ROCKETS AND MISSILES

Helium to Cool Space Ships

WRAPPING manned space vehicles with a thin blanket of gas may be the solution to the problem of air-friction heating during re-entry into the earth's atmosphere.

While re-entry difficulties have been overcome for ballistic missiles, they are still unsolved for the manned space vehicles and maneuverable missiles of the future. Ballistic missiles must endure extreme heat for only about 30 seconds. Maneuverable and manned vehicles, on the other hand, must endure heat for longer periods—up to 50 minutes—because they will enter the atmosphere at shallower angles and will decelerate at slower rates than ballistic missiles. Deceleration forces of ballistic missiles exceed those that the human body can withstand.

The skin heating problem of all space vehicles originates in what is called the boundary layer, a thin film of gas molecules from the atmosphere that collects on the skin of any object flying through the atmosphere. At speeds of 14,000 miles an hour and more, the gas temperature around the nose can rise to a dangerous 15,000 to 18,000 degrees Fahrenheit. If this heat is not dissipated, the vehicle will burn up like a meteor as it streaks through the atmosphere.

Scientists at California Institute of Technology have used a wind tunnel to blow hot air at high speed at a nose cone to simulate a missile's flight. At the same time, they arranged to have helium gas ejected from a hole in the front of the cone.

The onrushing hot air was found to spread the helium in a thin, continually flowing blanket over the cone's surface. The helium, in turn, prevented the hot shock wave layers of air over the nose from transferring much of its heat to the cone, and absorbed and carried away most of the heat.

The Caltech researchers, headed by Prof. Lester Lees and Dr. Clark B. Millikan, have calculated that a protective layer of helium only one-sixteenth of an inch thick flowing over the nose of a missile two feet in diameter would permit the cone's skin temperature to be held to a maximum of about 2,500 degrees, well within the tolerances of certain materials.

Research has also shown that a comparatively small amount of helium is required to keep a vehicle's skin from overheating. Prof. Lees estimates that on a 4,000-mile flight lasting about 20 minutes at an altitude of 20 to 30 miles, only about 15 pounds of helium—second lightest of all the elements and a great heat absorber—would be required to blanket the nose of a typical manned space vehicle.

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ANTHROPOLOGY

Return to Dig Neanderthal

FOUR AMERICAN anthropologists will leave for northern Iraq in June to spend the summer digging out remains of Neanderthal Man and his culture.

The expedition will return to a huge cave in the Shanidar Valley, the excavation site that yielded skeletal remains of a prehistoric infant in 1953 and skeletons of three prehistoric men in 1957.

One of the main purposes of this fourth expedition is to recover remains of a post-cranial skeleton of an adult Neanderthal. It was discovered in 1957 but could not be be removed because it is under tons of rocks and earth in the cave.

Dr. Ralph S. Solecki, Columbia University anthropologist, will direct this expedition, as he did the other three, in 1951, 1953, and 1956-57. His wife, Dr. Rose L. Solecki, will supervise the excavation of Zawi Chemi Shanidar, an early village near the cave. There is evidence that the same people occupied the cave and the village at different seasons of the year about 10,800 years ago.

Dr. Solecki said the village site appears to contain data that will throw light on the period of human history when man "began to emerge from a hunting and gathering stage to one dependent upon products of the fields."

Dr. T. Dale Stewart, curator of physical anthropology at the Smithsonian Institution, will be at the Shanidar cave until the already-discovered, post-cranial skeleton is exhumed. Dr. Stewart is responsible for restoring the 46,000-year-old Neanderthal-like skull found 14 and one-half feet below the Shanidar cave surface in 1957.

Jacques Bordaz, a graduate student in anthropology at Columbia University, will act as assistant archaeologist and work both at the cave and at the village.

The expedition will be allowed to bring back to the United States half of all the duplicated finds. If there is only one of a kind, the Iraqi government will keep it as a national treasure.

Science News Letter, April 9, 1960

PHYSICS

Atomic Rocket Reactor To Get Severe Test Soon

THE FORERUNNER of what may be America's first nuclear rocket reactor is scheduled to be run until it fails.

Upcoming experiments at the Atomic Energy Commission's Los Alamos Scientific Laboratory in New Mexico are aimed at developing the best design for a nuclear-powered rocket.

The reactor, called Kiwi-A, was first successfully tested July 1, 1959. It bears little resemblance to a flyable rocket engine but future nuclear rocket engines, like Kiwi-A, may well be gas-cooled reactors in which the gas is discharged at high velocity through a nozzle at the rear of the reactor to produce thrust.

The failure tests coming up will determine safety margins and limits of performance for this engine, R. E. Schreiber of the Los Alamos laboratory told the Congressional Joint Committee on Atomic Energy in Washington, D. C.

Another use of reactors in space was presented by B. I. Spinrad of Argonne National Laboratory in Lemont, Ill. He said an efficient reactor might some day "in the wild blue yonder" form an artificial sun for radiating heat to workers on another planet. In this concept, uranium oxide would be held as a liquid ball in gravity-free suspension to form a little sun.

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AERONAUTICS

Executive Predicts Piggyback Flight

A HUGE, swept-wing jet rises from a long runway. On the jet's back is a winged rocket carrying 30 passengers. At 20 miles altitude, the rocket separates from the jet, accelerates briefly through space and glides to its destination anywhere in the world—in an hour.

Rocket and space techniques now under development will make piggyback planes and flight above altitudes of 40 miles a commercial reality around 1980 or 1990, Leston Faneuf, chairman of the board of Bell Aircraft Corporation, told an audience at the University of California, Los Angeles.

Mr. Faneuf said rockets in the fringe of space would be subject to re-entry temperatures of 2,500 degrees Fahrenheit. The outer skin of the rocket transport would glow red hot. During the high speed glide to the ground, passengers would feel nearly weightless.

He added that a piggyback system would weigh half again as much as today's heavy bombers. It would be especially suitable, he said for intercontinental flights of 5,000 miles or more.

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CHEMISTRY

Shotgun Has Barrel Made of Glass Fiber

A SHOTGUN, just developed, is the first firearm to use a barrel made of glass fiber. The lightweight barrel is made of 500 miles of glass fiber chemically fused and bonded to a thin steel tube. Among its advantages to sportsmen are increased durability (it cannot rust), added safety (it has twice the burst strength of steel), cooler shooting (it has better insulating qualities), and lighter weight. Introduced at the annual meeting of the National Rifle Association, the semi-automatic shotgun was developed by the Winchester-Western Division of the Olin Mathieson Chemical Corporation, New York.

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