Aerial Pursuits

Volume 19.2 Newsletter of EAA Chapter 1114 Apex, NC March, 2013

European Designers of Homebuilt Aircraft

Part 1 - Alberto Santos-Dumont

Among aircraft homebuilders in North America, leading designers have household names. A good list of mostly American designers is found among the recipients of the EAA's August Raspet Award, "...presented every year to a person who has made an outstanding contribution to the advancement of light aircraft design." But what about designers from Europe, where homebuilding also has a long and rich history?

Having lived and flown light aircraft in my wife's native Germany on and off since 1979, I have come to admire the work of European lightplane designers, for instance Frenchman Claude Piel. whose CP-30 Emeraude (Emerald) was a favorite of the late Tony Bingelis, author of nearly 300 EAA articles and several important books on homebuilding. In the first article on leading European light aircraft designers I will focus on Alberto Santos-Dumont, arguably the one person who started the entire worldwide homebuilding movement.

A native of Brazil and son of a wealthy French-born coffee plantation owner, Alberto Santos-Dumont stood five feet tall and weighed only 90 pounds. He arrived in Paris, France in 1891 at the age of 18. Despite his being born in Brazil, 'Santos' (as many called him) saw himself as a citizen of France.

Santos Dumont

Next Chapter Meetings & Area Events

see eaa1114.org Calendar Page

Mar 16, EAA 1114 Breakfast, Cox Field

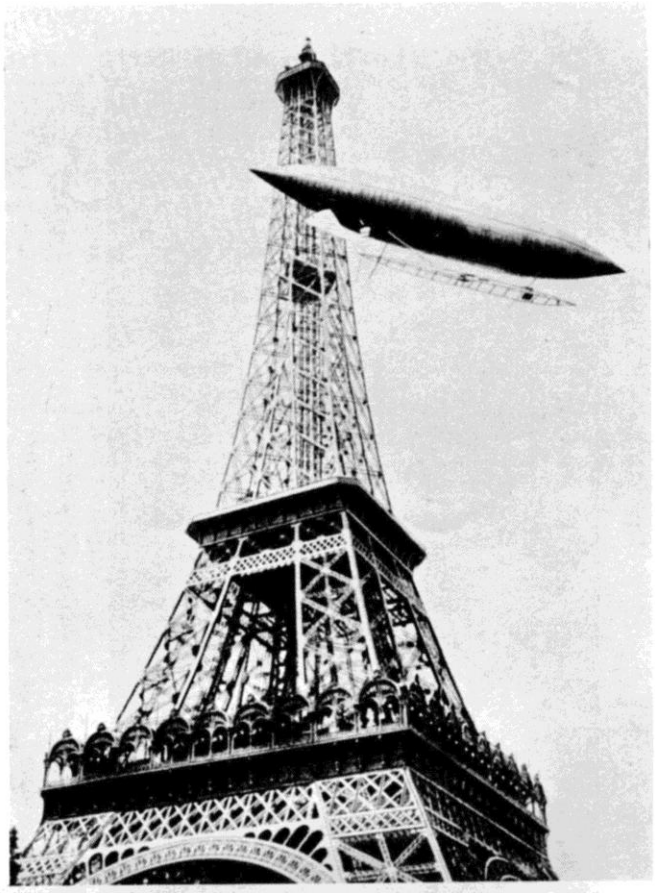
Mar 30, Blue Line Aviation Open House, Raleigh, NC

Apr 6, Young Eagles, Hickory Regional Airport

Apr 20, EAA 1114 Breakfast, Cox Field

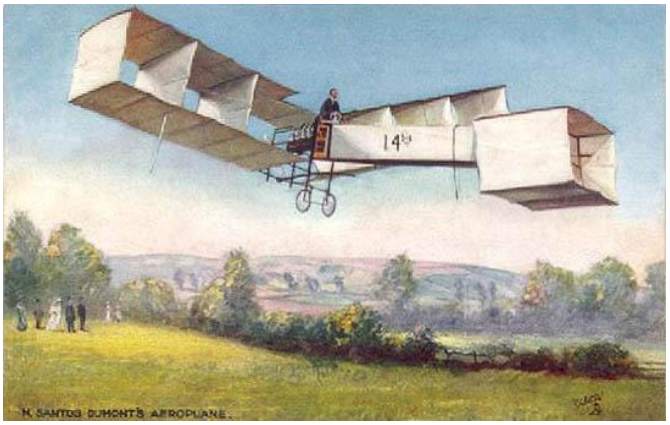
Apr 27, Young Eagles, Wilson Industrial Air Center

. Inspired in his childhood by the books of Jules Verne and fascinated by machinery, he continued his studies in physics, chemistry, mechanics and electricity through private tutors in Paris. Since ballooning was very popular in Paris in the late 19th century, it was only natural that Santos-Dumont took to the air himself, first by hiring an experienced balloon pilot, but soon flying in craft of his own creation. This led to the design and construction of 11 steerable balloons, or dirigibles, between 1898 and 1905. He won the prestigious *Deutsch de la Meurthe* prize in October 1901, flying his *Number 6* dirigible from the Parc Saint Cloud to the Eiffel Tower and back.



Dirigible number 6, 1901

By 1905, while still flying dirigibles, his attention had turned towards heavier-than-air aircraft. Santos met American glider designer Octave Chanute and was aware of the Wright brothers' aircraft as well as Gabriel Voison's manned box kite-like gliders that he towed behind a fast boat on the River Seine. His first successful design was the enormous, canard-wing *14-bis*, which was credited with making the first powered, heavier-than-air flight in Europe on October 23rd, 1906, three years after the Wright brothers had done the same in Kitty Hawk, North Carolina.

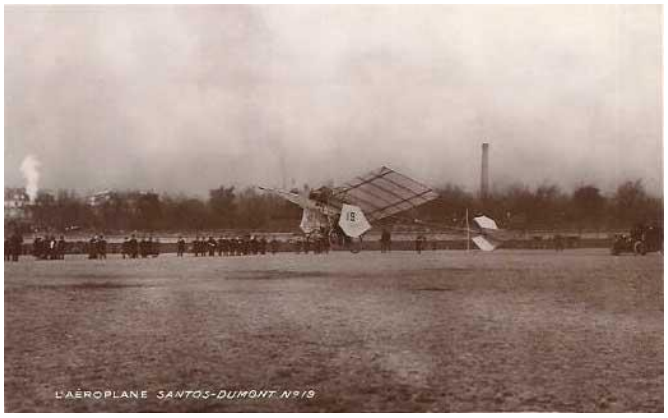


Santos Dumont flying 14bis, 1906

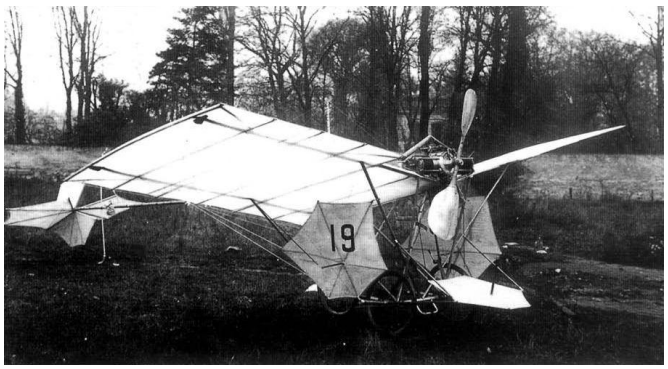
The success of fellow Parisian Louis Blériot's model VII in 1907 had a significant impact on Santos-Dumont's next creations. In 1907 he set his sights on developing a low-cost, lightweight, practical airplane, resulting in the *Number 19*. It was constructed of wire-braced, silk-covered rectangular wings of 16' 10" span and with very little thickness or camber, attached to a 26' 3" long fuselage consisting primarily of a single reinforced, wire-braced boom made of bamboo. Pitch and yaw were controlled by a one-piece empennage pivoting around an universal joint and connected to a steering wheel by cables. Roll control was provided by the pilot - leaning in the desired direction!

The pilot sat on a pan beneath the leading edge of the wing, between the main wheels and immediately forward of a third wheel. Later variants replaced this 3rd wheel by a tail skid or tail wheel attached to the bamboo boom further behind the pilot. A 20 hp Dutheil & Chalmers horizontally-opposed, two-cylinder, air-cooled engine mounted on the leading edge of the wing

provided power through a solid, paddle-like propeller that enabled a top speed of 60 mph, considered high for 1907. On the *Number 19-bis*, Santos lowered the engine in front of the pilot, driving a silk-covered wing-like propeller through a chain drive. Another variant of *Number 19* included an elevator in front of the pilot to increase pitch control, and rudder-like panels on either side of the pilot.



Number 19, 1907



Number 19, 1907

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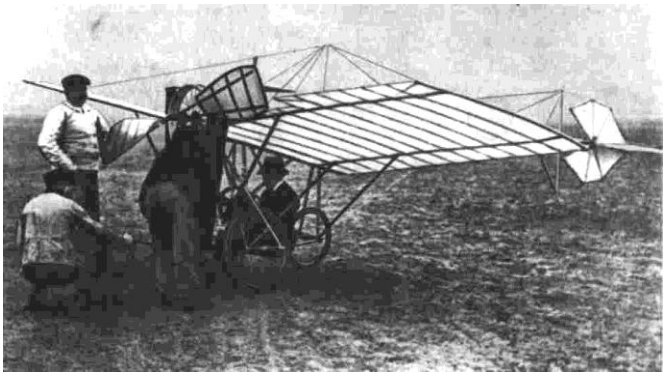


Number 19, 1907

After *Number 19* was damaged beyond repair in a 1908 crash, Santos-Dumont created *Number 20* which included a number of improvements over its predecessor: The engine was moved back up to the leading edge of the wing, and roll control was added through wing-warping, whereby cables attached indirectly to the pilot's flight suit were used to pull down on outboard wing panels (no upward deflection was possible).

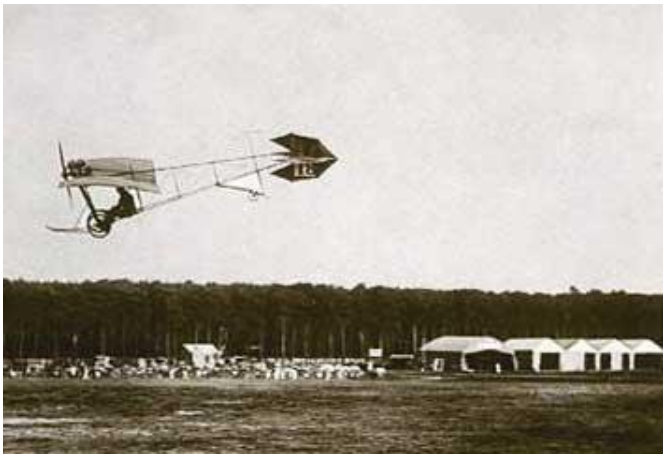
As a powerplant for *Number 20*, Santos used 24 hp liquid-cooled engines from Antoinette or, later, from Darracq. Cooling was provided by unique thin-tube radiators underneath the wing roots that extended aft along the entire 1.7m wing chord. When *Number 20* was found to suffer from structural problems and still lacked sufficient power, improvements were made in *Number 21*.

The single tail boom was replaced with three shorter, wire-braced, reinforced booms arranged in a strong tetrahedral configuration. The wingspan of *Number 21* was increased and the third trailing wheel was replaced by a tailwheel. *Number 22* was similar to *Number 21* but served as a testbed for a number of different engines.

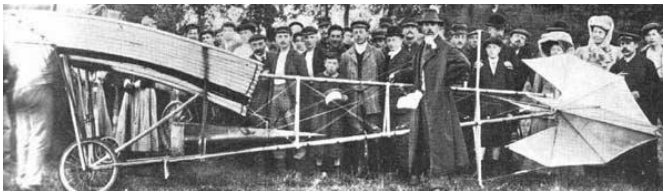
Santos Dumont in number 21/22

Demoiselle number 21/22

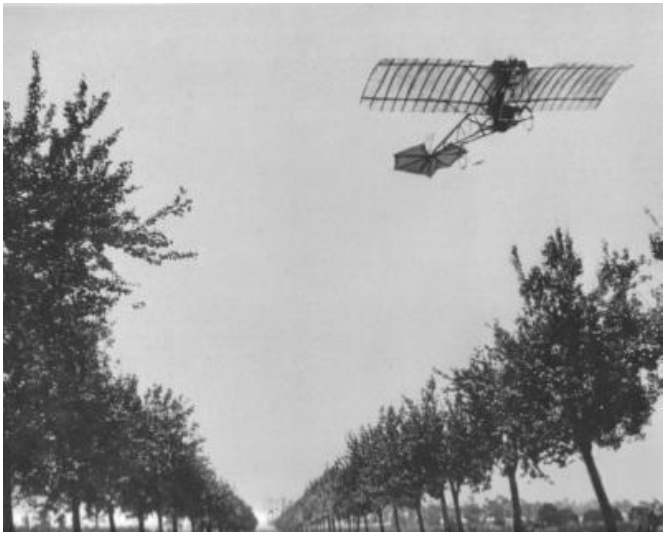
Demoiselle number 21/22



Demoiselle number 21/22



Demoiselle number 21/22



Number 22, 1909

In 1909-1910 Santos-Dumont made numerous cross-country flights at speeds up to 120 km/h (75 mph) in an airplane that the public called the *Demoiselle* (Damselfly). The designer was so enthusiastic about aviation that he gave away plans freely, claiming a build time of only 15 days! Clément-Bayard manufactured a small number of Demoiselles, making it the world's first production aircraft. *Popular Mechanics* included details on the

aircraft in their June, 1910 issue under the title "How to Build the Famous 'Demoiselle' - Santos-Dumont's Monoplane, by Arthur E. Joerin and A. Cross, A.M. (Paris)" The popularity of this article affirms why one could credit the Demoiselle with launching the worldwide homebuilt aircraft movement, two decades before Bernhard Pietenpol published plans for his *Air Camper* in the U.S.


June This Issue 251,000 15 Cents

POPULAR MECHANICS

WRITTEN SO YOU CAN UNDERSTAND IT

LARGEST CIRCULATION OF ANY MECHANICAL PUBLICATION IN THE WORLD

New Boat a Substitute For Deeper Waterways

Popular Mechanics offers no premiums; does not join in "clubbing offers," and employs no solicitors to secure subscriptions. It is for sale by nearly every newsdealer in the United States and Canada.

June 1910 Popular Mechanics


POPULAR MECHANICS 41

View of the "Demoiselle" Showing Position of Motor and Propeller

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June 1910 Popular Mechanics

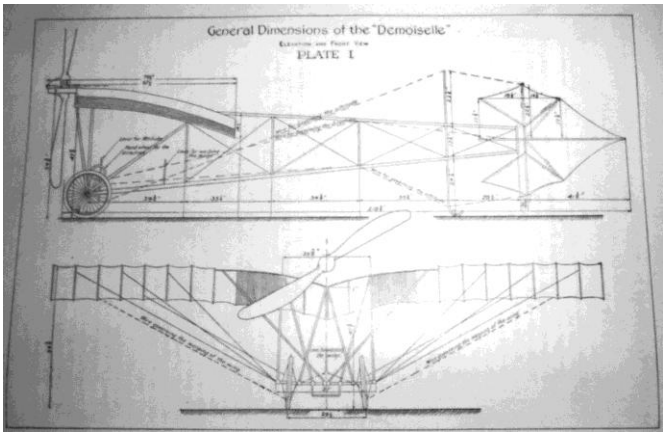
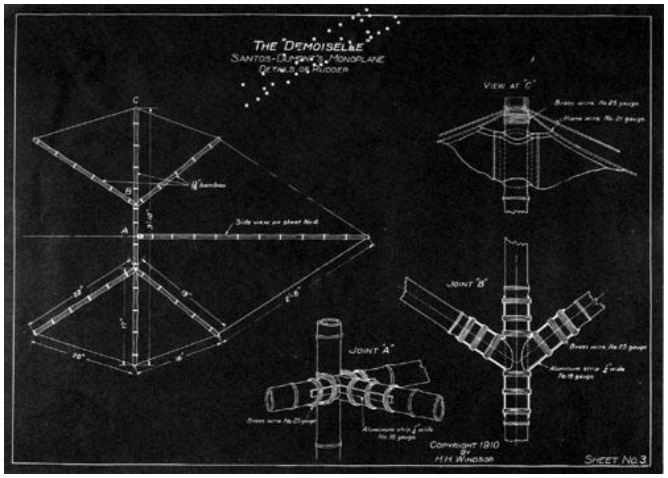

General Dimensions of the "Demoiselle"

PLATE I

June 1910 Popular Mechanics



Demoiselle details bamboo joints

At the pinnacle of his career and enjoying worldwide fame, Alberto Santos-Dumont was diagnosed with Multiple Sclerosis in the spring of 1910. Suffering from double vision and vertigo that prevented him from driving or flying, he closed his shop and in 1911 moved to the seaside village of Bénerville. He returned to his native Brazil in 1928 and ended his own life on July 23rd, 1932. Despite this tragic end to a remarkable career, Alberto Santos-Dumont remains one of the most important figures in the history of homebuilt aircraft.

Among those who constructed their own versions of the Demoiselle was Hans Grade of Köslin, Germany, whose 1909 *Libelle* (dragonfly) was one of Germany's first successful aircraft. A replica of the Demoiselle played a starring role in the 1965 British comedy *Those Magnificent Men in their Flying Machines.* When first attempts to fly this replica were made, pilots were unable to get airborne until it was realized that Santos-Dumont was a small, light-weight man. Joan Lily Amelia Hughes, a petite British WWII ferry pilot and one of her country's first female test pilots, was hired and the Demoiselle replica was reported to fly well with Hughes in the 'cockpit', dressed as the male French flier "Pierre Dubois."

Joan Hughes

Joan Hughes

Joan Hughes

Max Grade Libell 1909

More than a century after *Popular Mechanics* published plans for the Demoiselle and set off a worldwide homebuilding movement, people are still constructing and flying them today. In 2004 Brazilian industrialist Fernando de Arruda Botelho commissioned the construction of four replicas at the Instituto Arruda Botelho (IAB) to celebrate the centennial of Santos-Dumont's first flight. During AirVenture 2012, Sean M. Sweeney of Reunion, FL delighted the crowds during the flying showcase on Saturday, July 28th with his replica Demoiselle for which he received an Ultralight Honorable Mention award. Sean describes the plane: "This replica is one of the six constructed at the IAB in Brazil and is powered by an HKS four-stroke engine. It is on display at the Kissimmee Air Museum when I am not demonstrating it at various air shows around the country for the Botelho family."

IAB Brazilian Replica Botelho

AV12 Sean Sweeney Demoiselle

IAB Brazilian Replica Botelho

The French company APEV (www.pouchel.com) offers plans and a kit for their *Demoichelle*, an aluminum tube-and-fabric replica of the Demoiselle, powered by a two-stroke Rotax. An

electric-powered *Demoichellec* made its first flights in 2010. Airdrome Aeroplanes of Holden, MO (airdromeaeroplanes.com) offers three two-stroke Rotax-powered aluminum tube-and-fabric kits based on the Demoiselle: the *Dream Classic* single-placed with wire-braced wings; a strut-braced *Dream Classic* and the two-place *Dream Fantasy*. EAA Homebuilder Hall of Fame award recipient Ed Fisher offers plans and kits for his *Flitplane*, an ultralight design with clear Demoiselle-lineage (wingsoffreedomaviation.com). Modelers too can enjoy this historic little aircraft by building a 44" span electric R/C version offered in kit form by Sig Manufacturing.

Sig Demoiselle electric RC

Ed Fisher Flitplane

Demoichelle

Demoichelle

Airdrome Aeroplanes Dream Classic

In Part 2 of this series, we'll review the accomplishments of another early French designer, Henri Mignet, whose various aircraft - especially the *Flying Fleas* - became popular among

homebuilders two decades after the Demoiselle made its first flights.

Please read in preparation for the March 16 EAA 1114 Breakfast Meeting.

Fellow EAA 1114 Members:

Kent Misegades and myself have made a proposal to the board to fund a chapter tool crib. They have agreed to put it up to a vote by EAA 1114 members. The plan is to do this at the next chapter meeting. The crib would purchase tools that would benefit all members whether you are flying a certificated, vintage, or homebuilt aircraft. If the funds are allocated, they would be used to purchase seldom used or expensive tools that chapter members would then be able to borrow. The plan would be to have tools such as scales, prop balancers, and a host of other possibilities. I will give a more thorough explanation at the next chapter meeting or feel free to email any questions you may have.

Thanks,

Terry Gardner

EAA1114 Technical Counselor

On Sunday, February 24th, Jim Dukeman and friends flew to Blue Ridge Airport (MTV) for lunch. Jim reports that the weather was outstanding, with "clear blue and 22 and just bumpy enough to keep you alert". Jim sent along some pictures to inspire others to follow his example in the future.

From left: Jim Dukeman, Chris from GSO, ??, Berry (with Chris), Craig Winklemann, Cicle Boyd, Niels and Judy Neilson, Kent from Lake Norman

Blue Ridge Airport (MTV)

Restaurant at Blue Ridge Airport

Flight line at Blue Ridge Airport

Air Dukeman

Jim with friends. He claims that they are waitresses at the restaurant.

CLASSIFIED

Complete RV-8 Tail Kit

Prepunched kit purchased new from Van's in 2007. Horizontal stabilizer, vertical stabilizer, and right elevator are already assembled. Rudder and left elevator are still to be assembled. Also includes RV-8 preview plans, large format plans, assembly instruction manual, and electric elevator trim option. Current new price from Van's is $2,025 plus shipping.

This came with a quick-build fuselage that I purchased, but is surplus to my needs since I have already assembled my own tail kit. Everything is available for inspection prior to purchase at my shop in Raleigh. In addition, I will help the purchaser assemble the rest of the tail kit in my shop.

I would like to get **$1,000** for this, but take a look and make me an offer if you are interested.

Contact me at newsletter@eaa1114.org.