# Build and Fly
# The Original Wright Biplane

**TRAIL BLAZERS OF THE AIR – NO. 1**

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**IT WAS ON DECEMBER 17, 1903, THAT THE WRIGHT BROTHERS STARTLED THE WORLD WITH THE FIRST TRUE HEAVIER-THAN-AIR FLIGHT. NOW COMES HENRY STRUCK TO STARTLE THE MODEL BUILDERS WITH A TINY EDITION OF THE ORIGINAL WRIGHT BIPLANE—A MODEL WHICH HAS ACTUALLY STAYED IN THE AIR LONGER THAN DID ITS LARGER GRAND-DADDY! IT'S WORTH ANY MODEL BUILDER'S TIME TO CONSTRUCT THIS SHIP, EITHER AS A SOLID OR FLYING MODEL.**

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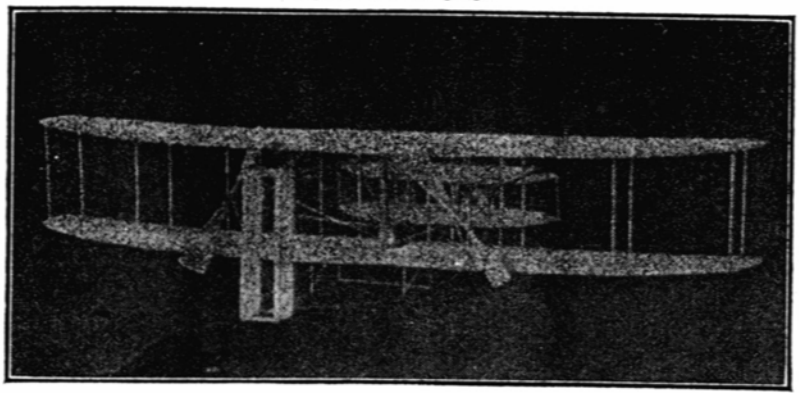
## By Henry Struck

*A rear view of the historical Wright biplane, showing the tail surfaces, the twin propellers, the dummy engine and radiator, and the "bicycle chains" connecting the engine with the props.*



INCREDIBLY swift has been the development of the airplane from the frail, slow, flying machines of wood and wire to the latest all metal, winged bullets; and no more impressive array of models can be built and flown than those depicting this change. The series of flying scale models we plan to present will enable you to construct a collection of the famous planes that have blazed the sky trail.

Absolute fidelity to scale is not part of our claim. Here and there tail areas have to be increased, landing gears lengthened to allow larger propellers, or other minor changes made in the interests of flying ability. All models, however, are proportioned to each other on a scale of 1/2" equals 1'.

The latter part of the 19th century saw an ever increasing number of experimenters in aeronautics—men like Otto Lillienthal, who made over a thousand glides from hilltops; Samuel Langley .of the Smithsonian Institution in Washington, who built and flew 14 ft. models a half mile; and Octave Chanute, who constructed a light biplane glider. These pioneers were almost within reach of the true airplane. Lillienthal had flying experience, Langley scientific knowledge and equipment plus a remarkable engine made for him by Charles Manly—a five cylinder radial of 52 h.p. and weighing only 125 lbs.—and Chanute a biplane design light and strong enough in which to mount the power; yet these men who together had all the needed ingredients for flight were far apart geographically.

Wilbur and Orville Wright, sons of a Dayton, Ohio, minister, were seized in their boyhood with the fascinating possibility of flight through a fluttering paper butterfly their father brought home one day. Grown to manhood they ran a bicycle shop, and they found ample time to watch interestedly, if not take an active part in, the researches of various mechanical pioneers.

Shortly after the death of Otto Lillienthal in a glider crash, his findings were published and reached the hands of the Wrights. These actual experiences decided the brothers to build a glider for themselves.

First came the selection of a flying site for the experiments. Kitty Hawk, N. C., was recommended by the U.S. weather bureau for its steady winds and rolling sand dunes. Accordingly a shack was built there and work begun.

Their first gliders were flown tethered on a line like a. kite in order to observe through long periods in the air the secrets of stability and control which had been the great bugaboos of all experimenters.

Amusing is the story told of the thorough and heated discussions on points of design between the brothers. Beginning with opposite viewpoints they would debate eloquently until some sort of agreement was reached.

Interesting also was their discovery of warping the wings for lateral control. Wilbur Wright, absent mindedly twisting a long narrow cardboard box cover in his hands while a customer was examining the article it held, was suddenly impressed by its resemblance to a wing and realized that here was what they sought. Tests on their glider proved the worth of the idea and the Wrights were ready to build a larger glider and finally to power it with an engine. The aileron, later developed by Glenn Curtiss, was an adaption of this system, and afterward a bitter court battle was fought between the Wrights and Curtiss over patent rights to the aileron, with the Supreme Court upholding the claims of the Wright brothers. With their newest and largest glider of over 300 sq. ft. wing area the Wrights made hundreds of flights in the latter part of 1902, and feeling confident of success, they sought a power plant. When they were unable to find a suitable one they redesigned a Pope-Toledo automotive plant which, though it developed only 12 h.p. for its • 180 lbs. of weight, was suitable for their very light machine. They mounted two propellers turning in opposite directions and driven by bicycle chains and sprockets. This made it necessary to cross the left chain, and a guide had to be devised to make it run smoothly.

A launching track was laid on the sands and everything was ready for the first test, but trouble with the transmission and cold, stormy weather delayed the Wrights until December 17, 1903.

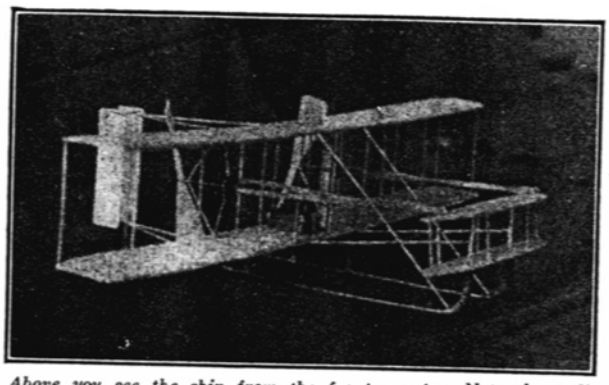
With Orville lying prone at the left of the motor to balance its weight and Wilbur running alongside holding a wing tip to steady the craft on the single track, the first successful, powered flight of a heavier-than-air craft carrying a man was made, terminating 12 seconds later at the same height as the take-off point. Four flights, the longest made by Wilbur and lasting 69 seconds, took place that day, with members of the Coast Guard station as witnesses.

Then a sudden gust of wind over-turned the plane, damaging it so that flying had to be abandoned.

Brought back to Dayton, the parts of the renowned plane lay in storage until finally the Wrights donated it in rebuilt form to the British Science Museum, as Arch Whitehouse stated in his interesting article in the February FLYING ACES.

The Wright brothers had made history! They had flown! Hundreds of brilliant men had planned and experimented,

but none had until that time succeeded completely. Logical and systematic research of their own, using the experience gained by others as a foundation; actual time in the air in gliders, acquiring the skill in handling their craft; and tireless persistence had lifted the Wrights above their fellow men.



*Above you see the ship from the front quarter. Note the rudimentary landing gear and the small outrigger airfoil which forms the control surfaces. From each end of the latter run the rubber strands which compose the model's power plant.*

## MAKING THE MODEL

OUR model is a faithful duplicate that can lay claim to a unique title. *It is one model airplane that will stay in the air longer than did its prototype —for its time has beaten that of the original Wright Biplane!*

Let us examine its design. What's this! It's really only a biplane form of the twin pusher. This old favorite of model builders has been forced out of the model flying game by the cleaner, more precisely adjustable, tractor type, just as the old pushers themselves were relegated to the museums by better designs.

The three view in Plan 1 is half size for the model and drawn to a scale of 1/4" to 1'. To get any dimension needed, merely double the size on the drawing. The layouts on Plan 2, on the other hand, are all full size.

The absence of a regular fuselage makes it best to build the wing, tail and rudder surfaces first. As the thin section does not allow room for a spar, very wide trailing edges must be used.

Shape the trailing edge of 1/16" by 3/4" soft balsa with knife and sandpaper. It is preferable to use the knife sparingly and emphasize the sandpaper. The leading edge is made of soft 1/8" square.

Do not be dismayed by the number of ribs, as it is quite simple to cut them all at once by the method shown on the layout plate. On the original ship very soft 1/16" sheet was used, though you may use 1/32" sheet for a lighter construction. After cutting to rough shape with your knife, smooth the block of slats with sandpaper to the final outline and 44 perfectly alike ribs will result.

To assemble the wings, mark the location of the ribs on the leading and trailing edges. Pin the trailing edges to a smooth board. Cement the end and center ribs to them, and then pin the leading edges to the front of the ribs. Add the rest of the ribs and fit the tips of 1/16" sheet in place. When the framework is dry, remove it from the board and sand the outline smooth. The elevators are made in exactly the same way. Their trailing edge is 1/16" by 3/8" soft balsa but the leading edge should be 3/32" sq. very hard balsa, as upon striking any object the elevators must suffer the shock. The rudders are simply rectangles built of 1/16" sq. balsa.

Cover all surfaces on both sides with white tissue. Stick the paper to the bottom first, making sure it adheres to all the ribs. Use dope for adhesive, but to prevent any warping do not spray with water or dope until the plane is assembled.

## ASSEMBLY

ALL struts and outriggers are made A* of bamboo. Split bamboo strips, A, about 1/32" by 1/16" by 2 3/8" long, connect the wings. Eighteen are needed. In the top view the regular interplane struts are shown by dots, the motor bearing struts by ovals and the skid struts by squares. Point the ends of the struts slightly, dip the ends in cement, and force them into the lower wing at the tips and center. Press the upper ends into the top wing. Check carefully to see that both wings have the same incidents and also line up perfectly in all directions. The rest of the struts are easily added. The motor bearing supports, B and C, are 1/16" sq. bamboo bent and glued between the wings in the indicated positions. The elevator struts, D, are 1/32" sq. by 1 1/8" long, while the rudder struts, E, are 7/8" long. Assembly of these parts is similar to the wings.

The skid struts, F and G, are 1" by 1/16" by 1/32" and are put in place next. The skids, I, are formed of 1/16" sq. bamboo and cemented in place. Add diagonal brace, H. The rudder booms, J, of 1/16" sq. are glued under the trailing edge of the top wing. Attach the rudder assembly to the tip of

the booms and skids. A long diagonal, K, 1/16" sq. is cemented in place. The upright part of the skids is forced through the elevator unit and cemented to the ribs. Be sure the incidence angle is correct. Strut L can now be added. M, N and 0 are of 1/32" sq. and complete the assembly.

Now spray all tissue lightly with water and dope thinly when dry.

## DETAIL AND POWDERING

THE dummy engine is carved from soft balsa. The radiator is also balsa, detailed as shown. The sprockets are 1/16" sheet and cemented to strut C. Use India ink to color these parts. When inking balsa wood first dope it lightly to prevent the lines from becoming fuzzy. Small brass bushings are cemented to struts B and C to serve as bearings. The best means of simulating the chains is black thread.

The props are made of blanks of 1/16" sheet balsa bent as shown by soaking in hot water, then pinning them to a board, with the tips twisted to the pitch indicated. Remember to make one left and one right. A piece of thin aluminum is cemented around the hub as reenforcement. Shafts and motor hooks are formed of .028 wire.

For power two strands of 1/8" rubber are enough for calm weather or indoor flying. Four strands 3/32" rubber are better for breezy weather flying. A small amount of clay is needed on the nose to balance the model, and a good place for this is under the elevator on the skid after the proper amount is found by gliding. A hundred turns will lift her into the air from a smooth surface. By lubricating, stretching and winding the motors with a double winder such as used for twin pushers, the duration will be greatly increased.

The brace wires are not necessary for a flying model but may be added if the object is to build an exhibition model. They are black thread.

Keep your model as light as possible. The original weighed 1/2oz. ready to fly and showed it in slow flying and good gliding.

A splendid historical flyer—the Bleriot monoplane—will be our next project. Don't miss it!