ROCKETS AND MISSILES

Double Space Payloads

➤ THE UNITED STATES is on its way to doubling payloads in space with a system that sounds like the ingredients of a new tooth paste: liquid fluorine with hypergolic action.

Combined with other elements, fluorine becomes a fluoride compound safe enough for treating water and tooth paste. But liquid fluorine itself is a dangerous, hard-to-handle fuel. In its natural state it is a greenish-yellow gas of the chlorine family. It must be kept at 306 degrees below zero Fahrenheit to maintain it in a liquid state.

It has been recognized as the most powerful of all oxidizing agents—so powerful that special methods for shipping and handling large quantities had to be developed. Allied Chemical's General Chemical Division has developed these methods and has supplied more than 40 tons of liquid fluorine to the Bell Aerosystems Company for rocket development.

Bell used safety measures similar to those with other rocket chemicals and has had a perfect safety record.

Under contract with the National Aeronautics and Space Administration, Bell has built a rocket engine designed to prove the feasibility of fluorine and hydrogen. Used for upper stages of rocket vehicles, such a rocket engine would have more power than those used now.

It would need no ignition devices, thus reducing the weight of the stage. The new engines have hypergolic or spontaneous ignition.

The Able stage of the Atlas-Able combination that will soon carry a highly instrumented space experiment station into orbit around the moon also has hypergolic ignition, but it uses a different fuel.

Bell has conducted full-scale firings of the new fluorine-hydrogen engine. Company engineers predict similar systems can double payloads. NASA officials agree.

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ASTRONAUTICS

No Women in Space

➤ THE RULE OF "LADIES FIRST" does not apply in outer space, Brig. Gen. Don Flickinger, USAF, assistant for bioastronautics, Headquarters Air Research and Development Command, Andrews Air Force Base, told SCIENCE SERVICE.

The emphasis on the official United States program for manned space flight still is on "man," he said, despite reports that a young woman pilot has been "tested and qualified" as an astronaut by a top scientist for the National Aeronautics and Space Administration.

Dr. Randolph Lovelace, chairman of NASA's Life Science Committee—the group that participated in the selection of the seven Mercury Project astronauts — last month named Jerrie Cobb, 28, of Oklahoma City, Okla., as the first woman candidate qualified for space duty on the basis of tests given her at the Lovelace Clinic in Albuquerque, N. M.

Neither the tests given Miss Cobb, nor the period of testing, met the standards which guided the selection of the Mercury astronauts, Gen. Flickinger said. "Adequate testing for such selection takes a matter of months and, of necessity, is far more rigorous than that to which Miss Cobb was exposed," he added.

Women have been ruled out of pioneer space flights for practical as well as valid medical reasons, Gen. Flickinger explained. Practically, there is the problem of designing and fitting a space suit to accommodate their particular biological needs and functions.

In order to determine adequately women's physiological and psychological resistance to the stresses of a space environment, biomedical studies would have to be made on hundreds of the fairer sex. It cannot be done on the basis of testing one or even the dozen women now undergoing preliminary testing at the Lovelace Clinic, Gen. Flickinger said.

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ROCKETS AND MISSILES

Echo Retains Shape

➤ THE BALLOON SATELLITE Echo has now been in orbit for more than seven weeks. And all that travel has left it with a few wrinkles but still in good shape.

Radio beams are still being bounced off it. Scientists are still studying slight changes in its orbit. These changes are caused by the pressure of sunlight on the large but light structure.

Scientists on the East and West Coasts and even in England and France have sent or received messages via Echo.

It is, however, no longer seen as frequently as earlier. On many of its passes at night it is eclipsed by the earth, just as the moon sometimes is, and therefore it reflects no light.

Echo will stay in the earth's shadow for long periods until late December when it will enter another phase in which it orbits in the sun's light for longer and longer periods and will again be visible several times each night.

Scientists had thought that when Echo first entered the earth's shadow it might collapse—the gases inside would cool and exert no pressure to keep the satellite expanded.

But Echo did not collapse, apparently because the pressure from outside the satellite is almost non-existent. The 100-foot balloon, made of aluminized plastic film, also survived the annual Perseid meteor shower. The shower hit the week end following Echo's launching on Aug. 12.

Passing these tests, Echo now may stay in its 1,000-mile altitude orbit for as long as a year before gravity pulls it low enough to burn from the friction of the earth's atmosphere.

Where does the National Aeronautics and Space Administration go from here?

Proposals and preliminary design studies for future inflatable structures include:

1. A great structure with shiny reflectors for focusing the sun's heat for conversion to electricity. Such a device could greatly increase the power supplies now available to satellites.
2. An inflatable glider or auxiliary wings for slowing a space ship's re-entry into the earth's atmosphere.
3. A sailplane that would move through space using the pressure of the sun's light in the way a sailboat uses the pressure of the wind. One expert believes a sailplane could get to Mars in 118 days—less than half the time he estimates a chemical rocket would take.
4. An inflatable laboratory or repair station in space.

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ROCKETS AND MISSILES

Rocket Communications Will Travel 1,400 Miles

➤ IN AN EMERGENCY, the United States may be able to get messages through to stations miles away via rocket.

A rocket that can broadcast messages from 300 miles up has been tested at Eglin Air Force Base, Fla., by the Air Research and Development Command as part of project "Tattle Tale."

From 300 miles up, a message will travel 1,400 miles along the earth's curvature. The communications payload, developed by the Hughes Aircraft Corporation, was carried aloft by an Aerobee rocket.

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TECHNOLOGY

Tape Unit Plays 40 Hours For Long-Distance Flights

➤ A TAPE RECORDER that will play unattended for 40 hours has been designed to provide airline passengers with entertainment on long-distance flights. The recorder utilizes a one-inch tape with 40 tracks of recording on it. The unit was developed by Epsylon Industries in Middlesex, England.

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