

SATELLITES

Heaviest unmanned spacecraft orbited

The heaviest unmanned spacecraft ever put into orbit was launched by the Soviet Union Nov. 16.

Called Proton 4, the 37,000-pound probe carried a variety of scientific instruments, mostly related to cosmic ray studies. Some U.S. observers believe it may be a prototype of an orbiting space station capable of supporting as many as six men for a month.

The Proton series, which began in July 1965, apparently uses a booster developing as much as three million pounds of thrust, almost twice the power of the uprated Saturn 1 rocket that launched the Apollo 7 astronauts. The Saturn 5 booster for future Apollo flights, including the moon landing, will develop some 7.5 million pounds of thrust.

All of the Proton probes have reportedly been concerned with cosmic ray measurements. In addition, Proton 2, launched Nov. 2, 1965, was equipped to hunt quarks, hypothetical elementary particles which have been theorized as primary building blocks of matter (SN: 3/17, p. 158).

BIOMEDICINE

Space zoo on Zond 5

Turtles, wine flies, mealworms, spiderwort and seeds of wheat, pine and barley in different nutritive environments, as well as lysogenic bacteria were aboard the Zond 5 circumlunar spacecraft, Soviet scientists say.

Many of these life forms were similar to those flown on the U.S. Biosatellites 1 and 2, which orbited the earth in 1966 and 1967 to test the effects of weightlessness and controlled radiation. The Soviet experiment aimed at gathering similar data for the vicinity of the moon.

The announcement of the space-going zoo also gave rise to speculation that the following craft, Zond 6, may have carried warm-blooded animals such as dogs, rabbits, rats or monkeys. Zond 6, launched Nov. 10, landed Nov. 17.

PROPULSION

Bigger booster family studied

Development of two new major U.S. space boosters, adapted from existing rocket stages, is being studied for the space agency, to see if permutations can expand the U.S. booster spectrum.

A two-stage version of the three-stage Saturn 5 moon rocket, under study by the Boeing Co. in Seattle, could put some 158,000 pounds into orbit around the earth. This falls between the 40,000-pound capability of the Saturn 1B, which carried the Apollo 7 astronauts, and the 280,000-pound capability of the Saturn 5. The new booster would consist of the first and third stages of the present Saturn 5, and could be uprated with a Centaur third stage to send 15,000 pounds as far as the planet Saturn.

Another adaptation of the Centaur would combine the NASA stage with the Air Force's Titan III booster. Martin Marietta Corp. in Denver, Colo., is analyzing the potential of the combination.

GUIDANCE AND CONTROL

Polar satellite to go synchronous

Australian and British scientists next year plan to move a satellite from a polar orbit into a fixed, synchronous orbit over the equator.

A small communications satellite, launched by a British three-stage Black Arrow rocket, will be maneuvered in space by means of a small electric ion thruster powered by 40 square feet of solar panels. A stream of ions, boiled off a pound of mercury within the engine, should provide the small but constant push to swing the satellite into position.

The satellite is the first of a planned series of low-cost communications and weather probes, launched from Australia's Woomera range.

INSTRUMENTATION

Breath analyzer for astronauts

Monitoring the composition of an astronaut's breath during a mission is the job of a tiny analyzer now being built for the space agency.

Key elements in the device, an ultraminiature vacuum pump and a mass spectrometer, will be worn directly under the astronaut's chin, in a unit about one inch in diameter and four inches long. An electronics package on the astronaut's back will analyze his breath continuously for content of oxygen, nitrogen, carbon dioxide and water vapor. The unit is being developed by Earth Science Co., Pasadena, Calif.

ORBITAL SHUTTLE

Lifting body flies first piloted success

The space agency's HL-10 manned lifting body, possible forerunner of an earth-to-orbit shuttle for crew changes, resupply and emergency rescue, made its first successful piloted flight Nov. 13, near Edwards Air Force Base, Calif.

The rocket-powered vehicle has no wings, but gets its lift from its unusual shape, resembling half a cone, rounded side down. Released from a B-52 bomber at 40,000 feet, the craft was flown to a height of 45,000 feet, reaching a speed of some 610 miles per hour, then glided to a landing on Rogers Dry Lake.

DESIGN

Flexible windows for space

Transparent, flexible rubber windows for inflatable space structures are being developed by Uniroyal, Inc., for the space agency.

Four polymers—silicone, ethylene-propylene, polyisoprene and polyurethane—have been evaluated. Only the silicone kept its transparency and remained free of surface cracking under long exposure to heat or ultraviolet radiation. To strengthen the windows against the pressure from within the structures, horizontal filaments of steel wire or glass fiber are imbedded in the polymer.

The windows might also find use in collapsible deep-sea construction, Uniroyal engineers believe.

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