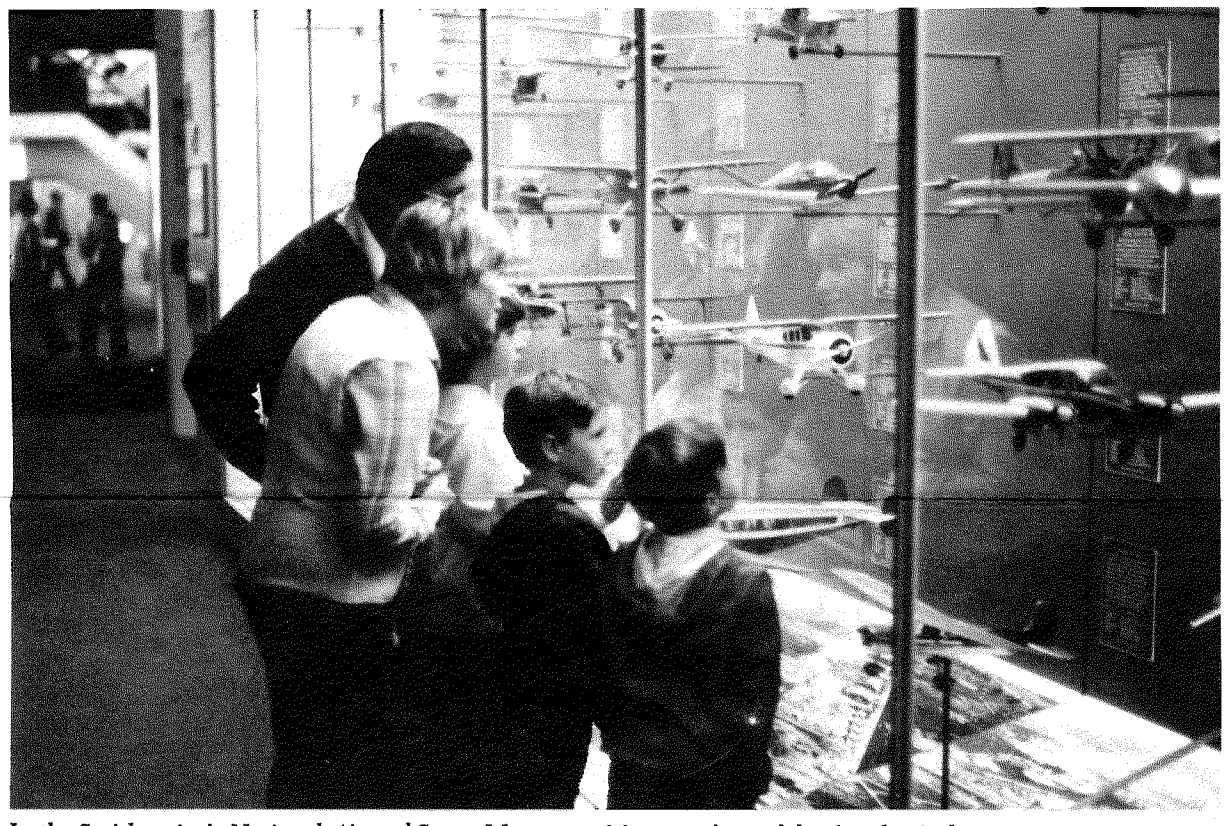
ART TO ZOO

News for Schools from the Smithsonian Institution, Office of Elementary and Secondary Education, Washington, D.C. 20560

MARCH/APRIL 1982

Airplanes and Airports: How To Take Off Without Ever Leaving the Ground



In the Smithsonian's National Air and Space Museum, visitors study models of early airplanes.

When it comes to getting from here to there, airplanes and airports are nearly as essential to the modern city as feathers are to birds. Despite fuel shortages and jet lag, airplanes and airports work together to move thousands of people and tons of cargo efficiently and quickly many thousands of miles all over the world, every day . . . so that the airplane is today our most popular and practical means of traveling long distances.

And in ways that few people realize, our lives right here at home have been affected profoundly by airplanes and airports throughout most of the 20th century. The advent and growth of air transportation in the United States during the past fifty years has provided our communities with new goods, services, and jobs while dramatically increasing the boundaries of our own personal knowledge and experience. Even if we never travel by air ourselves, our lives have still been transformed by jet-age mobility—for much of the world is now *brought to us,* via our local airports.

So here—from the Smithsonian's National Air and Space Museum, as well as from several major airports across the United States—are some ideas on how you might introduce the important subject of airplanes and airports to your students, especially in connection with a unit of study on *transportation* or *the community*. And at the core of our lesson plan is a visit to where else . . . but of course . . . your local airport!

Step 1: Planning Your Visit

In planning your airport visit, it's important to keep in mind that the size and character of the airport will largely determine the kinds of educational benefits you can expect your students to derive from the experience. Because of the great variety of aircraft and the large number of passengers served, a large or medium-sized commercial airport will certainly provide you with the widest range of things to see. A small-sized airport, although fun to visit, will be much more limited in the range of sights it can offer—no big jets, for example, and few if any concessions such as newsstands and snack bars.

With this in mind, an important first step for you to take in planning and arranging for your visit is to call the airport several weeks in advance so as to discuss your options with someone on the staff.* What specific things of interest can you and your students expect to find at this particular airport? Are guided tours available—and if so, for what grade levels? Does the airport have any printed materials, such as maps and information sheets, that it would send you ahead of time to help you prepare your students for their visit?

Once this information has been obtained, you are ready to decide upon the exact *learning objectives* of your visit. Depending on the range of educational opportunities the airport has to offer and the emphasis of your own school curriculum, you may wish to have your students do any or all of the following in the course of their airport experience:

- get a good, close look at the airplanes (both on the ground and in landing and taking off)
- find out in a preliminary way how an airport functions
- observe a variety of airport workers going about their jobs
- experience as much as possible the different steps involved in traveling by air.

*The person you should speak with varies from airport to airport. At most *large* airports, you will be likely to find someone who has been hired specifically to handle public education information (including school tours); at most small airports, you will probably end up speaking directly with the airport manager.

Step 2: Preparing Your Students

Now you are ready to get down to the critical step of preparing your students, in your school classroom, for their airport visit.

First discuss with the children: What *is* an airplane, anyway? And what is an airport? To begin this discussion, have the children stop and visualize for a moment any airplanes and airports they may have seen in real life or in pictures: What were the airplane's or the airport's important qualities and elements—the *distinguishing features?*

Now on the chalkboard, make a list of all the airplane and airport features the children can think of such as wings, engine, and ability to fly (for airplanes) . . . and control tower, runways, and flat surfaces (for airports). Then once this list has been completed, share with the children the following two definitions and historical perspectives, illustrated if possible with pictures of airplanes and airports of various sizes, which you have found in books, magazines, and other sources:

Airplane

Definition. An airplane is a winged vehicle capable of powered flight. Airplanes vary as to type of engine (jet or propeller driven) and also as to size. In regard to size, an airplane may be shorter than an automobile or longer than a football field and capable of carrying anywhere from between one and three hundred passengers. (For a scientific explanation of how an airplane flies, see *page 4* of this issue of *Art to Zoo.)*

Historical Perspective. Although the airplane was invented in 1903 (with the Wright Brothers' successful flight at Kitty Hawk, North Carolina), it was not seriously thought of as a practical means of transportation until several decades later. Indeed, it was not until the late 1920s and early 1930s, owing to the courage and inventiveness of men like Charles Lind-

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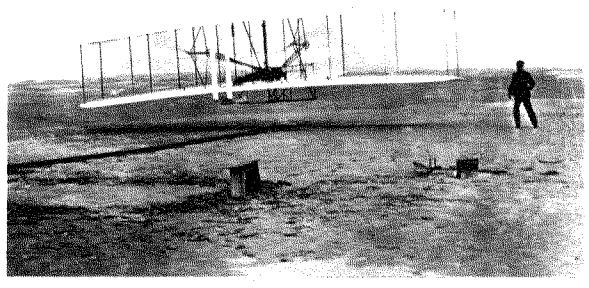


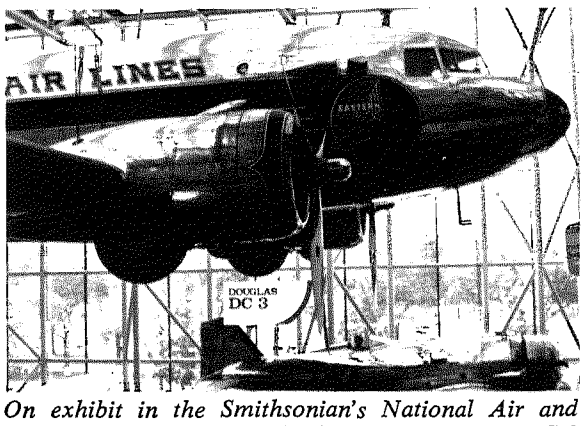
On December 17, 1903, at Kitty Hawk, North Carolina, the Wright brothers' plane, The Flyer, *took off on the first powered, manned flight that was both controlled and sustained. Photograph from the collection of the National Air and Space Museum, Washington, D.C.*

continued from page 1

bergh (first to fly non-stop, solo, across the Atlantic Ocean) and Wiley Post (early around-the-world flier, and inventor of several important instruments used in air navigation) that people began to get a glimpse of the airplane's tremendous world-shrinking potential.

Another important advance in aviation came towards the end of the 1930s, with the development by the Douglass Aircraft Company of an airplane called the DC-3. Now for for the first time some critical design problems were solved so that air travel was able to become common for business and pleasure. The DC-3 provided comfortable, rapid passenger service at low cost, allowing many more people to fly than had ever before been possible. In fact, it has often been said that the DC-3 was to the history of the airplane what the early Ford motor car was to the history of the automobile.

Today, of course, we have jet-engine planes that can fly much further and faster than the propeller-driven DC-3. But the DC-3 and the other early airplanes you see on these pages of *Art to Zoo* will not soon be forgotten in aeronautical history because they represent the tremendous ingenuity and pioneering spirit in aviation that eventually led us into the jet age and beyond.



On exhibit in the Smithsonian's National Air and Space Museum, an early Eastern Airlines DC-3.

Airport

Definition. An airport is a tract of leveled land where airplanes can take off and land. Typically, an airport is equipped with hard-surfaced runways for landings and takeoffs, a control tower, hangars (or airplane garages), and some sort of shelter for passengers and cargo. Some airports are big and complex—almost like small cities—while other airports are no bigger or more complicated than, say, a stretch of deserted beach or an empty cow pasture.

Historical Perspective. When air transportation was in its infancy, airplanes were much fewer in number and lighter in weight than the aircraft of today, which meant that the need for airports and airport services in those days was quite minimal. Back in the 1920s and 1930s, an airplane needed only a plain, flat surface—desert, beach, or country field—for landing and taking off. Then, as the aircraft industry grew, so did the numbers and kinds of aircraft flown and the frequency with which airports were used. Over the years, as airplanes became larger and more sophisticated, airports changed to accommodate this growth. The old-time single runway airport marked by a wind sock matured into a much more complex facility, although small private airports (used mostly for private planes) still have their place in our modern communities.

Step 3: The Airport Tour

Essentially there are two ways to visit an airport with a group of students: either *you* plan and conduct a tour activity on your own . . . or the *airport* does it for you.

A typical guided tour given by an airport almost always includes stops at the following places: the ticket counter, the security check, the observation deck, the customs and immigrations areas (if any), the passenger gates, and the fire and rescue station. Many airports also take children out onto the airfield, by bus, where the guide points out the maintenance areas and air cargo areas, the hangars, the runways and taxiways, and, of course, the *airplanes*. Some few airports even let the children board an airplane or visit the control tower, although this is generally not possible, both for safety reasons and because of the airport's busy schedule.

In the instance that your particular airport does *not* provide tour services for school groups, you should find it fairly easy to conduct a tour activity on your your own—if you have thoroughly acquainted yourself with the airport ahead of time. Your own airport tour might well include stops at many of the same points of interest mentioned above with the difference that you and the children would gather information *through direct observation* instead of from an airport tour guide. Here is what you do:

Worksheet on Airport Functions

Name of function	What's happening here?	Who works here?	How does this function serve the traveler?
Ticket counter			
Security check			
Customs			
Passenger gate			
Baggage claim			
Control tower			
Fire station			
Restaurant or snack bar			

At each stop along the way, encourage the children to take turns describing out loud *what they are seeing* and also *what they think is happening* at this particular juncture, and *why*. As the tour proceeds, have them take notes on their observations using the worksheet format shown here.

Later, back in the classroom, these notes can be verified and expanded as to provide the basis for a student-done classroom report or exhibit on *how an airport functions.*

Throughout the course of their tour, you may also want to have the children *sketch* or *photograph* some of the things they see, including especially the airplanes. Again, this material gathered at the airport could serve as the basis for further classroom research. Since sketching or photographing an object always helps a child to see it better and to understand the relationships between its different parts, such activity can make a most effective introduction to later classroom study of *how airplanes work* and *the principles of flight* (as suggested on *page 4* of this issue of *Art to Zoo).*

Aeronautics expert, Paul E. Garber, shows a young visitor through the National Air and Space Museum.

Step 4: Classroom Follow-up

Depending on your learning objectives, you will probably want to have your students emphasize either *airplanes* (AND HOW THEY FLY) or *airports* (AND HOW THEY FUNCTION) in their follow-up classroom research and exhibits or reports. To assist you in developing lessons on either or both of these two themes, materials containing *(1)* information about airports and *(2)* ideas for classroom experiments demonstrating the principles of aeronautics are available free of charge from the Federal Aviation Administration,* and additional free materials on the history of flight and aerodynamics are available from the Smithsonian's National Air and Space Museum.**

In addition to all these projects, your students might enjoy designing and presenting *as a class* a role-playing activity on traveling by air. For this presentation, some of the children would assume the role of passengers while others would assume the roles of the various airplane and airport workers who make traveling by air possible.

And that is how to take off without ever leaving the ground!

*Write to Department of Transportation, Federal Aviation Administration, Washington, D.C. 20591, for a free pamphlet listing these educational materials.

**Write to Curriculum Materials Coordinator, Education Services Division, National Air and Space Museum, Washington, D.C. 20560, for these two free packets: *History of Flight Tour* (for children in the middle grades) and *Discovery Tour* (for grades preschool through three).

Major U.S. Airports Offering Guided Tours to School Groups

Atlanta International Airport
Baltimore/Washington International Airport
Dallas/Fort Worth Regional Airport
Dulles International Airport, Washington, D.C.
Kennedy International Airport, New York City
Logan International Airport, Boston
Miami International Airport
Minneapolis/St. Paul International Airport
Newark International Airport
O'Hare International Airport, Chicago
Salt Lake City International Airport
Seattle/Takoma International Airport
Sky Harbor International Airport, Phoenix
Stapleton International Airport, Denver

Resource List

Books for Students

Bendick, Jean. *The First Book of Airplanes.* New York: Watts, 1976.

Davidson, Jesse. *Famous Firsts in Aviation.* New York: Putnam, 1974.

Engle, Lyle. *The Complete Book of Flying.* New York: Scholastic, 1976.

Harris, Sherwood. *Great Flying Adventures.* New York: Random House, 1973.

Settle, H. L. *The Story of Flight.* New York: Random House, 1967.

Stevens, H. Gyford; and Haggarty, James J. *Flight.* New York: Time-Life, 1967.

Books for Teachers

American Heritage History of Flight. New York: Simon & Schuster, 1962.

Gentle, E. J.; and Reithmaier, L. W. *Aviation and Space Dictionary.* Fallbrook, CA: Zero Publishing, 1974.

Gibbs-Smith, C. H. *Flight Through the Ages.* New York: Crowell, 1974.

Oakes, Claudia M. *Aircraft of the National Air and Space Museum.* Washington, D.C.: Smithsonian Institution Press, 1976.

Information on Request

In addition, you may wish to write to:
Center for Aerospace Education Development
Civil Air Patrol
National Headquarters
Maxwell Air Force Base, Alabama, 36112
for information on . . .
"Aerospace Personality Packets"
"Aerospace Activity Books"
Falcon Force, a learning kit for the middle school grades.

Education Services Division
National Air and Space Museum
Smithsonian Institution
Washington, D.C., 20560
for information on . . .
Flight (a filmstrip series)
Air & Space (a school periodical)

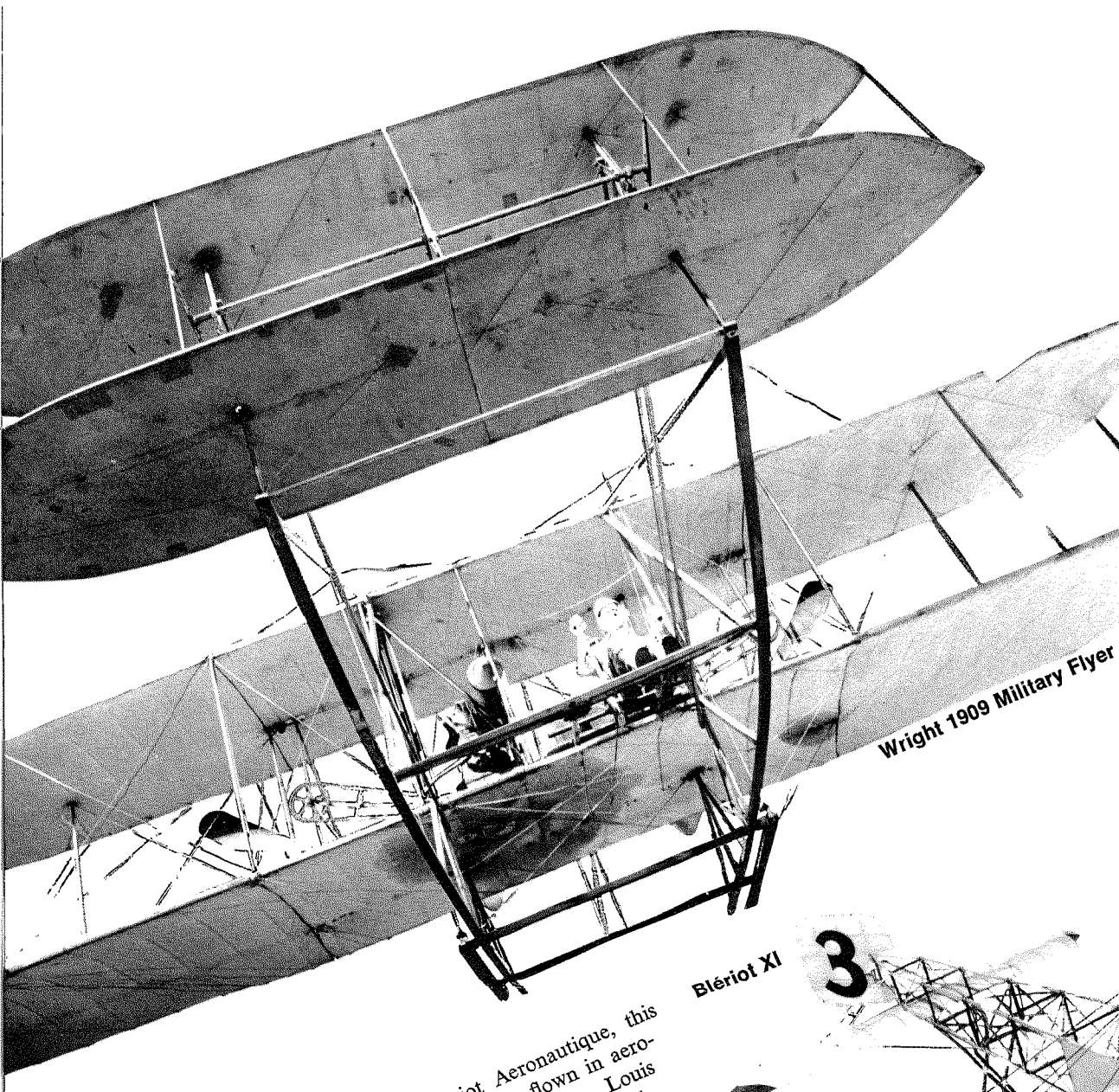
The first half of the second decade of the 20th century (right before the outbreak of World War I) was an exciting time to be alive in the United States. Among many other developments, the women's suffrage movement was gaining national momentum; the Model T Ford was replacing the horsedrawn carriage as a faster, more practical means of getting around; and the United States was gaining credibility as a leading power in international affairs. It was a time when anything seemed possible—including man's age-old dream to fly.

In 1910 the field of aviation was still in its infancy. The age of powered flight had begun just seven years earlier in 1903, when the Wright Brothers succeeded in flying a heavier-than-air craft at Kitty Hawk, North Carolina. Although a few individuals were now experimenting with the use of aircraft for commercial purposes, there was as yet no general consensus as to what the practical applications of the airplane might be. Flying was still confined mainly to races, displays, and demonstrations—enormously popular with the public.

The following photoessay is based upon an exhibition in the Smithsonian's National Air and Space Museum, designed to evoke the mood and excitement of an early aero show of the period 1910 to 1913. Three of the most important aircraft are pictured here in the hope of acquainting you and your students with the unique character of some of the early flying machines that helped to open the highway of the skies for mankind.

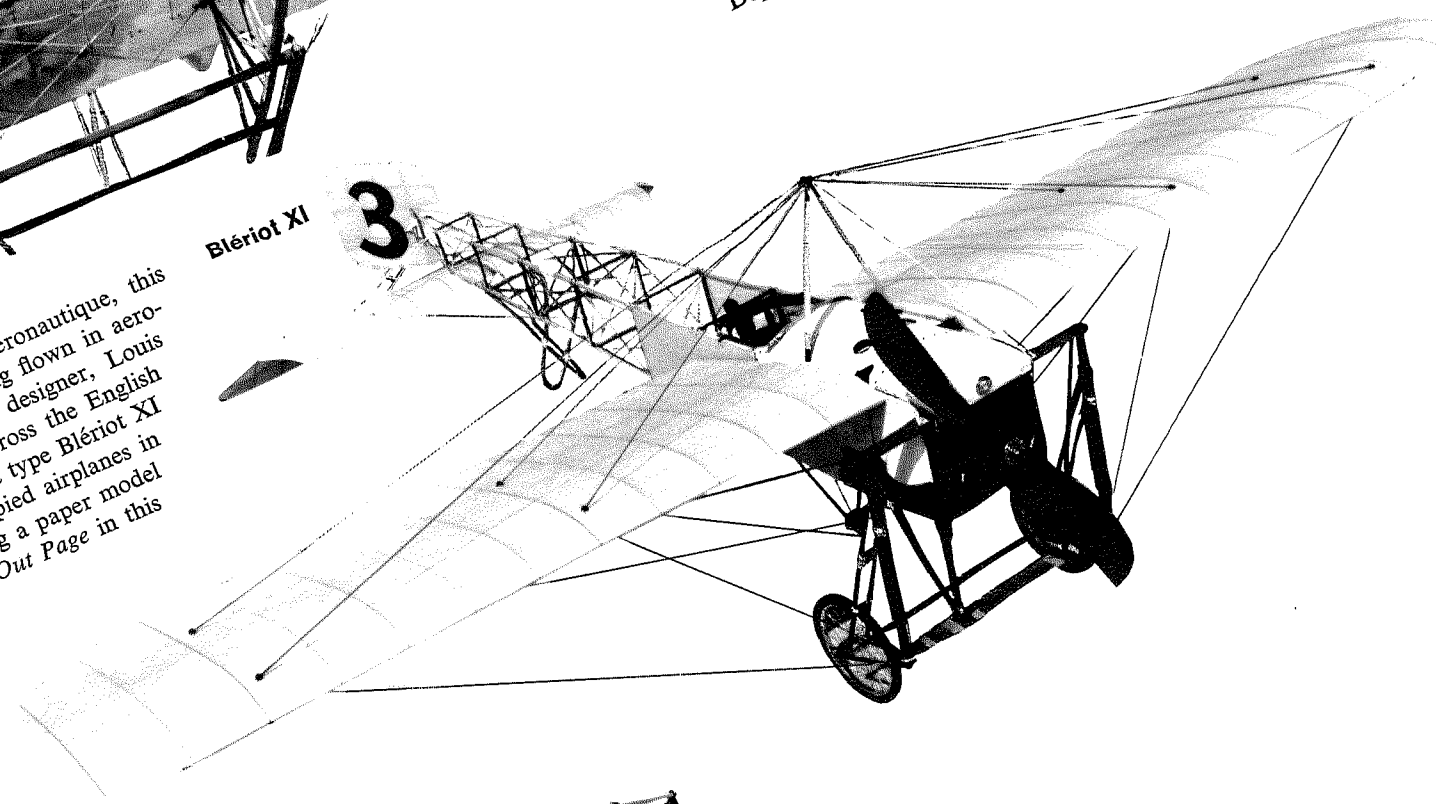
In studying these photographs, you will see that airplanes in those days usually had either one or else two pairs of wings*—and most had open cockpits. All were made from wood, with metal fittings and wire bracing. The wings, and often the bodies, of the aircraft were covered with cloth that had been treated with a special chemical compound so that the plane would be airtight.

Highway of the Skies



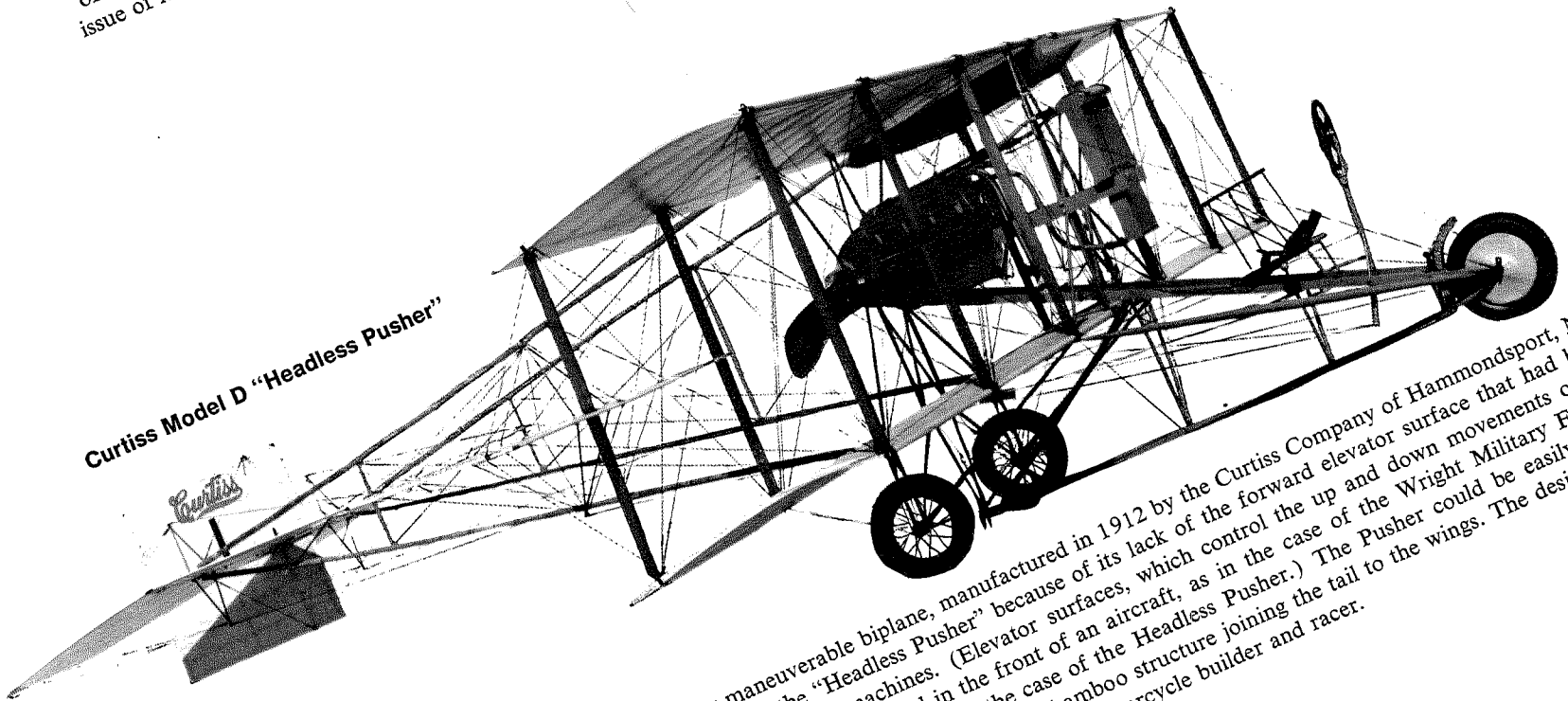
Wright 1909 Military Flyer

The world's first military aircraft, this plane was built for the U.S. Army Signal Corps by the Wright brothers in 1909. The Military Flyer was used for reconnaissance (scouting or searching) operations. This plane was presented to the Smithsonian by the War Department in 1911.



Blériot XI

Manufactured by the French firm, Blériot Aeronautique, this trim monoplane was typical of the aircraft being flown in aeronautical exhibitions around the country. The designer, Louis Blériot, made the first heavier-than-air flight across the English Channel in a similar craft in 1909. By 1913, the type Blériot XI was one of the most familiar and frequently copied airplanes in the world. (You can find instructions for making a paper model of the Blériot XI on *pages 2 and 3 of the Pull-Out Page* in this issue of *Art to Zoo*.)



Curtiss Model D "Headless Pusher"

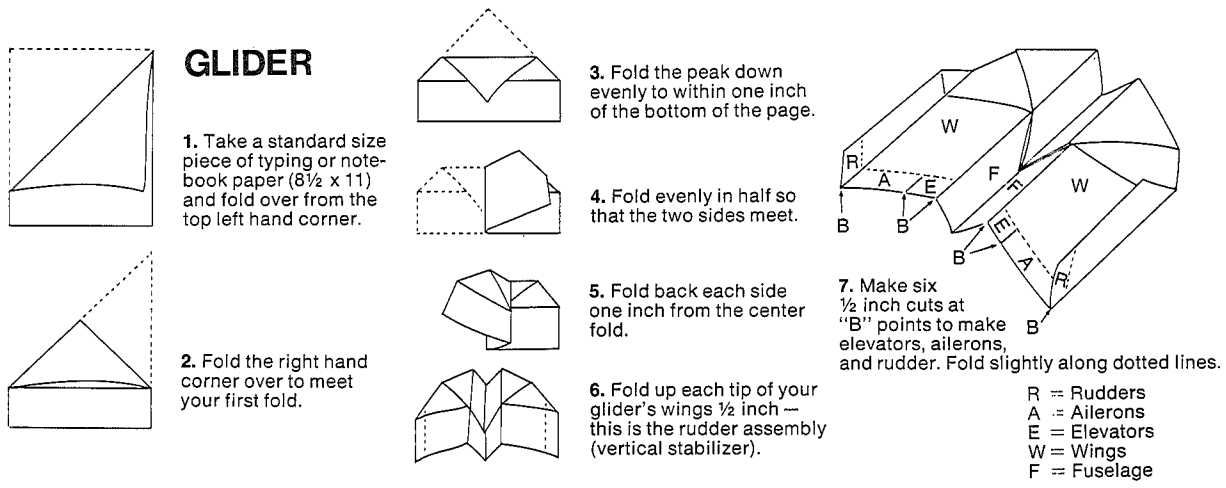
This highly maneuverable biplane, manufactured in 1912 by the Curtiss Company of Hammondsport, New York, was called the "Headless Pusher" because of its lack of the forward elevator surface that had been used on earlier Curtiss machines. (Elevator surfaces, which control the up and down movements of an airplane, were sometimes located in the front of an aircraft, as in the case of the Wright Military Flyer, and sometimes in the tail section, as in the case of the Headless Pusher.) The Pusher could be easily assembled, and featured a rugged, high-strength bamboo structure joining the tail to the wings. The designer of this craft, Glenn Curtiss, was also famous as a motorcycle builder and racer.

*Airplanes having one wing are called *monoplanes*. Airplanes having two wings are called *biplanes*.

Lift and Drag: Hang Gliders and the Principles of Flight

The men who built and flew hang gliders during the closing years of the 19th century laid the foundation for the first successful flying machines. German aeronautical pioneer Otto Lilienthal was the most influential of this group of early "test pilots" who sought to develop a stable glider as the first step toward powered flight.

The 1894 National Air and Space Museum glider *(shown here)* is considered the most successful of Lilienthal's designs. The wing and tail surfaces are covered with cotton cloth, and a horizontal stabilizer is connected to the frame by a pivot at the front of the rudder. The wings are designed to fold for ease in transportation and storage. The pilot was suspended between the wings by bars that passed underneath his arms. By moving his legs and torso, he could alter the center of gravity location so as to maintain limited control. Lilienthal made glides of up to 350 meters (1150 feet) in gliders of this kind. Hang gliding is today a popular sport in many parts of the country.

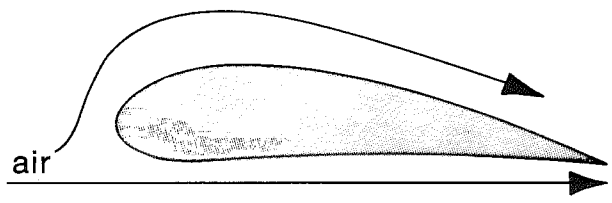


Directions for making a paper glider.

Lift and Drag

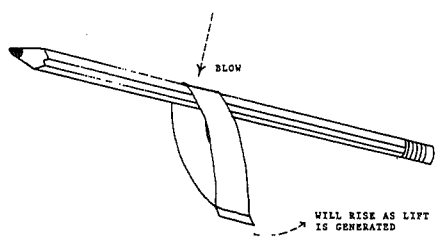
Two principles of flight basic to all gliders and airplanes are "lift" and "drag." The following explanation of these two principles is based on an interview with RICHARD HALLION, Curator, Department of Space Science and Exploration in the Smithsonian's National Air and Space Museum.

Lift is the force that acts on the wings of a glider or an airplane, causing the aircraft to rise into the air and stay there during flight. By studying a cross section of a typical airplane wing like the one shown here, your students should be able to see that the air flowing over the curved upper section of the wing must travel farther and therefore faster than the air passing under the flat, lower surface. This causes a pressure change which pulls the wing upward.



Cross section of a typical airplane wing.

To see exactly how this principle works, *students might now try constructing an airfoil.* Bend a 6″ x 1″ strip of paper around a pencil, fastening the ends of the strip together with a piece of tape, and creasing the paper slightly where it touches the pencil *(see sketch).* If you then hold the pencil and blow



Sketch of airfoil, demonstrating LIFT.

directly down onto the bent part of the strip, the taped ends will rise, demonstrating that *lift* has been created by the difference in air pressure on the top and bottom surfaces of the airfoil.

Drag is the resistance of a solid body, like a glider or an airplane, to the air through which it moves. While airplanes and gliders are *streamlined* to reduce drag, they also have devices for deliberately creating drag when needed. For example, the "speed brakes" that slow down an airplane are in essence flat surfaces that can be extended to increase drag.

To learn more about the phenomenon of drag, the children might try playing "human airplane." By running across the schoolyard holding pieces of cardboard turned first against the wind on the flat side and then into the wind on edge, students will quickly get a feel for drag, the second important principle of flight. A third basic principle of flight is *thrust,* which in the case of an airplane is supplied by engine power.

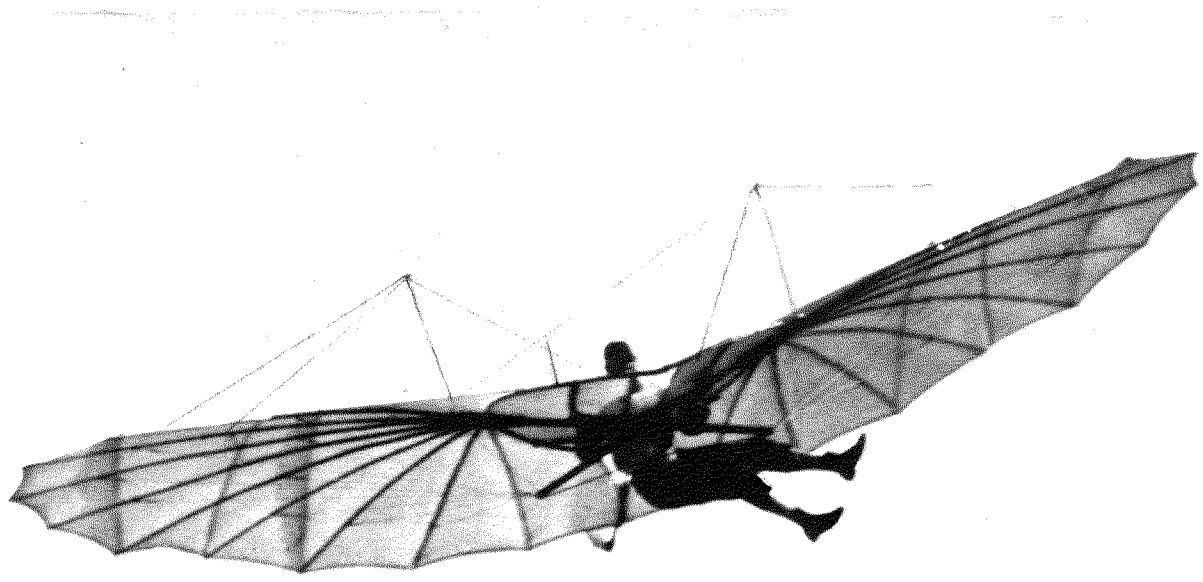
The paper glider diagrammed here illustrates to some degree the first two basic principles of flight. The diagram is taken from the "Teacher's Guide" to *Flight: the Sky's the Limit,* a 1975 Smithsonian Institution television film by David Wolper and Associates. Either show the diagram to your students using an opaque projector, or duplicate it for classwide distribution. Then have the children carefully follow the accompanying *directions to make paper gliders* of their own. (For best results, a ruler should be used to measure the rudder, ailerons, and elevators of each glider before cutting and folding.)

In flying their gliders, students should know that the ability to remain stable and also to maneuver in flight is made possible by controlling the flow of air over the surface of a glider or an airplane. This is done by means of small moveable parts, which can be adjusted to alter the aircraft's movements. The gliders your students have built have ailerons and elevators on the wings, and a rudder on the vertical part of the tail. By moving the elevators up slightly, a student can make his glider climb; by moving the elevators up further he can make his glider fly in a loop. If he moves the elevators down, he can make his glider go into a nosedive.

Students make paper gliders in a Smithsonian Resident Young Associate course on Flight.

With the elevators set slightly up, a student can move the right aileron slightly down and the left one slightly up, and the glider will roll to the left. By then moving the rudder to the left, a left turn can be executed. To turn the glider right, he can simply reverse this process. By experimenting with other small movements of these control surfaces, many other maneuvers can be accomplished. After some practice, the children should become expert at predicting—*prior to launch*—the paths that their models will take.

Only the sky's the limit when through active investigation with real materials, your students let their imaginations soar to gain a solid grounding in the principles of flight!



Lilienthal's 1894 glider.

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THE HIRSHHORN MUSEUM AND SCULPTURE GARDEN
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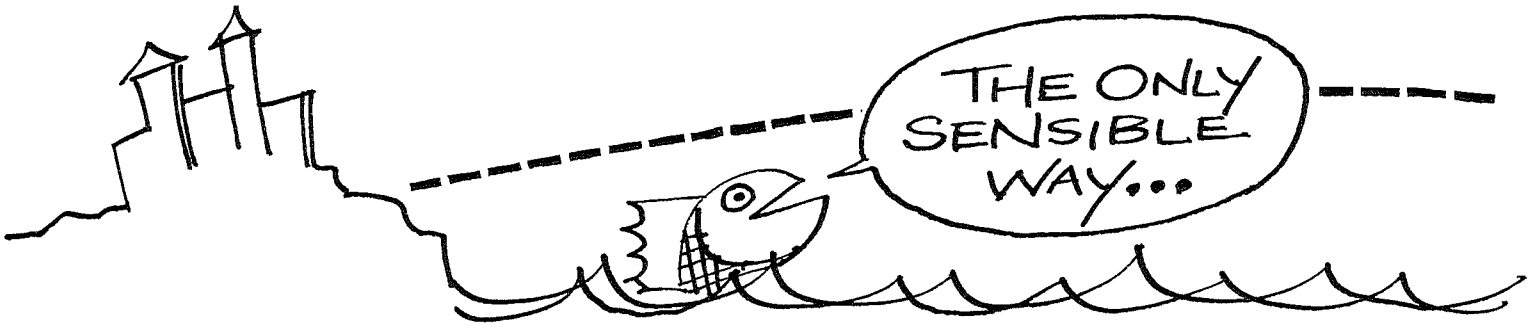
Pull-out Page



Early one morning in the spring of 1927, a tall young man in helmet and goggles stepped into the cockpit of a silver-painted airplane about twice the size of an automobile. The young man's name was Charles A. Lindbergh. His mission was to fly his airplane—the *Spirit of St. Louis*—across the Atlantic Ocean, from New York to Paris, without stopping.

Airplanes in those days were fairly new inventions and not usually flown long distances. Most people thought that the only sensible way to cross the Atlantic, or any ocean for that matter, was by ship. They thought that Charles A. Lindbergh would never make it from New York to Paris.

But thirty-three and a half hours after taking off from New York, Lindbergh landed in Le Bourget Airfield outside Paris. Cheering crowds ran to meet him. He and the *Spirit of St. Louis* had made it! The two of them had become famous almost overnight.

One of the few people who was not surprised by Lindbergh's success was Paul Garber here at the Smithsonian Institution in Washington, D.C. Mr. Garber had been interested in aeronautics since boyhood. Now that he was a young man, an important part of his job at the Smithsonian was to take care of a growing collection of objects relating to man's increasingly successful attempts at flights. These objects included gliders, balloons—and airplanes.

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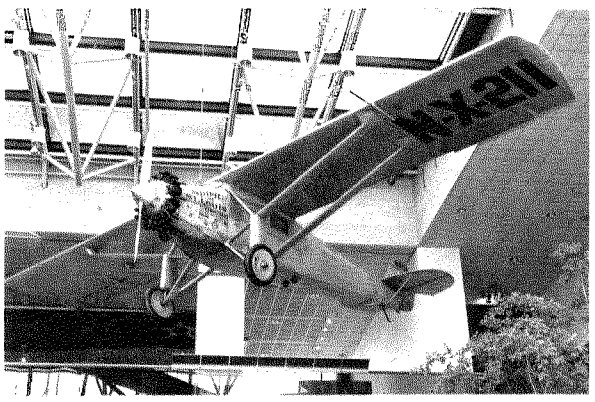
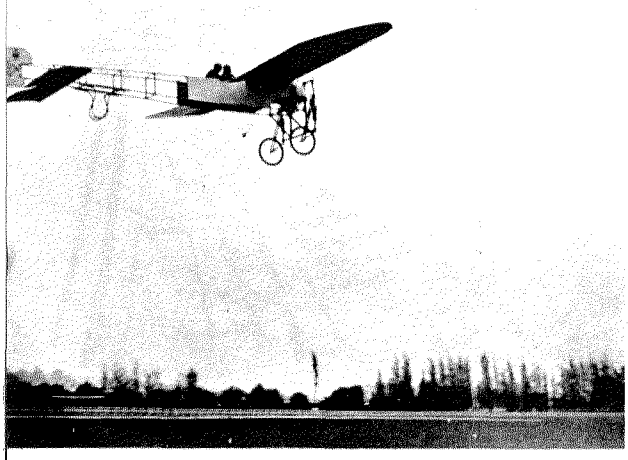


Lindbergh's plane, the Spirit of St. Louis, *on exhibit at the Smithsonian.*

Make a Model of a Blériot XI

Based on materials by RICHARD P. HALLION
Drawings by SUSAN WHITMORE



1918 photograph of Blériot XI in flight. From the collection of the National Air and Space Museum, Washington, D.C.

Here are instructions for making a model of an early airplane. The plane is called the Blériot XI.

Like other early airplanes, the Blériot XI was made from wood, with metal fittings and wire bracing. The wings of the craft were covered with cloth. Your model will be made mostly from construction paper. Besides construction paper you will need: a lump of clay, a toothpick, scissors, carbon paper, a ballpoint pen, and some glue.

Here is what you do:

1. Using carbon paper and a ballpoint pen, trace the patterns for the different parts of your model *(see page opposite)* onto construction paper. These parts are: the fuselage (or body) of the craft, the wings, the tail, the propeller, and the rudder. (On a real airplane, the propeller works to pull the aircraft through the air, and the rudder is used to turn the aircraft.) When you are all finished tracing, cut out each part.

2. Cut out a flat-ended circle in the center of the body of the fuselage, *as shown,* to make the cockpit. (The cockpit of an airplane is where the pilot sits.)

3. Cut out two slots for the wings of the plane and five slots for the tail section, *where shown.*

4. Fold the fuselage lengthwise along the four longer dotted lines. Then lightly glue the hatched area (/////) of the fuselage and press this glued area under the opposite flap to make the fuselage box. Wait for a minute or two to let the glue dry. Then fold the nose flap under.

5. Take a piece of clay the length and thickness of your little finger and roll it into a tight ball. Place this ball inside the nose of the aircraft and tape down the nose flap.

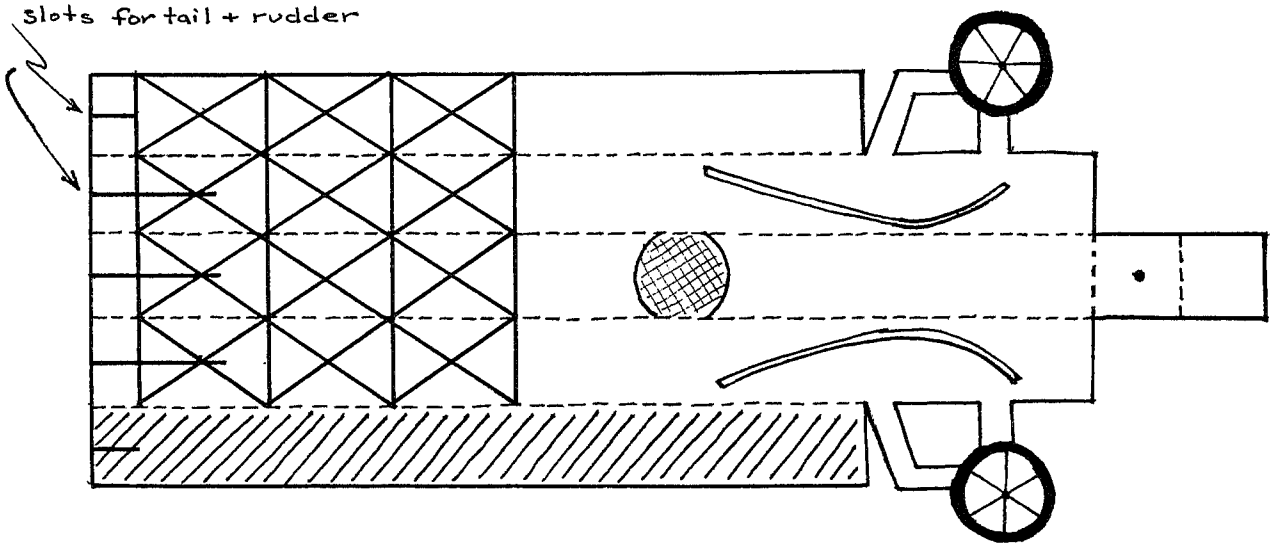
6. Take another, smaller, lump of clay (about the size of a small pea) and place it against the outside center of the nose of the aircraft, over the dot. Then pin the propeller through the clay to the nose of the craft *as shown.*

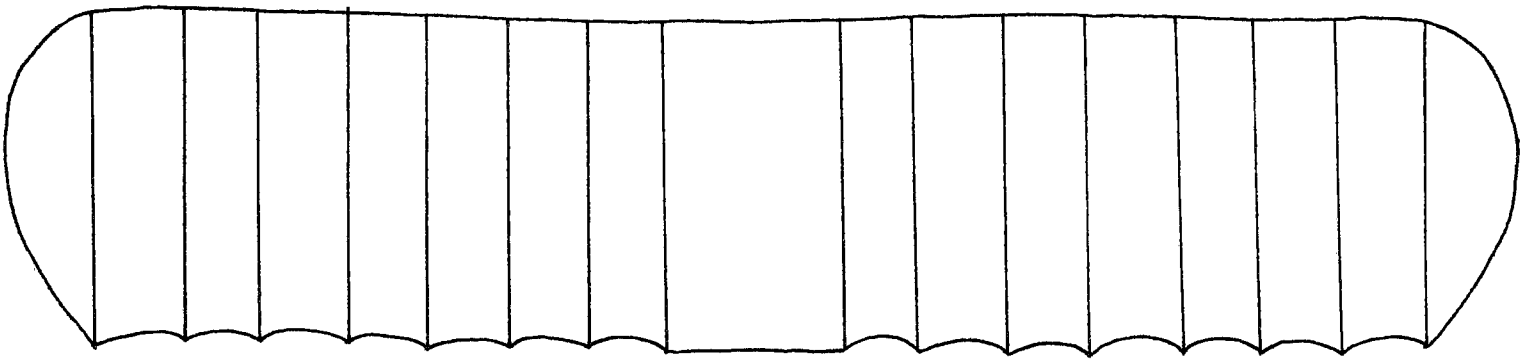
7. Stick a toothpick through the center of the wheels to make the axle.

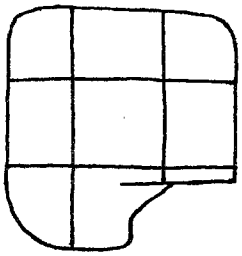
8. Slide the wings through the wing slots and glue them in place.

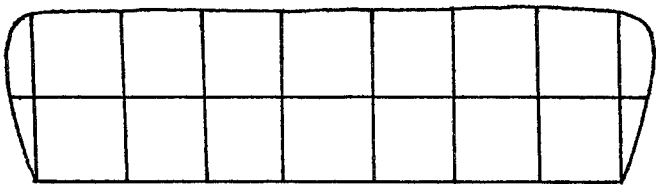
9. Assemble the tail section in the order shown and glue each part in place.

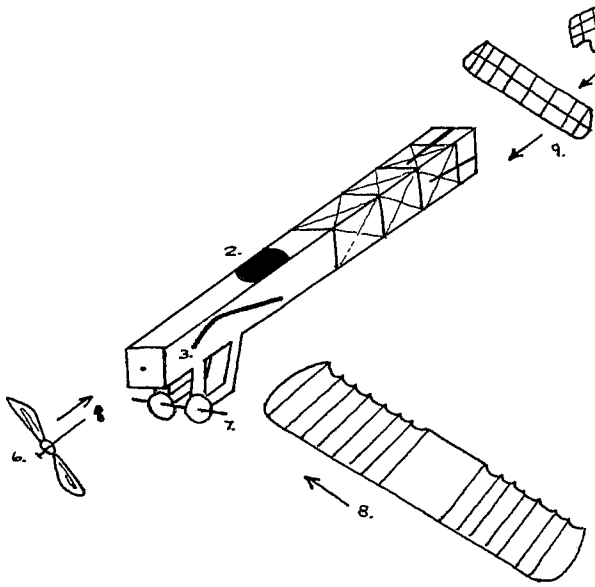
Now try flying your Blériot XI. If properly balanced, with the right amount of clay, it will fly in a straight line and land gracefully, *as shown in the drawing here.* However, it may tend to go into a nosedive or do backward flips, *as shown with dotted lines in these drawings.* Nosedives can be corrected by removing a small amount of clay; backward flips can be corrected by *adding* clay, a little at a time.



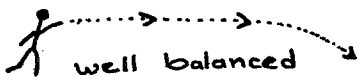


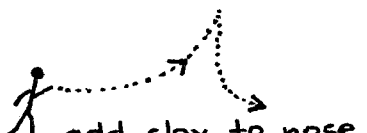


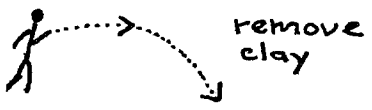


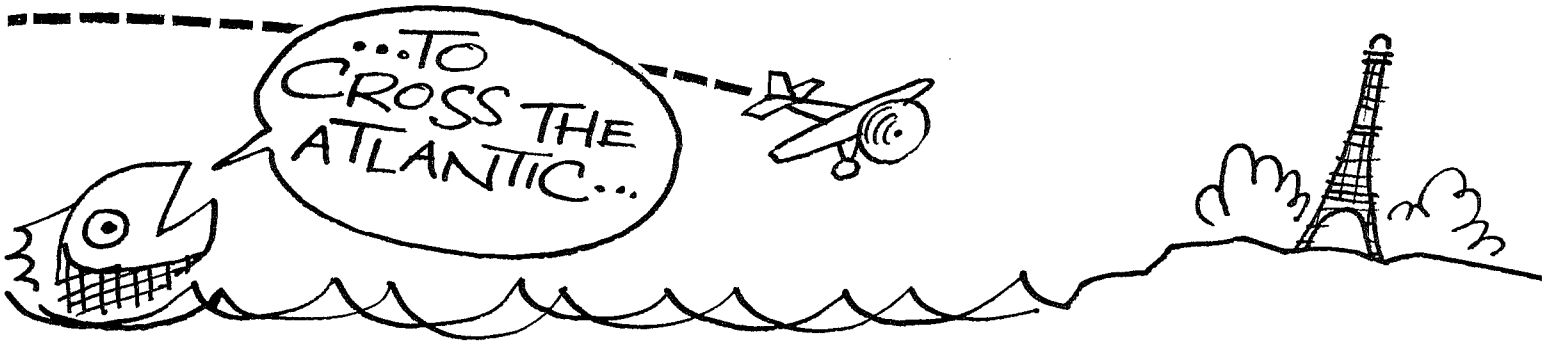


TRIMMING FOR FLIGHT









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Mr. Garber had felt all along that Charles Lindbergh would make it from New York to Paris. And Mr. Garber knew that this would mean that the *Spirit of St. Louis* would be the *first plane in the world* to fly all the way across an ocean, from mainland to mainland, without stopping. Because of its importance to the history of flight, Mr. Garber wanted the *Spirit of St. Louis* for the Smithsonian, where it would always be properly cared for and where it could be placed on exhibit for future generations to see.

And so it was that one of the first things Lindbergh received after waking up in Paris from the long sleep that followed his historic flight was a cablegram from the Smithsonian in Washington. The cablegram read:

> *Smithsonian Institution congratulates you on glorious achievement. Hope Spirit of St. Louis will eventually join Langley's machines, the "Army Wright" (first plane ever owned by any government), the NC4, "Chicago," and other historic American planes in our United States National Museum.*
>
> C. G. Abbot, *Acting Secretary, Smithsonian Institution*

In a recent interview, Mr. Garber, who still works at the Smithsonian, told us the rest of the story. "The *Spirit* was brought back to the United States aboard a U.S. Navy cruiser," he said. "Lindbergh toured the United States and Latin America in it; and then, on April 30, 1928, he telephoned me and asked me to meet him at Bolling Field [outside Washington]. He was flying it in and would deliver it into the Smithsonian's custody that very day!

"The plane was in perfect condition. We drained the gasoline from the tanks and the oil from the oil sump, and cleaned it. Then we took it apart and brought it to the Smithsonian's Arts and Industries Building, towing the body on its own wheels and carrying the wing and tail group in the truck. Once inside the museum, we put it back together and hung it from the ceiling on steel cables for visitors to see."

After that, Lindbergh often came to the museum to see the *Spirit of St. Louis,* and in the course of these visits, he and Mr. Garber became good friends.

In 1975, the *Spirit of St. Louis* was moved from the Arts and Industries Building to the Smithsonian's new National Air and Space Museum, where it has been given a place of honor in a gallery celebrating the "Milestones of Flight." From the museum balcony, you can look inside the cockpit and imagine how Lindbergh must have felt on that day fifty years ago when he and the *Spirit of St. Louis* set out on the grand adventure that proved once and for all the practicality of across-the-ocean flight.