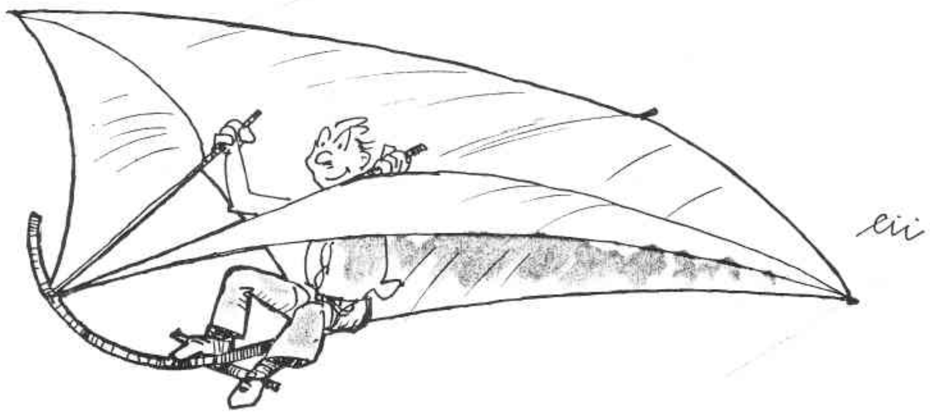
NUMBER 22, APRIL 1988

TWITT NEWSLETTER



TWITT
(The Wing Is The Thing)
PO Box 20430
El Cajon, CA 92021
USA

The next TWITT meeting will take place Saturday, 16 April 1988 at 1330 hours in Hangar A-4, Gillespie Field, El Cajon, California.

NUMBER 22, APRIL 1988

MINUTES OF THE MARCH TWITT MEETING

The TWITTs assembled on Saturday, 19 March 1988 in Bob Fronius' hangar at Gillespie Field. Presumably there were some opening remarks by Bob, but your unworthy Editor missed them because he (the Editor, that is) was absent and the tape recorder was on "Play" until an alert TWITT caught the error and set "Record." We therefore pick up the narrative with our featured speaker, Tasso Proppe, discussing the inadvisability of incorporating "bright ideas" into experimental aircraft.

Tasso mentioned that most tailless aircraft end up having severe adverse yaw—severe because the pilot has little with which to compensate for it. The usual remedy for adverse yaw in conventional airplanes is differential aileron travel, but this in turn causes roll-pitch coupling in tailless aircraft that employ "elevons," surfaces which control both pitch and roll. Tasso explained the concept of "tail volume" and noted that most tailless aircraft have very little of it. Tasso believes at least one Mitchell B-10 accident to have been caused by adverse yaw. The pilot was in a 45° bank and tried to reduce his bank angle. The result was a wingover which unfortunately intersected the ground.

The next "bright idea" to suffer was that of using spoilers for roll control. In 1943, Tasso tested an Me 109 equipped with both spoilers and ailerons, either of which could be used. The control of the spoilers was by cam followers; the cams themselves were on a long spanwise shaft. The first problem that manifested itself in flight was that the mechanism would bind as the wing flexed under load. The mechanism would simply lock up at high speed, and if the spoilers did deploy there was a definite lag in control response that would lead to overcontrol until a pilot got the "feel" of the system.

Mid-air restarting of engines is a constant problem in motorgliders and has therefore seen many "bright ideas" come and go. Springs are heavy and fragile—they fatigue in time. Tasso tried a recoil starter on one machine. Unfortunately, he had to brace himself against the rudder pedals to get a good pull, and the result was a high mortality rate among rudder pedals until he had strengthened them considerably. His solution to that problem was to rig a cord to the recoil starter in such a way that he could pull it with his right foot, in effect kick-starting the engine, but the geometry of the arrangement pulled his foot out to the side where it would kick whatever happened to be in the way. Electric start is becoming practical now that small engines are the rule—a 12 ampere-hour battery and a tiny starter will do the trick. Modern electric motors are very small and powerful. In connection with restarting, Tasso recounted his heroic attempts to restart an engine over El Mirage, his failure resulting in an unscheduled landing in an alfalfa field. On landing, a cursory check disclosed that the ignition switch was turned off.

The bright idea behind the "sustainer" engine is that, once in the air, a motorglider doesn't need a powerplant capable of liftoff and rapid climb—it only needs enough horsepower to stay up if the lift peters out. The engine is used in effect as an L/D ratio adjuster, achieving an effective value of infinity. The pilot uses winch or aerotow to get airborne, then sustains with the engine. The problem is that the engine horsepower is so marginal that the pilot ends up trying to soar in the airfield traffic pattern, because he doesn't trust his powerplant to get him home through, say, downdrafts. This behavior can be very irritating to airport operators and other soaring pilots.

Then use of reduction gearing to run a propeller at a lower, hence more efficient speed than the engine crankshaft actually makes sense, but implementing it in practice causes problems. The torque pulses of a single-cylinder engine are fatal to spur gears—they lose teeth. V-belt drives are more practical, having built-in slip and elasticity. The pulley sheaves, however, must be hardened or they will be abraded by grit entrained by the belt. No matter what system is adopted, the constant exchange of energy between the propeller— acting as a flywheel—and the crankshaft imposes a load on the reduction gear. One solution to this problem, namely the use of an over- running clutch which decouples the engine and propeller when power would otherwise be fed back from the propeller, has problems of its own, not the least of which is that a windmilling propeller usually has more drag than a stopped one. Another problem is that many engine installations in motorgliders require the engine to be retracted when stopped; this in turn requires the propeller to be locked in a certain position. The pilot needs a propeller brake and a certain degree of skill.

Folding propellers are another bright idea that hasn't quite given satisfaction; the structural problems of such a device are enormous. Alex Strojnik is the only person Tasso knows of who has a working folding propeller.

After a few words on the subject of stability, Tasso let himself be persuaded to expound on "Milestones in the History of Ultra Light Design." No details of this talk in this issue because TWITT has the entire hilarious text and will publish it in a forthcoming number.

Jack Green then rose to discuss his instructive experience with a "Monterey" sailplane which he modified to have a "T" tail instead of the original "V." Irv Culver had warned him about flutter, because he had not mass-balanced his control surfaces. To Jack's statement that he had many flutter-free hours on the machine, Irv simply said that flutter could appear at any time. When flutter did appear, it affected the rudder, not the elevator. The frequency was low but the force was very high. The flutter occurred on tow, and Jack's remedy was to release and land, which he did safely. Witnesses said that the entire tailboom of the ship was twisting wildly, but Jack's careful inspection disclosed no structural damage. He has since rebuilt the rudder with full mass balance.

Hernan Posnansky gave out a tip on mass-balancing control surfaces, namely that the balance weights should be attached at or near nodes in the bending mode of the surface. Hernan noted that the [US] Federal Aviation Administration has published an Advisory Circular on control-surface balancing. With that, the meeting decayed into small discussion groups and your Editor stopped taking notes.

APRIL MEETING ANNOUNCEMENT

The April TWITT meeting will take place on Saturday, 16 April 1988 at 1330 hours at hangar A-4, Gillespie Field, El Cajon, California. Our featured speaker will be Barnaby Wainfan. A graduate of Cornell (Bachelor, Aeronautical and Mechanical, 1977) and Michigan (Master, Aeronautical Engineering, 1979), Mr. Wainfan is employed by ACA Industries, Inc., Julian Wolkovich, President. [Mr. Wolkovich has many accomplishments to his credit, but is probably best known to TWITTs for his work with joined wing airplanes,,Ed.] Prior employment included five years with Northrop Advanced Systems and three years with Lockheed-California at Burbank. Mr. Wainfan writes a column for the magazine Kitplanes on aerodynamics, recently concluding an 8- part series on airfoil sections. He is an experienced aeromodeller, having competed at the national championship level. he has, as he puts it "a good supply" of trophies from the Northrop flying wing contest. He and his wife Lynne swept the entire contest last year, Barnaby taking Gas and Towline, Lynne taking Rubber. He has an extensive collection of material on tailless airplanes, including articles on that subject from *Aviation* (later *Aviation Week* then *Aviation Week and Space Technology)* dating back to 1911. Mr. Wainfan will cover three topics, illustrating his talks with as much hardware as he can stuff into his pickup truck:

(1) Development of free-flight flying wing models.

(2) Airfoil design for flying wings. This relates to a full scale project, of which Mr. Wainfan will bring in a 1/4 scale RC model. According to calculation, the airfoil sections he has developed are competitive in drag with the NASA NLF series, but have small positive zero-lift pitching moments.

(3) A thin airfoil code of his own devising, programmed in FORTRAN and running on PC-sized computers, for designing camber lines. The code accepts C_{mo} as an independently-specified parameter.

Another item on the April meeting agenda will be the possibility of finding outside financing for TWITT. Andy Kecskes and other TWITTs will discuss a number of proposals.

ABOUT THE COVER

Reinhold Platz was a designer for Tony Fokker, and was therefore responsible for the design of many fine powered aircraft in his day. The design featured on our cover, the result of his earnest and apparently successful effort to provide a light, cheap slope soaring machine for the impoverished amateur, unarguably lacks a horizontal tail, qualifying it under TWITT's rather liberal rules. Bill Moore provided us a translation of a contemporary (1924) article from the German aeronautical press. Unfortunately the printing quality of the original article, which your Editor has seen in the California Institute of Technology's Aeronautics Library, is rather poor and the illustrations simply won't come out in second generation photocopy. We are therefore doubly indebted to Ed Leiser of the San Diego Aerospace Museum for his cover art, which will give the reader and excellent view of Platz' ingenious design. Now does anybody have some loose chome- moly tubing and some doweling? I'll provide the Dacron...

The original German version of the following article appeared in the 26 January 1924 issue of the Zeitschrift fuer Flugtechnik und Motorluftschiffahrt. The translation comes to us via Bill Moore, of the Associated Glider Clubs of Southern California. It is not clear to your Editor whether Bill is the translator.

A NOVEL "SAIL-PLANE"

by R. Platz

The great interest which has been shown for the sport off sail planes has given rise to attempts to construct a sail plane that even in these times can be purchased by any and all lovers of the sport. The following are prerequisites for this:

1. A very low sales price; not appreciably more than the cost of a good bicycle.

2. Parts that can be put together in a relatively small package so that it can be transported even in an automobile.

3. Durability at all points so that it will not be harmed when seized with force or when struck.

4. Quick and easy assembly.

5. All parts must be easily replaced or substituted for.

6. The sail plane must be able to be carried by one man.

Until now these conditions had not been fulfilled in the construction of sail planes. We have here, then, a real advance.

The basic thought was brought to mind by the memory of a sail on a sailboat rigged as a sloop; by proper adjustment of the sails and proper matching of the center of pressure of the sail with the lateral center of gravity, one can sail for a long time without steering; the sails are "stable." A boat positioned in this manner can be guided to a limited extent by hauling in or slacking the jib.

If we now take two such sails and place their surfaces alongside one another and take the pilot's mass to be the lateral center of gravity, then turn the whole thing 90 degrees about its longitudinal axis, we then have, as shown in Figure 1, a sailplane which one can fly straight ahead and adjust for climb or descent.

In keeping with the intended simplicity and low purchase price, we should seek to avoid any other steering and miscellaneous mechanisms. We need to test to see if what we have already proposed provideds sufficient steering as it is. Transverse stability could be achieved through proper dihedral positioning of the crossbeams or masts. Then the only thing missing is the rudder. This function can be assumed by the jibs.

A paper model, shown in Figure 2, served as the first model. It is ballasted with a letter pin. The transverse stability is of course good due to dihedral. The climb and descent controls work fine. Fully adequate right-hand steering was achieved by use of the right jib, even during a vertical descent (stall) of the paper model. Similar left-hand operation was achieved by the use of the left jib.

The final form was then determined, and in four hours of work a model of 1.3 meters span and 0.4 square meters of area was completed. The first tests took place on nearby dunes, 6 to 8 meters high, in early November 1922. The calm of the first few days was not suitable for soaring, but was all the more suitable for undertaking the exact positioning of the jibs and the ballast, which consisted of a movable vise [?]. The first succcess was achieved in the following flying days. The model "sailed" at an area loading of 2 1/2 kg/m2 in a light wind. It repeatedly gained height and flew, head into the wind, along the ridge line, as has been repeatedly observed and described in connection with seagulls.

From this model it could be seen that all the previously mentioned conditions could be met. In full scale construction, difficulties could only arise from the nonrigid wing, particularly from its changing profile.

To study this final important question, a further model of 2.5 meters span and 1.3 square meters area was built, again in a few hours. In tests, it was determined that there was no noticeable difference when compared to the small model.

The sailplane of about 16 square meters area put under construction as a result of this determination was finished in a few days.

It consists of a curved keel of steel tubing, into the aft end of which the round wooden fuselage spar is stuck, with two welded side joints which serve as sockets for the masts, also made of round lumber. Further major components include the sewn "mainsail" and the "jibs," as well as the fasteners and three tin fittings.

The "rotating parts"consist of a single screw which serves as a forward pivot for the jibs.

The entire airplane is lashed together, ready for transportation, in ten minutes. It measures about 3.3 x 0.35 x 0.25 meters and weighs about 40 kg. Its transportability is shown in Figure 3. [Fig. 3 shows a man on a bicycle carrying the furled machine—Ed.]

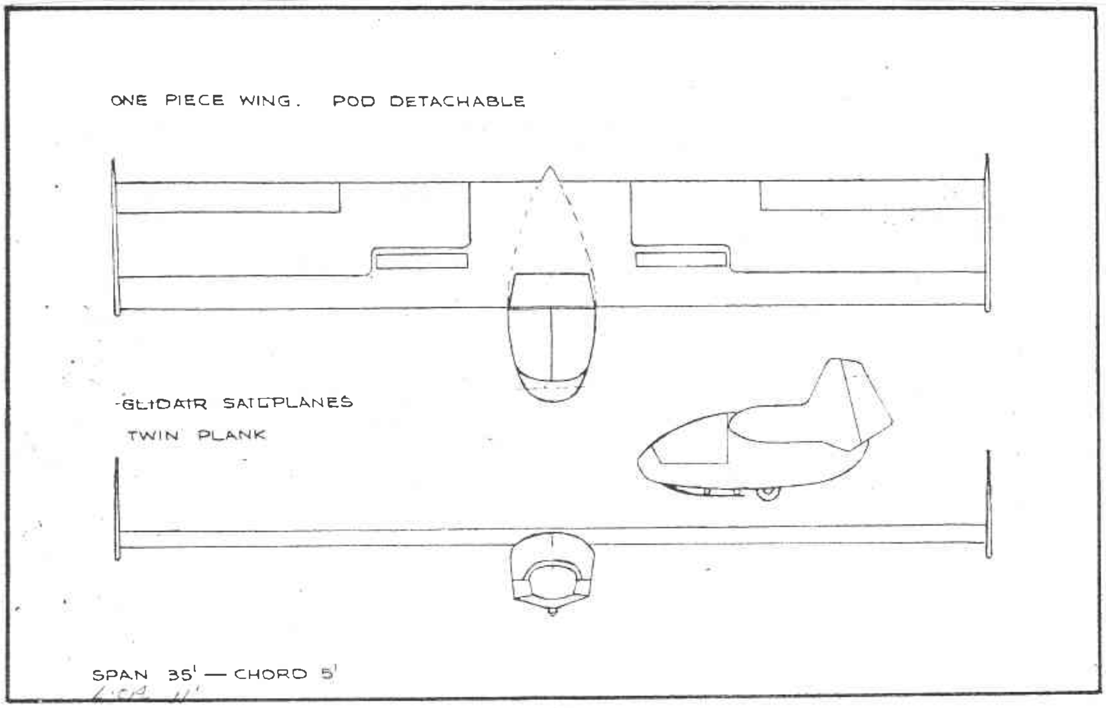
Its assembly for soaring is undertaken by one man in 15 minutes.

The tests were mostly, as with the small models, performed lightly loaded in light wind. Sail flexure, steering and landing were good, as with the models.

Further tests in the following days took place in a strong wind, flying from 25 meter dunes with up to 75 kg. Its fitness was tested in about 50 tests without a pilot and with fixed controls. The machine often landed in the sea or behind the dunes without the slightest damage.

The next tests took place with a pilot on board. Beginning with four tethers and a 55 kg pilot, some ten other "amateur sportsmen" with body weights up to 100 kg determined in succession that the pitch control was very easy to use. Without prior practice, however, it was still too dangerous to "release" at this point, because the slope of the dunes was almost vertical in some places.

The first free flight took place on the following flying day in February 1923 in a medium wind, from a 10 to 12 meter high dune.



Now the attempt must be made to "cruise" on the inherently very unsuitable dunes, whereupon the tests can be considered concluded.

Although the aerodynamic qualities of this sailplane are not the same as those of a "refined" sailplane, still in comparison the advantages mentioned earlier should carry a great deal of weight with the beginning glider pilot.

It will be interesting to hear the views and opinions of experts and of soaring practitioners concerning the problem we have described and this first attempt at solution.

A BRIEF HISTORY OF A TAILLESS GLIDER—THE AUSTRALIAN TWIN PLANK

by Reg Todhunter and Milton Lalas

This project, undertaken in the mid 50's, was to design and manufacture a prototype 2-place tailless glider, that was intended to provide a relatively cheap trainer for Australian gliding clubs.

Based conceptually on the EPB-1A, in which Al Backstrom played such a large part, our design was a combined effort, between Steve Marton, a former partner in a joint company, "Glidair Sailplanes," myself, and my old friend Milton Lalas, who is also co-designer of the current Blue Wren self-launching sailplane.

Early working drawings were produced by Steve, as was most of the original layout. Unfortunately his contributions came to an abrupt end when he left suddenly to migrate to the U.S.A.

At this point Milton Lalas entered the project, taking over some detail engineering design, stress analysis and stability and control calculations, and the submission of these to our Department of Aviation, who had suddenly decided that they had to control our project, as it was intended for eventual commercial production.

My own contribution was directed mainly towards planning and construction techniques and the manufacture of the prototype. Materials of construction were: Sitka spruce, used for spar booms and fuselage longerons; commercial waterproof marine ply for fuselage bulkheads; Birch aircraft plywood for fuselage skinning and mainplane torsion box "D" nose skinning, as well as for spar shear webs. Doped fabric covered the wing surfaces between spars. All fittings were made using aircraft steel sheet, with the exception of elevon actuating torque tubes, which were commercially available steel tube. The control system used elevons for pitch and roll control and were 20% chord, hinged on the top surface, and root driven by short pushrods from the steel torque tubes. The elevons were plywood covered over the total surface. Control input was from interconnected twin control columns, via a central mixer, using the same basic design from the EPB-1A. Yaw control was by independently operated tip rudders, hinged to fixed streamlined end fins. Control was via cable from the interconnected rudder pedals in the cockpit, with tension to open, with a spring return. Rudder control was by outward deflection only, with only one side operable at a time. Glide path control was by conventional top surface spoilers, hand operated. The undercarriage consisted of a single main wheel 10"x5", with a rubber shock mounted ash nose skid extending from nose to wheel. Removable nose ballast was by 2x11 lb 1/2" thick steel plates, and a rear ballast provision was by removable steel 1" diameter rods, housed in aluminum tubes fixed at the rear of the fuse pod.

Since pilot seating was side by side, one instrument panel was provided and housed the basic instruments--altimeter, A.S.I. and a Cobb Slater pellet indicating variometer. Two ottfer type tow releases were provided, and initially were mounted on the under wing surface directly on the mainspar, 3 1/2 feet from the aircraft centreline, one on each side. This necessitated a "Y" shaped tow yoke.

Construction began early in 1957 and time spent on it had to be sandwiched between sailplane repairs and building of the first EPB-1A produced in Australia. This was brought about because our D.C.A. insisted that the late Fred Hoinville, who brought the blueprints to Australia, should provide a complete EPB-1A for testing before he was allowed to sell copies of the drawings. some drawings had already been sold prior to this demand, and one constructor, who greatly modified the design, was killed in an accident whilst early testing was being undertaken on this aircraft. This event had almost immediate consequences for us, and the Department of Civil Aviation, with Gliding Federation support, served notice on us that unless we tested the design in a wind tunnel, it would not be considered for type approval. This had to be complied with, as construction was well advanced. A 1/5 scale model was made and a deal made with Syndney University to do the necessary testing in their tunnel, payment to be their retaining of the model for future student education. The resulting test data indicated that there were no real problem areas, and construction was allowed to continue. The lift, drag and pitching moment curves were invaluable years later, when they were used to formulate the design of a man-powered aircraft. Since the wind tunnel data was obtained at a Reynolds number of 700,000, the resulting design, the "Skycycle," was probably unique at the time in that we were using a tested profile for the mainplane. The twin plank was completed around February, 1958, and a request made for a permit to fly. This was a long time coming as the Department were procrastinating. We were told unofficially years later that as this was the first Australian designed tailless aircraft to reach flying stage, the Department apparently realised that there was little available research data in this country, and we had to wait until they searched overseas until they felt that the outcome of any testing could be predicted with some degree of certainty. In all fairness, I must say that apart from their agonisingly conservative approach the Departmental types were most sympathetic and generally very helpful.

Twin-Plank on the field with "onlookers."

Testing began on a weekend early in May, 1958, under the watchful eye of Departmental Engineers, and the C.T.O.A. of the Gliding Federation.

According to my records, the first winch tow was made on a Saturday, 30th May, 1958, with myself as pilot, and was simply a low run for general "feel." On Sunday, towing ws by winch and three tows were made, the first at around 5 feet height, the second a high speed tow at about 15 feet, and the third to approximately 25 feet; all of these short flights were quite straight forward.

The following Saturday was again by winch and was to 200 feet, followed by an "S" turn and a straight ahead landing. Even with a 5,000 foot strip, the fence came uncomfortably close at the end of the run. Some discussion then ensued with the Departmental Engineers, who were quite happy to proceed further.

That weekend marked the beginning of a quite extensive test program, under the watchful eyes of the Department of Civil Aviation.

After some three more winch tows, we commenced aero-towing using a DH-82 Tiger Moth, which was owned and flown by members of the Sydney Soaring Club. Test flying was restricted to weekends and was carried out on a further 6 days up until 17th July, 1958. On the last tow that day, flown dual for the first time with Merv Waghorn, we had an asymmetric release on one side at 500 feet. Due largely to having been towed too fast, our rate

Single-seat "Plank" on trailer.

of climb was poor and we found ourselves too far from the field to return, and Merv very calmly selected a field and made a textbook approach and touchdown, only to find the field very soft after recent ploughing. The main wheel sank into this fairly quickly, followed by the nose skid, and the aircraft decelerated rapidly, though smoothly, and then rolled over on the blunt rounded nose and we came to rest upside down with the tip fins preventing a complete rollover. Neither of us had more than a scratch, but we could not open the clamshell type canopy enough to leave and had to wait for some minutes until some nearby golfers appeared and, with some instructions from us, lifted the nose far enough for us to vacate the cockpit. The aircraft sustained minor damage, the worst being a crack in one side of the canopy. I, of course, had to repair it and due to work pressure this was not completed until early in March, 1959. The opportunity was taken to modify the wheel position to improve takeoff handling, and to move the tow releases inboard to the fuse sides. On almost all flights so far, full up elevon had to be used to endeavour to lift the nose, which due to the drop in Cl served to seemingly glue us to the ground. Takeoff was usually followed by a bump on the skid, raising the nose, following which the aircraft would leap into the air. The mod. improved this greatly, and all subsequent take-offs were made very easily. The aircraft nose would lift easily at 20 m.p.h., and would balance nicely on the main wheel until rotation was effected at 45 m.p.h. The new release position was also successful and several tows were made, and one side deliberately released. It was quickly found that the yaw produced could be held comfortably with rudder, and the tow could be continued to release height if desired.

According to my log book, I was allowed to carry out general familiarisation flying for some time, provided a permit to fly was sought each day [And we complain about the FAA!--Ed.] from the Department. Flying on weekends and using the Club's winch for launching, flying proceeded until the end of May, 1959. Average launch heights were at that time around 1100-1200 feet, and flight times about 4 minutes per flight.

On 6th September, 1959, further flight testing began using aero towing, and again with a DH-82 Tiger Moth, these flights began with an aero tow to 4,000 feet and manoeuvres carried out until 1,500 feet was reached, at which height testing ceased.

Seven flights over two full days and almost three hours of flying enabled investigation of behaviour throughout the c.g. range and included spinning attempts. The "Twin" proved very docile and forgiving and, following the usual string of reports that had to be forwarded to the Department, I was allowed to resume general flying.

Flying then became irregular and was carried out on only 4 days oover the period to early March, 1960, when the first significant soaring was achieved. All of the flying oveer this period had been solo, and due mainly to the fact that all flights were largely test flights, little opportunity had presented itself to go thermal hunting. Heights from the winch tows were generally 1200-1300 feet and this, coupled with a rather high rate of sink, effectively kept me from contacting a thermal of sufficient strength to climb away.

On 6th March, 1960, I again had the opportunity to be aerotowed by the faithful old Tiger Moth, and two flights were made, releasing at 2,000 feet and both flights were in good conditions, resulting in a 37 minute first flight, and on the second, after finding lift at 1,500 feet, climbed to cloud base at 4,200 feet for a 48 minute flight. An exciting day!

At this stage, to speed up the process of certification, the N.S.W. Chief Airworthiness Engineer for the Department, the late John Thorpe, offered to fly with me as passenger/observer, as he felt that this could expedite proceedings at Head Office in Melbourne. This was a tremendous gesture and I gratefully accepted. Here was a man game enough to fly in a tailless aircraft, over which the so called "experts" in the Gliding movement had cast an atmosphere of gloom and doom.

So on 3rd April, 1960, John occupied the right hand seat, with note pad, and I suspect fingers crossed, and we made a total of three flights, all from aero tow, and to an average of 4,000 feet before releasing. Each flight averaged 37 minutes and we were able to work through a comprehensive flight program that included crosswind take-offs, stall attempts, behaviour in the slip stream on tow, tight turns, behavior stick fixed and stick free, and generally work out the aircraft.

One little incident that remains for some reason etched in my memory involved John wanting to see how the aircraft behaved when in the slipstream of the towplane. I had already experienced this and so had no hesitation in dropping down a little and immersing the "Twin" fully in the turbulent air so familiar to sailplane pilots. There was no problem with handling in this situation, since control was adequate, gut the feeling was uncomfortable and not what one would do by choice. After about one minute of buffeting, I noticed John's furtive glances, but since no comment was made I stayed firmly in the slipstream. Finally John said in a very controlled voice "Can you get out of this, Reg?" The poor guy had been suffering, perhaps with visions of being stuck in the slipstream for the rest of the tow, but had valiantly not asked what was happening! Again I take my hat off to this guy's memory.

When he had departed to take a picnic lunch with his family (it was Sunday), I took a last tow and tried my hand at some simple aerobatics. Two or three loops and some four or five stall turns later I landed with some elation, as it had been another good day.

Shortly after, the Department of Civil Aviation notified us that their Chief Test Pilot, Cliff Tuttleby, would be in Sydney to check out the aircraft and would be accompanied by a Flight Engineer/Observer and a tow pilot, Mr. Russ Evans. The local DH82 Tiger was to be hired for launching.

On Thursday 12th May, 1960, we all gathered at Camden, and when all was readied Cliff asked me to fly with him to "show him the ropes," so to speak. A short flight took care of this and, becoming familiar with the aircraft handling very quickly, he announced he would begin flying with his observer in the right hand seat. Their first take-off together went very well until the two aircraft were over the airport fence at the far side, at a height of about 250 feet, when the glider was suddenly released and made a 180 degree turn, heading back for the starting point. We watched nervously as he kept coming, obviously planning to do a complete circuit. The last turn was a 180 degree into wind at around 80 feet, but was carried out very smoothly and followed by a no fuss landing.

When we had brought the aircraft back to the start point, he explained that after lift-off he became dissatisfied with the rate of climb, so decided to abort the flight. He then demonstrated one of his great qualities by asking me would I take another flight, with him as observer, to find if he was doing something wrong. I really admired the man for that. Since I was fairly sure the tow had been too slow on that particular flight, I suggested the tow pilot add anotherr 5 m.p.h. to the tow speed, and we took off together again.

By the time we had reached 1,000 feet, Cliff was satisfied that we had identified the problem, so we released and landed, and I again handed over the aircraft to him and his observer. As I recall, they used up a whole afternoon testing, and dusk was approaching when he declared himself satisfied. He then surprised (and delighted) me by asking if I would take Russ Evans, a very experienced pilot and the tow pilot all that afternoon, for a demonstration flight.

With Cliff in the "Tiger," Russ and I then took a tow to 2,000 feet and spent a very pleasant 16 minutes flying around while Russ got the "feel" of our "Twin Plank" first hand. On landing we discovered that Cliff had landed the "Tiger," after our tow, but had forgotten he had a 250 foot tow rope trailing behind, and had draped it neatly across some high tension power lines adjacent to the field; very fortunately the rope broke and he landed okay. The incident "blacked out" the local town of Camden for about an hour, as we discovered later whilst in the local bar recounting events of the day. Before he left, Cliff left me with the comment "I think you have a very good aircraft there, Reg." I considered that high praise indeed for our "Twin," coming from this man with his vast experience.

Some three days later, whilst giving a demonstration flight to a passenger, I suffered a minor accident in the initial stage of a winch launch. This was brought about by the tow yoke rope becoming hooked on one side around the rear of the landing skid. An asymmetric release resulted which yawed the aircraft suddenly through about 70 degrees before a complete release was effected. Fortunately, we were still on the ground and below take-off speed. I was able to bring the nose back around with the rudder, but just prior to straightening up completely the port wing struck a small bank at the edge of the airstrip. This resulted in damage to approximately 6 feet of the plywood "D" nose and a compression fracture or the rear spar at the elevon root.

Though the aircraft was repaired in the weeks following, the project must have been exacting a toll on my enthusiasm, because it was not until April, 1966 that the "Twin" was to fly again. A chance remark from a former Department of Civil Aviation Surveyor (to the effect that the "Twin Plank" had been close to type certification when I had stopped work on the project) rekindled old fervour, and following more submissions, drawings etc., I was allowed to proceed again. No more tests were asked for and no restrictions placed on flying other than to fly within placard and design limits.

So on 9th April, 1966, after a check flight with a Club instructor, my old friend Werner Geisler, in the Club's Kookaburra, I took an aero-tow solo to re-acquaint myself with the "Twin."

The following day was a good soaring day and two flights were made, both solo, and both soaring flights. The first was for 56 minutes and the second 42 minutes and gave the opportunity to really try out the machine in thermals in the company of other sailplanes. The aircraft could be consistently thermalledd at minimum speed--40 m.p.h.--with the stick almost right back. Very little rudder was needed in turns up to medium rate and this no doubt contributed to the good thermal performance. On two occasions I was able to "top out" in a thermal just below a Slingsby Skylark, who was able to "outreach" me each time by a mere 200 feet; but this was fine by me, as the Skylark is a great thermaller according to those lucky enough to fly her.

My 18 to 1 ratio of course made things difficult, and the radius of search for lift was a limiting factor. It was exciting stuff for all that, and helped to make up somewhat for the years of effort.

Flying was carried out intermittently during 1966 and into 1967, mostly launched by winch, and I began to feel a gradual acceptance of the design.

During March that year, the aircraft was involved in the making of a film about the wather, made by the The Australian Commonwealth Film Unit. This was a pleasant interlude, during which the "Twin" was filmed "air to air" from a Cessna 172. I was given a copy of the completed film "on permanent loan" as the arrangement was quaintly termed. The footage on the air to air shots was the best ever taken of the "Twin Plank."

Earlier in the year (1967), I had rejoined my old club at Camden and was inducted again as an Assistant Instructor, which left me little time to fly the "Twin." Consequently the aircraft had only 19 flights in 1967, but almost all were with a passenger, and I was to find increasingly that people who had been rather doubtful about the safety of this tailless aircraft in the beginning were now seeking out the opportunity to fly in the machine. I think those that tried it were suitably impressed with the "solid" feel that the "Twin" engendered. This was very satisfying, as it was a great turn around in attitude towards the "tailless bird." It had, over a prolonged period of testing and general flying, been aero-towed, winch towed up to 1,600 feet, and aerobatted without a hint of "tumbling," which had been predicted by the "experts" at the beginning of the project.

Then came the day in April 1967 when the Department finally granted the "Twin Plank" a restricted type approval certificate. What a moment that was! I believe it is still the only tailless design given a type approval in Australia.

According to my records I last flew the aircraft on 12th December, 1968, when five flights were made. The first two were solo from aero-tow to 2,000 feet, and the first was for 25 minutes, the second for 1 hour 26 minutes with a climb to cloud base at 4,800 feet. This was the longest of all the "Plank" flights, and still remains in my memory vividly. Three more flights were made in the afternoon, two with sailplane pilots seeking "a ride" and one with my stalwart brother Ernie, who was to accompany me to Tehachapi in 1984.

The aircraft had proven to be a safe and easy aircraft to fly and was extremely stabe in the air. Ground handling was a little awkward, but this could have been overcome with a trolley to support the rear end. Behaviour on the ground run was very good and the aircraft could be rotated between 15 and 20 m.p.h. and held on the wheel effortlessly. As take-off speed was reached, around 45 m.p.h., a gentle back pressure on the stick was enough to lift off. Similarly, on the ground roll after landing, the aircraft could be held on the wheel to below 20 m.p.h. I.A.S., before the nose would drop fairly genly on to the nose skid.

The only problem ever encountered on lainding was a willingneess to ground loop if landing downwind, which I found the hard way. The spoilers, which were mounted on the top surface of the mainplanes, were quite effective though they did produce a nose down pitch of around ten degrees when fully deployed. This could be overcome, however, with a little practise, and involved easing the stick back as the spoiler handle was operated. I had found the aircraft to be good in thermals when flown solo, but when flown dual the extra drag meant a minimum sink of something over 4 feet/second. One good soaring flight with a passenger was achieved, on a particularly good day, for 45 minutes, but I was not able to repeat this effort. Had the aircraft remained in service, I have no doubt that many more soaring flights would have been achieved. However, the "Twin" was retired after some 30 odd hours of flying, and the aircraft stored in various hangars and barns until it was given to the Powerhouse Museum in Sydney in the early 80's. This museum completely refurbished the aircraft and repainted her in the original colours of cream and red. It hangs in a prominent position just inside the main doors and looks great, in excellent condition throughout.

It was a fascinating project and I must salute my very good friend of some 35 years standing, Milton Lalas, for the huge contribution he and some of his colleagues made in helping to bring to completion this project. His efforts were such that the "Twin Plank" would not have flown but for his professional experience.

I must also pay tribute to my dear wife Phyllis and my children also, who bore the brunt of the massive frustrations inherent in such an undertaking.

[signed]

Reg Todhunter

The following material on a now obscure pioneer of both soaring flight and tailless airplane design appeared in Histoire du Vol a Voile, by Eric Nessler. The translation is by your friendly Editor, Francois-Marc de Piolenc. Ed Leisor's rendition of the 1909 Weiss glider appeared on the cover of Newsletter 21; unfortunately your Editor had no time left in which to translate the article, and no room to put it in that issue in any case! A three-view of the 1909 machine, which soared more than two years before the Wright brothers' did, appears in this issue.

JOSE WEISS

Jose Weiss is one of the great men of soaring. He belongs to a class of universal geniuses of which Leonardo da Vinci is the most striking example. In this type, artistic gifts unite with the scientific mind. Such men have, within the calm expanse of the spirit of science, the joyous urge to investigate mysteries.

Although naturalized a British subject at the age of 35, Jose Weiss remained deeply French in his soul; his origins and his spirit caused him to be so regarded by his contemporaries.

His renown has persisted in England, where he lived, but he is nearly forgotten in France. Well known in our country in soaring circles before the 1914 war, his memory has remained alive only in the recall of the rare persons of the soaring world of those days.

One of the main goals of this work is to pull this handsome figure from the mists of the forgotten and to put him in his place in the gallery of great pioneers.

Jose Weiss was born on 21 January 1959 at Neuilly-sur-Seine, which was at that time a small village. His family, of Alsatian origin, remained in its provincee until 1871, when it exiled itself to England, the father not wishing to live under the German regime. As soon as he reached adulthood, Jose devoted himself to painting. he adopted Sussex, of which he painted for many years the delightful and always numerous aspects. His works were held in high esteem, especially in America where he sold most of his productions. The money he had left over afte satisfying the needs of his household was devoted to aeronautical tests. It should be noted that all the progenitors of soaring, without exception, were artists. Human soaring was created by artists, to awaken the artist in mankind!

Jose Weiss was aware of the experiments of Le Bris, Mouillard and Lilienthal but, as we will see later, he did not share the theories of Mouillard and had ideas on machinery that differed from those of Lilienthal.

The Weiss machines were characterized by monoplane wings in the shape of a crescent. These surfaces with birds' wing airfoil sections, thick and at positive angle of attack in the center of the wing, showed a thin section at a neutral or slightly negative angle of attack at the tips. Certain combinations of torsion applied to the tips and rear parts of the wings served as control surfaces.

The planes were held by masts; the fuselage was attached below the wing and had no empennage. A single skid, rather long, under the fuselage and an elastic hoop under each wing completed these machines.

From 1905 to 1908, hundreds of tests of reduced scale models were done in England, on the one hand on the northern slopes of the Amberley Mountains near Arundel (Sussex), and on the other hand in the plain.

For these last mentioned tests, the models were launched from a wooden tower 32 meters high. Certain models weighed up to 40 kgs. for 4 m^2 of area.

Drawing his conclusion from these tests, Jose Weiss wrote this in l'Aerophile for 15 December 1908:

"Whatever M. Bazin may think (Mouillard's theory), I persist in not believing that ascending spirals, or even indefinite horizontal flight, can take place wothout rising air currents. But however small the rising effect thus produced, whether by eddies in the air or by the expansion of air in contact with a superheated area of ground, it is enough to explain everything, and birds use it from time to time. For a good many years of observations, I have never seen a bird carrying on this beautiful dance unless it was on the side of the mountains exposed to the wind, or at least over a clump of trees or some large object which explained the presence of a rising eddy. Never, for example, has anyone seen a sparrow-hawk doing his pretty little dance over a fixed point without having his beak to the wind and without having below him a monticule, a building or even a hedge to produce the necessary lifting effect. As a landscape artist, and from the beginning an observer by trade, spending my life in the fields, I am paid to know it. If, then, the height lost every second by our vulture is less than the height gained in the same time by the air mass, there results this seemingly paradoxical, yet quite natural fact that the vulture climbs while falling: that is to say that it climbs with respect to the ground while descending in relation to the ambient air which supports it.

Last Summer, I achieved one day with a small 3 kg. model four large consecutive orbits carrying my model some hundred meters above its starting point. Such are of course [a few] successes in a thousand [attempts], but they explain the dance of the birds, and with machines occupied and guided by an aviator who has become expert, I think that we will one day be able to do as well as the sail-boats."

"Flight has nothing in common with brute force. This is demonstrated to us by the motionless flight of the great birds. It is merely a matter of perfect form and perfect materials, a matter of perfect matching of the weight and the size of the surfaces; in sum it is a matter of the pilot's reflexes acting instantaneously in the presence of some external perturbing influence."

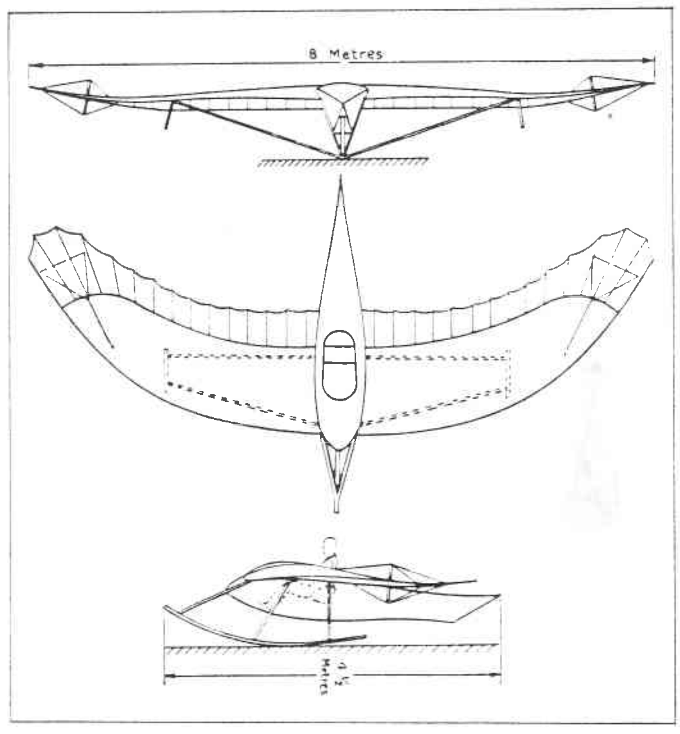
During a great meeting of the "Aeronautical Society" in March 1907, Jose Weiss gave a very outstanding lecture on "The Theory of Soaring Flight."

By the end of 1907, the Amberley tests had progressed to the point of allowing the construction of self-stable machines capable of holding a man. They were flown first by M. Weiss, then by Messrs Gerald Leake, Dr. Alexander Keith and Gordon-England, Jose Weiss' assistants. Mr. Gordon-England soon left simple aerial slides behind, becoming an expert. His means of takeoff was the following: The machine, being simply set facing into the wind at the edge of a slope in the Amberley Mountains, waited with its pilot for an increase in the speed of the rising wind to arise and depart by its own means. It is thus that in the course of a flight in 1909, Gordon-England gained a height of 12 meters over his point of departure and covered a distance of 1,600 meters. This flight achieved a distinct improvement over previous performances, which were horizontal flights.

The credit for having obtained the first appreciable height gain in soaring flight belongs therefore to the British experimenter Gordon-England, who achieved this exploit on 27 June in the year of Grace 1909.

His name must share the glory with that of Jose Weiss.

Among the very numerous flights carried out afterward, none was superior to those of Gordon-England, for their authors did not yet know how to carry out their maneuvers in the most favorable locations. It must be said that these machines, though controllable, did not allow maneuvers of very great precision. Let us recall in passing that control in pitch was achieved by displacing the occupants' weight by means of a sliding seat; a lever deflected laterally caused the warping of the



Weiss' 1909 Glider

wingtips for transverse stabilization, this control serving also for changing heading. The 1912 model had a vertical rudder controlled by pedals.

Furthermore, these machines, of compact appearance and extremely painstaking construction, retained a certain fragility; their main framework was of bamboo and the joints were executed in waxed cord. It must be recognized that flights made in these conditions, often high above valley floors, required a certain audacity.

Be that as it may, these soaring flights followed by gliding flights were admired. Jose Weiss and Gordon-England got students, and "The Amberley Aviation Society" constituted itself in early 1912. It is, to our knowledge, the first soaring club to have existed; it comprised a dozen members.

A reduced scale model of its machines is preserved at the Kensington museum.

Jose Weiss had seriously devoted himself to solving the problem of the launching system. A first apparatus, built in 1910, was made up of a slide built of light steel rails. This system pivoted about one end to allow the apparatus to be oriented into the wind. The other end rested on rollers running on a circular rail.

At the higher end of the launching slide, where the pivot was, there was a platform reached by a ladder. The glider, hoisted to the end of the slide by a capstan, was then launched with a cable pulled by a falling weight. This cable was attached to a special hook on the skid and detached itself at the slightest rise of the machine.

In their last tests, Weiss and Keith no longer used the catapult; they simply equipped their machines with wheels, allowing them to pick up the speed necessary for takeoff on the slope.

Before continuing our study of the work of Jose Weiss, it must be noted than in 1910, Mr. Handley-Page, who was building test equipment at Barkings, took an interest in the theories of Jose Weiss and built his first aeroplanes using the latter's wing shapes. One of his machines, piloted by Edward Petre, became the first aeroplane to overfly London.

In 1914, Jose Weiss and Keith had built a new hybrid sailplane which, actuated by the pilot, could momentarily flap its wings to allow it to take off from slopes without assistance. In flight, the wings were maintained in the horizontal position by compensating springs adjustable from the [pilot's] seat. One expects that an important success would have crowned their efforts if the 1914 war had not interrupted the experiments.

The poor state of Jose Weiss' health did not allow him to continue his work after 1918. His pleasant and gentle nature detested all cruelty, and the war had greatly affected him. It was in 1919 that he wrote to Georges Houard a letter in which he announced his impending death, urged researchers to pursue his work and expressed his conviction that long range sport soaring would be realized as soon as one was able to make machines capable of traveling a distance thirty times the altitude they lost.

The last thoughts written by Jose Weiss were a profession of faith in a great idea. We were with our friend Houard when this moving letter reached him.

Jose Weiss died a few days later, on 11 December 1919, in his house in Hougton at the foot of the Amberley Mountains.

Tasso Proppe with some of his "Big Ideas."