ROCKETS AND MISSILES

Atomic Rocket Cheaper

SATURN ROCKETS equipped with two atomic stages could do the job of a multi-million dollar Nova rocket at only half the cost, a new study shows.

The Atomic Energy Commission released the study. It shows that the Saturn, a super-rocket for space research, could be greatly souped up. Saturn is planned as a five-stage rocket and is scheduled for completion in 1964.

The report says that with its top four stages replaced by two atomic stages, Saturn would have:

1. Four times the payload capability of the five-stage Saturn.

2. The same payload capability as the four-stage Nova, a giant super-rocket proposed as Saturn's successor.

The study shows Nova would cost $48,000,000. The modified Saturn would cost $24,000,000. The modified Saturn might also be more reliable because it would have only three stages that could malfunction. Nova would have four.

In recent testimony before a House of Representatives subcommittee, Dr. Wernher Von Braun said planning has already begun on a Saturn with a single nuclear stage. The German-born scientist predicted that the super-rocket would be tested in flight in 1968 or 1969.

U.S. Air Force Lt. Col. Howard R. Schmidt and Maj. Ralph S. Decker, both attached to the AEC's aircraft reactor section in Washington, D. C., prepared the new AEC report. Col. Schmidt is chief of the section's missile project branch. He and Maj. Decker say a nuclear-chemical Saturn could be produced in 15 years.

They say the modified Saturn could lift a 36,000-pound payload for a soft landing on the moon. The cost per pound of payload delivered "would be $1,600 per pound for the all-chemical Saturn, $1,400 per pound for the Nova and $700 per pound for the chemical-nuclear Saturn."

In the modified Saturn, the two nuclear stages would each have a nuclear reactor that would produce great heat. The heat would make liquid hydrogen expand and rush out through a nozzle at the rear of the engine.

The AEC began a study of nuclear rockets in 1955. It is now jointly sponsored by the National Aeronautics and Space Administration under the name, "Project Rover."

The first Project Rover reactor experiments were completed last summer. Conducted at Jackass Flats in Nevada, the experiments tested a prototype nuclear rocket named Kiwi-A after the Australian bird that cannot fly.

Kiwi-A cannot fly either but information provided by its testing may help design reactors that can. This summer, more rocket reactor experiments are planned.

Science News Letter, May 14, 1960

ROCKETS AND MISSILES

Particles Hit Pioneer V

WHEN A GIGANTIC solar flare burst into space on March 30, Pioneer V was hit by its hot particles and sent information on the effects back to earth. Simultaneously, scientists on earth obtained the same data from high altitude balloons.

Thus scientists have been able to correlate information from the balloons, earth satellites, and Pioneer V, the solar satellite, with great success, scientists of the National Aeronautics and Space Administration, the University of Chicago and the State University of Iowa reported to the American Geophysical Union meeting in Washington, D. C.

Dr. J. A. Simpson of the Enrico Fermi Institute for Nuclear Studies, University of Chicago, described the solar bursts and their impact on the earth.

He said a huge solar storm on March 30 resulted in bombardment of the earth by radiation.

The particles in this radiation were accelerated after they entered the earth's atmosphere, giving off intense radiation.

Dr. Simpson said that one of the most outstanding recorded events occurred April 1 when protons were observed entering the earth's atmosphere at the poles. At the same time electrons coming from the sun were observed.

Dr. C. P. Sonett, director of the space physics section, Space Technology Laboratories, Inc., Los Angeles, reported that a ring current of particles circles the earth, centered about 40,000 miles from the earth's center. This ring, about 24,000 miles across, affects the earth's magnetic field. It has been observed by both Explorer VI and Pioneer V, in two different parts of space, Dr. Sonett said.

Whenever disturbances due to solar activity occur on earth, corresponding disturbances have been observed in space, Dr. Sonett reported. This makes current theories explaining how such effects occur questionable, Dr. Sonett said.

He concluded that information from Pioneer V and the Explorer satellites have accomplished two objectives: extended man's knowledge of space, and given new information on interplanetary space.

Science News Letter, May 14, 1960

ROCKETS AND MISSILES

175 Research Rockets Reported Fired by USSR

RUSSIA LAUNCHED 125 research rockets during the International Geophysical Year, plus 50 more in 1959, a report from Nice, France, indicates. Some of the rockets had payloads up to 4,850 pounds.

The launching of these rockets took place in the Soviet Union, in the Polar Zone and from a ship in the Southern Hemisphere and the Northern Pacific. Many indications of the constitution and composition of the upper atmosphere were reported obtained with the experiments.

According to Russian sources, the studies showed electron concentration varies with the time of day and season in the outer part of the ionosphere. This may be an important factor in radio reception, because the electrified layers reflect radio signals, thus making broadcasts possible over long distances.

The Russians also found that there are very high concentrations of electrons at least 290 miles above the earth.

Of the rockets, 158 were for studying weather. In some cases the luminosity of the sky and the distribution of ozone were studied. New data on temperatures and pressures in the stratosphere—the middle layer of atmosphere—were collected.

Science News Letter, May 14, 1960

ROCKETS AND MISSILES

Small Rocket Tested For Moving Satellites

See Front Cover

A MINIATURE rocket designed to maneuver satellites about in space has successfully operated for 47 hours in a test reported to the U. S. Air Force, which supported the testing program.

No bigger than a milk bottle, the power plant weighs only three and a half pounds, without fuel. It is an arc jet engine.

It gets its thrust from a gas (hydrogen or helium) that is heated by passing it through an electrostatic field. The heated gas expands and hurtles out the rocket's nozzle as seen on the cover of this week's SCIENCE NEWS LETTER.

The experimental rocket tested used helium as a working fluid and was operated in a near vacuum. The total velocity increase that the rocket could have given a vehicle in space was about 4,000 feet per second. It could do this because a satellite balanced in orbit can be shifted by relatively small amounts of continuous power over a period of hours or even days.

(The movement of a vehicle after it is lifted into space is very different from lifting it from ground into space. The latter requires great thrust for a few minutes.)

A nuclear source or solar batteries could provide the arc engine with electricity. A tank of liquid hydrogen or helium would be required to supply fuel. Thus, though the engine itself is light, fuel for months of operation would weigh many hundreds of pounds.

Tests were made by the new rocket's developer, Avco's Research and Advanced Development Division of Wilmington, Mass.

During the tests, the engine produced nearly three-fourths of a pound of thrust at specific impulse of 1,000 seconds with a power input of 30 kilowatts. Specific impulse is the rocket engineer's equivalent of miles-per-gallon. Specific impulses of about 250 seconds are about the current average.

Science News Letter, May 14, 1960