

PHYSICS

Power From the Atom

► **NUCLEAR REACTORS** are now found in the strangest places—from the ocean bottom to mountain tops and outward into space.

Although criticized for dragging its feet in peaceful atomic energy uses, the United States now has the oddest and most widespread arsenal of critical nuclear power sources in and out of the world.

This was emphasized by the installation of a new generator which will become the world's first ocean bottom atomic power source, and the dedication of the Air Force's first atomic power plant, perched on a remote mountain top in Wyoming.

The Senate also reversed an earlier decision when it approved building the world's largest nuclear power plant at Hanford, Wash. The decision coincided with the opening of the International Atomic Energy Agency 10-day session in Vienna to discuss international atomic energy programs.

Just where the United States stands and is heading is hard to guess. Views of various governmental agencies run from "America is first" to "We're so far behind we'll never catch the Russians." But the overall view seems optimistic.

The United States now has power plants in operation from the South Pole to Greenland. Nuclear submarines, atomic generators on satellites, isotope buoys and fission-powered airplane beacons are currently used by the Federal Government.

Since the first SNAP (Systems for Nuclear Auxiliary Power) was publicly displayed in January, 1959, many types of atomic generators have been built. SNAP generators, for example, have been built

for space power, as well as to power navigational aids on the bottom of the Atlantic.

These generators are "fed" with cerium-144, plutonium-238, cesium-137 and several other radioactive materials.

The new Air Force atomic power plant (PM-1), perched on top of a mountain, is about the size of a 55-gallon oil drum. It will do a job that at other radar installations takes more than 2 million gallons of diesel oil.

Dr. Hugh L. Dryden, deputy administrator of the National Aeronautics and Space Administration, has predicted that by the end of this decade communications satellites will have reactor power systems capable of producing 150 watts of electrical energy continuously for many years.

Isotope power supplies will be required for weather satellites, interplanetary space probes, instrument packages which measure conditions on other planets, and many types of rockets and space craft.

The first atomic-powered weather station in Antarctica began operation in February of this year, less than one year after atomic power was proved successful for weather stations.

The nation's first atomic-powered satellite, Transit-IVA, is a beacon in the sky for navigation of ships. Its small SNAP generator has been working successfully for more than a year. Navy ships are also homing on the Coast Guard's prototype atomic light buoy, sent to sea last December.

The newest atomic guide was sunk in 15,000 feet of water some 700 miles east of Jacksonville, Fla.

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SPACE

Astronaut Flight Control

► **THREE GIANT** electronic "brains" in Maryland control all the manned space flights of the National Aeronautics and Space Administration.

Acting on signals from the capsule's electronic equipment, the huge computers at Goddard Space Flight Center near Washington, D. C., "serve as the eyes and ears and brain of the space craft as it whirls around the world, according to Dr. T. P. Gorman of Goddard's advanced orbital programming branch.

Although the public generally believes the center at Cape Canaveral does the primary tracking, analyzing and correcting during Mercury shots, the system at Goddard is the real boss of the project. The Cape computers merely repeat exactly the same results and figures that originate with the main computers at Goddard. The two NASA centers are 1,000 miles apart.

In the Maryland center at Greenbelt, the Goddard "brains," three IBM 7090's, are constantly working out orbital flight plans not only for the Mercury capsules but for

NASA satellites, such as Telstar, Echo and Tiros.

Sending constant commands to the Wallops Island, Va., control center, the Goddard computers can signal satellites to raise antennas or change equipment at the exact split-second desired to gain the most information, the scientist said.

Two more digital computers at Goddard design and plan orbits and experiments to be carried out on each space mission. Information amounting to 32,000 words is processed speedily by each giant computer to give the fastest analysis of position, speed and information from the spacemobiles.

Calculations of immediate importance are considered while the satellites are still in orbit, Dr. James J. Fleming, chief of Goddard's data systems division, told SCIENCE SERVICE, but most of the information from space experiments takes months to process even on the ultra-fast computers. The processing would take thousands of millions of man-days to complete by hand.

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TECHNOLOGY

Blind Persons Helped By Bat Radar Device

► **SCIENTISTS** taking a hint from the way bats use their own natural radar have developed a device that may take the place of the blind man's cane or seeing eye dog.

The instrument enables a blindfolded person to make his way around objects and to locate and pass through an open door without touching the doorway.

Developed by Lockheed electronics research specialists, the device is equipped with a "voice," which by electric impulse emits supersonic sounds inaudible to the human ear. A pair of electronic ears pick up the sounds as they are reflected from objects in the man's path.

If there is an object within the 20-foot range of the instrument, the sounds reflected from it are converted to electrical energy and transmitted to the operator's earphones.

No sound in the earphones indicates the way ahead is clear. This is how a man finds an open doorway. As he turns the instrument box to left and right, he "hears" the walls; the signal ceases when the face of the box is pointed to the center of the doorway.

Power for the "bat radar" system is furnished by dry cell batteries which, carried in a case hung from the shoulder, make up much of the present weight.

It is presently too bulky to be used conveniently by the blind. A very substantial reduction in size and weight is expected to be no problem to space-age engineers.

Alvin E. Brown, with assistance of scientists Don J. Hodgson and Edward R. Holland, all of Lockheed Missiles & Space Co., built the bat radar system.

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BAT RADAR DEVICE—Alvin E. Brown, research scientist of Lockheed Missiles and Space Company, finds his way through a wooded area with a bat radar device developed to help the blind.