

U.S. Maritime Administration, speeds 50 knots in nine-foot waves.

The Hydrokeel vessel usually has two side keels. Blowers in the bow of the boat pump air underneath the hull between the keels so that the main body of the boat rides above the water on an air pocket, with the propellers and rudders beneath the water.

The Anti-Friction Hull Corporation, Laurel, Md., has built four Hydrokeel-type craft, including a 38-foot experimental cruiser.

### No Runways Needed

For more than half a century aircraft have freed man from the earth but, as one great inventor is reputed to have said, "the airplane will only be half invented until it can take off and land without runways."

The military need for VTOL (vertical takeoff and landing) aircraft has grown out of increasing guerrilla-type warfare in the jungle, desert or icy far north. Aircraft must be able to fly low, land on rough terrain and take off again without miles of concrete runways.

Commercially the landing strips now required by jet airplanes and other aircraft mean that the airport must be located far away from the city. Air travelers spend much of their time getting to and from the airport.

The helicopter, which is a little more than 20 years old, was the first successful VTOL aircraft. And as long as there are requirements calling for distances less than 100 miles, speeds not more than 160 miles per hour, heavy moving jobs and hovering for long periods of time, the helicopter will not be replaced.

### Commercial VTOL

VTOL planes, however, combine the vertical takeoff and hovering ability of the helicopter with the range and speed of conventional aircraft. VTOL can fill a major gap in the transportation spectrum—short haul distances, at speeds of 350 to 400 miles per hour.

VTOL craft could operate directly from downtown commercial areas and carry passengers directly to nearby major cities or to outlying airports, for cross country and intercontinental flights.

In order to achieve vertical flight, a huge amount of downward flowing air, or thrust, in relation to the plane's weight, is needed to lift it off the ground. Once the plane is airborne, there must be some transition to horizontal flight.

Aircraft achieve thrust by rotors, propellers, ducted fans or turbojets. Some VTOL designs have a dual propulsion system in which one means of thrust provides the lift and another provides horizontal flight. In another design, thrust from a fixed propulsion system is deflected downward by vanes or wing flaps that can be adjusted to different angles.

A third system has a moveable propulsion system. When tilted at a 90-degree angle it lifts the aircraft and then returns to its normal vertical position for horizontal flight.

At present, VTOL craft exist for military use only, most of which, in the U.S., are still in the experimental stage.

As soon as the millions of dollars poured into this field of research by the military have fully developed the vertical takeoff art, the heyday of commercial VTOL is expected to begin. Farsighted engineers even predict supersonic VTOL aircraft for commercial transportation to different continents.

### Future of Airports

The economically minded citizen may wonder about the future of the acres of concrete now surrounding airports. They may be located far from the city but they will never be completely obsolete. Engineers have included them in drawing board plans for a hypersonic aircraft that travels 16,000 miles an hour compared to the supersonic craft currently being discussed that travels 2,000 miles an hour.

The hypersonic airliner in a piggy-back position, as shown in the artist's concept on this week's front cover, would travel 50 miles above the earth and take you to any point on earth in a little more than an hour.

It would be launched from a piggy-back position on top of a manned, recoverable air-breathing booster traveling at an altitude of 120,000 feet at supersonic speeds of more than 5,000 miles per hour. The booster would then return for another launch.

A rocket in the transport would accelerate it to its near-orbital speed and would then be turned off, enabling the plane to glide about 10,000 miles before reentering the atmosphere. Commercial use of this transport has been predicted for the 1980 to 1990 era.

By the year 2000 the look and the pace of transportation will be entirely different from what it is today. By that time interplanetary travel may be as common as intercontinental travel is now. And traffic congestion in outer space instead of city streets the number one transportation problem.

• Science News Letter, 85:298 May 9, 1964

## Nature Note

### Wild Ginger

► IN THE PAST a child complaining of a stomachache might be served a cup of wild ginger tea made from the boiled roots of *Asarum canadense*.

Pioneers were shown by the Indians that the roots boiled in a rich sugar syrup were a palatable substitute for tropical ginger or as a tonic.

Its medical properties were well known to the Indians who also used it to conceal the flavor of slightly spoiled fish or meat.

Wild ginger is found in moist woods throughout the eastern United States. In the April-May period, beneath the pair of heart-shaped hairy leaves, several brown-purple bell-shaped flowers may be found. They often are concealed beneath last year's leaf mold.

The root is actually a rhizome, a thickened, elongated and horizontally growing structure distinguished from true roots by its buds and nodes. It is dug in the spring, cleaned, dried, and used as an aromatic bitter.

• Science News Letter, 85:299 May 9, 1964

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