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**BEHIND ENEMY LINES**—Ready for takeoff, this radio-controlled reconnaissance drone which was demonstrated successfully at Quantico, Va., can take pictures behind enemy lines without any persons aboard.

## ENGINEERING

## Reactor to Desalt Water

► THE NUCLEAR REACTORS known as breeders may eventually enable the U.S. to convert water from the oceans into fresh water for drinking, for irrigation, and for industrial and recreation purposes at a cost below today's average from conventional sources.

Although atomic researchers say that much more research is necessary before a working plant is actually available, they were able to conclude that such a plant is feasible and were able to project approximate costs of water from such a plant.

They calculate that water can be produced at about eight cents per 1,000 gallons in a plant delivering one billion gallons of fresh water per day. This cost can be further lowered by the sale of electricity to the public.

It may therefore be possible with breeder reactors to produce water for as little as five cents per 1,000 gallons and electricity for as little as one-half cent per kilowatt hour. Both these costs are decidedly below today's averages for conventional water and power.

There are several ways to purify saline water, including such methods as distillation, but the principal problem faced today is the high cost of the power needed for the purification process.

Breeder reactors, they point out, differ from conventional reactors in that they literally breed or create additional fuel supplies as a by-product. As a result of fissions produced by fast neutrons, the breeder reactor regenerates more fissionable material than it consumes and thus breeds additional fuel supplies at a savings in cost.

This created fuel in turn would power

the reactor and enable it to produce cheap electric power—power that would be available at a low price to the public and that would be used to power the water purification processes.

The research on second generation breeder reactors was conducted for the U.S. Atomic Energy Commission, which reported it through the Office of Technical Services, U.S. Department of Commerce.

The AEC-sponsored research at Los Alamos Scientific Laboratory, University of California, was done with a small test model breeder reactor.

• Science News Letter, 84:82 Aug. 10, 1963

## TECHNOLOGY

## Need Better Workshops To Build Big Rockets

► THE SPACE RACE has progressed so fast the last few years that construction crews are not able to build the rockets the engineers have designed, it was reported in Steel, July 1963, in Cleveland.

The facilities needed to build a moon rocket are not yet in existence, although theoretical knowledge has progressed to the point where the concept of a moon shot is old hat.

Tolerances must be measured in thousandths and often millionths of an inch, while the spaceships themselves may be hundreds of feet long.

Until bigger and better workshops are built, there will continue to be a lag-producing bottleneck between theory and practice. Fortunately work is being done to remedy this situation as soon as possible.

• Science News Letter, 84:82 Aug. 10, 1963

## MILITARY SCIENCE

## Radio-Controlled Drone Photographs Enemy Lines

► A RADIO-CONTROLLED reconnaissance drone that can take pictures behind enemy lines without any person aboard performed satisfactorily in a demonstration at Quantico, Va.

Made of glass fiber and aluminum, the drone is called the Bikini, because it was engineered to be as small as possible, yet still cover the strategic points. Tested for the U.S. Marine Corps, the plane can fly as high as 10,000 feet.

The 40-pound aircraft is small (six-foot fuselage and eight-foot wing span), fast (50 to 100 mph), and maneuverable (rudder and elevator controls). Its vital parts occupy one cubic foot of space and thus the plane would be difficult to put out of commission.

In the demonstration, the Bikini flew five to ten minutes. It cost under \$1,000 to build. The engine was developed by Bantam Motors, which started out by making model airplane engines, and the drone system was built by Republic Aircraft Corporation.

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## SPACE

## Space Probes Cheaper If Launched From Air

► PLANES WE HAVE now could launch large space probes in the air at 40% less cost than it takes to shoot a missile from the ground, an Air Force study shows.

The study, conducted by Booz, Allen Applied Research, Inc., Washington, D. C., for the Air Force Special Weapons Center, gives the following advantages to launching space probes from the air:

The plane's own speed would add to the rocket's launch speed.

The missile would have less atmospheric drag to fight.

The angle of launching could be lowered to about 30 degrees, considerably reducing gravity losses during the rocket's "burn-out."

The probe could be launched from just about any place, taking full advantage, for example, of the earth's faster rotational speed at the equator.

Ground pads could be reserved for extremely large shots, such as the launching of manned vehicles.

John W. Locke, an engineer with the research firm, told members of the American Institute of Aeronautics and Astronautics meeting in Los Angeles that the delta-winged B-58 "Hustler" bomber is the best of this country's planes for the rocket-launching job.

The Hustler could release a Scout rocket at an altitude of 40,000 feet, and the Scout could push a 120-pound payload to altitudes of more than 15,000 nautical miles.

Only 40 pounds could be hoisted to that altitude in a comparable ground launch, he said.

The study used the Spinning Unguided Rocket Trajectory (SPURT) program designed for the Air Force's CDC 1604 computer.

• Science News Letter, 84:82 Aug. 10, 1963