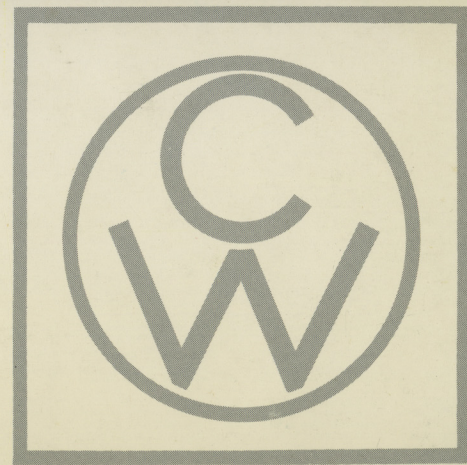
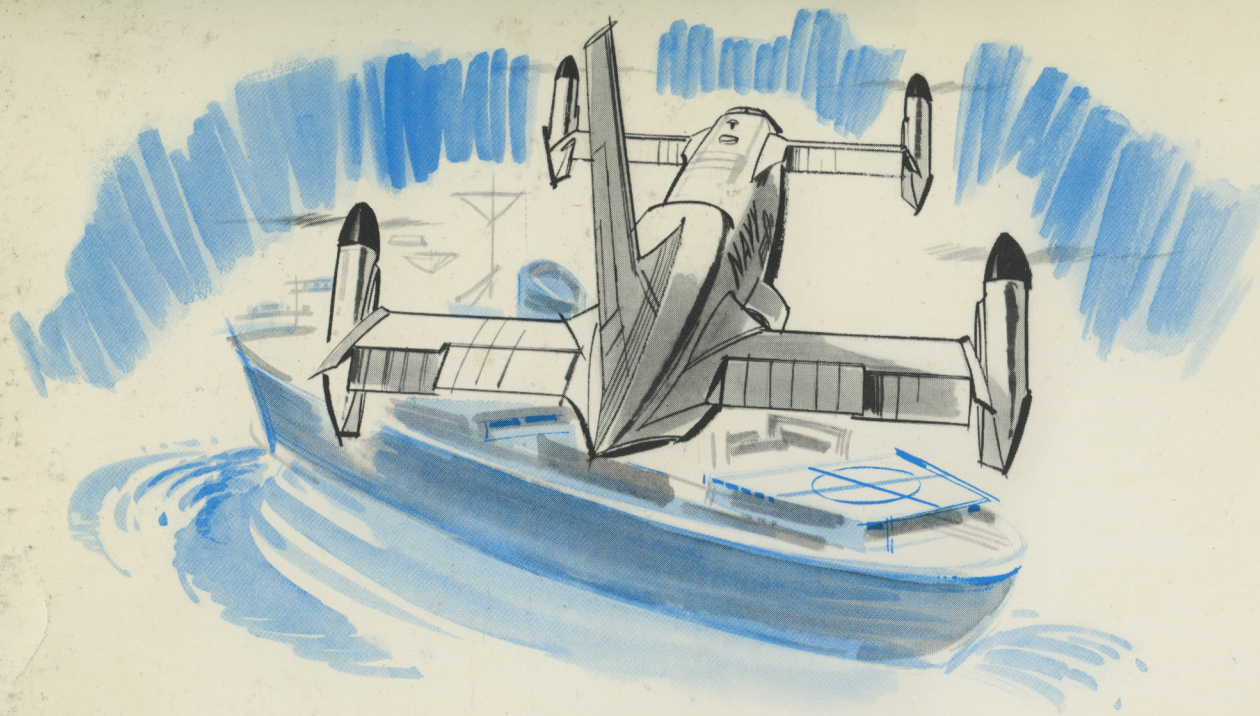


Curtiss-Wright *High Speed* VTOL

Curtiss-Wright Corporation, VTOL Systems Group
Caldwell, New Jersey, U.S.A.





Mission Versatility

TRANSPORT—High speed support for use without advance preparation. In jungles, tundra, desolate areas, ships at sea. In-flight refueling for extended range.

SEARCH AND RECOVERY—High speed, long-range, dash, search and hover or VTOL for pickup.

ARMED ESCORT—Weave, lead or trail. Take-off and land anywhere with convoy. Stable weapons platform at low altitude.

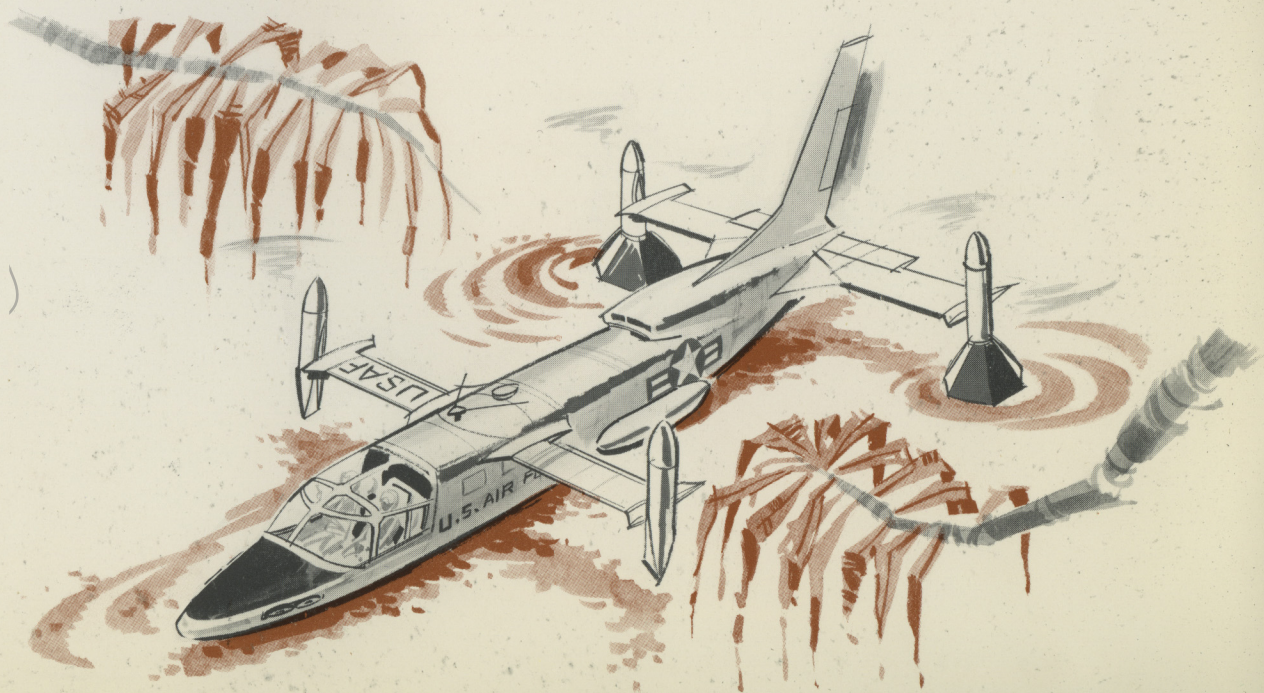
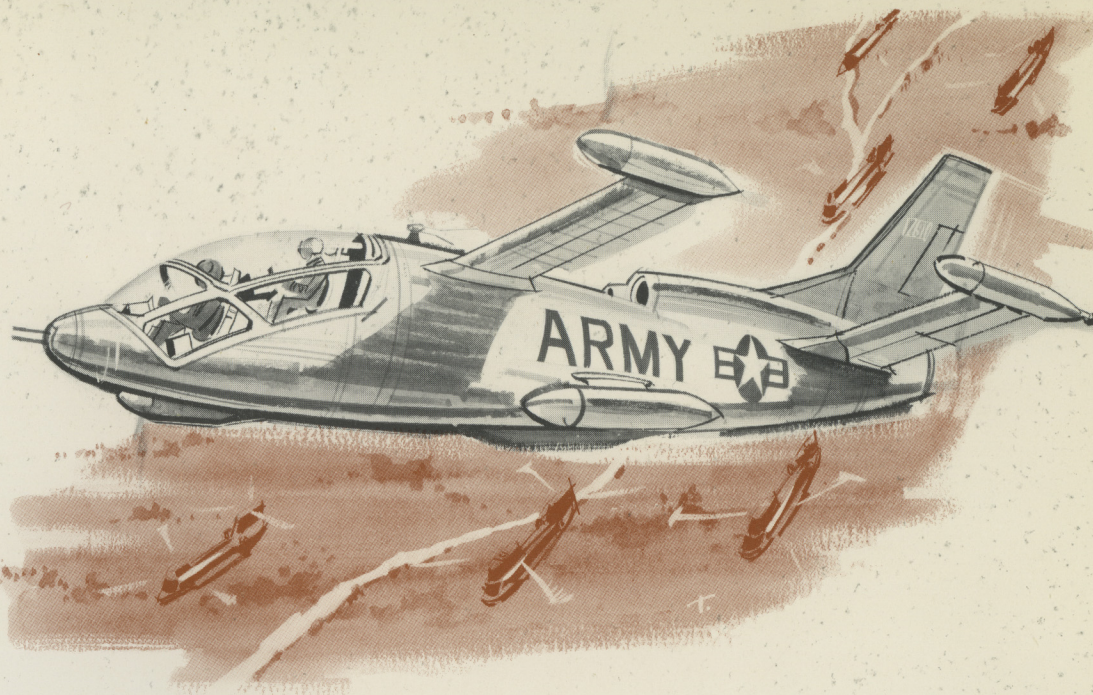


SURVEILLANCE—High speed, low or high altitude capability. Excellent platform stability at high speeds in rough air.

ANTI-SUBMARINE WARFARE—Hunt, identify at target speed, screen, kill and dash.

INFILTRATION, EXFILTRATION—Quiet, fast. Haul cargo or troops. Rapid cabin modification.

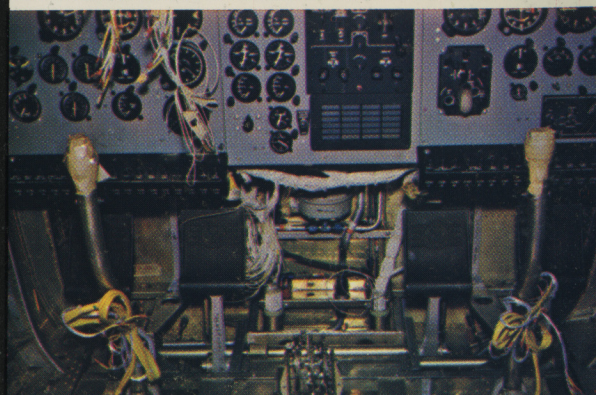
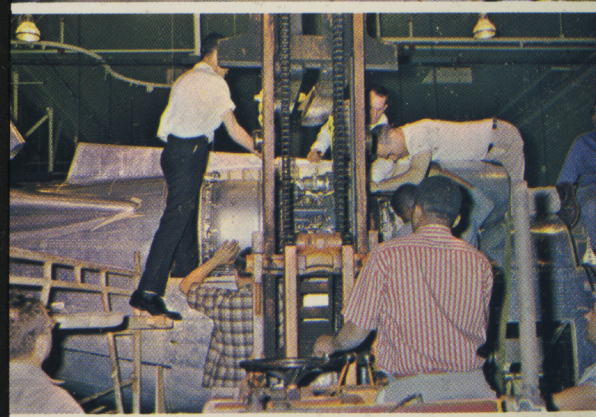
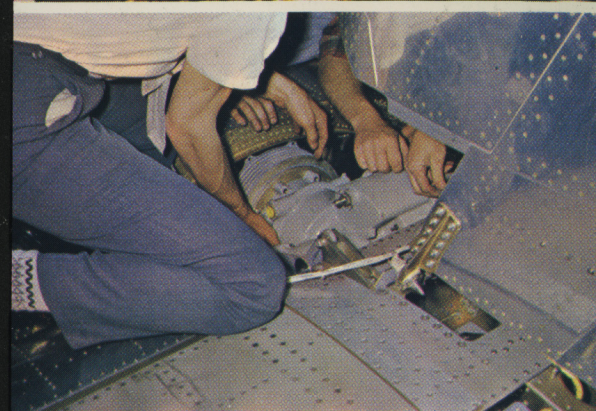
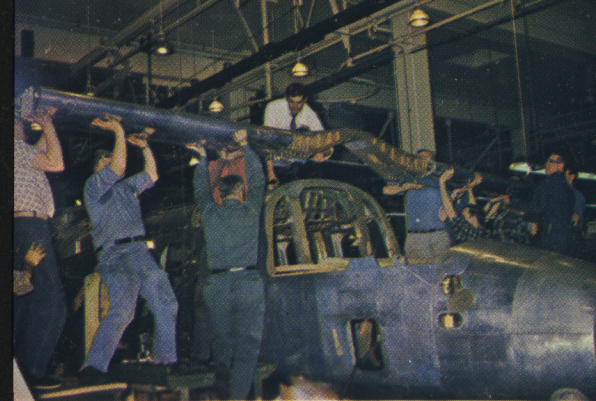
AERIAL FIRE SUPPORT—High speed nap-of-the-earth or altitude operations. Quick agile, maneuverable.



The X-19 Aircraft

The X-19 high-speed VTOL aircraft is a twin-engine, intershafted (so that either or both engines continuously drive all four propellers), tandem high-wing aircraft with four tilting propellers mounted in nacelles at the wing tips. It is of all metal semi-monocoque construction and has fully retractable landing gear.

The flight system design of the X-19, effectively utilizing propeller radial force, as conceived by Curtiss-Wright, has materially advanced the state-of-the-art. It combines vertical take-off and vertical landing capability with one-engine-out safety, high flight speeds, simplicity of design, smooth transition and standard airplane flight controls. The combination of these proven design attributes makes this aircraft and its derivatives highly adaptable to a wide variety of logistic and tactical missions.



Man's first powered flight was made by the Wright brothers at Kitty Hawk in 1903. They used a fixed wing, rigid propeller aircraft. Since then, only one other concept of flight through the atmosphere has been universally adopted as an everyday method of transportation—flight by rotary wing.

Now, a third concept, Vertical Take-Off and Landing (VTOL), coupled with considerably higher forward speeds than may be obtained with helicopters, is beginning a new chapter in the history of flight. The Curtiss-Wright Tri-Service Model X-19 is an advanced development of this new concept and is capable of flight speeds formerly associated with the fastest prop-jet transports.

Flight system principles and general configuration of the X-19 were conceived by Curtiss-Wright. Basic design, engineering and development of components were accomplished entirely with Curtiss-Wright funds. Curtiss-Wright has been awarded a contract to fabricate two prototype X-19's under Tri-Service funding and U.S. Air Force management. These prototypes will be used by the Army, Navy and Air Force for mission evaluation. Studies are being conducted to determine how this concept can be adapted to other future service requirements.

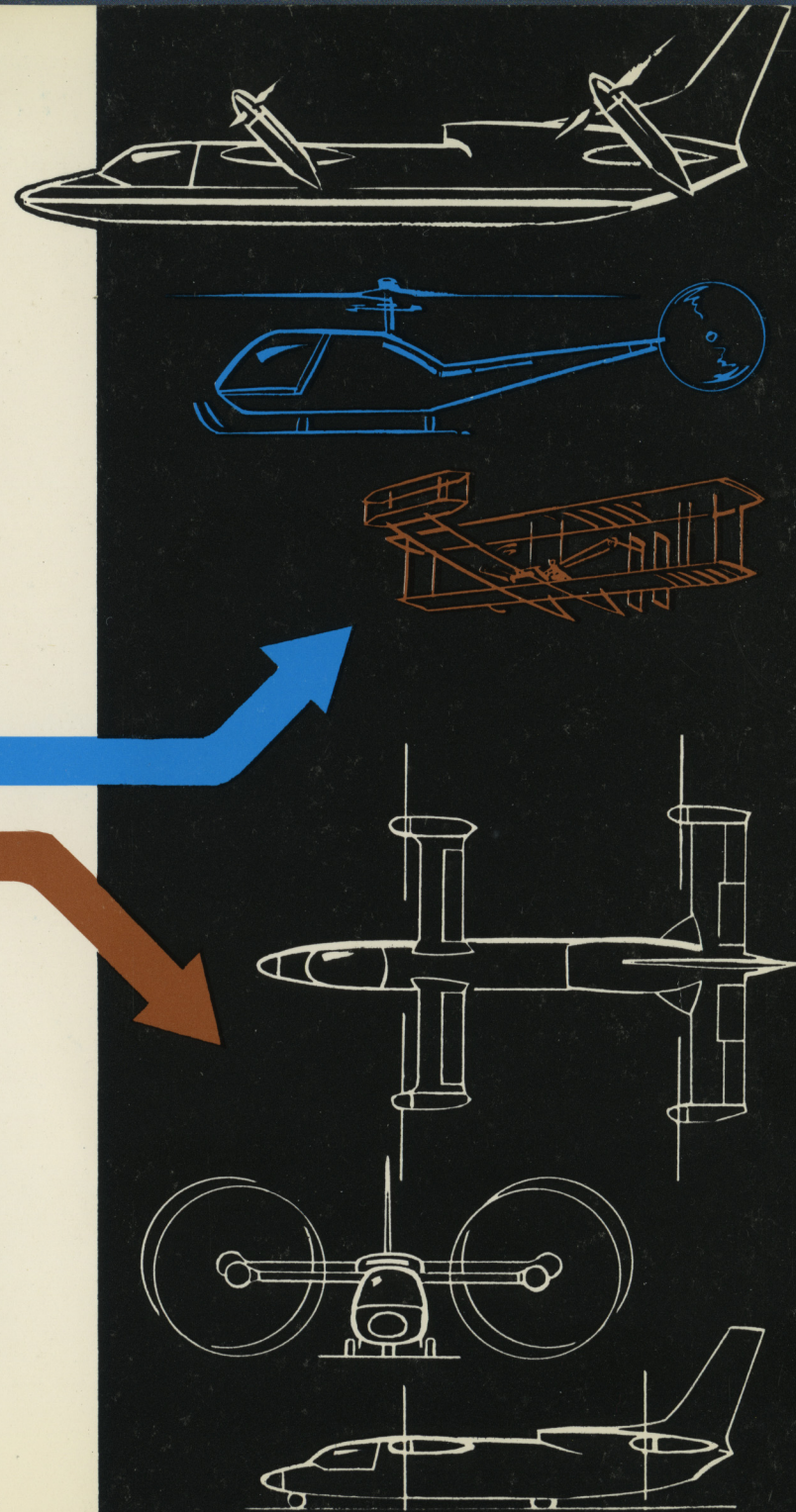
Beginning A New Chapter

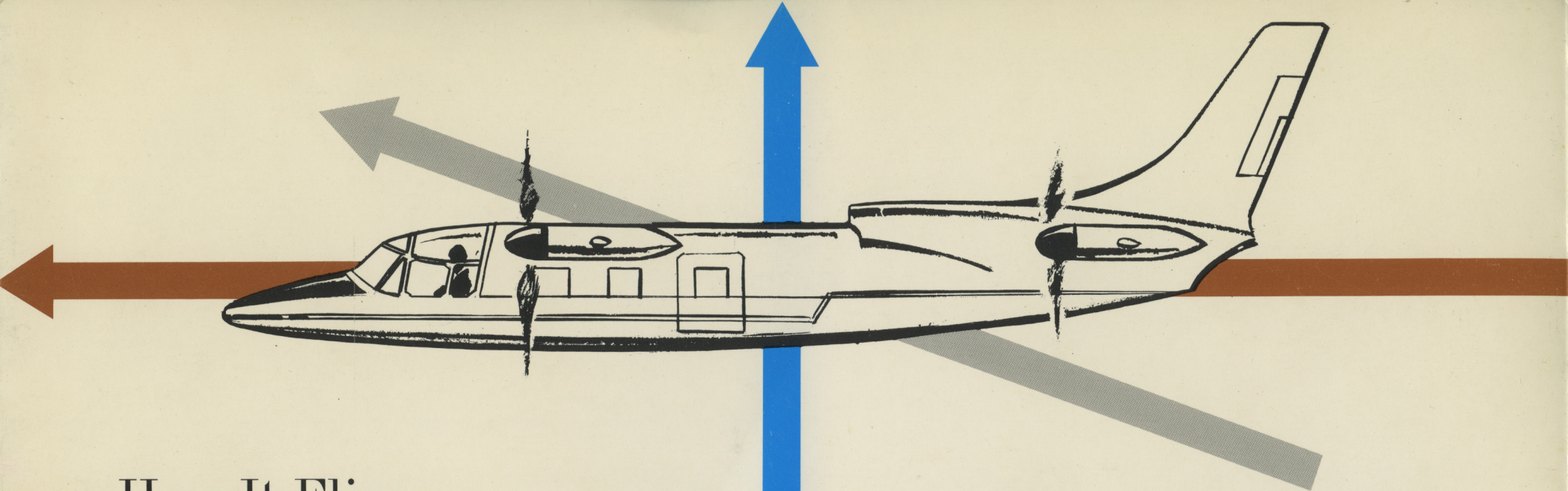
Curtiss - Wright VTOL Concept

The Curtiss-Wright VTOL concept is based on supplementing wing lift with the lifting force which results from the angular flow of air into the propeller disc. This continuous lifting force, purposely optimized in the Curtiss-Wright VTOL propeller blades, allows a smooth, uninterrupted transition from vertical to horizontal flight—without significantly compromising propeller efficiency during the hover or cruise conditions.

Because of this supplemental force (called radial force), the aircraft goes through transition without any discontinuity in either total lift or thrust while the four propellers are being tilted from vertical to horizontal during take-off or from horizontal to vertical during landing.

And it is propeller radial force which makes unnecessary the excess wing area needed by other aircraft for take-off and landing and enables the wings of Curtiss-Wright VTOL aircraft to be small, low-drag wings designed to be optimum for the desired primary flight condition.





How It Flies

The X-19's propellers tilt through an angle of approximately 90° from horizontal to vertical. The aircraft takes off vertically with all lift supplied by the propellers in the vertical position. By tilting the propellers from the vertical toward the horizontal position, the aircraft gains forward speed and can follow any flight path desired by the pilot during transition. At flight speeds of, and above, approximately 160 KN propellers are in the horizontal position.

The aircraft is flown in hover, transition and all other flight conditions by the standard stick and rudder pedal controls. In vertical take-off, hover and vertical landing conditions, control is accomplished by altering the thrust of various propellers. Aircraft pitch

control is obtained by varying the blade angle between the two front and two rear propellers, roll control is obtained by using different blade angles for the two right and two left propellers, and yaw control is obtained by varying the blade angle of diagonally opposite propellers.

As all four propellers are tilted forward and the aircraft gains speed, control by varying blade angle is gradually phased out and control is obtained by conventional aerodynamic surfaces—ailerons and elevators in the wings, and a rudder in the vertical tail surface.

Steady, unaccelerated flight can be maintained at any air speed from zero to maximum, including speeds in the transition range.

