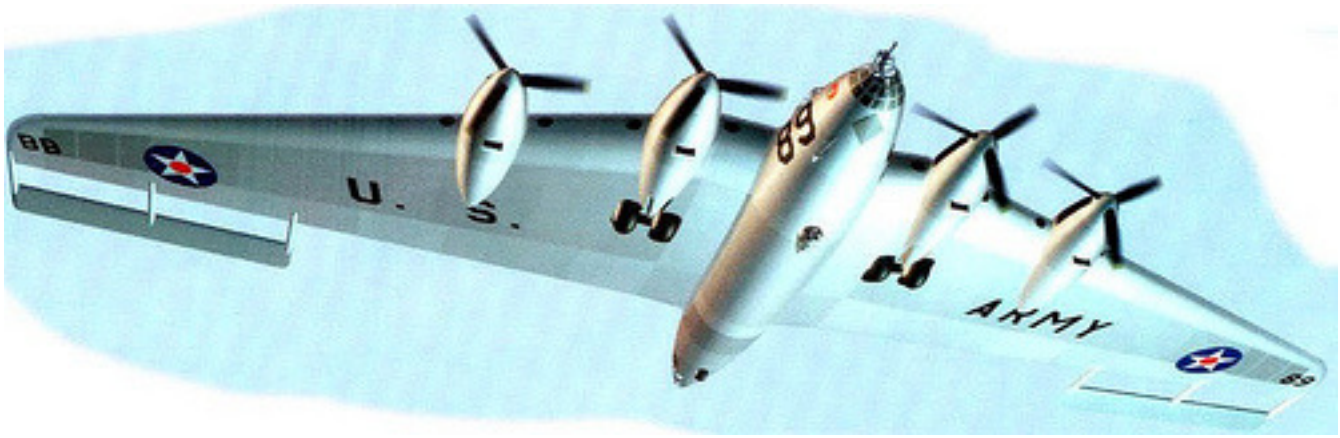
No. 322 APRIL 2013

T.W.I.T.T. NEWSLETTER



You can see more on the Boeing 306 in the members only section of the TWITT website. www.twitt.org

T.W.I.T.T.
The Wing Is The Thing
P.O. Box 20430
El Cajon, CA 92021

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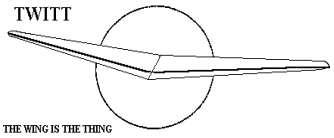

THE WING IS THE THING (T.W.I.T.T.)

T.W.I.T.T. is a non-profit organization whose membership seeks to promote the research and development of flying wings and other tailless aircraft by providing a forum for the exchange of ideas and experiences on an international basis.

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Meetings are held on the third Saturday of every other month (beginning with January), at 1:30 PM, at Hanger A-4, Gillespie Field, El Cajon, California (first row of hangers on the south end of Joe Crosson Drive (#1720), east side of Gillespie or Skid Row for those flying in).

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PRESIDENT'S CORNER

My thanks to all of you who sent in things that made good material for the newsletter. This sure makes it easier to put each issue together so I hope the trends continues into next month with comments or questions coming up from some of the opinions expressed this month. I do have a piece from Syd Hall that didn't make into this issue due to space restrictions, but I will get to it next month.

I wanted to remind everyone that there is an event you might be interested in attending if you live in the western US. The Experimental Soaring Association (ESA) will host their annual Western Workshop at Mountain Valley Airport over the Labor Day weekend (8/31-9/1). The Eastern Workshop occurred this past weekend at Harris Hill featuring sailplane building and restoration. The Western Workshop will feature a special theme marking the 40th anniversary of the Maupin Woodstock sailplane, another short wing the Irv Culver Screaming Weiner and, the more modern short wing SparrowHawk. There is an excellent program that will talk about these historic aircraft and other presentations on subjects of interest to everyone on current development in aviation.

I hope everyone is getting ready for the coming soaring season. I hope to be in the air by the Labor Day event since there is fabric on the fuselage now and I should have much of the taping done by the end of this week.

Andy

LETTERS TO THE EDITOR

Bill and Bunny,

Saw your reply re. the Windlord in the latest TWITT newsletter, I would be happy to supply the drawings of the drag rudder/elevon for RCSD, unfortunately no photos as yet as I haven't built it into one of my designs yet. Just e-mail back if you want me to send over the diagrams. I had not heard about the problems of twist destabilizing plank type wings, any further info on this?

John Newton

John,

We placed our original question and your nurflugel elist response, together with your illustrations, in the latest issue of RCSD (April). You can download a copy from the RCSD web site

<http://www.rcsoaringdigest.com/>.

Anything more that you would care to send will be most gratefully accepted. Regarding twist destabilizing plank type wings, this information came from Dave Jones (Western Plan Service) in personal correspondence. Dave learned a lot from experience, and none of his plank designs utilize twist. Nearly all of the airfoils Dave designed had a section of the lower surface which was flat, making for easy no twist wing structures. The Windlord has an extensive portion of the top surface which is flat, so you build the wing upside down.

Haven't got back to the Windlord XC as I just put the April issue on-line last night.

Bill and Bunny,

Bill and Bunny

Many thanks for including the diagram in RCSD, well chuffed It's on the front cover! I look forward to reading the mag, the F3F model featured looks a work of art and lots of technical info, right up my street. I'll send you more items as and when I get chance, working on a few flying wing designs at the moment so will keep you posted.

Since e-mailing you I discovered a simple servo end point adjuster that can be used to limit the travel of the servo, Ideal for drag rudders etc. where you only want the servo to operate over half the rudder sticks movement from its centre position and stay put for the other half. I have bought one myself and they are a doddle to set up and use.
http://www.modelradioworkshop.co.uk/products/servo-end-point-adjuster

If this were used on the drag rudder servo (connected to the aileron channel) on my idea you would not need the servo arm to be set differentially on it, not only that the drag rudder would not open a small amount on the "wrong" side (as it does in the present setup) so less drag when turning. Hope this makes sense!

You may have seen already but there is lot of discussion regarding the Kasper wings on homebuiltairplanes:
http://www.homebuiltairplanes.com/forums/light-stuff-area/2943-witold-kasper-39.html#post167184
May be of interest to you.

Thanks again,

John

Hello twitt.org,

Please tell me the current status of your newsletter, membership etc. I'm researching flat-surface flying wings like Barnaby Wainfan's Facetmobile and would like to read whatever is available.
Thanks.

David Josephson
Santa Cruz, California

(ed. – This was my reply to his inquiry: Thank you for the inquiry about TWITT. We are still in existence and publish a monthly newsletter along with the having the website. Since we have been around for so long we have stopped having any regular meetings (ran out of topics and speakers) as may still be indicated on the website (I am really behind in getting updates done to it). The members only section does contain all of our past issues dating back to June 1986 along with some Horten plans material and an article on Boeing flying wings.

We currently have 67 members most of whom have been with the association for many years and have a wide range of experience in aviation.

I hope this has answered your questions on TWITT. I look forward to receiving your annual subscription by mail or through PayPal from our website.)

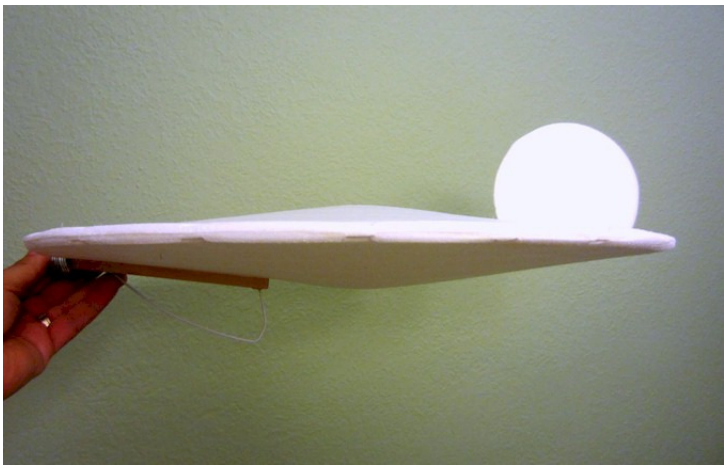
Andy,

You were right, this was caught in spam filter.

At the moment I am interested in annular/circular wings: ie Vought v-173, Arup S-3, or Russia's Discoplan

I have built glider models,

http://www.instructables.com/id/2012-San-Francisco-Flugtag-Aircraft-Model/



We will be in the 2012 San Francisco Flugtag. Unlike most of the entries our goal is to fly the longest distance. The current record is 225 feet.

In pursue of this goal we have designed a circular flying wing. We have make several versions of varying thickness, and with the thickest point in various locations.

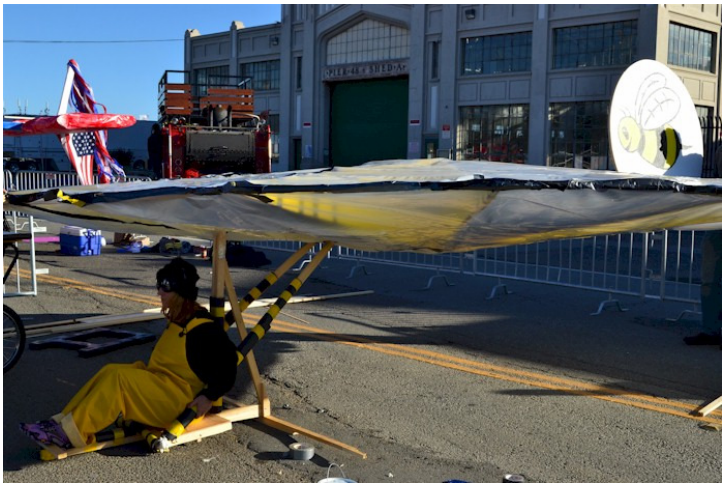
This Instructable will walk you through building and flying a model of the version we are building for the contest.

The model is a 20 inch circle with the thickest point 3 inches and placed in the center of the wing.

Our models get a 12 to 1 glide ratios. Launched from 5 feet they will fly 60 feet. This is made more impressive given they don't look like they will fly at all.

For more information/Video please see

www.Facebook.com/sfflugtag
https://twitter.com/sfflugtag
http://www.youtube.com/user/SFFlugtag?feature=watch



and a 17 foot diameter version for the Red Bull Flugtag (one of the few teams actually going for distance). Please see attached picture

I believe you put me in touch with a couple of members when I was researching the project.

Thank you,

Adam Albert

(ed. – This was in reply to our message exchange where apparently the e-mail subject line must have keyed his spam filter. I found this is happening more often these days as people try to keep junk mail out of their in boxes. Something to consider when you think you are missing a message.)

Hello Mister Hoey:

I live here in Austria and I have ordered the Turkey Vulture (plan and parts). There isn't a written plan. I don't have any description for the plan. Please can you tell me the individual ribs stuck on the nose strip like how high?

Thanks,

Wolfgang Mair

Hello Wolfgang,

The construction article was printed in the June 2002 issue of Model Airplane News. Some of the photos and descriptions were not included in the article.

I am attaching the full text of the construction article and most of the photos. That should allow you to complete the model successfully.

The wing was built with a full-depth spar for added strength since it is a very thin airfoil. That results in the use of shim blocks to maintain the desired camber in the airfoil and alignment during wing assembly.

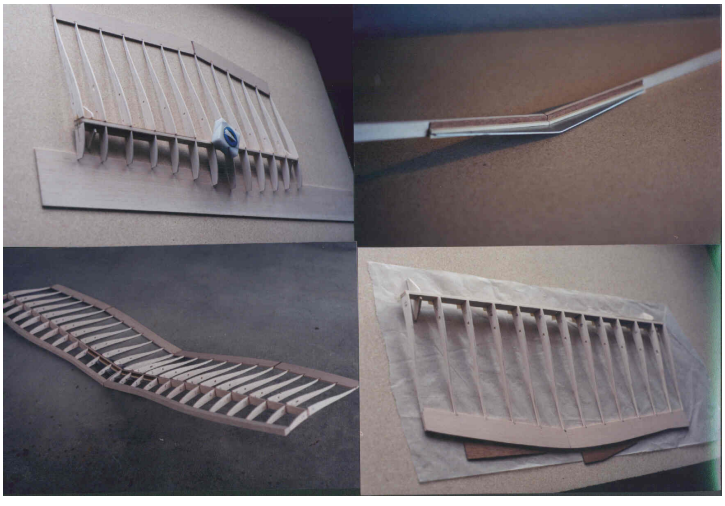
It is a nice flying airplane, but there is one change which I have found that improves the handling qualities. . Reduce the wing dihedral from 16 degrees (total, 8 degrees per side) to 10 degrees (five degrees per side). This makes the airplane less oscillatory in roll. Many builders have also built the wing in one piece which eliminates the rather complex joiner plate at the wing root.

Good luck, and let me know how it flies.

Bob Hoey

(ed. – Bob has agreed to allow me to publish all this information on the TWITT website where we already have a piece on his Turkey Vulture model. I have included one of the photos here so you can get an idea of his documentation and you can find the complete package at the link below in a week or so, if it isn't up by the time you get this issue.)

http://www.twitt.org/1partdrib.html#top



Dear TWITT,

Since 1998 I run a Me 163B Komet website, and Reinhold Stadler contributed a lot of material in the early years. Unfortunately we lost contact around 2004.

http://robdebie.home.xs4all.nl/me163.htm

Recently I started reading Russell Lee's 'Only the Wing' in which Reinhold was mentioned for his work on the Horten bell-shaped lift distribution. I would love to ask him some questions about that, since I may have an application for it.

Therefore my question is whether Reinhold is still active in TWITT, and whether you could get me in touch with him, maybe by forwarding this message? Many thanks in advance!

Best regards,

Rob de Bie

(ed. – Since I don't like to release member e-mail addresses not knowing how private they wish to remain, I forwarded Rob's message to Reinhold from which the following exchange occurred.)

Thank you for transferring the message. I will contact Rob and keep you informed, if something interesting comes up.

Robs Komet web site is very interesting for tailless enthusiasts, as he really collected a lot of good stuff. His discussion forum always brings interesting things.

Please note, that my email has changed (not mucweb, only web now).

Thank you and have a good time!

Reinhold

Hello Rob,

Via TWITT I got the message, that you are trying to get in contact with me again. How are you! How are things running with the Komet page and discussion forum?

I am a member in TWITT, but not very active at present. In 2006 I changed my job, working in research now (not aerospace). As we are presently

assembling our experiment (one of the biggest in Germany) not much space is left for hobbies aside my family. However, I slowly work on sorting and structuring my collection of flying wing and tailless data to restart when things are relaxing...

With kind regards,

Reinhold

Hello Andy,

Here's a question (it occurred to me this morning) that might make for interesting discussion among T.W.I.T.T. members:

Why are canard sailplanes (gliders) virtually non-existent? Even tailless and flying wing gliders are common by comparison.

(The only one I'm aware of is an experimental canard motorglider that Burt Rutan built and flew in the 1970s or 1980s.)

A new company called Swiss Space Systems (S3, see: www.s-3.ch/) plans to launch satellites into orbit using an Airbus A330, from which will be launched a reusable tailless suborbital space plane (powered by LOX & kerosene) which will, in turn, release an expendable upper stage with its satellite payload. Here (see: www.space.com/20449-swiss-private-rocket-plane-2017.html) are new illustrations of S3's space plane (called SOAR) and its third stage with a satellite payload. SOAR's design stems from that of Dassault's proposed VEHRA air-launched space plane (see: www.google.com/search?sclient=psy-ab&hl=en&site=&source=hp&q=Dassault+VEHRA&btnK=Google+Search).

Jason Wentworth

Andy,

Thanks for clarifying Burton's intention. *(ed. – I had explained that Tony had sent this filler in as a humor piece and not so much a technical piece.)* We amateurs are easily misled. I hope the issues of Reflexed Airfoils and Marske's Pioneers 2 and 3 will furnish more valid controversy for sailplane designers and builders.

As you may know or can find out, there is a deep and abiding prejudice against Marske designs for 40 years (even in the old SHA and SSA), and I feel the very successful record since then deserves a second look by the "amateur" builder/flyer instead of their having to "re-invent the wheel".

Bob Michener

(ed. – So here is another take on the wing lift theories that came shortly after the original article appeared in Sailplane Builder. I hope there will be more comments as this issue and the next SB hits the streets.)

Re: ”wing lift war” controversy, January 2013
SAILPLANE HOMEBUILDER

Jim Marske had a local pilot friend, who was a pragmatic, practical, don’t-confuse-me-with-that-aerodynamic-theory-bull, who would hold forth that the flat-plate AoA (Angle of Attack) was the “real” source of “lift”. Jim suggested a thought experiment wherein a plane was dived vertically from altitude with no AoA at all relative to the earth’s gravity, then the question was: would the target point on the Earth stay the same

or "drift" up-screen as the plane neared the Earth. If it "drifted", it would be evidence of upper airfoil lift; drifting down screen would be evidence of a preponderance of "flat plate" lift? I never heard that Mr. Pragmatist tried it in his Super Cub….but to me this was characteristic of Jim's hands-on, experimental, experience-tested conceptualization that cut through to solutions that had confounded his aero professors.

Reflexed airfoil theory is another area that Jim's practical investigations makes a significantly major contribution to "wing lift wars" that is currently embroiled in descriptive-limited, quaint "lift demons and drag pixies", and the theory-confabulating "chordwise thrust".

1) Liebeck, a man-powered flight designer experimented in the 60s, had a computer-that produced an airfoil that was (roughly as I recall) characterized by a thick-looking airfoil with a reflex (Fig.1). As I recall, it was rumored that he got it a few feet off the ground.

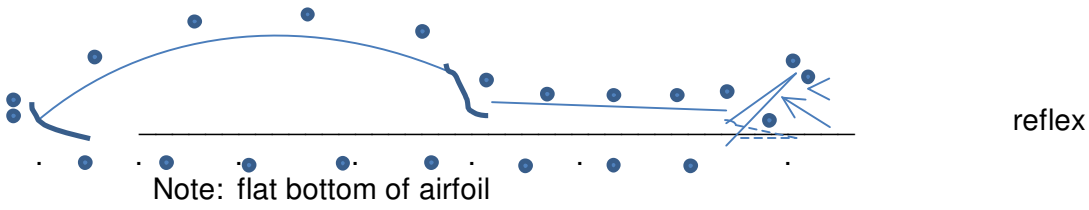


FIGURE 1. Liebeck computer-designed airfoil w/idealized air movement positions, time equivalenced (boundary layer neglected). Wider spaces indicate greater vertical movement.

His interpretation was that two adjacent, idealized air molecules that were separated by the airfoil would precede across the top and bottom contours of the aerodynamic profile at different rates of acceleration and deceleration. Where there was a distance between any adjacent molecules at any time, a "vacuum" developed for "sucking up" the airfoil (*Warning: these are my anthropomorphic extrapolations).* In the average non-reflexed airfoil, these "marked" molecules would exit the airfoil at slightly different times and speeds, creating by pressure-differential a vortex (wake turbulence), the source of induced (?) drag.

It is important to reduce/eliminate this wake turbulence. The strategy Liebeck was to have the original two molecules become "re-adjacentized" (new word but you can guess what I mean) at the Trailing Edge with the same speed or acceleration by manipulating the contours of the upper airfoil, hence the strange 'hump' in the upper mid-section that had initially accelerated the "top" molecule (relative to the "bottom") with the reflex taking care of the final deceleration of this top molecule to "re-adjacentize" with the bottom molecule at the same speed, thus ideally eliminating wake turbulence Induced Drag.

While the positive "flat plate" AoA would have considerable upper surface turbulence for random lift, the lower surface might compound the inefficiency by "suction" of the lower molecules subtracting (increased) "drag" due to increased molecular speed (as pressure?): downward "suction" being----logically-----Drag? Altogether, culminating in theoretically impractical performance as well as unacceptable instability.

2) This Reflex theory which further fits (seems validated) by the demonstration by Jim Marske famously increasing* the L/D 50% over a similar airfoil unreflexed (and---as a bonus in the Marske airfoil---furnished extraordinary spin resistance). Fauvel originally, of course, had exploited reflexing for stability so successfully in the AV series of the 1920s, and the 17% thick airfoil was copied by the Flying Plank as Jim's XM-1?, but Jim showed independent initiative by switching to the proven NACA series and demonstrating reflexing also increased performance.

2a) As a corollary observation, Marske experimentally changed 17% thick airfoil to 9% before thinner airfoils were the fad (the 1-26 is 12% I think). My wood-spar PIONEER 2 wing flexed so much that it was often assumed to be a fiberglass spar; yet Jim had proof loaded it (he was a Test EN) to 8 g's. (Later the Genesis carbon spar tested at >12 g''s: the test jig broke at 19 g's.]

3) The comparison of Jim's PIONEER 2 airfoil, 23012-R, reflexed @ 75% chord (notation?) contrasts with the Schweizer 1-26's 33015 standard non-reflex. The T.E of the PIONEER 2 was "raised" 3". (The PIONEER airfoil also differed significantly in having a "cusp" on the lower L.E. that Marske had found (intuited?) helped performance.)

4) Bruce Carmichael once had an article in SOARING wherein he discussed an anomaly ("sweet spot"?) in the Fauvel polar around 69 MPH as I recall where the Drag seemed to briefly level out as if the reflex Drag was optimized at that speed. Which raises the question: could manipulating the degree of reflex---if not compromising its inherent stability---as a function of speed, optimize more L/D?

Cordially,

Bob Michener, PIONEER 2 owner and former (pre-medically restricted) flyer

*The increased L/D also benefitted from the further reduced (Induced?) Drag of not having "extra" empennage surface to "drag around", as well as the L.E. 'cusp'. The PIONEER 2d has according to degree of "clean up" achieved L/D of 33 to 38.1 (19:37 Zulu,cent.Ohio; AS Corr.=60.23MPH), Dave Welles, test pilot: http://www.continuo.com/marske/pioneer%20iid%20/performance/pioneer%20i.. p.6/12

Original 1-26 model achieved an L/D of 21.5 (R.Johnson in SOARING), later models achieved L/D 23.

Hi Andy,

Your reader Ged Terry showed me the January 2013 issue of Sailplane Builder for my comments on "The Wing Lift Wars". I have written a short article on the subject (attached) which I offer for publication in the hope that your readers would be interested.

I began gliding in 1947, was an instructor for over 20 years and retired from active flying in 2009. On technical matters, I was employed from 1952 to 1992 at the English Electric aircraft company, later BAE etc, working on the flight controls and handling qualities of five RAF Service fighter and strike aircraft, two of then fly-by-wire, and three FBW research aircraft, and then completing a few years of occasional consulting work for them. (I even met Mary Schafer, though we did not discuss Lift Demons.)

An aeromodeller in my youth, I absorbed plenty of what I eventually realized were simply aeronautical myths, also becoming amazed at how deeply entrenched these were in aviation folklore. Though not a theoretical aerodynamicist, my work was in our aerodynamics department in a fruitful collaboration with our test pilots, making it possible to eradicate all the popular fallacies from my personal internal library, of which lift fallacies were about the last to go.

All the usual fallacies appeared in the "Wing Lift Wars" pages of the magazine. I took the opportunity to write in simple terms on how lift actually works. If you publish it, I would ask that if you receive any comments needing a response I could be sent a copy in time to write straight back.

With best regards,

John Gibson

(ed. – I find it interesting that something starting out as sort of a humorous conversation on the theory of lift has created the at least two very insightful papers on what is actually going on. John has indicated he would like to hear directly from anyone who has something to say about the following article. If you do respond, please remember to add twitt@pobox.com as a cc: addressee so I can share with everyone.)

Wing Lift: Peace for 120 years

John Gibson
john.gibson@orpheusmail.co.uk

Practical lift theory began to emerge 120 years ago, experiment and theory each constantly developing and confirming the other up to the highly advanced state of today's knowledge. Nobody in the aerodynamics community fights wars over it. A hundred years ago there was little theory in the public domain, so the aviation community invented its own and has taught many of them to succeeding generations without seriously checking against current knowledge. The superb Lift Demons lampoon by Mary Shafer may have been prompted by Jeff Raskin's discovery in 1994 that the equal transit time notion (ETT) coupled with the Bernoulli Principal could not explain lift. He was right but the popular conclusions that followed were wrong.

It has always been part of lift theory that the upper surface flow passes the trailing edge well in advance of the lower (at negative lift the reverse applies). Despite this, it is now commonly asserted that lift theory had always been wrong (often in the form "Bernoulli was wrong!") and that the huge advances in aviation were achieved with no knowledge of how aircraft flew. Does anyone really believe this? ETT is wrong but aerodynamicists did not invent it. The Bernoulli Principle was right in the 1750s and is so now, but it was not a lift theory. It defines the fluid pressure and velocity relationships in pipes, with a constant mass flow rate independent of the diameter, and it does not apply in a free fluid stream. In aerodynamics it is applied along the flow streamlines in which by definition the mass flow rate is also constant.

Lift and circulation

Submarines at neutral buoyancy and wings in flight are supported only by the pressures on their skins with a downward force on top which is lower than the upward force underneath. Submarines passively use the natural water pressure gradient, and current examples need to be scores of feet deep to obtain the necessary pressure range. Wings generate their own pressure field to modify the wing surface pressures with a lift force equal to the wing loading. The 5 to 6 lbs/sq.ft of many gliders is a mere 0.25% of the 2240 lbs/sq.ft. static pressure at sea level, but however large the aircraft, circulation explains its lift. There is no other source.

The theory was derived in the 1890s by three researchers, each unaware of the others. They were Lanchester (U.K.), Joukowski (Russia) and Kutta (Germany). Its roots lay in the 1750s hydrodynamic theory but it was sparked by the mid-19th century Magnus theory explaining the drifting trajectory of rotating cannon balls and the vortex theories of Helmholtz. It says:

In upright flight, a vortex is generated around the wing, increasing the streamline flow velocities on its upper surface and decreasing them on the lower. The respective zero lift surface pressures decrease and increase in accordance with the Bernoulli Principle. The net forces act upwards on the lower surface and downwards on the upper, the net vertical components being the only lift force. The fundamental lift theorem is:

"Lift per unit span = circulation strength x air density x velocity"

Derived by Joukowski in 1906 and found implicitly in Kutta's work in 1910, this theorem was later confirmed by physical lift and circulation measurements. It led Joukowski to the generic form of modern aerofoils with rounded leading edge and thin sharp trailing edge, both of which perform necessary functions for efficient lift. Kutta found methods to calculate lift on a simple aerofoil formed by twin concave arcs similar to the later Antoinette's, explaining the mystery of lift generation at zero angle of attack (AoA). Before the 1920s, the basic low speed theory had been established by Prandtl and his Goettingen team with the viscous boundary layer, which is the cause of skin friction, form drag and the stall but without which lift would be impossible, and with the additional lift-induced drag of a complete wing, described below. Very highly developed for many decades, the theory served aviation well and still underpins the design of low speed aerofoils and wings. The complete 18th century Euler inviscid fluid hydrodynamics and the 19th century Navier-Stokes viscous flow theories have become increasingly used in the last half-century, but they were insoluble prior to high powered digital computing.

Techniques developed in early experimental aerodynamics for flow visualization allow no argument about the nature of airflow around aerofoils and wings. Most people are familiar with the Magnus effects of a curveball struck or thrown with spin. With no spin there is no lift force. With spin, the adjacent air carried round by it creates pressure changes with a force normal to the spin axis. The deviation from the zero-lift ballistic path is controlled by the spin rate and its direction. The effect is better envisioned in lift theory by a spinning cylinder, which given a diameter equal to the chord can produce four times more lift than an aerofoil with high lift flaps.

The same circulation principle applies to aerofoils and wings despite the lack of mechanical rotation. At the zero lift AoA, pressures above and below are mostly suction (or static pressure on flat plates) that cancel each other out. As the AoA is altered, lift begins to be generated by initiation of a vortex around the aerofoil triggered by separation of the boundary layer at the sharp trailing edge, continuously sustaining and adjusting the vortex strength to maintain a smooth flow off the wing. It adds to the velocities and the suction above and decreases them underneath, creating lift proportional to AoA and speed squared. For negative

lift the reverse effects ensue. All sections lift in the same basic manner whether cambered, or symmetric, or flat plates (inefficient) or curved plates (good for small slow model aircraft).

False lift explanations and their correction

The common fallacies about basic lift theory are clearly marked by any or all of the following typical features. They are often found in "pilots' literature", whether official teaching or not, and some are found in unreliable Wikipedia entries.

- There is no mention of circulation (though the current PHAK attempts to describe it but gets it wrong while also retaining the common fallacies).
- It invokes Newton's 3rd law. This refers to opposing force pairs, not motion. It says that lift equals weight in steady flight but it cannot explain the lift. Newton used the 2nd law of solid body momentum (which is inapplicable to a free stream of fluid) to suggest a drag formula for spheres in a fluid, but when it was later adapted to flat plates at small AoA the predicted lift was so poor that scientists ridiculed ideas of winged flight for most of the 19th century. (Try kicking a ball carved out of air.)
- The "Newtonian reaction" fallacy is coupled with pushing air downwards. Testing of aerofoil in two-dimensional flow wind tunnels (on model wings spanning the tunnel to eliminate tip effects) proves that air approaches in an upwash followed by a reversal to the original level with no net downwash. A wing with tips generates a downwash, but it decreases lift and causes lift-induced drag. It results from the two trailing vortices rolled up from the fragments of the lift vortex shed across the full span. The flow between the tips is depressed in a downwash from a point ahead of the wing by the vortex pressure field, reducing the AoA which must be restored with a nose up pitch attitude increment. The horizontal component of the aft-tilted lift creates a lift-induced drag. An up wash is also created extending out laterally, vital to birds migrating in V-formation skeins.
- It may refer to a wing pulling the upper flow down. Pressure cannot be negative, and "suction" is just a positive pressure that is less than static. The pressure gradients across the flow from the undisturbed static pressure above to the reduced pressure on the wing surface push the flow against the wing. It may be said that viscosity "sticks" the flow to the surface, but it is not a glue and it ultimately causes flow separation. On the lower surface the pressure may quite typically be mostly a "suction" as noted earlier, though weaker than on the upper, but it will be raised a little at high AoA or considerably near a high lift flap even at low AoA. Aerofoil profiles act like bounding streamlines, and streamlines meet at an angle only at a stagnation point and do not "bounce off" another.
- The principle of the venturi may be offered as a wing lift analogy. Usually it will then be cut in half and an unidentified imaginary restriction is added to the flow above it, thus removing the possibility of a venturi effect and of circulation. Because the mass flow rate is constant in a closed tube, a venturi throat velocity is fixed by the throat to inlet area ratio. The Bernoulli Principle, also valid only in a closed tube, gives the pressure. Streamlines are notional closed tubes by definition, containing constant particle mass flow rates and with velocities determined by circulation. They self-adjust their cross sections to maintain the mass flow rate and the Bernoulli Principle gives their pressures. As a result they move closer together as velocity increases and pressure decreases, or move apart as velocity decreases and pressure increases. So a streamline is like a flexible venturi in which the flow conditions control the diameter.

The significance of aviation fallacies

Apart from wasting effort on teaching/learning/arguing about them (for 100 years!), the common lift fallacies discussed briefly above have been of little significance to pilots because they do not influence flight safety. That cannot be said for other fallacies, some equally old, concerning the flight mechanics of aircraft behavior and how to handle them. The one about reflex wing sections on tailless aircraft that appears in the February issue is almost universal among pilots, but it has no influence on stability. Who now knows that the correct techniques developed by the Wrights in a few flight hours up to 1905 were ignored by

aviators until the 1950s? Pilots even today are still having the same stalling accidents that killed and injured large numbers of early pilots. But that's for another day.

References

Some trustworthy references are:

"Aerodynamics for Naval Aviators", HH Hurt, 1960. Simple language and good diagrams, readily available as a PDF.

"Theory of Wing Sections", Abbott and von Doenhoff, 1949/1959. Very comprehensive by two NACA staffers, with plenty of easy narrative reading (for this the maths can be ignored).

"A History of Aerodynamics", JD Anderson, 1997. All-narrative, no maths, goes back 2000 years to Aristotle and Archimedes.

Press Release 25.03.2013

Vision of a Danube flight: the idea of the "Tailor of Ulm" lives

Evaluation criteria for the City of Ulm Berblinger Competition 2013 now published

With the Berblinger Competition 2013, the City of Ulm is once again calling for innovative ideas for civil aviation to make flying more environmentally friendly. The Berblinger Jury, which includes renowned aviation experts, has now published the evaluation criteria that will be used to judge the 2013 competition entries. Applications may still be submitted up to 30th June 2013.

Is it possible to perform a long-distance flight using environmentally friendly construction, components and propulsion systems within 10 years time? The City of Ulm believes: yes – and for the Berblinger Prize 2013 it has committed itself to promoting visions and developments in the field of general aviation, which aim to meet this goal.

In 1811, Albrecht Ludwig Berblinger had the vision of crossing the River Danube from one bank to the other using a hang-glider. In the spirit of Berblinger, and continuing his vision, the City of Ulm aims to promote innovative developments in general aviation that makes it possible to perform an environmentally sustainable long-distance flight. The long-distance objective is a competition flight following the course of the Danube along its whole length from source to mouth, as free of noise and emissions as possible. Therefore, the motto of this year's competition: "Vision of a Danube Flight" completely in the spirit of the legendary Tailor of Ulm.

The objective of the Berblinger competition 2013 is to show in theoretical projects the approaches that could be pursued in order to achieve this goal of environmentally sustainable long-distance flight.

We are looking for ideas for an innovative, manned aircraft or for individual components that can contribute towards the realization of this "Vision of a Danube Flight". Aspects of environmental sustainability such as energy consumption, exhaust and noise emissions, will play a particularly important role. The prize money amounts to €25,000.

The Berblinger Competition 2013 will have its own stand at the AERO aviation show in Friedrichshafen from 24th – 27th April. Visitors will be able to find out all about the current competition and pick up the entry packs. The latest information on the 2006 and 2011 competitions is being prepared in time for the AERO and will be available at the show. The book also contains a media CD, which is an impressive record of the 2011 Berblinger Flight Competition.

The evaluation criteria, the entry form and other information on the competition are all available at http://www.berblinger.ulm.de/.

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AVAILABLE PLANS & REFERENCE MATERIAL

Tailless Aircraft Bibliography

My book containing several thousand annotated entries and appendices listing well over three hundred tailless designers/creators and their aircraft is no longer in print. I expect *eventually* to make available on disc a fairly comprehensive annotated and perhaps illustrated listing of pre-21st century tailless and related-interest aircraft documents in PDF format. Meanwhile, I will continue to provide information from my files to serious researchers. I'm sorry for the continuing delay, but life happens.

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Books by Bruce Carmichael:
Personal Aircraft Drag Reduction: $30 pp + $17 postage outside USA: Low drag R&D history, laminar aircraft design, 300 mph on 100 hp.
Ultralight & Light Self Launching Sailplanes: $20 pp: 23 ultralights, 16 lights, 18 sustainer engines, 56 self launch engines, history, safety, prop drag reduction, performance.
Collected Sailplane Articles & Soaring Mishaps: $30 pp: 72 articles incl. 6 misadventures, future predictions, ULSP, dynamic soaring, 20 years SHA workshop.
Collected Aircraft Performance Improvements: $30 pp: 14 articles, 7 lectures, Oshkosh Appraisal, AR-5 and VMAX Probe Drag Analysis, fuselage drag & propeller location studies.

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VIDEOS AND AUDIO TAPES

(ed. – These videos are also now available on DVD, at the buyer's choice.)

VHS tape containing First Flights "Flying Wings," Discovery Channel's The Wing Will Fly, and ME-163, SWIFT flight footage, Paragliding, and other miscellaneous items (approximately 3½+ hours of material).
Cost: $8.00 postage paid
Add: $2.00 for foreign postage

VHS tape of Al Bowers' September 19, 1998 presentation on "The Horten H X Series: Ultra Light Flying Wing Sailplanes." The package includes Al's 20 pages of slides so you won't have to squint at the TV screen trying to read what he is explaining. This was an excellent presentation covering Horten history and an analysis of bell and elliptical lift distributions.
Cost: $10.00 postage paid
Add: $ 2.00 for foreign postage

VHS tape of July 15, 2000 presentation by Stefanie Brochocki on the design history of the BKB-1 (Brochocki,Kasper,Bodek) as related by her father Stefan. The second part of this program was conducted by Henry Jex on the design and flights of the radio controlled Quetzalcoatlus northropi (pterodactyl) used in the Smithsonian IMAX film. This was an Aerovironment project led by Dr. Paul MacCready.
Cost: $8.00 postage paid
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An Overview of Composite Design Properties, by Alex Kozloff, as presented at the TWITT Meeting 3/19/94. Includes pamphlet of charts and graphs on composite characteristics, and audio cassette tape of Alex's presentation explaining the material.
Cost: $5.00 postage paid
Add: $1.50 for foreign postage

VHS of Paul MacCready's presentation on March 21,1998, covering his experiences with flying wings and how flying wings occur in nature. Tape includes Aerovironment's "Doing More With Much Less", and the presentations by Rudy Opitz, Dez George-Falvy and Jim Marske at the 1997 Flying Wing Symposiums at Harris Hill, plus some other miscellaneous "stuff".
Cost: $8.00 postage paid in US
Add: $2.00 for foreign postage

VHS of Robert Hoey's presentation on November 20, 1999, covering his group's experimentation with radio controlled bird models being used to explore the control and performance parameters of birds. Tape comes with a complete set of the overhead slides used in the presentation.
Cost : $10.00 postage paid in US
$15.00 foreign orders

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