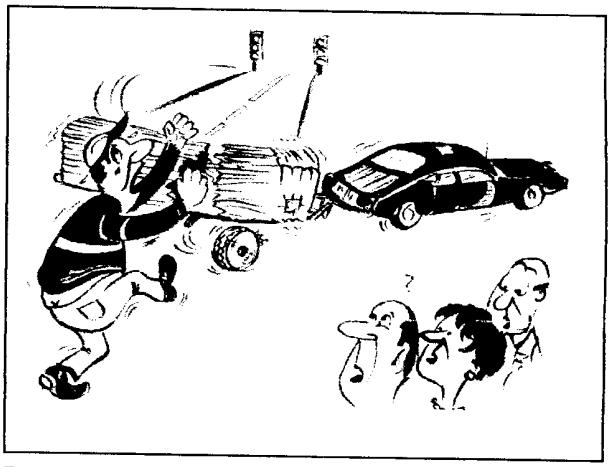
THE AUSTRALIAN HOMEBUILT SAILPLANE

Editor: James Garay

Volume 8 Issue 29 www.geocities.com/capecanaveral/hangar/3510 *June 2003*

EDITORIAL



Peter Champness event.

G'Day Folks! Welcome again to a new issue of our newsletter.

If you have this issue with the remark **"Complimentary Copy"** in the front page, it's an indication that you have not renewed your subscription. You will find a re-renewal form at the end of this issue.

It's amazing how time passes by...yes, it's already been three months since the last issue #28 and it's winter time in Australia.

With this issue I am entering into my eighth year as Editor and during this time many things have happened in the home built sailplane scene. Our group is still going steady and as always, our aim is to share the knowledge and experience between us.

The newsletter is very well received as you can see if you read the Mail Box section. It is understood that I can't satisfy everybody, but to this point I have been coping with this very well and am always looking for new and interesting items to write in this newsletter...so, as I've said before in previous newsletters, if you have an interesting article you want me to include in our newsletter, please send them to me. It's your newsletter and you can make it even better with your input and contributions in the form of articles.

Also, many times before I have said that I don't do this alone, behind me I have those magnificent men and their flying machines helping me, they have all my appreciation and respect.

In this issue you will find a contribution from Martin Simons who talks about the Horten Wing. Also, you will find an article from Peter Champness...this is a very interesting read. It's amazing how you can contribute to this humble journal, every little bit counts! See the articles from Alan Bradley (Mr Rambling) and Alan Patching.

James Garay
Editor

Address all correspondence to:

James Garay
3 Magnolia Avenue
Kings Park Victoria 3021
Australia

Inside This Issue

MAIL BOX

Dear James,

So far I have not been able to work the Profili program on my Mac-Instosh It just says it can not find the program that created it. I will see what I can do about getting a PC Emulator. There are a few other uses I could find for it too, but I am so accustomed to the Mac now that I do not really like using IBM stuff, I do have a simple profile plotting program which works well enough for most of my requirements, but a more professional one would be handy!
All the best Martin Simons. SA.

Dear James,

A friend passed on a copy of AHS from March 2002. I have recently checked out your web site, and would like to receive your Newsletters. I am especially interested in buying a lightweight powered sailplane that is already built or near completion.
I have logged about 180 hours in sailplanes, most of which was in IKB a motorfalke, which was recently totaled here at Tyagarah airfield. Regards J, Leach.NSW.

Dear James,

I enclose money order for membership to AHS. I would like any information on building the Duster and EP-2 if it is available. Yours faithfully. D. Oxley. QLD.

Dear James,

How are you old son!....All fit and well?.. I hope!..
Thanks for bunging me into the "WOODY-ROO" at the Avalon air show, and letting me do some hangar flying and all that jazz. I didn't find a thermal, but just imagined what it would be like. I liked the aussie art work in the cockpit. Good on ya Jim !..you are a Fair Dinkum Aussie! And you have done it well. Keep that Newsletter on the run mate!. We all look forward to it and is chock full of interest, that keeps us oldies on ours toes and off the street!.
With regards Dougie Cole, Victoria.
PS.Keep logging up those flying hours in the "Woody-Roo" Jim.

Dear James,

Please excuse my tardiness in paying my subscription. This is the time of the year when all our bills meet and create havoc with our budget. I am almost certain you know what I mean.

So please find here included the fees for another year of good news on the home built sailplane side of things.
A good friend of mine Jerry Leach from Northern NSW will also send in his funds for the first time, Jerry was very impressed with the Newsletter I send him.. So there you are-one more convert. He is a member of the Tyagarah motor glider club and is looking at purchasing a single seater motor glider. But he will tell you that!. I am sure.

I am still looking for a wreck to make a cockpit mold for a high speed ultralight. I must just have to go to the gliding club and mold of one of their machines. I am sure they would be impressed. Ha.Ha.Ha....!

I am just back home from Narromine and the yearly Ultralight fly in we had 432 aircrafts in and out from Friday 12.00 midday until Sunday same time. A lot of new machines and new almost anything, really a very rewarding trip for me despite having driven 2500 Kms there and back. Come on Easter 2004!. I am looking for second hand instruments among them ASI,VSI,T &B. do you know of an aircraft / sailplane wrecker who may have those things?. I will send Dr.P. Champness the plans back. Poor man's waited long enough. What sort of motor glider is there on the market in OZ (second hand)? Any Fauvel wings anywhere? I did seriously investigate one of them as possible conversion to motor glider? (First flew one in 1957) and been flying wing mad ever since. Where could I get second hand canopies?
Bye for now James. Take care and keep up the good work. Andre Maertens QLD.

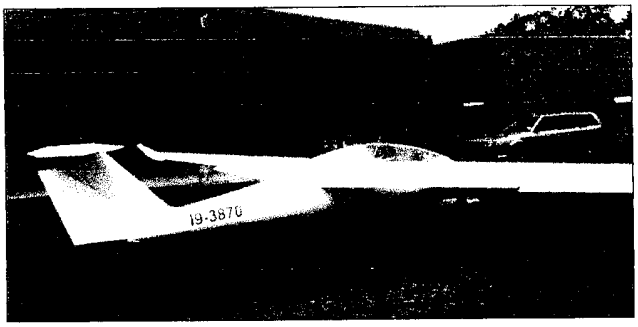
Dear James,

As you might recall I sent you a letter almost three years ago announcing that I was about to purchase a TST-3 Alpin TM kit from the company TeST in Czech Republic. This is a single seat self launching glider mainly in wood but with a fibre glass cockpit and turtle deck.

The engine is a Rotax 447 which retracts into the fuselage by way of an electrical actuator. The wingspan is 13.8 m and the glide ratio is quoted as 33:1 at 46 knots.

Well two and half years later (2100 hours of my time!) the project is within days (well certainly within weeks) of completion. The project has been of immense interest to me (and lots of other people who call in to see the progress) and has been very rewarding as, step by step, she becomes nearer to a completed glider.

Enclosed is a photo and shortly I will send you a report of the initial test flight results, which will be particularly interesting to any one looking to build or own such a self launching glider.
Yours sincerely. John Everest. Qld..



Dear James,

Please find my renewal subscription form. And thanks for your dedication to the Australian Homebuilt Sailplane over the years.
Regards A.Bradley. SA.

TECHNICALITIES

ESTABLISHING THE STRUCTURAL INTEGRITY OF AGEING GLIDERS

By Claude Alan Patching.

INTRODUCTION

The problem of ascertaining whether a Certificate of Airworthines should be renewed for an ageing glider is eventually faced by every airworthiness authority. Despite the fact that the external appearance may be excellent at the time of inspection, there are a number of factors, some time dependent, which could have resulted in a reduction in the static strength.
These factors include poorly executed repairs and maintenance, fatigue, glue deterioration, degradation of plastics from ultraviolet and possible effect of heat.

This report is concerned mainly with the approach being adopted by the Gliding Federation of Australia for wooden gliders. At present all gliders are required to undergo a special inspection as defined in the Manual of Standard Procedures when they reach 20 years, or sooner if decided by an Airworthiness Inspector.

TERMINOLOGY

The term "limit", "proof", and "ultimate" load will be used in this report, and though they do not have unique definitions, there is general acceptance of the following terms:
(a) Limit load- this is synonymous with Design Limit Load, and is the maximum load that the designer expects the glider to be subjected to during normal service. This load may be experienced more than once by one or more of the type, depending upon length and severity of service. Conversely a little-used glider or one not loaded to capacity may never reach limit load conditions. The application of limit load should not produce any failure or permanent set in the primary structure. Furthermore any distortion of secondary structure at Limit Load should not adversely effect the flying capabilities of the glider.

(b) Proof Load can be either equal to or greater than Limit Load, but in the case of the complete structure it is in the most instances taken as being equal in magnitude.

(c) Ultimate Load is the maximum load that the glider structure must withstand without complete collapse. Ultimate Load in most cases is required to be 150 per cent of Limit Load. In a structure designed for static strength only, the stress should reach failing stress values at Ultimate load conditions.

DURABILITY

The durability of a glider is difficult to ascertain without actually operating it for a large number of years.

WOODEN AIRFRAMES

As far as is know wood has an infinite life and the life of the structure is governed by the bonding agent, ie, **The Glue**. Some years ago there were doubts as to the life of some of the Urea Phenol Formaldehyde glues used in aircraft production. However, as a result of a very extensive investigation in Australia and England, it was established that the glues commonly used showed little deterioration in periods of up to 25 years.

Furthermore there is evidence (not widely spread) from two independent structural test investigation that have produced confirmation of the satisfactory durability of Phenol type adhesive,

A number of locally produced Grunau glider wings were tested to destruction, by the Aeronautical Research Institute, Argentina, after 15 years of club use and all failures occurred in the wood.

During an investigation into the fatigue characteristics of Vampire wings at the Aeronautical Research Laboratories, Australia, involving testing to failure of 19 complete wings; two fuselage were used to react the loads, and these survived the entire program with no sign of failure in either the wood or the glued joints.

The durability of the glue used in glider construction has been reported by Irving and Vernon. The British Gliding Association has also made a study of airworthiness of ageing wooden gliders and has concluded that with correct maintenance and regular inspection, they should have an operating life of at least 20 years. The eldest glider still flying in Australia (The Golden Eagle) designed by H.G. Richardson was constructed in 1934 using casein glue. According to the council for Scientific and Industrial Research Organization (CSIRO) this glue has a life of at least 50 years provided adequate sealing precautions are taken to prevent an excessive ingress of moisture.

METAL AIRFRAMES

Metal aircraft structures have proven themselves as far as durability is concerned, although in the case of gliders denting of the wing surfaces cannot be tolerated because of the adverse effect of performance. Increasing the drag by a pound or so does not usually concern the powered aircraft operator.

PLASTICS

The durability of fibre reinforced plastic (FRP) structures is yet to be established. During manufacture a special ultra-violet shielding layer is incorporated in order to block out rays that might degrade the resin. From the experience of fiberglass boats there is reason to suspect that there probably could be degradation after about ten years of service.

FATIGUE

FATIGUE IN WOODEN STRUCTURE

The safe fatigue life of wooden gliders designed to the British Civil Airworthiness requirements Section E- Cloud Flying

Category- has been estimated by Obee to be 100.000 hours, which for all practical purposes can be regarded as infinite.

FATIGUE IN METAL STRUCTURES

The problem of fatigue is now well known to designers and operators of all metal aircraft. Gliders owners have been spared this worry because of the low design and operating stresses in the structure and the small number of hours flown each year.

A preliminary analysis of some data shows that significant amounts of fatigue damage can be received by a metal glider during it's effective service life. Flight load measurements have indicated that the amount of "g" being applied is perhaps higher than was expected during the design stage
The design maneuvering limit load factor of 5.3 has been considered to be adequate, based on previous experience. However, some "g" load measurements made in Rusia have indicated that it is essential for pilots to be trained not to overload their gliders.

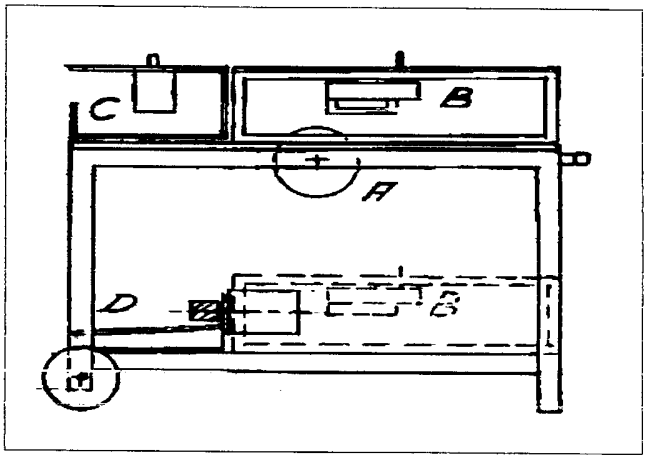
HINTS & TIPS

Portable Workstation For A Squeezy Workshop *By A. Bradley.*

Until I sold our boat last month space in my shed was at a premium for building my Woody. In fact I only had an available area of 11m x 3m. I needed to find a way to accommodate a number of tools into one corner. These were a circular saw, jigsaw, router and a sanding drum.
Some 30 years ago I bought a second hand BBQ and built a steel angle trolley to mount it. About 2 years ago the rust ceased to hold the BBQ together and I dumped it behind my shed. I have now turned it into a portable workstation incorporating those tools.

The Circular Saw (A) which only has a 70mm cut is permanently mounted in a 19mm thick bench top permanently fastened to the trolley frame.
My variable speed portable Jigsaw is fitted upside down to an MDF top fastened to two rectangular steel frames. The combination can either be quickly bolted to the circular saw top or stored underneath securing it with the same wing fitted machine screws. The circular saw can still be used for most small jobs with the Jigsaw in place. The router (C) is mounted in the top of a plywood box into which most of the chips fall. On one side of the box is only half-enclosed providing access to the router for switching and adjusting.
The scarfing Drum (D) is mounted to a flat piece of MDF at the correct angle which is interchangeable with the router. Incidentally, the guide that the tapered edge of the scarf runs against is slightly behind the sanding drum and leaves a small ridge on the edge that is easily sanded off by hand. The guide is also slightly convex which enables concave edged scarves to be made and of course straight or convex edges. It only requires a little practice. No adjustment necessary for varying ply thickness although several passes may be necessary. I also have a flat wardrobe door panel that can be fitted flush with the surface of all these tools for supporting full sheets of ply. Each piece of equipment has its own simple dust pickup that I can connect to a mobile Festo vacuum container. This has two filters, a large bag filter for the dust and a large cartridge filter to final clean the air returning to the workshop. The whole setup works so well I have no intention of any change even though space is no problem now.
My 14 inch throat band saw to which I have fitted a 12 inch diameter sanding disc, buzzer and drill press are all free standing along one side of the work area. The rest of the space is taken up with workbench at one end and a plan table adjacent on the long side.
Oh, I almost forgot, down the centre of the remaining space is a 7 metre long by 300mm wide assembly table. Until recently the fuselage was on top of this, lengths of timber are stored underneath. Incidentally I found that the quite accurate assembly table on which I jigged the fuselage and will build the wing spars and jig the wings can be made with two lengths of 40 x 25 galvanized fence rail mounted on 75 x 32 pine legs and topped with MDF. The legs are shimmed and 'Dyna' bolted to the floor.

Alan Bradley's workstation



CHEAP TOOLS JUNKIE

By Peter Champness

"Cheap tools will always let you down whereas good tools will last you a lifetime." I been told this dozens of times and it may be true enough but whose lifetime do they mean for a start. I found out the hard way when my lifetime membership of the Ansett Golden Wing Club lasted for a much shorter period than expected.

I admit that I am a cheap tool junkie. Let me loose in any market and within two minutes I will have located the tool merchants and started turning over the goods looking for bargains. Not that markets are the only good spot for bargain tools. Most hardware shops these days have a bargain bins and large displays of sale items. Other good opportunities can be found in the ubiquitous Chinese 2 dollar shops. Letter box catalogues are perused for new ideas or for the possibility that there is something that I might want which is on sale. Then there is 'Clints Crazy Bargains', a shop I just can't go past without popping in to check out the latest.

The first problem I have with GOOD tools is that they are expensive. That might not matter if the tool is to be used constantly but in my case at least the tool may be used intermittently or maybe only once before it is lost or forgotten about. Therefore, if the tool can survive one use, the cheaper it is the better I am pleased. Not that I would not like to own a nice set of Stahlwille spanners. I would love it! But I couldn't guarantee that they would last any longer than the cheapo spanners that I actually own.

The second problem with GOOD tools is obsolescence. Who in their right mind would buy a hand drill these days when cordless electric drills are so cheap and readily available. A few nights ago I was walking the dog when I came across a lawn edger left out for the hard rubbish collection. It was in good condition so I took it home. Of course I know that this was an error because they are awkward to use and tiring at best especially with the very tough grass which usually grows over the path edges. The owner was throwing it out because he has bought a Whipper Snipper and hasn't used the old lawn edger for years. I will probably have to throw it out myself after I have thought about it for a while, especially as I now have three of them.

So much for the GOOD tools but what about the cheap tools. Well I can say that so far I have not had a cheap tool let me down. It is true that the cheap chisels may not hold a sharp edge for very long but they are usually adequate for the job. The expensive chisels are often not much better especially after I have tried to sharpen them. Then there are many times when I just wouldn't want to use an expensive chisel, such as when I think there might be a concealed nail somewhere in the wood or when I am using it to open a paint tin.

A cheap tool is better than no tool. My grinding wheel was bought as a hardware store special about a year ago. I have never had one before and have used sharpening stones or hand files instead. I am amazed by how much I use it these days. Even though it is of fairly indifferent quality it doesn't matter for most tasks and if a really good edge is required one uses the sharpening stone for the final touch up, which is what the GOOD tool tradesman does anyway. The same can be said about my bench vice which I have had for a bit longer. It is pretty crappy but even so when I can be bothered cleaning up the bench sufficiently to use it, it beats the hell out of my usual technique of holding an item in one hand or on my knee whilst I try to saw or file it neatly with the tool held in the other.

In Bunnings Hardware stores there is often a large bin of assorted spanners at $1 each. The bin is worth a good rummage about in the hope of finding the smaller sizes which are fairly uncommon. The spanners have no brand but are slimmer than a lot of cheap spanners which can be an advantage in tight spots and they look better than the fat ones. This is another irresistible bargain and I now have such a large collection of 8mm spanners that I could have bought one GOOD spanner for the same price. The advantage of a large spanner collection should not be over looked. Not only does one often need two of the same size because the nut is the same spanner size as the bolt head but there is also the problem of the lost spanner. The larger the number of spanners, the more likely that the appropriate spanner can be found.

Another reason for the cheap spanner collection is the need, on occasion, to modify a spanner to reach a particularly intractable nut or bolt. Gliders seem to be specifically designed as the home of the very difficult intractable nut. Psychologically it is difficult to have to saw your GOOD spanner in half in order to attach a piece of bent wire to reach the intractable nut. The mental strength needed to modify a cheap spanner is very much less and can be achieved on occasions with only a moderate delay, thereby allowing the job to progress more quickly.

Socket sets are another favorite. When I did the basic gliding engineering course it was suggested that we each equip ourselves with a set of ¼ drive sockets. These sets are readily available in the cheap tool departments and are so attractively packaged that I have had to buy quite a number of sets of them. The quality is adequate and large torques are rarely required in glider work. Indeed in these small bolt sizes large torques are rare in any application. Hence the sockets are unlikely to fail under load. The first set was packaged in a metal case with a thin plastic insert to hold the sockets. After a short time the plastic insert cracked and all the sockets slid about and got mixed up. These days the packaging has improved immensely and because they were cheap I bought another set and then another set. Lately I have bought a set because it contained a particular item (an angle drive extension bar) and it was cheaper to buy a whole set rather than try to buy that particular item on its own.

Returning once again to the subject of cheap power tools I have to rate my current cordless electric drill as the greatest tool bargain I have ever purchased. Browsing in Crazy Clints as is my wont I saw it there and bought it after only a short debate with myself about the need for another. My old cordless drill had been giving trouble and has since packed it in completely with a faulty trigger switch. The brand is Southern Cross which I had never heard of and does indeed sound pretty suspicious. It has to be Korean or something. It has two 18 volt batteries, with a charger, a keyless chuck, reversible action, adjustable clutch and a variable speed trigger. The price was approximately $65 which I reckoned was good value for the spare battery alone. One could easily spend 5 times as much for a GOOD drill with same features and so far it has performed perfectly for almost a year. It came in a plastic carry box which contains all the accessories and also has a set of drills and screw bits in the top of the case. The drill bits are probably of poor quality and so far I have not used them but the day will undoubtedly come when I have forgotten the extra drill bits and will happily use whatever I have to do the job rather than leave it to another day even if it is a one use drill bit.

The cheap tool department is a great source of fascinating ideas which can otherwise be hard to find. Inspection mirrors, magnetic pickup tools, grapples, string lines, plumb bobs, tape measures, tire pumps and spirit levels are all items I have purchased on the cheap and they all work tolerably well. I recently purchased a plastic tire pressure gauge for $2 and found that it worked when I got home (even I was surprised).

So lets acknowledge the place of cheap tools. The quality is often a lot better than one has a right to expect for the price. Ten tools are better than one and unless you finally get to own

every tool that you could want or if one of the cheap tools should finally let you down then go and buy another.

WHAT'S NEW

WE HAVE NEW SUBSCRIBERS.
Jerry Leach. PO. Box 641 Murwillumba. NSW 2484.
D. Oxley. 36 Ishmael Rd. Camira.Qld.4300.

CROSS COUNTRY IN A "WOODSTOCK".

On Sunday 25th of May 2003 Matt Michaels flew his "Woodstock" in the United States from Ames Iowa to Northwood (20 miles SE of Albert Lea MN) and returned to Ames. A distance of just over 300 kilometer (187miles) for a Diamond goal flight.

On Monday 26th Matt Michaels bested his previous days flight by flying his "Woodstock" on a triangular course of 406 Kilometers (252 statute miles) He flew from Ames Iowa to Creston to Dennison and landed back at Ames Iowa. A truly incredible flight!

The "Woodstock is a modest home built glider with a glide ratio of 24:1. Matt and his glider were featured in the May issue of Soaring magazine

AUSTRALIAN GLIDING MUSEUM.

The Gliding Museum will be holding a woodworking workshop on the 11-13-18-29th of June 2003, guest speakers are G.Sunderland, D.Lyon and E.Blunt. The sessions are at the Gliding Museum workshop in Ferntree Gully. If you are interested to take part in this venue contact C.A. Patching on 9817-5362

SHOP TALK

ONE MAN RIGGING

Peter Champness

Assembling a glider from the trailer is a labor intensive activity. Setting up at the Homebuilders Regatta was no problem, partly because Mike Williams had already rigged the glider before I got there. Even so there are usually plenty of willing helpers at that event. It is not necessarily the same at the local club on an average weekend and even worse on a weekday when there may not even be enough people present to act as helpers.

The principal problem is getting the heavy wing out of the trailer, turning it horizontally, lining the wing up with the fuselage and then holding the wing tip up for a long time whilst the connecting pins are installed. These activities usually need four people, at least two of whom are moderately strong and healthy (no bad back!), although it can sometimes be done with three. I once managed to rig my Foka with the assistance of only one other helper but the helper has never been seen again at rigging time! The supply of strong healthy helpers diminishes steadily over time because the rigging activity is a potent cause of bad backs.

There are few helpful accessories commonly seen such as wing stands which help a bit but do not get over the worst of the heavy lifting. I have thought over the years about elaborate cranes and articulated arms, which pivot from the side of the trailer with jacks and things but they were all too difficult and expensive to build.

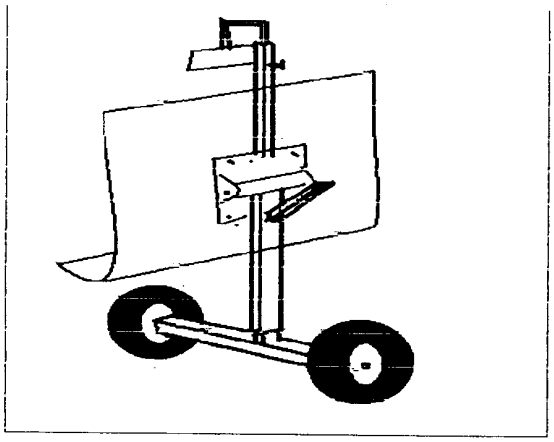
I have recently seen a simple and useful device which really does help. Eugene Blunt has built such a device and the two of us easily rigged the Foka in 20 minutes. Happily his Cobra 15 (which is basically a Foka 6, from the same manufacturer SZD) has almost the same wing. This is important because the tray which caries the wing has to be individually shaped to the wing of the glider. Hence the wing rigging device for the Cobra 15 can be used for the Foka 5.

The basic principled of the **one man rigging device** is one of the oldest ideas of all time. How does on carry a heavy weight without injuring ones back? The answer is the wheel! With a simple wheel, heavy weights are easily carried about. Consider a wheelbarrow, one of the simplest of wheeled devices. Weights of seventy to one hundred kilograms are easily carted about in a wheel barrow, more than the weight of a glider wing, which weighs 50 to 70 kilograms on average. The idea has been around for quite a while in the wheeled trolleys which are used to load wings into trailers. The wing root trolley however is very limited because it only gets the wing in and out of the trailer. There is still the problem of rotating the wing, raising it to the height of the fuselage and advancing the wing to the fuselage is still not addressed.

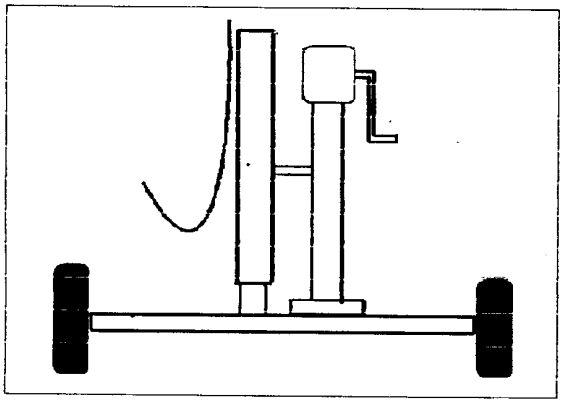
The break though idea is to place the wheels under the center of gravity of the wing which is about 40 percent of the distance from the root to the wing tip. If the wing is supported at this point the whole weight is easily managed and even if the wing tip, or wing root, has to be place on the ground whilst minor alignment problems are fixed or forgotten items are attended to, there is no need for pillows or cushions to protect the wing because the point loads on the wing tip or wing root are very low.

The inventor of the **one man rigging device** is obscure. I would like to give full credit. Laurie Mckinnley at the GCV has built quite a few of these devices for club members. John King, also of the GCV (who is currently restoring the PLANK flying wing glider) described the device to me and drew me a diagram. Eugene Blunt of Albury/ Corowa has built one and showed me how to use it. I also met a glider pilot at Corowa, whose name I unfortunately forget, who had bought his trolley from a German Company. His trolley may have been a model for several of the homemade versions.

The diagram shows the general arrangement. If the wheels have pneumatic tires the trolley can be used over moderately rough ground.



The tray has to be able to be adjusted up and down. The easiest way to do that is to weld a jack to the side. I have not drawn the jack because it was hard to draw. One needs the old fashioned type of jack with the handle on the side. These are no longer available because all of the car manufactures have changed over to the scissors type jack, but can sometimes be found at garage sales and flea markets. Look out for them because it is nice to have one before you start building your own trolley.



This diagram shows the arrangement of the jack. The wing platform is connected to a square section tube which is a sliding fit on the outside of a smaller diameter inner tube. My initial thought was that the larger section tube would form the base with the smaller tube on the inside. The problem with that is that you need to cut a slot for the jack to connect to the sliding inner tube!

It is also an advantage if the wing platform can be disconnected from the wheel base. Not only can a different wing platform be attached but it also is more compact for storage.

The wing platform has been the most difficult part for me to construct. I have tried to mould plywood but in the thickness required it will not take the required bend. I will have to mould it out of fibreglass, which will be a new skill. More about this in the next newsletter.

THE HORTEN- IV. SAILPLANE

By Martin Simons

Eds note: Information provided by Bernd Ewald to Martin Simons via E-Mail, B.Ewald is helping to build a replica of the Horten-IV,

Here is an excerpt.
I am making good progress. From the DLR (German Aeronautical Research Organisation) I got the offer to build the complete set of ribs in their training workshop, so about 50% of the wing structure are secured.

Last week we had the winter meeting of the German members of VGC. On this occasion I gave a report on the Horten progress. Some weeks ago I picked up Prof. Nickel at Freiburg and we together visited Heinz Scheidhauer at Bad Krozingen, who recently celebrated his ninetieth birthday, He was in relative good shape and he was very enjoyed about the fact, that a new Horten IV may fly again.
Best wishes Bernd..

Horten IV

As a first project the rebuilding of a true historic Horten IV flying wing sailplane started at the Darmstad University of Technology in Germany.

Between 1930 and 1955 the German brothers Dr. Reimar Horten and Walter Horten designed a number of successful tailles airplanes, some of them went into small series production. Especially the sailplanes Horten IV and Horten VI, which where superior to most conventional sailplanes of the time, still today enjoy a legendary reputation in the aeronautical society.

To bring a true historic replica of a Horten plane back into the air, is of highest historical interest. Certainly the sailplane Horten IV is the most suitable type for a true historic and flight worthy reconstruction. Good flying characteristics are established and the Horten IV undoubtedly is the most beautiful and successful Horten sailplane. A first discussion with the responsible adviser at the Luffahrt-Bundesamt showed no serious problems for a certification as a single plane.
An airworthy Horten IV at flying displays or other aeronautical events will be a sensational attraction.

Project management and trusteeship for the Felix Kracht Foundation will be done by the Hessisches Institut fur Luftfahrt e.V." at Darmstadt. This non-profit organization has statutory target to support teaching and research in the aeronautical field at the Darmstadt University of Technology. So the 'Hessisches Institut fur Luftfahrt" ask the aeronautical and gliding community for contributions for the reconstruction of a Horten IV.

The Myth of the Bell-shaped Lift Curve

By Martin Simons

As many already know, a Horten IV sailplane has been restored and is now displayed at the Oberschleissheim division of the Deutsch Museum, just outside Munich. Although this surviving example might be capable of flying it will not do so, being preserved as a museum exhibit.

However, Professor Berndt Ewald's , formerly of Darmstadt Technical University, is hoping to get a new Horten IV tailless sailplane built (full scale) and flown. Whether he will be able to find time and financial support remains to be seen but it would be most exciting to see one of these famous sailplanes in the air

again after so long. It would also give us a chance to answer some outstanding questions.

I wrote most of what follows in the first place for the International Vintage Glider News magazine, in which future developments of Berndt's project will doubtless appear from time to time. With a few appropriate changes, it may be of interest to model fliers too.

The Horten brothers, Walter and Reimar, from 1934 produced their series of tailless sailplanes and powered aircraft. Great things were claimed and much was expected.

What the Hortens did, for which they deserve much credit, was to persist with their tailless designs until they had a sailplane that may have been nearly as good as the best of the contemporary orthodox types. Eric M Brown, the famous test pilot, wrote in 1983: "They persevered where others have given up. I only wish I could share their enthusiasm and faith."[1]

In the end there was disappointment. Hans Zacher, much of whose life has been devoted to test flying and measuring the performance of sailplanes, has written "Unfortunately, in earlier reports many facts have been hidden and others have later been realised to be wrong. Often self-praise occurred and so-called flight measurements have not been physically exact." [2] He continued "One has to emphasise that with tailless aircraft it is more difficult to find the necessary compromise between good performance, desirable and safe flight characteristics, easy handling on the ground and cheap construction costs, compared to 'normal' aircraft."

Reflexed profiles and centres of pressure

Contrary to some claims, the Hortens did not make any astonishing discoveries. For example, they have been credited with being the first to realise the benefits of the so-called reflexed wing profile. This is wrong. Wind tunnel tests on reflexed wing sections had been performed before 1924 and the results widely published. Alexander Lippisch used them for the 'Storch' series of tailless aircraft. There were many examples available to designers before the Hortens began their work. In the old-fashioned terminology, reflexed profiles have a centre of pressure which does not move appreciably at the changing angles of attack normally used in flight.[3] Unlike the ordinary cambered type of profile, they do not try always to push the nose down. (The nose down pitching tendency of the usual type of wing is normally resisted by a tailplane or a canard forewing.)

If there is no tail a reflexed wing profile which does not require the nose-up balancing force is an advantage for balance and trim but to use them is to sacrifice some performance. In terms of lift and drag, reflexed profiles are relatively inefficient.

[1] Eric M Brown, *Wings of the Weird and Wonderful Vol 1* Airlife, 1983, p 145 - 9.
[2] Hans Zacher, quoted by Karl Nickel and Michael Wohlfahrt, *Tailless Aircraft in Theory and Practice*, AIAA, 1994, pp26 - 8
[3] The centre of pressure, however, is an abstraction, a result of mathematical calculation and not directly measurable. It is preferable to say that correctly designed reflexed profiles have zero or positive pitching moment measured about the aerodynamic centre, which is at approximately the quarter chord position.

Flutter

There were other difficulties which the Hortens never solved. One was wing flutter. Karl Nickel wrote, "I have experienced flutter with the tailless sailplanes Horten H IV. Beginning at approximately 140 km/h (87 mph) it started to rattle and shake and to flap its wings more and more. I know this phenomenon and I am terrified of it." He mentioned also the fatal accident to the Horten IVB, caused by wing flutter. The H IVB had wing profiles copied from the P - 51 Mustang. The fighter's wing section, unsurprisingly, did not prove suitable for a sailplane but flutter is not caused simply by the type of wing profile. Swept back wings with a degree of torsional flexibility, are always prone to this. The Hortens used the orthodox materials of their time, mostly pine for spars and ribs, birch plywood for the wing leading edges skins and fabric covering for open frame behind the main spars of the wings. Torsional stabilty was not very good, despite the use of light alloys for the extreme wing tips. Other pilots experience flutter at lower airspeeds.

The Bell - shaped Lift Curve

Of special importance to the Hortens was the so-called 'bell shaped' lift distribution (Figure 1).

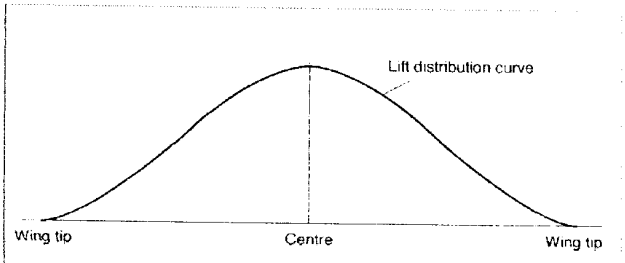


Figure 1 The Horten's 'bell-shaped' lift distribution curve

A lift distribution curve appears if the lift developed at each station along the span of a wing is plotted on the vertical axis of a graph, where the horizontal axis represents the wing span. To compute this is a normal step in the design of any aircraft. Assuming the wing is at some positive aerodynamic angle of attack to the airflow, the maximum lift is developed at or close to the centre of the wing. The fuselage, if any, may spoil this to some extent but such interference is reduced as much as possible by careful design and fairing. At the extreme tips there is no lift so the curve there touches zero. The area under the lift distribution curve represents the supporting force. For the aircraft to sustain itself in flight, the total upward force integrated under the curve, must equal the total weight.

Vortex-induced drag

At high angles of attack, as when a sailplane is flying slowly and, perhaps, circling in a thermal, by far the most important sources of drag are the wing tip vortices. The difference in pressure between the upper and lower surfaces of the wing, causes cross flows. Powerful vortices trail away behind each tip. This creates very high drag. In slow flight, trimmed for the minimum rate of sink, the vortex-induced drag is more than all the rest put together. At the slightly faster trim required for the best glide ratio, vortex-induced drag is usually half the total. Clearly, anything that increases vortex drag has a very serious effect on the soaring ability of a sailplane, and on the best glide.

It has been known for a long time that a lifting wing (assuming there are no winglets) will develop least vortex-induced drag when the lift distribution curve forms a semi ellipse. If the curve departs noticeably from the elliptical form, there will be a drag penalty.

To achieve the ideal elliptical lift loading, the simplest way is to use an elliptical wing plan with no wing twist or span-wise change of angle of incidence. Most modern sailplanes approximate this closely. Each part of such a wing produces a share of the total lift in proportion to its area. No part is idle, and no part is overworked. Every bit of the wing produces drag, so it is important that every bit should also produce a proper share of the lift.

Drag penalty of the bell shape

The Horten bell-shaped lift curve departs considerably from the elliptical (Figure 2). There are, inevitably, serious losses, particularly at low flight speeds as used for soaring. The Hortens knew this. The increase of wing vortex drag, they hoped, would be more than compensated by the saving of tail and fuselage parasitic drag. In this they were too sanguine.

The best glide ratio of the Horten IV is sometimes stated to be 1:37.[1] This was never attained in actual flight. Reimar Horten, by his own admission, made the original calculation assuming that the span wise lift distribution of the sailplane was perfectly elliptical.[2] The 'bell shape' is far from elliptical. The 1:37 ratio emerging from this crude preliminary calculation was nevertheless published and apparently has been accepted widely ever since[3].

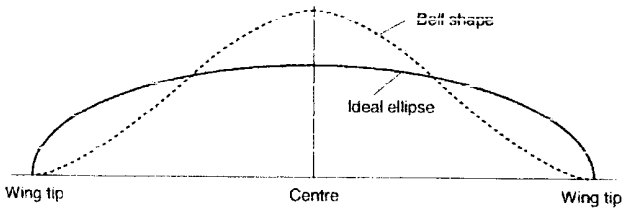


Figure 2 The 'bell-shaped' lift distribution curve compared with the ideal elliptical lift distribution. The total area beneath each curve is equal representing the required lift for flight.

There were only two attempts to measure the performance of the H IVin flight, one in Darmstadt over two or three days in May 1943, by comparison flights against the D - 30 Cirrus. (The pilots were Hans Zacher in the D - 30 and Heinz Scheidhauer in the H IV.) The Darmstadt tests, to which Zacher's remarks about precision (see above) apply, found the best glide ratio to be 1:32. The estimated polar curve published after these tests show the H IV to have been considerably inferior to the D - 30 except that the stalling speed was 10 km/h slower. The flying wing might have been able to turn more tightly. This was mainly because the Horten wing loading was lower. If the Horten had been ballasted to bring the wing loading to the same as the D - 30, the Darmstadt curves show the H IV would have been considerably worse than the Cirrus except at high flight speeds. (At which speeds the flutter problem arose.) The best glide measured was slightly less than the existing DFS Reiher of 1938.

The second attempt to measure the H IV performance was in 1959 at Mississippi State University, about which more is said below.

Penetration?

The bell-shaped lift curve, while not good for soaring, might seem to favor the fast glide when vortex drag becomes relatively less significant. What is lost in the climbs during a cross-country flight, might be made up if there is good 'penetration' between thermals.

Unfortunately this does not apply to the Horten sailplanes.

Washout

To produce the bell-shaped lift curve the Horten wings were built with a negative twist, that is, 'washout'. There was a progressive geometric change of the profile towards the tips also. The twist and change of profile were necessary to achieve the bell curve at low flight speeds, but also for balance and stability of the swept wing. The effect of the twist, however, was to force the entire shape of the lift distribution curve to change at different airspeeds.

Trimmed nose-down to reduce the angle of attack and fly fast, the outer parts of a 'washed out' wing are compelled to operate at negative angles of attack.[4] The lift distribution curve then shows negative or downward 'lift' over the outer panels. At moderate airspeeds, the Horten 'bell' acquires an upturned rim.

New tip vortices develop, rotating in the reverse direction. These do not cancel out any of the vortex drag from the normal lift-induced effect. The total lift from the inner wing still must support the total weight. The tip download compels the inner parts of the wing to work even harder to counteract the downward force from the washed out tips. So the total vortex effect inboard is more, with greater drag. To this the new tip vortices drag must be added. Far from producing their proper share of supporting force, the outer wings push the glider down.

All this about washout applied to ordinary sailplanes with washout. Most of the older 'vintage' sailplanes, like the Rhoenadler, Petrel, Olympia and Weihe, had pronounced washout and hence they, too, had more or less bell shaped lift curves at low flight speeds. But at high airspeeds the pilot can see from the cockpit that the tips begin to bend down. The total integrated area under the lift curve, taking in both positive and negative, must still support the weight. The inner part of the lift curve is forced to a higher peak to compensate for the negative contribution of the washout (Figure 3). The elliptical wing with no twist, does not suffer in this way.

[1] R Horten & P Selinger, *Nurflügel*, H Weisshaupt 1983 p 108

[2] Nickel, op cit, p 442.

[3] The figure is tabulated with other leading data on page 108 of *Nurflugel*, but only five pages earlier the test results and the resulting polar curve estimates are also shown, demonstrating the exaggeration.

[4] This applied also to those sailplanes which had marked wing washout, such as the old Rhoenadler and Slingsby Petrel. In a sense, these also had 'bell shaped' lift curves. See the author's previous article on washout, available from VGC Sales.

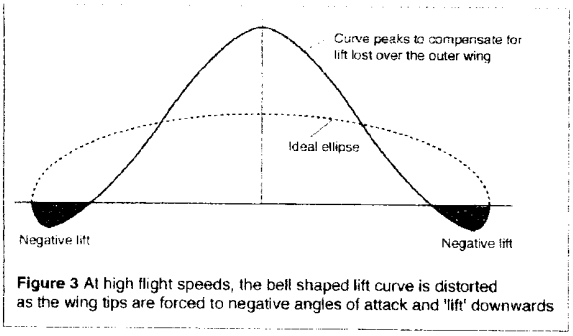


Figure 3 At high flight speeds, the bell shaped lift curve is distorted as the wing tips are forced to negative angles of attack and 'lift' downwards

Adverse yaw

Why, then, did the Hortens use the bell shaped lift curve? Their main reason was not to improve the performance but to improve control in yaw. The sailplanes had no vertical fins and no orthodox rudders (let alone winglets), to save the drag of these parasitic items. It seems to have been a matter of firm principle to them, that nothing should be added to the pure wing. It was theorized that, with the outer wings producing little or no lift because of the bell curve, deflection of the ailerons would not result in the adverse yawing experienced with orthodox sailplanes. There would then be no need for a fin or fins. Unfortunately this proved to be mistaken.

Karl Nickel wrote "Any pilot who ever flew a Horten aircraft knows that this aim has not been attained. Unfortunately all Horten flying wings possessed an adverse yaw moment, which for some of them has been very disturbing."[1]

Aileron drag

A brief discussion of aileron drag is necessary. Adverse yaw is experienced at the moment when the pilot wants to enter, or come out of, a turn. To turn efficiently an aircraft has to bank, directing a proportion of the lift force to one side. Ailerons roll an aircraft by creating an imbalance of the span-wise lift distribution. One wing produces less lift, the other more, so the aircraft rolls. Unfortunately, because of the difference in strength of the two tip vortices, there is a difference in drag and the aircraft tends to yaw away from the desired turn. If not corrected at once, an ugly sideslip results. With sailplanes, having relatively very long wings, the effect is much more pronounced than on most powered aircraft. To enter a turn cleanly, some means of preventing adverse yaw must be found.

At the desired angle of bank, determining the rate of turn, the pilot checks the roll and, to maintain the turn, in a sailplane usually has to 'hold off' bank a little with the ailerons held slightly against the turn.

To come out of the turn, the ailerons are applied to create the necessary imbalance of lift, there is aileron drag and adverse yaw at this moment, but it disappears once straight flight is resumed with ailerons central and the tip vortices return to equality.

To emphasise all this, adverse aileron drag is inescapable. The lift imbalance weakens the tip vortex on one side while increasing the vortex on the other. Accordingly, drag on the wing with aileron up decreases while that on the other wing increases. This inequality tends to yaw the aircraft away from the desired turn. *Whatever the shape of the basic lift distribution curve, moving the ailerons produces unequal tip vortices.*

The bell shaped lift curve does not change this. The absence of any kind of vertical stabiliser on the Horten sailplanes compelled the pilot always to use the wing tip drag spoiler rudders against the yaw. The additional drag of the spoiler rudders was certainly not less than the drag of an ordinary rudder on a vertical tail. Nickel concluded: "The use of the 'bell shaped' lift distribution to avoid or to reduce adverse yaw is inappropriate!"

Summing up

All in all, it is not very surprising that the Horten flying wings had difficult handling characteristics. Walter Horten admitted this. Pilots must get used to it, he said. Some pilots did, yet the 'wings' did not perform as well as had been hoped. Reflexed profiles sacrifice efficiency for the sake of balance, swept back, slender wooden wings tend to flutter, the bell - shaped lift curve creates extra vortex drag at low flight speeds when vortex drag is dominant already. Washout distorts the lift distribution even further at high speeds.
This brings us to the tests carried out by August Raspet's group at Mississippi State University in 1959. These were reported in detail to the OSTIV Congress at Cologne in 1960. The paper presented to OSTIV remains available and merits careful study. Rudi Opitz, a very good contest soaring pilot who had some success flying the H IV in soaring competitions in the USA, assisted the MSU, trained the pilots and remained available to advise the group.

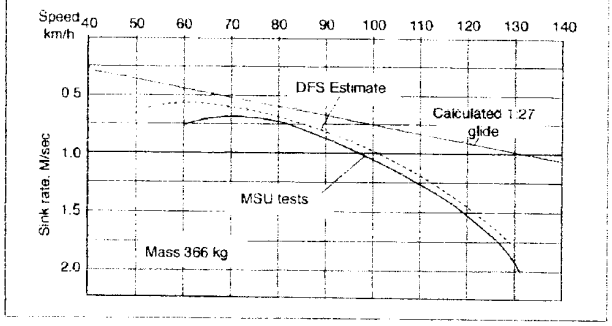
Compared with a few comparative flights in 1943, the MSU results were the outcome of a long series of carefully measured flights supported by detailed theoretical analysis of the results. There were wool tuft tests of the airflow at different airspeeds, drag coefficients were measured at five separate stations along the wing, control deflections were recorded. Great care was taken throughout.

No important changes were made to the Horten sailplane or its control linkages before these tests. They were apparently just as the experienced Opitz had set them for his contest flying. A fairing was added to the exposed nose skid. Preliminary flights revealed airflow separation over the centre section of the wing, indicating that some break down of the lift there was already a problem, with additional drag arising. An attempt was made to cure this by changing the shape slightly and sealing the shell covering the semi-prone pilot position. There is no way these changes could have reduced the performance. On the contrary, they would have enhanced it.

The measured performance of the flying wing was considerably poorer than the MSU team had anticipated.

[1] Nickel P 443 - 4

Figure 4 Horten IV flight performance curves



A best glide ratio of 1:29.5 was found, with a minimum rate of sink of 0.7 m/sec against 0.55 m/s for the Darmstadt estimate. MSU at that time led the world in performance testing. No claims were made that were not well supported by factual evidence.

There may, as the MSU paper indicated, have been some other differences between the Horten IV tested in 1943, and the one flown sixteen years later. The centre of gravity, for example, may have been in a slightly different position. It could not have been much different for the sailplane would not have been controllable at all if it had been shifted very far. Variations of the pilot weight would not have changed the balance point much in any case.

At the end of the OSTIV paper, a program was suggested whereby the H IV, or a derivative of it, might be developed to the point where a best glide ratio of 1:50 could be obtained. The death of August Raspet in an aero plane accident soon after the completion of the tests, rendered this further work impossible at MSU. Perhaps, if a new Horten IV is built now, there will be a future for it based on the MSU recommendations.

MORE BRADLEY RAMBLING

By Alan Bradley

Thanks very much for the weights of the major components of your "Woody-Roo". I expect mine won't be too much different, but I am doing my best to keep the weights down.

My Woody is progressing quite satisfactorily although I must say that my non-gliding friends don't think it changes from one month to the next. The fuselage is pretty much as far as it can go without having the wings to fit to it.

I was lucky to pick up two molded canopies that were damaged, one being a Libelle and the other a LS1. The LS1 appears to be well suited to my Woody as having moved the pilot forward by 100mm I am able to recline more thus reducing the head height. I have made up a trial canopy incorporating the LS1 profile in timber and it feels good. The seat back needed to be modified but the recess created is ideal to take a backpack chute.

I have completed the fibreglass fairings for the tail wheel, rudder to stabilizer, main wheel and nosecone. I have made a removable nosecone as described in Mal Bennetts' Sept. 2001 article. It worked out well and I am particularly pleased with the permanently installed air duct. I took the opportunity to extend the nosecone some 50mm to make it a bit sexier. Having made these pieces on male moulds there is a need for a skim of filler over the outside but I will do this with the rest of the glider.

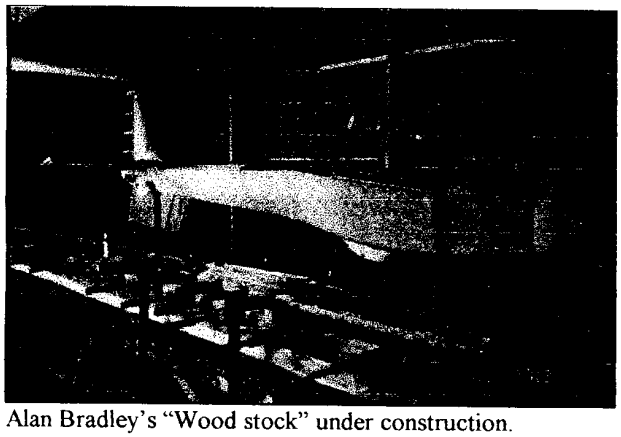
Material for the wing spars had been a problem. I spent several months without success looking for Douglas fir, which was even good enough to put into my test rig. I spoke to Harry Schneider and was lucky enough to find that he has a reasonable quantity of laminated beech. This is a beautiful product available in sheets 585mm wide, 12.5mm thick (9 laminations) and 4800mm long. This is an aircraft quality product which has published figures showing it is 42% and 24% stronger in tension and compression respectively than Douglas Fir but is 44% denser. I tested several pieces in bending and confirmed that these figures are quite conservative. In fact my test figures exceeded those specified by some 50%. I learned from Mal Bennett that he had experienced some problems gluing solid beech with epoxy resin. With Harries timber I made up 15 test pieces. Before gluing I spoke to the Epiglue manufacturer who did not think I would have a problem if I followed the normal procedure of roughening the surface, vacuuming and solvent wiping before gluing. The test samples included eight 20:1 scarf with the remaining pieces being plain overlapping joints. The results were quite spectacular with 100% success. It also showed up the high quality of the laminated beech.

My wings will have a 1 metre increase in span over the standard Woodstock and a load increase to accommodate a motor, fuel and up to a 110kg pilot. The spar is being redesigned by Mike Burns. In the meantime I have made some generous estimates of the cap sizes, which has enabled me to laminate the caps ready for final machining when Mikes work is done.

Because of the stronger material I am fortunately able to comfortably accommodate the upgraded caps within the standard 38mm spar width.

Cutting the spar webs taught me a lesson and that is to check that the material provided is what you think you have bought. I noticed that the plywood was stamped class 3 whereas aircraft ply is class 1 Class 2 is acceptable for aircraft providing the inner laminations are inspected against a test light for defects. I looked at the invoice and it was written up as aircraft grade. I made inquiries from three supply companies and they said that class 1 and 2 is very difficult to get. It appears that class 3 is pretty much all that is available and it appears it is being used by many aero plane builders – hopefully after close inspection. Fortunately Harry Schneider came to my rescue again as he had enough class 1 for my needs. He was also able to supply my requirements for the torsion box. The other good luck story is that the local company that supplied the class 3plywood took it all back in strips for a full credit. As well I was thanked for pointing out the error as it was supplied to them as aircraft quality.

The job now grinds to a halt shortly as I have to take my wife on our 12 weeks trip to the warm weather for winter. Incidentally, I still make the bed, do the vacuuming and don't go shopping with Marilyn which together maintain my brownie points in credit – well worth the effort – especially the "not going shopping" undertaking. Ha,Ha.Ha.....

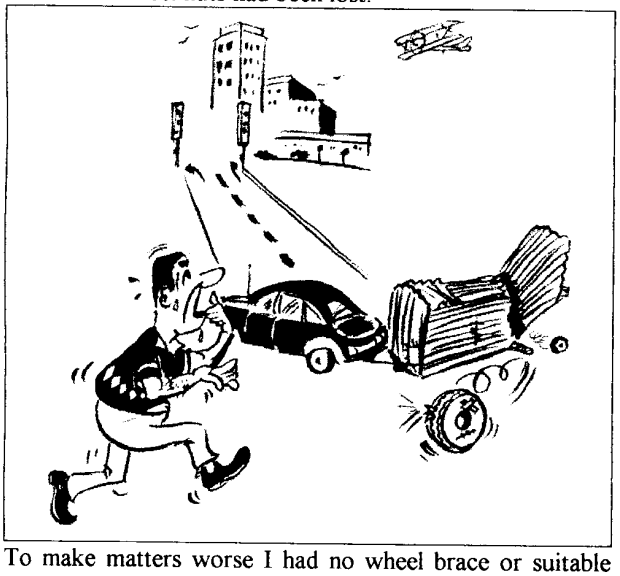


Alan Bradley's "Wood stock" under construction.

GLIDER TRAILER'S TALK

By Peter Champness

My recent trip to Benalla with the Foka in tow ended in disappointment at Craigeburn on the northern outskirts of Melbourne when the left wheel of the trailer departed into the scrub and rocks of the roadside. The wheel returned moments later and bounced across three lanes of speeding traffic coming finally to rest in the median strip. I watched all this in the rear view mirror, aghast at the possibilities of disaster and did my best to bring car and trailer to a halt in a safe spot. The glider appeared undamaged but the brake drum had been distorted by the dragging along the ground and all the wheel nuts had been lost.



To make matters worse I had no wheel brace or suitable jack. I spent some time in the hot sun contemplating my situation, deciding finally that there was no prospect of obtaining any help within walking distance and that I would therefore have to unhitch the trailer and drive back toward Melbourne, to obtain suitable equipment and replacement wheel nuts. This almost led to a second disaster. When I unhitched the trailer from the car, the draft of a passing truck almost spun the trailer transversely across the highway. It seemed best to put the trailer back onto the car until I had collected a suitable pile of rocks from the side of the road to use as wheel chocks.

In the end I was able to replace the wheel. The brake drum was too badly damaged to replace it and the necessary gap resulting from the lack of brake drum was made up with piles of washers on each wheel stud acting as spacers. The day by now was well advanced and it seemed a good idea to return home rather than attempt the long drive to Benalla with a dodgy wheel. On the way back I started to consider the problems of glider trailers with, at the back of my mind, the possibility of starting again and building a new trailer incorporating improvements on the current design. This is the second fright I have had with this trailer, the first being when I dropped a wheel into a deep culvert on the side of the road at Bacchus Marsh and the whole trailer tipped on its side before bouncing upright again. Once again the glider was inside but survived with only minor damage. The axle was slightly bent by the blow, which may have contributed later to the wheel falling off incident.

One failing of my trailer which I would like to improve upon is the sensitivity to side gusts of wind. This had been very noticeable on the outward journey because there was a strong, gusty north wind, a problem made much worse by the passing of many large trucks. Glider trailers are quite bad in this respect because they are quite light for their size and necessarily have a large lateral area.

Assuming that the trailer has been designed to be as small as possible considering the load it has to carry there are some other features which might make further improvement. One of these is rounding of the upper corners by the use of curved bows. Peter Raphael in his recent excellent article on the construction of these bows lists a number of advantages but neglects the aerodynamic qualities. It is well known that a circular cross section has only half the drag of a square section and even a modestly rounded corner is likely to be better than a square one. I have seen this idea carried to extremes with the glider trailer constructed like a tube but I feel that this might make loading and unloading awkward as well as restricting the interior space

Another potentially beneficial design feature is adjusting the centre of lateral area of the trailer to be closer to the axle. A side view of my trailer shows that the centre of lateral area is well forward of the axle. Even when driving straight into the wind the trailer will therefore have a tendency to try to swing around and proceed rear first. An arrow is made to fly straight by the addition of fins at the back and the same could be done with a glider trailer but a better idea is probably to try to make the trailer narrower at the front. If the centre of lateral area is coincident with the axle the trailer should swing gently to the side when struck by a side gust before returning to the straight path. As it is, the tendency is for the trailer to twist imposing a steering force on the car. An analogy might be striking a cricket ball on the sweet spot of the bat. A ball struck high up toward the handle by comparison will impose a severe shock to the batsman's hands!

The final aerodynamic feature I thought of was the use of low profile ribbed metal sheet specified for walls rather than the roofing material usually used. The roofing material has higher ribs to increase its stiffness but the ribs are side on to gusts of wind and probably increase the lateral resistance. The deep grooves between also funnel rainwater toward the fin box which is therefore difficult to seal against leaks.

Most glider trailers have a very lightweight metal frame. Making a heavier chassis should reduce the sensitivity to wind gusts and also improve stability by lowering the centre of

gravity. Unfortunately the heavier trailer is not only more expensive in materials but also costs more in fuel to tow around. A small car might have trouble towing the heavier trailer although given the difficulties I have had already I don't think I would like to tow a glider trailer in anything smaller than a six cylinder sedan. A heavy tow vehicle definitely helps. If the loaded trailer weighs more than 750kg the use of trailer brakes is mandatory!

I have been given a few other ideas about trailer mass by advisors, particularly about the distribution of mass about the axle. The size and shape of the glider limit what can be done but there are a few things. This will be the subject of an article in the next newsletter.

HOME BUILT SCALE GLIDERS.

By Sir Colin Collyer.

James..! Here a few lines to let you know what's going on in scale soaring. We have just returned from a meeting in Swan Hill over ANZAC weekend. Over 40 pilots and many more models. These days not too many models are under quarter scale and in fact, the ¼ scale Woodstocks are probably the smallest, along with the 1/5 scale Schweizer 1-26's of which there were about 4 (2 Woodstocks). The larger models include a 1/3 ASK18 at 6 metres, a 1/3 Fox at 5 metres and 2 nearly 1/3 Foka 5's at 4 metres.
Martin Simons had 3 models out flying, PWS101, Condor 3 and Weihe. He was the only pilot to get away in a decent thermal and he did it twice, once each with the Condor and Weihe.

Brian Spencer had an Airspeed Tern, at ¼ scale. An unusual model with varnished wood and natural cloth covering. Its shape is very different from the normal sailplane shape with lowest aspect ratio lots of taper and a "tiger moth" rear end.
I had several models, ¼ scale Woodstock, ASAK8, ASK14 motor glider (electric) and a Zefir 2 that I have just restored. It was built 33 years ago, and after the pilot tripped and fell off the sand dune the model crashed into the sea. One Alan Villiers purchased the bits and stored/ repaired the model for the ensuing 33 years. I purchased the bits off Alan and finished the restoration, altering the control arrangement, with servos now in the wing for the fowler flaps, and also a servo for ailerons (the cables for all these had rusted up after the visit with the saltwater, but in today's world are replaced with a better system). The model was originally flown on reeds, a very antiquated system of R/C, and with fowler flaps and retract the model was very advanced for its day.
Other interesting models... The two electric model gliders, my ASK14 at ¼ scale including retract at 10.5 lbs. The other was Barry De Kuyper's Tandem Falke, a little under ¼ scale, but still about 4 metres. With a Astro 40 and gearbox, again about 10 lbs. Both these models use about 20 cells and have a motor on time of under 5 minutes, giving a non thermal flight of about 20 minutes.
What's all this got to do with the homebuilder? Well except for the 2 fully molded models, the others were all built up in someone's shed. Some started life as a dream, a plan, and a pile of timber, while others start as purchased kits, with even fibreglass fuselages being purchased.
The whole system is very similar to the homebuilder scene, only the size is different.
As for flying, mostly we aero tow, using big models with huge chainsaw motors in them. For example, a model suitable for a 10 to 15cc motor would have a 45 to 62 cc petrol motor. Overpowering the tug makes the job a lot easier, and speeds up the launches. Petrol motors are cheaper to run, but a days towing may still use 6 litres.
Anyone wanting to look at this activity is welcome at the VARMS field High Street Road, Wantirna South (next to Cathies Lane***) on the last Saturday of each month***.
P.S. I am looking for Boomerang photos. I seem to recall one on the cover of AG years ago, Rego. TT, I think.

A LITTLE BIT OF GLIDING IN AUSTRALIA

By Allan Ash.

Geoff Richardson at Coode Island

Flying had been a long-standing interest of Geoff Richardson by the time he left school, and his home in suburban Melbourne had seen this interest expressed in a series of well-made model aircraft which had performed well. Geoff was still a young teenager in 1929 when *Popular Hobbies* featured constructional drawings of the Zogling glider.
Within a couple of months he had begun building but progress was rather slow and the work did not finish until October 1932. By this time Geoff had joined the Melbourne Gliding Club and begun training at the Coode Island aerodrome.
His Zogling attracted a lot of attention when it was taken to Coode Island to be test-flown. Made throughout of silver spruce, the workmanship was excellent and the glider was brightly painted with a red and white fuselage and gold wings and tail. Test flights were carried out by Ray Garrett and the machine was found to fly well. Thereafter, the Zogling became a regular participant in the club's flying activity and, after several years, was bought by the club.

By 1934, Geoff Richardson had realised the need for a more advanced machine and began the design of a sailplane of 44 feet wing span. The design was influenced by the latest trends in Germany but was not simply a copy of any particular machine. Construction of the sailplane, which was named *Golden Eagle*, took three years, during which time the young pilot had advanced in experience to being one of the club's instructors as well as its president.

LAUNCHING INTO THERMALS.

By Allan Ash.

How many sailplane pilots read the article "Lockout-Taming the Beast" by James Freeman published in the April 2003 issue of *Soaring Australia?*

The article dealt with a problem that is peculiar to hang gliders but I hope sailplane pilots are not above learning something from our hang gliding brethren.

Tucked away in the middle of the article on the HG problem are few paragraphs about how to ensure that one is launched into lift instead of sink. Sailplane pilots who are launched by winch or car tow could learn something useful from this advice, so I will reprint it with acknowledgements to the author James Freeman and the publishers, Soaring Australia, with a few HG terms translated into "sailplane" language.

The best time to launch when you are trying to catch a thermal is when the wind are lightest and the mechanical and thermal turbulence are at their smallest.

When a thermal lifts off, the surrounding air must rush in from all directions to replace the rising air. Let's call this the thermal filler wind. Wind is just moving air, so what we experience at launch is the combined effects of the prevailing wind and the thermal filler wind.

The wind we get depend on whether the prevailing wind and the thermal filler wind are canceling each other out enhancing each other. What this mean is that if there is a light prevailing wind and you stand facing down the runway, when the wind is light/tail, there is a thermal out in front of you.

If the wind is across the runway then there is probably a thermal off to the downwind side of you. When the wind is blowing strongest from in front it is because there is a thermal behind you. So if you launch at this time you launch into the sinking air between thermals and not only get dud (low) launch but also don't find a thermal because the next one is probably still about 2000 metres up wind. Moral: launch when the wind are lightest to maximize your chances of getting a good thermal out in front.

Yes, this does mean that on light wind days the optimal time to launch is when there is a light tailwind. However, don't take off in a tail wind that is stronger than you are prepared to land in.

A useful technique is to place a windsock on the side of the strip about 200 m upwind of the launch point and another windsock about 50 m up wind of the launch point. This allows the pilot to "see" that critical parcel of air which must be flown through while gaining the first 100-200 feet of height.

SMILE ☺

Eds note. This corner is just for your enjoyment and to get rid of the monotony , if you don't like it, don't read it..."but don't write or ring me about it.

I've got a gastric problem, doc."
"Do you use your bowels regularly?"
"Yes, every morning at eight o'clock"
"Well, what's your problem?"
"I don't get up till nine."

****

Doctor, doctor. I need some pills. I've become a kleptomaniac".
"Try these", said the doctor, "and if they don't work, get me a CD player."

****

"There are three important tribes in Africa" said the anthropologist.
"Firstly, there are the Masai, who grow to 6'6" or 195 cm. They live in the pastoral areas. They tend cattle. They are very proud people. They thump their chest and cry, " We are the Masai !"
"Secondly", he continued, "There are the Pygmy, who live in the dense forest. The Pygmy are 4'6" or 135 cm. They are hunters and very proud tribe. They beat their chest and cry, "We are the Pygmy!"
"And lastly, there are the Fukawi. They are 5'6" tall and live in the lush grassland where the grass grows 6' high. They are also a very proud people who jump up and down, beat their chest and cry ***" Where the Fukawi?"***

The coach of Aussie footballers was traveling through Dublin when the guide announced, "We are now passing the biggest pub in Ireland."
A voice called from the back of the bus..."Why???"

****

Terrence had just returned to Ireland after a holiday in Australia, His family wanted to hear about his trip. Terry told them that Australians were the most hospitable people he had ever met.
They will share their home with you, they will share their grog with you, and they will share every thing" he said. ***It's those white bastards you've got to watch".***

****

Why do Aussies wear shorts?
To keep their brain cool.

----------✂----------

THE AUSTRALIAN HOME BUILT SAILPLANE NEWSLETTER

Address: *3 Magnolia Ave Kings Park Vic 3021 AUSTRALIA.*

Re-Subscribe Application Form.

*I,*_____

*Signed*_____ *Date* _____

*Address*_____

Wish to re-subscribe / not re-subscribe to the A.H.S. for one year. (If you do not wish to re-subscribe could you please forward this form to the above address so we can adjust our records).

If subscribing, please forward this form plus the subscription fee to the above address.

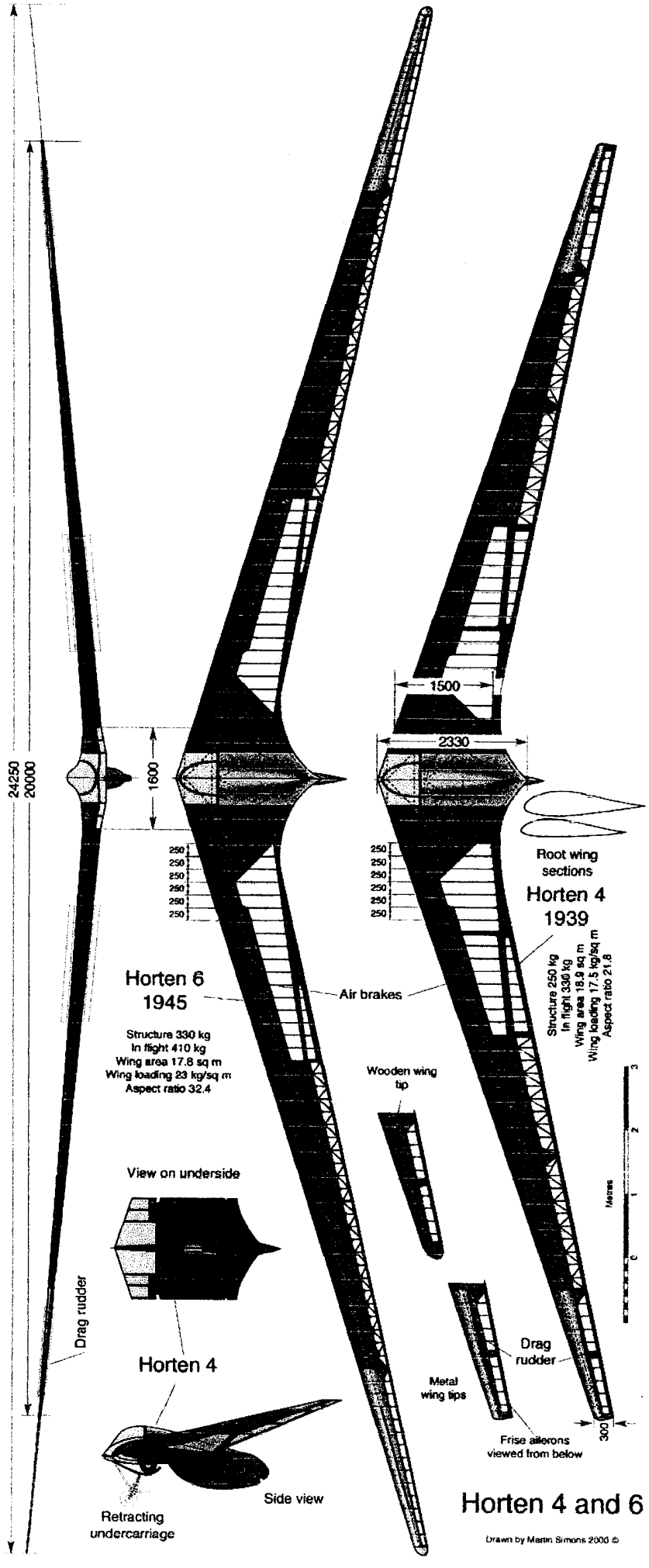
THE SUBSCRIPTION FEE FOR THIS YEAR IS:

A$20(Australian) and A$ 25 (Overseas). Please note: only Australian currency can be accepted.

Thank you for your assistance in keeping our records up to date.

Please Note: This is your final Newsletter unless you re- subscribe.

----------✂----------


24250
20000
1600
250
250
250
250
250
250
Horten 6
1945
Structure 330 kg
In flight 410 kg
Wing area 17.8 sq m
Wing loading 23 kg/sq m
Aspect ratio 32.4
Air brakes
1500
2330
Root wing sections
Horten 4
1939
Structure 250 kg
In flight 330 kg
Wing area 18.9 sq m
Wing loading 17.5 kg/sq m
Aspect ratio 21.8
Wooden wing tip
Metres
0
1
2
3
View on underside
Drag rudder
Horten 4
Side view
Retracting undercarriage
Drag rudder
Metal wing tips
300
Frise ailerons viewed from below
Horten 4 and 6
Drawn by Martin Simons 2000 ©

CLASSIFIEDS

AUSTRALIAN GLIDING MUSEUM.

If you wish to join this project and if you have any question or wish to discuss any aspect of the Proposal or wish to volunteer to assist with any of the Museum's projects, please do not hesitate to contact .

Graeme Barton. 2 Bicton Street. Mount Waverley.Victoria 3140 Australia. Phone: (03) 9802 1098.

Membership AU $ 15 .

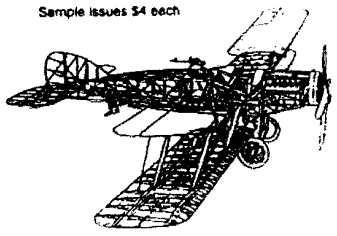
WANTED - Study books and/or plans for gliders. Design Building etc. Contact: John Thirwall, P.O.Box 69, Northbridge 2063 Ph. 02 9958 7311 Fax 02 9958 0350

VINTAGE TIMES
Newsletter of the Vintage Glider of Australia. Editor Tighe Patching. 11 Sunnyside Crescent. Wattle Glen. Victoria 3096. Australia. Annual Subscription: AU $ 15

"SAILPLANE BUILDERS "
Official publication of The Sailplane Builders Association U.S.A. Regular Membership (First Class Mail) US$33. All other countries (surface mail) US$ 32. South America & Central Canada (Air Mail) US$40. Europe (Air Mail) US$45. Pacific Rim & Others (Air Mail) US$50. Make cheque payable to Sailplane Homebuilders Association.
Mail To: Dan Armstrong, Sec/Treas.
21100 Angel Street Tehachapi, CA 93561 USA.

WW1 AERO (1900-1919)
SKYWAYS (1920-1940)
- historical research
- workshop notes
- information on paint/color
- aeroplanes, engines, parts for sale
- your wants and disposals
- information on current projects
- news of museums and airshows
- technical drawings and data
- photographs
- scale modelling material
- news of current publications

Sample issues $4 each



BUILD ONE! A REAL ONE!

Sole distributors for P3V, a computer program to generate a 3-view from a photograph

Published by WORLD WAR 1 Aeroplanes, INC.
15 Crescent Road, Poughkeepsie, NY 12601 USA (845) 473-3679

(Payment may be made directly in Australian Dollars to: Colin R. Owers. Pudman St .Boorowa. NSW 2586, saving Bank charges)

FOR SALE. Plans to build a ¼ SCALE Radio Control "WOODSTOCK". A$ 30,00 including plastic canopy. Contact Colin Collyer. 37 Cleveland Rd. Ashwood. Victoria 3147, Ph. (03) 9807-6462

AIRCARFT PLANS.Homebuilts, gyros,ultralights,fliders etc. For full list send four 50 cents stamps to AIRCRAFT PLANS. RMB-5100 Wangaratta. Vic 3678 AUSTRALIA.

AVIATION and GENERAL ENGINEERING

SAILPLANE MAINTENANCE, REPAIR, MODIFICATION, DESIGN AND MANUFACTURE
PILOT'S SAFETY EQUIPMENT

MIKE BURNS

TOCUMWAL AERODROME AUSTRALIA
BOX 139 TOCUMWAL N.S.W. 2714
Phone/Fax (058) 742914
Phone A/H (058) 742920

"BIRD FLIGHT AS THEIR BASIS OF AVIATION"
By Otto Lilienthal

6" x 9" Quality paper back $US 19.95 + $ 4.95 . S/H (in the USA}

Obtainable from:
Aviation Publishers. American Aeronautical Archives
A world Leader in Aviation Publications
Markowski International Publishers
One Oakglade Circle Hummelstown PA 17036 USA.
Phone (717) 566-0468 Fax (717) 566-6423
Or: E-mail to amaeroarch@aol.com with your Visa or Master Card information, ship-to address, and telephone.

Subscribe to Pacific Flyer

12 Monthly issues. The only magazine to give you all the Ultralight and Homebuilt Aircraft News, Flight Reviews, Building Tips, Personal Interviews and New products
Subscriptions rate:

AU$ 66.00 Australia only (GST and postage included).
AU$ 78 Asia/Pacific only include airmail.
AU$ 99.50 International. Include air mail.
(Please pay in Australian Dollars only)
Send to: **"Pacific Flyer"** P.O.Box 731 Mt Eliza Vic. 3930 Australia
Ph: (03) 9775 2466
Fax (03) 9775 2488
International Fax: 61-3-9775 2488

"Fundamentals of Sailplane Design"
***By Fred Thomas* Published by Judah Milgram**
(301) 422-4626 fax (301) 422-3047
Email: ilgram@cgpp.com

Available from:
The Technical Book Shop, 295 Swanston Street, Melbourne 3000
Ph (03) 9663 3951 Fax (03) 9663 2094
Email: <info@ techbooks.com.au