SPACE

A-Power for Moon Trip

➤ CHEMICALLY powered rocket engines to be developed for a manned flight to the moon will be designed so that nuclear engines could be substituted, at least in the vehicle's upper stages, the head of the National Aeronautics and Space Administration told a joint House-Senate atomic energy subcommittee.

NASA Administrator James E. Webb said that planning for the lunar flight is built around chemical fuels, rather than nuclear power, because "no one could be sure that technology would advance rapidly enough" to make nuclear rocket propulsion feasible by that time. But in effect, the door will be left open, just in case.

Reporting progress on Project Rover, the joint NASA-Atomic Energy Commission nuclear rocket program, Mr. Webb said that adding nuclear rocket stages to moon-bound vehicles would result in "performance gains" and "large payloads."

Nuclear rockets are primarily intended, however, for missions beyond the moon and the heavy payloads required "to support lunar bases and for manned exploration of the planets. Nuclear energy is essential for such missions," he said.

The program has AEC in charge of the initial reactor phase and NASA in charge of the engine and vehicle phase. Flight tests for a nuclear-powered space vehicle are not expected before 1966 or 1967.

"We hope they will be the first in the world," Mr. Webb said.

Dr. Glenn T. Seaborg, AEC chairman, said the success of the program is not yet assured. But he also thought there was a chance of getting a nuclear-powered engine in time for use in "the upper stages of a manned mission to the moon."

Upcoming ground tests for reactors using gaseous hydrogen and liquid hydrogen as fuels will do much to determine the feasibility of the nuclear concept, he added.

Project Rover is budgeted at $89,500,000 for the current fiscal year. Total expenditures may reach as much as $1 billion before a successfully functioning engine is evolved, the subcommittee was told.

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TECHNOLOGY

Can Talk to Computer

➤ THE SAME WORDS that one engineer would use to describe the solution of a problem to another engineer now can be used to give instructions to digital computers. The machine will understand such words as inverse, adjust, intersect, ramp, area and alignment.

Prof. C. L. Miller of the Massachusetts Institute of Technology described the system of doing this to the American Association of State Highway Officials in Cambridge, Mass. His system is called COGO, for co-ordinate geometry. It is expected to increase civil engineers' use of computers.

COGO already is in daily use in the MIT Engineering Systems Laboratory that Prof. Miller directs, and has made it feasible to give students full-scale engineering problems as homework assignments. It also is being employed in the Puerto Rico Department of Public Works and will soon be used with a new engineering computer that the Massachusetts Department of Public Works is installing.

The primitive or pseudo languages previously used to instruct machines made their use time-consuming and costly for problems that are rarely exactly alike. With COGO, it is technically and economically feasible to write a separate program for each set of data, use the program once and discard it.

Prof. Miller considers it one step in the development of a much larger system. The Civil Engineering Systems Laboratory is interested in attaching a drafting machine to a computer, and COGO can be expanded to include the words an engineer would use to communicate with a draftsman. Thus engineers ultimately may be freed from such routine chores and enabled to devote more of their time to the creative work for which they are professionally trained.

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SPACE

"Astromech" Orbits Soon

➤ AN "ASTROMECH," or mechanical crewman, that will "breathe" and give off heat and moisture, much as a human would, is scheduled to take a space trip around the earth very shortly.

The flight will be a severe test of the Mercury capsule and its instrument systems, since they will undergo nearly two hours of flight and a re-entry period of six to seven minutes, or eight times more than during earlier flights. A flatter and longer re-entry angle into the earth's atmosphere is necessary to bring a craft back from orbital flight compared with sub-orbital flight. During time of re-entry the space capsule will withstand temperatures of up to 2,000 degrees Fahrenheit.

The Atlas rocket's ability to release the spacecraft at the speed, altitude and flight path angle for orbital flight also will be tested, the National Aeronautics and Space Administration reported. The orbital flight, if successful, will check the ability of the braking rocket system to bring the craft down from orbit. Mercury tracking stations scattered all over the world will track it.

The spacecraft will have a complete life support system capable of maintaining a man in space and all the equipment necessary to circle the earth on automatic control. In addition, electronic equipment and sensing devices have been installed to try to duplicate the human brain's ability to make judgments and corrections for errors.

Other mechanical devices will try to duplicate man's actions in space. Since the "astromech" cannot see, a special color camera will point out one of the two portholes to "see" the view. Another camera will "look" through the pilot's periscope and a third will record instrument panel readings. A tape recorder located where the pilot's head would be will record sounds during the flight.

The capsule is scheduled to go into orbit when 100 miles up traveling at about 17,400 miles per hour. Its highest point will be 154 miles. It is expected to land in the Atlantic Ocean 200 miles east of Bermuda. During re-entry between 46 and 12 miles altitude, the speed of the capsule will be slowed down from 17,000 to 1,350 miles per hour.

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GENERAL SCIENCE

Applied Research Opens New Roads to Basic Facts

➤ ADVANCES in applied science can sometimes be of great benefit to the pure scientist and open up new fields of research, a reverse of the normal trend of development, Prof. D. J. E. Ingram, physicist of University College of North Staffordshire, told the British Association for the Advancement of Science meeting in Norwich, England.

All the war-time research in radar has now been used by scientists to study the fundamental properties of matter, he cited as an example.

Microwaves have found application in two major fields, diagnostic and therapeutic medicine and detection of gases in industrial plants, Dr. J. Thomson, director of the British Scientific Instrument Research Association, told the BAAS. The medical use depends upon the dielectric factor and the loss of microwave intensity in human tissue. Gases can be detected by the absorption of microwaves by their molecules.

Use of molecules in the direct amplification of radio waves, as in the relatively new device, the maser, allows the reception of signals from outer space that are too weak to be detected by the conventional use of electronic circuits, Dr. O. S. Heavens, reader in experimental physics, Royal Holloway College, told the meeting. Now that the maser has been made to work for light, Dr. Heavens predicted highly directional light sources of high intensity would find new and important uses in the future.

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