

1976 BIG YEAR FOR SATELLITES

1976 was our national Bicentennial year and it also was the 50th anniversary of the first liquid fueled rocket flight. Goddard participated in the commemoration of both by contributing to the national Bicentennial exhibit at Kennedy Space Center, Fla., and with 50th anniversary ceremonies at GSFC. During the same period an official NASA Visitor Center was opened at Goddard attracting more than 50,000 visitors through December.

Mid-year was also a time of change for GSFC with Dr. Robert S. Cooper, Deputy Director for the previous year, taking over the Center Director's chair in July from Dr. John F. Clark, who had held that position since 1965.

Meanwhile scientific and applications spacecraft continued to send back all kinds of data . . . data that are being used to better understand our universe and to help us manage our technology and natural resources here on Earth.

The first satellite to be launched last year, Helios-2, carried three Goddard experiments and scientific papers were presented on results from that and an earlier mission in December 1974. New information on our nearest star was picked up by Helios 1 and its predecessor, Helios-2, both carrying Goddard experiments and both showing the necessity for examining the Sun from greatly different angles than has been done so far. The Helios spacecraft were built by West Germany and the Atlas/Centaur launch vehicle was the U.S. contribution to the project.

On January 17, just two days after Helios-2 was placed in solar orbit, GSFC's Delta rocket pumped its first spacecraft of the year into orbit. It was CTS, an experimental highpowered communications satellite. CTS is a cooperative U.S./Canadian project.

Three Marisats were launched by Deltas for Comsat General Corp., the first spacecraft in February, the second in June and the third in October. As the name implies they provide maritime communications service for the industry.

Other communications satellites put up by Deltas were RCA-2, a domestic commercial comsat; NATO-III-A, a North Atlantic Treaty Organization spacecraft and Indonesia's Palapa-1.

The launch of Indonesia's Palapa-1 communications satellite last July was of great importance to that country's national unity program. Only via satellite could thousands of islands making up the Indonesian nation be bound together at a reasonable cost.

About the same time as Palapa was being placed in orbit Goddard's ATS-6 (Applications Technology Satellite-6), launched in May 1974, was finishing up its job of supplying India with a means of transmitting educational and instructional information to thousands of villages throughout the country. Later, when the spacecraft was being brought back toward the United States from its geostationary position over Africa, it was used to demonstrate telecommunications techniques to 27 less technologically advanced nations. This involved film/tape transmissions and live discussions between U.S. and foreign officials speaking from their respective countries via small ATS ground receiving stations.

NASA's Lageos, a laser-reflecting steel ball for making precise geodetic measurements, was placed in an eight million year orbit. Of course, Goddard experimenters by positioning up to 14 laser ranging stations, expect to have some precise information in somewhat less time—five or six years. However, there is a steel plaque on board which tells by whom, when, and where the satellite was launched—a space time capsule.

Only one weather satellite was launched in 1976, NOAA-5, a polar-orbiting spacecraft which transmits weather photos and other information used by meteorologists, oceanographers and the fishing industry, to name only some of the uses for the data.



ONE OF NASA's successful satellites in 1976 was Lageos, appearing like a cosmic golf ball.

NASA SETS 100 PER CENT RECORD IN 1976

NASA achieved a perfect score in 1976 in its 16 launch attempts.

This marks the second time in its 19-year history that the space agency achieved success in all of its launches in a single calendar year. In 1972 NASA was successful in all of its 18 launch attempts.

In keeping with the trend over the past several years, most of the launches were for organizations other than NASA. Twelve were paid for by other government agencies, private corporations, and foreign countries. Two were for NASA missions and two were for cooperative scientific programs in which Germany and Canada supplied spacecraft, which were launched by NASA for the opportunity to share the resulting science.

The launch schedule also indicates the growth in the ability of man to effectively use space for his own direct benefit, since 14 of the 16 launches were direct applications—11 communication satellites, one geodetic, one navigation, and one meteorological satellite.

AIDSAT . . . A TELE-COMMUNICA

Recently, Goddard's Closed Circuit Television complex in Building 8 became the operational program center for an historic experiment in telecommunications technology transfer statesmanship.

Living up to Secretary of State Henry Kissinger's promise of May 6, 1976 before the U.S Conference on Trade and Development in Nairobi, Kenya, to make available American technology to Africans and other developing nations, NASA programmed through the ATS-6 spacecraft a series of two way television broadcasts to twenty-seven countries over a ninety day period.

Having completed a one year loan-service period to India on July 30, the powerful satellite began its westward move to a new geosynchronous orbital position over the Christmas Islands (140° W. Longitude) in the western Pacific on August 1.

Utilizing spacecraft availability during the transit period, personnel from NASA Headquarters, Codes 202, 512 and 950 combined to produce a series of twenty-seven programs to as many nations over the three month relocation time. Naturally the experiment program was named AIDSAT.

Ex-Goddard engineer Paul McCeney, now in NASA Headquarters Office of Applications, was named AIDSAT Program Manager, with Al Whelan, GSFC Code 950 designated as Project Manager. John Wilhelm of A.I.D. was the Program Coordinator. Under the leadership of these three men a hasty, but thorough organization was formed and AIDSAT was off and running, with demonstration personnel ultimately covering about 200,000 miles through 35 different countries. Three technical teams dispersed with small receiving terminal equipment were called Clusters A, B, and C, so named for the type antennas, receivers and monitors they operated in "cluster" fashion at the various remote sites.

The two-part program began August 1. Phase I included demonstrations in countries of Southeast and South Asia, the Middle East, East and North Africa. Phase II included countries in West Africa, South and Central America and the Caribbean.

Tailored to communicate with high level decision and policy makers, AIDSAT program participants included eight presidents, three prime ministers, a king, and a sultan; many top-ranking ministers and businessmen.

An interesting bonus effect included the millions of host country viewers who watched the programs by direct or delayed broadcasts over national television networks. For some, the demonstration broadcasts were the first colorcasts ever received in the host country. During the UNESCO-sponsored conference on Applied Science and Technology in the Arab World, held in Morocco, science and technological ministers of the Arab countries attended the special AIDSAT demonstrations presented especially for them.

Because of this level of host country participation, specially selected anchorman/narrators were chosen to host the programs. For Phase I, astronauts Owen Garriot and Gerald Carr narrated the proceedings from the Madrid, Spain, STDN site. Turning in a professional job for six of the Phase II programs was Goddard's own Associate Director of Code 900, Bill Stroud. The remaining eleven broadcasts were hosted by astronauts Cmdr. Bruce McCandless, USN, and Drs. Bill Lenoir and Bob Parker. All three astronauts hold key positions in the upcoming Shuttle Program and one can readily see why—they are unflappable, cool, articulate and completely professional.



MEMBERS OF TECH TEAM CLUSTERS A and B of the AIDSAT demonstration teams that covered approximately 50 thousand miles each were: (first row, from left) Ivan Sindall, John Chitwood, Clint Carle, Duke Carnright, Eldon Volkmer, Phil Sofey, Michael Moore, Dave Nace, (second row, from left) Don Christianson, Lee Harper, Billy Lane, Fred Tifer, and Doug Kahle.



FULL-COLOR DUPLEX AIDSAT PROGRAMS EMANATED FROM Goddard television facilities in Building 8. Twenty of the persons required for various production duties were (first row, from left): Bob Williams, Jesse Callahan, John Arslanian, Henry Wagner, Patsy Respes, Randy Beeman, (second row) Jim Hatton, Bill Lenoir, Leroy Burke, Mike Raimond, Denny Exley, Dick Burns, Ray Suggs, (third row) Bob Shaffer, John Mitchell, Ron Marth, Al Irwin, Al Jackson, Jim Lacy, and Bob Jones.

IONS STATESMANSHIP PROJECT



DEMONSTRATION TEAM LEADERS (from left) Dave Nace, John Chitwood, and Al Whelan check installation of a TART (transmit and receive terminal) feed system; one of many used throughout the three-month, 27 country AIDSAT program.



GODDARD'S OFFICE OF PUBLIC AFFAIRS produced a 60-second television spot on AIDSAT that was aired nationally.

Three Code 950 engineers were the Cluster managers: Dave Nace, Cluster A, John Chitwood, Cluster B, and Al Whelan, Cluster C. Each manager had the responsibility of being in the right place at the right time with all equipment working properly. Since panel members of the host countries were comprised of Cabinet or ministerial level officials, failure of any one Cluster would have been catastrophic.

With host country coordination by A.I.D., NASA Headquarters and contract personnel, pre-production details were supervised by Robert Shafer, NASA Headquarters Assistant Administrator for Television. Technical supervision of programs originating from the Building 8 CCTV complex was provided by Code 512's John Arslanian, Henry Wagner and Denny Exley. "Big Henry" Wagner also doubled as Program Director with panel protocol smoothly coordinated by Code 202's Al Shehab, working in concert with A.I.D. Protocol Officer, Bill Paupe.

Each country visited was beamed essentially the same two-and-one-half hour program format. Each conference began with a personal, taped message from President Ford. Films illustrating remote sensing, earth orbiting communications and meteorological satellites were transmitted through Madrid (Phase I) and Rosman, N.C. (Phase II) STDN sites, up to ATS-6 and then down to the participating country. Two way direct video communications between U.S. and host country panelists occupied the final hour.

The line-up of host countries visited by Clusters indicate the magnitude of travel and "technological statesmanship" involved.

<i>Cluster A</i>	<i>Cluster B</i>	<i>Cluster C</i>
Thailand	Bangladesh	Pakistan
Oman	United Arab Emirates	United Arab Emirates
Jordan	Yemen	Kenya
Sudan	Libya	Morocco
Mali	Upper Volta	Ivory Coast
Cameroon	Central Africa Republic	Liberia/Sierra Leone
Uruguay	Bolivia	Argentina
Ecuador	Surinam	Peru
Jamaica	Costa Rico	Haiti

From the above run-down, one might imagine that Cluster Managers and team members would have a few "sea stories" to tell about security, weather and modes of transportation, but that is another story, perhaps for another issue.

On December 10, Center Director Dr. Robert S. Cooper presented the coveted Group Achievement Award to the Agency for International Development Satellite Team. The citation read:

"In recognition of the outstanding technical and managerial accomplishments, personal dedication and professionalism of the entire AIDSAT Project Team, that contributed to the highly successful international demonstrations in which leaders of over twenty-five underdeveloped countries were shown the potential benefits to be derived from the application of satellite communications and remote earth sensing."

Dr. Cooper initially authorized the commitment of center resources, personnel and reputation in support of the AIDSAT Project concept, with the full knowledge that a "million and one things" could go wrong, and probably would. They didn't.

As Redskin Coach George Allen is fond of saying, "It was a 43-man team victory!"

Congratulations AIDSAT Team!

GODDARD AWARDS TECHNICAL CONTRACT TO MINORITY FIRM

Goddard has awarded a minority contract to Systems and Applied Sciences Corp., Riverdale, Md., to provide and maintain computer software for the Nimbus G project.

This is a contract with the Small Business Administration and the Corporation, which has been certified as a minority contractor. It is a cost plus fixed fee contract for \$1,391,864. The work is to be completed by March 31, 1980, and will be performed at Goddard and at the firm's facilities on Kenilworth Avenue, Riverdale, Md. The firm will employ about 15 to 20 people on the project.

Systems and Applied Science Corp., will design, develop, test and maintain a software system for processing data sent to Earth by the Nimbus G spacecraft which will be launched in November of 1978 to develop advanced sensors and technology basic to pollution monitoring and the oceanographic and meteorological disciplines.

This is the first Goddard contract of over \$1 million in the technical field awarded to a minority firm, and is the largest multi-part single contract to be awarded by any NASA Center to a minority Contractor. It brings Goddard's minority contract total to over \$13 million. The corresponding NASA-wide figure now totals \$80 million.

According to Linton G. Cheers, Chief of the Procurement Management Division, "We at Goddard have every confidence that the Systems and Applied Science Corporation will handle their responsibilities in a way that will reflect favorably upon the Goddard Space Flight Center, the Nation, and on the ability of minority groups to successfully compete in all facets of our increasingly complex society."

Goddard Mourns . . .

- The Reverend Matthew P. Thekaekara died November 24 of a stroke. He was 62 years old.
- Edward Singh Chin died December 9 after having a heart attack. He was 52 years old.

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Edited by PAO Staff
Patricia Ratkewicz, Secretary, Phone Extension 4955



ANALYZING A PRINTOUT on the Nimbus-G project is (from left) Tom Cherrix, Goddard Contract Technical Officer; Sharad Tak, Vice-President of Systems and Applied Science Corporation; Ralph Shapiro, Goddard Nimbus Missions Operations Manager; and Porter Bankhead, President of Systems and Applied Science Corporation.

SPACE BATTERY WORKSHOPS PAY DOUBLE DIVIDENDS

NASA-sponsored workshops on space battery technology are providing the American taxpayer double dividends for the federal funds expended on the research and development of spacecraft power systems.

The workshops are conducted to help increase efficiency and lifetime of spacecraft battery systems through exchange of information between users and manufacturers. The program is resulting in better and longer-lived batteries developed in industry for use in heart pacemakers, aircraft and other consumer products such as portable tape recorders, radios and flashlights.

Initiated in 1968, the workshops are held annually at Goddard where battery research for spacecraft use has produced major advances during the past 15 years.

"As a direct result of the workshops, we have been able to develop uniform standards and quality control steps now accepted and used throughout the battery community," said Gerald Halpert, Goddard's battery workshop chairman.

One new technique reviewed at the workshop is an electrochemical process of fabricating battery plates at high temperatures—100 degrees C (212 degrees F.). This technique promises to reduce the steps in fabricating battery plates and provides for a more uniform product than conventional techniques.

Plates, a fundamental element of batteries, provide the medium through which electrons flow from a negative to a positive electrode in producing electrical energy.

Workshop participants also exchanged ideas on a rechargeable nickel-hydrogen battery, a recent development which promises to provide more energy per pound for the larger units, with storage capacities ranging from 25 to 100 ampere hours.

The first experimental use of a nickel-hydrogen unit in space will be aboard the Navigational Technology Satellite-2, part of the joint services research program for a global satellite system.

Another workshop topic was special procedures and techniques developed at Goddard for battery development, implemented in industry for product evaluation and quality control.