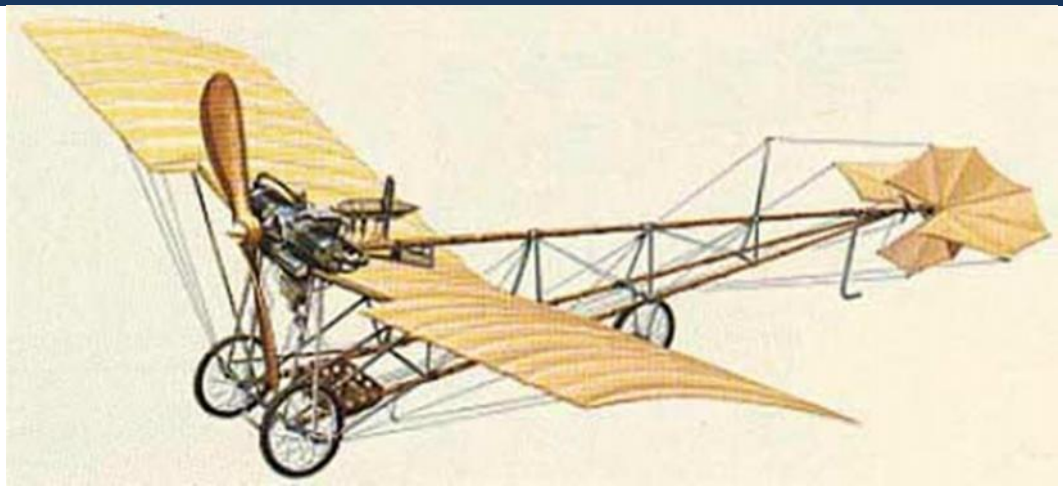
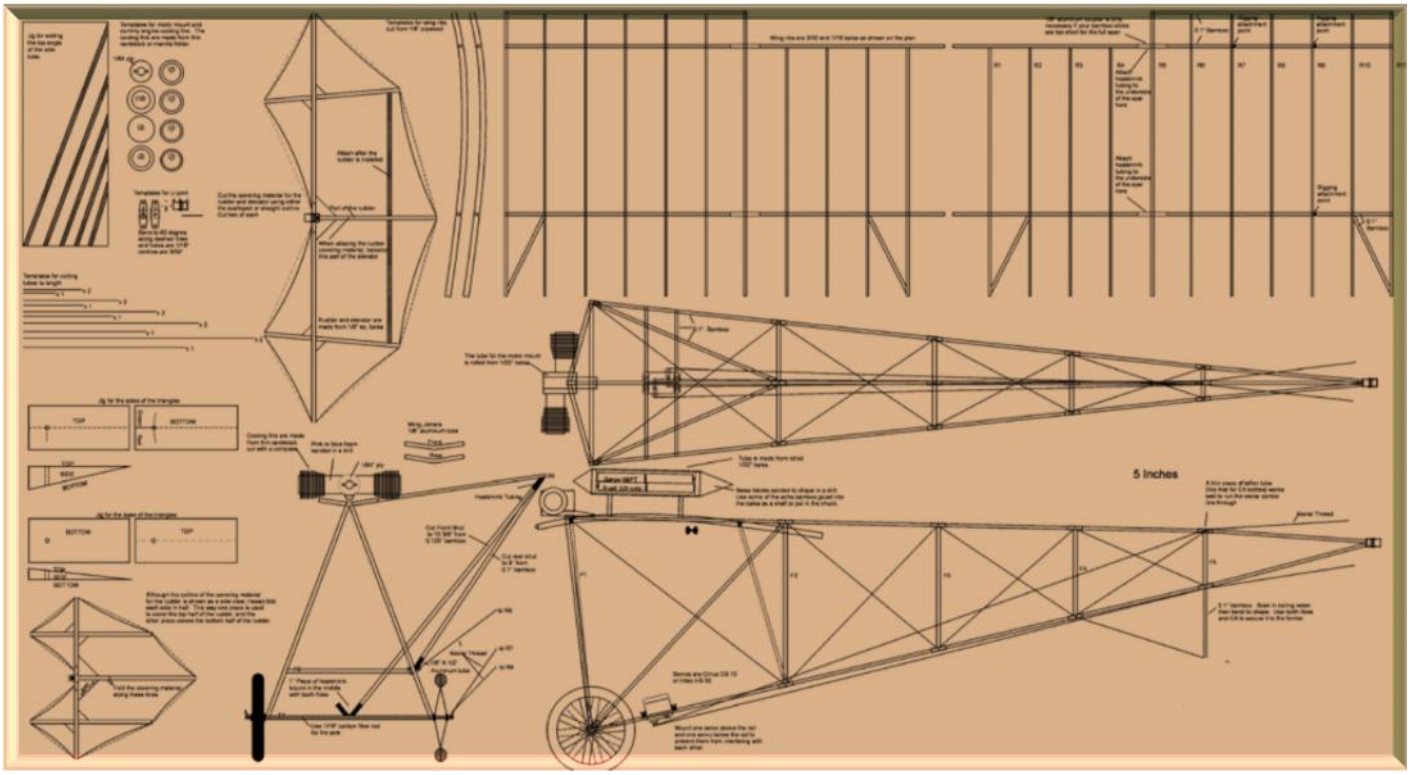
Demoiselle (1908) *Aviation Pioneer* 45 and 24 Inches Wing Span Plan



The **Santos-Dumont *Demoiselle*** ("Damselfly") was an early aircraft built in France by Brazilian aviation pioneer Alberto Santos-Dumont. It was a light-weight monoplane with a wire-braced wing mounted atop an open-framework fuselage built around a reinforced bamboo boom. The pilot's seat was below the wing, and between the main wheels of the undercarriage. The rear end of the boom carried a tailwheel and a conventional empennage. As originally designed (as the **Santos-Dumont No. 19**) Santos-Dumont used a liquid-cooled Dutheil & Chalmers flat-twin engine rated at 15 kW (20 hp) mounted on the leading edge of the wing. Later, the inventor repositioned the engine to a lower location, placing it in front of the pilot. The Demoiselle was controlled in flight by a tail unit, pivoting on a form of universal joint that functioned both as elevator and rudder, which the pilot operated with a steering wheel.

Role	Experimental aircraft
National origin	Brazil / France
Designer	Alberto Santos-Dumont
First flight	1908

Demoiselle 45" Wing Span Plan



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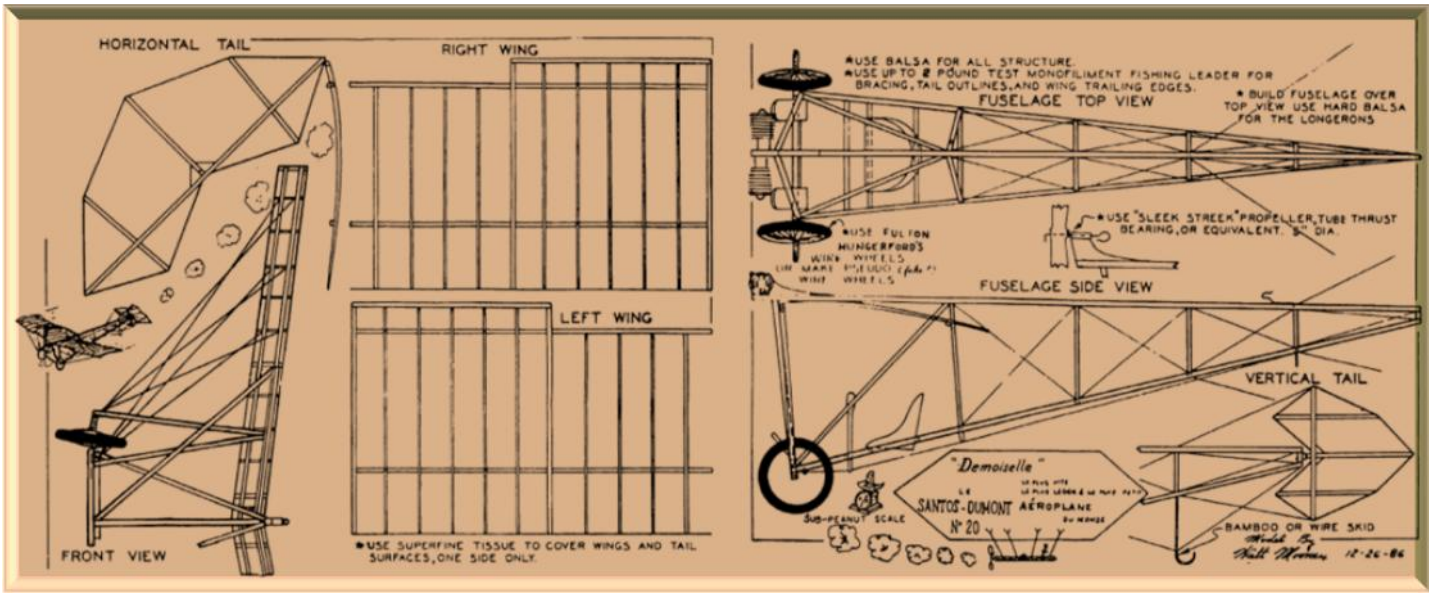
The No. 19 was damaged beyond repair when crashed by Hélène Dutrieu in 1908. Santos-Dumont's next Demoiselle, the **No. 20**, featured an 18-kW (24-hp) Antoinette engine, later replaced with a Darracq-built liquid-cooled opposed twin engine of approximately 3.2 litre displacement and similar power output, and some additional wing reinforcements. Both the Antoinette and Darracq-powered versions had a pair of lightweight thin-tube radiators mounted under the wing roots and just below the lower layer of fabric wing covering, running the entire 1.70 meter chord of the wing root panels. It also utilised wing warping for lateral control, with control cabling that only pulled down alternately on the outer section of the rear wing spar with no "upwards" warp capability. Due to structural problems and continuing lack of power Santos-Dumont introduced additional modifications in the **No. 21**: a triangular and shortened fuselage made of bamboo; the engine was moved back to its original position, in front of the wing; and increased wingspan. The design of **No. 22** was similar to No. 21. Santos-Dumont tested opposed-cylinder (he patented a solution for cooling this kind of engine) and water-cooled engines, with power settings ranging from 15–30 kW (20–40 hp) in the two variants. A feature of the water-cooled variant was the liquid-coolant pipeline which followed the wing lower side lofting to improve aerodynamics.

Demoiselle 24" Wing Span Plan



Dumont. He performed flights with it in Paris, and made trips to nearby places. Flights were continued at various times through 1909, including the first cross-country flight with steps of about 8 km, from St. Cyr to Buc on 13 September 1909, returning the following day, and another on 17 September 1909 of 18 km in 16 min. The Demoiselle, fitted with a two-cylinder engine, became rather popular. The French World War I ace Roland Garros flew it at the Belmont Park, New York, in 1910. The June 1910 edition of the *Popular Mechanics* magazine published drawings of the Demoiselle and affirmed that "This machine is better than any other which has ever been built, for those who wish to reach results with the least possible expense and with a minimum of experimenting."[1] American companies sold drawings and parts of Demoiselle for several years thereafter.

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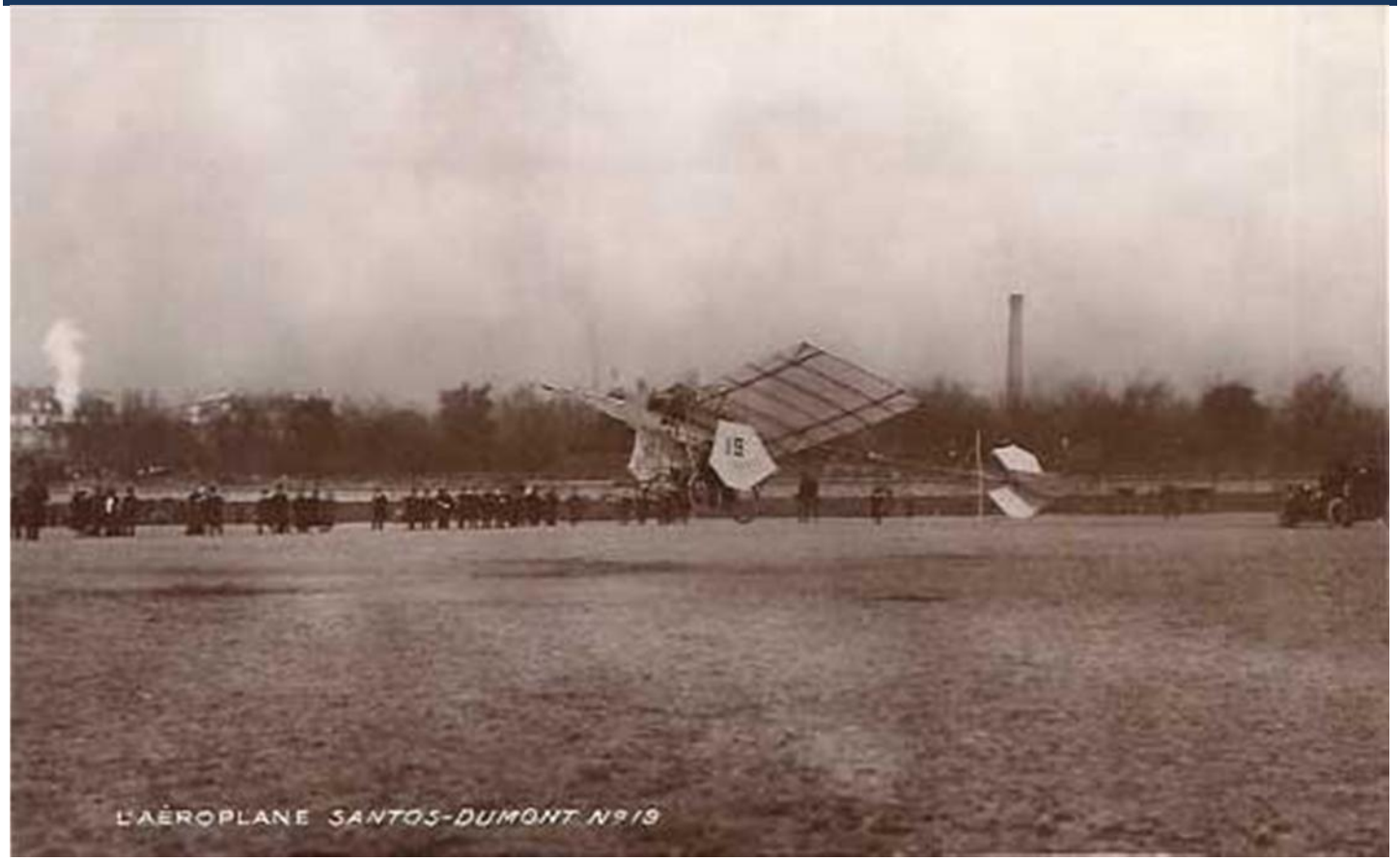

The Demoiselle could be constructed in only fifteen days. Possessing outstanding performance, easily covering 200 m of ground during the initial flights and flying at speeds of more than 100 km/h, the Demoiselle was the last aircraft built by Santos-Santos-Dumont was so enthusiastic about aviation that he released the drawings of Demoiselle for free, thinking that aviation would be the mainstream of a new prosperous era for mankind. Clément-Bayard, an automotive maker, constructed Demoiselles, they planned a production run of 100 units, built 50 and sold only 15 for 7,500 francs for each airframe.[2] (or 50,000 francs). It was the world's first series production aircraft. By 1909 it was offered with a choice of 3 engines, Clement 20 hp; Wright 4-cyl 30 hp (Clement-Bayard had the license to manufacture Wright engines); and Clement-Bayard 40 hp designed by Pierre Clerget. It achieved 120 km/h. An example of a No. 21 with a Darracq engine is preserved in the *Musée de l'Air et de l'Espace*. Several flyable replicas were built by Personal Plane Services Ltd for the 1965 film 'Those Magnificent Men in Their Flying Machines' and others have been built since then.

Specifications (No. 20)

General characteristics

- **Crew:** One pilot
- **Length:** 8.00 m (26 ft 3 in)
- **Wingspan:** 5.10 m (16 ft 10 in)
- **Height:** 2.40 m (7 ft 11 in)
- **Wing area:** 10.2 m^2 (110 ft^2)
- **Gross weight:** 143 kg (314 lb)
- **Powerplant:** 1 × Darracq, 26 kW (35 hp)

Performance

- **Maximum speed:** 90 km/h (60 mph)

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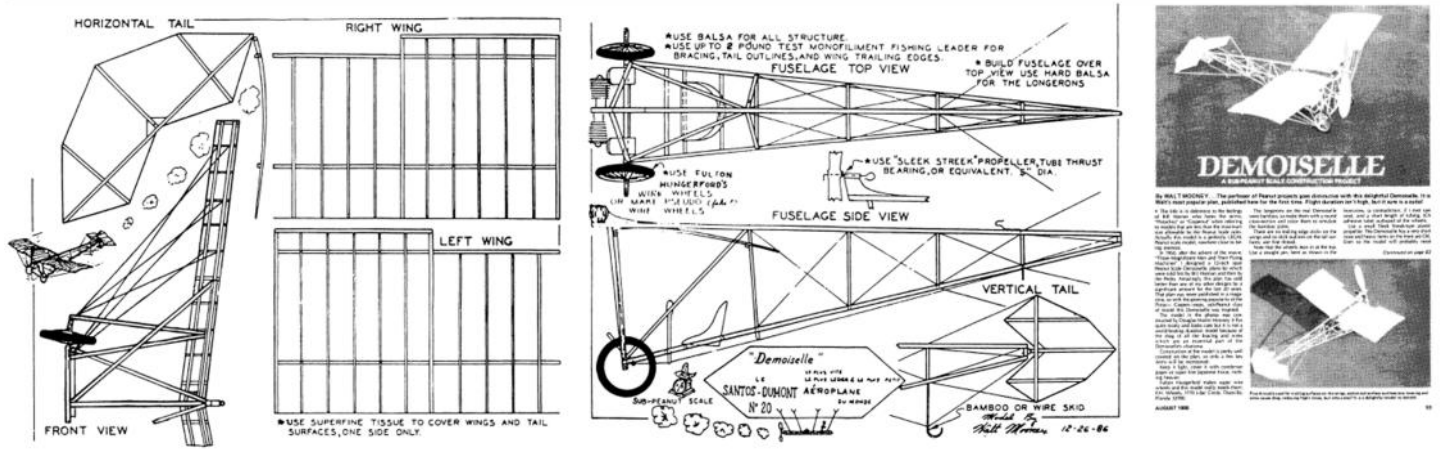
Modeln'pal and chief researcher, Brad Horton, tells us that Santos also was the first to invent the **flying car** shown here configured to take-off in a ferocious cross wind

Santos continued to test the aircraft, soon coming to the conclusion that the dirigible was not necessary. On September 13, the 14-bis took a short hop of from twenty to forty feet; on October 23 it flew a full 197 feet; and on November 12 it went 722 feet in a flight lasting twenty-one seconds. All of Europe was electrified by this, the first heavier-than-air flight by a European. Octave Chanute reported back to the Wrights that, while Santos-Dumont had indeed flown, he had no means of controlling the aircraft except by shifting his weight, and even that was difficult because the pilot stood in a narrow wicker basket. Santos' next airplane, the No. 15, equipped with a makeshift wing-warping mechanism, broke up while taxi-ing for a take-off in March 1907.

Demoiselle (1908) *Aviation Pioneer* 45 and 24 Inches Wing Span Plan

Demoiselle 12” (Peanut Version) Wing Span Plan



By this time, Santos had seen several Blériot aircraft in flight and had decided to construct a monoplane. The result was the Demoiselle No. 19, an ultra-light tractor monoplane made of bamboo and silk and weighing only about 153 pounds. The Demoiselle (nicknamed the Grasshopper) became a sensation all

over Europe and was sold by the thousands, introducing an entirely new generation to the thrill of flight for less than five hundred francs. Many designers regarded the Demoiselle as an oddity, but the aircraft had a clear impact on many designers and its image can be seen lurking in the lines of Anthony Fokker’s first aircraft, the Spinne (Spider) of 1912 and in light aircraft of the post war period.

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In 1910, Santos-Dumont was diagnosed with multiple sclerosis. He went into retirement, though he followed aviation developments throughout the war. In 1928, he returned to Brazil and was given a hero's welcome. As his ship was docking, a sea plane carrying six prominent Brazilians who wished to greet him crashed and all six were lost. Santos, by this time quite frail, asked that all ceremonies and events honoring him be cancelled. On July 23, 1932, Alberto Santos-Dumont committed suicide. In his final years, he had become despondent about the destructive uses to which nations had put aviation, and about his role as a pioneer of flight.

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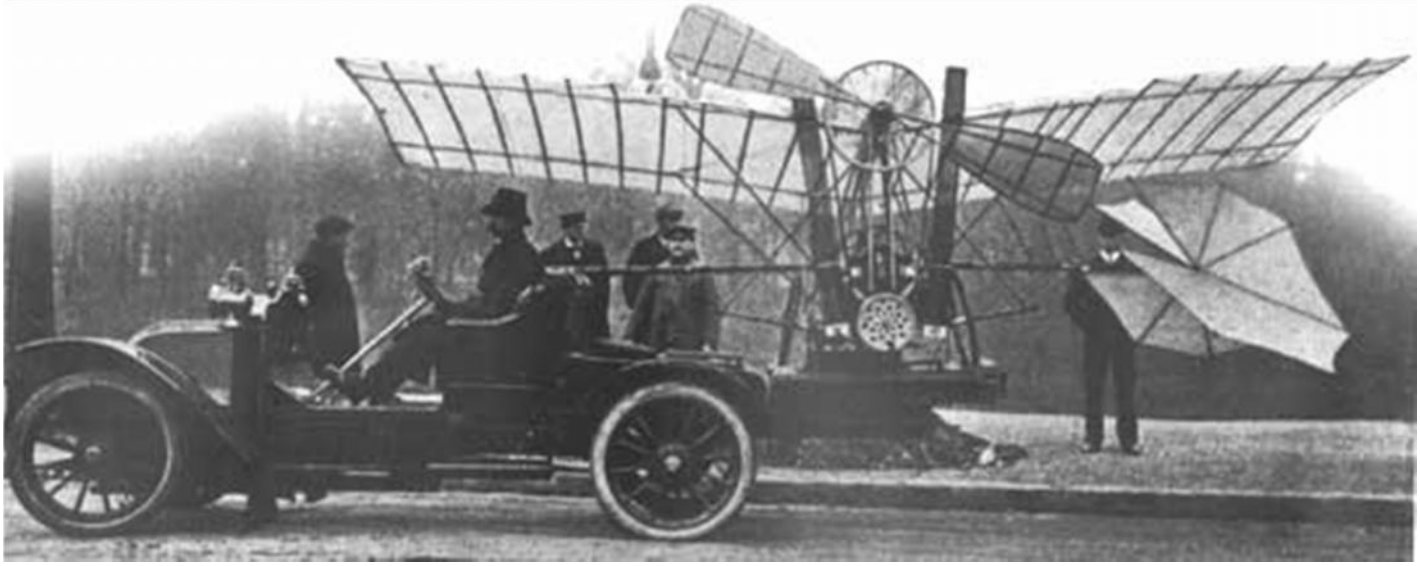

14-bis, ***the plane in which Santos-Dumont made his historic 1907 flight.***

Another version of the Santos Dumont Demoiselle

Actual photo of the Santos DuMont Demoiselle in flight. This was the first true Ultralite