



## **The Sky's the Limit Volume I: The Early Days of Flight**

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## Introduction

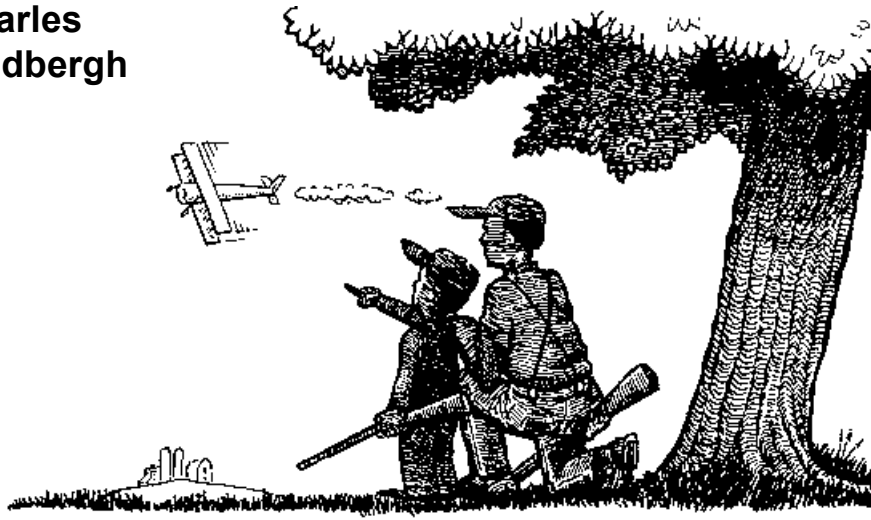
The Sky's the Limit is a series of books featuring people who have made contributions to the field of aviation. A variety of backgrounds and perspectives are represented as the reader learns about such people as Anne Morrow Lindbergh, an aviation writer and pilot, Angelo De Ponti, an aviation businessman, and Franklin Chang-Diaz, an astronaut and rocket scientist. Each book includes activities related to aviation and the principles of flight. The activities range from making a compass to completing a word-find exercise.

The series begins with the early days of flight in the United States and continues through the space program. The books are not intended to be a complete history of aviation. Rather, they draw from a variety of disciplines to inspire young readers in the areas of math, science, reading, writing, art, and engineering.

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## Charles Lindbergh

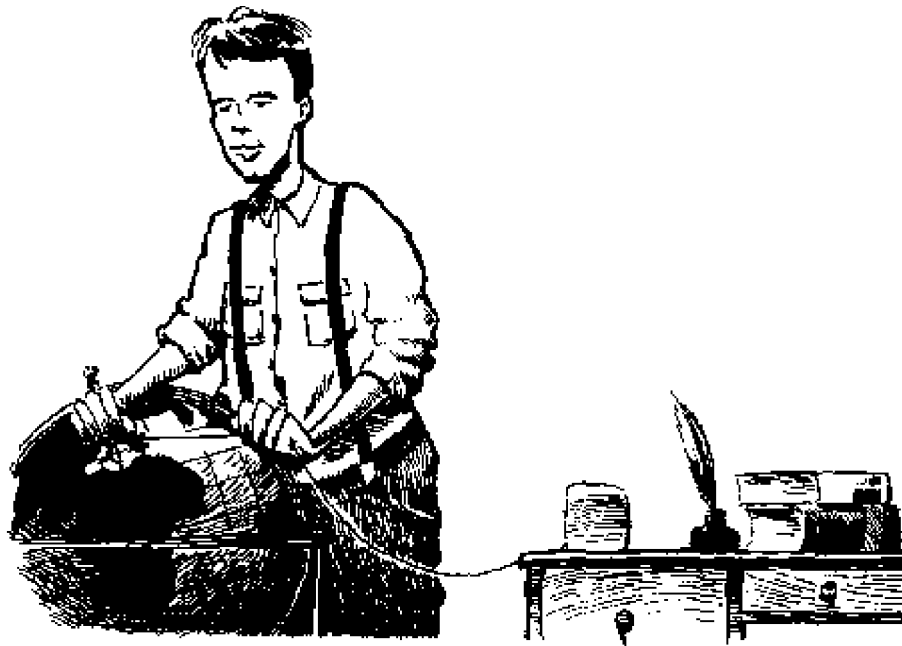


Charles Lindbergh was born in Detroit, Michigan on February 4, 1902. When he was very young, his family moved to a farm in central Minnesota near a town called Little Falls. His father was a United States congressman and his mother taught chemistry at the high school. Charles liked living the outdoor life in Minnesota. He helped with the farming and enjoyed swimming in the Mississippi River. Whenever his father was home from Washington D.C., he and Charles would go hunting. Young Charles was fascinated by the sight of airplanes. They were a new invention then and a thrill to see.

As a child, Charles was especially interested in mechanics. By age nine, he knew all about gasoline engines. At age eleven, his parents put him in charge of driving and fixing their car. Charles was already an excellent mechanic. In high school, he helped with the farm and even built a tractor from a mail order kit. When Charles was in college, he heard about a school in Nebraska that taught people how to fly and repair airplanes. With his parents permission, he packed up his motorcycle and went to learn how to fly. Flying had everything he liked: being outdoors, adventure, and mechanics. After school in Nebraska, he enrolled in the U.S. Army flight school to become a professional pilot.



He learned that becoming a professional pilot meant more than flying an airplane well. It also meant studying and getting good grades. At first his grades weren't so good. Afraid that he might fail, he began studying during every spare moment. He even studied in the bathroom at night when he was supposed to be in bed. His hard work paid off. He graduated with the highest grades in his class. Charles was now a professional pilot.



His first job as a professional pilot was flying a route between St. Louis and Chicago delivering mail to the towns along the way. This was not an easy job. He flew through terrible weather and landed at towns that didn't have an airport or a runway. While he was working at this job, he heard about a contest to see who could be the first pilot to fly across the Atlantic ocean between New York and Paris. This was a big challenge to pilots and airplane makers. There had been many attempts so far, but no successes. In fact, six pilots had already died trying. Charles began thinking, how far was it from New York to Paris?

Charles decided to enter the contest. First he had to find a company that would build a plane for him. He believed the best plane for a trip like this would be a one person, single engine airplane. The airplane companies disagreed with him. It was too dangerous. How could anyone fly that far with only one engine? Charles kept searching. Finally, he found a company named Ryan that would build a plane for him. When the plane was ready, Charles was ready too. He packed a canteen of water, sandwiches, maps, and charts.

Charles flew and flew and flew. He was so tired that he had to hold his eyes open to stay awake. After 33.5 hours of flying he spotted Paris. He landed to the cheers of a roaring crowd. Charles was the first person to cross the Atlantic ocean alone in an airplane. After Charles had several days to rest, President Coolidge sent a U.S. Navy ship to bring Charles and the plane home. In New York, millions of people gathered to welcome Charles home and celebrate his success. Charles continued to have many more adventures as a pilot. To read more about him, you may want to visit a library or bookstore. The plane he flew, named the Spirit of St. Louis, is now in the Smithsonian National Air and Space museum in Washington, D.C. Models of his plane can be seen in various airports throughout the country including: Minneapolis, Minnesota; Lincoln, Nebraska; St. Louis, Missouri; and Oshkosh, Wisconsin.

## Make a Compass

One instrument Charles Lindbergh had in his airplane to help him find his way was a compass.

What is a compass, and how does it work? A compass is an instrument with a magnetized needle that points north. By knowing where north is, you can use the compass to find other directions.

How does it work? The earth contains metals that are naturally magnetized. One end of the needle of a compass will always point toward the north pole due to the Earth's magnetic properties. You can make a compass yourself and see how it works.

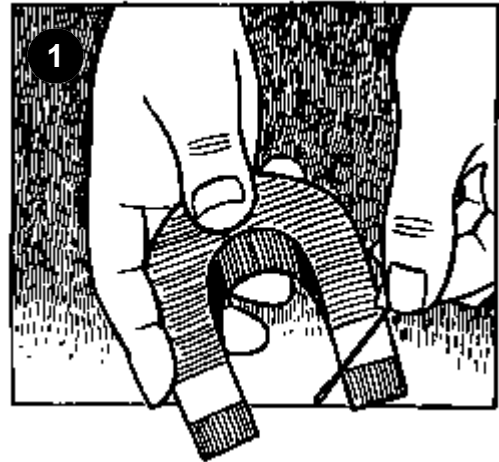
What you will need:

- 1 sewing needle
- 1 magnet (maybe there is one on the refrigerator)
- 1 bowl of water
- 1 small piece of paper

1. Stroke the dull end of a needle across the magnet sixty times, going in the same direction each time.

2. Now place the small piece of paper on top of the water in the center of the bowl. Set the needle on top of the paper and gently move the paper to cause it to spin slightly. Make sure there is no metal near by (does the table you are working on have metal in or under it?) Also make sure the magnet you used to magnetize the needle is at least 2 feet away from the bowl. If the paper gets stuck to the side of the bowl, gently nudge it toward the center again.

What is happening? When the needle and paper have stopped moving completely, the sharp end of the needle is pointing north. You can prove this compass is really pointing north by setting a manufactured compass nearby. Don't set the two compasses too close to each other because they will interfere with each other.





## Bessie Coleman: Early Aviator

Bessie Coleman was born in Atlanta, Texas, on January 26, 1893. Her mother was African American and her father was Native American of the Cherokee Tribe. As a child, Bessie's favorite activity was reading. She read every book that she could find. She was a very good student and liked school. At home, she and her brother and three sisters worked different jobs to help their family.

After high school, Bessie read books about flying. The books were so exciting she decided she wanted to be a pilot. She worked hard and began saving her money to go to flight school. But when she wrote to flight schools about becoming a student, she discovered that none of them would take her because she was a woman. In those days, it was thought that women couldn't be pilots because they weren't strong enough or tough enough to fly an airplane. A friend suggested that she go to France to learn how to fly because women were allowed in flying schools there. She saved her money and when she had enough, she went to France. After earning her pilot's license she came back to America. Bessie was the first African American woman ever to receive a pilot's license.

Now she had a goal of starting a pilot's school in America that would accept girls and African Americans. To earn money for the school, Bessie flew in air shows all across the country. She flew figure 8's, loops, and other daring and spectacular stunts. She became famous for her bravery as a stunt pilot and for her determination in getting her license. People were amazed at what she could do.

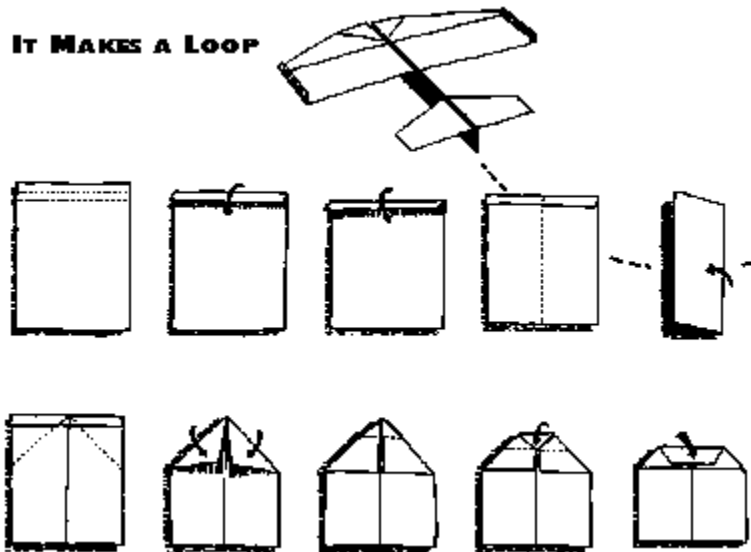
She had one last flying show to do, and then she would have enough money to open the school. Just before her last show however, she was testing her plane and something went wrong. The plane crashed and Bessie did not survive. Bessie's friends opened the school for her and called it the Bessie Coleman Aero Club. Bessie showed many people that girls and African Americans can be great pilots.

Even though it was very difficult, she didn't give up on her dream. She was brave and worked hard at what was important to her.

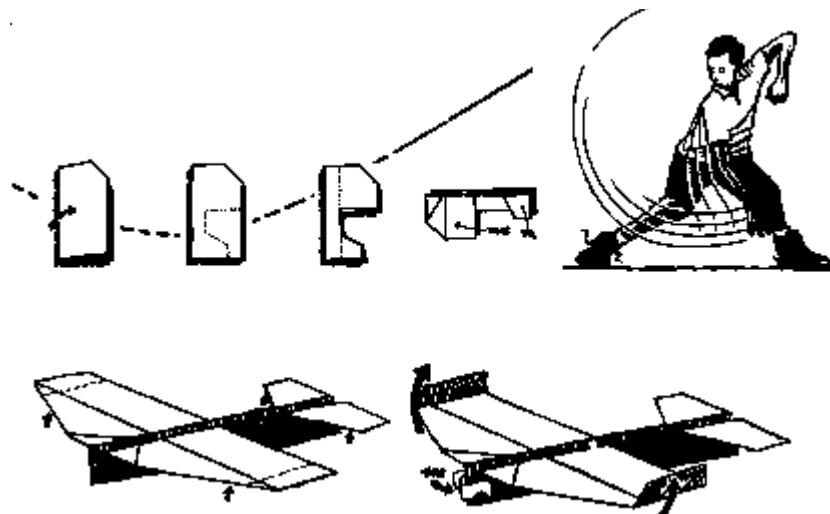


### It Makes a Loop

1. Fold over the end of a piece of paper twice. Then fold in half. Open flat, then fold down the corners to the center crease. Next, fold over the pointed end twice.



2. Fold in half, then cut out a piece as shown, then follow the dotted line to fold wings and tail. Put wings and tail in position, fold up the wing tips. Put tape on nose to add weight and hold body together.





## Amelia Earhart: Around the World Adventurer

Amelia Earhart was born in Atchison, Kansas, in 1897. She and her sister Muriel were always busy playing football and improving their aim shooting their rifles. One day Amelia went to the airport to watch planes take off. World War I was being fought and there were many military planes coming and going. Watching planes inspired Amelia to learn to fly some day. After high school, she was able to earn

enough money to pay for flying lessons. She was a good student and a good pilot.

After earning her pilot's license, she was asked if she would like to be the first woman to ride in a plane across the Atlantic Ocean. She knew it would be scary but she was willing to try. On the trip, Amelia took pictures and recorded important information. After 21 hours, the pilot, Wilmer Stultz; the mechanic, Lou Gordon; and Amelia landed safely in their plane, called "Friendship". They became famous worldwide for their successful flight.

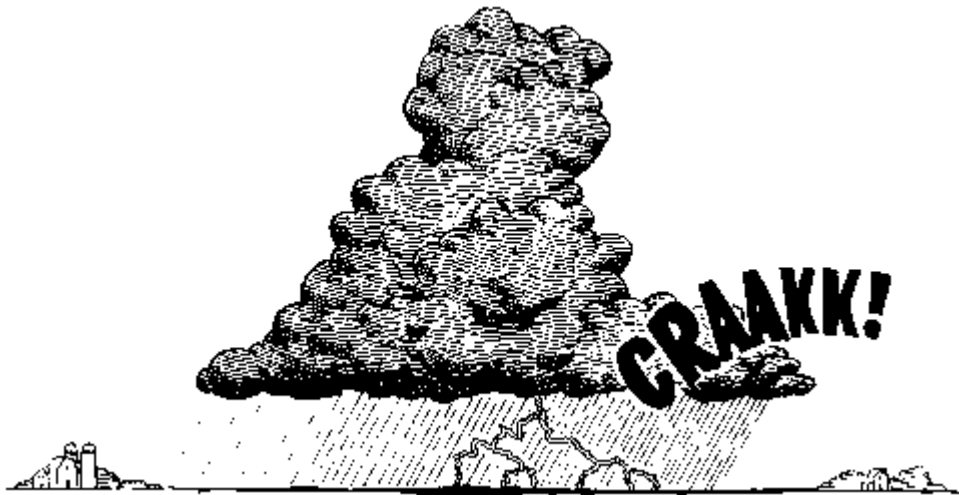
Amelia began to think about crossing the Atlantic Ocean as a pilot. No woman had ever done this before. Could she really do it? On May 20, 1932, the anniversary of Charles Lindbergh's crossing, she began her journey. The trip was scary. She flew through a lightning storm and once almost crashed into the ocean. When the plane began to leak fuel, she was forced to make an emergency landing. She landed in a cow pasture in Ireland, becoming the first woman pilot to cross the Atlantic. She returned to New York aboard a U. S. Navy ship and was welcomed by President Hoover. A huge parade was given in her honor.

Next, Amelia began to think about making a trip around the world. She planned to fly around the Earth at its widest point, the equator; something no one had ever done before. For this trip, she asked Fred Noonan, pilot and navigator, to join her. Amelia and Fred studied maps and charts and learned about weather patterns for the areas they would fly through. The whole trip would take about 32 days, with stops each night for fuel and rest.

After traveling for 30 days, Amelia and Fred had gone almost completely around the Earth. Only 2 days of travel remained before reaching home. But the most difficult part of the trip was still before them; crossing the huge Pacific Ocean and locating tiny Howland Island where they would stop for fuel. A Coast Guard ship would be standing by at Howland Island ready to communicate with Amelia by radio to help her locate the island. But something went wrong. The radio messages did not get through as they were supposed to. Fred and Amelia did not make it to Howland Island. Ships and planes from all around the area were called out to search but no trace of them or their plane could be found. What happened to them? Did they run out of fuel? Did they land somewhere else? The mystery remains unsolved today though searchers continue to look for clues.







## Lightning and Thunder

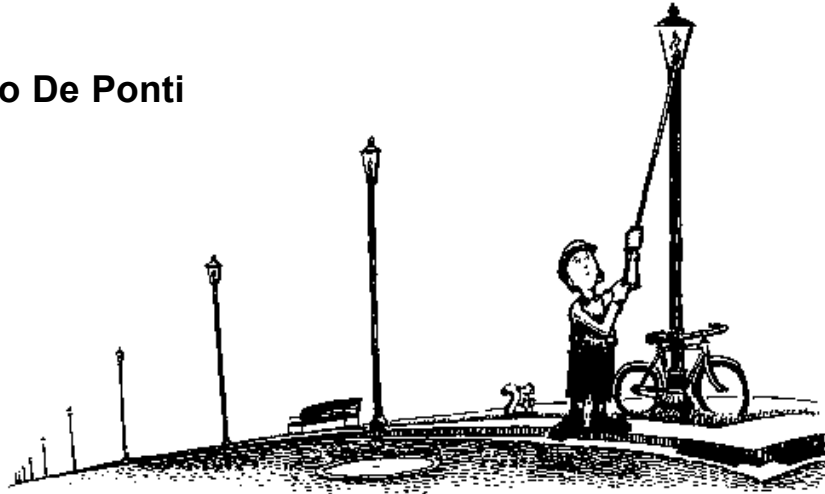
You can tell how far away a storm is by using this very simple method.

When you see a flash of lightning in the sky, start counting "one thousand one, one thousand two, one thousand three ..." and stop counting when you hear the thunder. Now divide that number by 5. Your answer tells you how many miles the storm is from you.

Repeat the steps with the next flash of lightning. You can tell if the storm is moving toward you or away from you by comparing the two answers.

How does this method work? Thunder is the sound produced when lightning strikes. We see the lightning first because light travels very fast, much faster than sound. The sound of thunder travels at 1/5 mile per second (slower than the speed of light). Counting tells you how long it took for the sound of the lightning (thunder) to reach you. Dividing this number by 5 gives you the distance in miles the sound travelled from the lightning stroke.

### Angelo De Ponti



Angelo De Ponti was born in St. Paul, Minnesota, in 1909. He discovered at an early age how to be a successful businessman. When he was 9, he was busy working three jobs. He delivered newspapers and telegrams and lit street lights. In those days, street lights were gas powered and had to be lit every evening. Sometimes Angelo (or Shorty as everyone called him) lit as many as 240 street lights a night.

As a teenager, he worked in a bicycle shop and helped build roads as a construction worker. These jobs taught him the basics of mechanics.

When he was older, he often visited a small airport to watch the planes takeoff. He liked talking with the workers and helping wash the airplanes. Soon the workers began sending him on errands and giving him jobs to do around the airport. Before long, he was spending all of his spare time at the airport sweeping floors, sorting nuts and bolts, and cleaning airplane parts. When he was offered a full time job at the airport, he gladly accepted. He was responsible for getting the planes ready to fly and putting them away at night.

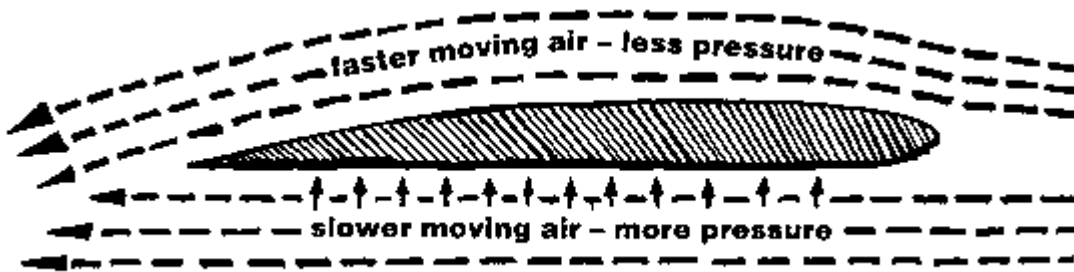


When Angelo was 19 he rented a small space at the airport and started his own business selling airplane parts. His business was so successful that he had to move into a bigger space and hire people to work for him. As his business continued to grow he added more services such as selling fuel and airplanes and offering flying lessons. What had started small was now a huge business. At one time Angelo had 450 people working for him.

As a businessman, Angelo was able to recognize a need and then organize a plan to fill that need. Thanks to his good business sense, many people enjoyed flying to De Ponti aviation where they and their plane were taken care of. Angelo developed a necessary part of aviation that made flying both comfortable and practical. Even though he is retired now, the services he started are still available to pilots and air travelers coming into the Minneapolis and St. Paul airports. The next time you are at an airport, look around at all the services that an airport offers to make air travel run smoothly. Business people like Angelo De Ponti make all of that possible.

## What Makes an Airplane Fly?

One of the things that keeps an airplane up in the sky is air pressure. How does this work? If you look at the end edge of a wing on an airplane, it looks something like this.



As the wing moves through the air, the air pressure on top of the wing becomes less because the air has to travel farther to get over the curved surface of the wing. The bottom side of the wing is flat and does not disturb the normal pressure of the air. So now, the pressure of the air above the wing is less than the air pressing on the bottom of the wing. This allows the wing to stay up. To demonstrate this, try the simple experiment below.

## Air Pressure: A Demonstration



You will need two long strips of paper, any size

Hold the two strips of paper about 2 inches apart, in front of you.

Now blow steadily between the two strips. What do you think will happen? Will the two strips of paper move apart?

How does this work?

When you blow between the strips, you are blowing the air away from between them and this lowers the air pressure at that point. Now the pressure between the strips is lower than the pressure on the outside of the strips so the pieces of paper move together.