
      - b. Export regulations
      - c. Local utilization
    - 2. Animals
    - 3. Eggs
    - 4. Enforcement
    - 5. Parks, reserves, sanctuaries
  - B. Conservation Authorities
    - 1. Government
    - 2. Private
      - a. Universities
      - b. International organizations
      - c. Other
  - C. [illegible]

C. Inaccessibility of Rookeries
D. Environmental Factors
   1. Pollution
   2. Coastal development
   3. Coastal highways
E. Financial Aid
   1. Local
   2. Outside
F. Education - Publicity
   1. Radio
   2. Newspapers
   3. Pamphlets
   4. School Programs
   5. Films

V. Culturing Projects or Hatchery Programs

VI. Migration Patterns

VII. Tagging
   A. Intra-regional returns/finds
   B. Inter-regional returns/finds
   C. Extra-regional returns/finds
   D. Opinions about a regional tagging centre

VIII. Priorities for local situations

UNIVERSITY OF HAWAII
PEACESAT
2560 Campus Road · Honolulu, Hawaii 96822

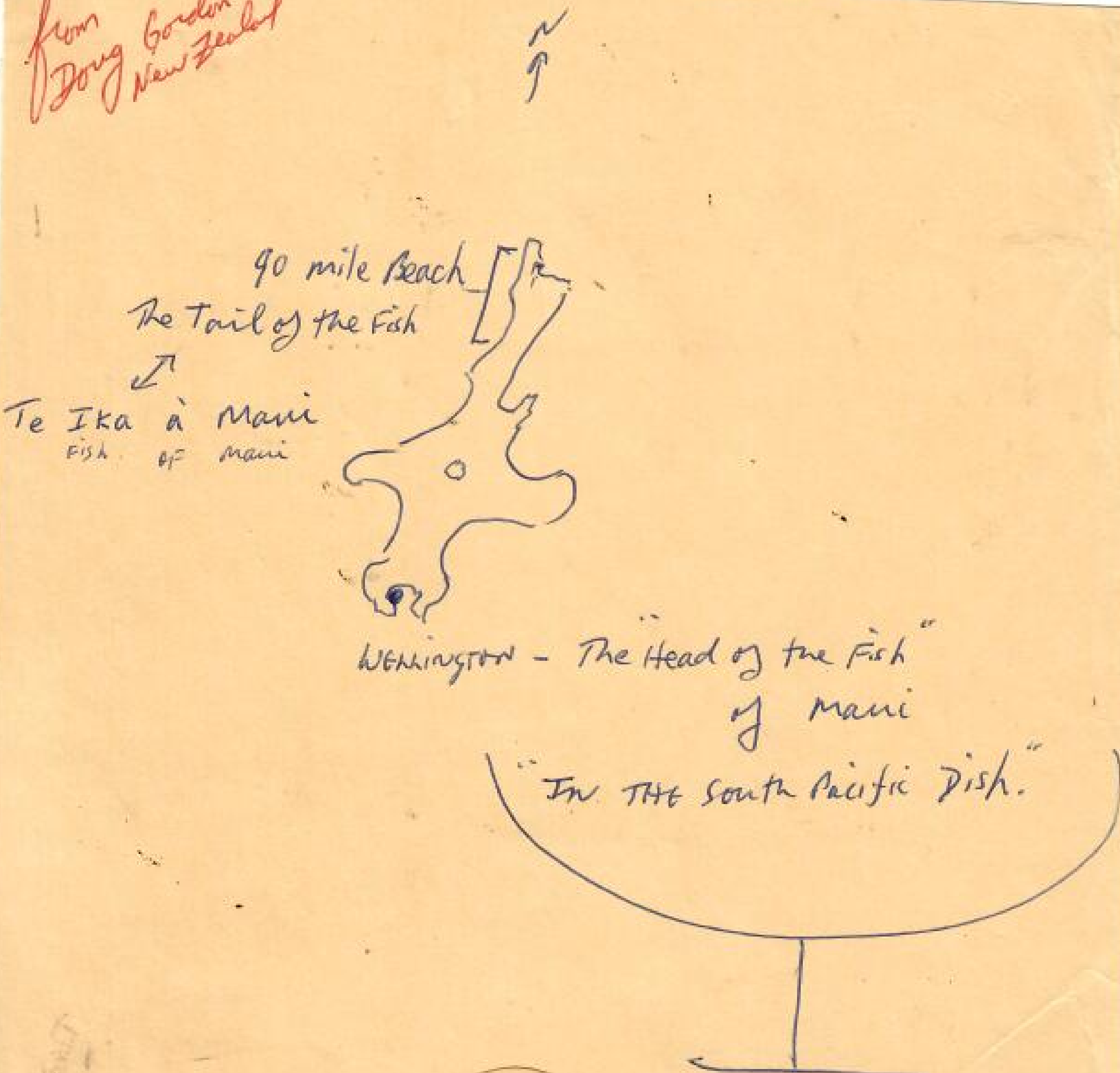
PEACESAT Agenda
October 11, 1976 Gmt 0100-0300

SEA TURTLES - Noumea Chairing (SPC)

I. Regional Cooperation
   A. Determination of status of regional turtle pupulations
      1. Regional Tagging Center
         (a) where?
         (b) who?
         (c) sponsorship?
         (d) services?
         (e) budget?
      2. Surveys and tagging program
   B. Clearing house for information
      1. catch statistics
      2. farming and hatchery experiences
      3. scientific literature
   C. Past & Present ranges and sites
      1. maps for each species showing past and present distribution
      2. critical habitat identification
         (a) nesting sites
         (b) nursing sites for juvenilles
         (c) breeding area
   D. Conservation
      1. regional sanctuary or reserve system
      2. re-establishment of populations in areas where exterminated
   E. Education
      1. preparation of materials (films, slides, posters, etc.) on turtle conservation and management for village level audiences.

George - This is agenda - Hawaii time for Oct. 10 - Sunday - from 3:00-5:00 P.M.

from Doug Gordon New Zealand



N.Z. Journ[al] of Marine & Freshwater Research Mar 1969 — 500 lbs. Leathery — First Southern record of the Platy leopard-ring Leatherback — notes on the ... of Dermochelys coriacea — Charles McCann

Ministry of Agriculture & Fisheries

~~P.O. BOX 2298 WELLINGTON~~
~~NEW ZEALAND~~

~~DFI BUILDING~~
~~FEATHERSTON ST~~
PHONE ~~47-275~~

Tues 29 June

1. - imported products - source (Brand) ARRAYS volume
2. Chatham IS (status of)
3. compile up-to-date on sightings all write up

Fisheries Management Laboratory
7 - 13 Donald McLean St.
Newtown
Wellington

Dear George, I've just had a look at the Peacesat prog. and don't see a Marine Turtle slot — and Elsa Doesn't seem to be in yet (phone) — However I've managed to locate Charles McCann. He's been retired for the past 10 years and says he's away behind in correspondence and therefore is not too interested in letter writing. However, I've managed to kindle his enthusiasm re the space age satellite medium and I feel that once I know when the next slot on Turtles is to be held — then I will go out 20 odd miles — pick him up and drive him into Peacesat. That way we'll be able to get it from the "horses mouth".

Anyway — for your record his address is

C. Y. M. McCann,
8 Kiwi Street,

N.Z. Journal of Marine & Freshwater Research Mar 1969 First Southern Hemisphere record of the Platylepadinae barnacle and notes on the host — Charles McCann
500 lbs leathery

Ministry of Agriculture & Fisheries

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~~NEW ZEALAND~~

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Tues 29 June

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Newtown
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Anyway — for your record his address is

C. Y. M. McCann,
8 Kiwi Street,
Heretaunga
Wellington, N.Z.

over

Young Leatheys occassionally stranded along 90 mile beach

Upon ringing the Museum (Dominion Museum, Wellington,) I find that a Dr. Doctor Moreland is now overseeing work that would take in this sphere (Turtles) however - negative enthusiasm on the subject in hand.

Whatever If everything else fails I believe (McCann) he has written 2 main turtle papers - which should be easily obtainable from -

According to Moreland - since these papers were written there have been a number of sightings - - However more sightings of other species especially Damocles.? (Leathery Turtles)

..... So I just recieved word from Peacenet that a turtle session is scheduled for July 12. 1-3 pm. NZ time - so I'll work to get McCann along -

Thanks for the Reprints George and

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Thanks for the Reprints George and
have a good one!

Douglas B. Gordon.