

SPACE

Space-Walkers Needed

A Russian cosmonaut's success in leaving and returning to his spaceship in flight opens the way for greater mobility for space repairs and photography—By Jonathan Eberhart

► **ALEXEI LEONOV's** excursion into space, protected by nothing more than his space suit has implications reaching far beyond the race for the moon.

Man must be able to work in space unprotected by capsules or spaceships, if he is ever to expand his boundaries to include the moon, planets, and even the stars. Orbiting space stations, a must for any large-scale space voyages as well as extended observations of earth and sky, will demand that men climb about "in the open" to make repairs, take photos and monitor instruments.

Trips to Mars and beyond would be much safer if crew members were free to climb about outside, fixing accidental meteor punctures and remedying other emergencies. The technical problems are not insurmountable although NASA devoted 200 pages in a special report to how-to-reel-in-an-astronaut.

The obstacle is simply the number of unknowns. It took an even dozen orbital space shots by the U.S. and the Soviet Union before a man was even exposed to outer space.

Since the early days of science fiction, the idea of huge super-ships, assembled in orbit because that was the only way to get them off the ground, has occurred repeatedly in discussions of truly long-range missions. Without the ability to maneuver as Cosmonaut Leonov has done, such a project would be essentially impossible. The creation of a remote control system to completely replace a live work crew could hold development back for years.

Even on space flights of the relatively limited scale of Gemini, the few partially-blocked photos of earth taken by our astronauts could be transformed into vast panoramas by a cameraman with the freedom to move about as he chooses. The pictures taken by U.S. weather satellites of the earth and its cloud layer still suffer from changes in the attitude of the satellite, and consequently require hundreds of hours of laborious matching and assembly by scientists on the ground.

Imagine an astronaut, floating with an unobstructed view between his spacecraft and the earth, taking motion pictures in color (and 3-dimensions, Cinerama and any other system that now cannot be used because of aiming, loading, and handling problems) throughout an entire orbit!

Beginning with the fourth manned Gemini flight, GTA-6 (for Gemini-Titan-Atlas), astronauts will be maneuvering about trying to join their Gemini capsules with Agena target vehicles, in practice for the return trip from the moon. Billions of dollars and several years could be saved if all that was needed was for an astronaut

to climb into space, push off from his spacecraft towards the target, lash the two vehicles together and tighten the cable until they were close enough to be locked together.

• Science News Letter, 87:196 March 27, 1965

Fishing for Astronauts

► **WHAT DOES ONE** do when U.S. astronaut in space floats away from his spaceship? Just reel him in by his safety line like a fish. This is not as easy as it sounds.

No aspect of "astronaut retrieval" is simple. Material suitable for the safety line, for example, is far from obvious. Nylon was by far the weakest of the materials tested. The more successful choices were Havar, Inconel and Hastelloy.

And who does the reeling in? Not another astronaut. A sudden jerk and the line would snap. Instead, digital and analog computers have been experimentally designed to consider the mass of both astronaut and spaceship, their speed relative to each other and to other objects in space, the tension on the line and several other factors.

If the line has to bend at sharp angles around guides and flanges as it is paid out, friction could create a hazard. So NASA scientists designed a special sensor that would continuously measure the angle between the line and the spacecraft. The sensor would feed the information to a computer, which in turn would turn the vehicle so that the line would always unreel straight out from the spaceship.

Docking a vehicle at a space station or handling radioactive materials could be made much easier by the use of a freely operating man in space. Individual, hand-held thrust units or "back-packs" have been designed to enable men to move themselves about in no-gravity situations, but they are cumbersome, tricky and can be dangerous.

• Science News Letter, 87:196 March 27, 1965

SPACE

Minute Corrections Made By Valveless Rocket

► **NEW, SUPER-SIMPLE ROCKETS** with no moving parts may be just the trick for making the minute corrections necessary to keep a space station properly oriented in its orbit.

The valveless rockets use electrical energy, available from solar cells, to cause a solid propellant to sublime, or convert directly, to a gas, thus producing thrust. Two sizes are being produced by the manufacturer, Rocket Research Corporation, Seattle, one-hundred-thousandth of a pound thrust and a thrust of one-ten-thousandth of a pound.

• Science News Letter, 87:196 March 27, 1965

Questions

ASTRONOMY—How was the presence of an invisible star in the constellation Pisces, the fishes, detected? p. 197.

BIOCHEMISTRY—What is the physiological function of the nucleic acid for which the structure was for the first time determined? p. 195.

ENGINEERING—How can engineers use a recently developed formula based on a 110-year-old intuition? p. 198.

GEOPHYSICS—Why was the South Pole chosen for a study on the origin of some nitrogen oxides? p. 200.

MEDICINE—Why is a drug given to dilate blood vessels during shock considered desirable? p. 201.

ZOOLOGY—What two types of memory are known to exist? p. 194.

SCIENCE NEWS LETTER

VOL. 87 MARCH 27, 1965 NO. 13

Edited by WATSON DAVIS

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N.W., Washington, D. C. 20036. 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. Please state exactly how magazine is addressed. Include zip code.

Copyright © 1965 by Science Service, Inc. Reproduction of any portion of SCIENCE NEWS LETTER is strictly prohibited. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicated services issued by Science Service. Science Service also produces and distributes THINGS of science (monthly), produces and publishes books, and conducts the National Science Youth Program. 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.



SCIENCE SERVICE

The Institution for the Popularization of Science organized 1921 as a non-profit corporation.

Board of Trustees—Nominated by the American Association for the Advancement of Science: Athelstan F. Spilhaus, University of Minnesota; Wallace R. Brode,*** Washington, D. C.; Bowen C. Dees, National Science Foundation. Nominated by the National Academy of Sciences: Henry Allen Moe, The Clark Foundation; Harlow Shapley, Harvard College Observatory; Detlev W. Bronk, Rockefeller Institute. Nominated by National Research Council: Leonard Carmichael,* National Geographic Society; Benjamin H. Willier, Johns Hopkins University; Eric A. Walker, Pennsylvania State University. Nominated by Journalistic Profession: O. W. Riegel, Washington and Lee University; Gordon B. Fister, Allentown (Pa.) Call-Chronicle; Ralph B. Curry, Flint Journal. Nominated by the Scripps Estate: Edward J. Meeman, Memphis Press-Scimitar; Ludwell Denny, Scripps-Howard Newspapers; Edward W. Scripps II,** Edward W. Scripps Trust. *President; **Vice-President; ***Treasurer.

Staff—Director: Watson Davis, Assistant Director: Dorothy Schriver. Writers: Charles A. Betts, Jonathan Eberhart, Ann Ewing, Edith Lederer, Faye Marley, William McCann, Barbara Tufty, Judith Viorst, Ruby Yoshioka. Science Youth Division: Joseph H. Kraus, Lloyd Ulmer. Photography: Fremont Davis. Production: Marcia Nelson. Syndicate Sales: Forrest L. Snakenberg. Librarian: Margit Friedrich. Interlingua Division in New York: Alexander Gode, 80 E. 11th St., GRamercy 3-5410. Advertising Manager: Fred A. Moulton, METropolitan 8-2562, Washington, D. C.