

## ROCKETS AND MISSILES

## Navy Plans New Missile

► THE NAVY has put in its bid for a place in developing this country's space technology with a missile capable of destroying a satellite.

In testimony given to the House Committee on Science and Astronautics, Capt. Robert F. Freitag, astronautics officer in the bureau of naval weapons, said the Navy believes it can develop such an anti-satellite weapon within 18 months.

Capt. Freitag referred to the weapon as "a minimum energy missile" that would be "launched vertically with just enough power to arrive at the latitude of the satellite at zero velocity." The missile would be designed to hover and wait at that point for the satellite to come. By terminal guidance, it then would seek out the satellite and destroy it.

"This type of thing could be done very simply," Capt. Freitag said. "We believe within a year and a half, for example, we could destroy one of our own satellites as a demonstration of this capability."

The Navy was bolstered in its bid for space place by its traditional inter-service rival, the Army. Lt. Gen. Arthur G. Trudeau, Army chief of research and de-

velopment, said he believes "space is too important to be entrusted to one service."

All three services "have real talent and competency in this field," he said, urging a joint military space agency under the Department of Defense. Gen. Trudeau said command of such a proposed joint agency should be rotated every few years.

He also spoke strongly for the Army's right to space rule, declaring "the Army has the capability of developing satellites for almost any military purpose." He suggested that the Army has potential capabilities for such aspects of space as lunar construction and surface mobility which "are not now being employed."

The Navy has been turned down by the Defense Department on a request for authority to develop a tactical weather satellite and develop the Polaris as a satellite launching vehicle. The Navy's Sea Scout program designed to permit the sea launching of satellites still is not approved, but here the Navy still has hopes.

The Army-Navy bid for space employment so far has not been recognized by the Administration. The Air Force still soars in command of the wild blue yonder.

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## Solid-Fuel Rockets Issue

► SOLID-FUEL ROCKETS were a burning issue at Congressional hearings on budget appropriations for space.

There has been considerable testimony by responsible experts that solid-fuel rockets can propel the United States ahead of the Russians in their capability of launching heavy vehicles. This potential is virtually ignored in official U.S. plans for space development.

The current budget for the National Aeronautics and Space Administration allots \$3.1 million for research and development of solid-fuel boosters compared to more than \$99 million for liquid-fuel rockets. The investment in liquid-fuel rockets was increased by the Kennedy Administration by more than \$20 million.

This dependence on liquid-fuel rockets has persisted within NASA despite demonstrations borne out by independent industrial research that the solid-fuel engines can be produced at one-third the cost and in considerably less time than that estimated for their liquid-fuel counterparts.

Concerned observers have attributed the lag in NASA in solid-fuel development to excessive reliance on the German scientists, proponents of liquid-fuel engines, who presently dominate NASA's booster development.

Among these is Dr. Wernher von Braun, known for his work on the V-2 rocket with which Hitler hoped to conquer the world. Dr. von Braun now is director of NASA's

Marshall Space Flight Center at Huntsville, Ala., where large booster development is concentrated.

Although an expert in the liquid-rocket field, Dr. von Braun has had little direct experience with large, solid-propellant rockets. His success with the Redstone liquid-fuel booster in Project Mercury demonstrates his mastery of liquid-fuel propulsion technology.

Largely upon his recommendation, the Saturn C-1 vehicle, a three-stage liquid rocket of one and a half million pounds of thrust designed for heavy space loads to be operational in 1964, is getting the largest share of NASA funding for large booster research and development.

United Technology Corporation, a subsidiary of United Aircraft Corporation, independently sponsored at a cost of \$5.5 million the development of large, solid-propellant rocket engines of conical segmented design that successfully fired with one-quarter million pounds thrust in July, 1960.

This company contends that if it had depended upon Government sponsorship and support for this project, it would be waiting still. The two-stage rocket is uncomplicated. Its fuel is safe to handle. And the rocket can be easily assembled. Tests have demonstrated its high reliability.

Proponents of solid-fuel propulsion insist that concentrated effort in research and development in solid-fuel rockets would

yield a booster with a larger and more reliable launch capability sooner, more than two million pounds of thrust by 1964.

They point to the fact that solid propellants are used now in the upper stages of almost every U. S. rocket flight made and are the basis of the escape system for Project Mercury.

Rep. Victor L. Anfuso (D.-N.Y.) and Rep. David S. King (D.-Utah) have sponsored a bill calling for authorization of \$30 million for research and development of solid-fuel boosters. They are members of the House Committee on Science and Astronautics before whom the hearings on appropriations for NASA were held.

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## Death Predicted for U. S. Balloon Satellite

► THE DEATH of Echo I, the United States' 100-foot balloon satellite, was predicted at a meeting of the International Committee on Space Research in Florence, Italy.

September, 1962, July, 1963, or May, 1964, are the most likely times for Echo to die, Dr. Pedro Zadunaisky of the Smithsonian Astrophysical Observatory, and Drs. Irwin I. Shapiro and Harrison M. Jones of the Massachusetts Institute of Technology reported. Echo will die when it comes close enough to the earth to become captive of the denser layers of the atmosphere.

For an ordinary satellite, the death prediction can be made more exactly because its perigee (the closest distance to the earth during its orbit) falls continuously.

Because of its large size compared to its weight and the high altitude, the effect of solar light pressure is able to counter-balance the atmospheric drag effects on Echo and can even cause perigee to rise. The rising effect is periodic, however, so the satellite probably will perish on one of the dates aforementioned. Best estimates favor July, 1963; Echo was launched in August, 1960.

The scientists received their data on Echo from photographs taken by the Smithsonian's Baker-Nunn satellite tracking cameras located around the world. Information also was gathered from radio and telescopic observations, particularly from the Observatory of Paris at Meudon, France.

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## Gaseous Envelope Speeds Underwater Missiles

### See Front Cover

► A GASEOUS ENVELOPE such as the one shown around the torpedo on the cover of this week's SCIENCE NEWS LETTER may double the speed of underwater missiles.

Experiments at Convair Division of General Dynamics Corporation, San Diego, Calif., show that much of the skin friction drag of a hydrodynamic body can be eliminated by the vapor envelope.

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