SPACE

Speed Up Travel to Mars

➤ A SPACE VEHICLE may be able to travel to the planet Mars ten times faster than now expected by using a new kind of atomic battery.

This power system would send a spacecraft to Mars in 35 days instead of the 400 days calculated with nuclear power systems such as the Snap-8 now under development. The travel time is figured from an orbit around the earth to a Mars orbit.

William R. Mickelsen, chief of the electrostatic propulsion components section, Lewis Research Center, Cleveland, Ohio, reported that he and Charles A. Low Jr. have worked out the concept for this advanced system.

He told the Institute of Aerospace Sciences meeting in New York that such an electrostatic propulsion system would use an isotope and produce electricity directly without the help of turbines and generators ordinarily used.

This power system could accelerate molecules to the needed velocities, he said. The voltage through which nuclear particles would be generated could run as high as 1,000,000 volts, he told SCIENCE SERVICE.

The scientist from Lewis, a facility of the National Aeronautics and Space Administration, commented on ion space propulsion engines that also use a nuclear power source. He said the existing cesium and mercury ion engines are adequate in size, weight, efficiency and durability for early flights in space. The Snap-8 nuclear power system is now planned as the power source.

For long flights, the ion engines will need to be smaller, more efficient and have a longer life than the present models.

Ion engines are especially valuable for space travel because of their economical use of fuel. The forward thrust is produced by fast-moving ions, electrically charged atoms or molecules, ejected out the end of the rocket in a jet stream.

The efficiency of ion engines is very high in space, or up to 20,000 seconds, but their thrust is low. Thrust is the lifting force of a rocket and for any given thrust, the smaller the weight of propellant needed per second, the higher the efficiency, or specific impulse.

A spacecraft propelled by an ion engine needs to be boosted away from earth by a rocket of great thrust to overcome the earth's gravitational pull. Rockets of high thrust with a specific impulse of 300 seconds are considered very good today. They are powerful in lifting power but use up their fuel very fast.

Mr. Mickelsen said that after an ion rocket has been boosted into space and spirals away from earth, a low specific impulse of 2,000 to 3,000 seconds is needed because more thrust is necessary to get the rocket on its way. Ion engines of today must be improved before they can operate at this low efficiency and deliver the higher thrust needed. To make the ion engines more useful, a fuel other than mercury or cesium may be preferable, he said. Large molecules of 500 to 1,000 atoms that can be suspended like a mist may be the ideal solution. Very heavy hydrocarbon particles could be the answer.

The mass of mercury ions is too small, and cesium ion engines lose power due to heat loss through the back of the engine. In the cesium engine the atoms are ionized by contact with a very hot tungsten surface which loses heat like a radiator. This tungsten surface is exposed to space through the back of the engine. Mr. Mickelsen proposes it be placed inside the engine in future models.

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SPACE

Space Vehicles Meet

➤ SPACE VEHICLES can rendezvous with each other high above the earth twice a day by using the right kind of orbit.

A space vehicle can meet, or rendezvous, with another without having to overtake it and waste precious fuel if an orbit of 31 degrees inclination at 263 miles above the earth is chosen.

A vehicle could be launched to rendezvous with one previously sent aloft when the first craft makes its second pass over the launching site, Norman V. Peterson, chief of the astro sciences group, Norair Division of the Northrop Corporation, Hawthorne, Calif., told the Institute of the Aerospace Sciences in New York.

This compatible, or synchronized, orbit also provides greater opportunity for rescue missions of men and materials in the future, when astronauts may be joining several rocket stages together for trips to the moon and planets.

The so-called target vehicle, the first one fired, will be kept in the rendezvous orbit by "station keeping," he said. This involves the firing every one or two weeks of a small control jet from the vehicle by telemetry controlled from earth.

A big problem with the rendezvous technique is time delay if the second vehicle cannot, for technical reasons or because of weather, be launched just when the target vehicle is over the launching site, he said. However, a technique has been worked out to solve the problem.

The second vehicle can be launched into a parking orbit of 116 miles above the earth and wait until it is in the same place as the target vehicle. This will happen automatically due to the earth's oblateness, Mr. Peterson told SCIENCE SERVICE.

A satellite in a parking orbit that is delayed five minutes would have to wait in a parking orbit for one day. If delayed 14 minutes, the wait amounts to three days.

A manned vehicle going into parking orbit will need an additional 200 pounds of food and auxiliary power to make the rendezvous if delayed five minutes, he said. However, if a vehicle would try to overtake the target vehicle after the five-minute delay, 9,000 pounds of additional propellant would be needed.

He added that the parking time in space could be used by astronauts to make weather observations or in training for conditions in space.

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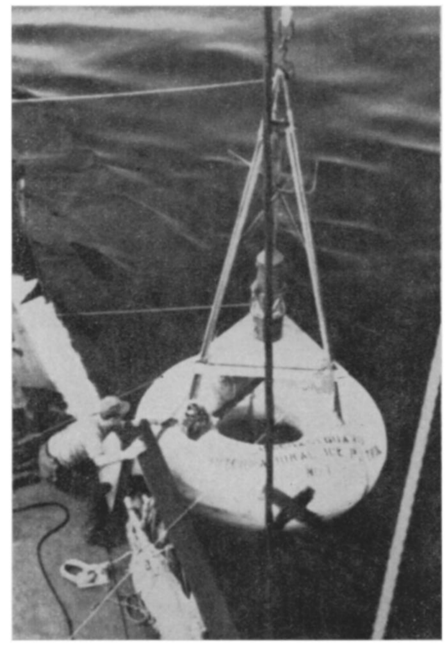

Experimental Buoy

OCEANOGRAPHY

Oceanographic Buoys Set To Study Iceberg Area

➤ THE EXPERIMENTAL use of oceanographic buoys to serve as floating electronic laboratories for recording information on iceberg-clogged lanes highlights this year's International Ice Patrol program.

Three buoys will be placed near the Grand Banks, Newfoundland, and will record intensity, strength, direction and volume of the Labrador Current, as well as water temperatures, wind velocities and heat output of the southward-flowing current.

The information will permit the U. S. Coast Guard to approximate the inflow of heat and its bearing on the production and distribution of icebergs. It could also allow the forecast of severity of ice conditions within a coming season.

Along with this new phase of research, ships and aircraft will once again keep watch in the North Atlantic waters for iceberg dangers in shipping lanes. This year marks the 44th patrol carried out by the Coast Guard since it began in 1914.

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