

The 100th Anniversary of Flight

**THE LOGBOOK OF
SIGNAL CORPS NO. 1
The U.S. Army's First Airplane**

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2d Lt. Benjamin D. Foulois, c. 1906

INTRODUCTION

In December 1909, 1st Lt. Benjamin D. Foulois was summoned into the office of Brig. Gen. James Allen, Chief Signal Officer of the U.S. Army, who told the officer that he was to become the sole flyer of the newly acquired Wright military airplane, designated “Signal Corps No. 1.” Foulois was to report to Fort Sam Houston, Texas, in order to assess the aircraft’s military possibilities. “Take plenty of spare parts, and teach yourself to fly” was the heartening command given to the young lieutenant.¹ Foulois had minimal exposure to heavier-than-air mechanical flight and had yet to fly solo. In the early days of flight, every attempt to leave the ground held the possibility of disaster. Unpredictable mechanical failure or dangerous weather conditions were constant threats. Admirably, Foulois not only survived the assignment but also developed his skills as a pilot, introduced modifications to the aircraft, and established many new procedures along the way.

A product of the “Good Old Horse and Buggy Days”² rather than the age of aviation, Benjamin “Benny” Foulois was a man of great ambition and strong personality. Foulois would later be described by the *San Antonio Light* as “one of the smallest men in the Army. He is five feet five inches in height and weighs only 135 pounds.”³ The self-described “Juvenile Delinquent”⁴ joined the Army as an enlisted man in 1898, using his brother’s birth certificate to pad his age, but he quickly became disenchanted with Army life. Avoiding with “rum,...quinine, self-discipline, and luck” the diseases that felled most of his fellow soldiers in Puerto Rico, Benny returned home. After mustering out of the service, he quickly grew restless and enlisted, this time under his own name, as a regular in the Army.⁵

Foulois was commissioned a second lieutenant on February 2, 1901. Always conscious of his ground-level entry into the Army, Foulois resented the treatment of enlisted men as “second-class citizens” and often blamed his career woes on this distinction.⁶ In August 1905, Foulois headed to Fort Leavenworth, Kansas, to attend Infantry and Cavalry school. He eventually transferred to the Signal Corps school to pursue his interests in technology. His thesis, “The Tactical and Strategical Value of Dirigible Balloons and Aerody-

1. Benjamin D. Foulois with C. V. Glines, *From the Wright Brothers to the Astronauts: The Memoirs of Major General Benjamin D. Foulois* (New York: McGraw-Hill, 1968), p. 70.

2. File: Notes, Undated, Box 60, Benjamin D. Foulois Papers, Library of Congress, Washington, D.C., hereafter cited as Foulois Papers.

3. File: *San Antonio Light* Articles, Box 25, Foulois Papers.

4. File: Notes, Undated, Box 60, Foulois Papers.

5. Foulois, *From the Wright Brothers to the Astronauts*, pp. 12–15.

6. File: Notes, Undated, Box 60, Foulois Papers.

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namical Flying Machines” written in 1906, led to an assignment with the Office of the Chief Signal Officer, aligning Foulois’s career with the newly established Aeronautical Division.⁷

As a member of the board of officers selected to observe the acceptance trials for the U.S. Army’s first dirigible and airplane, Foulois was present at



Lt. Benjamin D. Foulois and Orville Wright during the airplane tests at Fort Myer, Virginia, in 1908

Fort Myer, Virginia, in 1908 and 1909. Earning Orville and Wilbur Wright’s rare stamp of approval, Foulois gained mechanical experience while assisting the brothers with the machine. He made his first flight on July 30, 1909, as Orville’s passenger during the final test of the airplane.⁸ Benny marveled at the ability of “such a contraption of cloth, wires, pulleys, chains, and wood” to fly.⁹ But fly it did. “Signal Corps Specification No. 486” required the plane to carry at least two people, have a range of 125 miles, achieve a minimum speed of 40 miles per hour, and remain in the air for one hour.¹⁰ Upon meeting these requirements, Signal Corps No. 1 was purchased for \$30,000 and officially

accepted on August 2, 1909, into the U.S. Army inventory.

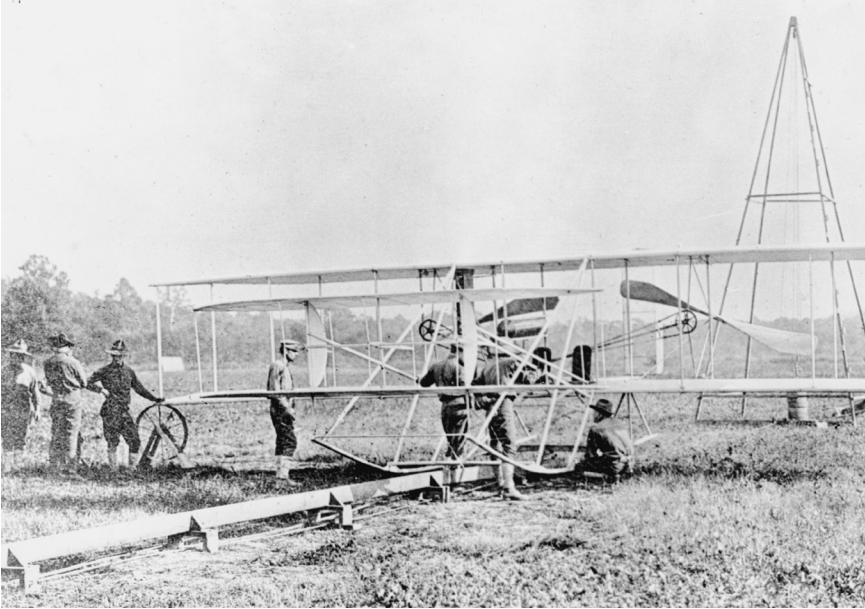
All the plane lacked was a pilot. The contract with the Wright brothers specified that they train two men, and Foulois was originally selected to be one of them. A temporary assignment in France, however, intervened, and instead Wilbur Wright trained Lts. Frederic E. Humphreys and Frank Lahm at College Park, Maryland, in the fall of 1909. When Foulois joined them in late October, he received 54 minutes of instruction with Wilbur and flew for two hours as Lt. Humphreys’s passenger. The Army’s first flying season came to a close on

7. Foulois, *From the Wright Brothers to the Astronauts*, pp. 43–48.

8. *Ibid.*, pp. 62–63.

9. *Ibid.*, p. 52.

10. Charles deForest Chandler and Frank P. Lahm, *How Our Army Grew Wings* (New York: Ronald Press, 1943), App. 6: “Signal Corps Specification No. 486: Advertisement and Specification for a Heavier-Than-Air Flying Machine.”



Signal Corps No. 1 in its original configuration at College Park, Maryland, in October 1909.

November 5 when Humphreys and Lahm crashed the airplane, ending for the time Foulois's opportunity to solo. Shortly thereafter, Humphreys and Lahm returned to their original branches of service, leaving Foulois the sole pilot (albeit an undertrained one) available to fly the U.S. Army's only airplane.

After the November 5 crash, General Allen decided to move the aircraft to a warmer locale, more conducive to flight. Perched on the wing of the plane, pilots were completely exposed to the elements, making flight in bad weather a physical hardship.¹¹ Flying in the cold and wind was more than uncomfortable. The flimsy aircraft of the day were no match for harsh weather, explaining the well-known fact that the Wright brothers refused to fly under less than ideal conditions.¹² Flying in Texas promised to solve the weather problem. The *San Antonio Light* reported that the lieutenant "spoke of the climatic conditions existing here, saying that it seemed to him almost ideal for winter work with the aeroplane."¹³

Eager to begin, Lieutenant Foulois arrived at Fort Sam Houston with a \$150 maintenance fund, eight enlisted men, and one airplane. "My two major objectives," Foulois later wrote, "were to learn the secrets of flight with a minimum of damage to me and the machine (in that order), and experiment with

11. Rebecca Hancock Cameron, *Training to Fly: Military Flight Training, 1907-1945* (Washington, D.C.: Air Force History & Museums Program, 1999), p. 22.

12. Tom Crouch, *The Bishop's Boys* (New York: W.W. Norton, 1989), p. 398.

13. File: *San Antonio Light* Articles, Box 25, Foulois Papers.

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the airplane design, the engine, and its fuel and oil systems for use in making future airplane and engine specifications.”¹⁴ Fortunately, Foulois’s “little combat Air Force”¹⁵ maintained a detailed logbook, tracing his progress.

Foulois first had to face the challenge of teaching himself to fly. As noted above, he had some experience but had never soloed. “Old Number 1” was a pusher aircraft, meaning it was pushed rather than pulled by two rearward-facing propellers. Hampered by a lack of instruments, a fairly small (25 to 30 horsepower) engine, and an unnatural control system, it was not an easy machine to fly.¹⁶ The controls consisted of two sticks: one controlled the elevator; the other operated wing warping and the rudder. Topping it all off was a foot pedal with which to regulate engine speed. The control system, though not too complex, was hardly an instinctive system. Flying the old girl thus required a great deal of coordination.

In contrast, instrumentation was depressingly simple. Old Number 1’s only instrument was “a piece of string about eight inches long with a weight attached to the horizontal crossbar between the front ends of the two skids.”¹⁷ This string monitored sudden changes at speed and served as a curve indicator as well as a stall predictor. Stalling, or falling out of the sky because of a loss of forward momentum, was not yet fully understood in 1910 and given the utter lack of safety equipment, was greatly feared by all aviators.

Staying in the air was challenging enough, but taking off and landing commanded even greater fear. A catapult was required to propel the machine down a monorail, for it had no wheels.¹⁸ This system was both logistically and technically impractical, potentially causing the pilot to become stranded when landing, if able to take off at all.

As might be expected, landing was “the most difficult task to accomplish.”¹⁹ The pilot had to cruise slowly above the ground with a dead motor until the skids made contact. Foulois was especially concerned about teaching himself this process, something he had never done alone. In a whopping understatement, he later admitted that he had some “misgivings” while in the air on his first flight.²⁰ Apparently, this concern and the lack of proper instruction led Foulois to be “ground shy,” to level off too high during landing.²¹ His tendency may explain some of the many repairs needed to keep Signal Corps No. 1 flying.

14. Foulois, *From the Wright Brothers to the Astronauts*, p. 75.

15. File: Notes, Undated, Box 60, Foulois Papers.

16. Cameron, *Training to Fly*, p. 27.

17. Foulois, *From the Wright Brothers to the Astronauts*, p. 60.

18. See footnote 45 attached to the February 26, 1910, entry in the daily log for a further explanation of the tower and track setup, as well as the August 18, 1910, entry on page 28 of the daily log regarding the addition of wheels and simplification of this process.

19. Cameron, *Training to Fly*, p. 24.

20. Foulois, *From the Wright Brothers to the Astronauts*, p. 4.

21. Chandler and Lahm, *How Our Army Grew Wings*, p. 188. Also see Foulois’s marginal note to the September 8, 1910, entry in the daily log referring to Chandler and

The Texas winds exacerbated the problems caused by mechanical intricacies. Although Foulois had originally spoken highly of the conditions at Fort Sam Houston, by May he was blaming the weather for delaying flight opportunities. He wrote to the Chief Signal Officer, “Throughout the last two months the winds have been very changeable and unreliable, varying at times from 5 to 30 miles per hour in less than 15 minutes. This condition of weather has made it extremely difficult to accomplish much.”²² High winds presented several challenges to early aviators. Engines were not yet powerful enough to manage flight in such conditions. “Changeable” winds made flight logistically impossible because the tower and track setup would have to be moved to point into the wind. Foulois’s concerns about the Texas air extended beyond griping over the wind, however. He believed that the machine inexplicably struggled in Texas with maneuvers it had easily accomplished at College Park. Baffled, he wrote to General Allen that “the machine, with its engine operating at the *same number* of revolutions per minute is not capable of carrying the same weight in this section of the country.”²³

Foulois claimed that he succeeded at the daunting task of teaching himself to fly through correspondence with the Wright Brothers, even calling himself “the first, and only, pilot in history to learn to fly by mail.”²⁴ While few letters are available at the Library of Congress (possibly explained by the claim in the record of flights that the 1910–1911 correspondence was lost), the letters from the Wrights that do exist would have been invaluable to Foulois.²⁵ Topics addressed issues such as engine trouble, new developments, and the purchasing of more parts or airplanes. Even if the Wrights couldn’t provide answers, they were usually willing to offer support or share news of their recent innovations. Sometimes the support extended beyond the purely mechanical. One of the Wrights (the letter is unsigned) thought it was “rather cheeky” for the generally unsupportive Army to consider sending Foulois to the Mexican border in early 1911, scoffing, “It seems to me that the object is to chase appropriations from Congress rather than filibusterers in Texas...”²⁶ However, no amount of correspondence or support changed the fact that Foulois was still on his own.

Nonetheless, Foulois succeeded admirably. Although he “crashed frequently,” he was injured only once when he was pinned to the ground by a

Lahm’s ground-shy comment.

22. Monthly Activity Report to the Chief Signal Officer from Aero. Detach., May 3, 1910, File: Monthly Activity Reports, Box 25, Foulois Papers.

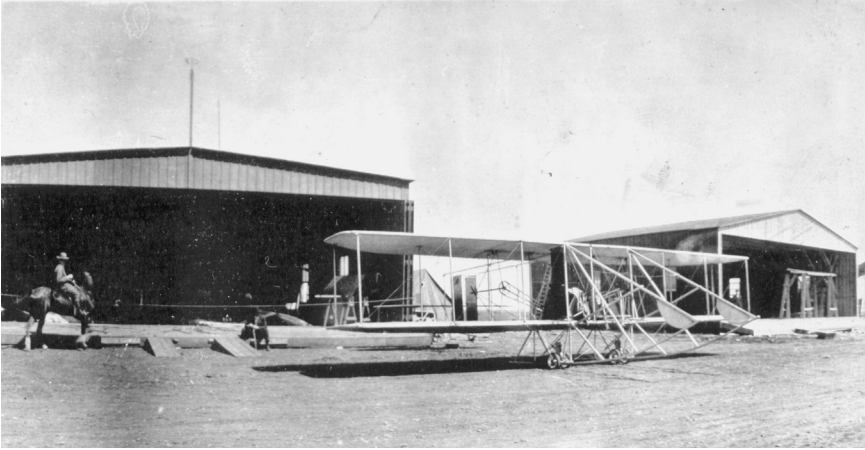
23. *Ibid.* Fort Myer, Virginia, next to Arlington Cemetery, was the location of the Army trials for purchasing the aircraft, and College Park, Maryland, northeast of Washington, D.C., was the location used for training the first Army aviators and the future site of the first Signal Corps Aviation School.

24. Foulois, *From the Wright Brothers to the Astronauts*, p. 75.

25. See Roger G. Miller, “‘Kept Alive By The Postman’: The Wright Brothers and 1st Lt. Benjamin D. Foulois at Fort Sam Houston in 1910,” *Air Power History* (Winter 2002), pp. 32–45, for a discussion of the extent and content of this correspondence.

26 Letter to Benjamin Foulois, February 10, 1911, File: General Correspondence,

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Signal Corps No. 1 in its final configuration. Note the three front braces to each skid, in contrast to two on the Wright Model B, facing page. The elevators have been removed entirely from the front of this aircraft, which retains the small dual wheels attached to each skid.

truss wire.²⁷ As evidenced by the log, Foulois was hampered by accidents, the constant need for repairs, and bad weather. He later wrote, “The combination of my limited experience in landing with a dead engine...the bad bucking habits of No. 1 in gusty winds, and forced landings because of the erratic temperament of the engine, kept the machine in the shop more days than it was out.”²⁸ Only 30 days from March through October 1910 presented conditions favorable for Foulois to fly the machine. As expected, the \$150 maintenance fund that Foulois had been allotted disappeared quickly, leaving him to spend close to \$300 of his own money to keep Old Number 1 flying.²⁹ By the end of 1910, a “face-lifting operation” was necessary to revitalize the machine, and that included adding many modifications that would be introduced in the new Wright Model B.³⁰ Despite this effort, however, the old girl was finally retired in April 1911, to be replaced by a Wright Model B. The Wright Brothers restored Signal Corps No. 1 to its original condition, and the U.S. Army then donated the historic machine to the Smithsonian Institution, where it now resides.³¹

While the physical obstacles Foulois faced were great, bureaucratic difficulties proved most irritating. For example, he blamed his detachment’s assignment to Leon Springs during June and July 1910 on the Signal Corps’

Benjamin Delahauf Foulois, 1910–1911, Box 10, Wright Papers, Library of Congress.

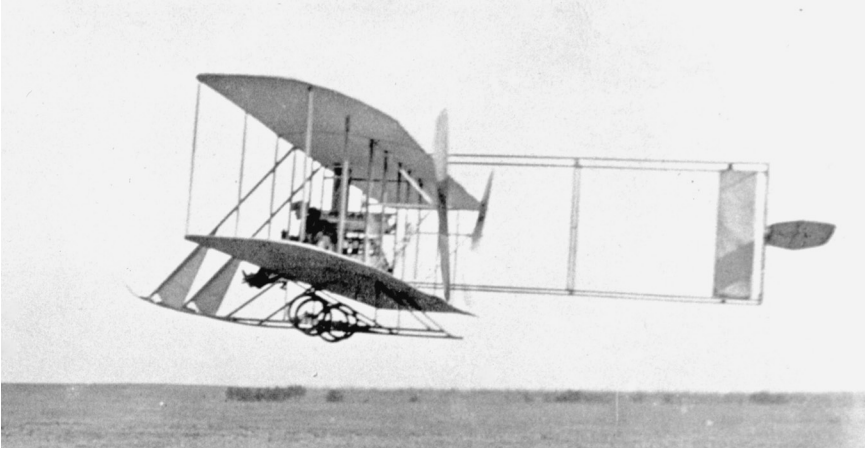
27. Foulois, *From the Wright Brothers to the Astronauts*, p. 5.

28. *Ibid.*, pp. 74–75.

29. *Ibid.*, p. 5.

30. *Ibid.*, p. 79.

31. Crouch, *The Bishop’s Boys*, p. 446.



The Wright Model B, flown by Foulois and Phillip O. Parmalee

displeasure with publicity over his flying.³² Also frustrating was the lack of congressional support. Congress repeatedly denied General Allen's requests for funding, preventing the United States from keeping pace with the rest of the world in aviation development. This failure was particularly distressing because, from Foulois's viewpoint, it indicated a lack of faith in the future of aviation. Observing the U.S. space program during the 1960s, Foulois enviously marveled at the change in perspective, saying, "What a different reception today to American Space Men, as compared with the reception accorded the Wright Brothers and those of us associated with them in 1905–1909!"³³

The "Logbook of Signal Corps No. 1," located in Box 25 of the Benjamin D. Foulois Papers in the Library of Congress in Washington, D.C., demonstrates not only Foulois's attempt to succeed at teaching himself to fly, but also to make legislators and Army men alike recognize the necessity of building up American aviation. The leather book, adorned sparsely with a piece of tape proclaiming "Log — Airplane No. 1 (Feb. 3, 1910–July 22, 1911) (Fort Sam Houston and Maneuver Division) Texas" consists of three main sections. The handwritten document opens with the flight diary (hereafter referred to as the daily log) that contains a brief description of the day's events and accomplishments. Spanning pages 5–27 of the logbook, the day-by-day format of the daily log ends after the October 10, 1910, notation, when the format of the entries becomes Foulois's later recollections on how the remaining time through July 1911 was spent.

After the abrupt end of the daily log, a large number of blank pages follow until, on page 73, a second section containing propeller information begins. As evidence of the detachment's dedication to precision, every new set of propellers was tested for efficiency, and the results were duly recorded.

32. Foulois, *From the Wright Brothers to the Astronauts*, pp. 75–76.

33. File: Notes, Undated, Box 60, Foulois Papers.

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A detailed record of the individual flights follows this propeller test data. Unlike the daily log, the record of flights section states specifically that Lieutenant Foulois is the author. This section includes much of the same information as was contained in the daily log, but it is presented in much greater detail. Its placement at the back of the logbook, several pages removed from the end of the diary, indicates that it was written after completion of the diary.

While Foulois's hand can be seen in the diary, namely in terms of editing the language of the entries as he reviewed them for accuracy, Benny did not write the journal himself. He most likely assigned that task to one of his enlisted men acting as a clerk. This was a fortuitous decision, given the illegibility of Foulois's scrawling handwriting, although Benny did take some issue with the results. The clerk tended toward the verbose, whereas Foulois favored a sparser, more utilitarian narrative. This conflict can be seen in the diary entry for September 1, 1910, for example. The original version reads, "The machine, though the engine ran beautifully, seemed to be laboring very much...." Foulois crossed out this statement, replacing it with: "The machine, though the engine ran well, controlled very poorly...." Foulois, sacrificing style in favor of pure military accuracy, clearly intended that the logbook be taken seriously.

It appears that Foulois played a more direct role in writing the record of flights section, as indicated by its title, "Record of Flights at Fort Sam Houston, by Lieutenant Benjamin D. Foulois." However, the handwriting does not match Foulois's additions to the text, indicating it was probably dictated to a member of the detachment. Unlike the more creative diary, the record of flights contains few concessions to poeticism. The description of clouds as "very puffy" in the daily log entry for August 28, 1910, is a rare exception. Instead, the record of flights is strictly a compilation of data, meticulously recorded, not only by day, but broken down flight by flight. Foulois badly wanted to present a professional, competent summary of his work at Fort Sam. He knew full well that any sloppiness on his part could have serious consequences for future aviation appropriations or legislation.

The main intent of the logbook was not bureaucratic posturing; primarily, it was to provide the detachment with information by which to identify problems with the machine and attempts to correct them. The cantankerous machine and shifty weather continually challenged the "little band of pioneer aviation mechanics."³⁴ Initially, the recorder took very few technical measurements. As Foulois began to struggle with the machine and blame the Texas atmosphere, the measurements became increasingly complete. In March, only the wind speed was noted, but by August, barometer readings were being included in an attempt to solve the riddle of Texas weather. Foulois and his men were never able to definitely determine what was responsible for the plane's lack of lift. Also troubling was the engine's tendency to misfire. Perplexed by the seeming arbitrariness of their successes, Foulois and his men

34. *Ibid.*



Built as the Field Officer Quarters in 1881, Quarters No. 8 at Fort Sam Houston is named “Foulois House.” Foulois lived here while at Fort Sam Houston in 1910–1911.

were continually searching for the source of all the mishaps. As such, they tracked all the factors that could contribute to poor performance, recording not only wind speed and barometric readings, but also engine revolutions per minute and the presence of “aqueous vapor” in the air.³⁵ In some instances in the daily log, but more extensively in the record of flights, length of glides and distances required to achieve takeoff were also noted. Beginning as early as March 21, 1910, the record of flights also describes the number of gallons of gasoline in the tank and the levels of oil in the engine. The record of flights records in minutest detail the technical and performance data on each flight. The doggedly attentive document even lists three separate barometer readings in the entry for August 25. The record of flights, though more thorough in its observations than the daily log, grew as frustrations mounted over time. This increasing documentation helped Foulois evaluate the efficacy of modifications as well as determine the plane’s performance limits, a matter best settled before attempting to use the machine on active operations.

Besides learning to fly, Foulois also made significant mechanical changes to Signal Corps No. 1. He added wheels, relocated the elevating planes several times, and possibly added a safety belt (unsubstantiated by documentary evidence). Foulois also established precedents for running similar operations by writing “Provisional Airplane Regulations for the Signal Corps, United States Army, 1911” to document all he had learned for the benefit of both non-flyers in Washington and future aviators. By 1911, Foulois had acquired considerable flying experience, having flown nine hours and ten minutes over the course of 64 flights at the time of S.C. No. 1’s retirement. He “had learned to

35. See the August 25, 1910, entry of flight diary.

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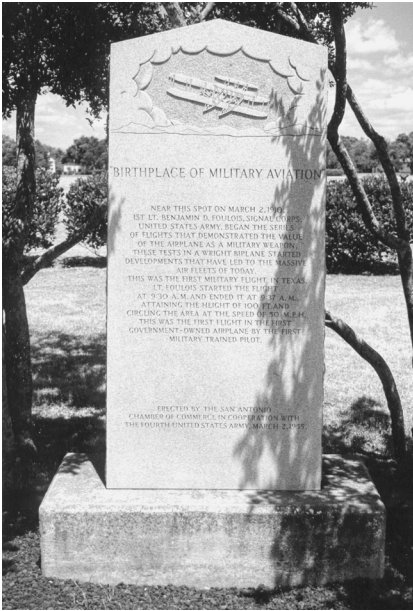
love the smell of airplanes, the blast of wind in my face, and the exhilaration that only flying can give a man.”³⁶

Foulois eventually became a major general and Chief of the Army Air Corps from 1931 to 1935, retiring in the scandalous aftermath of the Air Mail Fiasco. Among numerous contributions to the Air Force, Benny Foulois is best known as the pilot who taught himself to fly.



Lieutenant Foulois makes last-minute adjustments as the engine is running before he and Phil Parmalee set out for Eagle Pass in 1911.

36. Foulois, *From the Wright Brothers to the Astronauts*, p. 94.



Located on the parade ground, this marker commemorates Foulois's first flights at Fort Sam Houston on March 2, 1910.

The car garage behind the Garrison Company House at Fort Sam Houston was built on the site where Signal Corps No. 1's hangar stood in 1910-1911.



The parade ground at Fort Sam Houston where Foulois did much of his flying in 1910, as it appears today.

EDITORIAL POLICY

Most of the Logbook of Signal Corps No. 1 was handwritten by one or more individuals in a neat, professional hand. The logbook is presented as it was originally written although certain adjustments to the format of the material as originally recorded were considered editorially felicitous. Where such format changes have been applied to assist a modern-day reader's comprehension of the author's original record, the information appears here phrased in *italic* type. This convention is most frequently used to express, using the author's words, what had originally been indicated only symbolically by his use of ditto marks. As is standard practice, notations made by the present editor appear as [bracketed] information.

Interpolations and annotations were added to the original logbook and, judging from the handwriting, were nearly always attributable to Benjamin D. Foulois. Many of these interpolations appear to have been made, on the basis of internal evidence, within hours or days of the original entry. Others appear to have been made from months to years later, perhaps as Foulois was contemplating his memoirs. Such author interpolations are indicated here in a **sans serif** typeface. The author's annotations found as marginal notes in the original logbook are preceded here by the bracketed phrase, "Marginal note." In various places, words are underlined in the original text. Whether these underlinings were done contemporaneously with the writing of the text or were made later is unknown; however, the underlinings have been scrupulously retained in this text.

DAILY LOG

February 1910

- 3 Detachment arrived [at Fort Sam Houston³⁷] from Chicago³⁸
 4 Unloaded aeroplane from car³⁹
 5 Lieut. Foulois arrived from Wash. D.C.
 6 Sunday
 7 Getting estimates on blocks etc. for tent⁴⁰
 8
 9



The modern main entrance to Fort Sam Houston, San Antonio, Texas.

37. Named after the first president of the Republic of Texas and first governor of the state of Texas, Fort Sam Houston is a major military reservation and headquarters located in the northeast section of San Antonio, Texas. Construction of the post began in 1876, and by the time Foulois arrived in 1910, it was a major Army headquarters garrisoned by a regiment of infantry, a regiment of cavalry, two batteries of field artillery, and detachments of signal and engineer troops. *The Handbook of Texas Online*, August 15, 2002, <http://www.tsha.utexas.edu/handbook/online/articles/view/FF/qbf43.html>

38. Foulois exhibited Signal Corps No. 1 (S.C. No. 1) at the Fifth Annual Electrical Show sponsored by the Chicago Electrical Trade Association from January 15 through 29, 1910.

39. This entry refers to a railroad boxcar. The airplane could be moved on something much smaller, though. The U.S. Army contract under which S.C. No. 1 was purchased specified that the machine “be designed so that it may be quickly and easily assembled and taken apart and packed for transportation in army wagons. It should be capable of being assembled and put in operating condition in about one hour.” See Chandler and Lahm, *How Our Army Grew Wings*, App. 6.

40. The tent appears to have been a workshop. Blocks were pulleys used to ease the handling of the heavy canvas.

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- 10 Detachment arrived from Wash. D.C.
- 11 Spliced ropes for tent rigging
- 12 Put single and double blocks on ropes for tent
- 13 Sunday
- 14 Working on main tent poles, loops, and eyes
- 15 *Working on clamps and eyebolts*
- 16 *Working on clamps and eyebolts*
- 17 *Working on clamps and eyebolts*
- 18 *Working on clamps and eyebolts* and iron rods for deadmen⁴¹
- 19 *Working on clamps and eyebolts*
- 20 Sunday
- 21 Moved aeroplane from quadrangle⁴² to shed⁴³ and commenced assembling
- 22 Washington's Birthday
- 23 Assembled main planes,⁴⁴ rudder & skids
- 24 Put on motor, cooler, tank, & elevating planes
- 25 Fixed up connections, soldered joints
- 26 Set up tower and track⁴⁵
- 27 Sunday

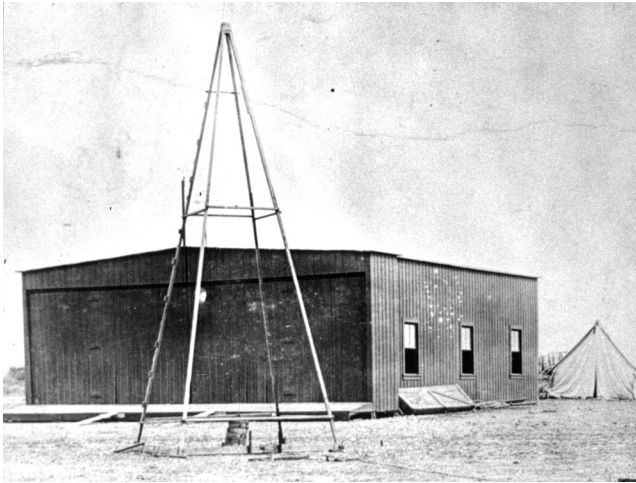
41. A deadman was an anchor set in the ground to which a tent's supporting ropes were attached.

42. The Quadrangle was the predominant structure at Fort Sam Houston, and its ninety-foot clock tower was the post's most distinctive feature. Built in 1876–1877 as a Quartermaster Supply Depot and later converted to a headquarters, the Quadrangle is currently the centerpiece of the Fort Sam Houston National Historic Landmark. *DPTMSEC, Fort Sam Houston Museum Divisions*, August 14, 2002, <http://www.cs.amedd.army.mil/dptmsec/tour.htm>

43. A local construction company built the wooden aircraft hangar under contract. See Miller, "Kept Alive by the Postman," p. 37.

44. The word *plane* was used to designate the horizontal surfaces of the aircraft. In this case, it refers to the wings. *Elevating planes* in the next entry refers to the movable surface that would later be called the elevators, while a *horizontal plane* (as in the entry for May 9) describes a fixed horizontal stabilizer. The term *aeroplane* refers to the entire machine.

45. The tower and track were necessary to launch early Wright airplanes, which lacked wheels. Foulois wrote in his memoirs that "launching was accomplished by resting the skids on a small two-wheeled truck placed with its tandem wheels on a monorail track. The weight [1,400 pounds] was lifted to the top of the starting tower by a system of ropes passed through a pulley block fastened near the outer end of the monorail track, thence back to the airplane, and to a trigger which was placed within easy reach of the pilot. The weight was lifted to the top of the starting tower. The engine was then started, and [the pilot would]...trigger the starting device. The weight would come down to earth with a loud thump, and the plane would catapult down the rail. After a run of about 50 feet, it would leave the track..." Foulois, *From the Wright Brothers to the Astronauts*, p. 54. This system presented a serious problem in terms of a practical airplane. If the wind changed direction after the rail was established, everything had to come to a halt, the airplane removed, and the rail taken up and reset. And if the airplane landed at other than its starting point, it was unable to take off again. The skids were also vulnerable to damage during landings. See, for example, the entries for March 18 and April 27, 1910.



The shed, or hangar, and the launching derrick for Signal Corps No. 1 at Fort Sam Houston, Texas.

- 28 Muster.⁴⁶ Reenforced control wires. General overhauling. Ran engine for 2 periods of 7 min each.

March 1910

- 1 General routine work
 2 Lieut. Foulois made 4 excellent flights lasting 7½, 10, 21, 21 min. respectively. On the fourth flight, **gasoline feed pipe broke**. Made [for] rough landing due to an attempt to flatten the gliding angle too much, which resulted in landing on rear end of skids. As a result of this rough landing, two wooden **truss** braces, the front & rear stringer pieces on the center plane, were broken, and the two bed plates underneath the engine were cracked. Upon examination it was found that one of the bed plates under the engine had been cracked, presumably during the flights at Ft. Myer or College Park, and had never been repaired. As a result of this, the whole structure supporting engine had been weakened, and it only required a sharp jar to break it.
 3 Repairing engine bed and sewing covers⁴⁷ for planes
 4 *Repairing engine bed and sewing covers*
 5 *Repairing engine bed and sewing covers*
 6 Sunday
 7 Repairing center plane
 8 Replaced center plane and sewed it

46. Foulois apparently held a formal assembly, or muster, of the detachment.

47. The cloth covers on the wings were apparently damaged and either required repairs or needed new ones sewn from Pride of the West muslin, the type used for Wright airplanes. Crouch, *The Bishop's Boys*, p. 255.

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- 9 General overhauling
- 10 Repairs completed. Put in 6 new wire braces.
- 11 Tried out motor. Wind from 28 to 45 miles, South.
- 12 Made 5 perfect flights, lasting 8 min 25 sec, 15 [min] 10 sec, 4 min 10 sec, 12 min 10 sec, & 16 min respectively. During the 4th flight Lt. Foulois made a large detour of about 1 mile from the aero field, circling the building at the Lower Post. The machine was under perfect control at all times and landings were excellent. (Last flight—called for safety belt)⁴⁸
- 13 Sunday
- 14 Replaced two heel plates on skids. Made a new key for right propeller sprocket. Put in one new roller on short driving chain. Made 1 flight lasting 22 min 25 sec.
- 15 Put in left-hand forward brace. No flights on account of high winds.⁴⁹ Put stuffing⁵⁰ box on gasoline pump.
- 16 No flights on account of high winds. Put stuffing box on oil pump.
- 17 Made three flights lasting 6 min 2 sec, 5 min 35 sec, and 7 min respectively. On last flight engine slowed down and was compelled to land on rough ground.
- 18 No flights, high winds from 24 to 37 miles per hr. Overhauled engine and found engine cylinders were not getting oil due to loose connection in oil pipe. Replaced several braces on forward part of skids and readjusted entire front control framework which had become badly warped. Removed engine and gave it a thorough

48. This claim for the use a safety belt was added sometime after the initial day's entry, but whether the addition was made later that day or years later is uncertain, as explained in the introductory essay. Independent contemporary evidence of the addition of a safety belt to S.C. No 1 is lacking. No such innovation was included in the record of flights (although many modifications are recorded in that section), and Foulois failed to mention such a change in his monthly reports to the Chief Signal Officer. Nor is evidence that he mentioned a safety belt to the Wright Brothers available in the surviving correspondence with them. Further, the entries in the diary and record of flights for this date are inconsistent. The diary states that the airplane was "under perfect control at all times and landings were excellent." In contrast, the record of flights entry states that "it seemed difficult to maintain horizontal flight." Foulois later claimed that the addition of a safety belt was the result of difficult flying conditions that nearly threw him from the airplane, suggesting that the account given in the record of flights is the more accurate. Foulois, *From the Wright Brothers to the Astronauts*, p. 73. See also the discussion in Miller, "Kept Alive by the Postman," pp. 42–43.

49. This was the first of the nine days in March unsuitable for flying because of the weather. Foulois quickly discovered that the variable Texas winds made Fort Sam Houston a less than desirable test area. Frustrated by the conditions in April, for example, he wrote the General Allen that "the winds have been very changeable and unreliable....This condition of weather has made it extremely difficult to accomplish much." Monthly Activity Report to the Chief Signal Officer from Aero. Detach., May 3, 1910, Box 25, Foulois Papers.

50. A stuffing box is a seal around a rotating shaft packed with grease or a similar substance intended to prevent leaks.

- overhauling and cleaning.
- 19 No flight, high winds from 18 to 26 miles per hr. Cut out section of cloth underneath engine and made removable section of tin.⁵¹ Put in sight feed glass⁵² in oil pipe on engine.
- 20 Sunday
- 21 Made one flight of 13 min. From air estimated height of about 10 ft, a glide of 213 ft was made. During the flight, a wind of 16 mile vel[ocity] blew steadily for about 3 min. (Cross-wind landing. Damage shown in M[ar]ch. 22–26 Log.)
- 22 No flights on account of wind. Secured data regarding the fore and aft balance of machine.
- 23 No flights on account of heavy winds. Put in 4 new wire supports on machine, a diagonal support, and band on skids. Changed poles on aero-tent and re-rigged it again.
- 24 No flights on account of heavy winds. Erected tent, put in three new wire supports.
- 25 No flights on account of heavy winds. Tested motor for full speed & full retard.
- 26 No flights on account of heavy winds. Motor tests.
- 27 Sunday
- 28 [Marginal note: Target Range] Made trip to target range and took measurements of butts⁵³ for buzzer system installation.⁵⁴
- 29 Making drawing of and estimates on work at target range
- 30 *Making drawing of and estimates on work at target range*
- 31 *Muster. Making drawing of and estimates on work at target range.*

April 1910

- 1 No flights. Heavy winds 7–20 miles SE. *Making drawing of and estimates on work at target range.*
- 2 *No flights. Heavy winds 10–35 miles SE. Making drawing of and estimates on work at target range.*
- 3 *Sunday. Heavy winds 21–37 miles S.*

51. The decision to replace the wing fabric under the engine with tin may have been to reduce the risk of fire from gas- or oil-soaked cloth, or it may have stemmed from a desire to make the machine easier to clean and maintain.

52. The sight feed glass was a fixture mounted in the oil tube enabling the airplane operator to observe and monitor the critical flow of oil to the engine.

53. Butts were the individual firing positions at a target range.

54. As will be clear later in the log, Foulois and his “little band of pioneer aviation mechanics” spent June 15 through July 16, 1910, at the military training camp at Leon Springs, several miles west of San Antonio, updating the rifle target range with a new communications system. The work involved digging ditches, rebuilding the target houses, laying electrical cable, and connecting the system. Foulois later claimed that this assignment was actually punishment for “the unfavorable publicity to which the S.C. had been subjected when it was publicly learned that I had been put to the personal expense of some \$300.00 in order to keep Army Airplane No. 1 in the air.” File: Notes, Undated, Box 60, Foulois Papers.

Logbook of Signal Corps No. 1

- 4 No flights. Worked on plans for Annunicator **System**. *Heavy winds 17–22 miles S.*
- 5 *No flights. Completed plans for Annunicator System. Heavy winds 12–18 miles NE.*
- 6 [Marginal note: **wheels**] Made one flight lasting 4 min 4 sec. Wind SE 3–22 miles. **Worked on drawing for system of wheels for aeroplane.**
- 7 No flights. Wind 16–24 miles S. Worked on drawings for wheels.
- 8 No flights. Wind 4–16 miles. Rain in forenoon & afternoon. Worked on drawings for system of wheels for aeroplane.
- 9 No flights. Rain. Wind 6–30 miles SE. Worked on drawing for system of wheels for aeroplane.
- 10 Sunday. Rain. Wind 8.5–22 miles S.
- 11 No flights on account of deep mud. Wind 2–18 miles. Worked on drawings for system of wheels for aeroplane.
- 12 Made 5 flights of 5 min 24 sec, 5 min 20 sec., 4 min 47 sec., 5 min 38 sec., 12 min. respectively. Made glides each time from a height of 68 to 300 ft. Longest glide 1296 ft; and 19 1/5 sec. Max. height during flights, 400 ft. Wind 2–12 miles.
- 13 No flights. Wind 12–24 miles SE. Worked on drawings for system of wheels on aeroplane.
- 14 Made three flights of 7 min 27 sec, 5 min 5 sec, and 35 min 2 sec respectively. Flew over lower post and quadrangle and made several fig. 8. Made two attempts to take Capt. Hennessy⁵⁵ as passenger; failed on account of adverse winds.⁵⁶ Wind 2–30 miles.
- 15 Made two flights of 5 min 24 sec and 12 min respectively. During 2d flight, the exhaust valve on No 4 cylinder broke off while in midair. Engine was shut off and an easy landing made. Wind 3–40.
- 16 No flights. Wind 15–35 miles. Took No. 4 cylinder off motor. Finished blueprints for aeroplane wheels. **Mailed copies of blueprints to Chief Signal Officer and Wright Brothers.**
- 17 Sunday. Wind 12–30 miles.
- 18 No flights. Wind 2–15 miles. Awaiting spare parts to repair engine.

55. Capt. Frederick B. Hennessy, 3d Field Artillery, was assigned to Fort Sam Houston in 1910. He had already shown some interest in aviation, having made a balloon flight some years earlier. Hennessey began flight instruction at Fort Sam in April 1911 and was the first Adjutant/Supply Officer of the 1st Aero Squadron (Provisional) in 1913. He never qualified as a Military Aviator after the U.S. Army established that rating in early 1912, but he did earn Federation Aeronautique Internationale (F.A.I.) pilot license No. 151. He returned to the field artillery in July 1913. Juliette Hennessy, *The United States Army Air Arm, April 1861 to April 1917* (Washington, D.C.: Office of Air Force History, 1985), pp. 42, 60, 72–74, 76, 94, 162.

56. As noted in the introduction, Foulois believed that the difficulties he encountered carrying a passenger were a result of the atmospheric conditions in central Texas. Monthly Activity Report to the Chief Signal Officer from Aero. Detach., May 3, 1910, Box 25, Foulois Papers.

- 19 No flights. Wind 7–21 miles.
 20 *No flights. Wind 3–15 miles.*
 Awaiting spare parts to repair engine.
 21 No flights. Wind 24–47 miles.
 Awaiting spare parts to repair engine.
 22 No flights. Wind 16–30 miles.
 Awaiting spare parts to repair engine.
 23 No flights. Wind 4–18 miles.
 Rec'd spare parts for engine.
 24 Sunday. Wind 15–25 miles.
 25 No flights. *Wind 3–12 miles.* Put new cylinder on motor.
 26 Made 2 flights lasting 2 min 7 sec and 3 min 35 sec respectively. Wind 3–18, very squally.
 27 Made 3 flights lasting 9 min 6 sec, 9 min 15 sec, and 1 min respectively; last flight was made with a passenger, E. O. Eldred.⁵⁷ Wind 3–10 miles. Rough landing—side skid. Damaged landing skids.
 28 No flights. Repairing machine. Wind 3–16 miles
 29 *No flights. Repairing machine. Wind 20–30 miles.*
 30 *No flights. Repairing machine. Wind 25–40 miles.*



Fort Sam Houston's most recognizable structure is the tower in the center of the Quadrangle. Foulois often incorporated the quadrangle into the circles and figure eights that he flew in signal Corps No. 1

May 1910

- 1 Sunday. Wind 18–30 miles S.
 2 No flights. *Wind 16–35 miles S.* Ran engine for two periods of 5 min. each.
 3 No flights. Wind SE 17–31 miles. **Collected data on cost of wheels for aeroplane.**
 4 No flights. Windy S 6–19 miles per hour, very gusty. Designing new propellers. Started painting boxes and chests.
 5 No flights. Wind 12–24 miles S. Building a new rear plane for experimental work. Painting boxes and chests.

57. Edward O. Eldred was either an enlisted or possibly a former enlisted man, since the punctilious Foulois failed to mention a rank. He was one of the nine original soldiers who made up the Signal Corps's provisional Balloon Detachment in August/September 1907. Many of the men in Foulois's detachment at Fort Sam had been members of the Balloon Company, including Corporal Burge. See Chandler and Lahm, *How Our Army Grew Wings*, pp. 77–78.

Logbook of Signal Corps No. 1

- 6 No flights. Wind 14–22 m[iles] S. Painting boxes and chests. Working on rear plane for aero.
- 7 No flights. Wind 4–20 miles S. Very squally. Completed rear plane for aeroplane. Painted S.C. insignia on boxes and chests. Ran motor for 5 min. Full speed 1286 full retard 1117 RPM.
- 8 Sunday. Wind 5–14 miles S.
- 9 Made one flight of 7 min 53 sec. Wind 3–18 miles S. Took off rear horizontal plane and restored it to its original position in front.⁵⁸ Put in new wire braces on rudder.
- 10 No flights. Wind 13–19 miles S. Put in all new wire braces on rudder. Repaired tent cover.
- 11 No flights. Wind 16–24 miles S. Put new rear horizontal plane on machine. Ran engine for two 5 min periods to discover cause of engine missing. Working on a K.D. work bench⁵⁹ for aeroplane tent.
- 12 Wind 5–16 miles NE. Made one flight of 3 min 45 sec. This flight was made with both front control planes in their original position, and with a new curved plane in rear. It was noted that the machine travelled at a greatly increased speed although it was not as steady as before. The unsteadiness was principally due to inexperience in operating with both planes in front. During the last few flights the engine has been missing explosions quite frequently, it was therefore deemed advisable to take all old cylinders off and give them a thorough cleaning and overhauling and replace all old valves with new ones. Upon taking off the cylinders both No 2 and 3 were found to have cracks in the cylinder heads extending from spark plugs to exhaust valves. Both cylinders being cracked in exactly the same places. No. 3 cylinder also had a crack in the water jacket near the cylinder head and had a leak between water jacket and cylinder head.
- 13 No flights. Wind NE 10–20 miles. Working on drawing for new propellers. Finished work bench for aeroplane tent. Awaiting cylinders for engine.
- 14 No flights. Wind 19–30 miles S. Put in new plane control wires on aeroplane. Awaiting cylinders for engine.
- 15 Sunday. Wind 20–35 miles

58. See the entries of May 24 and June 8, 1910, for further examples of experiments with the rear plane. Foulois repeatedly altered its position in an effort to correct the bucking habits of S.C. No. 1, but he later wrote that he had little success. After the 1910 flying season, Foulois and his crew undertook a face-lifting operation that added many of the features of the newest Wright design, the Model B, to Old Number 1. These changes included eliminating the front elevators entirely and replacing them with a single elevator mounted behind the rudder. Foulois, *From the Wright Brothers to the Astronauts*, pp. 76–78, 79.

59. Unidentified, possibly a brand name.

- 16 No flights. Wind 24–35 miles S. Awaiting cylinders for aeroplane.
- 17 No flights. Wind 15–26 miles NE. Awaiting cylinders for aeroplane.
- 18 No flights. Wind 10–17 miles NE. Awaiting cylinders for aeroplane. Painted track.
- 19 No flights. Wind SE 2–45 miles. Received cylinders for engine. Commenced replacing old ones. Painted tower. Rain.
- 20 No flights. Wind 4–45 miles. Rain. Installing new cylinders in motor.
- 21 No flights. Wind 10–22 miles NE. Making new T bolts and gland nuts and lock nuts for waterjacket on cylinders. Ground and sharpened tools.
- 22 Sunday. Wind 2–12 miles NE.
- 23 No flights. Wind NE 17–24 miles. Completed repairs to engine. Numerous leaks in water jackets of **new** cylinders. Ran motor for one 5 minute period.
- 24 No flights. Wind 5–16 miles SE. **Very gusty.** Removed the upper elevating plane.
- 25 No flights. Wind SE 9–25 miles. **Very gusty.**
- 26 No flights. Wind S 12–23 miles. **Very gusty.**
- 27 No flights. *Wind* SE 10–26 *miles.* **Very gusty.**
- 28 Wind 7–18 miles SE. Very [word “puffy” crossed out] **gusty.** Made one flight of 1 min 10 sec. Engine missing continually. Made new contact points for anemometer.⁶⁰
- 29 Sunday. Wind E 18–36 miles.
- 30 Decoration Day.⁶¹ Wind 6–16 miles S. Made one flight lasting 1 hour 2 min. Wind very irregular. Made several speed tests over a half-mile straightaway course. Max speed 45.68 miles per hr; minimum speed 38 miles against an 8 mile wind.⁶²
- 31 Wind 2–12 miles SE. Made two flights of 5 min 35 sec and 2 min 45 sec respectively. Muster.

June 1910

- 1 Wind SE 3–15 miles. Made three flights of 14 min 13 sec, 9 min 50 sec, and 7 min 15 sec respectively. Glided down at the conclusion of each flight from heights of 90 to 150 feet. Longest glide, 945 ft in 15 ²/₅ sec. Max height during flights, 390 ft.
- 2 No flights. Wind 15–37 miles. Made binding post for anemometer.

60. An anemometer is a device for measuring the force of the wind.

61. Decoration Day is now known as Memorial Day. Its original name was derived from the tradition of decorating graves.

62. Although Foulois complained of engine difficulties, the speed of 45.68 mph was more than respectable, especially considering that Orville Wright, with Foulois as his passenger, had managed a speed of 42.583 mph during the acceptance trials at Fort Myer the previous year. Crouch, *The Bishop's Boys*, p. 399.

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- 3 No flights. Wind S 13–28 miles. Made trip to Leon Spring, Texas, to look over target range and make arrangements for the Buzzer Installation work.
- 4 No flights. Wind SE 4–26 miles. Extremely gusty. Made 4 control chains and brackets, and put in one roller on driving chain on machine.
- 5 Sunday. Wind SE 4–17 miles.
- 6 No flights. Wind SE 12–24 miles. Fitted new gasoline tank on aeroplane. Packing up boxes & bundles for target range.
- 7 Wind S 7–22 miles, very gusty. Made 2 flights of 1 min 40 sec and 4 min 28 sec respectively. The start of first flights was made in a 15-mile wind; the velocity of the wind during flights varied from 5 to 14 miles within two minutes.
- 8 No flights. Wind S 10–26 miles. Making a new rear plane for aeroplane.
- 9 No flights. Wind S 14–28 miles. Finished working on new rear plane for aeroplane.
- 10 No flights. Wind 5–24 SE miles. Rain. Getting material and working on wheels for aeroplane.
- 11 No flights. Wind 10–29 miles SE. Working on system of wheels for aeroplane.
- 12 Sunday
- 13 Getting material packed for Buzzer installation. Working on wheels for aeroplane.
- 14 Loaded car with material for Buzzer installation. Working on wheels for aero. (Simmons and Madole)⁶³
- 15 Moved from Ft. [Sam] Houston to Leon Springs, Texas, to commence work on Buzzer system on range. Madole and Simmons working at the Arsenal, San Antonio, Texas,⁶⁴ on spare parts of machinery for wheels for aeroplane.
- 16 Unloading cars at Leon Springs and hauling the material to target range. Madole and Simmons continue work at Arsenal, San Antonio Texas.
- 17 Completed unloading cars. Unpacked and checked up material for Buzzer Installation. Commenced plowing ground for trench. Simmons and Madole making spare parts of machinery for wheels

63. When Foulois and his detachment moved to Leon Springs, he left civilian mechanic Oliver H. Simmons and Pvt. Glenn R. Madole behind to manufacture the parts needed for S.C. No. 1's new landing gear.

64. The original U.S. Army arsenal at San Antonio was located in the former Spanish mission, later famous as the Alamo. In 1859, the army built a new arsenal south of the town several miles from Fort Sam Houston on what is now South Flores Street. The facility gradually expanded until it comprised some thirty-eight buildings during World War I. The arsenal closed in 1949. *The Handbook of Texas Online*, August 14, 2002, <http://www.tsha.utexas.edu/handbook/online/articles/view/SS/qbs2.html>.

- for aeroplane at the Arsenal, San Antonio, Texas.
- 18 Digging trench from butts towards 200 yd range.⁶⁵Distributed fibre conduit along range. Simmons and Madole continue work at Arsenal. Moved range house between targets 8 and 9 and installed telephone, buzzer switch, annunciator,⁶⁶ & distributing box therein. Took old push button system out at butts.
- 19 Sunday
- 20 Continue digging trench towards 200 yd range. Made changes at range house between targets 24 and 25. Hauled sand and drain pipes to manholes. Simmons and Madole continue work at Arsenal.
- 21 Continue digging trench. Preparing material for installation. Simmons and Madole continue work at Arsenal.
- 22 Digging trench and plowing. Simmons and Madole continue work at Arsenal.
- 23 Digging trench. Laying conduit. Simmons and Madole continue work at Arsenal.
- 24 Plowing and digging trench. Laying conduit and filling in trench. Simmons and Madole continue work at Arsenal.
- 25 Plowing and digging trench. Filled in trench where conduit was laid, made boxes for mixing cement. Simmons and Madole continue work at Arsenal
- 26 Sunday
- 27 Digging trench and manholes. Hauled reels of cable to position for laying same, completed boxes. Simmons and Madole continue work at Arsenal.
- 28 Digging trench and manholes. Laid 2000 ft of cable in conduit. Simmons and Madole continue work at Arsenal.
- 29 Digging trench and drain. Laying fibre conduit. Preparing circuit wires for 300 yd range. Simmons and Madole continue work at Arsenal
- 30 Digging main trench, manholes & drains, Laid fibre conduit to 600-yd [range]. Preparing wires for 300 yd. range.

July 1910

- 1 Digging main trench, manholes, & drain. Laid fibre conduit to 800

65. The small-arms firing range on the military reservation near Leon Springs, Texas, provided individual rifle training for ground troops. The range comprised a firing line and numbered target positions at distances from 200 yards to more than 1,000 yards. Foulois and his detachment were sent to install a standard Signal Corps communications system connecting the firing line with the target positions. Battery-powered electrical buzzers communicated messages in Morse code through a complex system of underground wires. *Technical Equipment of the Signal Corps, Manual No. 3, 1916* (Washington, D.C.: Government Printing Office, 1917).

66. An annunciator is an electrically controlled signal device.

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- yd range. Finished wires for the 300 yd firing points.
- 2 Digging main trench, manholes, drains. Laid fibre conduit to 1000 yd point and pulled cable through from the 600 yd to 1000 yd firing point. Made manhole at 200 yds.
 - 3 Sunday
 - 4 Prepared 8 foot cords for push buttons and tested them out. Made telephone cords. Assembling buzzers and strap keys for installation and testing same.
 - 5 Digging trench at 300 yd firing points. Made manhole at 300 yds. Completed assembling buzzers and strap keys on boards. Took measurements and connected iron conduits between firing points of 300 and 500 yd ranges.
 - 6 Digging trench, manhole, and drain at 1000 yds. Made manhole at 500 yds. Made holes in 4" pipe for outlets. Cut and made threads on iron pipe. Connected up and installed about 70 ft of cable conduit in pit.
 - 7 Covering drain at 200 & 300 yds. Connected and strapped up about 75 ft of cable conduit in pit. Moved telephone house to its permanent position between targets 24 and 25. Installed switch and annunciator in telephone house. Made one splice and one pot-head.⁶⁷ Cut up and made threads on iron pipe for firing points. Made manhole at 600-yd p[oin]t
 - 8 Filling in main trench. Made manhole at 800 yd range. Installed terminal boxes in 300 & 500 yd manholes. Tested out cable from 500 yds to pit. Made one splice and one pothead in pit. Connected up and strapped up 75 ft of conduit to range house in pit. Made conduits for pit and cut & threaded iron pipe. Laid telephone cable in 200 yd trench. Making boxes to enclose buzzers & keys.
 - 9 Filling in main trench. Cutting and threading $\frac{3}{4}$ " pipe for outlets at firing points. Making boxes to enclose buzzers and strap keys. Preparing wires for the 500 yd. firing point. Preparing wires to buzzers and keys in pit. Finished manholes.
 - 10 Sunday
 - 11 Filling in main trench. Finished wires for firing points for all ranges. Connected terminal boxes and manhole at 300 yds with distributing box in pit and made two splices at 300 yds.
 - 12 Completed filling in main trench. Connected terminal boxes in manholes at 500[,] 600, and 800 yds with distributing box in pit. Set up outlet boxes at 300 yds and made connections to terminal box from firing points. Made splices in 500[,] 600, and 800 yd range manholes.

67. A pothead in 1910 was a terminal hermetically sealed to the sheath or conduit for underground electrical cable that ensured a moistureproof connection between wires inside the cable and those outside.

- 13 Connected terminal box in manhole at 1000 yd point with distributing box in pit. Made two splices for telephone cable at 200 yd range manhole. Set up outlet boxes at 500 yd and part of 600 yd range and made connections to terminal boxes from firing points. Made splice in 1000 yd manhole. Filled trench at 300 yd range.
- 14 Completed setting up outlet boxes at firing points on all ranges. Completed connections from firing points to terminal boxes at all ranges. Filled trenches at 500[,] 600, 800 yd ranges. Made up wires for connections from distributing boxes to annunciator and switches in telephone houses.
- 15 Put in 2" iron conduit, connecting wires to buzzer and strap keys in wooden box. Painted all buzzer boxes. Tested 1000[,] 800[,] 600[,] 500 yd. ranges. Installed and connected up buzzer and strap keys. Enclosed each.
- 16 Completed testing and covered all manholes. Detachment returned to Ft. Sam Houston in the evening. [Marginal note: left Leon Springs]
- 17 Sunday
- 18 Working on system for wheels for aeroplane
- 19 Set up aeroplane tent. Working on system of wheels for aeroplane.
- 20 Made three flights of 3 min, 3 min 50 sec, and 2 min respectively. Third, [wind] 6–12 miles SW.
- 21 No flights. Wind too strong. 14–22 miles S. [Marginal note encompassing entries for July 21 through 29, inclusive: **Remodeling skids and braces for use of wheels.**]
- 22 *No flights. Wind 18–30 miles S.*
- 23 *No flights. Wind 14–27 miles SE.*
- 24 *Sunday. Wind 18–32 miles SE.*
- 25 *No flights. Wind SE 15–25 miles.*
- 26 *No flights. Wind SE 12–20 miles.*
- 27 *No flights. Wind S 8–18 miles.*
- 28 *No flights. Wind S 18–36 miles.*
- 29 *No flights. Wind SE 14–30 miles.*
- 30 *No flights. Wind S 11–25 miles. Drilling holes for spokes in rims for wheels.*
- 31 *Sunday. Wind S 10–18 miles.*

August 1910

- 1 No Flights. Wind SE 14–30 miles. Enlarged holes for spokes, cut and threaded spokes, and set up 3 wheels for aero.
- 2 No flight. Wind S 10–21 miles. Completed setting up wheels for aeroplane. Working on and testing rubber buffers⁶⁸ for system of wheels on aeroplane.

68. Synonymous with shock absorbers.

Logbook of Signal Corps No. 1

- 3 No flights. Wind 15–30 miles S. Working on and testing springs and buffers for aero wheels.
- 4 No flights. Wind 12–18 miles SE. Continue work on wheels for aero.
- 5 No flights. Wind 18–36 miles SE. Testing new springs for wheels.
- 6 No flight. Wind 15–24 miles S. Commenced placing wheels under aeroplane.
- 7 Sunday. Wind 10–17 miles S.
- 8 No flight. Wind 14–27 miles SE. Completed wheels and installed them under the aeroplane.
- 9 No flight. Wind 18–30 miles SE. Tested strength of wheels under machine.
- 10 No flight. Wind 15–20 miles S. Tested thrust of propellers.
- 11 No flight. Wind E 14–24 miles.
- 12 *No flight. Wind S 12–20 miles.*
- 13 *No flight. Wind SE 15–25 miles.*
- 14 Sunday. *Wind SE 10–21 miles.*
- 15 No flight. *Wind S 12–18 miles.* Fixed sprockets & tightened chains on aero.
- 16 *No flight. Wind SW 10–18 miles.* Put on new propellers, put rivets and new keys in left-hand sprocket.
- 17 No flight. Wind SE 15–24 miles. Made new work bench. Tested out new propellers. Put in two new struts and moved gasoline tank on machine to improve lateral balance.
- 18 Wind SE 8–28 miles. Made one flight of 2 min 20 sec. With wheels under machine, air ascension was negotiated in 110 ft. In landing, the machine came to a full stop in 125 ft. Steel springs used to take recoil too weak; necessitating the designing of heavier ones. [Marginal note: 1st use of wheels.]
- 19 Wind NE 5–16 miles. Made two flights of 15 min 10 sec and 6 min 45 sec respectively. A glide of 2175 ft from an altitude of 725 ft in 30 ⁴/₅ sec was made. (Original springs on wheels.) Note: new springs for right-hand wheel installed, 26 Aug 1910.
- 20 Wind SE 5–24 miles. Made 2 flights of 7 min and 4 min 5 sec respectively; attaining a height of 1000 ft. Shutting off motor at 900 ft gliding to earth in 32 seconds, a distance of 3600 ft. After 2d flight, motor was shut off at 500 ft and glided to earth in 30 ¹/₅ sec, describing a semicircle. Engine missed explosions during both flights. Took cylinders off and found that rocker arms on second and third cylinders were loose, allowing leakage of mixture under compression and explosion. Worked on engine and new springs for wheels.
- 21 Sunday. Wind S 12–18 miles.
- 22 Wind S 5–18 miles. Made 2 flights of 3 min and 16 min respectively. In both flights, the starting and landing was accomplished

- without the slightest difficulty. In first flight the machine took the air after a run of 117 ft and in landing the machine came to a full stop in 318 [ft.]. In second flight the machine took the air after a run of 114 ft, and in landing came to a full stop in 330 ft after touching the ground.
- 23 Wind 7–28 miles SE. Made three flights of 3 min 50 sec, 1 min, and 3 min respectively. In all three flights it was extremely difficult to make the machine climb, and it did not seem to lift, traveling at all times with a tilt to the rear. After the third flight, the engine was tested for speed and gave 1452 R.P.M. at full speed; within 2 revolutions of the best speed it has ever made. In yesterday's flights, the engine was not running at all well, missing explosions quite frequently, and there were 32 lbs more gasoline in the tank. Even under these conditions the machine operated beautifully. The cause of the troubles of today is evidently atmospheric. Yesterday was a clear, bright, dry morning. This morning, the sky was overcast with dark clouds, and there seemed to be considerable moisture in the atmosphere. On all flights, there seemed to be a downward trend to the air, as the machine seemed to *be* drawn down when passing over depressions. On the third flight, the wind had increased slightly, and in getting off, against the wind, the machine responded very well, but as soon as the direction was changed, it *responded very* slowly to the lateral controls, particularly on the curves. The only solution of this problem is more speed.
- 24 Wind 5–20 miles SE. Made two flights of 2 min 10 sec and 10 min respectively. Remarks.⁶⁹
- 25 Wind 6–23 miles S. Made 3 short flights of 30 sec, 20 sec, and 33 sec respectively. Unable to get machine to climb. Would not take the curves. Sky overcast with heavy Clouds. Air heavy with aqueous vapor. Slight E wind 5 miles. High barometer. Engine running as well as usual. Nothing done to machine since last flight of Aug 24 except to clean out gasoline fuel pipe. Flights discontinued to repair hub of right hand sprocket. Barometer 30.048" at 6:30 AM to 30.11" at 11 AM.
- 26 No flights. Wind 15–32 miles NE. Made new hub for sprocket and put it on machine. Put in new spring on right-hand wheels under aeroplane. Barometer 30.06 to 30.193 at 2:30 PM [Marginal note: **new spring on right wheel**]
- 27 No flights. Wind NE 14–25 miles. Barometer 30.093 to 31.18 at 10 AM.
- 28 Sunday. *Wind NE 18–30 miles.*

69. A line-and-a-half of empty space appears at this point in the logbook. If it was left for the insertion of remarks, it was never used.

Logbook of Signal Corps No. 1

- 29 No flights. *Wind NE 12–21 miles.* Barometer 20.06 to 30.097". *at 10 AM.* Replaced four wires on aeroplane.
- 30 No flights. Wind NE 15–38 miles. Barometer 30.088.

September 1910

- 1 Wind SE 3–8 miles. Made one flight of 6 min. Barometer 30.14", temperature 83°F. dry. The machine, though the engine ran [words "beautifully, seemed to be laboring very much" crossed out] **well, controlled very poorly**, and only after a height of approximately 150 ft was attained did the machine ride evenly.
- 2 No flights. Wind SE 15–22 miles.
- 3 *No flights. Wind] W 18–37 miles.*
- 4 Sunday. *Wind SW 16–24 miles.*
- 5 Labor Day. No flights. Wind 12–24 miles S.
- 6 No flights. Wind SE 12–18 miles.
- 7 *No flights. Wind SE 17–23 miles.*
- 8 Wind **gusty** 5–20 miles S. Barometer 30.307". Temperature 82°F. Made one flight of 1 min. In this flight the machine refused to respond quickly to its lateral controls due to atmospheric conditions. The flight was terminated very quickly, as a sudden whirlwind struck the machine, tossing it vertically in the air about 30 ft and tipping it sidewise at an angle of about 45 degrees. In order to prevent the machine from tipping completely it was necessary to descend at a very steep angle to gain the necessary lifting effect on the wing tips. There was not sufficient space between the machine and the ground to fully recover the balance of the machine before one wingtip struck the ground damaging the skids and one lower wing tip. [Marginal note: **Note: This was the** [word "only" crossed out] **second flight on which I didn't walk away and crew had to pull plane off of me: pinned down in the wreckage.** (See Chandler-Lahm book p. 188 in ref being ground shy)]⁷⁰
- 9 No flights. Wind NE 10–28 miles. Repairing machine. Working on new set of propellers.
- 10 No flights. Wind NE 8–21 miles. Repairing machine. Making new propellers.
- 11 Sunday. Wind NE 12–18 *miles.*

70. The referenced passage states that "Foulois maneuvered the airplane exceptionally well while in the air, but lack of adequate training with an instructor made him inclined to be 'ground shy,' that is, he leveled off a bit too high on landing, resulting in rather hard contact with the ground." Chandler and Lahm, *How Our Army Grew Wings*, p. 188. Foulois's marginal note in the diary—added after the Chandler Lahm's book was published in 1943—may reflect that he was sensitive about or disagreed with the label "ground shy"; however, the contention offers at least a partial explanation why, in Foulois's later comment that "every landing broke something." Foulois, *From the Wright Brothers to the Astronauts*, p. 76.

Daily Log

- 12 No flights. *Wind NE 9–36 miles*. Repairing machine. Working on new propellers.
- 13 No flights. *Wind N 24–39 miles*. *Repairing machine*. Working on new propellers.
- 14 No flights. Rain. *Wind N 26–58 miles*. Repairing machine. Making new propellers.
- 15 No flights. *Wind NE*. 18–32 miles. Repairing machine. Making new propellers.
- 16 No flights. *Wind 12–20 miles* *Repairing machine*. Making new propellers.
- 17 No flights. *Wind 5–18 miles E*. *Repairing machine*. Making new propellers.
- 18 Sunday. *Wind SE 5–16 miles*.
- 19 No flights. *Wind SE 8–24 miles*. Repairing machine. Completed new propeller. Assembling machine.
- 20 No flights. *Wind NE 8–13 miles* Assembling machine. Straightened left-hand propeller shaft and made one new sprocket key.
- 21 No flights. *Wind NE 5–16 miles*. Completed assembling machine.
- 22 No flights. *Wind SE 10–24 miles*. Painted up machine.
- 23 *No flights. Wind NE 8–22 miles*.
- 24 *No flights. Wind NE 6–18 miles*.
- 25 Sunday *Wind NE 15–28 miles*.
- 26 No flights. *Wind S 12–20 miles*.
- 27 *No flights. Wind NE 6–55 miles*. Rain.
- 28 *No flights. Wind NE 4–24 miles*. Too muddy for a start of flight with the machine.
- 29 *Wind NE 4–22 miles*. Made one short flight of 25 sec.
- 30 *Wind 4–24 miles NE*. Made one flight of 1 min 10 sec.

October 1910

- 1 No flights. *Wind NE 4–25 miles*
- 2 Sunday. *Wind E 12–30 miles*.
- 3 No flights. *Wind 2–8 miles*. Rain.
- 4 No flights. *Wind 5–12 miles E*. Muddy grounds.
- 5 *No flights. Wind NE 12–26 miles*. *Muddy grounds*.
- 6 *No flights. Wind NE 23–40 miles*. Rain. *Barometer 30.37"*.
- 7 *No flights. Wind E 15–28 miles*. *Barometer 30.43"*.
- 8 *No flights. Wind SE 12–35 miles*. *Barometer 30.32"*.
- 9 Sunday. *Wind NE 17–28*. Rain. *Barometer 30.17"*.
- 10 No flights. *Wind S 13–24 miles*. Rain. *Barometer 30.23"*.

Logbook of Signal Corps No. 1

On D.S.⁷¹ at Belmont Park⁷² and Baltimore Aviation⁷³ Meet,
Oct–Nov 1910

U.S. Army Air Detachment on duty at Fort Sam Houston, San Antonio,
Texas, 1910 & 1911

(1932)⁷⁴

1st Lt B. D. Foulois, S.C.

Comdg, Maj. Gen.
A.C., retired

[Marginal note encompassing data for lines Idzorek through Cook, inclusive:
9 enlisted, 1 civ. mech., 10 as of 2/M[ar]ch/1910?]

Sgt Stephen J. Idzorek, S.C.

Lt. Col. Air Corps

Sgt. Herbert Marcus, S.C.

Master Sgt., retired

Cpl. Vernon L. Burge, S.C.

Lt. Col. A.C. *retired*

Pvt. Cpl. Glenn R. Madole, S.C.

status unknown

Pvt. Felix G. Clarke, S.C.

status unknown

Pvt. R.W. Brown, S.C. (1910 or 1911)

status unknown

Pvt. (1910)? (1911)? Pierce, S.C. (1910 or 1911) status unknown

Civilian Mechanic Oliver G. Simmons (1910) Pres., Genl. Manager,
The National Tool
Co., Cleveland O.

Cook (Ret) William C. Abolin (1910)

Pvt. Kenneth L. Kintzel (in 1910 or 1911?)

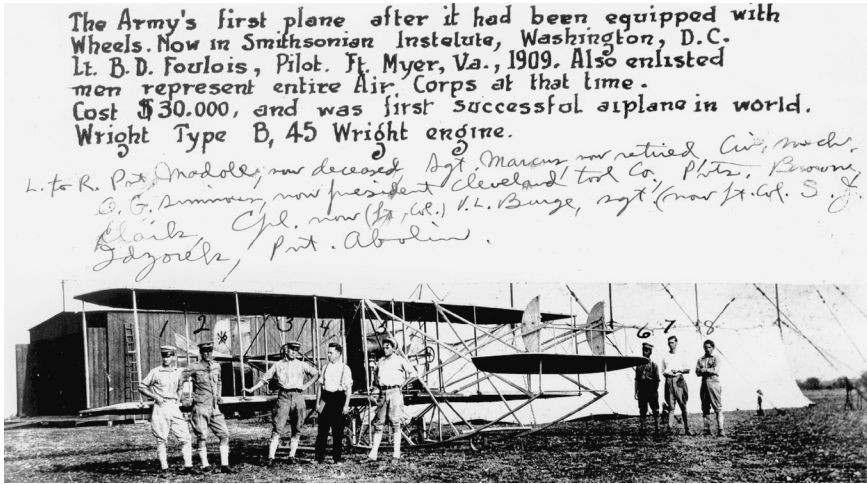
(Note: See Plate No. 27, *How The [sic] Army Grew Wings*, following
Page 192)

71. Detached status.

72. The International Aviation Tournament, held from October 22 to 30, 1910, at Belmont Park on Long Island, New York, was one of the most important of the early international aviation meets. More than twenty-five of the world's greatest airmen from England, France, and the United States competed for \$74,800 in prizes. Sherwood Harris, *The First to Fly: Aviation's Pioneer Days* (New York: Simon & Schuster, 1970), pp. 195–197, 202–209.

73. The air meet at Baltimore, Maryland, took place from November 2 through 8, 1910, but appears to have been hampered by rain and overshadowed by the Belmont Park Meet. Chandler and Lahm, *How Our Army Grew Wings*, p. 182; Fred Howard: *A Biography of the Wright Brothers* (New York: Alfred A. Knopf, 1988), p. 359.

74. This date poses a conundrum because the status of the detachment members as listed below it was incorrect as of 1932. Foulois, for one, was still Chief of the U.S. Army Air Corps, while Sgt. Stephen Idzorek and Cpl. Vernon Burge were majors. Foulois retired in December 1935. Idzorek became a lieutenant colonel in August 1936 and retired in his permanent rank of major in October 1939. Burge became a lieutenant colonel in February 1934 and a colonel in October 1940, retiring in January 1942. It is probable that Foulois wrote the original list in 1932 and updated the status of individuals later. See the *U.S. Army Register* for the appropriate years.



Signal Corps No. 1 at Fort Sam Houston in the late summer of 1910. From left to right, those pictured are Pvt. Glenn R. Madole, Sgt. Herbert Marcus, Pvt. R. W. Brown, civilian mechanic Oliver G. Simmons, Pvt. Felix Clarke, Cpl. Vernon L. Burge, Sgt. Stephen J. Idzorek, and Pvt. William C. Abolin. The tricycle landing gear designed by Foulois and his crew — a pair of wheels mounted to each skid under the wing and a nose wheel fixed to the cross bar under the front elevator — is visible. The wheels are much smaller than the standard sets provided by the Wright company, as can be seen in the picture of the Wright Model B on page 9.

December 1910

No flights. Remodelling wheels and replacing wires, etc.

January 1911

No flights. Building new propellers, new struts, new surfaces

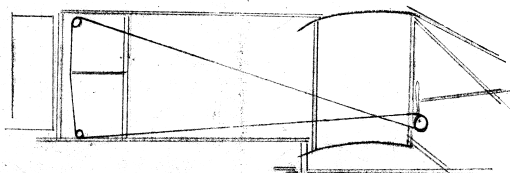
February 1911

No flights. Replacing all old wires, cables, etc. Shifted from old original No. 1 type of 2-stick control to new type B single warping — rudder control.⁷⁵ Installed elevator surface as a fixed surface in rear of rear vertical rudder, thus providing one elevator surface in front and one in rear.⁷⁶

75. The Wright control system on S.C. No. 1 consisted of a single control stick left of the pilot's seat for the elevator, and a control stick on the right side to manipulate the wing warping. Moving the left stick backward and forward moved the elevator up and down; moving the right stick backward and forward rolled the machine right and left. A short section at the top of the wing-warping stick was hinged for right and left motion and controlled the rudder. The wing-warping and rudder controls were linked, allowing the wing warping and rudder to work together to ensure a coordinated turn. Hennessy, *The United States Army Air Arm*, p. 93.

76. A photograph of S.C. No. 1 in its final form shows the airplane with an elevator in

Logbook of Signal Corps No. 1



The Wright brothers sent Foulois this sketch for a modified control system whereby the rear-mounted stabilizer of Signal Corps No. 1 could become an elevator moving in conjunction with the elevator in the front.

March 1911

General overhaul and remodelling completed. No. 1 reassembled and few short flights made. No more flights made however due to arrival of Collier Type B⁷⁷ in February 22 1911.

Note: All record of flights in Collier Plane in 1911 and other flights made in 1911, were combined in a chest of personal records, which were lost during the World War, 1917–1918. [Marginal note: 1910–1911 correspondence with Wrights also lost.]

1st flight mil Collier plane, Feb 23, 1911. Parmalee,⁷⁸
Foulois.

On reconnaissance duty with Collier plane (with Phil Parmalee) on Mexican Border, March 1 to 7, per S.O. 42, H.q. Dept of Texas.

(Laredo to Eagle Pass flight, 3/March/11. Return trip, Eagle

the rear and no forward control surfaces. Since the comments in this text were a later addition to the logbook, it is possible that Foulois's memory was unclear about the final modifications. See Miller, "Kept Alive by the Postman," p. 40.

77. Robert F. Collier, owner of *Collier's* magazine and an aviation enthusiast, purchased a new 1910 Wright Model B and offered to lease it to the U.S. Army, which had no funds for new aircraft. The Army paid Collier a nominal fee of \$1.00 per month for the airplane and sent it to San Antonio. Hennessy, *The United States Army Air Arm*, p. 40. Hennessy states that the Collier-Wright arrived on February 21, 1911.

78. Since Foulois was unfamiliar with the Model B, the Wright brothers sent one of their finest pilots, Phillip O. Parmalee, to San Antonio to give Foulois instruction. Parmalee had learned to fly in the Wright School at Dayton, Ohio, and was best known for the first delivery of aerial freight. He transported 200 pounds of silk cloth from Dayton to Columbus, Ohio, on November 7, 1910. Flying on the Collier-Wright began, according to Hennessy, on February 22, but it was halted five days later when the detachment were transferred to Fort MacIntosh on the Rio Grande. *Ibid.*; Crouch, *The Bishop's Boys*, p. 433.



Foulois and Parmalee prepare for takeoff in the Collier-Wright Model B.

Pass to Laredo, 5/March/11. Ended in Rio Grande, 25 mi out of Eagle Pass.) Assigned to duty with Maneuver Division,⁷⁹ San Antonio, Texas, per telegraphic authority, Sec War, dated M[ar]ch 14, 1911. Note: no record of flights with Maneuver Div, although a number were made in Collier Plane and in a new Type B plane No. 3⁸⁰ — solo, and in company with Parmalee (March) and Coffyn⁸¹ (Apr, May '11)

79. The outbreak of the Mexican Revolution in 1910 led to unrest along the border with the United States. In early 1911, President William H. Taft sent some 16,000 troops to the Southwest. The U.S. Army, which lacked a permanent division-level organization, took this opportunity to form the Maneuver Division at Fort Sam Houston under Maj. Gen. William H. Carter, its first attempt to develop a modern tactical division. The formation never reached full strength, conducted no maneuvers, and was disbanded on August 7, 1911. Nonetheless, the experience proved valuable when the army activated the 2d Division in February 1914 and went to France in 1917. Thomas F. Burkett, "Mobilizations of 1911 and 1913," *Military Review* (July 1973), pp. 65–74.

80. On March 3, 1911, Congress made its first appropriations for U.S. Army aviation, \$125,000 for Fiscal Year 1912. With these funds, the Signal Corps purchased five aircraft, Nos. 2 through 6, from three manufacturers: the Wright Brothers, Glenn Curtiss, and W. Starling Burgess, who manufactured Wright-type aircraft under license. S.C. No. 3 was accepted at Fort Sam Houston on April 27, 1911. Hennessy, *The United States Army Air Arm*, pp. 40, 42.

81. The Wright brothers recalled Parmalee and replaced him on April 18 with Frank T. Coffyn, another Wright Company pilot. Coffyn was one of the first six pilots taught to fly by the Wrights at Dayton, and he later was a member of the Wright Flying Team. Like Parmalee, Coffyn worked with Foulis to improve his piloting skills. *Ibid.*, p. 42.

Logbook of Signal Corps No. 1

March-April-May-June-July 1911

On duty with Maneuver Division w/Provisional Aero Co. S.C.⁸² during above period. Assigned to Provisional Aero Co. S.C. per order 2, office Chief Signal Officer, dated April 5, 1911.

Note: Provisional Aero Co. organized within the Maneuver Div upon the arrival of Beck,⁸³ Kelly,⁸⁴ and Walker⁸⁵ with the first Curtiss D-Type plane (U.S. Army Airplane No. 2).⁸⁶

July 1911

Relieved from duty with Maneuver Div, July 22, 1911, per S.O. 160 W.D.⁸⁷ dated July 11, 1911. On duty, Div. Military Affairs, W.D. Wash D.C. from July 25, 1911, per S.O. 160 W.D. dated July 11, 1911.

82. The Signal Corps formed a Provisional Aero Company on April 5, 1911, at Fort Sam Houston under the command of Lt. Paul W. Beck. To govern the unit, Foulois wrote the "Provisional Aeroplane Regulations for the Signal Corps, U.S. Army, 1911." The unit disbanded shortly after the crash and death of Lt. George E. W. Kelly on May 10, 1911, and the men and equipment transferred to the Signal Corps Aviation School at College Park. Foulois, *From the Wright Brothers to the Astronauts*, pp. 86–94.

83. Lt. Paul W. Beck, Signal Corps, was one of three officers detailed in late 1910 to the Glenn Curtiss flying school on North Island at San Diego, California. While assigned at North Island, Beck was sent as the army observer to the aviation meet at Los Angeles in January 1911, and he subsequently conducted some bombing experiments with Lt. Myron Crissy of the Coast Artillery Corps. The U.S. Army transferred Beck to Fort Sam Houston before he finished instruction. Beck earned F.A.I. pilot certificate No. 39 in August 1911, was awarded Expert Aviator certificate No. 6 by the Aero Club of America in 1912, and received his Military Aviator badge in July 1913. Beck outranked Foulois on the army list and thus took command of the Provisional Aero Company formed at San Antonio, a situation that irritated Foulois because Beck was an inexperienced flyer. *Ibid.*, pp. 86–87; Hennessy, *The United States Army Air Arm*, pp. 42, 45, 50, 52, 236.

84. Lt. George E. M. Kelly, 30th Infantry, was one of three officers assigned to the Glenn Curtiss flying school on North Island. On May 10, 1911, Kelly, in the Curtiss Model D, S.C. No. 2, attempted to land at high speed, appeared to lose control, and was killed in the ensuing crash. After the accident, General Carter, Commander of the Maneuver Division, terminated flying at Fort Sam Houston. Lieutenant Kelly was the first U.S. Army officer killed while piloting an airplane. Kelly Air Force Base at San Antonio was later named after him. Hennessy, *The United States Army Air Arm*, pp. 42, 45, 47, 50, 86, 239; Chandler and Lahm, *How Our Army Grew Wings*, pp. 190–192.

85. Lt. John C. Walker, Jr., 8th Infantry, was one of three officers assigned to the Glenn Curtiss flying school on North Island. He later earned F.A.I. certificate No. 554 issued in August 1916. Hennessy, *The United States Army Air Arm*, pp. 42, 45, 167, 239.

86. The second airplane purchased by the U.S. Army was a Type 4 Curtiss Model D powered by a Curtiss 50-horsepower engine. The Model D was a pusher aircraft that featured a tricycle landing gear and ailerons mounted between the upper and lower wings in lieu of wing-warping. After Lieutenant Kelley's fatal crash on May 10, 1911, S.C. No. 2 was rebuilt and sent to the Signal Corps Aviation School. Chandler and Lahm, *How Our Army Grew Wings*, p. 192.

87. War Department.

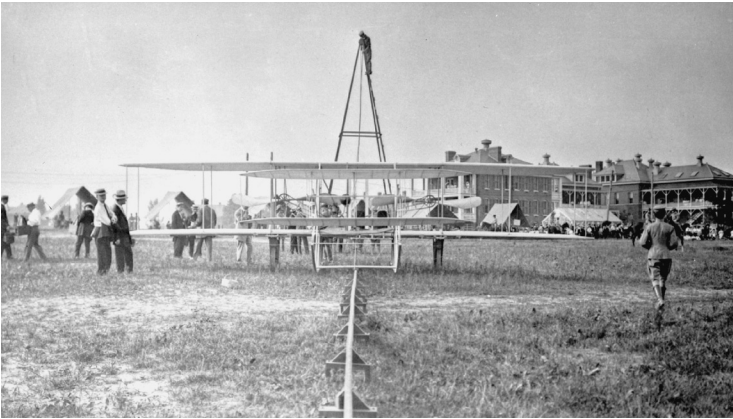


Cavalrymen watch a new age as a Wright Model B flies over the Army encampment on the parade ground at Fort Sam Houston in 1911. The buildings seen in the distance in the photograph to the right are the permanent buildings of the main post.

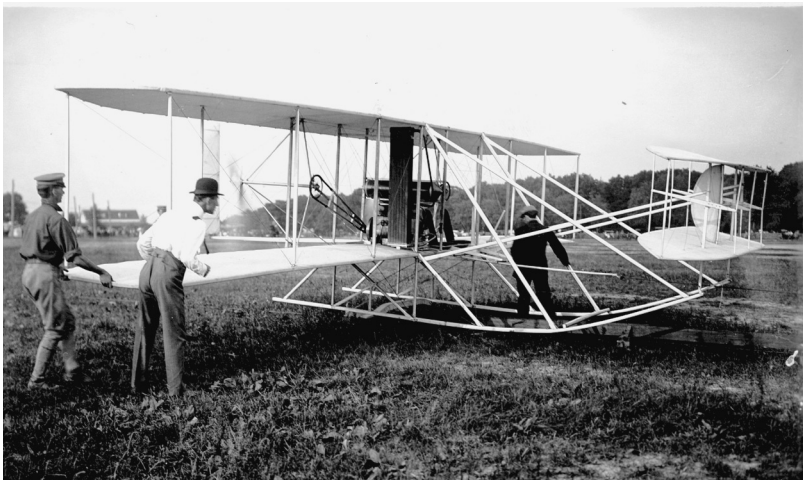
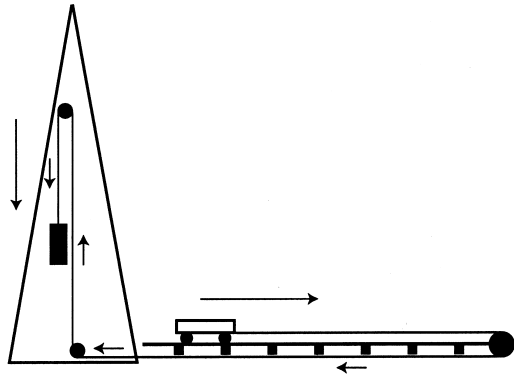




A Wright Model B, possibly the Collier Wright, is being assembled from a rail car at the top. Both panels of the right wing are in place. Inside the hangar at Fort Sam Houston are propellers, elevators, seats, wheels, rudders, and wings, awaiting assembly. The fully assembled Model B in the bottom photograph is being returned to its hangar.



The vectors indicated on this schematic of the launching derrick, shown at the rear in the photograph above, demonstrate how the force from lowering the weight from the top of the scaffold propels the aircraft forward along the rail, which is demonstrated in the photograph below.



Logbook of Signal Corps No. 1

PROPELLER TEST DATA

		Propeller			
3/24/10	Full	advance	1261	RPM	Original set propellers
	<i>Full</i>	retard	1092	<i>RPM</i>	
4/26/10	<i>Full</i>	advance	1268	<i>RPM</i>	
	<i>Full</i>	retard	125	<i>RPM</i>	
5/02/10	<i>Full</i>	advance	1307	<i>RPM</i>	2d set propellers
	<i>Full</i>	retard	1104	<i>RPM</i>	
	<i>Full</i>	advance	1454	<i>RPM</i>	
8/17/10	<i>Full</i>	advance	1454	<i>RPM</i>	3d set propellers
	<i>Full</i>	retard	1214	<i>RPM</i>	
8/23/10	<i>Full</i>	advance	1452	<i>RPM</i>	
	<i>Full</i>	<i>advance</i>	1438	<i>RPM</i>	
	<i>Full</i>	<i>advance</i>	1392	<i>RPM</i>	
Propeller tests May 10, 1910					
	Full	retard,	thrust,	1103	RPM
	<i>Full</i>	advance,	“	1268	<i>RPM</i>
	<i>Full</i>	retard,	pull,	338	lbs.
	<i>Full</i>	advance,	“	452	<i>lbs.</i>
	Thrust at full advance taken after a 5 min run				
9/21/10	Full	advance	1462		
	<i>Full</i>	<i>advance</i>	1426 (2d test)	new left propeller used	
9/29/10	<i>Full</i>	<i>advance</i>	472	RPM	at 8:35 AM
	<i>Full</i>	<i>advance</i>	1424	<i>RPM</i>	at 9:27 AM after a run of approximately 10 minutes.

[Written at bottom of page:]
 Arnstein's No. 00 Never Slip Tire Cement, Eugene Arnstein, Chicago, Ill.⁸⁸

88. Arnstein's Cement appears to have been a fixture on Wright machines. In November 1903, as the Wright brothers were preparing the 1903 airplane for its first flight, they faced a serious problem. No matter how hard they tightened the setscrews, the propeller sprockets worked themselves free from the drive shafts when the engine ran. In desperation they finally applied Arnstein's hard cement, which, according to Orville, "would fix anything from a stopwatch to a threshing machine." The sprockets never came free again. Quoted in Crouch, *The Bishop's Boys*, p. 261.

RECORD OF FLIGHTS AT FORT SAM HOUSTON

by
Lieutenant Benjamin D. Foulois

Mar 2

- (1) Start at 9:30 AM
 Finish at 9:37:30 AM (7 ½ min)
 Maximum height 125 ft
 Length of glide at descent, 40 ft
 Wind NW, 7 miles, unsteady

2d flight

- (2) Start at 10:57 AM
 Finish at 11:07 AM (10 min)
 Maximum height 200 ft
 Wind NE, 6 miles

3d flight

- (3) Start at 2:00 PM
 Finish at 2:21 PM (21 min)
 Maximum height 100 ft.
 Wind NE to SW to NW, 5 miles
 5 ¼ gasoline in tank before this flight
 4 3/8 gasoline in tank after this flight

A start was made, machine failing to rise owing to a defective roller and a powerful gust of wind blowing down the track from Southwest as machine started.⁸⁹

4th flight

- (4) Start at 3:35 PM
 Finish at 3:56 PM (21 min)
 Maximum height 90 ft.
 Wind SW to N, 7 miles

On this flight made rough landing due to attempting to flatten the gliding angle too much, which resulted in landing on rear end of skids. As a result of this rough landing, two wooden truss braces, the front and rear stringer pieces on the lower center plane were broken and the two bed plates underneath the engine were cracked.

89. See the footnote to the February 26, 1910, entry in the daily log for a discussion of the tower and track launching system.

Logbook of Signal Corps No. 1

Upon examination it was found that one of the bed plates underneath the engine had been cracked, presumably during the flights at College Park or Ft. Myer, and had never been repaired. As a result of this the whole structure supporting engine had been weakened, and it only required a sharp jar to break it.

Mar. 12 Start at 9:15:15 AM
Finish at 9:23:40 AM (8 min 25 sec)
(5) Wind at start NW, 1.2 miles
Maximum height 90 ft.
5 Gals gasoline in tank = 3 ¾" before flight

2d flight

(6) Start at 9:45:05 AM
Finish at 10:00:10 AM (15 min 5 sec)
Wind at start NW, 1.2 miles
Maximum height 100 ft.
5 gals. gasoline more before flight = 6 ½" in tank

3d flight

5 ¾" gasoline in tank
(7) Start at 10:21:55 AM
Finish at 10:26:15 AM (4 min 10 sec)
Wind at start NW, 3 miles
Maximum height 90 ft.
Slide at landing 90 ft
Weights were 3 ft lower than ordinarily causing a little more difficulty than usual in making machine rise from track. Defect corrected.

4th flight

(8) Start at 3:04:10 PM
Finish at 3:16 PM (12 min 10 sec)
Wind at start NE, 4.8 miles
Maximum height 225 ft
Slide at landing 118 ft
Max wind during flight, 7.2 miles
The Lieutenant flew over the buildings at the Lower Post about 1 mile distant from aero field.

5th flight

5" gasoline in tank
(9) Start at 4:20:40 PM
Finish at 4:36:40 PM (16 min)

Record of Flights

Wind at start SE, 3.6 miles
 Maximum height 100 ft
 Slide at landing 115 ft
 Max wind during flight, 10.8 miles
 Southeast track used in all flights

Flights in afternoon were made with two sack weights weighing 15 ½ lbs placed at extreme front end of skids. It was noticed in morning flights that machine seemed to drag down in rear and it seemed difficult to maintain horizontal flight. After the addition of the weight in front, the machine travelled perfectly and no dragging sensation was noticed.⁹⁰

1 weight 8 ½ lbs; other, 7 lbs

- Mar. 14 6 5/8" gasoline in tank
- | | | | |
|------|-------------------------|---------------|-----------------|
| | Start at | 3:13:45 PM | |
| (10) | Finish at | 3:36:10 PM | (22 min 25 sec) |
| | Wind at start | NW, 3.6 miles | |
| | Maximum height | 115 ft | |
| | Slide at landing | 84 ft | |
| | Max wind during flight, | 7.2 miles | |
-
- | | | | |
|------|------------------|------------|----------------|
| | Start at | 3:02:23 PM | |
| | Finish at | 3:08:25 PM | (6 min 02 sec) |
| (11) | Wind at start | SE | |
| | Maximum height | 90 ft. | |
| | Slide at landing | 100 ft | |
-
- | | | | |
|-----------|------------------|------------|----------------|
| 2d flight | | | |
| | Start at | 3:23:35 PM | |
| (12) | Finish at | 3:29:10 PM | (5 min 35 sec) |
| | Wind at start | S | |
| | Maximum height | 175 ft | |
| | Slide at landing | 78 ft | |
-
- | | | | |
|-----------|----------------|-------------|---------|
| 3d flight | | | |
| | Start at | 3:56:30 PM | |
| (13) | Finish at | 4:03:30 PM | (7 min) |
| | Wind at start | S, 12 miles | |
| | Maximum height | 100 | |
-
- | | | | |
|---------|-----------|------------|--|
| | Start at | 4:17:50 PM | |
| Mar. 21 | Finish at | 4:30:50 PM | |

⁹⁰. The addition of weight to the nose suggests that the machine had developed a tail-heavy condition.

Logbook of Signal Corps No. 1

- Wind at start SE, 3.6 miles
Wind during flight 16 miles
- (14) Maximum height 350 ft (13 min)
Glide from 10' height, 213 ft
Slide at landing 75 ft
Gasoline in tank bef[ore] flight, 4 1/2"
Gasoline in tank after flight, 3 7/8"
- April 6 6" Gasoline in tank before flight
Start at 9:03:50 AM
Finish at 9:03:55 AM
Without weights
Wind at start SE, 12 miles
- 2d flight
Start at 9:14:56 AM (4 min 4 sec)
Finish at 9:19 AM
- (15) Wind at start SE, 10 miles
Glide lasting 5 3/5 sec from a height of 25 ft
Maximum height 125 ft
- April 12 6" Gasoline in tank before flights
Start at 1:20:11 PM
Finish at 1:25:35 PM (5 min 24 sec)
- (16) Wind at start SE, 7 miles
Maximum height 125 ft
Glide from 68' height = 157 yds in 9 4/5 sec
- 2d flight
Start at 1:43:10 PM
Finish at 1:48:30 PM (5 min 20 sec)
- (17) Wind at start SE, 6 miles
Maximum height 150 ft
Glide from 68' height = 172 yds in 8 sec
- 3d flight
Start at 2:08:08 PM
Finish at 2:12:50 PM (5 min 38 sec)
- (18) Wind at start SE, 6 miles
Maximum height 300 ft
Glide from 200' height = 284 yds in 19 1/5 sec.
- 4th flight
Start at 2:35:12 PM

Record of Flights

- (19) Finish at 2:40:50 PM (5 min 38 sec)
Wind at start SE, 4 miles
Maximum height 400 ft
Glide from 300' height = 432 yds in 19 sec
- 5th flight
- (20) Start at 3:09:50 PM
Finish at 3:21:50 PM (12 min)
Wind at start SE, 2 miles
Maximum height 175 ft
Glide from 175' height = 253 yds in 15 sec
4" Gasoline in tank
1/8" oil used in cups during the PM
6° angle in getting off track
- April 14 Start at 9:06:08 [AM]
Finish at 9:13:35 [AM] (7 min 27 sec)
- (21) Wind at start NE, 3 miles
Glide from 220' height = 272 yds in 12 sec
Maximum height 300 ft
- 2d flight
- (22) Start at 9:49:50 AM
Finish at 9:54:55 AM (5 min 5 sec)
Wind at start SE, 3.5 miles
Maximum height 375 ft
Glide from 250' height = 248 yds in 13 2/5 sec
- 3d flight
- (23) Start at 10:30:08 AM
Finish at 11:05:10 AM (35 min 2 sec)
Wind at start NE, 6 miles
Maximum height 600 ft
Glide from height of 200' = 11 3/5 sec
Flew over lower post and quadrangle in the course of this flight;
also several figure 8s
- April 15 Start at 11:12:06 AM
Finish at 11:17:30 AM (5 min 24 sec)
- (24) Wind at start SE
Maximum height 275 feet
Glide from 80' height = 121 yds in 7 4/5 sec
- 2d flight
- Start at 1:56:45 PM

Logbook of Signal Corps No. 1

- (25) Finish at 2:08:45 PM (12 min)
Wind at start E
Maximum height 250 ft
In this flight, exhaust valve on No. 4 cylinder broke off. The motor was stopped and machine was guided safely to earth.
- April 26 Start at 2:44:07 PM
Finish at 2:46:14 PM (2 min 7 sec)
(26) Wind at start SW
Maximum height 75 ft
Glide 4 2/5 sec
- 2d flight
Start at 3:34:15 PM
Finish at 3:37:50 PM (3 min 35 sec)
(27) Wind at start SW
Maximum height 115 ft
Glide 5 1/5 sec
- April 27 Start at 9:24:34 AM
Finish at 9:37:40 AM (9 min 6 sec)
(28) Wind at start SW
Glide from 100' height = 200 yds in 12 2/5 sec
Maximum height 175 ft.
- 2d flight
Start at 10:05:30 AM
Finish at 10:14:45 AM (9 min 15 sec)
(29) Wind at start SW
Glide from 40' height = 90 yds in 4 2/5 sec
Maximum height 140 ft.
- 3d flight
Start at 11:02:30 AM
(30) Finish at 11:03:30 AM (1 min)
Passenger: Eldred, E.O.
- May 9 Start at 10:20:53 AM
Finish at 10:28:45 AM (7 min 53 sec)
(31) Wind at start NE
Glide 302 yds in 16 3/5 sec from 125 ft
Maximum height 300 ft
- May 12 Start at 9:05:40 AM
Finish at 9:09:25 AM (3 min 45 sec)

Record of Flights

- (32) Wind at start NE
 Glide 6 $\frac{3}{5}$ sec
 Maximum height 90 ft
 The rear horizontal plane was replaced in its original position in front. A new, smaller plane was put in its place. Speed of machine was increased noticeably.
- May 28
 Start at 10:33:30 AM
 Finish at 10:34:40 AM (1 min 10 sec)
- (33) Wind at start NE
 Glide 5 sec.
 Maximum height 75 ft.
- May 30 Start at 10:08:45 AM
 Finish at 11:10:45 AM (1 hr 2 min)
- (34) Wind at start SE
 Max height 125 ft
 Max wind during flight, 15 miles
 Results of tests over half-mile course; course laid N and S.
- | | | | |
|-------------------------|-----------------------|-------------|--------|
| Start from N end | 42 $\frac{2}{5}$ sec} | 40.09 miles | |
| Finish at <i>N end</i> | 47 $\frac{2}{5}$ sec} | | 37.97 |
| Start from <i>N end</i> | 41 sec} | 42.15 miles | |
| Finish at <i>N end</i> | 44 $\frac{2}{5}$ sec} | | |
| Start from <i>N end</i> | 47sec} | 41.67 miles | |
| Finish at <i>N end</i> | 39 $\frac{2}{5}$ sec} | | 45.685 |
| Start from <i>N end</i> | 45 $\frac{4}{5}$ sec} | 41.67 miles | |
| Finish at <i>N end</i> | 40 $\frac{3}{5}$ sec} | | |
- May 31 Start at 10:03:50 AM
 Finish at 10:09:15 AM (5 min 35 sec)
- (35) Wind at start S
 Max height 100 ft
- 2d flight
- (36) Start at 3:04:20 PM
 Finish at 3:07:05 PM (2 min 45 sec)
 Wind at start SE
 Max height 90 ft
- June 1 Start at 9:15:28 AM
 Finish at 9:29:45 AM (14 min 13 sec)
- (37) Wind at start E
 Maximum height 250 ft

Logbook of Signal Corps No. 1

	Glide	723 ft in 12 $\frac{2}{5}$ sec	
		2d flight	
	Start at	9:46:05 AM	
	Finish at	9:55:55 AM	(9 min 50 sec)
(38)	Wind at start	SE	
	Maximum height	150 ft	
	Glide	900 ft in 14 $\frac{3}{5}$ sec	
		3d flight	
	Start at	10:29:15 AM	
	Finish at	10:36:30 AM	(7 min 15 sec)
(39)	Wind at start	S	
	Maximum height	390 ft	
	Glide	945 ft in 15 $\frac{2}{5}$ sec	
June 7	Start at	10:37:10 AM	
	Finish at	10:38:50 AM	(1 min 40 sec)
(40)	Wind at start	SE, 15 miles	
	Max height	75 ft	
	Glide	10 $\frac{2}{5}$ sec	
		2d flight	
	Start at	10:55 AM	
	Finish at	10:59:28 AM	4 min 28 sec)
(41)	Wind at start	SW, 12 miles	
	Max height	75 ft	
	Glide	7 $\frac{1}{5}$ sec	
July 20	Start at	9:24 AM	
	Finish at	9:27 AM	(3 min)
(42)	Wind at start	NE	
	Max height	50 ft	
	Glide	4 sec	
		2d flight	
	Start at	9:47:20 AM	
	Finish at	9:51:10 AM	(3 min 50 sec)
(43)	Wind at start	SE	
	Maxim. height	150 ft	
	Glide	12 $\frac{4}{5}$ sec.	
		3d flight	
	Start at	10:12:40 AM	
	Finish at	10:14:40 AM	(2 min)

Record of Flights

- | | | |
|---------|--|---|
| | Max. height | 100 ft |
| Aug. 18 | Start at | 7:40:20 AM |
| | Finish at | 7:42:40 AM (2 min 20 sec) |
| (44) | Wind at start | SE |
| | First use of wheels on machine, a start was made in 111 ft and stop in 125 ft. | |
| Aug. 19 | Start at | 7:01:30 AM |
| | Finish at | 7:16:40 AM (15 min 10 sec) |
| (45) | Wind at start | NE |
| | Maximum height | 800 ft |
| | Glide height 725 ft = 30.45 sec – distance 725 yds | |
| | 2d flight | |
| | Start at | 10:00:10 AM |
| | Finish at | 10:16:55 AM (6 min 45 sec) |
| (46) | Wind at start | SE |
| | Maximum height | 200 ft |
| | Glide from 150 ft | 11 sec |
| Aug. 20 | Start at | 6:40:45 AM |
| | Finish at | 6:47:45 AM (7min) |
| (47) | Glide from height of 900 ft in 32 sec, a distance of 3600 ft | |
| | Wind at start | NE |
| | Maximum height | 1000 ft |
| | 2d flight | |
| | Start at | 7:04:40 AM |
| | Finish at | 7:08:45 AM (4 min 5 sec) |
| (48) | Wind at start | SE |
| | Maximum height | 700 ft |
| | Glide | 30 1/5 sec from height 500 ft in a semicircle |
| Aug. 22 | Start at | 6:50:45 AM |
| | Finish at | 6:53:45 AM (3 min) |
| (49) | Wind at start | NE |
| | Max height | 150 ft |
| | Glide | 11 2/5 sec |
| | 2d flight | |
| | Start at | 7:03 AM |
| | Finish at | 7:19 AM (16 min) |
| (50) | Wind at start | SE |
| | Max height | 100 ft. |

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- Aug. 23 Start at 6:43:40 AM
 Finish at 6:47:30 AM (3 min 50 sec)
 [51] Wind at start S
- 2d flight
 (52) Start at 6:51 AM
 Finish at 6:52 AM (1 min)
 Wind at start S
- 3d flight
 (53) Start at 7:04 AM
 Finish at 7:07 AM (3 min)
 Wind at start S
 Wind very puffy in all flights
- Aug. 24 Start at 6:40:10 AM
 Finish at 6:42:20 AM (2 min 10 sec)
 (54) Wind at start E
 Barometer 30.04"
- 2d Flight
 (55) Start at 8:22:40 AM
 Finish at 8:32:40 AM (10 min)
 Wind at start E
 Barometer 30.05"
- Aug. 25 Made three short flights as follows:
 30 sec, 20 sec, and 33 sec (see diary of Aug.25)
 Barometer rising gradually from 30.048" at 6:30 AM to 30.11" at
 11 AM and then dropping gradually to 30.02" at 4:00 PM
- Sept. 1 Start at 10:52 AM
 Finish at 10:58 AM (6 min)
 Barometer 30.14"
 Thermometer 83°F, dry
 Wind SE
- Sept. 8 Start at 8:50 AM
 Finish at 8:51 AM (1 min)
 Barometer 30.30"
 Thermometer 82°F
 Wind S, very unsteady
- Sept. 29 Start at 9:07:30 AM

Record of Flights

Finish at 9:07:55 AM (25 sec)
Barometer 30.245"
Temperature 77°F
Wind NW, 4 miles
Distance covered 1513.215 feet
Speed 40.08 miles per hour
Direction of flight NE

Sept. 30 Start at 10:33:40 AM
Finish at 10:34:50 AM (1 min 11 sec)
Barometer 30.20"
Temperature 84°F
Wind 4 miles at start to 12 miles at finish, NE
Direction of flight NE

PHOTO CREDITS

Photographs on pages 11, 13, 15, and 21 are courtesy Megan Chamberlain.

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Sketch on page 34 is from a letter, Wright brothers to Foulois, May 31, 1910, in General Correspondence, Wilbur and Orville Wright Papers, Library of Congress.

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