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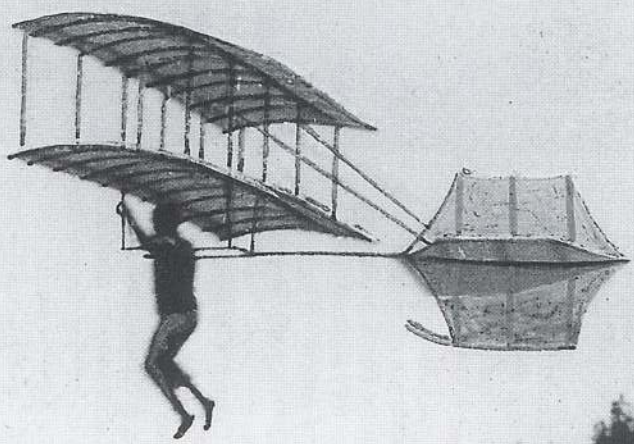
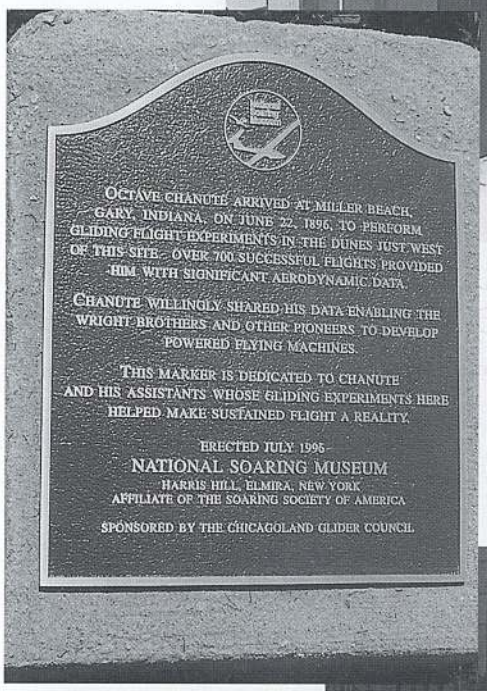
Octave Chanute



The National Soaring Museum's
Eighth National Landmark of Soaring-
Octave Chanute and his Assistants
Centennial Celebration
Miller Beach, Gary, Indiana, July 27, 1996

by James W. Swinnich, NSM Executive Director

NSM Landmark Committee Chair, Simine Short addresses gathering at the National Landmark program. Chicagoland Glider Council Treasurer, Ray Konrath, right.



National Landmark of Soaring plaque at Miller Beach, Gary, Indiana.

Right, Jeffery Byard, NSM President, speaking on the historical significance of mortorless flight.

Sand. Wind. Beach. Gliders. And Octave Chanute was there in spirit! All the elements were in place for the NSM's 8th National Landmark of Soaring Dedication which took place on 27 July 1996 in Marquette Park, Miller, Indiana. The event recognized Chanute's work 100 years ago on the shores of Lake Michigan. Most importantly, the pioneering verve of early aviation rematerialized.

Due to the efforts of NSM Landmark Committee Chair Simine Short, this soaring event accomplished what all NSM programming and exhibits strive toward - an engaging, diverse community involvement expanding the motorless flight audience. The event was sponsored by the NSM in conjunction with The Aquatorium Society, and The Chicagoland Glider Council.

The plaque dedication ceremony was opened by Simine Short with remarks from Gary Mayor, Scott King, President George Wagner of the Western Society of Engineers, and introductions by Aquatorium President George Rogge, and NSM President Jeff Byard. It was the team of Byard, Rogge, and Chicagoland Glider Council Treasurer Ray Konrath who had the honor of unveiling the bronze plaque laid in a garden setting fronting The Aquatorium.

There was music, and stirring selections they were, by the Ceol More Bagpipe Band, a fabulous rendition of America The Beautiful by John Dunson to open the plaque ceremony, with the evening festivities featuring the reggae band Steris.

The day was highlighted by Dr. Tom Crouch's lecture. Chair of the Aeronautical Department at The National Air and Space Museum, the distinguished Dr. Crouch provided historical context for both those familiar with and oblivious to the Albatross, two surface glider, and multi-winged ships flown by Chanute and his compatriots. The slide program and an opportunity to question the premier historian of early aviation was an enlightening treat for the audience taking in "Octave Chanute, Pioneer of Flight." Crouch's presentation was also a reminder that Chanute was not operating alone in a scientific vacuum. Herring, Avery, and Butusov (and even Chanute's dogs Rags and Tatters) played integral roles at the 1896 camp. Crouch further illuminates the role Chanute played in aviation history around the 1896 period with the accompanying article in this NSM Journal.

In recognition of Chanute's significance and the centennial anniversary, three replicas of his two-surface ship were built. Two were transited to Indiana with thoughts of flying the crafts dancing fancifully in the heads of their creators.

Sixth grade students from the Asa Adams Elementary School in Orono, Maine, built and flew their ship 150 feet in the Pine Tree State. Under the tutelage of teachers Chris Chilelli and Richard Glueck, the kids took on the project and six of them screened a video of that flight following the Crouch presentation.

Aeronautical engineer Paul Dees traveled the country east from Redmond, Washington, with his family and a wood and fabric replica. Dees had successful flights with his ship the day prior to the 27 July events. These flights took place along Lake Michigan shores about ten miles west of Miller Beach.

The Rochester Institute of Technology also generated an 1896 two surface ship, but of modern composite materials - weighing a mere fifty pounds. The graduate students - Pete Kapinski, Matt Lyon, Dale Davis, John Lanzoni, and Gerald Guadagno - were led in their efforts by Dr. Kevin Kochersberger.

It is this craft which will be displayed through 30 December 1997 by the NSM in our Restoration Area. It will complement an exhibit on early aviation by Chanute in this country and Lilienthal in Germany during the 1890's.

Both Dees and Kochersberger valiantly attempted to fly the gliders. Breezes off the water were southwestern. This meant the two pilots had to run on a down sloped angle through dune grass covered sand to have the wind directly in their face. The precipices known by Chanute have eroded from cliff like proportions of 80 and 100 feet to graceful serene slopes of but 15 and 20 feet. These adverse conditions translated into a day when flight was not possible for these two particular ships. However, anyone interested in aviation history certainly appreciated the arduous efforts. The sun drenched beach crowd cheered enthusiastically with Kochersberger's mere leaps into the air while burdened with the glider.

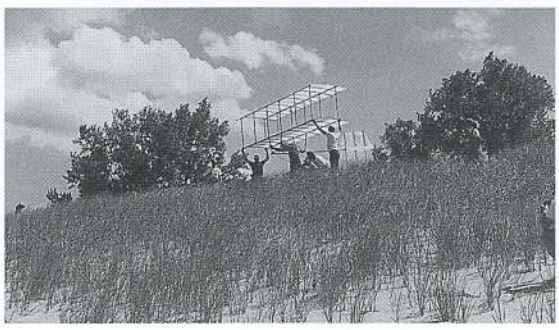
A glider mail run was made in a Schweizer 2-33 co-piloted by Kenny Ruffin of the Gary Flight Academy and Walter Gleason of the Chicagoland Glider Council. The glider gently set down on the soft Lake Michigan sands. Then, Gary, Indiana's U.S. Postal Service representative Michael Perry accepted the mail. The mail bag carried special souvenir envelopes emblazoned with a commemorative postmark recognizing Chanute, the Miller Beach site, and the NSM's National Landmark of Soaring Program.

It should be noted that the famous Tuskegee Airmen will be recognized and honored as a prominent part of the displays within The Aquatorium.

The event closed in style with The Aquatorium Society's Annual Fund Raiser. This time it was a reggae beach party featuring foods from eight local eateries. The money raised supports the restoration of the 1921 Gary Municipal Beach Bath House, now simply called the "Aquatorium." Extensive refurbishing work on the structure has been both well planned and executed. The beautiful architectural integrity remains, with walled, open-air gardens and beach views, the edifice and its setting is breathtaking. The society, formed in 1991, consists solely of volunteers and 400 members.

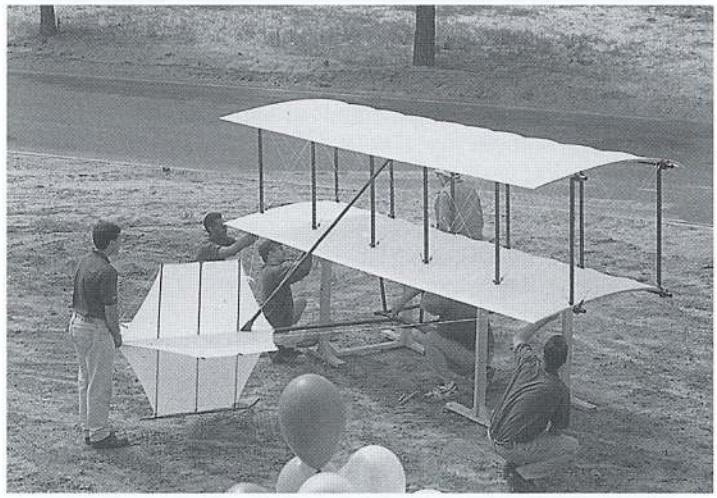
In addition to these participants, the Chicago Hang Glider Association and Chicagoland Glider Council displayed ships on a rise above and in front of The Aquatorium, the Jaycees sponsored the all-day volleyball tournament, and the NSM and SSA were represented by trustees and members alike from across the nation. Billie Chanute and John Hodges, descendants of Octave, were also in attendance. From speaking with them, it is very apparent that they recognize the historical significance of Octave's contributions and appreciated the efforts of the NSM, Aquatorium Society, and all those of the Indiana Dunes region who are working to commemorate those advancements.

It was crucial that the NSM pay homage to Chanute and his work with this landmark. The work of Dees, the students in Orono,Maine, and the R.I.T. grads also testify to the enduring impact Chanute and Herring had upon the evolution of aviation. Another institution is also recognizing these historic scientific achievements. The Chicago Museum of Science and Industry opened "Designed To Fly" in October 1996. Addressing early aviation, it too is focused on Chanute. Little else is being done in the nation to recognize the watershed occurrences taking place on the Indiana Dunes one hundred years ago.



Left to right: In front of Rochester Insititute of Technology's Chanute reproduction, Dr. Kevin Kochersberger, Pete Karpinski, John Lanzon, Matt Lyon, Gerald Guadagno and Dale Davis. Extreme right, Paul Dees, builder of Chanute reproduction using traditional materials.

Onlookers examine the Dees Chanute reproduction at Miller Beach.



Last-minute adjustments to the R.I.T. Chanute reproduction.

Left, the R.I.T. Chanute ready to launch, recalling 100 years of gliding history.

ON THE COVER

Chanute two-surface glider in flight over a Lake Michigan sand dune, 1896. Inset. Octave Alexander Chanute, 1832-1910. *(National Air & Space Museum, Smithsonian Insitituion photos)*

Octave Chanute Pioneer of Flight

by
Dr. Tom D. Crouch
Chair of the Aeronautical Department
Smithsonian Institution
National Air and Space Museum

It is not certain how Octave Chanute (1832-1910) first learned of Otto Lilienthal's death. Short accounts of the glider accident suffered by "the flying man" on August 9, 1896, began appearing in American newspapers during the week after the event. Chanute spent much of late August 1896 away from his Chicago home, however, living in the relative isolation of his glider camp pitched in the sand dunes ringing the southern shore of Lake Michigan. It is possible that he first heard of the tragedy through two letters that Wilhelm Kress and Herman Moedeboeck, friends and correspondents, had mailed from Berlin on August 13.

Ironically, Kress had spent the week of July 18 to 26 in the Berlin suburb of Lichterfelde, where Lilienthal, "... a tall, slender, sympathetic personality," had invited him to witness his glider trials.

> We went direct to his experimenting hill, 15 meters high, situated in a field. After he had shown me the half dozen flying machines that were housed at the top of the hill, and he made his flying toilet, he began his interesting experiments, and flew down, with two different apparatus, five times. The weather was very favorable, and Lilienthal himself said he had never flown better; but I must confess that, from the photographs I had seen, I expected more, and that I felt somewhat disappointed. He landed, in the most favorable instances, 26 to 30 paces from the foot of the hill. The longest flight was at most 325 meters horizontally; most of them were shorter. (1)

"The flight and landing were steady and gentle," Kress reported to Chanute, "but the construction of the apparatus disturbed me in many ways...." He was especially troubled by the control system and the way in which the two wings of the biplane glider were trussed together. "I warned Lilienthal very carefully," Kress remarked, "and he promised me that he would soon put it in order." A week later he was dead.

A Lilienthal-type glider constructed by A.M. Herring in the air over the Indiana dunes (Courtesy National Air & Space Museum, Smithsonian Institution).

Tom Crouch, Chair of the Aeronautical Department, Smithsonian Institution, National Air & Space Museum, presenting his slide lecture at the Eighth National Landmark of Soaring, at Marquette Park, Miller Beach, Indiana.

The news of Lilienthal's death came as a shock to Chanute, who regarded the German pioneer as the world's leading aeronautical experimenter. He had carried on an extended correspondence with Lilienthal; attempted to represent his interests in America; celebrated his courage; publicized his achievements; and encouraged other enthusiasts to make use of the German's information and experience.

At the same time, Chanute, like Kress, was not completely surprised by Lilienthal's death. He knew that Lilienthal's system of hang glider control was positively dangerous. Moreover, the inherent weakness of the bat-like Lilienthal wings and shaky wing trussing system were perfectly clear to one of the nation's most distinguished bridge builders. The desire to correct both the structural and control deficiencies of the Lilienthal aircraft had been a critically important factor in Chanute's decision to build and test gliders of his own design.

A native of France who had emigrated to the United States at the age of six with his father, Octave Alexander Chanute (1832-1910) had gone to work in 1849 as a chainman on a Hudson River Railroad survey crew. Over the next four decades he had built a reputation as one of the most experienced and successful civil engineers working in America. He had supervised track laying operations for railroads that opened the American West; constructed a variety of important structures, from the first bridge over the Missouri River to the Chicago and Kansas City Stockyards; been employed as chief engineer by the Erie Railroad; and served as president of leading engineering professional organizations.

His interest in flight had begun as a hobby and had grown to become a consuming passion. During the critical years 1885 to 1903, he emerged as the creator and focal point of an international community of flying machine experimenters. Chanute corresponded

with virtually every major figure in the field, from aging and inactive pioneers like Francis Herbert Wenham to such promising newcomers as Wilbur and Orville Wright.

He drew geographically isolated pioneers like the Australian Lawrence Hargrave and Louis Mouillard, a resident of Algeria and Egypt, and the Californian John Montgomery, into an international dialogue, and communicated the latest bits of news from leaders in the field, such as Lilienthal and Langley. He played a key role in attracting Langley into the field in the first place. Through literally thousands of letters, he personally linked his correspondence into an informal, world-wide network, providing them with information, encouragement, and, on many occasions, financial assistance.

Chanute organized sessions of aeronautical papers for the professional engineering societies to which he belonged; attracted fresh talent and new ideas into the field through his lectures at universities; and produced critically important publications that helped to establish a baseline of shared information. The publication of his classic, *Progress in Flying Machines*, in 1894 was a milestone in the early history of aviation. (2)

Having accomplished all of that, Chanute decided to join the ranks of the active aeronautical experimenters. Working with a handful of young associates, Chanute produced variations on two classic glider designs during the decade 1894-1904.

Chanute was always perfectly clear as to the reasons for his decision to begin active experimenting after having spent a decade as an armchair aviator. As he explained to his fellow members of the Western Society of Engineers: "The intention was mainly to study...the maintenance of equilibrium - which it was hoped to gain automatically."

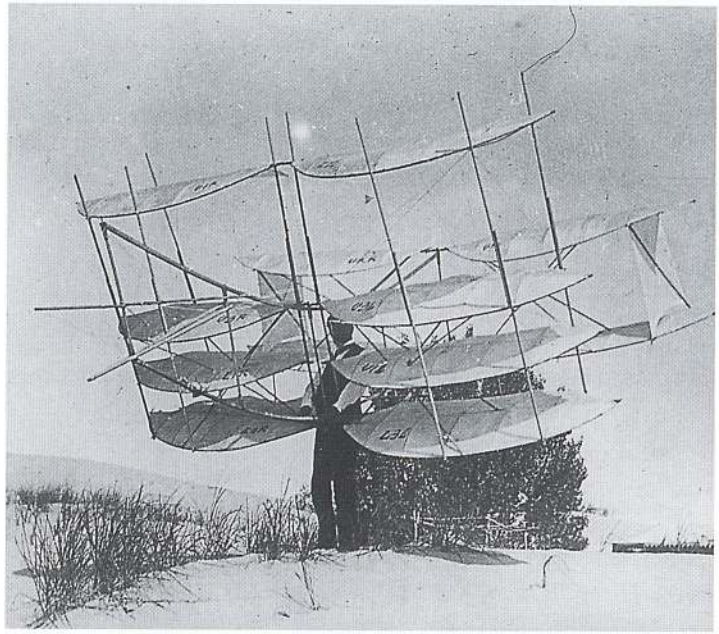
> This it was expected to do by reversing the method of Lilienthal, who moved his body weight to bring back the center of gravity under the center of pressure. It had occurred to Mr. Chanute that it might be preferable...to shift the surfaces [of a glider] so as to bring back the varying center of pressure over a fixed center of gravity, and that in such a case the operator need not move at all, except for the purpose of steering. (3)

While he was about it, Chanute was determined to provide such aircraft with a trustworthy structure that could be analyzed and guaranteed to withstand the expected forces of flight.

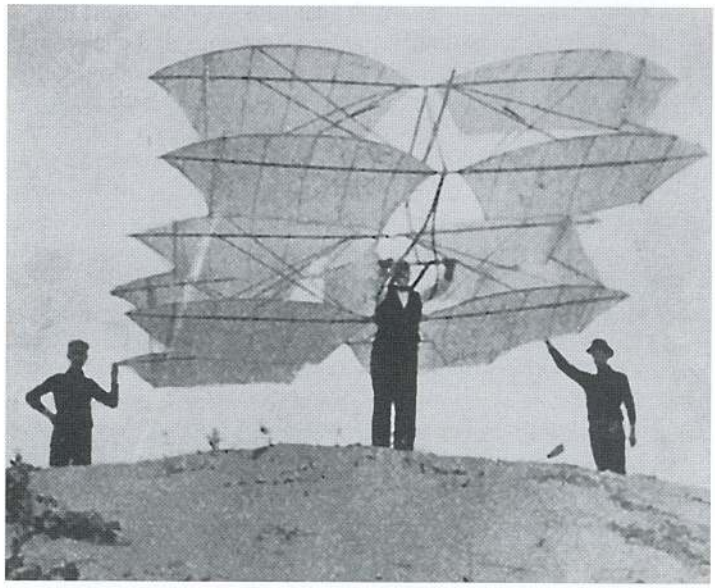
From the outset, Chanute recognized the difficulty of providing sufficient lifting surface in a relatively weak, externally braced monoplane wing. Like Wenham, Stringfellow, and other 19th century pioneers, he favored a multiplane arrangement in which a large amount of wing area could be provided with shorter, superposed surfaces. Chanute's unique contribution would be the use of existing bridge trussing systems to bind the stacked wings of a multiplane or biplane into the lightest, strongest possible structure. (4)

His very first aircraft design, tested in 1895 as a hand launched model glider, featured four pair of biplane wings set in tandem on either side of an enclosed fuselage. Pivoted at the center, the wing pairs were free to rock back and forth to provide a measure of automatic stability in gusty conditions. Each of the eight biplane wings sets were linked together with a Howe bridge truss. (5)

Chanute, who had financed the construction of gliders designed by impoverished experimenters like Louis Mouillard, began the practice of hiring promising young engineers or experimenters of his acquaintance to build and test the gliders he had designed. This approach freed Chanute from what he regarded as the onerous work of actually building a machine, and served as yet another means of offering financial encouragement to a deserving and talented younger technician. He chose a New York engineer, Augustus Moore Herring, to build the 1895 hand-launched tandem biplane model.



Multiplane Glider. Note the markings on the wing. Unidentified pilot, probably Chanute. (Courtesy National Air & Space Museum, Smithsonian Institution)



Multiplane Glider (Courtesy National Air & Space Museum, Smithsonian Institution)

Herring was no newcomer to aeronautics. Born to a wealthy Georgia family in 1865, he studied mechanical engineering at the Stevens Institute of Technology, but did not graduate. When a consulting firm which he had established in New York fell victim to the Panic of 1893, he worked at a variety of jobs. Herring's real love was aeronautics, however. During the early 1890's he had constructed several unsuccessful gliders, as well as one very interesting biplane model powered by rubber strands.

In the spring of 1894, the New Yorker began work on the first of three successful gliders based on original Lilienthal plans obtained from Germany. Herring's short flights with these machines caught the attention of the New York press, and, as a result, came to Octave Chanute's notice. (6)

Chanute's original association with Herring was short lived. The two men corresponded during the period that Herring was build-

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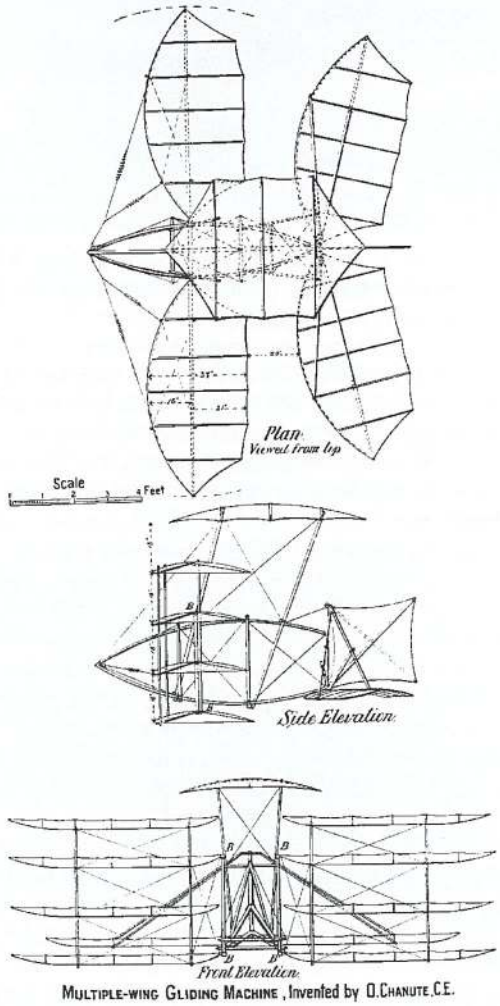
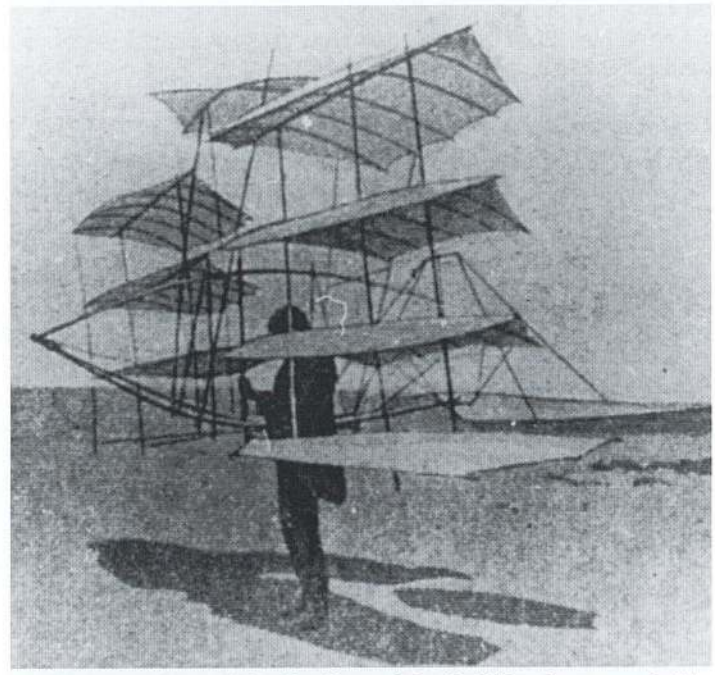
ing and testing the small, hand launched glider incorporating Chanute's earliest notions of automatic stability. By 20 May 1895, however, Herring had left Chanute's employ for economically greener pastures as Samuel Pierpont Langley's chief aeronautical aide at the Smithsonian. Langley, hard at work attempting to develop large, steam-powered flying models, could offer a much higher government salary and the disappointed Chanute willingly, but unhappily, released his new employee.

Herring, talented, opinionated, and independent, found it very difficult to function under the strict conditions which Langley maintained at the Smithsonian. The Secretary insisted that he be kept informed of the most minute details of the aerodrome model project and refused to allow Herring the free hand that he believed was required if the program was to progress. Langley, on the other hand, found Herring's attitude difficult to accept and came to believe that the young engineer was contributing very little to the success of the aerodrome effort. In fact, a comparison of the Langley models before Herring's appearance on the scene and after his departure suggests that he was responsible for many of the major changes in configuration leading to the successful Aerodrome flights of 1896. (7)

Herring and Langley reached a parting of the ways in December 1895, but the New York engineer did not remain unemployed for long. Chanute cabled him immediately, asking if he could come to Chicago to supervise a crew of workmen assembling a series of gliders that were to be test flown the following summer in the isolated sand dunes bordering the southern shore of Lake Michigan.



The 1896 multiplane in its final or Katydid configuration. (Courtesy National Air & Space Museum, Smithsonian Institution)



Multiplane glider with pilot in position holding it up, probably Chanute. (Courtesy National Air & Space Museum, Smithsonian Institution)

Chanute asked that Herring bring with him the best of his Lilienthal copies, so that they could be tested as a control against which the quality of new designs could be gauged. Herring accepted.

During Herring's stay in Washington, Chanute had abandoned the tandem wing multiplane design of the previous spring. He now favored a very different type of multiplane consisting of a wooden framework with a large vertical tail at the rear. Twelve wings, each with a six foot wing span and three foot chord were to be mounted on either side of the frame in pairs (a quadraplane arrangement) at the front of the craft, and two pairs (a biplane arrangement) between the forward wings and the tail. (8)

The wings and vertical tail were covered with oiled nainsook silk. Spruce and willow were the principal woods employed in the construction. The finished craft was some 15 feet long; 14 feet wide; weighed some 34 pounds; and sported 180 square feet of wing surface. One report described the craft as "in appearance like six pairs of birds, superimposed." (8)

As noted, the multiplane was designed to test a method of obtaining automatic stability. Initially, this was to be accomplished by attaching all of the wing roots of the forward wing sets on the right and left sides of the aircraft to a pair of tall upright poles that were free to rotate fore and aft. The forward wing sets on either side were trussed together so that they operated as a unit. They were held in place, fore and aft, with spring mounted guy wires. When either side was struck by a gust, the outboard end of the wings could fold, or sweep, slightly to the rear, pivoting on the single upright to which the roots were attached. The spring mounted guy wires would pull them back into place when the gust had passed.

Chanute had hired William Avery, a Chicago carpenter, to build the multiplane to his specifications. Avery was assisted by William Paul Butusov, an emigrant Russian seaman who had come to Chanute the previous summer, filled with tales of having made fabulous, but secret, gliding flights in the wooded hills around Mammoth Cave, Kentucky. Chanute would also pay for the construction of a glider, to be known as the Albatross, designed by Butusov. Dr. James Ricketts, a Chicago physician whom Chanute described as having "a slack practice and a taste for aeronautics," would serve as camp cook and stand by to offer medical assistance if required. A.M. Herring, and Chanute's pet dogs, "Rags" and "Tatters,"

rounded out the party. (9)

By June 22, 1896, all work was complete on both Herring's and Lilienthal's craft as well as the Chanute multiplane. The little band of would-be aviators loaded their disassembled gliders, camping gear, and tools onto a Lake Shore train for a short trip to the little railroad station at Miller, Indiana. Some 30 miles southeast of Chicago, Miller lay on the edge of the sand dunes that ringed the southern shore of Lake Michigan. With high dunes for take-offs, soft sand for landings, and strong, steady winds blowing off the Lake, the area was ideal for gliding. (12)

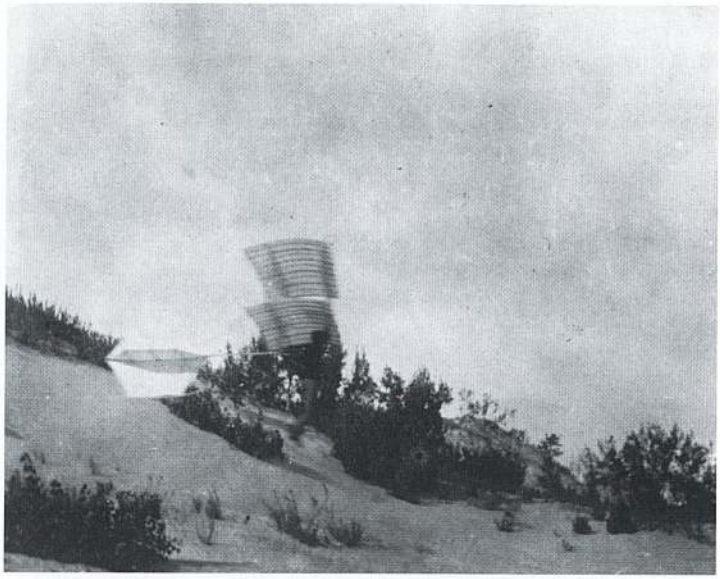
While the Dune country still had the feel of a remote wilderness, you could climb to the top of a tall dune on a clear night and see the bright lights of Chicago twinkling across the tip of Lake Michigan. The site had the advantage of enabling the men to travel home for the weekends, or whenever their presence was required by families and businesses in Chicago. The disadvantage was the concentration of reporters hungry for a story. Newsmen, alerted by reports of the strange equipment being unloaded at the Miller station, arrived in camp on the first day. Chanute, who had hoped to conduct his tests without the assistance of the fourth estate, was disappointed.

Herring and Avery began to test the gliders before the tents were fully pitched. The Lilienthal was first into the air and proved awkward, dangerous and difficult to control. "The operator," Chanute noted, "had to shift his position as actively as a tightrope dancer...in order to avoid being overturned." The best flight obtained with the craft covered 116 feet on June 29. Glides of 80-100 feet were more common. (10)

The Lilienthal was weak, and was frequently broken in hard landings. Chanute attributed the fact that no one had been injured flying the craft to the deep camber of the wings, the tips and edges of which touched the ground first, giving the operator some measure of protection. By June 29 the crew was having trouble keeping the machine properly rigged and balanced. An attempt to remedy the situation by cutting away a portion of the fabric only made the situation worse. The craft was abandoned that afternoon. Chanute's judgment was short and to the point. "Glad to be rid of it." (11)

Herring made the first flight with the Chanute multiplane on June 24. Over the next two weeks the craft would be tested as both a kite and a glider. It would be held on the ground while tufts of

Butusov's glider "Albatross" on launching ramp, ready for take-off, source unknown. (Courtesy National Air & Space Museum, Smithsonian Institution)



The 1897 version of the Chanute Herring biplane. (Courtesy National Air & Space Museum, Smithsonian Institution)

light-weight material were released at the leading edge in order to observe the flow of air around the wing. More important, the 12 wings of the craft would be almost constantly reconfigured, restacked, and rearranged in what Chanute remembered as an "interesting and instructive evolution."

TABLE 1:
Chanute Multiplane
Changes in Wing Configuration
June 23-July 4, 1896

1. (June 23) Original 12 wings: 8 in front, 4 in back
2. (June 25) 8 wings: 4 sets front
3. (June 27) 12 wings:4 sets rear, 2 sets front
4. (June 29) 12 wings:4 sets front, 2 rear
5. (June 30) 12 wings:4 sets front, 2 rear, upper front wing raised 3 feet above wing beneath it
6. (July 1) 12 wings:5 sets front, 1 set rear

The multiplane machine was test flown with a total of six different wing configurations between June 24 and July 4. Things became so confusing that all of the wing sets were numbered in order to keep track of their position in the arrangement.

The final, and most successful, configuration featured five superposed wing pairs at the front and only one pair at the rear. First tested on July 1, this insect-like version, with its confusing stack of wings trapped in a web of crossed wires, was immediately dubbed "the Katydid." By July 4, Herring and Avery were routinely making flights of from 50 to 80 feet in very light winds. "Winged machine is more compact and handy than Lilienthal's," Chanute noted in his diary, "and it promises to be safer & steadier." (13)

Somewhat disappointed by bad weather, the mixed performances of the gliders, and the plague of reporters that had descended on the camp in the dunes, Chanute decided that a break was in order. The members of the party quit flying at 2 p.m. on July 4, packed up their gear, and caught the 6:41 train for Chicago at the Miller station. They were to remain in the city for a month and a half, rebuilding the multiplane Katydid into its seventh and final configuration and finishing work on Butusov's glider, the "Albatross." Far more important, however, they would also design and build the first version of the most successful and best-known of all pre-Wright gliders, the Chanute-Herring "two-surface machine," during the hiatus in Chicago.

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Left, Chanute's two surface glider, in flight with spectators watching. (Courtesy National Air & Space Museum, Smithsonian Institution)

The R.I.T. Chanute glider reproduction on a short hop along the wind-blown Michigan dunes. In 1896 these dunes rose 80 to 100 feet.

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During his spare time on the dunes, Herring had flown a small monoplane kite with a flexible cruciform tail that had very much impressed Chanute. As Chanute later recalled, he and Herring had discussed the possibility of building yet another glider, loosely based on the kite and some other ideas that Herring had been toying with related to the use of a cruciform tail unit that would be free to give in any direction when struck by a gust, thus, he hoped, maintaining the stability of the craft. Having witnessed the frailty of the Lilienthal glider for himself, Chanute was also interested in providing the new craft with a carefully designed structure that would provide maximum strength for minimum weight.

In view of the importance of this glider in the evolution of the flying machine, the credit for its design is a matter of some importance. Four years later, Chanute and Herring attempted to sort things out in a sharp exchange of letters. In publications describing the 1896 glider trials, Chanute had always been scrupulously careful to give his young associate credit for the regulating tail, suggesting that he himself had been responsible for the rest of the design.

Herring disagreed, arguing that what would become known as the "two surface machine" was inspired by a small aspirating (soaring) kite that he had built and flown during the first period on the Dunes. Moreover, he regarded the regulating tail of the glider as the key to its success, as he explained in a 1901 letter to Chanute.

> I have never understood why you should appear to claim all of the credit for the invention of the two surface gliding machine, since its success depends wholly upon the efficiency of the regulating mechanism which was my work and furthermore I made the design for the original two surface machine alone and I put them on paper as a scale drawing in the course of one afternoon in your study. (14)

Chanute had a very different view.

> While we were still in camp, I made and gave you (Herring), on cross section paper, a sketch of the two surfaced machine with a Penuad tail to serve in building the 1896 machine. This you assigned as the reason why I should join you in applying for a British patent, at the time I disclaimed any share in the design of the propelling (stability) arrangements. (15)

For the rest of his life, Herring would continue to point to what he regarded as a striking resemblance between the 1896 glider and some model aircraft that he had flown in New York in 1892 and three years later in Washington D.C. A.F. Zahm, a Catholic University professor who had witnessed flights of the model at the Smithsonian in 1895, agreed with Herring. He commented in 1908:

> "It is sometimes said that the best French airplanes are copied from the Americans...Farman's aeroplane resembles the Wright brothers'; theirs resembles Chanute's glider of 1896, and this in turn resembles Herring's rubber driven model...(16)

But Zahm would ultimately prove to be a less than fully trustworthy witness. In truth, it does not seem difficult to apportion credit for the design between the two men. Herring was responsible for the use of the spring-mounted cruciform tail unit and for the detailed design work. Chanute provided financial support, suggested the original triplane form, and insisted on the Pratt truss bracing system and other structural elements that represent the most important features of the machine and were certainly responsible for its success. In short, the glider was a joint venture, with Herring deserving primary credit for the stabilizing tail, and Chanute for the elegantly braced structure. (17)

The new glider was finished in Avery's Chicago workshop and ready for shipment back to the dunes by mid-August 1896. As originally constructed, the craft that was to become famous as the Chanute-Herring "two-surface machine" was actually a triplane. Each wing had a span of 16 feet with a chord of four feet three inches. The wings and tail surfaces were covered with varnished silk. The complete machine weighed some 31 pounds.

Two support bars passed beneath the operator's arms, and a braced wooden pole supported the tail, which was of special interest. Both Cayley and the French experimenter Alphonse Penaud

had observed that a properly positioned fixed cruciform tail would provide a useful degree of inherent stability in the pitch axis. In the case of the 1896 glider such a tail was placed on a universal joint (actually a flexible wooden member), guyed by wires that ran forward to the wings, where they were attached through springs.

The new triplane was simple and elegant, quite a contrast to the studied complexity of the rebuilt Chanute multiplane or Paul Butusov's enormous "Albatross," which resembled a cross between a gigantic bird and a sailing schooner. All three machines were shipped back to the lakeshore aboard the steamer Scorpion on August 21. This time the members of the party established their camp five miles farther down the beach, where, Chanute noted: "the hills were higher, the solitude greater, and the path more obscure to the railroad, which it reached at a sand-pit station consisting of a single house, and called Dune Park." The reporters, he hoped, would have to work a bit harder to locate this camp. (18)

Bedeviled by late-summer storms blowing off the Lake and by the need to begin work on the launching apparatus for Butusov's "Albatross," the crew did not get flight testing underway until August 29, 1896. Early trial flights with the Chanute-Herring glider convinced the party that the triplane wings provided too much lift at the front of the structure. Avery suggested the removal of the bottom wing to produce the final, classic, "two-surface" configuration. With this step accomplished, glides of over 150 feet became commonplace. Eventually, flights of up to 359 feet, lasting as long

The Dees Chanute reproduction on the strand after a launch from the 10 to 20 foot dunes at Miller Beach.

as 14 seconds were made. (19)

The rebuilt multiplane was not flight-tested until September 5. Four of the original wings were now mounted at the front, with two wings behind, flanking the vertical tail. The entire craft was now capped by a large, horizontal kite surface mounted over the top set of wings. Total wing area in front was now 143.5 sq.ft.., as opposed to 29.5 sq. ft. at the rear. The finished craft weighed 33.5 lbs. One of the rear wing sets had been removed by the time the first substantial flights were made on September 11. (20)

The forward wings were still free to fold toward the rear, pivoting on the tall rods to which the wing roots were attached. The rods themselves were now mounted, top and bottom, in ball bearings that enabled the wings to swing more freely. Repeated testing demonstrated that the operator was still required to move his torso to exercise control, although not to the extent required by the Lilienthal glider.

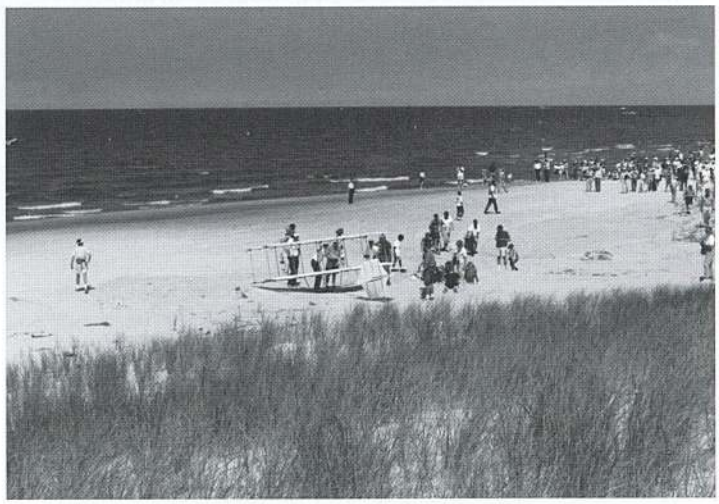
Moreover, Chanute had taken an important step toward transforming the mechanism designed to provide automatic stability into something approaching an active control system. The pilot of the rebuilt multiplane now rested on a swinging board seat, which freed his arms to some extent. Also provided with stirrups and a brace for his legs, he could actively swing the wings fore and aft by means of light lines operating through pulleys. Chanute was pleased with the results.

> It was found, as we expected, that by thrusting
> the wings forward the machine was tossed up,
> and vice versa that by thrusting one wing forward
> the machine turned towards the opposite side,
> and that these would be effective ways of
> directing the apparatus when under flight,
> either up or down or in a circling sweep. (21)

Chanute's inability to profit from the lessons of flight testing is striking. To the end of his life he remained convinced that the original triplane configuration of his most famous glider had been superior to the "two-surface" version. Moreover, as intriguing as the experiment with active controls for the multiplane may have been, Chanute quickly abandoned them and returned to the pursuit of automatic stability.

The rebuilt multiplane was flown repeatedly, but was never able to cover distances as great as those attained by the two-surface glider at its best. In a performance of the multiplane on September 11, Herring and Avery covered distances of between 148 and 183

Left, Chanute's two-surface glider flying toward the lake shore, source unknown. (Courtesy National Air & Space Museum, Smithsonian Institution)



feet in a 22.3 miles wind. (22)

The multiplane was also beginning to show its age. As a result of repeated episodes of rebuilding, rearranging, and shifting, the wings were warped and deformed. By September 23 Chanute has decided to cease flying the machine before someone was injured.

W.P. Butusov's "Albatross," so named because of its resemblance to an earlier glider of that name designed, built and flown in

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France by Jean Marie LeBris (1868), had a 40-foot wingspan and an empty weight of 190 pounds. Unlike the Lilienthal, the multiplane and the two-surface machine, Butusov's elephantine craft could obviously not be launched by running down a boardwalk laid in the sand and leaping into the air. The glider would gather momentum (and, hopefully, flying speed) running down a large inclined trestle.

Initially rigged and tested as a giant kite, the "Albatross" was launched into the air from the trestle on September 17 and flown with four lines from the ground. Following some additional testing and repairs to damage suffered in a storm, the giant craft was first sent down the trestle, unmanned and weighted with ballast, on September 26. Demonstrating unsatisfactory gliding characteristics and suffering additional damage in landing, the "Albatross" was abandoned. (23)

While the rebuilt multiplane and the "Albatross" proved less than fully satisfactory, the little group of pioneer birdmen were overjoyed with the performance of the biplane, which surpassed that of every other glider flown in the world to date. Moreover, Chanute was confident that the little craft was relatively safe.

TABLE 2:
The Flights of September 11, 1896
Chanute kept a more careful record of the performance of the multiplane and biplane on September 11, 1896. His notes on the flights of that day are better and more complete than for any other. He recorded five flights with the multiplane that morning in a wind (apparently averaging) 22.3 mph. (24)

pilot	distance	time
Herring	148 ft.	7 seconds
Avery	174 ft.	7.6 seconds
Herring	166 ft.	7.5 seconds
Avery	188 ft.	7.9 seconds
Herring	172 ft.	7.8 seconds

Chanute recorded even more information on six flights of the bilplane made in a 31 mph wind that afternoon.

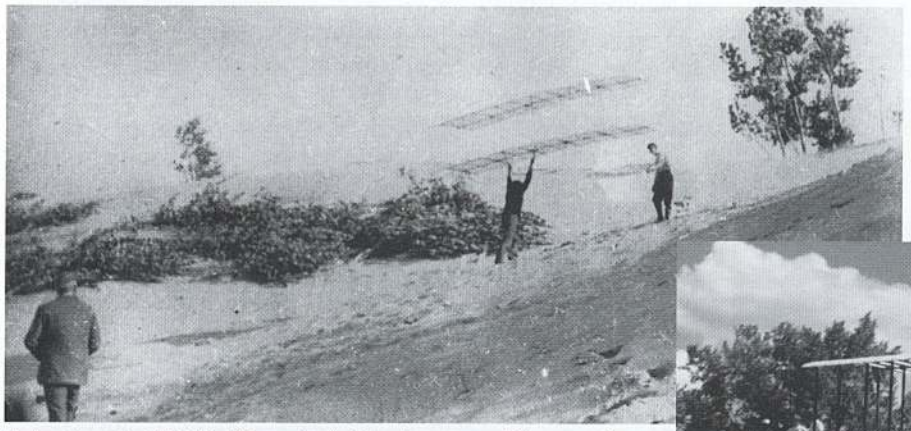
pilot	distance	time	angle	fall
Avery	199 ft.	8 sec.	10%	34.6 ft.
Herring	234 ft.	8.7 sec.	7.5%	30.4 ft.
Herring	220 ft.	9 sec.	——	——
Herring	235 ft.	10.3 sec.	——	——
Avery	256 ft.	10.2 sec.	8%	35.5 ft.
Herring	359 ft.	14 sec.	10%	62.1 ft.

Flights continued into late September. Chicago newsmen, who located this camp as easily as they had the first, spread word of the activities of the Chanute party across the nation. Chanute, long famous among the small circle of international aeronautical enthusiasts, was now elevated to the position of a public celebrity. It was a role in which he was by no means comfortable.

In spite of the success of the biplane, Chanute remained unconvinced that the little craft could serve as a stepping stone to the airplane. Too many problems, he believed, remained to be solved. He would not sponsor the construction of a copy of the "two surface machine" for another 8 years, preferring to spend his time offering encouragement to a new generation of talented young researchers, notably Wilbur and Orville Wright.

Herring, however, could scarcely be restrained. He was convinced that the little biplane was a sort of "proto-airplane." All that was required, he reasoned, was to do some fine tuning of the design, add an engine and propellers, and proceeded to unveil the machine to a wondering world. Herring, recognizing that Chanute did not agree with his desire to rush ahead toward the construction of a powered version of the biplane, left the camp prior to the end of the experiments.

"Mr. Herring did not prove satisfactory," Chanute explained in a letter to his friend James Means, editor of the Aeronautical Annual.



Bringing the R.I.T. Chanute to the dune crest for another launch at the Miller Beach centennial celebration.

Left, carrying a glider uphill during gliding experiments - source unknown. (Courtesy National Air & Space Museum, Smithsonian Institution)

He left me...giving as his reason that he did not want to countenance by his presence the pending test of a third machine, designed by Wm. Paul [Butusov]....I think the real reason is that he knew I would never consent to apply a motor to a full scale machine, believing this to be entirely premature, while he was at the time so elated by our joint success and the unwelcome (to me) advent of the newspaper reporters, that he thought success within his grasp. He told me that he intended at once to build a full sized machine with a gasoline motor of his invention, with the assistance of a syndicate of newspapers or from the proceeds of public exhibition. I understood that he had applied to Barnum and Bailey's circus, but had been unable to make an arrangement. (25)

His failure to interest the circus notwithstanding, Herring constructed a new version of the original triplane on his own and returned to Dune Park in October 1896, a month after Chanute, Avery, Butusov and Ricketts had abandoned the site. Herring's October triplane featured a compressed air automatic control system operating on the otherwise standard cruciform tail. In addition, the two pilot support bars, which had extended straight down from the center section of the original machine, were angled now slightly in to give the operator a bit more leverage on his craft. These angled support bars would remain a standard feature of Herring biplane gliders in the future.

No reporters were present to chronicle Herring's solitary test flights that fall. His own reports of the activity, offered in James Mean's *Aeronautical Annual* and in court testimony given many years later, spoke of flights of over 900 feet in length, with quartering turns in the air permitting Herring to angle across the slope of the dunes. In view of Herring's later experience, however, it scarcely seems reasonable to credit these claims. (26)

Satisfied with the performance and sure that Chanute would refuse to assist him in adding power to the glider, Herring set out in search of a new patron. He found him in Matthias Arnot, an Elmira, New York, banker who was captivated by the possibility of flight and anxious to offer financial assistance to a talented experimenter. Arnot underwrote the construction of a third Herring-Chanute glider, this one to be flown by Herring in the Indiana Dune during the summer of 1897.

The 1896 Chanute-Herring and the 1897 Herring Arnot bear such a strong resemblance to one another that Chanute used photos of the two machines interchangeably, always to Herring's chagrin. There are differences that permit us to distinguish the two, however. As noted above, the 1896 craft featured pilot support bars built perpendicular to the lower wing, while the 1897 glider featured support bars angled slightly in for better leverage. In addition, the wings of the 1896 glider continued for a few inches beyond the outer struts. In the case of the 1897 glider, the outer wing struts were positioned precisely at the wing tips.

Chanute tests two-surface glider in sand dunes of Lake Michigan near Gary, Indiana. (Courtesy National Air & Space Museum, Smithsonian Institution)

For the most part, the 1897 machine was constructed of black spruce. The wings and tail surfaces were covered only on the upper side. The tail unit was not fitted with the compressed air device tested on the October 1896 triplane.

Herring and Arnot did not pitch their 1897 camp on the dunes until September. Progress was rapid, however, and within a few days flights of up to 600 feet were being reported. Unlike Chanute the previous season, Herring relished publicity and made certain that reporters not only knew where to find the camp, but were specifically invited to attend the trials, and, on occasion, were even allowed to fly the glider. Fortunately, one of these neophyte airmen described his brief foray into the sky:

> The machine weighs only twenty-three pounds, but it is as big as the bay window of a cottage... Once underneath the machine one finds himself standing on a wide plank which rests on a sand hill. The hill is about 100 feet high and steep enough...You face the wind as squarely as possible and shift the machine to and fro until you feel that it is balanced fairly well on your arms. You are suddenly aware that the broad expanse of varnished silk above your arms is trying to get away from you with every gust of wind. At the same time you remember the caution to keep the front edge of your machine depressed until the moment of your departure from earth...Just at this time...one sees a stump sticking out of the sand at the bottom...and wonders whether he will hit it or miss it in his downward flight. He sees a small tree and shudders at the thought of landing on its top. One of his friends down the hill is cautioned

1897 version of the Chanute-Herring biplane. (Courtesy National Air & Space Museum, Smithsonian Institution)

> to move half a mile to one side. In the meantime, a sickening fear comes over one that he may lose his balance and plow a long and deep furrow in the sand with nose...One takes four or five running steps down the plank, expecting to fall to the sand like a stone. To his surprise and pleasure, he experiences about the same sensation as a man making his first ascension in an escalator. There is a queer feeling of being lifted from underneath. The wind rushes in the face of the operator like a hurricane and hums through the fine wires that form part of the framework with a shrill note. All these things are noted in a moment of dread, for the earth is rising as if to strike one. (27)

The 1897 season was a striking success and Herring was more than ready to forge ahead to the construction of a powered version of the biplane. Now residing in St. Joseph, Michigan, he convinced Arnot to fund the project. By October 1898 he had completed work on a new airframe and a small compressed air engine. On two occasions, October 10 and 22, 1898, Herring was able to

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hop his machine off the ground for distances of up to 73 feet. (28)

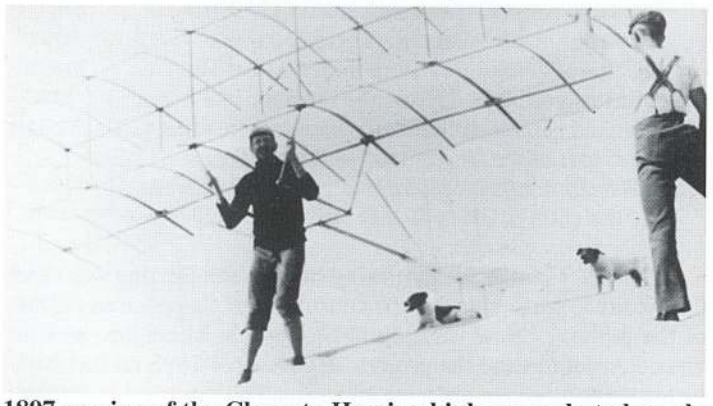
Like so many other hang glider enthusiasts, he had assumed that once a stable, trustworthy glider was constructed, the step to powered flying would be relatively simple. He now discovered that this was not the case. His 1898 machine fell far short of what he had hoped, and there seemed to be no way of adding more power without further burdening a craft that was already overweight. Arnot's death soon thereafter left Herring without a patron to support a continued effort.

But the story of the 1896 Chanute gliders was far from complete. In 1902, Chanute shipped what remained of the 1896 multiplane to Herring and paid his old friend to rebuild the craft in its final configuration. Herring produced new wings and empennage, and traveled to Kitty Hawk, NC, to test the Chanute machine at the glider camp established by Wilbur and Orville Wright. The multiplane did not perform well, and Herring was stunned by what these two relative newcomers had accomplished in a few short years.

Herring became determined to reenter the field of aviation in competition with the Wright brothers. In point of fact, he was clearly not in the same league. The story of his 1908 bid to construct an aircraft for the Army is well known, as is his involvement with Glenn Curtiss, Starling Burgess, J.V. Martin, and other early aircraft builders. He died in 1926 a bitter man, convinced that he never received the credit which he felt he deserved for his role in the invention of the airplane. (29)

The two-surface machine enjoyed a much longer career and had a much greater impact than the multiplane. Chanute patented a version of the biplane fitted with a swinging seat of the sort first tested on the multiplane glider in 1896. In 1904 he commissioned William Avery to build and fly one last model of the craft at the St. Louis Exposition. Once again, the new craft differed slightly from its predecessors. The airfoil of the other Chanute-Herring craft had been a simple arc, but aeronautical science had come a long way since 1896. The 1904 variant was the first to feature a parabolic wing with the high point of the arch set well forward of the center chord position it had occupied in the earlier versions. Avery made a number of flights in the new glider, towed into the air by a winch. The exhibition was finally canceled when Avery suffered a fall and injured his ankle. The 1904 glider was purchased on the spot and shipped to France where it resides today in the collection of the Musee de l'Air.

The impact of the Chanute-Herring design on other aircraft builders is apparent. In the U.S., the Wrights and virtually everyone else used the braced biplane structure as their starting point. The little biplane glider clearly influenced thinking in Europe, as well. Chanute's lectures to the Aero Club de France in 1903 reignited French interest in heavier-than-air flight. Copies of Chanute-Herring gliders were among the first aircraft flown by Ferdinand Ferber, Gabriel Voisin, and other French pioneers.



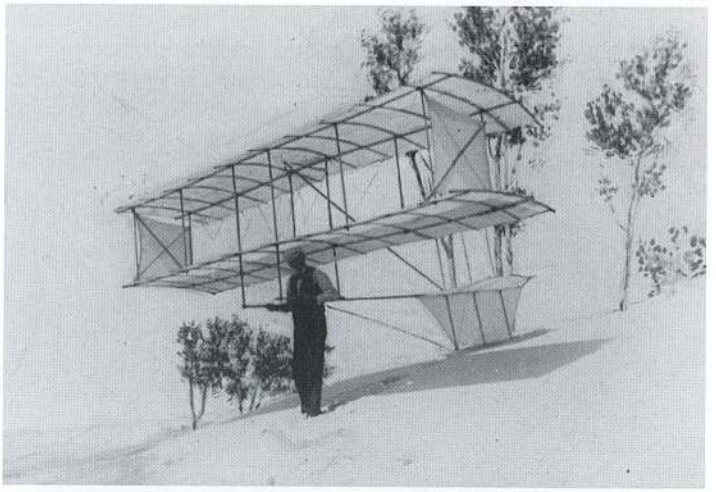
1897 version of the Chanute-Herring biplane ready to launch. (Courtesy National Air & Space Museum, Smithsonian Institution)

Nor did the influence of the Chanute glider end with the invention of the airplane. *Popular Mechanics* and *Flight* magazine recommended variants of the Chanute-Herring craft to readers interested in a safe glider for training purposes. The Long Island-based Wittman Company, and others, produced Chanute-Herring variants as flight trainers. In the U.S., would-be aviators like Paul Edward Garber were still leaving the ground for the first time slung beneath the sturdy wings of a Chanute-type glider as late as 1915.

In building and flying their first classic biplane glider, Chanute and Herring prepared the way for the experimenters who would make the first powered flights. Their notion of automatic stability proved to be a blind alley. The commitment of the Wright brothers to active pilot control of an essentially unstable aircraft was a critically important step toward the realization of powered flight. Even Wilbur Wright, however, recognized that Chanute's mechanisms for obtaining automatic stability represented a "great advance" over the hang glider control of Lilienthal, Pilcher, and others. (30)

Wilbur Wright was quick to add, however, that Chanute's contributions to aircraft structures were far more important. "The double-deck machine," he noted, "represented a very great structural advance, as it was the first in which the principles on the modern truss bridge were fully applied to flying machine construction." Chanute's rigid, light-weight structure became the model for all externally braced biplanes. It was nothing less than the first modern aircraft structure.

As Wilbur Wright remarked in a 1910 eulogy of his old friend,



Two surface Chanute glider, unidentified pilot, probably Chanute. (Courtesy National Air & Space Museum, Smithsonian Institution)

Chanute's "...labors had vast influence in bringing about the era of human flight."

> His "double-deck" modification...will influence flying machine design so long as flying machines are made. His writings were so lucid as to provide an intelligent understanding of the nature of the problems of flight to a vast number of persons who would probably never have given the matter study otherwise, and not only by published articles, but by personal correspondence and visitation, he inspired and encouraged to the limits of his ability all who were devoted to the work. His private correspondence with experimenters in all parts of the world was of great volume. No one was too humble to receive a share of his time. In patience and goodness of heart he has rarely been

surpassed. Few men were more universally respected and loved. (31)

Notes:

1. Wilhelm Kress to Octave Chanute, August 13, 1896; also H. Moedeboeck to O. Chanute, August 13, 1896, originals in the Papers of Octave Chanute, Manuscripts Division, Library of Congress (hereafter cited as the Chanute Papers). Unless otherwise indicated, all Chanute letters are included in: *The Correspondence of Octave Chanute, 1888-1910*, Ramsey Room, National Air and Space Museum (hereafter cited as *Correspondence*). This thirteen-volume set of typed transcripts includes virtually all of Chanute's aeronautical correspondence. All letters are presented alphabetically by the name of the individual with whom Chanute was corresponding. A good index is provided at the front of the first volume. The preparation of the transcripts was apparently the work of A.F. Zahm, Chief Division of Aeronautics, LC, following the receipt of the Chanute papers. The NASM set was once held by the Institute of Aeronautical Sciences. The LC holds a second set. It is not clear how many other sets of this marvelous resource exist or where they are located.

2. For bibliographical treatments of Octave A. Chanute see: Tom D. Crouch, *A Dream of Wings: Americans and the Airplane, 1875-1905* (New York: W.W. Norton, Inc., 1981), pp.21-26; "Early Presidents of the Society: XI. Octave Chanute, 1832-1910, President of the Society, 1891," *Civil Engineering*, vol.7, no. 12 (December 1937), pp. 871-873; [W.H. Williamson], *Octave Chanute: Aviation Pioneer* (Rantoul, Illinois: Public Affairs, Chanute Field, 1940); "The Life and Work of Octave Chanute," *Aeronautics* (January 1911), p.2; Alicia Chanute Boyd, "Some Memories of My Father," unpublished manuscript, various copies in the Chanute Biographical files, NASM and "Biographical Materials," Box 18, Chanute Collection, LC; Other major Chanute manuscripts and biographical materials are to be found in the John Crerar Library, Chicago, Il.; Manuscript Division, Denver Public Library, Denver, CO.; American Heritage Research Center, University of Wyoming.

3. Octave Chanute: Gliding Experiments," *Journal of the Western Society of Engineers* (November 1897), p.600.

4. Octave Chanute, "The Origins of the Two-Surface Machine," *Aeronautics* 3 (October 1908), p. 9-10. Chanute expressed his earliest notions of heavier-than-air technology in: *Progress in Flying Machines* (New York: The American Engineer and Railroad Journal, 1894); *Aerial Navigation: A Lecture Delivered to the Students of Sibley College* (New York: 1891); ,"Aerial Navigation: Balloons and Flying Machines from an Engineering Point of View," *Cassier's Magazine* 20 (June 1901), pp.111-128. For complete coverage see: *Pearl I. Young, The Complete Writings of Octave Chanute (1832-1910): Consisting of Books, Periodicals, Newspapers, Letters and Notebooks* (Lancaster, PA: [s.n.] 1961.

6. For biographical material on Herring see: James V. Martin, "The Aircraft Conspiracy," *The Libertarian* (March 1924), pp.120-127; see also Crouch, *Dream*.

7. Ibid.; see also Herring manuscript volumes, Langley Watebooks, Ramsey Room, NASM.

8. "Men Fly in Midair," *Chicago Tribune* (June 24, 1896).

9. The finest accounts of the 1896 trails are to be found in Chanute's reports: "Gliding Flight"; "Recent Experiments in Gliding Flight," *Aeronautical Annual* 1897 (Boston, 1897); "Experiments in Flying," *McClure's Magazine* 15 (June 1900), pp.127-133; Howard Lee Scamehorn, *Balloons to Jets: A Century of Aeronautics in Illinois* (Chicago: Regency, 1957) offers a solid secondary account of the 1896 trials, as does Crouch, *Dream*.

10. Octave Chanute, 1896 Notebook, Box 9, Chanute Papers. The diary is published as Appendix IV: Chanute Documents, in Marvin W. McFarland, *The Papers of Wilbur and Orville Wright* (New York: McGraw-Hill, 1953), v.1, pp. 641-654 (hereafter cited as Diary).

11. Diary, p. 643.

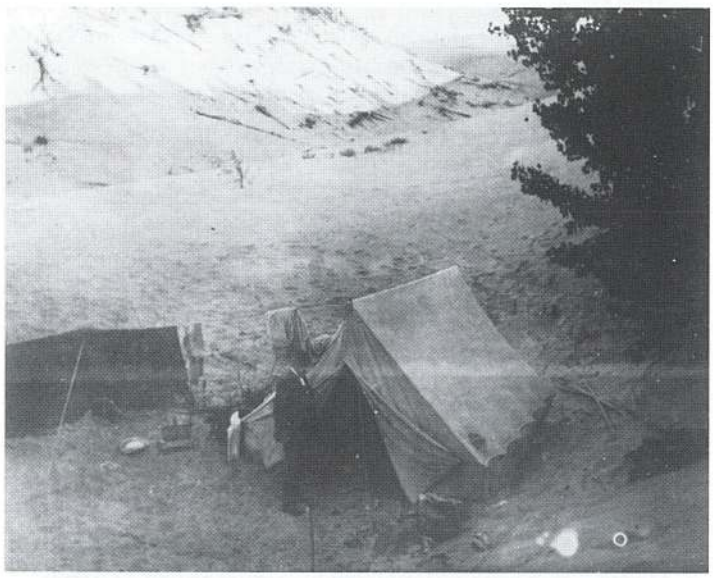
12. The table is based on information provided in the Diary.

13. Diary, p. 644.

14. A.M. Herring to O. Chanute, March 17, 1901, box 1, Chanute Papers, LC. Also included in *Correspondence*.

15. O. Chanute to A.M. Herring, March 24, 1901, box 25, book 37, pg. 361, Chanute Papers. Also in *Correspondence*.

16. A.F. Zahm quoted in Crouch, "The Origins of a Classic: Octave Chanute, Augustus M. Herring and Their 'Two-Surface Glider of 1896-1897') *Bungee Cord* (vol. 7, no. 1, Spring 1981), pp. 7-10.



View from top of dune of tents - Camp Chanute. (Courtesy National Air & Space Museum, Smithsonian Institution)

17. For a discussion of the contributions of Chanute and Herring to the "two-surface machine," see: A.M. Herring to O. Chanute, arch 178, 1901, box 25, book 17, p. 361, Chanute Papers, LC. Both letters are included in *Correspondence*; See also: Martin, "When Will Merit Count..."; Carl Dientsbach, "The Invention of the Chanute Glider,"*American Aeronaut* (June 1908), p. 165; Chanute, "Evolution..."; Crouch, *Dream*, p. 192-194.

18. Chanute, "Recent Experiments," p. 39.

19. Diary

20. Chanute, "Gliding Flight"; Chanute, "Recent Experiments."

21. Chanute, "Recent Experiments," p. 45.

Continued on Page 14

Fokker - Continued from Page 15

the glider. Fokker feared that the cable might foul the tail controls so his constructor, Reinhold Platz, devised a semi-circular safety hoop that extended from one tailplane tip to the other, rising above the rudder. This hoop was braced by two struts.

According to Mr. Celeen, Platz was never told of the "stand-off" bomb concept and assumed that Fokker was interested in gliding as a sport. Only one V-30 was built. It was the original aircraft that was displayed at the Paris exhibition. Fokker diplomatically omitted to explain that it was originally intended as a flying bomb.

Mr. Celeen said that Fokker obtained an American patent (USP #1,418,783, June 6, 1922), for an aero-towing arrangement. It incorporated the tail protecting hoop devised by Platz in the Summer of 1918. It envisioned a long guide tube for the cable running from the cockpit to a point behind the rudder, the guide passing over the protective hoop. The tube could be fitted above or below the fuselage.(5)

Jeffery Byard, NSM President, vintage sailplane restorationist and authority, also called attention to Richard Miller's book, *Without Visible Means of Support* (6) Miller noted that Fokker's early experiments in which he aero-towed a glider were largely ignored and the credit for the first aero-tows was given to Gottlieb Espenlaub and his associates, who successfully demonstrated the technique in 1927.

Miller wrote: "The glider was a very sensible little monoplane with a wingspan of 27.5 feet and a length of 20 feet 3 inches. Only one look was necessary to see that it was nothing else than one of the wartime D VIII fighters, sans Spandaus (machine guns) and with the pilot position moved forward to compensate for the absent engine. Considering Fokker's cut and patch reputation and his genius for improvisation, this conversion is not at all surprising."

Meantime Fokker's airliner project was gaining steam and orders were accumulating, so he turned his attention to that increasingly lucrative aviation field. Miller said: "Thus gliding which would not be ready for Anthony Fokker's genius for years to come, lost the contributions of a man who might easily have advanced the sport by leaps and bounds."

1921 photo of Anthony Fokker, right, with Wolfgang Klemperer in the cockpit of his Blaue Maus, at the Wasserkuppe (NSM multi-media collection.)

There ends the questions surrounding the NSM's archive photo. Many thanks to the readers of the *NSM Historical Journal* who took the time to research and reply to the query on this unique glider.

References

1. The International Encyclopedia of Aviation. Janes All The Worlds Aircraft pgs. 448-449 David Monday, assistant compiler.
2. Airplanes of the World, Rolfe & Dawydoff p 75
3. History of the German Air Force p 34, Bryan Philpott
4. Besides many articles on sailplaning and aero history Mr. Simons authored *The Worlds' Vintage Sailplanes 1909-1945* and *Slingsby Sailplanes, A Comprehensive History of all Designs*
5. Ary Celeen, in a later paragraph, mentions that Fokker, by now regarded as an expert on military aircraft, read a paper before an audience of Dutch officers. In it he emphasized the tactical and strategic importance of airborne guided missles. Fokker was right but 20 years too early.
6. *Without Visible Means of Support*, Richard Miller, pgs. 28-31

Chanute - Continued from Page 14

5. June 30: Raised top wings in O.C. to test whether the increased leverage of wing would make the machine more difficult to control, and whether the increased distance between wings would make the lift greater. Total weight of machine 37lbs., a 5-lb. bag of shot in front."

6. July 1: Photographed machine; "After waiting till 5 p.m. for more wind, took off the upper deck wing and inserted it in the wide space under front top surface thus having five sets wings in front (148 sq. ft.) and having one set at bottom in rear (29 sq. ft.) Called this the 'Katydid'.....I am well satisfied that this is the type to adopt for rebuilding."

7. The final configuration as completed in Chicago. Four wings in front; two wings in the rear; an overhead kite surface. Herring rebuilt the craft in this configuration for the Kitty Hawk trails of 1902.

Herring plays with small dog (right side of the glider can be seen from the rear). (Courtesy National Air & Space Museum, Smithsonian Institution)

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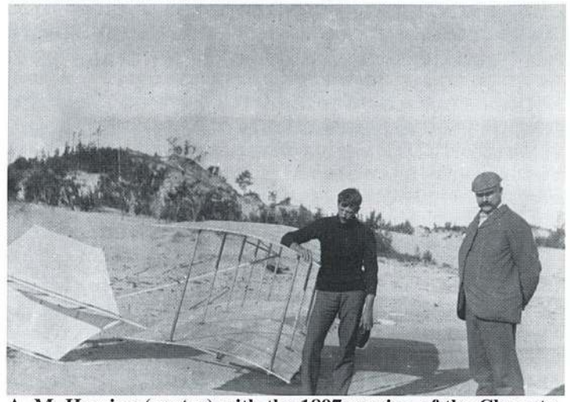


A. M. Herring (center) with the 1897 version of the Chanute-Herring biplane. (Courtesy National Air & Space Museum, Smithsonian Institution)

22. Diary

23. Diary

24. All tabular information is from the diary entry for September 11, 1896.

25. O. Chanute to J. Means, November 14, 1896, box 24, book 33, p. 464, Chanute Papers, LC. Also in *Correspondence*.

26. For accounts of A.M. Herring's later experiments see: A.M. Herring, "Recent Experiments Toward A Solution of the Problem of the Century,"*Aeronautical Annual 1897* (Boston, 1897), pp. 68-74; A.M. Herring, "Early Herring Correspondence, "*American Aeronaut* 1 (February 1908), 154-157; "Herring's Airship Actually Flew," *American Aeronaut* (April 1908), p. 632. Additional information is to be found in Chanute's correspondence with Herring, James Means, and others in Correspondence. The Cornell University Library also holds a small but important collection of A.M. Herring papers.

27. *Chicago Times-Herald*, September 8, 1897.

28. Martin, "When Will Merit Count..."; *Niles* [Mich.] *Mirror*, October 28, 1898; *Elmira* [NY]*Advertiser*, November 18, 1898; *Horseless Age* (May 1897), p. 7; *Chicago Evening News*, November 17, 1898.

29. Crouch, Dream, offers a solid secondary account of Herring's later years. See also, Tom D. Crouch, *The Bishop's Boys: A Life of Wilbur and Orville Wright* (New York: W.W. Norton, 1989).

30. Wilbur Wright, *Some Aeronautical Experiments* (Chicago: Western Society of Engineers, 1901), reprinted in McFarland, *Papers*, pp. 99-118.

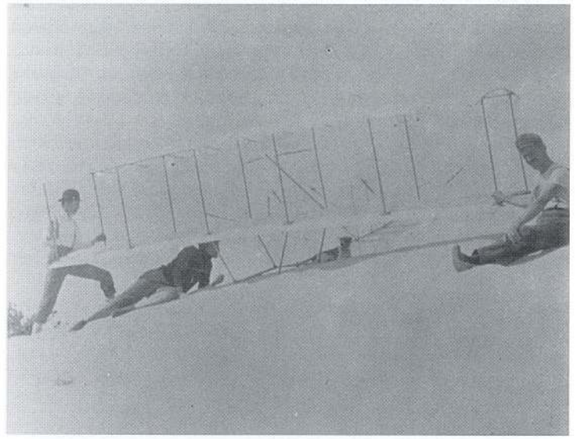
31. Wilbur Wright, *Aeronautics* (January 1911), p. 4, reprinted in McFarland, *Papers*, 1015.

APPENDIX I:

The structural history of the Chanute Multiplane glider is recorded in detail in the pages of the small pocket diary Chanute kept during his stay on the Dunes. The following notes call attention to the sequence of changes in that machine. Each number represents a major change in configuration. Quotations are from the diary as reprinted in Marvin W. McFarland, *The Papers of Wilbur and Orville Wright* (New York: McGraw-Hill and Co., 1953).

1. (June 23, 1896) Herring assembles the "12-winged machine - Eight forward, four back." June 24: "Tried the 12-winged. Found it steady but lifting too much in front. Tied on 12 pound bag of sand in front."

2. June 25: "Repaired 12-winged machine and reset it as 8 winged. Locate C. Of Pressure just under 1st pair. It proves more steady than Lilienthal's and promises to soar. Took a few short runs but



Herring, right and companion relax during the 1897 glider trials on the Indiana sand dunes. (Courtesy National Air & Space Museum, Smithsonian Institution)

wind too strong and gusty." June 26: Tried O.C. apparatus with 8 wings, and found it better balanced and easier to handle than with 12 wings. C.P. about under the center of front wings. Surface was 118 sq. Ft. Were afraid to jump with it as the wings seemed too frail to sustain a man of, say, 150 lbs, and 25 lbs. of machine. Made test of wind currents with down and found it deflected downward after leaving wings."

3. June 27: "Rigged up machine with 4 wings in front & 8 behind, the latter superposed to 0.4 their breadth. Found this much easier to handle than Lilienthal & more stable than any arrangement yet tried." June 29: "Tried 12 winged machine with four wings front and 8 behind. Found it better balanced when standing still in wind than with any previous arrangement, but found the front was insufficiently sustained when in flight (59 sq. ft.). The rear held up better than with wings as previously staggered."

4. June 29: "Next tested with 8 wings front (118 sq. ft.) And 4 behind. Found machine nearly as easy to control when standing and sustaining much better in flight. Both Herring and Avery made glides of 76 ft. Against a north wind and pronounced the machine seems to be the proper arrangement to adopt, i.e., the supporting surfaces at the front with the load (operator) directly under the center of those wings, and about ° or less surface in the rear to steady the flight and act as a tail.

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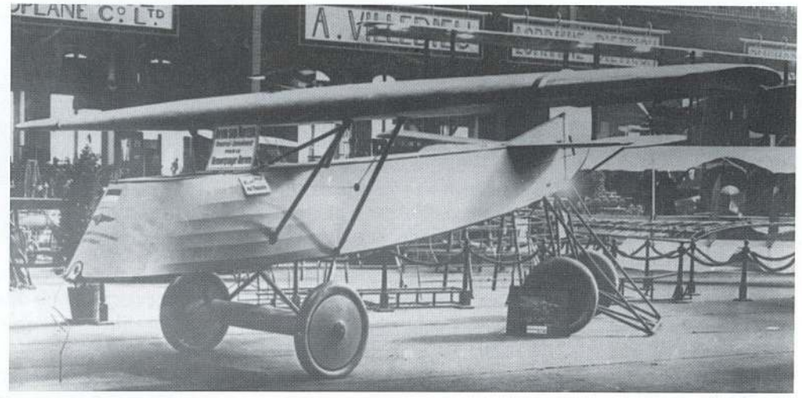
The Fokker D VIII Glider

by
Bill Gallagher
NSM Curator of Education



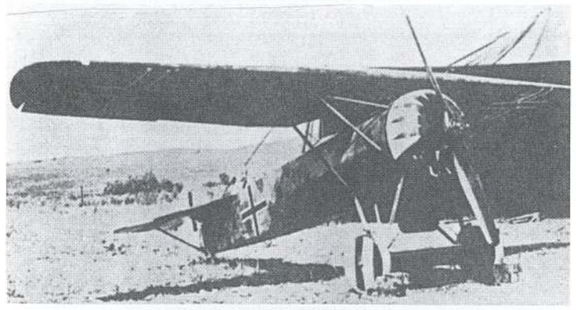
Archive photo of the Fokker D VIII (V-30) that appeared in the previous NSM Historical Journal, Vol. 18 Number 1, 1996

There it was again, that enigmatic photo of the Fokker D VIII glider in the NSM's pre-1930 graphics archive. It seemed to pop up every time the file was opened but no one could identify it. As our curiosity grew, the inability to identify what surely looked like a fascinating aberration in the development of motorless flight became a challenge.

A photo querry was published in the *No. 1, 1996 NSM Historical Journal*. Could any NSM members provide information on the ship, its background and where the picture was taken?

The responses were immediate and global.

First, a look at the Fokker D VIII fighter plane as originally designed. It was produced for the WW I German Air Service by the famous Dutch plane designer Anthony Fokker (1890-1939).(1) Referred to as the "Flying Razor" because of its unique internally-braced, cantilever wing, the D VIII had a 200-horsepower Goebel rotary engine. Intended as a frontline replacement for the Fokker D VII biplane, it was in the advanced test stage by the end of hos-



Fokker D VIII intended as a replacement for the famed D VII biplane fighter - Cantilever internally based wing is noteworthy.

tilities.(2) While several of the ships had engaged in combat, the D VIII was dogged by structural problems and only 85 had been delivered by the November 1918 Armistice.(3)

Among the responses to the NSM inquiry, aero-historian and author(4) Martin Simons, Stepney, South Australia, wrote: "It was the Fokker V-30 and was exhibited at the Paris Aero Salon in 1920. According to the book, 'German Aircraft of the First World War' by Peter Gray and Owen Thetford, the V-30 was a V-26 converted to a glider. The V-26 was the forerunner or prototype of the D VIII. The same photo appears...."

Mr. Simons continues: "In 'Fokker, the Man And His Aircraft' by Henri Hegener, pg. 212, there is a different photo showing the V-30 at the Paris Salon, 1921. According to this it was supposed to have been created in 1918, using the wings and most of the fuselage of a V-26, for 'stand off' bombing.

"The idea was to pack it with explosives, tow it with a biplane (type 31) to the target and release it (pilotless, I presume) in the hope that it would hit and explode on the point aimed at. The German military for once seems to have adopted the right attitude—it could hardly have worked. At the Paris exhibition it created a row because the old German markings and camouflaged paintwork were still visible under the thin coat of dope applied on top."

Mr. Simons's letter concerning the picture of the D VIII (V-30) concludes: "A lot more detail is given in Richard Miller's little book, 'Without Visible Means of Support' pages 28-3. The same photo you have appears there but Miller mentions also an exhibition in Belgium during 1920, and he too refers to the ill feeling caused by the old markings. He gives an account of Fokker's test flying the glider. I don't know what Miller's sources of information were, but I have found him quite reliable in other areas..."

Burt Compton, Miami, FL, faxed his findings to the NSM. "Researching the Fokker D-8 (D VIII) in the *NSM Journal*, I referred to Anthony Fokker's autobiography 'Flying Dutchman' published in 1939. The first post WWI Paris Aviation Exhibition was held the year after the Armistice. Fokker had returned to Holland after the war, smuggling a large quantity of aircraft and parts, along with significant sums of money back to Holland from Germany.

"Fokker describes displaying at Paris an F-2 single engine, five passenger transport and a 'touring glider' made from a D-8 which he planned to tow behind the F-2 for promotional purposes. Fokker had painted Dutch circles over the D-8's iron crosses on the upper wings but one day he looked down from the balcony above the exhibition area and saw that, in certain light, the outline of iron crosses showed through."

Further, in Mr. Compton's fax, "In the Journal's photo, the D-8 is tipped—perhaps to minimize the chance of officials seeing the iron cross outline. German aviation exhibits were banned from participation, and Fokker was regarded by the French and British airplane manufacturers as a German citizen [for providing aircraft for the Central Powers' war effort-Ed.].

Mr. Compton said that Fokker's appearance at the Paris exhibition provided quite a stir, almost a riot. The French put a guard around his two aircraft. The shrewd Dutch businessman and builder appreciated the publicity.

Another response to NSM's photo inquiry came from archic Ary Ceelen, Eindhoven, Netherlands. Mr. Celeen writes: "In the Summer of 1918 Fokker began to experiment with gliders towed by a specially modified two-seat version of the Fokker D VII [biplane-Ed.]. It was apparently given the designation Fokker V-31. It was fitted with a simple winch to wind in the cable after releasing

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