THE HANRIOT MONOPLANE

BY

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Echoing the Wright Brothers' technology-transfer of the bicycle to the heavier-than-air aeroplane, René Hanriot, hitherto a Darracq racing car driver, climbed the engineering ladder from the ground-based motor car to the airborne flying machine by designing his first, albeit frail, single-seat monoplane in 1907 after a one-year delivery delay of his originally ordered Antoinette, and subsequently displayed it at the Salon de l'Aeronautique in 1909.

The aircraft, powered by a single, 50-hp Buchet engine, featured an open framework fuselage mated to two rectangular wings whose span stretched to 31.2 feet, thus mimicking the monoplane configuration of his intended purchase and the later, world-renowned Bleriot XI, both of his native France.

Hanriot's inadequate experience and capability, remedially eliciting the aid of Eugene Ruchonnet, Leon Levasasseur's engineer, resulted in a secondary technology-transfer, from boat-building to aerial design, the result of which required its "hull" to substitute aerodynamics for fluid dynamics. Something new, indeed, often relied on the foundation of something old, particularly during the nascent period of aviation.

Subsequent designs, developments of the first constructed at his Rheims workshop, had included the 20-hp, Darracq-engined *Libellule* and a larger derivative powered by a 40-hp Gype, both of which had enabled him to establish a flying school in Betheney in 1910. Instrumental in these aircraft had been Louis Wagner who, like Hanriot himself, had risen from the ground up as a racing car driver, and Marcel Hanriot, Hanriot's son, who, at the age of 15, had become the world's youngest pilot.

Although Hanriot's first airframe had sustained damage during landing, it had nevertheless provided the foundation for a smaller, but similar monoplane which had sported a simple, elegant, aerodynamically-clean configuration when it had appeared in July of 1910 and it had embodied features of the transportation modes from which it had been developed.

Constructed of ash, spruce, and steel tubes, the aircraft had a mahogany ply-covered, inverted, A-frame, racing skiff-like fuselage which appeared as if it could equally slice through waves as well as air. The light, but strong structure eliminated the need for the number and complexity of bracing wires traditionally required by box frame or girder build-up assembly.

Cambered, rounded-tip wings, formed by two laminated spars and multiple ribs and covered with unbleached cotton fabric, were steel tape lashed to the fuselage and hinged, like those of the Wright Flyer and the Bleriot XI, to induce in-flight banking by means of wing-warping. The 30.5-foot span and seven-foot chord resulted in a 183 square foot area.

The large, triangular-shaped, fixed horizontal tail, measuring 9.3 feet long by eight feet wide and equally covered with unbleached cotton, extended to two separate, longitudinal-controlling elevators, which sandwiched the rudder, while the fixed surface had been tightly stretched with the aid of two transverse spars and sported both unmoveable, dorsal and ventral, triangular-shaped projections to increase stability.

The laced fabric, scalloped, vertical tail, hinged to provide control about the yaw axis, appeared like a boat's sail.

Power was provided by a 35-hp, eight-cylinder, water-cooled, V-type, E.N.V. engine, mounted on, and partially supported by, the A-frame struts, its two rows of cylinders set at 45-degree angles to the vertical and sharing a common crankshaft, and it drove a single-bladed, mahogany propeller. The type also flew with a Clerget engine.

The Hanriot Monoplane rested on twin wheels and a tailskid.

With a 27-foot, 3/4-inch airframe and a seven-foot, 5/8-inch height, the pioneer aircraft had a 500-pound gross weight.

The shallow cockpit, almost resembling a canoe-like dugout which virtually placed the pilot on the "deck" of the racing skiff airframe, featured little more than engine and axis-control levers. The right side stick, for instance, moved forward and aft to actuate the hinged, fabric-covered elevators for pitch control, while the left side stick, moveable in a sideways direction, activated the wing-warping mechanism for in-flight banking, or lateral axis control. The coupe atop it, informally known as a "blip switch," provided engine control, usually replacing the left-located throttle, since a hand was seldom free to operate it.

Fuel, stored in the cylindrical, metal tank, directly behind, and on the same level as, the engine, often required pressure to ensure continued flow, initiated by the squeezable rubber ball mounted on top of the right, pitch-control stick.

The scalloped rudder, ensuring yaw-axis stability, was moved by means of a foot-depressed bar.

Several, ground-attendant facilitated propeller turns, coupled with right stick-topped, rubber bulb initiated fuel pressure build-up and an opened throttle, resulted in ignition, its proper functioning verified by blip switch testing.

Initial taxi and direction were usually aided by the ground crew, who lifted the tail from the grass, but a significant power application, bathing the vertical and horizontal tail surfaces in propeller-generated slipstream, often enabled them to become effective.

Final aerodynamic surface testing and take off acceleration required hand and foot control, the left stick actuating the wing-warping, the right the elevator-pitch deflection, and the feet the rudder-yaw axis. Infused with life with a full, forward throttle, the monoplane required an equally forward stick depression to allow the increasing airspeed to act on the horizontal tail and aerodynamically leverage it off the ground in a forward rotation maneuver, the aircraft's aft-half now "flying," as if it were a mini-airplane unto itself, with wind-direction caused yaw deviations corrected with rudder deflections.

With the left hand gripping the wing-warping actuator, the pilot was ready for the transition to air-surrendering flight the moment the still-spinning wheels were disconnected from the cradling blades of grass—or that instant that the lift-generating wings triumphed over gravity and separated them from the earthly plain.

The pilot, now a quad-limb extension of a tri-axis aerial body, applied positive control during initial climb-out.

Although there were no incremental throttle settings and the aircraft therefore flew at full, continuous power, its original, 35-hp engine had been inadequate to exert other than a sluggish, wing-warping created banking response.

Descent, induced by a combination of blip switch power interruptions and backward-stick, downward pitch, enabled the Hanriot to return to the ground, a maneuver requiring a balance between power and gravity. Resettling on to the grass with a final engine cut, it was both cushioned and resisted by it, decelerating as diminished airflow over the horizontal tail returned the tailskid earthward.

The Old Rhinebeck Aerodrome example, a reproduction constructed by Cole Palen, Mike Lockhart, and Andy Keefe with the aid of drawings published in *Flight* during the winter of 1974 in Florida, had originally been powered by a 1910, two-cycle, water-cooled Elbridge Featherweight engine, but it had later been retrofitted with a more capable, water-cooled, 50-hp Franklin after it had sustained connecting rod damage. Because of its lower weight, it often resulted in a nose-high pitch which had to be elevator-counteracted during flight, although its increased horsepower produced more sprightly performance than the original engined-version had offered.

The aircraft, initially demonstrating stability problems, was subsequently modified and first performed in the 1976 Hammondsport Air Show. Demonstrating its handling characteristics much further afield, it partook, along with the Curtiss Model D and the Sopwith Camel, of the 2003 Australian International Air Show in Geelong, flying circuits round Avalon Airport's 11,000-foot runway. Like the other Old Rhinebeck pioneer designs, including the Curtiss Model D itself and the Bleriot XI, it is relegated to short hops from the grass field during Saturday, "History of Flight" air shows.