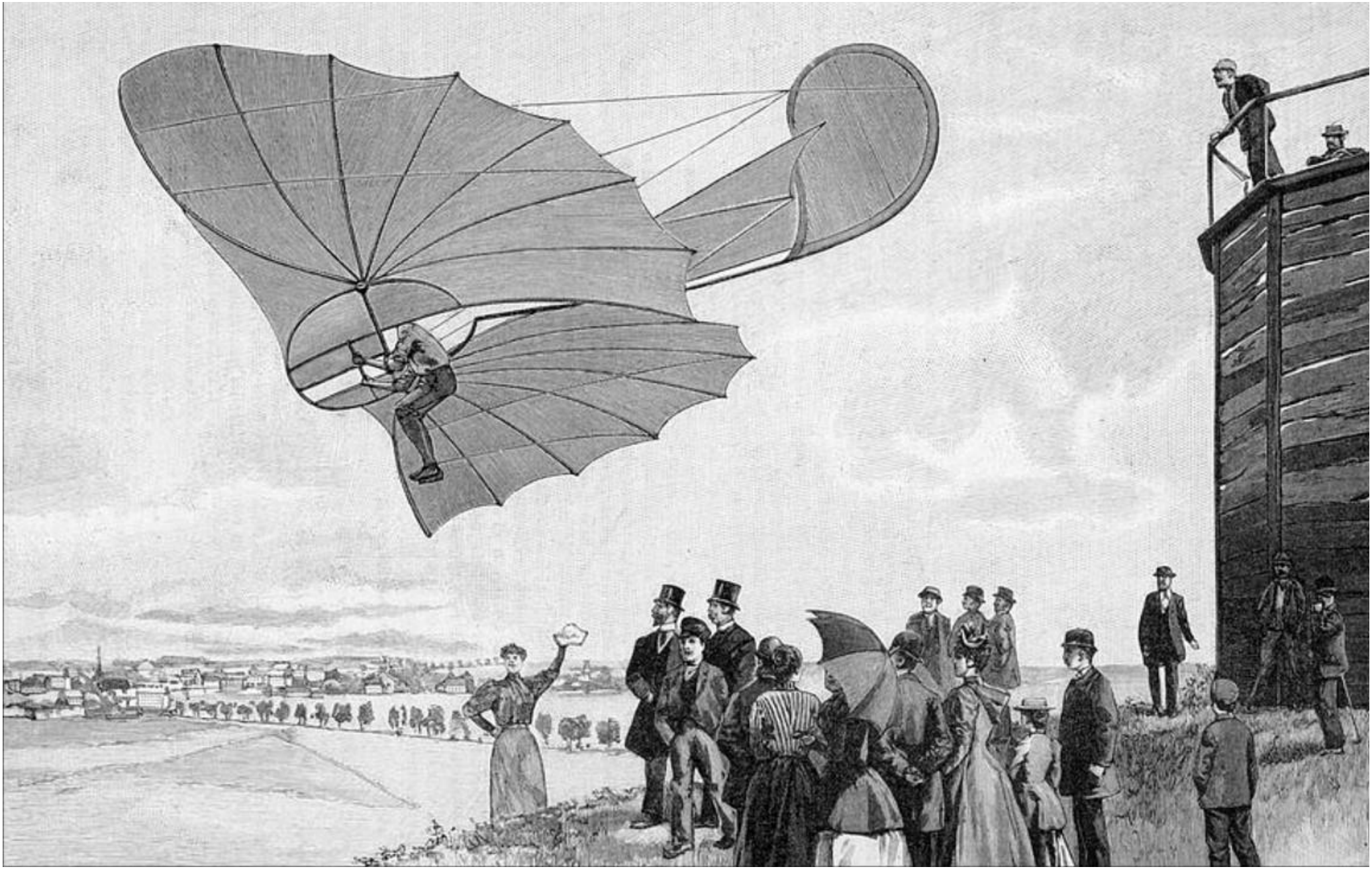


National Soaring Museum
Historical Journal

Summer 2021

Table of Contents

Front Cover: *Lilienthal Glider*

Back Cover: *Lilienthal Glider*

NSM Journal

Summer 2021

Mead Gliders and Other Sport Craft

Having been frustrated in trying to find out anything at all about the business history of Mead Gliders in Chicago, I decided to forge ahead, nonetheless, and present here some of the interesting products that this enterprise came up with starting in the late 1920s. Even the street on which their business was operating has disappeared! There no longer is a Market Street in Chicago!

Perhaps the most widely known product made by Mead Gliders, was the primary glider, *Rhön Ranger*, in kit form. Thousands of these were built and flown in the early 1930s.

SOARING TO SUPREMACY!

The Rhon Ranger is making Glider history; it is here portrayed at the start of its remarkable flight on which it floated aloft over level ground for more than seventy-five seconds from an altitude of only 250 feet. Spectators who had only seen ordinary gliders were amazed at the performance of the Rhon Ranger.

And you can BUILD IT YOURSELF for only **$89.50**

The Rhon Ranger Kit contains every item used on the glider, from the tiniest nail to the last coat of dope; every part is numbered; you can't make a mistake. Send 10c today for illustrated literature describing this

Superb Training Glider!

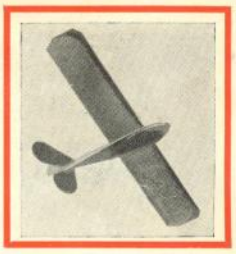
MEAD GLIDERS

Dept. B.5. 12 S. Market St. Chicago, Ill.

The *Rhön Ranger* consists of a simple open wooden frame fuselage with doped fabric covered section at rear, fabric covered wooden framed wing of constant cord, fabric covered wooden framed tailplane, elevators and rudder.

The airframe, when assembled, is braced with tubular metal struts. In addition, the wing root joint between the wings is covered by plywood panel fairings.

introducing the CHALLENGER



Another Triumph *of* MEAD Engineers

The CHALLENGER, an advanced glider whose graceful symmetry is matched by its efficient performance . . . . a beautiful ship which combines the thrills of spectacular flight with the ingrained dependability of the true thoroughbred. BUILT ENTIRELY AROUND THE FAMOUS RHON RANGER—veteran Primary which has stood the test of time and has ably demonstrated its airworthiness all over the world—the CHALLENGER marks another milestone in the progress of modern gliding.

These distinguished sister-ships offer you the full consummation of your gliding ambitions, in the most economical and thorough manner possible.

The "CHALLENGER STREAMLINE KIT," prepared with the same careful precision and attention to detail that has enabled hundreds of novices to build and fly Rhon Rangers, is now ready for immediate shipment to any part of the world, at the amazingly low price of $44.00 complete, F.O.B. Chicago.

(In two groups, if desired: Structural materials $25.00; covering and dope $20.00.)

Rhon Ranger owners who have mastered the rudiments of motorless flight can experience a new thrill in the swift and silent CHALLENGER. Comfortably seated in the snug cockpit, with its convenient instrument panel and responsive controls, the true significance of soaring flight becomes apparent to the enthusiastic pilot.

If you already own a Rhon Ranger, you can easily convert it to the "Challenger" for only $44.00; if you have never flown a glider, order any Rhon Ranger Kit, learn to fly in it, and then convert it to the "Challenger."

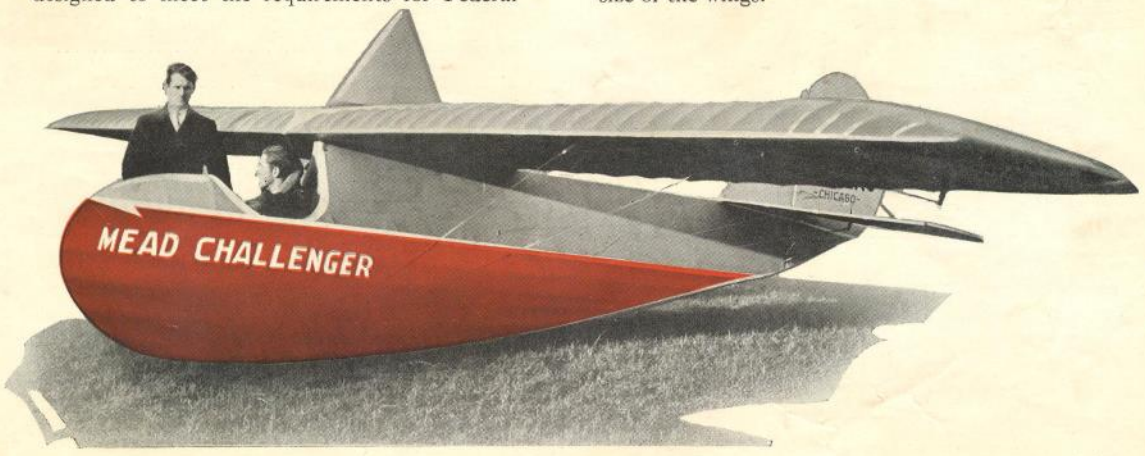
The "Challenger" like the Rhon Ranger, is designed to meet the requirements for Federal Approved Type Certificate. Either ship can be licensed at any time if the specified materials are used and the blue prints followed in workmanlike manner.

A "Challenger" feature worthy of note is the absence of heavy struts to support the wing. Among the many advantages of wire rigging are the following points: Less parasitic resistance, thus increasing the forward speed of the glider; less dead weight, thus reducing the sinking speed of the glider; adjustability of the dihedral angle of the wing to meet varying air conditions, and maximum strength to withstand the hard jolts of bad landings. The first two points have a beneficial influence on the performance of the glider in the air, the third is desirable in that it makes it possible for beginners flying in rough air to rig any desired amount of dihedral angle into the wings and thus eliminate excessive use of the ailerons. The tendency of long streamlined struts to buckle from the severe stresses imposed by a hard landing is avoided through the use of landing wires supported by the sturdy streamlined cabane.

The time required to attach and rig the wing of either the Rhon Ranger or the "Challenger" varies from twenty to thirty minutes for three persons. Those who have had some experience in this work can generally do it in less time.

The "Challenger" is not a separate or an experimental design. It is a continuation of the Rhon Ranger into a streamlined soaring-type glider. It is intended for those who desire the efficient performance of a sail-plane with all the stability and sturdiness of a primary trainer.

The "Challenger" is offered in two models, one slightly larger than the other, for this reason: Those who have never flown a glider should follow the dictates of experience and learn to fly in the Rhon Ranger. When their preliminary training is completed, they can at very little cost transform the Rhon Ranger into the "Challenger" using the same wings, same fuselage, same cabane, same tail group (except for the rudder), and the same wires. On the other hand, those who have already had sufficient glider experience to justify the purchase of a soaring-type glider will be more interested in the "Challenger Contest" model by reason of its larger wing area and greater soaring ability. The same fuselage and tail group are used on both models, the only difference being in the size of the wings.



CHALLENGER Construction Kits

Each Kit builds the complete Challenger, including safety-belt and release-hook.

STANDARD CHALLENGER (Pictured on reverse side)
Span 32 ft.; chord 5 ft; wing area 160 sq. ft. Total weight empty 140 lbs.

Kit	(Complete in one shipment)	Price
#1.	(Regular Knockdown)	$131.00
#2.	(With metal fittings finished)	143.50
#3.	(With ribs finished)	151.00
#4.	(Ribs and metal fittings finished)	163.50
	Complete, ready to fly ($15.00 crating charge extra)	500.00
	(Completed fuselage and tail group only) ($7.00 crating charge extra)	200.00

(Design and color scheme optional on finished gliders.)

CONTEST CHALLENGER:
Span 37 ft.; chord 5 ft.; wing area 185. Total weight empty, 150 lbs.

Kit	(Complete in one shipment)	Price
#5.	(Regular Knockdown)	$146.00
#6.	(With fittings finished)	158.50
#7.	(With ribs finished)	168.00
#8.	(Ribs and fittings finished)	180.50
	Complete, ready to fly ($17.00 crating charge extra)	540.00
	Complete fuselage and tail group only ($7.00 crating charge extra)	200.00

(Design and color scheme optional.)

GROUP PURCHASE PLANS: (Refer to Kit Numbers above)

Kit Numbers:	#1	#2	#3	#4	#5	#6	#7	#8
1st shipment (Main Fuselage structure)	$ 20.00	$ 23.50	$ 20.00	$ 23.50	$ 20.00	$ 23.50	$ 20.00	$ 23.50
2nd " (Controls, seat and tail unit)	17.00	23.00	17.00	23.00	17.00	23.00	17.00	23.00
3rd " (Fuselage streamline materials)	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
4th " (Wing and Cabane materials)	35.00	38.00	55.00	58.00	46.00	49.00	68.00	71.00
5th " (Covering materials)	29.00	29.00	29.00	29.00	31.25	31.25	31.25	31.25
6th " (Dope)	12.50	12.50	12.50	12.50	14.25	14.25	14.25	14.25
Total cost by installments	$136.50	$149.00	$156.50	$169.00	$151.50	$164.00	$173.50	$186.00

IMPORTANT NOTICE, effective February 1st, 1931:
The laminated parts of the CHALLENGER, such as the curved nose-piece, longerons, tail-unit trailing edges, fairing-strips, etc., are furnished cut into thin strips ready to be glued together in their proper curves. These members will be furnished glued up into shape, ready to build into the ship, at an extra charge of $5.00 if desired. (Specify "with curves glued.")

The "Duodrop" release-hook is now standard equipment with all Mead Glider kits; the parts are furnished cut to shape, ready to bolt together.

Safety-belts and Mead "Universal" turnbuckles are furnished with all kits.

One gallon Aircraft Lacquer (color optional) is furnished with the following complete Rhon Ranger Kits: Combination Kits Nos. 2, 3, 4 and 5. (This will give the entire glider one coat.)

Additions to stock list:

Plywood:

1/32" three-ply alder, per sq. ft.	$0.24
1/32" birch (A-N spec.), per sq. ft.	.35
1/16" birch (A-N spec.), per sq. ft.	.35
3/8" No. 21 cement coated nails, per lb.	$1.00
1 3/4" aluminum pulleys, each	.35
Steel housings for above, each	.25
Aileron balance springs, each	.20

MEAD BLUE PRINTS

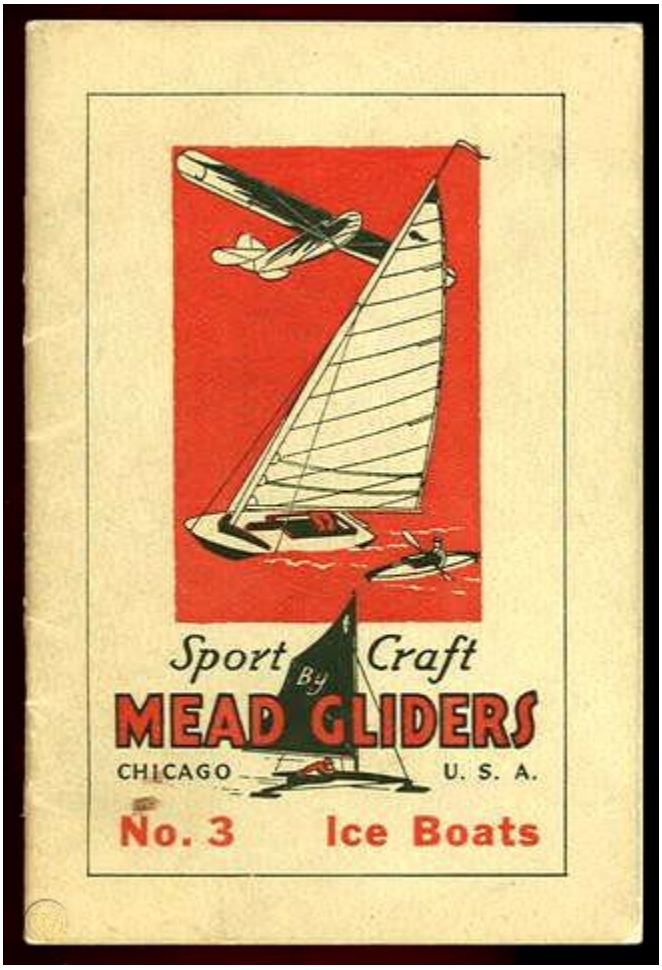
Rhon Ranger (Primary Trainer)

General Assembly (4 sheets)	$2.75
Full Size Rib and Aileron-rib (2 sheets)	1.25
Full Size Metal Fittings (3 sheets)	.75
(The above blue prints are furnished free with our kits).	
Pontoon Drawings (2 sheets)	$1.50
Landing Gear (1 sheet)	1.00
Release Hook (1 sheet)	.35
Wing Skids (1 sheet)	.35

The Challenger: (included with kits)

Standard Model	$3.75
Contest Model	4.25

GLIDERS Mead
CHICAGO, ILL. U.S.A.



Toy Ice Boat

Mead primary glider from a kit

http://all-aero.com/index.php/contactus/60-gliders/6631-mead-primary-glider

The Mead Company put out an expansive catalogue for the kits and plans for *Rhön Ranger* gliders, Ice Boats and Ice Yachts, such as the *Batwing III* and *Batwing IV*, *Cyclone*, Mead Motor-Sleds, Mead *Ki-Yaks*, and *Pollywogs*. The *Cyclone* is of special interest - it was a 10 foot long *Ki-Yak* canvas-covered spruce sled based on a biplane fuselage, propeller, and often fitted with Harley-Davidson engines. These motor-sleds were often raced on the frozen Great Lakes, and although temperamental, and prone to breakdowns, could achieve astonishing speeds. The *Rhön Ranger* and Mead *Challenger C-3* gliders were very popular with gliding enthusiasts in the U.S. and abroad from 1931 until World War II, with the *Challenger's* normal flying speed of 30 m.p.h., and wing span of 38 feet.

Mead Cyclone Motor –Sled

← From the Harley-Davidson Museum in Milwaukee, the Mead Cyclone Motor-Sled, "Pop's Trolley." These ice sleds could be built from a kit, circa 1930. "Pop's Trolley" was a Mead Cyclone motor sled powered by a 1925 Harley-Davidson engine.

This 10-foot-long canvas-covered spruce, propeller-driven ice boat is one example of the many uses found for Harley-Davidson motors over the years. The motor-sled was sold as a kit by the Mead Ice Yacht Co. of Chicago in the Thirties, and this prototype was powered by a 1925 H-D JDCB 74-cubic-inch V-Twin. $38.50 bought the entire sled, except for the countershaft, propeller and engine. Some sleds were powered by Harley-Davidson motorcycle engines from the owners' motorcycles that weren't being used in the winter.


New Mead MOTOR SLED
READY
For Home Builders
MEAD GLIDERS, 15 S. Market, Dept. 10-07, CHICAGO

Pictured below is a rare Mead Batwing Sail Glider/Kayak, offered for sale in 2021 . The Mead Company produced Glider Boats, Planes and Bikes, since the 1920s. This glider is from the 1940s. Pictures include the original parts: Batwing Sail, Wood/Canvas Pontoons/ Rigging and toolbox with all the bolts/misc.

Mead Batwing Sail Glider/Kayak

As part of our International Vintage Sailplane Meet, July 10-17, we were delighted to greet Dr. Markus Raffel, Department Head of the DLR, who brought his Lilienthal Glider Replica and gave a morning presentation on his work with the replica.

Dr. Markus Raffel and the Lilienthal Glider

Dr. Markus Raffel

by Markus Raffel
Originally published in USHPA Pilot, December 2018

When I stood on the sand dune in northern California in April of this year, with the wind interacting with the 32-kilogram wings of my self-made replica of Otto Lilienthal's glider, I started hesitating. I was approximately 25 meters above the beach - nothing that could scare a seasoned pilot of a modern hang glider. But being those 25 meters in a willow skeleton covered with a thin white bed sheet that had been designed 125 years ago, gave me pause.

I remembered what had happened when I was caught by a gust some weeks earlier. It lifted me four meters in just one second, and for a short time, this upwards acceleration nearly doubled the force acting on my legs, leaving me confused as to how I should react. My instinct told me to stretch my legs to try to reach the ground. But the glider pitched up, and I stopped in the air and fell relatively softly, with the glider acting as a kind of parachute. The patented pivoted tail plane had worked as it was intended to. Lilienthal's dihedral wing design did the rest, and the glider and pilot fell nicely in horizontal orientation.

Dr. Raffel flies the Lilienthal monoplane

I was hanging in it vertically, landing first on my feet, then on my knees. But even if the fall happened in a kind of slow motion, having 32 kilograms of weight attached to my shoulders makes me remember the landing. So I learned the hard way what my flight instructors told me: The most important lesson to remember is to know when not to fly.

I have been working in experimental aerodynamics for more than 25 years. This doesn't make me an expert in the physics of flight, but it has made me interested in various aspects of it.

I flew powered small aircrafts in Europe and the US with passion, but became really obsessed by the idea of flying Otto Lilienthal's wonderfully designed monoplane after the successful wind tunnel tests done by the German Aerospace Research Establishment (DLR). These tests, as well as the center-of-gravity tests, performed by an athletic young DLR employee, proved the potential stability of Otto Lilienthal's foldable mono-plane, his *Normalsegelapparat* ("normal soaring apparatus") for the first time scientifically. However, this meant the glider flies in steady condition, with an operator capable of holding his legs horizontally forward, while holding himself in the glider with only his hands and his arms. But, does that mean an inexperienced pilot of average fitness can foot-launch it, fly it safely, and perform coordinated flare landings?

In April of last year I took a vacation and learned to safely fly a hang glider downhill in Millau, France. I started building my Lilienthal glider after the original patent drawings, supported by my PhD student, Felix Wienke, Markus Krebs, and other flight enthusiasts. In doing so, we basically copied the DLR's glider that was made under the advice of Bernd Lukasch, the director of the Otto Lilienthal Museum in Anklam (Germany).

We used the same fabric that was used by the museum, which was shirting woven on an authentic machine, based on the instructions found during a careful analysis of the original material. The rest of the glider consists of a pinewood mainframe, willow cockpit, and tail and steel wires located between the main frame and the wings, like the original. For the struts that form the wings we used pine wood (bent into shape while wet) instead of willow, because of my heavier weight and the fact that the aerodynamic loads during the planned towing tests were going to occur higher than during free downhill flights.

After successfully testing the glider with more than 100kg sand ballast, we started tethered flights on a 5m x 5m platform. The glider and I were attached to a trailer that was towed by my car. This allowed me to gain some experience with the glider without risk. I could easily learn how to counteract an unwanted roll to one side by swinging my legs to the opposite one. I could also control the altitude by leaning forward and backward in the glider. However, this pitch control was limited, due to the way we attached the towing rope on the glider. And a pitch-up input on the trailer did not result in deceleration, because Markus used the cruise control, and my car didn't bother too much about the additional drag. That was another big difference to free flight.

During the second step, I performed flights at a limited altitude of an average of two meters attached to a rope winch, which we built with a modified Italian scooter that had a reel instead of the rear wheel. With this scooter, Felix powered and controlled my flights over and up to 200m distance. I flew at speeds of up to 50km/h over soft grass. Due to our self-imposed altitude limit, we couldn't detach the rope and had to maintain the tension until shortly before landing.

Otto Lilienthal built a training hill 15 meters high just for his flight testing. The cone-shaped hill allowed him to always start facing into the wind. It was surrounded by flat fields and, up to moderate wind speeds, there were likely only moderate gusts. I tried for a long time to find something similar close to where I live, but couldn't replicate such ideal conditions. The winch allowed me to train on a small airfield, where we also placed the leading rope block in a manner that allowed me to start against the main wind direction. During these winch flights, in contrast to the tethered flights, I had to be able to control the roll angle and, therefore, also yaw reliably. The pitch trim during most of the flight, however, was still obtained by the variation of the attachment location of the rope. Only during the last meters, when the tension of the towing rope ended, a big difference was made if I had remembered early enough to lean back, by either stretching my arms or not. Moving my chest just a few centimeters away from the crossbars that form the mainframe of the glider caused it to flare and land softly. When I forgot that or didn't coordinate well with Felix, I was reminded of the benefits of kneepads and the convenience of soft grass below me.

Lilienthal Training Hill

The controllability of Lilienthal's monoplane was finally proven during free downhill flights in California. The most successful free flights were performed at a sand dune with adequate slope and height supported by a gentle and constant wind at the beach close to Monterey. The trim, especially the pitch trim, was the most elaborate part of the flight, because it was influenced by the flexibility of the wooden structure, the tension of the wires below the wing, and the weight, height and fitness of the pilot.

I was 12 years older than Lilienthal when he started to fly, 12 kg heavier and 12 cm taller than he (55, 90 and 192 respectively). So I had to run faster, move more weight, and create more drag. (I also wasn't as fit as Herr Lilienthal.) He, on the other hand, frequently jumped from the roof of a building and managed to come to a stable fast downhill flight afterward. The famous photographs of Lilienthal with his legs high up in the air - frequently towards one side - were later used to explain how imperfect his method of control was. However, he knew very well what he was doing and decided, after testing flaps, wing warping, and an actively pivoted tail plane, to willingly control his wings by weight shifting, just as many thousands of pilots do while flying weight-shift-controlled light aircrafts in accordance with FAR103 or other national flight rules. And I am fairly certain that no-one wants to try starting a conventionally controlled aircraft at ground velocity zero just a few meters above the ground, like Lilienthal did, with his method of controlling his aircraft. However, what I intended to do was much easier.

I came to LA on the first of January for a sabbatical semester that I spent at the California Institute of Technology in order to develop aerodynamic measurement techniques. I got a truck from my NASA friend JT for that time, brought the disassembled glider with me as oversized luggage on Lufthansa, reassembled it, and spent every free minute driving to potential training hills in California. With the help of Andy Beem (Windsports, LA - the best hang glider flight instructor I ever met), I eventually managed to find the right trim of the glider, which had always been a bit too tail heavy for my fitness, weight and size before.

After having found the suitable pitch trim, the glider reacted nicely and sensitively to my pilot input and could easily be directed against the wind. During start, there is one moment when you have to decide not to catch a descending wing with your foot below it, but counterintuitively help that wing by shifting your feet to the other side. That frequently happened during the start at the sand dune, but the training paid off, and when the wind lowered one of the wings, I automatically shifted my legs to the other side. The control of the roll angle is basically like the one of a modern hang glider, but the legs need to travel a wider way to create a similar reaction from the glider, because of the lesser weight that is shifted.

It must be understood that you cannot perform turns when flying low with the steep hill behind you. So I don't know more about steep turns, other than that Lilienthal, who flew much higher, tried to avoid them for some reason. Lilienthal reported once that landing requires a similar counter-intuitive move as turning the glider. He reported that you have to bring your legs behind you to pitch up and decelerate, even if your instinct wants you to have your feet in front of you, when approaching the ground at higher speeds. However, this depends on the trim of the glider, and, in my case, it was just enough to fall a bit backwards and, therefore, move the weight of my whole body to the rear.

The problems I had while coordinating my landings at the beginning were the same as the problems I had during early hang glider landings. I initiated the landing too early and too slowly, so the flow on the wings separated slowly but massively. As separated flow is never steady nor two-dimensional, one wing starts sinking earlier than the other and generates more drag at the same time. This is what makes you turn at the end of your flight in such a situation just as well with Lilienthal's glider as with any other. The trick of landing the Lilienthal glider well is doing this maneuver a little later and a bit more consistently, so the stall occurs dynamically, and the dynamic stall vortices along the leading edges of the wings force the flow into a two-dimensional condition, while creating a short lift overshoot and an additional pitch-up moment. When I finally managed to fly nicely and steadily for up to 70+ meters and to coordinate gentle straight landings, I knew this glider design was and still is just wonderful.

When Lilienthal began his first aerodynamic experiments and bird observations, he lived in a world where even leading scientists did not believed in the possibility of human winged flight. Supported by the new technology that allowed for the addition of photographs to newspapers, he changed everything with this elegant white glider, and motivated other pioneers to start developing powered airplanes. Wilbur Wright wrote about Lilienthal in 1912: "…he was without question the greatest of the precursors, and the world owes him a great debt."

Lilienthal's flying machine still radiates joy and admiration when being unfolded and prepared for wonderful controlled straight downhill flights. The highest risk I can see will occur if a flight becomes unsteady. At this point your body, which is attached to the glider only by your elbows and hands, becomes a multi-element pendulum. And multi-element pendulums are good to generate chaos, but no stable conditions in a common sense. The weaker you are, the earlier it happens, but at the end it will happen to anyone who doesn't know when not to fly.

Dr. Raffel's Lilienthal replica on display at the National soaring Museum during IVSM 2021

Otto Lilienthal - reprinted from the Bungee Cord, Summer 2021

Otto Lilienthal

One hundred and twenty-five years ago, on August 9, 1896, Otto Lilienthal lost control flying in a thermal and died the following day in a Berlin hospital. Forty some years later, in 1938, Igor Sikorsky wrote, “It is proper to pay tribute to one of the greatest pioneers of all times, Otto Lilienthal. His achievements are unique and outstanding. The fact that no successful attempts of human flight were ever before reliably recorded is due, not to any general conditions of technique or engineering, but mainly to the absence of a man capable of visualizing and correctly solving the problem. I believe, that the work of Otto Lilienthal, who started with little help from other branches of engineering or prior art, succeeded in opening the era of human flight. This will remain the most outstanding known human achievement.”

Otto Lilienthal’s initial interest in flying was not a scientific one, he simply wanted to fly, but he realized that the scientific knowledge in the aeronautical field was generally insufficient. He stated in the introduction to his book “Bird Flight as the Basis of Aviation,” published in 1889, “Our knowledge of the mechanical processes during bird flight obviously is not on a level, comparable with those of other branches of science.” After much studying Lilienthal made his first flights in 1891, two years after publishing his book. In the next five years, he made thousands of flights with more than ten different aircraft and flying up to 250 meters in distance.

But it was not his study of the physics of wing design that made him world famous. This fame is due to his photographers, all pioneers in the development of photography. We know of 145 photos of Lilienthal flying between 1891 and 1896, which were spread around the world. Working with the Lilienthal Museum, Dr. Markus Raffel from the German Aerospace Center (DLR) had tested a full-size replica of the “Vorflügelapparat,” Lilienthal’s research glider. This monoplane glider was test flown in June on the dunes of Nags Head, NC, and then went on display, first at the NSM during IVSM and then in Oshkosh.

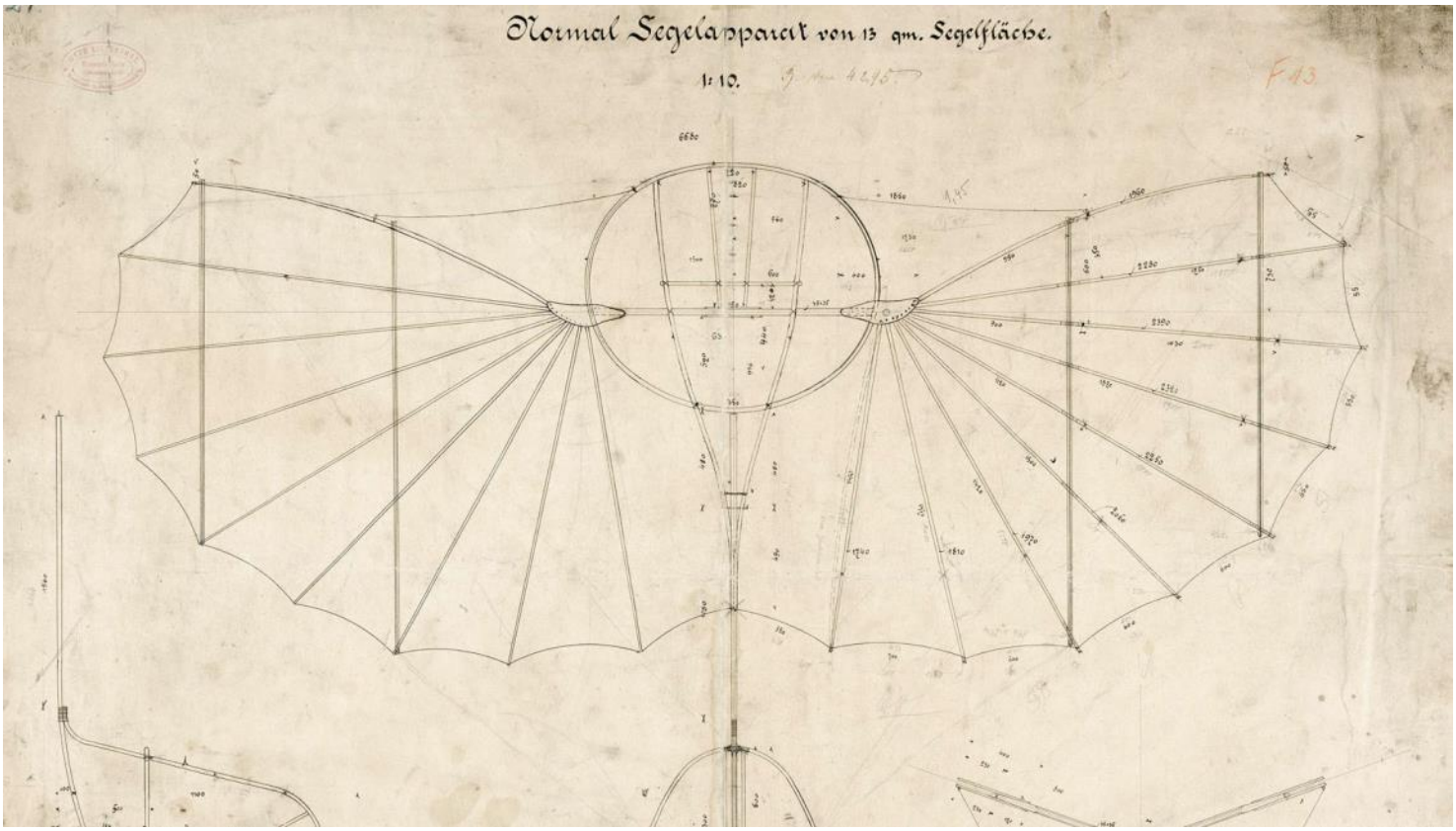
This glider with its additional wings in the front was truly a “device for experiments.” Otto Lilienthal wrote to Alois Wolfmüller on 3 October 1895: “I have also attached a surface to each wing tip which I can straighten up by pulling a cord to bring the leading wing tip back.” Describing a third way to achieve control, “I made an arrangement similar to yours for moving or turning the wings, by placing the outer tension wires at different points with a lever, which is mounted at the lower base point and thereby receives the stroke, so that the wing profile makes the correct rotation.” This device was probably operated directly from the control frame via a reversing lever. With a compensation movement to the right, the left tension wire lever had to be tightened in order to make the left surface stronger. The results of the tests were unsatisfactory, and he wrote, “But I am not really taken with these innovations, because if the body is quite free to shift the center of gravity, one can achieve more in a simple way.”

Apparently Lilienthal envisioned and tried many novel methods for control with this glider design.

Wright Brothers on Lilienthal

Lilienthal's research was well known to the Wright brothers, and they credited him as a major inspiration for their decision to pursue manned flight. However, they abandoned his aeronautical data after two seasons of gliding and began using their own wind tunnel data.

> *“Of all the men who attacked the flying problem in the 19th century, Otto Lilienthal was easily the most important. ... It is true that attempts at gliding had been made hundreds of years before him, and that in the nineteenth century, Cayley, Spencer, Wenham, Mouillard, and many others were reported to have made feeble attempts to glide, but their failures were so complete that nothing of value resulted.”*
>
> *- Wilbur Wright*

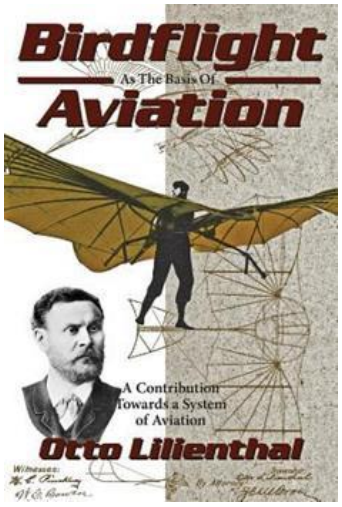


Lilienthal - Like a Bird

Lilienthal did research in accurately describing the flight of birds, especially storks, and used polar diagrams for describing the aerodynamics of their wings. He made many experiments in an attempt to gather reliable aeronautical data.


Lilienthal Models

He was the first person to systematically investigate and describe aerodynamic principles. His revolutionary book, “Der Vogelflug als Grundlage der Fliegekunst” (Bird flight as the basis of aviation) was first published in 1881 with a circulation of just 1,000 copies. It would go on to assist others in their own development of aircraft - including the Wright brothers, who noted: “His most important finding was that a convex wing provided more lift than a flat one.” It was already known that birds had curved wings, but Lilienthal was the first to exactly measure this phenomenon and transfer it to air-craft design. He began testing in the spring of 1891, and is estimated to have completed more than two thousand successful flights before he died on one of his flight tests in 1896.



During his short flying career, Lilienthal developed a dozen models of monoplanes, wing flapping aircraft and two biplanes. His gliders were carefully designed to distribute weight as evenly as possible to ensure a stable flight. Lilienthal controlled them by changing the center of gravity by shifting his body, much like modern hang gliders. However, they were difficult to maneuver and had a tendency to pitch down, from which it was difficult to recover. One reason for this was that he held the glider by his shoulders, rather than hanging from it like a modern hang glider. Only his legs and lower body could be moved, which limited the amount of weight shift he could achieve.

References:

https://aeroreport.de/en/good-to-know/like-a-bird

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Anyone is invited to contribute article material and photographs with identification about historical soaring activities, renovation of old sailplanes, soaring pioneers, unusual uses of sailplanes, etc.

Manuscripts are subject to whatever revisions, additions or deletions are necessary to make the material conform to the space limitations and standards of the NSM. Material that is to be returned must be accompanied by a self-addressed, stamped envelope. No compensation other than credit will be given. Materials sent by e-mail should go to: info@soaringmuseum.org. If we receive an overabundance of articles for the upcoming edition, your material will be saved for a future edition.