

NAVIGATION

Flying Ships for Combat

► FLYING SHIPS and machines that ride on a cushion of air are being designed for the military to carry nuclear weapons and troops across oceans or rugged terrain at speeds over 100 miles an hour.

The United States is behind in the race of hydrofoils and hydroskimmers, an expert said in Washington, D. C., but a new development has given this country a great potential for a military weapon.

"Our first hydrofoil was not built as a test vehicle," Rear Adm. Ralph K. James, chief of the Navy's bureau of ships, stated. "It was designed as a war ship."

The Navy's interest in the hydrofoil and the machines supported by an air cushion (ground effects machine) is "to advance the state of military weaponry."

The PC(H)-1, or patrol craft hydrofoil number one, is using the American-designed submerged foils which gives the U.S. an advantage over European designers. As opposed to the surface-piercing foils which can be used only on smoother waters, the submerged foils ride beneath the water's surface, carrying the ship high out of the water and reducing drag. All hydrofoils depend upon some sort of leg and foot to lift the hull of the ship above the water.

The hydrofoil is not new. Enrico Forlanini built and tested the first such vehicle in 1905, followed by Alexander Graham Bell in 1918.

Many other countries, including Russia, are running commercial passenger hydrofoils on rivers and straits as economically as standard ferries—and much faster. Hydrofoils have the advantages of greater speed and overcome rough weather and rough seas.

For these reasons, the U.S. Navy has shown more than a passing interest in the crafts.

Boeing Company, for example, is developing a high-speed hydrofoil test ship (Fresh-1) which will be capable of 100 knots and have the same advantages as the Russian hydrofoils.

The Navy is also interested in building ground effects machines or hydroskimmers which have the added ability of running either on water or on land. Using a "cushion of air," the hydroskimmer has no upper limit on the speed at which it can "fly" nor on the weight which it can carry, Adm. James said.

The Vehicle Research Corporation, under support of the Maritime Administration, is now developing a 100-ton surface effect ship which can cruise more than 100 knots. Dr. Scott Rethorst, president of the company, said this ship, the Columbia, is the smallest economical size hydroskimmer.

Westland Aircraft, a British firm, has built the largest hydroskimmer now afloat, Stuart Miller of Yeovil, England, reported. By 1970 the firm expects to have a 100- to 150-ton vehicle capable of carrying at 80 knots 300 passengers or 25 cars riding eight feet above the ground or water surface. Fares for such services are expected to be a little more than one cent for each passenger mile.

And for passengers who worry about sea or air sickness, Mr. Miller explained that these ships "ride on a bubble of air." There is little or no rolling or rocking because of the height they "sail" above the water or ground.

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Bell Aeroystems

HYDROSKIMMER—The artist's sketch shows the hydroskimmer now under construction by Textron's Bell Aeroystems Company, Buffalo, N. Y. Designed primarily for cruising over water, it will also be able to operate over land. Scheduled for testing in May 1963, it will be the largest air cushion vehicle ever built in the United States.

SPACE

U.S. Now Has Capability For Twin Space Shot

► THE UNITED STATES now can equal the Soviet manned twin space shot, SCIENCE SERVICE learned at Cape Canaveral.

The systems and power to do this are now available, J. Merritt, operations director of Project Mercury at Cape Canaveral, said. Although we do not have the vehicle or booster to keep two men up as long as the Russians did, we can launch two men into orbit at different intervals and return them to earth almost simultaneously.

The U.S. twin-orbital try would, under present conditions, be limited to 24 hours. The astronauts would be able to communicate with each other in space, and the return to earth could be coordinated just as the Russians did. This engineering ability was evident in the almost "bull's-eye" landing of Astronaut Walter M. Schirra.

National Aeronautics and Space Administration is in the process of modifying three Mercury capsules for an 18-orbit, 24-hour mission.

The MA-9, the next Project Mercury mission, is scheduled for early next year. If the flight is as successful as Schirra's shot, it is possible that a limited twin-orbital attempt may be made with the remaining two systems. However, there are no definite plans for this.

The capsule for the 24-hour flight will weigh less than all previous capsules.

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GENERAL SCIENCE

Bell Hydrofoil Model for Smithsonian Institution

► A SCALE MODEL of a hydrofoil or "flying ship" made by Dr. Alexander Graham Bell in 1918 was presented to the Smithsonian Institution, Washington, D. C.

One of the earliest United States' hydrofoils, the Bell HD-4 was the result of eight years of experiments by Dr. Bell and his associates. On one of its first voyages, the HD-4 achieved a world speed record for marine vehicles of 70.86 miles per hour.

The 60-foot vessel had a three point suspension system. The foils in the stern were connected to the air rudder for directional control. The foil in the bow was to prevent diving.

Hydrofoil vehicles attain high speeds, as compared with other marine vessels, by being partially lifted out of the water. They obtain their lift from airfoil-shaped surfaces that extend beneath the surface of the water.

Dr. Bell's hydrofoil was of primitive construction. The hull was made of wood with steel fittings. Its outer skin of canvas was laid in marine glue. Steel straps and piano wire were wound spirally around the hull to offset twisting.

Despite its primitive design, on Sept. 9, 1919, the HD-4, powered by two 360 horsepower Liberty engines, reached a speed of 70.86 miles per hour—a world record for marine vehicles at the time.

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