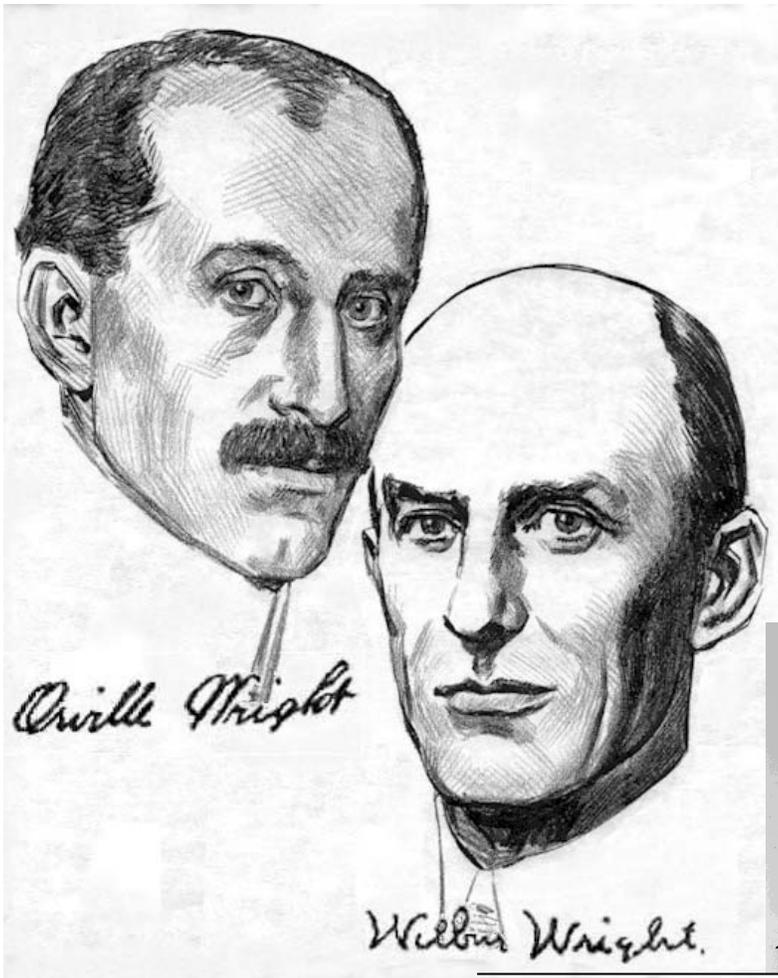
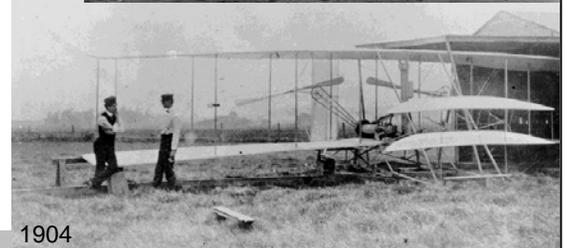
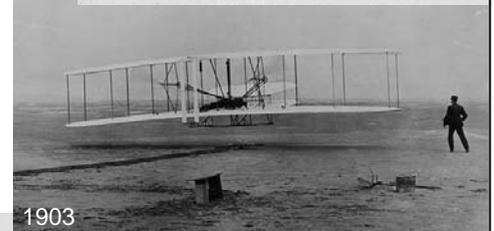
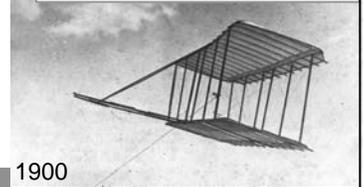
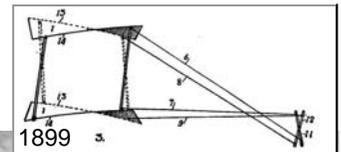


The Birth of Aviation

On December 17, 1903, Orville and Wilbur Wright, two brothers from Dayton, Ohio, made the first sustained, controlled, powered flights from the sands of Kitty Hawk, North Carolina. Although we celebrate this date as the birth of aviation, the actual invention of the airplane was a painstaking and dangerous endeavor that started long before that day and continued long afterwards. To accomplish this task the Wrights built **7 aircraft**, each a little better than the last, and tested them at two locations, Huffman Prairie (near Dayton) and Kitty Hawk. When they finally perfected a practical flying machine, they had made about approximately **2200 gliding flights** and **158 powered flights**. This work had occupied 2093 days in Dayton, 227 in Kitty Hawk, and about 20 days traveling between for a total of **2320 days – over 6 years** between 1899 and 1905!



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1899

"I am convinced that human flight is possible and practical."

– Wilbur Wright to the Smithsonian Institution

Aircraft tested: Model glider, 5-foot wingspan, flown as a kite.

Longest flight: Unknown.

Day 1 – May 30, 1899

Bicycle maker Wilbur Wright tosses his hat into the scientific arena, writing to the Smithsonian Institution for information on mechanical flight and announcing his intention to “add my mite” to the emerging science of aeronautics. He is convinced that piloting an aircraft is a skill that can be learned, just like riding a bicycle. The problem, as he sees it, is control.

Day 16 – June 15, 1899*

While twisting a small cardboard inner tube box, Wilbur discovers a simple method for changing the angle at which the wings of an aircraft meet the wind, enabling a pilot to roll into a turn. This is the beginning of a revolutionary new control system for airplanes.

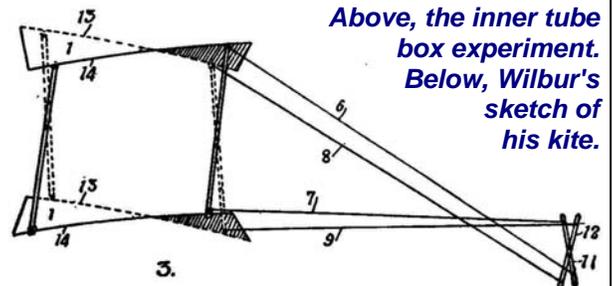
Day 53 – July 21, 1899*

Wilbur builds and flies a “model glider” as a kite. Pulling on the control strings, he twists the wings to test his ideas about aircraft control. The control system works, and Wilbur enlists his brother Orville to help him build a full-size man-carrying glider.

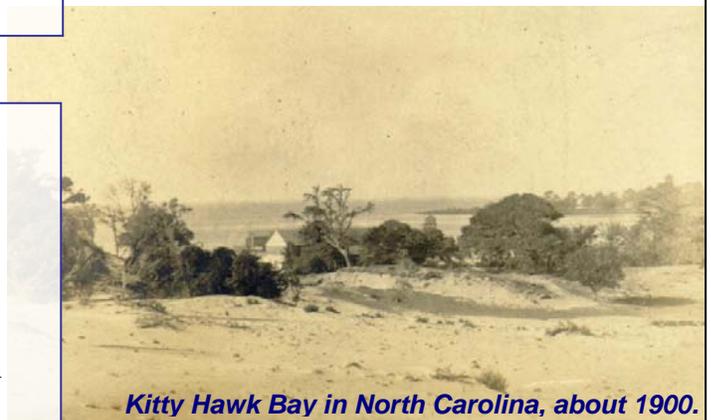
Day 181 – November 27, 1899

Wilbur and Orville determine that to fly their gliders safely, they need a location with high winds to launch them and soft ground to land them. They write the United States Weather Bureau for a list of the windiest places in America. Kitty Hawk, North Carolina is sixth on the list.

Wilbur's letter to the Smithsonian.



Above, the inner tube box experiment. Below, Wilbur's sketch of his kite.



Kitty Hawk Bay in North Carolina, about 1900.

1900

"I have not taken up the flying problem with the expectation of achieving the solution at the present time or possibly any time."

– Wilbur Wright to his father.

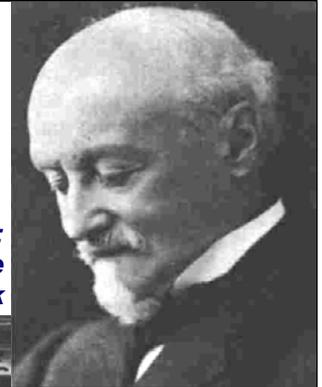
Aircraft tested: Glider, 17-1/2-foot wingspan.

Longest flight: Approximately 200 feet, 15 seconds.

Day 349 – May 13, 1900

Wilbur writes Octave Chanute for advice. Chanute is an accomplished engineer and the co-designer of the "Chanute-Herring Double-Decker," a biplane glider on which the Wrights will base their first aircraft designs. It is the beginning of a prolific correspondence which helps Wilbur to grow as a scientist.

Right:
Octave Chanute



Below:
The Tates at home in the Kitty Hawk



Day 444 – August 16, 1900

Joseph Doshier, superintendent of weather station at Kitty Hawk, and Bill Tate, a country commissioner, invite the Wright brothers to come to North Carolina to conduct their flying experiments. They are the only ones to respond to the letters of inquiry the Wrights sent to windy locations identified by the U.S. Weather Bureau.

The 1900 glider flown as a kite.



Day 472 – September 13, 1900

Wilbur Wright arrives at Kitty Hawk and begins building his first glider in Bill Tate's front yard. Orville arrives two weeks later and the brothers begin to test the glider, flying it as an unmanned kite. They are disappointed because the glider does not produce enough lift to support a man in moderate winds.

Wilbur washes dishes in the sand at Kitty Hawk.



Day 511 – October 22, 1900

Wilbur makes his first free glides in high winds. He won't let Orville fly until he is sure the aircraft is safe. The glides are unspectacular, no more than 200 feet long. But they give the Wrights their first taste of flight.

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1901

“If man ever flies, it will not be within our lifetime, not within a thousand years.” – Wilbur Wright to his brother Orville

Aircraft tested: Glider, 22-foot wingspan.

Longest flight: 389 feet, time unknown.

Day 772 – July 10, 1901

Wilbur and Orville return to Kitty Hawk with a larger glider, hoping the increased wing area will produce more lift. But again their glider falls short of expectations. The Wrights begin to suspect the information that aeronautical scientists have developed to design aircraft – particularly the lift tables – are incorrect.

Day 797 – August 4, 1901

Octave Chanute visits the Wright brothers at Kitty Hawk and watches them fly. Although the Wrights themselves are disappointed with the performance of their new glider, Chanute is enthralled. He is also impressed with the nature and number of their aeronautical experiments.

Day 842 – September 18, 1901

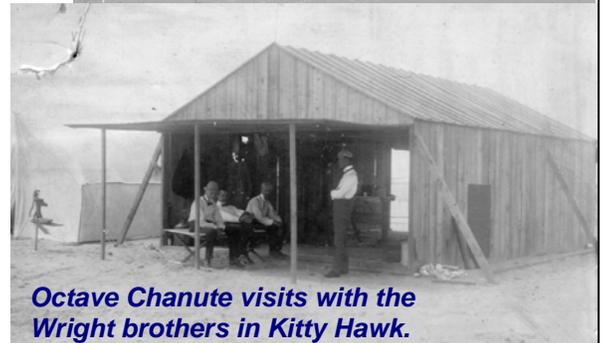
The Wrights arrive back in Dayton feeling like failures and uncertain whether to continue when Chanute invites Wilbur to present a scientific paper to the Western Society of Engineers. His presentation, “Some Aerial Experiments,” arouses much interest particularly when Wilbur challenges the accuracy of the lift tables that other scientists have accepted as gospel.

Days 854 through 946 – October to December, 1901

Having questioned traditional aeronautical wisdom, Orville and Wilbur set out to find the truth. They build a wind tunnel and test 200 wing shapes for lift and drag. In the process, they identify the errors in the accepted information and establish a body of accurate lift data with which to design aircraft.



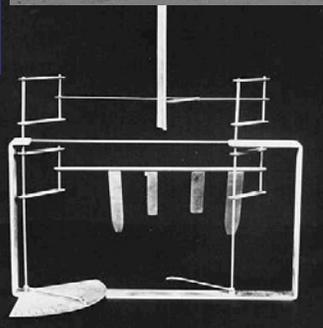
Launching the 1901 Glider.



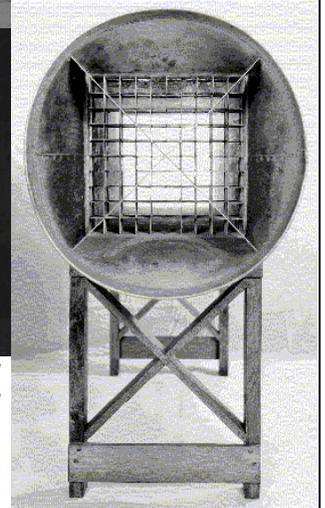
Octave Chanute visits with the Wright brothers in Kitty Hawk.



Wilbur eats a little sand after a hard landing.



The Wright wind tunnel (right) and Lift balance (above).



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1902

“We now hold all the records.” – Orville Wright to his sister Katherine

Aircraft tested: Glider, 32-foot wingspan.

Longest flight: 622 feet, 26 seconds.

Days 1127 through 1183 – June to August, 1902

After the busy season for their bicycle business, Orville and Wilbur begin to build their third glider. This is the first aircraft they have designed using the information from their wind tunnel experiments. It is also the first aircraft since their model glider to have a tail – two fixed vertical surfaces at the rear.

Day 1209 – September 20, 1902

The Wrights begin to fly their new machine at Kitty Hawk. It is an enormous improvement over their previous gliders, providing adequate lift for long glides. However, they still have problems with control. When they turn the glider, sometimes it stalls and dives for the ground, a frightening maneuver the Wrights call “well digging.”

Day 1227 – October 8, 1902

To prevent the glider from well digging, Wilbur and Orville convert the fixed tail to a movable rudder. With wing warping to control roll, an elevator for pitch, and a rudder for yaw, the 1902 Wright Glider is the first aircraft ever with *three-axis control*. The Wrights begin to truly fly, making over 1000 glides – some over 600 feet – before returning home.

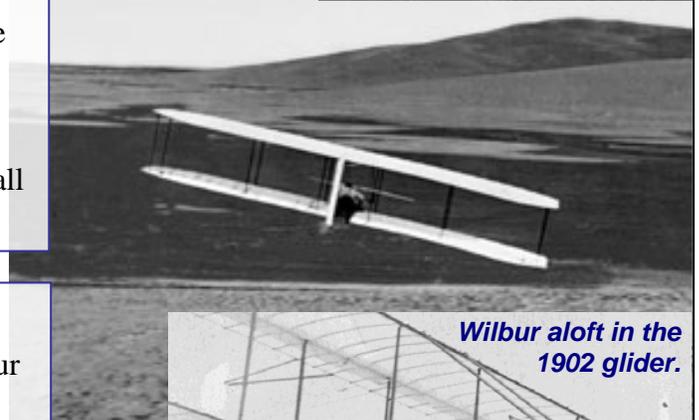
Day 1283 – December 3, 1902

Encouraged by the success of their glider, the Wright brothers decide to build a powered aircraft. They write to ten different manufacturers of gasoline motors, but none can offer a suitable engine for an airplane.

***Kiting the
1902 glider.***



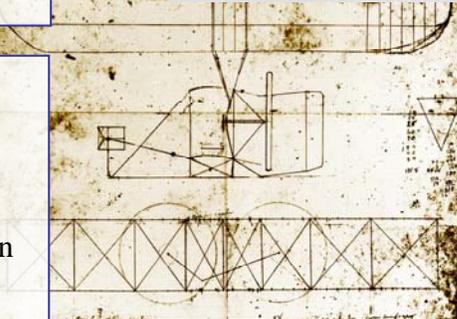
***Orville makes a
controlled turn.***



***Wilbur aloft in the
1902 glider.***



***The Wright
brothers
planned their
first powered
airplane on
wrapping paper.***



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1903

“Success. Four flights...” – Orville Wright in a telegram to his family

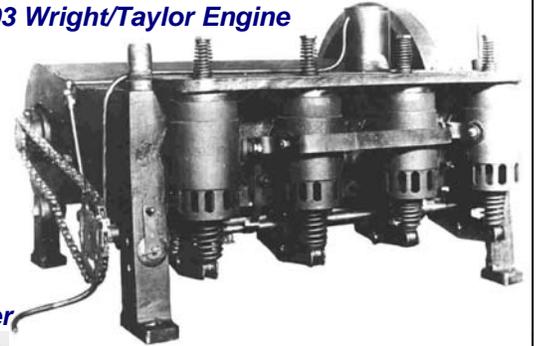
Aircraft tested: Flyer I, 40-foot wingspan, 12 horsepower motor.

Longest flight: 852 feet, 59 seconds.

Days 1312 through 1401 – January to March, 1903

Wilbur and Orville search for information on designing propellers and find nothing. They painstakingly work out their own theory, treating the propeller as a rotary wing and using much of the same information that they had developed for designing efficient aircraft wings.

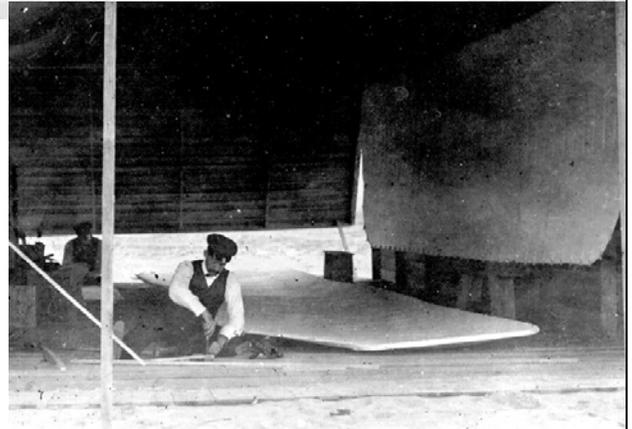
1903 Wright/Taylor Engine



**1903
Wright
Propeller**

Days 1312 through 1462 – January to May, 1903

With the assistance of Charlie Taylor, a machinist in their employ, the Wright brothers design and build a four-cylinder engine. The completed engine weighs about 200 pounds and produces about 12 horsepower – enough to power the airplane with just a little to spare, the Wright figure.



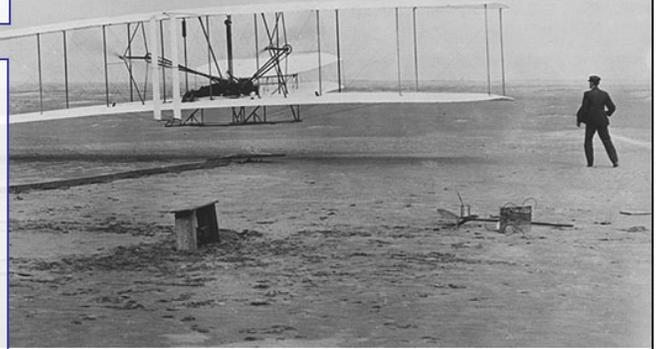
Assembling the 1903 Flyer.

Day 1579 – September 25, 1903

The Wrights arrive back in Kitty Hawk and begin a rigorous routine of flight training and aircraft building. When the winds are up, they fly their 1902 glider to hone their skills as pilots. When they can't fly, they assemble their powered flying machine, the “Flyer.”

Day 1662 – December 17, 1903

In the teeth of a 20 mile-per-hour gale, the Wright brothers make four powered flights, the first sustained and controlled flights ever. The longest lasts 59 seconds and covers 852 feet. Just after the fourth flight, a gust of wind rolls the Flyer over and dashes it to pieces. Wilbur and Orville pack it up and leave for home.



The first flight on December 17.

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1904

"We certainly have been 'Jonahed' this year."

– Wilbur Wright to Octave Chanute

Aircraft tested: Flyer II, 40-foot wingspan, 15-16 horsepower engine.

Longest flight: Approximately 3-1/2 miles, 5 minutes and 4 seconds.

Days 1767 through 1819 – April to May, 1904

Because they were only able to make four flights with their original Flyer, the Wrights feel they haven't adequately tested it. With the help of Charlie Taylor, they build a copy – the Flyer II. They also prepare a field near Dayton called Huffman Prairie in which to fly it.

Orville and Wilbur consult in front of the Huffman Prairie Hangar.



Days 1820 and 1823 – May 23 and 26, 1904

The Wrights attempt to demonstrate the Flyer II for the press. But the weather at Huffman Prairie is hot and the winds calm. The Flyer can't reach sufficient speed to take off. The best the Wrights can manage is a 25-foot hop. The newspaper reporters are kind but unimpressed.

Wilbur looks dejectedly at the result of yet another unsuccessful takeoff.



Day 1927 – September 7, 1904

After a frustrating summer of unsuccessful attempts, the Wrights decide that their engine is not powerful enough to lift the Flyer II into the air without the assistance of a strong wind. They build a simple catapult – a derrick that drops a weight, pulling the Flyer along a track. Almost immediately, they begin flying again.



The Flyer II takes off with the help of a catapult (above) and Wilbur's notebook describing the first circular flight (right).



Day 1939 – September 19, 1904

The Wright brothers fly the first full circle in an airplane, making a complete turn around Huffman Prairie in 1 minute and 35 seconds. Despite this accomplishment, the tests are beginning to show that the Flyer design has problems. Every now and then, they lose control of the elevator, the plane begins to pitch up and down, and they have to land.

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1905

“The series of experiments upon which we have been engaged for the past five years has ended in the production of a flying machine...”

– Wilbur Wright to his congressman

Aircraft tested: Flyer III, 40-foot wingspan, 20 horsepower engine.

Longest flight: 24 miles, 39 minutes.

Day 2247 – July 14, 1905

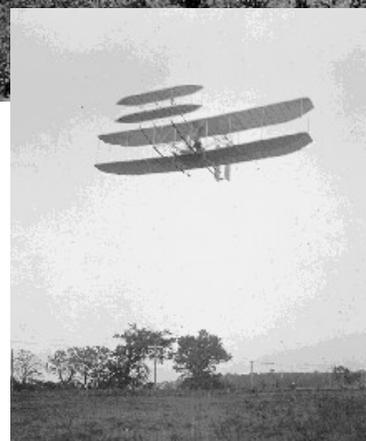
The Wrights build a third aircraft, the Flyer III, but on its first flight Orville loses control of the elevator. The Flyer pitches up and down violently, crashing nose first into the ground. Orville is not badly hurt, but nonetheless the Wrights realize the accident could easily have been fatal. They decide to redesign and rebuild the aircraft.



Days 2278 through 2291 – August 24 to September 6, 1905

The first test flights of the rebuilt Flyer III show the elevator problem has been solved, but a rudder problem appears making the aircraft difficult to turn. Carefully, the Wrights work out the problem, enlarging the rudder and changing its pivot point.

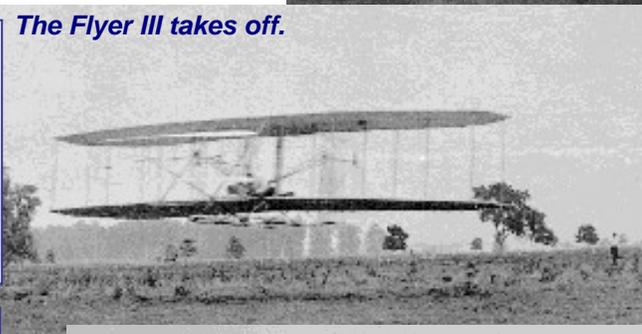
The Flyer III on the launching rail (above) and in the air over Huffman Prairie (right).



Day 2311 – September 26, 1905

With most of the bugs ironed out, the Wrights teach themselves how to fly a powered aircraft. In a few weeks, they have honed their piloting skills to where they can keep the airplane aloft indefinitely, landing only when out of gas.

The Flyer III takes off.



Days 2319 and 2320 – October 4 and 5, 1905

Once again, the Wrights invite the public to Huffman Prairie to watch them fly. On the second day, the Flyer III flies for 39 minutes covering 24 miles in about 30 rounds of the field. It is the world's first practical airplane, capable of taking off, navigating to a given destination, and “landing without wrecking,” as Wilbur explains it.

Wilbur flying the Flyer III on October 4, 1905.



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