

SPACE

Land Spacecraft on Land

Future manned space vehicles may be recovered on the flat lands of the western U.S. Land recovery will be cheaper and less dependent on weather conditions, Tove Neville reports.

► **COSTLY** and unpredictable sea recovery of space vehicles, such as Lt. Col. John H. Glenn Jr.'s Mercury capsule, may be replaced by land recovery in the future.

The two-man Gemini capsule to follow the Mercury capsule into space may be the first to be recovered on land, the National Aeronautics and Space Administration told **SCIENCE SERVICE**. Extensive flat lands in the western United States might be possible landing sites.

The Gemini craft will be used for experiments in the rendezvous technique for joining two or more parts of a deep space vehicle while traveling in an orbit around the earth. Land recovery may also be used to reclaim burned out Saturn boosters scheduled to send moon ships into deep space. Now rocket boosters are either burned up in the atmosphere or fall into the ocean after use. Re-use of boosters would mean a saving in the space program.

One advantage of land recovery is that the high cost of deploying ships at each orbital landing area can be saved. Relatively small ground crews could handle land recovery whereas both U.S. Navy carriers and destroyers are tied up with the sea recovery. The use of these ships leaves the country more vulnerable to enemy attack at such times.

Although the land recovery of space vehicles and boosters does not eliminate wind and visibility problems, no surface problem such as high seas exists. Several hold-ups of Astronaut Glenn's flight were due to waves up to 20 feet high. Such hold-ups are costly and mean time setbacks for the space program.

Another advantage of land recovery is a greater chance for survival if the astronaut lands in an unexpected spot, the space agency noted. If he lands somewhere in the middle of the Indian Ocean, he would be much farther from civilization than if he fell down on a deserted area in Utah.

However, several problems of land recovery have yet to be solved. An object hits the ground harder, although not faster, than it hits water. To reduce the impact and shock, a means of slowing down the speed of the vehicle as it descends must be found.

To do this, control must be developed to give a certain amount of maneuverability to the vehicle after it enters the atmosphere. A device to do the job for the Gemini space capsule could be a controllable parachute, or series of parachutes, NASA said. For future space vehicles and rocket bodies a paraglider with wings may be used.

One of the greatest limitations to land recovery is the small amount of land available on earth as compared to the area covered by water. Besides the American

continent, the only other two possibilities for land recovery of Astronaut Glenn's Mercury capsule would have been Australia and Africa. When later flights of up to 18 orbits, scheduled to begin in 1963, were being planned, other land masses could have been considered. For three-orbit missions, of which three more are planned this year, all orbital elements would have to be recalculated if land recovery were to be made. In addition, permission from foreign countries, sometimes unfriendly to the West, would have to be obtained.

The sea recovery was chosen for the Mercury capsule because the possibility for damage to astronaut and capsule is now less than on land. The water acts as an enormous shock absorber whereas land recovery would be very bumpy.

The Mercury capsule will not be recovered on land except in case of a malfunction so an orbit could not be completed. The capsule was not designed for land recovery but the astronaut could be recovered this way and survive in case of emergency. Underneath the astronaut's couch, to which he is strapped, is a metal honeycomb designed to act as a shock absorber on impact with the ground.

One of the best locations for land recovery in the U.S. is believed to be the site at Edwards Air Force Base, Calif., from where the X-15 rocket plane is "launched." This is one of the largest, flat areas in the U.S. It is also far from highly populated centers.

• Science News Letter, 81:163 March 17, 1962

GENERAL SCIENCE

Russia Builds New Base in Antarctic

► **RUSSIA** is building a new Antarctic base. The new station, called Novo Lazarevsk, is on a rocky plateau 2,375 miles from Mirny on Queen Maud Land.

Dr. Alexandre Afanasiev, chief of the Soviet Department of the Arctic and Antarctic, also revealed that Russian scientists would fly from Russia to Mirny through Sydney twice a year in future.

They planned to make regular nonstop flights from Sydney to Mirny. The air route, 6,000 miles, will be the longest single hop in the world.

Two Russian turbojets which reached Sydney after a successful flight from Mirny flew nonstop from Mirny to Christchurch, N. Z., on the return flight.

By bypassing the United States base at McMurdo Sound, the Russian planes saved 19 hours on their return flight.

• Science News Letter, 81:163 March 17, 1962

TECHNOLOGY

Tiny Electric Parts Available to Public

► **MOLECULAR** functional electronic blocks, tiny parts used in radios and electronic equipment stemming from a new concept, are now available commercially.

The functional blocks are parts of a number of molecular electronic systems discovered by Westinghouse Electric Corporation, Youngwood, Pa., while developing a molecularized radio receiver for the U.S. Air Force.

Molecular electronics is a relatively new concept of integrating into a solid block of material (smaller and much thinner than a dime) functions ordinarily performed by an assembly of electronic components.

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MANNED SPACECRAFT CENTER—The NASA center, to be constructed on 1,600 acres near Houston, Tex., will include headquarters (center), environmental test chambers (left and right center) and antenna test range (dome upper center).