Testing the Military Flyer at Fort Myer, 1908-1909

David R. Chenoweth
Air Force History and Museums Program

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Prologue

Following their successful flights in 1903 at Kitty Hawk, North Carolina, the Wright brothers found an area near Dayton -- Huffman Prairie -- where they could continue their experimentation and development closer to their home. By the end of 1904, they began to think that their machines might have practical applications and began to make attempts to sell their machines and their knowledge. Nothing came of these attempts, and they continued experimenting for another year. However, because they did not yet have a patent to protect them, they earlier had decided not to fly exhibitions or demonstrations, wanting to wait until they had a firm contract. Thus, in late 1905, they put their machines away, not to fly again until 1908, and began to search seriously for buyers. Even after the patent was granted in 1906, they preferred not to fly publicly lest their unique wing-warping control system be seen and used by others.

In December 1907, the U.S. Army issued Signal Corps Specification Number 486, an advertisement for a heavier-than-air flying machine that had to be supported entirely by the dynamic reaction with the atmosphere, a machine that had to be sufficiently simple for an intelligent person to learn its operation in a reasonable amount of time. The machine had to carry two people, remain in the air for an hour, carry sufficient fuel to fly 125 miles, and had to average 40 miles an hour in a speed test. It was also desirable that the machine could be transported on Army wagons. 1

Successful in their response to this advertisement, the Wright Brothers signed a contract with the federal government in February 1908 that required delivery of a flying machine to Fort Myer, Virginia, within 200 days. Following delivery, they had an additional 30 days to demonstrate that the machine complied with all specifications. At about the same time, they signed another contract to provide aircraft to the French. 2

The Wrights' previous machines carried only a single person, who lay prone in a cradle that moved left and right on the lower wing. Cables connected the cradle to the wings, and by moving the cradle, the pilot changed the shape of the wings, allowing him to control the machine.
and the flight. The machine built for the Army carried two people, who sat upright on the lower wing, and the controls were moved to three levers placed alongside the seat, one on the pilot's left and two on the right. The lever on the left moved the front horizontal surfaces, controlling vertical movement, and the two on right controlled the wing warping and the rear rudder. The machine had a single unmovable vertical vane in front for stability.

Since they had not flown for over two years, Wilbur and Orville returned to North Carolina in April 1908 to gain experience with the new control system. Despite mechanical problems and bad weather, they managed to get a few flights in, including their first flights with a passenger. On May 17, Wilbur left Kitty Hawk for Europe to perform demonstration flights for the French contract. Shortly after, Orville returned to Dayton, stopping first in Washington to inspect the Fort Myer parade ground, where the flying tests for the Army would be made.³

Fort Myer today is a small, crescent-shaped area west of Arlington National Cemetery, which is directly across the Potomac River from the Lincoln Memorial in Washington, D.C. Many of the older buildings on Fort Myer were built between 1895 and 1908 and appear in photographs taken during the tests in 1908 and 1909. The large building in the background of some of the photographs was the Fort Myer hospital, but is now the post headquarters. A low stone wall that still separates the cemetery and Fort Myer on the west side of the cemetery can also be seen in photographs taken of the tests.

The cemetery and the fort are both on land that originally was part of the Custis estate, the home of George Washington Parke Custis, the grandson of George Washington. In 1861, during the Civil War, the federal government improperly seized the land for military purposes. The government later bought the land at auction when Custis' granddaughter, the wife of Confederate general Robert E. Lee, was unable to appear in person to pay taxes. Soon after the seizure, a fortification to protect Washington was established on the site where Fort Myer is now. In 1900, the Army collected all its balloon assets at Fort Myer; but in 1908, it was a cavalry post, and the tests took place on the post's parade ground.⁴

Fort Myer, 1908

Orville and the crated aircraft arrived at Fort Myer on August 20; the engines got there on August 25. The machine was initially housed in a large balloon tent while a wooden hangar near the parade ground was completed, and the Army provided a ground crew to assist Orville. The machine was ready for flight on September 2, after problems with the engine were solved. It was first transported to the parade ground on a wagon to satisfy that portion of the Army's specifications.⁵

In appearance, the machine resembled the Wrights' 1903 Flyer, but was longer, heavier, had a broader wing span, and had a more powerful engine. Like the 1903 machine, it had two propellers behind the wings that rotated in opposite directions to cancel the torque generated by a single propeller. It had no landing gear, but used skids to enable it to land on any type of ground surface. For take offs, the Wrights had devised a launch system that used a heavy weight suspended under a derrick. The weight was connected to a cable that ran through pulleys from the top to the bottom of the derrick, to the end of the launch rail, then back to the frame of the machine. When the weight was released, the cable pulled the machine down the rail into the air. A hub from a bicycle wheel mounted on the machine's front crosspiece rolled
on the rail, while the rear of the machine rested on a small carriage with more hubs that rode on
the rail. This carriage was not connected to the machine, but fell off the rail as the machine
lifted into the air. This launch system was first used in 1904 at Huffman Prairie, but in 1908, it
satisfied a requirement of the specifications that the machine be capable of flying from any
terrain encountered by the Army. 6

Since the machine had no landing gear, large wheels were placed under the wings to move it
from the hangar. The machine was rolled out to the derrick and placed on the rail. The weight
was cranked up and secured, the cable was connected to the front of the machine, and the pilot
released the weight to launch the aircraft.

A board of Army officers that had just approved the tests of a dirigible were still at Fort Myer
to monitor Orville's flights and make sure the aircraft met all the Army's specifications. Among
others, the officers included Major George S. Squier, the board president; Lieutenant Frank
Lahm, who had raced in and won balloon races; Lieutenant Benjamin Foulois, who had been
placed on the board because of a thesis on dirigibles and airplanes he had written at the Signal
Corps School; and Lieutenant Thomas Selfridge, who was a member of Alexander Graham
Bell's Aerial Experiment Association. Squier, Foulois, and Lahm reached general officer rank;
Squier and Foulois ultimately headed the Army's air arm, Squier as Chief Signal Officer and
Foulois as Chief of the Air Corps. Selfridge was one of the Army's most experienced aviators:
he had designed and flown aircraft for the Aerial Experiment Association and he had been one
of the pilots taught to operate the Army's new dirigible. 7

Orville was very cautious; he began with very short flights, gradually increasing the time in the
air and he would not fly when wind speed was more than a few miles an hour. The first flight
on Thursday, September 3, lasted only a little longer than a minute, and the second, on the 4th,
was just over four minutes long. The wind was too strong for flying on the 5th, and as Orville
and Wilbur would do no work on Sunday, no flying took place on the 6th. On Monday, Orville
flew for less than a minute; but on Tuesday, September 8, he made two flights: the first lasted
over eleven minutes, the second, seven minutes and thirty-four seconds. Both flights could
have lasted longer: he ended the first to come down for goggles; the second ended because of
darkness.

These short flights were merely a prelude for the flights that were to come. Over the next four
days, Orville made increasingly longer flights, the longest on Saturday, September 12, when he
flew for over an hour and fourteen minutes. He took passengers up twice, Lieutenant Lahm on
the 9th for six minutes and Major Squier on the 12th, when they stayed up for over nine
minutes. On the 10th, he reached two hundred feet, the highest altitude an airplane had flown.
During one of the flights, Orville twice flew in a figure 8 pattern over the field, demonstrating
the capability of the machine and his control of it. 8

Orville was not the only person flying at this time. In an extraordinary set of circumstances,
Wilbur had just begun to demonstrate an aircraft in France, and the brothers were almost in
direct competition with each other for record flights. Other people were flying experimental
aircraft in Europe, and the Aerial Experiment Association was experimenting in the United
States. However, the Wrights' wing warping system gave them control of their aircraft not
possible with other aircraft. With their control, they could bank and turn in tight circles, while
the others could only make wide skidding turns, and the Wrights' machines were able to fly
farther, higher, and longer. 9

The flying at Fort Myer attracted larger and larger crowds, including President Taft, members
of his cabinet, and observers from the military of several countries. Also present were
competitors of the Wright brothers, especially Alexander Graham Bell and Glenn Curtiss of the
Aerial Experiment Association.

There had been no flying for four days. Sunday was the 13th, with no flying. On Monday, Orville overhauled the engine, and the wind was too strong on Tuesday and Wednesday. On Thursday, September 17, because Lieutenant Selfridge and Lieutenant Foulois were going to St. Joseph, Missouri, to exhibit the Army's new dirigible, Orville took Selfridge up as a passenger.11

On the fourth circle of the field, part of one of the propellers flew off, Orville lost control, and the aircraft crashed. Selfridge died as a result of the crash, and Orville was badly injured, suffering a broken leg, broken ribs, and back injuries that bothered him the rest of his life. He spent seven weeks in the Fort Myer hospital, not returning to Dayton until November 1. The Wrights requested and received an extension to their contract.12

The cause of the accident was determined to be the propellers. One had split during the flight, causing vibration. Orville later related that he felt the vibration and decided to stop the engine. A few seconds later he felt two large jolts, followed by severe shaking. The vibration had caused the propeller to come loose, and it hit the supports for the rear rudder, breaking the propeller and causing the rudder to collapse. The combination of one broken propeller and the inoperative rudder made the machine uncontrollable.13

While Orville recuperated, Wilbur continued to fly in France, establishing height and endurance records. In January, when he was finally able to travel, Orville joined Wilbur in Europe. They returned to Dayton in May to prepare a new machine for the postponed tests, but first tested the propellers to determine what had caused them to split. Though they had earlier tested the propellers, which they had designed and made, they had done so statically by placing weights on the blades equal to the force they estimated the propellers would generate. This time they tested them dynamically by spinning the propellers with an engine. They discovered that the blades were too thin, which allowed them to flatten out and split under the pressure of spinning. They made new thicker blades to prevent the splitting and reinforced the propeller mounts to prevent a blade from striking the rudder supports.14

Fort Myer, 1909

Orville and Wilbur built a new machine for the 1909 tests with slightly smaller wings to increase its speed. It was higher off the ground, and the skids were turned up more in the front. The machine arrived in Washington on June 18, and Orville, with Wilbur accompanying him, got to Fort Myer on the 20th. They completed assembly of the machine by Thursday, June 24, and tested the engine on Friday and Saturday. They erected the launching derrick on Saturday, leading to expectations of flights on Monday, June 28.15

As in 1908, the flights in 1909 started slowly. High winds prevented flying on Monday, disappointing the huge crowd that had gathered. On Tuesday, June 29, Orville made four very short flights, all under a minute, because of engine problems, and flew only one short flight on Wednesday. On Thursday, July 1, Orville made three flights, with the longest lasting only about nine minutes. The engine quit in the middle of a flight on the 2nd, and Orville crashed again, hitting a tree behind the hangar. Structural damage to the frame was not severe, but the fabric covering the wing was badly torn, and Orville went back to Dayton for another one.

He returned on July 7 and again began making short flights, the first on the 12th, with others on the 13th and 17th. He made two flights of about a half-hour each on the 19th and made a flight of an hour and twenty minutes on the 20th, exceeding the length of the longest flight he made in 1908 before the September crash. Between the 21st and 26th, he made several flights, none
longer than 20 minutes.\textsuperscript{16}

Sometime after the crash on July 2, the Wrights changed their controls. Photographs taken of the machine on July 2 show three levers and a single front vertical vane like the 1908 machine, while photographs taken later in July show two levers, the right lever with a top portion that could be moved left or right, and two vertical vanes between the front vertical surfaces.

On July 27, in the first official flying test for the Army, Orville took Lieutenant Lahm up as a passenger. The flight lasted for one hour, twelve minutes, and thirty-seven seconds, satisfying the Army's requirement for a one-hour flight with a passenger. The final requirement was the speed test, in which the machine had to average forty miles an hour with a passenger for the Wrights to receive full payment for their machine. The contract listed a range of prices for the aircraft based on the speed attained in the speed test. For every mile an hour under forty, ten percent of the bid price would be deducted, and for every mile an hour over forty, ten percent would be added. However, if the speed was less than thirty-six, the machine was unacceptable.\textsuperscript{17}

The course that had been chosen was from Fort Myer to Shuter's Hill in Alexandria, Virginia, and back, a distance of ten miles. A balloon was anchored at the five-mile mark for the machine to circle, but the time required to turn around the balloon did not count against the speed. Orville selected Lieutenant Foulois to accompany him, partly because of his flying experience in the dirigible and his navigation skills, but also because of his small size. Everything was ready on July 28, but wind and rain on both the 28th and 29th held the test up until July 30.\textsuperscript{18}

Lieutenant Foulois carried two stop watches to record the times going and returning, as well as a map, a compass, and a barometer. Orville circled the field twice to gain altitude, then headed south for Alexandria. Two members of the board had gone to Alexandria to record the times when Orville and Foulois passed the mark and when they started back; other members of the board recorded times at Fort Myer. Foulois started one watch as they passed the mark at Fort Myer, stopping it at Alexandria, then started the other as they passed the balloon after the turn, stopping it as they crossed over Fort Myer.\textsuperscript{19}

The board averaged all the times recorded by the various members. The official speed for the trip to Alexandria was 37.735 miles per hour, that for the return trip was 47.431, an average of 42.583 miles per hour. With a speed of two miles per hour faster than the required 40, the Army purchased the Wright Brothers machine for $30,000.\textsuperscript{20}

The contract required the Wright bothers to instruct two people in the operation of the machine. Because the parade ground at Fort Myer was small and surrounded by trees, and because the post commander thought the flights were interfering with his drilling, another location was needed. Lieutenant Lahm located an acceptable area at College Park, Maryland, just north of Washington. Here the Army built its first air field and the Wrights conducted their first training.\textsuperscript{21}

A short summary of the Wright brothers flights at Fort Myer could read "Crashed in 1908; flew in 1909." This summary, while true, is not totally correct, even though the flights in 1908 did not complete the trials for the Army's contract. The Wrights' flights in 1908, both in the United States and Europe, stunned observers. During the five years after the Wright brothers first flight in 1903, others had flown, mostly unsuccessfully. Some had been able to make short straight flights, others had made awkward wide turns, but none exhibited the Wright's ability to make tight circles and figure 8s. Following the 1908 accident, Major George Squier, the president of the board, said that no one could doubt that the problems of flight had been solved.
and that the Wrights' place in history was assured. Nevertheless, both the Wrights and the Army benefitted from the extension to the contract. The aircraft delivered in 1909 had a different control system and a shorter span than the 1908 machine and was superior in both control and speed. Thus, the Army got a safer machine that was easier to control, and the Wrights had a faster machine that got them a higher purchase price.22

Notes


13. Chandler and Lahm, p 154; Foulois, p 57; McFarland, pp 936-938, 953-954.


15. Hennessy, p 33; McFarland, pp 956-957, 1193-1196.


22. Foulois, p 57.