AERONAUTICS

Straight Up and Away

Dart-like aircraft, triangular wings, circular platforms that take off without runways, and then fly like conventional aircraft, are among fascinating aircraft now being developed.

See Front Cover

➤ A SLEEK AIRCRAFT roars vertically upward from a small area marked by the plane's shadow a scant fraction of a second ago.

It hovers momentarily. Then it streaks out of sight, soon approaching a shattering speed nearly that of sound.

The aircraft returns, hovers and drops lightly on the exact spot it left a few minutes before.

This is not in the far future. It is happening now. The aircraft belongs to an unusual group of airborne vehicles now undergoing close scrutiny by the armed services for military use. All have the following in common: vertical take off and landing (VTOL) and an ability to fly like conventional aircraft.

The idea is not new. Helicopters, a prime example of VTOL, have been with us for some time. Even in the late 1400's, an unknown aerodynamicist named Leonardo da Vinci designed a corkscrew-shaped aircraft that was supposed to spiral straight up into the sky. He never did finish it.

The first VTOL aircraft—the helicopter—has many disadvantages. Helicopters are highly inefficient while flying forward, expensive and have a limited range, payload and speed.

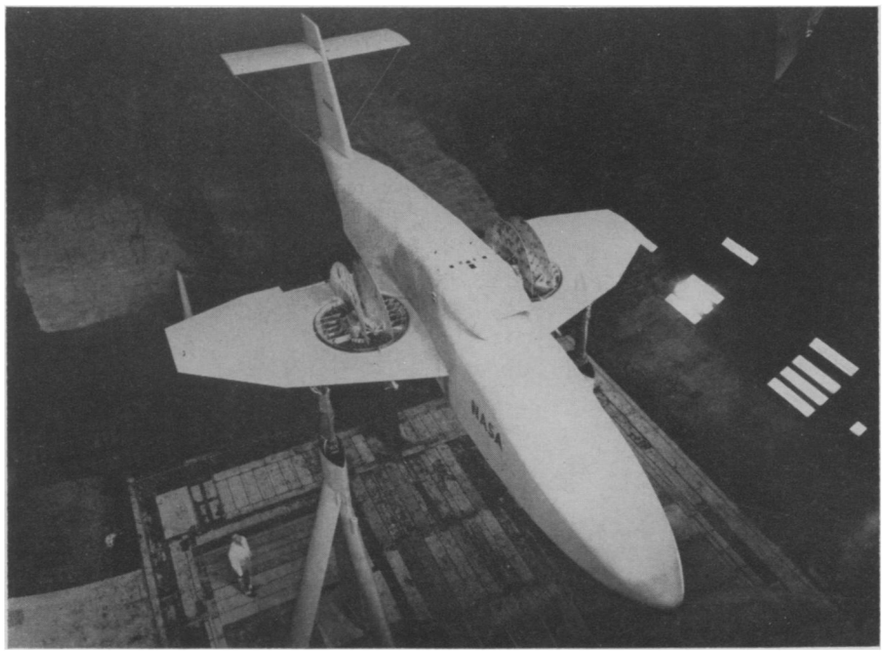
VTOL enthusiasts (of the non-helicopter group) believe their unusual craft combines the vertical attributes of the helicopter with the speed and range of conventional aircraft. Military men envision VTOL fighter, reconnaissance and transport craft that can speedily fan out from widely separated runwayless "airfields" about the size of the aircraft. Troops and supplies could be quickly shuttled from one battlefront to another, fighter planes could fly up from unlikely places and attack the enemy, while reconnaissance VTOL planes maintained close liaison with troops in the forward battle area.

The military does not have a monopoly on VTOL crystal-ball gazing. As suburbia continues sprawling into the surrounding countryside and as large jets require larger runways, today's cross-country traveler finds himself spending more time getting to and from airports than in actual air travel. Commercial airlines picture VTOLs as ideal inter-urban carriers that would shorten such travel time.

VTOLs come in all shapes and sizes. One looks like a dart, another like a spider. Still another resembles a manhole cover suspended in air. The methods of achieving vertical take off and landing are just as varied.

In order to lift off vertically, a huge amount of downward flowing air, or thrust, is needed. Engines or wings that swivel 90 degrees, thrust-deflecting fans in wings and fuselage or at the wing tips, and huge wing flaps are some of the methods used. One company simply uses an overhead helicopter rotor to get up and down and regular turboprop engines for horizontal flight.

The artist's concept seen on this week's front cover shows how the XC-142, being designed for the Army, Navy and Air Force by Ling-Temco-Vought, might look as it takes off vertically, later to fly horizontally in the usual manner.



General Electric

LIFT-FAN PROPULSION—The six-foot-diameter lift fans mounted in the wings of this full-scale VTOL model airplane are shown with doors open in take-off position. The lift fans, developed by the General Electric Company for the U.S. Army, are powered by turbojet engines mounted inside the fuselage. The model tests are being conducted by NASA.

New Interest in VTOLs

In the past, VTOLs (except helicopters) were confined mostly to the drawing board, test models, or at best an experimental plane. Within the past year, the Defense Department in quick succession awarded a $70 million contract for a tri-service VTOL transport and announced it will spend nearly $35 million in developing a British-made VTOL fighter plane. More contracts are expected to follow soon.

This new interest has given U.S. manufacturers a new outlook on their poorly funded VTOL projects.

The scientific and engineering know-how of three aircraft companies will be combined to develop a transport plane designed for all the armed forces.

Four turboprop engines will be mounted on a tilting wing that is turned upright so that the propellers will serve as rotors and then shifted to horizontal position for forward flight. The transport is designed to carry four tons of payload.

Another VTOL being tested full-scale in a wind tunnel by the National Aeronautics and Space Administration has powerful lift-fans six feet in diameter mounted in the wings. The version was developed by the General Electric Company for the U.S. Army.

The lift-fan propulsion system is designed to provide this type of aircraft with the maneuverability of a helicopter and level jet-speed flight of about 600 miles an hour. The lift fans are powered by two GE turbojet engines mounted inside the fuselage.

A British fighter plane, the Hawker P-1127, has an advanced turbofan engine that uses four swivelling nozzles to divert the thrust downward for lift off and to the rear for conventional flight.

West Germany and Britain are sharing equally in the development cost of the Hawker, a cooperative effort that is becoming more common among NATO nations. General Lauris Norstad, NATO's Supreme Commander, has been stressing for many years the need for a fighter plane that can operate independently of large airfields,

which would be among the first targets of enemy missiles in war.

The United States, meanwhile, is moving ahead with other VTOL projects. The Army is developing two surveillance planes.

One, a General Electric-Ryan Aeronautical Company project, uses six-foot fans tucked within each wing for its vertical lift. The thrust is diverted to the fans from two jet engines. The other project, Lockheed Hummingbird, utilizes a series of valves and turbojet engines to greatly increase vertical lift with no additional fuel consumption.

The preliminary trials of the Hummingbird are scheduled to be completed the end of November.

All these planes figure in some way in U.S. military plans. However, neither the U.S. Air Force nor the Navy now has a VTOL fighter under development.

It would be unrealistic to state that there are no barriers to a system of VTOLs for military and commercial purposes. In the past, the meager funds spread over a wide variety of experimental VTOL projects hampered progress in the field.

High fuel consumption required by the propulsion system—the gas turbine—that made VTOLs possible, the vision-cutting and engine-clogging dust storms raised by VTOLs blasting off, and increased competition from improved helicopter models and the "short take off and landing" aircraft are disadvantages pointed out by critics.

However, as one Federal Aviation Agency official stated, the two greatest problems facing U.S. transportation today are commuter travel and the short-trip travel, defined as up to 400 miles. More and more cars clog the nation's roads, with no relief in sight.

A system is needed that is reasonably cheap, convenient and flexible, avoids jammed highways, yet is readily accessible to the traveler when he wants it, the official stated. The VTOLs would closely fit that description.

• Science News Letter, 82:354 December 1, 1962

ARCHAEOLOGY

New Dating Method For Million-Year-Old Fossils

➤ A NEW RADIOACTIVE dating method promises to close one of the major remaining gaps in methods of fixing dates on the geological and archaeological time scales.

The new procedure, based on radioactive inequality in nature between uranium-234 and its parent U-238, was originated by David Turber of Columbia's Lamont Geological Observatory at Palisades, N.Y. The research is described in the Journal of Geophysical Research, Nov. 1962.

Uranium-234 is an isotope of uranium formed by the radioactive decay of U-238. The "disequilibrium" between the two isotopes possibly can be employed to date sedimentary material—which often contains fossils—as old as 1 million to 1.5 million years. Previous methods available could only date material accurately back 20,000 years to the last ice age.

• Science News Letter, 82:355 December 1, 1962