

SPACE

Find Life on Mars 1964?

By 1964 a U.S. space probe to Mars could reveal if simple life forms exist on the planet as has been indicated from astronomical observations, Tove Neville reports.

► BY 1964 the United States may find out if life exists on the planet Mars. This will be done by sending a space probe with a telescope to Mars to photograph the planet with visible and infrared light.

Such studies can reveal if organic molecules (the building blocks of living forms) are present on the planet's surface, Dr. William H. Pickering, director of Jet Propulsion Laboratory, California Institute of Technology, Pasadena, told SCIENCE SERVICE.

Infrared spectroscopy done with the 200-inch Mt. Palomar telescope indicates that organic molecules may exist on Mars, but the evidence is not clear-cut, Dr. Pickering said. The Mars probe would have to circle as close as 20,000 to 30,000 miles from the planet to get this evidence, he said. When closest Mars is about 48,000,000 miles from the earth on the average.

Dr. Pickering told the American Rocket Society meeting in New York that scientists hope to find out more about the magnetic fields and the radiation particles surrounding Venus and Mars. They would like to determine with space probes if radiation belts similar to the Van Allen belts surrounding the earth are also present in the vicinity of Venus and Mars. These radiation belts of trapped particles are considered dangerous to space travelers.

The Mars probe would be part of the Mariner program that includes eventual landing of instruments on Venus and Mars to find out more about conditions on the planets' surfaces.

Dr. Pickering said that the lunar probes, Ranger and Surveyor, will complete increasingly complicated missions, landing instruments to make physical and chemical analysis of the moon. The probes will be sterilized with heat and ethylene oxide before take-off to insure that no earth bacteria contaminate the surface and destroy evidence of the moon's origin.

• Science News Letter, 80:267 October 21, 1961

Salvage Space Hardware

► AS MUCH AS 20% of the cost on every 1,000,000 pounds of "space hardware" sent up in a year could be saved if the booster vehicle were reused. This important saving to American taxpayers could be as much as 27% in 10,000,000 pounds of annual space transport, two scientists reported at the American Rocket Society meeting in New York.

Drs. William S. Porter and R. G. Voss of the National Aeronautics and Space Administration's Marshall Space Flight Center, Huntsville, Ala., said this saving is possible if the recovery operation of the space vehicle and the refurbishment rate for reuse do not

amount to more than 55% of the cost of a new booster.

They based their calculations on transporting large volumes of pay loads into low altitude orbits with a Saturn-type two-stage rocket. The large first stage of the rocket would be recovered and used again instead of being totally lost as is now the case.

Two methods are being considered for the recovery, glider plane and parachute. Rogallo, a paraglider wing, is at present considered impractical because it has a limited range and would not be able to return to the launching site without additional power or a tow aircraft.

The parachute recovery has a disadvantage in that the booster would be dropped in the sea where salt water corrosion could damage the material.

However, tests made on an H-1 rocket engine after immersion in salt water showed that the refurbishment only amounted to

about four percent of the cost of a new engine.

These preliminary results make parachute recovery look more favorable than previously thought, the scientists said, and recovery of the boosters should be begun as soon as possible because of the great savings.

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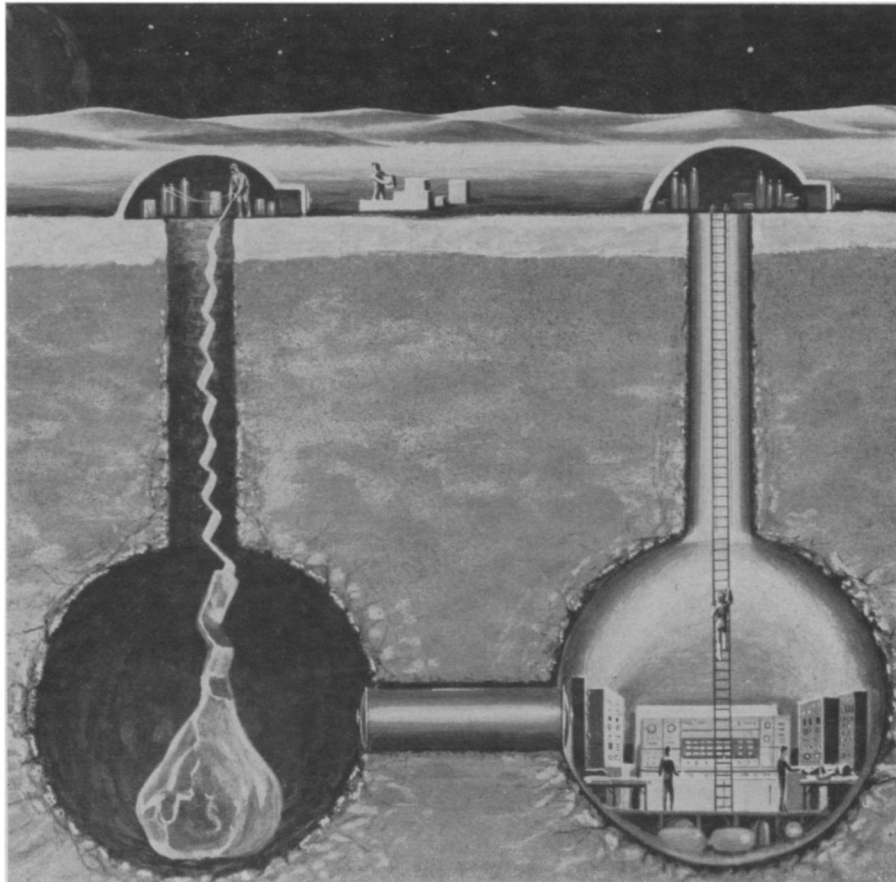
Moon Station by 1970

► THE U.S. has the know-how and resources to build a permanent manned station on the moon by 1970, the American Rocket Society was told in New York.

Dr. H. H. Koelle of the Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala., said such a moon station could be expanded into a moon settlement by 1975. He predicted manned planetary flights will begin between 1972 and 1974.

The techniques of space transportation are expected to progress rapidly during the next two decades, resulting in lower cost for a "round trip to an earth orbit or to the moon," he said.

Calculations show that by 1975, about 5,000 manned round trips from the earth surface to a low altitude orbit could take place yearly. As space travel becomes more economical, commercial space flight is ex-



MOON BASE—A series of connected pressurized chambers were suggested as an underground moon base by General Electric engineer Germano Di Leonardo at the American Rocket Society meeting in New York. An airtight membrane is being inflated in the left chamber; life support equipment is shown installed in the right. Structures on the surface contain airlocks.



ASTRONAUT SEAT FOR SPACE LANDINGS—Built to withstand 60 g's.

pected to follow—sometime between 1975 and 1980. The younger generation of today will take an active part in such flights, Dr. Koelle predicted.

He said the following developments could contribute to cheaper space transportation:

1. Increased size of launch vehicles.
2. Increased reliability of launch vehicles.
3. Multiple use of each launch vehicle.
4. Increased performance of propulsion systems.
5. Eventual use of extraterrestrial resources.
6. Increase of available economic resources.
7. Increase of space activities in general.

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Life Support Systems

➤ NO MAJOR TECHNOLOGICAL DEVELOPMENTS will be necessary to meet the life support requirements for the next generation of manned spacecraft, a physician and an engineer reported to the American Rocket Society in New York.

Dr. James N. Waggoner, health director of the Garrett Corporation, Los Angeles, and project engineer William L. Burriss, also of the Garrett Corporation, said they have concluded that certain changes should be made in environmental control systems in order to meet man's physiological requirements for extended trips in space.

The scientists reported a mixed gas atmosphere rather than 100% oxygen would be preferable. They suggested a mixture of oxygen and nitrogen be used. The "atmospheric" fluids could be stored on the space ships at extremely low temperatures (at about minus 400 degrees Fahrenheit) in smaller and therefore lighter containers because these fluids contract when cooled.

The scientists also recommended that a space radiator with an ethylene-glycol-water mixture be used for removing heat from the astronaut's cabin. This would reduce the amount of evaporation on the skin and cut down the astronaut's water requirements.

These changes would make the longer space trip possible, using chemical power

systems such as hydrogen-oxygen fuel cells or hydrogen-oxygen dynamic heat engines.

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Seat for Space Landings

➤ A SEAT designed to protect an astronaut from pressures up to 60 times his own weight, during space landings, was described at the American Rocket Society meeting in New York.

The safety device was reported by W. C. Boyce and H. E. Freeman of the Chance Vought Corporation, Dallas, Tex. Developed for the Air Force, it will be tested first with dummies and later with men.

The seat includes a fiberglass "jacket" to protect the body and an "apron" for the legs. The device could also be used in military aircraft for crash landings or in automobile and aircraft accidents in which the high gravitational forces of 60 g's occur.

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Zero-Gravity Cell Makes Oxygen for Use in Space

➤ A ZERO-GRAVITY electrolytic cell, capable of producing oxygen under the weightless conditions of space flight, has been developed by scientists at Battelle Memorial Institute, Columbus, Ohio.

Standard cells depend on the pull of gravity on the electrolytic solution to separate water into hydrogen and oxygen. The new experimental cell, however, defies natural gravity. The centrifugal force produced by rotation acts as an artificial gravity field.

In space, the cell could be used with another Battelle-made device that chemically changes carbon dioxide in an astronaut's breath into carbon and water. This device can use the hydrogen produced by the cell, while the cell uses the water to produce more breathing oxygen. Together, the two could create a livable atmosphere in a spacecraft for a two-year flight, with no supplemental oxygen supply needed.

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RADIO ASTRONOMY

Biggest U.S. Radio "Dish" Installed in California

See Front Cover

➤ AMERICA'S BIGGEST radio telescope "dish," 150 feet across, has been installed on Stanford University campus, Stanford, Calif.

The steel and aluminum parabolic antenna, seen on the cover of this week's SCIENCE NEWS LETTER, will be used for radar and radio explorations of the solar system before the end of the year.

The \$350,000 dish was designed and built by Stanford Research Institute with support of the Air Force Office of Aerospace Research and the Defense Atomic Support Agency. It is the first of three such radio telescopes planned for the U. S.

• Science News Letter, 80:268 October 21, 1961

SCIENCE NEWS LETTER

VOL. 80 OCTOBER 21, 1961 NO. 17

Edited by WATSON DAVIS

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N.W., Washington 6, D. C., NORTH 7-2255. Cable Address: SCIENSERV.

Subscription rates: 1 yr., \$5.50; 2 yrs., \$10.00; 3 yrs., \$14.50; ten or more copies in one package to one address, 7½ cents per copy per week; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

Change of address: Three weeks notice is required. When ordering a change please state exactly how magazine is addressed. Your new address should include postal zone number if you have one.

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Printed in U.S.A. Second class postage paid at Washington, D. C. Established in mimeograph form March 13, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Reader's Guide to Periodical Literature, Abridged Guide, and the Engineering Index. Member of Audit Bureau of Circulation.



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