GEOPHYSICS

U. S. Satellite Tested

The United States is continuing its final tests with the six-inch satellite preparatory to launching a 20-inch "moon." Another firing will occur in the near future.

See Front Cover

➤ THE EXPLOSION of the Vanguard rocket at the first U.S. try to launch an artificial earth satellite did not damage the six-inch sphere housed in the rocket's third stage. However, the sphere will not be used for future launchings, but others like it will.

Such failures are to be expected in firing any rocket of new design, even though the three stages that were to hurl the first U.S. moon into an earth-circling orbit had been successfully tested separately.

The Soviet success in launching earth satellites is attributed to the fact that Russians used the same rockets to put their moons into orbit that are used to power their intercontinental ballistic missile. Some tests of these ICBM rockets undoubtedly were failures, also, but were not given any publicity.

Here are the facts concerning the first U. S. artificial earth satellite.

It is a six-inch, four-pound test "moon" containing two radios, transmitting at 108.00 and 108.03 megacycles to within four kilocycles. One is powered by a battery, expected to last about two weeks, the other by solar cells, which will operate only when the tiny sphere is in the sunlight. Lifetime of the solar cells is not known.

The photograph on the cover of this week's SCIENCE NEWS LETTER shows Naval Research Laboratory scientist Wayne Traylor as he readies a six-inch satellite for vibration tests up to 25 g's at the laboratory in Washington, D. C. The six rectangular objects on the aluminum sphere's surface house solar batteries that are to be evaluated during the test flight for possible use as power supplies for later satellites.

The crystal controlling the broadcasts at the even 108 megacycles is mounted at the satellite's center so its temperature will be as nearly constant as possible.

The crystal controlling the broadcasts at 108.03 megacycles is temperature-sensitive, however, and mounted on the satellite's surface.

The difference between the two frequencies thus indicates the skin temperature, each degree centigrade changing the frequency by about 100 cycles. The temperature so measured is expected to be accurate to within five degrees.

No nickname has yet been given the U.S. satellites, although various suggestions have been made. Because the Russians beat the U.S. into space, it is possible that all satellites will be nicknamed sputniks.

Official names of satellites, subject to approval next year by the International Astronomical Union when it meets in Moscow next August, follow the same system as for comets. (See SNL, Oct. 26, p. 259.)

Satellite experts in Washington expect the 20-inch U.S. satellite will have approximately the same visibility as the first Russian sputnik, just detectable by the naked eye under good conditions, but the six-inch sphere can not be seen without binoculars or telescope. The third and propelling stages of the U.S. satellite rockets will probably not be as visible as the Russian ones were because they will not be as large.

Since the U.S. launchings are made at an angle of only 35 to 40 degrees to the equator, the satellites will not be visible from places more than 40 degrees in latitude on each side of the equator. This means they will not be seen north of Philadelphia, Indianapolis, Denver and Reno.

Lifetimes of either the tiny or 20-inch spheres depend upon the accuracy with which they are thrown into orbit. Scientists expect they will circle the earth at least several weeks.

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A *nuclear* center is being established in Puerto Rico to develop a comprehensive program for research and training in nuclear science and engineering and the peaceful applications of nuclear energy in medicine, agriculture and industry.

TECHNOLOGY

Better Rockets Seen

➤ SOLID propellant rockets, already replacing complicated expensive liquid-fueled engines in the nation's defense effort, are being made safer and more efficient by a new technique of combining two engines in a single rocket, scientists at the American Rocket Society meeting in New York were told.

Many new air-to-air and ground-to-air anti-aircraft missiles will feature two propulsion stages that do not separate in flight after the first stage burns out. Robert S. Newman, assistant principal engineer, solid engine department, Aerojet-General Corp., Sacramento, Calif., said the integrated two-stage, or dual thrust, rockets will be more reliable than many present systems because the joint between the two stages, as well as the complicated separation instruments, will be eliminated.

Many existing defense missiles consist of two stages. The first stage booster gets the rocket off the ground or away from the launching plane and builds up acceleration. The second stage sustainer provides thrust as the missile proceeds to its target.

Booster rockets usually are jettisoned after burn-out to reduce the missile's weight. The separation of the booster from the sustainer is a complicated operation that rocket engineers would like to avoid, Mr. Newman said.

He added that the jettisoned booster section also provides a significant hazard to friendly planes as well as persons on the ground.

The only disadvantage to integrating the booster and sustainer in one unit is that of increased weight during the remainder of flight. This problem will be overcome by more efficient solid propellants that will reduce overall size and weight of the missile, the rocket engineer predicted.

A modification of the dual thrust system was also described. It consists of tandem-mounted rocket engines which actually make up a single engine in two compartments. Each compartment would carry a fuel appropriate to the job it is to do.

During the past year the Defense Department has indicated that simple, inexpensive solid rockets are gradually replacing many of the complicated, and often-times less reliable, liquid-fueled rockets. Mr. Newman said solid propellant chemists have made advances recently that will put solid fuels into rockets for which only liquid fuels would have been considered a few years ago.

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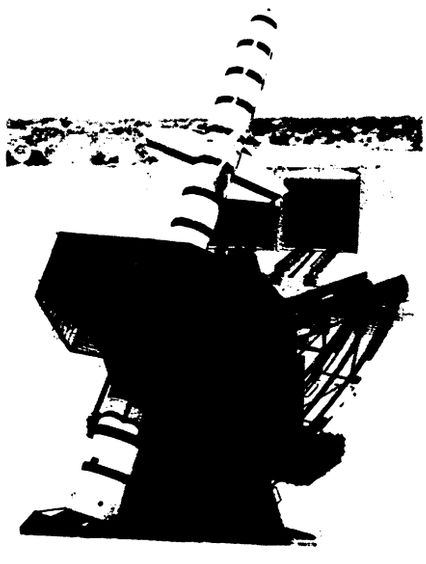

MISSILE—Talos missile is shown on automatic missile launcher. Each missile is contained in a reinforced concrete storage cell within a circular magazine. During a tactical engagement, signals are received at the launcher which automatically rotates to the proper missile storage cell. A cart runs from the launcher into the cell, picks up the missile and transfers it to the launcher.