

SPACE

NASA Launches First 'Cartwheel' Satellite**See Front Cover**

► A NEW VERSION of the TIROS weather satellite has been launched by the National Aeronautics and Space Administration from Cape Kennedy, Fla.

The new satellite, designated TIROS IX, rolls along its near-polar orbit much like a cartwheel. Its cameras view the earth from its side or rim unlike cameras on earlier TIROS, which pointed from the bottom of the satellite.

TIROS IX rolls at a rate of ten revolutions a minute and its cameras view the earth once during each revolution. Thus, the entire sunlit portion of the earth can be photographed daily. None of the other satellites has scanned more than about one-fourth of the earth each day.

This is the tenth successful launch of a weather satellite. Eight earlier TIROS have snapped some 415,000 weather pictures of the earth and the Nimbus I has taken 27,000 pictures.

TIROS IX is the first satellite to be launched in a near-polar sun-synchronous orbit from Cape Kennedy. TIROS IX entered orbit over the Pacific Ocean about 300 miles west of Quito, Ecuador, after its Delta launch vehicle had performed three "dog-leg" maneuvers.

Primary objective of the TIROS IX research and development launching is to test the cartwheel configuration. It is the fore-runner for the joint NASA and U. S. Weather Bureau operational weather satellite system called the TIROS Operational Satellite (TOS) system. The TOS program consists of six launches and is scheduled to begin next winter.

TIROS (Television Infrared Observation Satellite) is a weather satellite project of NASA's Office of Space Science and Applications. Technical direction is under the Goddard Space Flight Center, Greenbelt, Md. The U. S. Weather Bureau receives all weather data from the satellite for distribution to the world-wide meteorological network.

Shown on this week's cover are two pictures taken from Tيروس IX on Jan. 23. The left view, taken on the satellite's 17th pass, shows the North Atlantic Ocean with a frontal band standing out near the horizon. The right view, from the 19th orbit, pictures the U.S. Southwest and western Mexico, with a sun glint off Baja California.

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EDUCATION

More Science in High School Than College

► HIGH SCHOOLS are doing better than colleges in educating non-science majors in science and mathematics.

Freedom to choose college courses enables students to avoid science and mathematics. Generally, students get most of their scientific training before entering college.

A study of non-science graduates from four Kentucky colleges shows that while two-thirds had taken three or more years of math in high school, only 60% took a math course in college. Students who took high school chemistry totaled 53%, but 83% avoided it in college. Less than half of the group had taken a physics course in high school or college.

Fred D. Boercker and William H. Owens, physics professors at Georgetown College in Georgetown, Kentucky, conducted the study. They reported their findings to the joint meeting of the American Physical Society and the American Association of Physics Teachers in New York.

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GEOPHYSICS

New Emphasis on Studies Of Core of Earth Urged

► DRILLING a hole eight to ten miles into the earth's hot interior is one of the programs urged during the next ten years by a panel of the National Academy of Sciences-National Research Council.

The panel called for an intensive effort to chart the invisible and mysterious interior of earth during the next decade.

The panel urged a new emphasis on studies of the earth from surface to core, with particular focus on the mantle, which extends some 2,000 miles below the crust. Forty nations are now collaborating in the Upper Mantle Project, which will reach its peak activity during the next three years.

Within the mantle are locked the major secrets of the earth's history of 4.5 billion years. The enlarged research effort proposed by the panel to trace the flow of matter and energy from the mantle to the crust is outlined in a 198-page report, "Solid-Earth Geophysics: Survey and Outlook."

More than 50 of the country's top geophysicists contributed to the report. Some of the questions asked are:

Is the interior of the earth heating up or cooling down?

Are the continents in motion?

What causes the 20 major earthquakes each year?

Can earthquakes be predicted?

What is the origin of the earth's magnetic field?

Several scientific tools will be used, either singly or in combination, to shed light on these problems. Among these are:

1. Seismology, upon which most models of the earth's structure are based, involving the analysis of seismic waves generated by earthquakes and man-made explosions.

2. Deep drilling of the earth's crust, to extend the basis for inferences on the structure and composition of even deeper zones. The super-deep hole would be drilled after studies had shown its feasibility.

3. Heat flow measurements through the floor of the oceans and through the continents.

4. Gravity determinations of the distribution of mass beneath the surface.

5. Geomagnetic studies to reveal patterns of electrical conductivity that give rise to magnetic fields.

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IN SCIENCE

MEDICINE

Advanced Stage Tumors Fade After Drug Use

► COMPLETE DISAPPEARANCE of large, transplanted mouse tumors in an advanced state occurred after treatment with a single dose of the drug aniline mustard.

In a screening test for drugs that might be valuable in treating malignant tumors of bone marrow, Drs. M. E. Whisson and T. A. Connors of the Chester Beatty Research Institute, London, found that aniline mustard retarded tumor growth more effectively than a number of other drugs now in use.

Although many transplanted animal tumors may be cured if treated with drugs the day after implantation, when treatment is delayed and the tumors increase to 20% of the body-weight, cures are rare, the physicians point out.

Drs. Whisson and Connors, reporting in *Nature*, Jan. 23, 1965, found, however, that even 17 to 21 days after implantation, the tumors treated with aniline mustard completely disappeared.

Regression of the tumor mass occurred very rapidly during the first week of treatment and then much more slowly.

The high selectivity of aniline mustard requires further investigation, the physicians said. They believe it is closely related to the chemical structure of the drug.

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AERONAUTICS

Giant U.S. Jet Transport Wins High British Praise

► THE HUGE, 600-passenger subsonic jet transport plane called the C-5A, now being studied for use by the United States Air Force, is winning British praise as an example of a military project planned with a possible commercial future in mind.

The C-5A is still in the early discussion stage as a military troop/cargo plane capable of carrying 250,000 pounds. There is already talk it could reduce commercial air passenger fares by half.

"Planners in the United States have been most successful in foreseeing commercial requirements while meeting military demands," E. Colston Shepherd said in *New Scientist*, 25:34, 1965. "Britain has no comparable system for making military needs subsidize commercial ends," he added.

The Boeing 707 is another example of both military and civilian interests benefiting from the same design.

The prototype was designed as a dual-purpose military/civilian aircraft, and was first adapted by the Air Force into the KC-135, a tanker for mid-air refueling.

Today there are 395 707's in commercial service around the world.

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CE FIELDS

PUBLIC SAFETY

Stop Amateur Rocketry, Says Space Group

➤ "NO MORE amateur rocketry" says one of the nation's top space and rocket organizations.

The growth of basement rocket building has prompted the American Institute of Aeronautics and Astronautics to take a strong stand on the problem, particularly in California, where the AIAA is even asking for new laws to prohibit unauthorized rocket building.

Originally the AIAA was looking for a way to help the growing numbers involved in the relatively new hobby. However, one official told SCIENCE SERVICE, most of them turned out to be "basement bombers."

The AIAA finally decided that any help would be inadequate. In 1963 it published a pamphlet called "An Open Letter to Amateur Rocketeers," written by a Stanford University physics student as a warning about lost eyes and fingers resulting from unsuccessful rocket launchings. The institute also went on record as being "firmly opposed to dangerous experimentation with energetic chemicals."

California, in particular, is a center of "basement bombers." The only restrictive legislation now on the state's books is an anti-fireworks law that applies only to solid propellants. Thus, rocketeers could use gasoline or any other liquid fuel.

Broader anti-rocket laws would not necessarily stifle budding space scientists, however, the organization maintains. "We are not against experimenting," came the answer to a question, "we are just against killing people."

Several areas of research could be just as interesting to young space scientists, but much less dangerous. One example is the construction of a space simulation chamber, on the ground, for a mouse.

In the pamphlet the AIAA asks every space-oriented young adult or science club member engaged in amateur rocketeering: "Are you interested in making a contribution to the science of rocketry and astronautics, or do you just want to risk your life in meaningless experimentation?"

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NUTRITION

Feeding by Machine Helps Reduce Weight

➤ FAT PERSONS can keep track of their calories and lose weight by using a machine feeder that monitors food intake electronically, it is reported in the Journal of the American Dietetic Association, 46:18, 1965.

The machine dispenses single mouthfuls of a liquid diet formula, delivered by way of a mouthpiece when the dieter pushes a

button. A recording timer shows the exact time of eating.

One 400-pound patient went down to 275 calories a day without discomfort. He said he could not take more food because he felt that the machine was "watching" him. When he was allowed to pour the formula into a drinking glass, his daily intake increased to 575 calories a day.

Drs. Sami A. Hashim and Theodore B. Van Itallie of St. Luke's Hospital, New York, and the Institute of Nutrition Sciences, Columbia University, reported the results of the automatically monitored food-dispensing apparatus.

They said the feeding device also has been used on healthy volunteers, and for persons with lower lip operation problems.

A 22-year-old healthy male volunteer who fed himself three times a day by machine wore a pedometer to estimate his activity. He ordinarily was accustomed to 4,430 calories a day, but when he was given two milligrams of amphetamine half an hour before each meal, his food intake was lessened to a daily mean of 3,987 calories with resulting weight loss.

Among the many medications that are claimed to reduce appetite, the researchers said that only certain members of the amphetamine group are of value.

Even these drugs are effective only for limited periods and must be carefully fitted into a well planned, long-term program of weight control.

The best reducing program for most patients is one that includes proper motivation, an appropriate diet and sufficient exercise.

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PLANT PHYSIOLOGY

Grass Grows Slower With 'No Mow' Chemical

➤ A "NO MOW" chemical that keeps grass from growing too fast is being used more and more along highways, on military installations, golf courses and industrial parks throughout the country.

The chemical, maleic hydrazide, will also halt the rapid growth of trees for an entire season with one spraying, said Billie S. Morgan, U.S. Rubber Company, Naugatuck, Conn.

"The chemical works nicely on home shrubs and hedges," Mr. Morgan said, "with little or no side effects."

However, he does not recommend it for use on home lawns because of the possibility that the grass might be discolored temporarily. In addition, there are no low cost applicators available for home use.

The maleic hydrazide, sprayed on a plant, preferably during the spring, is absorbed by the green leaves of the plant and collects at the base of a new shoot. The chemical blocks the cell division of the shoot, thus preventing it from growing.

Mr. Morgan, together with Paul W. Bohne, also of the U.S. Rubber Company, reported the latest findings on the "no mow" chemical at a meeting of the Highway Research Board in Washington, D.C.

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PHYSICS

New Method to Detect Neutrinos Proposed

➤ A NEW METHOD to detect neutrinos, the most elusive atomic particles in the universe, will be tested deep in a salt mine near Cleveland later this year.

The neutrino is called a "ghost" nuclear particle because it is about as close to nothing as the photon, the packet of light by which we see and know the world about us.

The photon is familiar, but the neutrino lies almost beyond human experience, even though 500 billion of them from the sun pass through your hand every second.

Neutrinos, which have no charge and no observable mass, are hurled into space by the sun and other stars. They shoot out from an atomic nucleus at the speed of light when atoms split or when they fuse together, carrying away some of the energy released in either case.

The new method to detect neutrinos from the sun was proposed by Dr. F. Reines and R. M. Woods Jr. of Case Institute of Technology, Cleveland. In Physical Review Letters, 14:20, 1965, the scientists suggest building a large target made from boron or lithium, wrapping the slabs of either element in plastic.

In order to tell the difference between the sun's neutrinos and those thrown out by all other stars in the cosmos, two or three tons of target material would be needed, and at least a year of counting. Detectors would record a neutrino when it reacted with the boron in either case.

Other sources of electrons counted by the detectors would be reduced to a very low number using the proposed method by burying the equipment deep in the salt mine and by mounting the apparatus on a turntable turned broadside to the sun.

The equipment, which has been designed, would be placed 2,000 feet deep in the Morton Salt Company's Fairport Harbor Mine, about 30 miles northwest of Cleveland.

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MEDICINE

New Treatment Relieves Cerebral Palsy Patients

➤ A NEW TREATMENT has brought relief to cerebral palsy patients suffering from muscular rigidity and spasticity, Dr. Juan Negrin Jr. of New York City reported to a joint meeting of the Orthopaedic Research Society and the American Academy of Orthopaedic Surgeons in New York.

The technique allows a cold solution, circulating through a tube system, to come in contact with the spinal cord, lowering the temperature in this area. The rest of the body remains at normal temperature.

Dr. Negrin believes that the improvement in these patients may be due to interference with the stretch reflex, the involuntary contraction of a spastic muscle when it is suddenly stretched.

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