

SPACE

Test Ion Engine in 1962

► AN ELECTRIC space engine for travel to the moon and planets will be tested in space in 1962. This ion engine is fueled by mercury, the metal used to measure temperatures of people and the weather.

The great importance of electrical space engines is their efficient use of fuel so that small amounts of propellants will take such a rocket a long way into space.

The efficiency of a rocket is measured in what is known as specific impulse, which is expressed in seconds. For any given thrust, the smaller the weight of propellants needed per second, the higher the specific impulse. Chemical rockets with specific impulses of 300 seconds or more are considered very good. The electrical ion engine can obtain specific impulses up to 20,000 seconds. Because electric rockets need heavy power plants to produce small amounts of thrust, these engines can only be used for propelling a space vehicle that has already been boosted through the atmosphere into space.

In electric ion rockets the forward thrust is produced by fast-moving ions, electrically charged atoms or molecules, accelerated by electric fields and ejected out the end of the rocket in a jet stream.

The mercury ion engine, developed at Lewis Research Center in Cleveland, will be ground tested for the first time during the early part of 1962. Telemetry gear and a space capsule will be included with the flight prototype engine in the test package. Later in the year, after tests in the vacuum tank have been completed, the same engine test package will be tested in space.

William R. Mickelsen, chief of the electrostatic propulsion components section at Lewis, told SCIENCE SERVICE that two electric space engines will be tested in space together, the mercury engine and one using cesium as fuel, being developed by Hughes Aircraft Company. A Scout rocket will carry the capsule with both engines 3,000 miles above the earth. The electric engines will start once the capsule has been launched outside the earth's atmosphere. Engine performance in space will be checked against the earlier ground tests, he said.

A space craft 15 to 20 feet long with instruments and using a complete electric propulsion system could possibly be sent into space by 1965, Mr. Mickelsen said. The

power source for the engine is expected to be some type of nuclear generator.

He said it is not now certain if mercury, cesium or some other fuel will make the best propellant for the electric ion engine. A fuel made up of very large heavy molecules with many hydrogen or carbon atoms, or a combination of both, might make a good ion engine propellant.

At the present time the Lewis Center, a facility of the National Aeronautics and Space Administration, is experimenting with such large hydrocarbon molecules, and measuring the ease with which they can be bombarded with electrons to make them into ions.

Mr. Mickelsen suggested that the fuel of future manned space vehicles using electric propulsion could serve as a radiation shield if the fuel tank was built as a sphere around the cabin.

• Science News Letter, 81:5 January 6, 1962

TECHNOLOGY

Computer Made to Think

► A GIANT electronic "brain" is being made to "think" in much the same way that humans solve problems.

Using the same basic set of instructions, the machine can solve different types of problems. The General Problem Solver, or GPS as it is called, is an "appreciable step" toward electronic computers that some day may "think" on their own.

Using a computer to simulate the processes of human thinking gives scientists a powerful new tool to learn more about both humans and machines. How computers have simulated human thinking is reported in Science, 134:2011, 1961, by Drs. Allen Newell and Herbert A. Simon of Carnegie

Institute of Technology, Pittsburgh, Pa.

Although they used an International Business Machines 7090 computer, the program for General Problem Solving is written in a machine language that can be used in other computers. The program involves selective search for possible solutions based on rules of thumb.

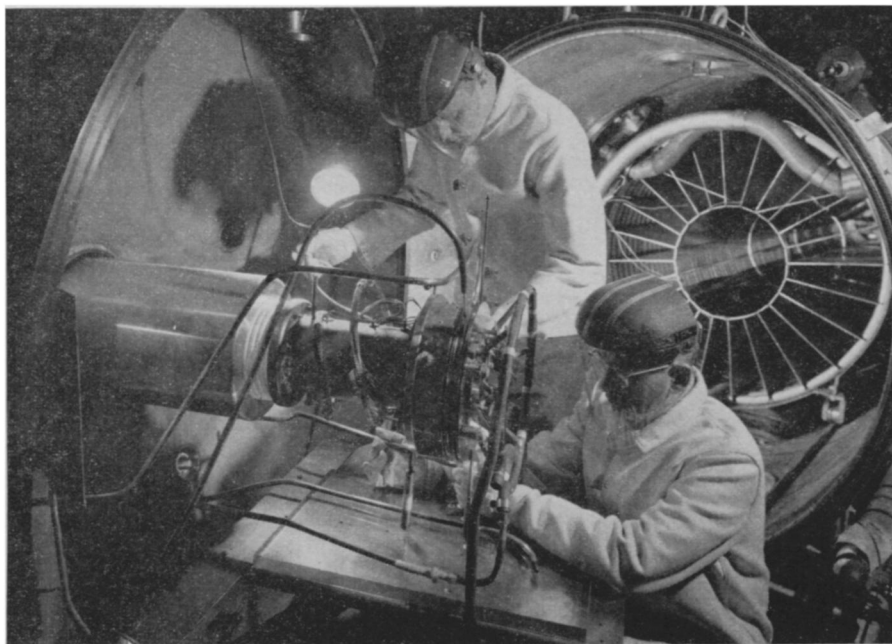
Since it is general purpose, it differs from such programs as those for proving theorems in geometry, for designing electric motors and transformers, for writing music or for playing chess. It also differs from programs that "learn," or modify themselves in various respects on the basis of experience. All of these are limited to a single type of task, Drs. Newell and Simon said.

The General Problem Solver is a single program for several tasks, Dr. Newell told SCIENCE SERVICE. Because the GPS gives a good approximation of certain kinds of thinking, the process of human thinking "can no longer be regarded as completely mysterious."

That the computer simulates human thought processes is shown by comparing how it solves problems with the way humans solve problems. The humans usually are sophomore students faced for the first time with problems in logic. They are encouraged to think aloud as they work their way toward a solution, using the same basic rules as the computer. The student's method of reaching a solution is then compared with the computer's method.

The IBM 7090 has a memory of 32,000 words, all of which are used during the time the machine is actively solving a problem. However, the basic program by which the problems are solved consists of only about 10,000 words. When a new problem has to be solved, only some 600 to 1,000 words have to be added to the program before the computer can do the job.

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ELECTRIC ION ENGINE—Scientists at NASA's Lewis Research Center install a cesium ion engine in a high vacuum tank that provides a simulated space environment for research on electrical propulsion.