THE AUSTRALIAN HOMEBUILT SAILPLANE

Editor: James Garay

Volume 9 Issue 34 www.geocities.com/capecanaveral/hangar/3510 **September 2004**

Editorial

G'day mate! It's very satisfying to receive your letters telling me that I am doing a good job being the Editor of this Newsletter. Thank you very much!...and keep those letters coming in.

Happy 80th Birthday Alan Patching!

On the 6th June 2004 Alan and his family held an open house party in their back yard to celebrate Alan's 80th birthday. Almost over 80 guests attended and a bunch of very familiar faces from the gliding fraternity were present to salute Alan.

Malcolm Bennett, Peter Raphael (The Erudite), Peter Champness and myself, where there to express our best wishes to Alan on behalf of the "AHS" members.

Among those present I could see Doug Cole, Caleb White, John Ashford and Jenne Goldsmith ("Vintage Times" Newsletter's editor extraordinary), chatting and having a good time.

Springtime is here in this part of the world, time has passed by so quickly and I can't believe how fast the days are going. Once somebody told me that when this happens it means that you're getting old...I don't believe them...I say time fly's when you're having fun!.

This issue is full of good articles and comments and as usual Peter Raphael (the Erudite, very well known around the world) is presenting to you with flair, some Hint's & Tip's on Catenary Leads. It works, I have one in my workshop and I assure you it's a must have if you are conscious about safety in your workshop.

Dr. Peter Champness continues his article on Mercury Barometer and atmospheric pressure. Mike Burns presents a new concept of self launch sailplane if you enjoy local flying **"TAREE"** is here for you. Also Alan Bradley gives us some insight on how he is enjoying his holiday in Queensland and how he has accumulated many brownie points just looking after the birds. His wife Marilyn is very happy keeping Alan at home in his shed and his glider in the living room.

That's all for now, see you next issue.

James Garay
Editor

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Inside This Issue

MAIL BOX

Dear James,

Please fin enclosed my annual subscription money. I have still got my Carbon Dragon but have not flown it much lately being unable to obtain tows. However I am relocating the glider in the few weeks and hope to start flying again. The other reason I have not flown is I have been busy getting my P.P.L.

I am now a share holder in a Cherokee 180 E. Yes they are noisy but you can go some where in these things.

Back to the Carbon Dragon, it is a pity no more of these gliders are being built as I believe they are the ultimate in Ultralight Gliders even compared to the so called new designs around at the moment. Jim Maupin got it right first time sure it takes around 2000 hours to build from the plans but I believe it is worth while.

Unfortunately there are no more plans for sale but if any one wants one I am sure they could be obtained as hundred were produced. Keep up the good work James and your crew. I hope to drop in one day. Regards, Graham Betts.

Dear James,

Sorry for being late with my subscription. As I have a chat with you on the telephone; there are only a couple of things at which I am getting better as I get older:
-My ability to forget
-My skill at procrastination.
-Keep it up.

P.S. I will be away for the next 3 months building up a reserve in brownie points. I hope I will need them when I return. My WOODY is coming together nicely now.. Controls have been fitted to the wings and I had the pushrods welded yesterday. Soon I hope to join the wings together for the first time. This will enable me to check the amount of reaming necessary to get the wing alignment correct and have the main pins machined while I am away. Alan Bradley

Hello James,

On hand your info, thanks you, enclosed find my money order to cover my subscription.
As I like to start building my own glider, could you suggest one not to complicated.
As in regard of your article page 7 no one will give his opinion, my pet have a good nature being a German Shepard, also a large garage and a lot of tools and time.
Awaiting your reply, yours sincerely. Rene Jollin.

Hello James,

Thanks for the issue 33, and I was really interested for all his content and in particular for the article by Mike Sadlin on his ultralight glider "The Goat". It reminds me of my first training in France back in 1936 with the Aero Club of Haute Moselle, it was a project of the Government.

The Club had all wood gliders supplied by AVIA. Also many home built by the club AVIA-11 training and AVIA --11A enclosed and AVIA -40 high performance that look like The Libelle.

I nearly was killed in an AVIA-11 for non observing the rules. It was my fault. So when I saw the picture in the newsletter I said to myself. "It will be fine to use it as sight seeing in the fresh air" (Good for Queensland).

Less time to build it, easy to carry, low cost etc.
The drawing is available from the web, but how?
I will be glad to contact Mike Sadlin. Can you help?
It was nice to talk to you on the phone. Regards R.Jollin.

Dear James,

Thanks for the reminder! I was enjoying Queensland weather when I received the last newsletter, and then promptly forgot to renew my subscription when I returned home.

I am not sure that building a full size machine will become a priority for a while, as going solo gaining A, B and C certificates is more important at the moment.

Training in Bob King's Jabiru powered SF 25 B Motor Falke (HNO) has given me an insight into the practicalities of owning a powered glider in Tasmania.. With both small club membership and small thermals, self launching and the ability to return to the airstrip seems to be a most desirable situation.

Colin Collyer may be interested to hear that I have begun construction of a scratch built, 1/5 scale version of HNO. It is intended to be electric powered as there are plenty of suitable motors available these days.

I enjoy the read, and have applied some ideas to model building. Regards. Dennis Phillips. Tasmania.

Dear James,

Sorry for the delay in getting the sub to you. I had a lot on my plate after loosing my co-pilot of 40 years plus. As you can image it takes a bit of getting used to. That's life and I miss her very much. Doug Cole.
Eds. Note.
Doug. On behalf of the all AHS members please accept our sincere sympathy on the passing away of your wife.

Dear James,

On hands the last issue of the AHS Newsletter and I thank you for it. So. I will follow your advice on building the Woodstock as few builders in Australia, including your self have the best knowledge and can give good advice, if needed.

Now. Where can I get the plans? Including the building of the jig for the fuselage and the wings and list of material. Awaiting your information. Yours truly, Rene Jollin.

The Mercury Barometer and the Nature of the Atmosphere

By Peter Champness

In the last newsletter I discussed the Mercury Barometer as a device for measuring the absolute atmospheric pressure. The Mercury Barometer is not only very accurate. It has no mechanical moving parts and is immune from mechanical errors and fluctuations do to friction or variations in temperature.

The development of the Mercury Barometer was not well explained and has an interesting history during the renaissance period of European Science. The Torricelli Tube as it was first known was the first successful attempt to create a physical vacuum. Initial investigations of the Torricelli tube involved the nature and properties of the vacuum at the top of the tube. Further studies however shifted attention to the nature of the atmospheric gases acting on the lower end of the mercury column.

Experiments with vacuum pumps revealed not only the dependence of living creatures on the air we breathe but also the mixture of gases which form the atmosphere. Investigations with vacuum pumps also gave rise to the gas laws which describe the relationships between pressure, volume and temperature and the nature of air resistance. Understanding of the atmosphere and experiments with fluids (which include gases) gave rise to flying machines and ultimately to gliders, which we enjoy today.

Philosophers had argued for thousands of years about the nature of a vacuum and whether a vacuum could exist as a physical reality. Aristotle maintained that 'Nature abhors a vacuum'. By this he meant that it was in the nature of things that matter will always move to fill in an empty space. Because he thought that this was a fundamental property of matter he thought that a vacuum could not exist.

What however would happen if all the matter within an enclosed space could be pumped out? Devices for pumping water existed on ships and on farms. It had been noticed during attempts to pump water from wells and from mines that there seemed to be limit to the height that water could be raised using a suction pump (or a siphon). In 1638 Galileo wrote that he had a problem trying to pump water from a well when the level had fallen too low: *"When I first noticed this phenomenon I thought that the machine was out of order; but the workman whom I called to repair it told me the defect was not in the pump but in the water which had fallen too low to be raised though such a height; and he added that it was not possible, either by a pump or by any other machine working on the principle of attraction, to lift water a hair's breadth above 18 cubits; whether the pump be large or small this is the extreme limit of the lift".*

Clearly there was something unsatisfactory about the Aristotle concept that a vacuum could not exist because nature abhors it. Why should nature's abhorrence extend to 18 cubits and no further?

The puzzle of the water pumps was solved in 1643 by Evangelista Torricelli. Torricelli worked as Galileo's secretary for two years from 1641 to 1642 and succeeded him as the court mathematician to the Grand Duke of Tuscany. Torricelli took a glass tube, about a metre in length and sealed at one end by the glass blower, and filled it to the top with mercury. Mercury is a liquid metal, 14 times more dense than water and the densest of all liquids. Holding his finger over the end to stop the mercury from spilling out he inverted the tube and placed it in a bowl of mercury. When he removed his finger the mercury dropped down the tube, but not all the way to the bottom. A column of mercury remained in the tube about 76 cm in height leaving a space at the top!

What did the space at the top contain? No air could get in. If the tube was lowered into a deeper vase of mercury the space at the top would disappear if the height of the top of the tube was less than 76 cm above the surface of the mercury. It seemed that Torricelli had created the first sustained physical vacuum.

The height of the mercury column in Torricelli's experiment is equivalent to the height to which water can be raised by suction. Mercury is 14 times heavier than water and hence the height is $1/14^{th}$ as great, 76cm compared to 10.5 metres (18 cubits). A water barometer could be constructed but it would need to be about 11 metres in height which is inconveniently large.

In 1644 Torricelli wrote to a friend about his experiment: *"Many people have said that it is impossible to create a vacuum; others think it must be possible, but only with difficulty, and after overcoming some natural resistance. I don't know whether anyone maintains that it can be done easily, without having to overcome any natural resistance. My argument has been the following: If there is somebody who finds an obvious reason for the resistance against the production of a vacuum, then it doesn't make sense to make the vacuum the cause of these effects. They obviously must depend on external circumstances.....We exist on the bottom of an ocean of air; beyond doubt that air does possess weight. In fact, on the surface of the Earth, air weighs about four hundred times less than water.... The argument that the weight of air as determined by Galileo is correct for the altitudes commonly inhabited by man and animals, but not high above the mountain peaks; up there, air is extremely pure and much lighter than the four hundredth part of the weight of water".*

Torricelli may have continued with this concept and proven that the pressure of air depended on the weight of the air above the surface of the earth. However he did not. Apart from the fact that he had other areas of scientific interest, such as the mechanics of projectile motion and the flow of liquids through small openings he was inhibited in expressing his ideas about the vacuum by the fact that he lived in Italy at a time when it was controlled by very powerful Popes. Galileo had been tried by the Inquisition and forced to recant his theories of Cosmology on threat of torture and death. He was sentenced to jail which was commuted to house arrest by the intervention of his mentor (Cardinal Bellamine). The church at this time had adopted the philosophy of Aristotle as official dogma. Aristotle maintained that a vacuum could not exist! Therefore it was unwise to make extravagant claims about

creating a vacuum in your own laboratory.

Torricelli's experiment however quickly became known to other scientists in Europe who conducted further experiments to demonstrate the vacuum and it properties. One of these was Robert Boyle in England. Boyle used vacuum pumps constructed by Robert Hooke to evacuate air from large glass jars. He found that mice or birds placed in the jar would lose consciousness as the jar was emptied of air and die if the vacuum was increased. He also demonstrated that the height of the mercury column in the Torricelli tube was due to air pressure rather than a mysterious suction force produced by the vacuum. An Aristotelian theory at the time was that the mercury was supported by an invisible rope like structure called a funiculus (Latin funis, for rope) which pulled on the mercury, preventing it from falling to the bottom. Boyle demonstrated the superiority of the air pressure theory by successfully predicting the height of the mercury column when the air pressure was changed to various values. He formulated Boyle's law of gases which states that the pressure exerted by a gas is inversely proportional to its volume.

A spectacular experiment demonstrating the enormous force exerted by air pressure acting on a large surface was conducted by Otto von Guerike in the German city of Magdeburg. Von Guerike constructed two large hemispheres of bronze which fitted closely together to form a sphere with a good seal. At a public display in the city square the hemispheres were placed together and the air inside evacuated using the city fire pumps. After much pumping von Guerike announced that he had created a vacuum. Furthermore he claimed that far from abhorring the vacuum nature would vigorously defend the vacuum! To prove the point a team of eight horses was harnessed to each of the hemispheres and then driven off in opposite directions. Despite repeated attempts, the horses were unable to separate the spheres. When the valve was opened, and the air readmitted, the hemispheres were easily parted.

The Torricelli theory that air pressure is due to the weight of air in the atmosphere was taken up by Blaise Pascal, a French polymath who developed the beginnings of probability theory as well as constructing a calculating machine and devising new theorems in mathematics and geometry. Pascal planned an experiment to demonstrate this theory by taking a Torricelli barometer to the top of a mountain and comparing the pressure at the bottom and the top.

He wrote to his brother-in-law Florin Perier asking him to compare the mercury level in the Torricelli tube at the bottom and the top of a local mountain: *"if it happens that the height of the quicksilver(mercury) is less at the top than at the base of the mountain (as I have reason to believe it is, although all who have studied the matter are of the opposite opinion) it follows of necessity that the weight and the pressure of the air is the sole cause of this suspension of the quicksilver, and not the abhorrence of the vacuum: for it is quite certain that there is much more air that presses on the foot of the mountain than at its summit".*

After a delay of a few weeks due to bad weather Perier gathered his team in the convent garden in the town of Clermont on the 9 September 1648. Two Torricelli tubes were prepared. Local observers verified that the readings of the two tubes were the same. One tube was then left in the supervision of the priest whilst Perier and his team headed for the summit of Mount Puy-de-Dome in Auvergne, 1465 metres above sea level. Readings were taken on the way up, at the summit and on the way down. When the team reached the bottom the two tubes were compared and the levels were again the same. The difference in the height of the mercury column between the bottom and the top of the mountain was 8.25cm. The difference was so large that they were inspired to repeat the experiment at a more modest height. The tube was taken to the top of the dome of the Notre Dame Cathedral in Clermont, a height of 39 metres. This time the difference in height of the mercury was 4.9mm, a small but measurable difference.

It was noticed also that the height of the mercury column was not constant at sea level but varied over time with changes of the weather.

On my own barometer at home I have observed over the past few weeks a maximum height of 77.5cm (during a period of high atmospheric pressure) and a minimum height of 74.8mm (low). The difference is just over 2.8cm which is quite a large variation and corresponds with a change in altitude of about 300 metres (1000 ft) at constant atmospheric pressure.

The phenomenon of air resistance is readily apparent to anyone who stands in a strong wind. The retarding effect of air resistance was first described by Galileo who was studying the nature of falling bodies due to Gravity. Galileo was said to have conducted public demonstrations of his theories of falling objects by dropping stones and other objects from the Leaning Tower of Pisa . Galileo noted that objects moved faster and faster as they fell to earth. He also noted that large/ heavy objects fell at the same speed as lighter ones. This was a new idea at the time. It was previously held that the heavy object fell down faster because its weight was greater.

When Galileo dropped a feather and a rock at the same time however the rock fell faster. Galileo held the view that they ought to fall at the same speed but the feather was retarded by the resistance of the air. This idea could not be checked at the time because the nature of gases and the atmosphere was not well understood.

Later development of more efficient vacuum pumps allowed the theory to be checked. In 1717 a French scientist named Desaguliers demonstrated the theory at a meeting the Royal Society in London. He created a glass tube about 7ft high from which he pumped most of the air. A piece of paper and a Guinea coin were dropped inside the tube and it was found that the paper fell with very nearly the same velocity as the coin. It was concluded that if it had been possible to exclude all the air from tube there would have been no difference in the time of fall. Desaguliers' tube was constructed of four separate pieces of glass sealed at the junctions with paper and oil. Apart from the inefficiency of the vacuum pump there must also have been leaks at the joins.

This experiment was one of the first conducted by the Astronauts when they landed on the moon. Those who watched Aldrin and Armstrong on television in 1968 may recall seeing them drop a small stone and a feather from shoulder height. Because the moons gravity is only $1/10^{th}$ that

of earth, the rock and the feather fell more slowly than we are used to on earth. Both touched the ground at the same time.

Notes:
Cubit: A unit of length used by the ancient Egyptians. It corresponds to the distance from the elbow to the tips of the fingers with the arm held at a right angle. The length of a cubit varies depending on the person but is about 58cm. In the book of Genesis Noah's Ark was said to be 300 cubits long and 50 cubits wide.

Mercury: a metal which is liquid at ordinary temperatures. It is a good conductor of electricity. It is also quite toxic. Mercury poisoning causes severe degenerative neurological disease which is irreversible. The disease is called Minimata disease after a small Japanese village where many of the population were affected by industrial pollution of their river.

Guinea coin: A British gold coin with a value of 21 shillings (One pound, one shilling). Until recently it was common for Doctors and Lawyers to state their fees in Guineas. The term is still used in horse racing (Guinea Stakes).

Plagiarism: Copying large amounts of material from other sources without acknowledgement. Plagiarism is now considered a very bad thing to do. I acknowledge that I have copied quite a lot of the material in this article from the second chapter of reference 1. For those who are interested it is quite a good read. John Barrow follows the challenge of zero, nothing, the vacuum, the void and creation from nothing in mathematics, philosophy, science art and literature. He finds many interesting paradoxes and his quest goes all the way from ancient philosophy to modern cosmology including Einstein's theories and beyond.

References:

1. The book of Nothing. John D. Barrow, Vintage (Random House) 2001
2. The History of Science Museum. Florence Italy
3. A History of the Sciences. Stephen F. Mason. Macmillan, 1962
4. 100 Great Lives. Sun Books 1969.

WHAT'S NEW!

BORDERTOWN 2005.

Again, next January 8th to 15th we are joining ours cousins VGA for the Summer camp at Bordertown.
The organizers expect to provide facilities such as:

- Camping and bunkhouse.
- Meals catered for.
- Winch will be available.
- Aerotow may be available.

Keep the date in your diary. More information is expected by the next issue of AHS.

TAREE - Self launch sailplane

By Mike Burns

When the late Jim Maupin designed his "WOODSTOCK" glider he followed in the footsteps of many people who have pursued the concept of small, light, low cost sailplanes. He set four main goals by which the WOODSTOCK design was guided:

(1) Use the least expensive materials, adequate for each part of the sailplane.
(2) Use as little of those materials as possible.
(3) Keep it simple and light.
(4) Exploit fully the use of common parts.

"TAREE" Is an effort to continue that line of thought and concept into a simple, low weight, low cost Self Launch Sailplane.

"TAREE" IT'S PURPOSE.

The **"Taree"** has a simple purpose " To provide low cost simple access to self launching for those who wish to thermal and wave fly independent of aero tow and wire launching".

"TAREE" THE COMPROMISES

To achieve its purpose there have to be compromises:

(1) Performance
As a pure sailplane, engine off, it has a best glide ratio of 28:1 combining with a minimum speed under 35 knots to provide good thermalling capability, losing out on cross country performance.

(2) Structure
To avoid high design, development and tooling costs wood is the primary structural material, combining with fabric and some composites to net the lowest weight airframe. This is at the expense of not achieving laminar flow aerodynamics.

(3) Power
The low weight structure allows the use of a small, simple 2 stroke motor which will help to achieve low operating and launching costs. The developed power will provide performance adequate for safe operation and certification, no excess.

"TAREE" - WHO IS IT FOR?

If you want 40:1 glide, 750 km capability, high performance competition and so on, the ***"TAREE" is not for you!.***

If you enjoy local soaring, up to 300 km tasks, exploring wave and other atmospheric conditions and perhaps Sport Class competition, then that is what ***"TAREE" is all about.***

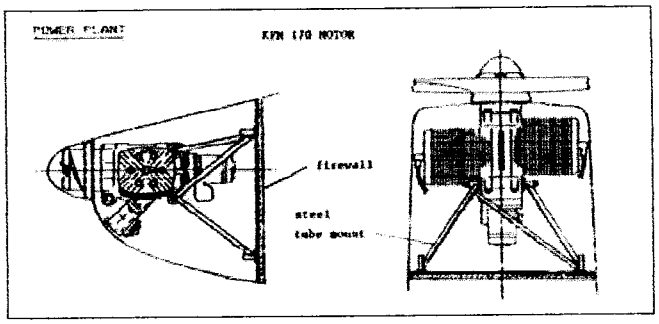
Suitable for the homebuilder in drawings or kit form, and both private owners and clubs when purchased complete.
"TAREE" IT'S CONSTRUCTION.

Construction is "classic" timber technology combining with modern glues, fabrics, finishes and composites.

Questions of fatigue, maintenance, repair ability, systems access, serviceability, are all catered for by careful detail design based on the accumulated experience of the gliding movement. The aim being to produce a product with a 40 year life at minimum on going cost.

As much Australian material as possible is used in the structure and systems, ultimately an Australian engine will also be able to be installed.

POWER PLANT. KFM 170 motor.



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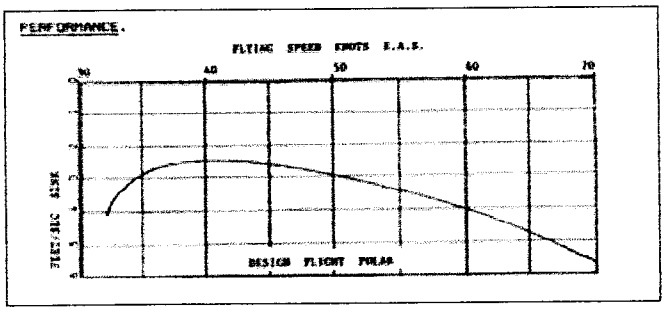

NEWS FROM SWEDEN

By Nils-Ake Sandberg.

TMG=Touring Motor Glider.
SLG= Self Launching Glider.
SSG=Self Sustaining Glider.

The SSG Blanik L-13 in Hoganas in the South of Sweden was test flown with two jet engines on top of it. It did not take off the ground by it's own power, but was aero towed in September 2003. Some more people are about to fit jets on their gliders too. There are pictures on WWW.segelflyget.se on Archive (Archive) for 2003.

The jet engine used so far are for launching model planes and give only about 150 Newton in trust. They seems to cost around 22.000 Sir. Each (1AU$=5.5Skr)
There are lots of them around the globe and a lot of people who try to do progress with them.
The engine used in the Caproni by Mike Burns from AVIATION and GENERAL ENGINEERING. Australia, definitely have a market. Those model jets are made for radio control and have to be modified for use in sailplanes.

The enthusiasm in Hoganas is overwhelming and a lift for soaring in Sweden. Advanced model pilots have used jets for many years.

My early memory from jet is very small one, powering an 'A 32 Lansen model kit plane. These model was flying excellent and so did the original in our air force.

It was a complicated 2 tablet engine, kept in the container by a net disc. It was fired by a string you just set to fire. When the tablets were burning, the thrust was coming from a small hole about 2 m/m in diameter. The trust was like 50 grams and the nozzle were made like a snap on device. It really was a small jet who got very hot, so you have to do some covering by aluminium foil so the model won't burn up. These was in the 60th.

Many years later I visited Gavl where some people built a pressure jet powered by butane gas, entering in liquid faze. It gave a thrust of around 200 Newtons but was never used for launching gliders. They wanted take off from the ground, so they were disappointed.

Mr. J.Biggs is asking for opinions about Blowfly in June issue. Using my aerodynamic program on the data, I got an L/D of 20 ay 90 km/h.
I think it is a great idea to use JAR-22 instead and make a little better L/D. around 35 would be nice. This is of course a motor glider pilots opinion I use it for cross country with stopped engine. The Grob G 109B has L/D 28 and SF-25C L/D 24 just for comparison. Why not UL rules? That rule makes the aircraft too weak due to a low weight.

Folding propeller means less rpm then 3000 and 3 blades means more job than a 2 blades. But it is a good idea, with higher L/D it is a more wanted issue.

The study of sketches and aerodynamic calculations will be the first step and most projects will seem a little different after that step. Important step to minimize the work at building step. Overall it is a good start

BOOK REVIEW

By Martin Simons,

Segelflugzeug-Geschichten, Die Gleit-und Segelflugzeuge des Deiutschen Segelflugmuseums (Sailplane Stories, the gliders and sailplanes of the German Sailflying museum)
by Peter F Selinger

The sport of soaring began in Germany in 1920, when a competition was held on the Wasserkuppe. After 1918 Germany was forbidden by the Versailles Peace Treaty to build or fly aeroplanes. The hateful rules would not be broken if a few enthusiasts built and flew gliders. In the eyes of the legal bureaucrats these were not aeroplanes

The Wasserkuppe was not a perfect site. This dome shaped, mountain about 20 km east of Fulda in the High Rhon, rises 950 metres above sea level, may be snow-bound in winter and likely, even in summer, to suffer from *Knofe*, as the local pilots called it: Low cloud and rain for days on end. The site had been used by an energetic group of Darmstadt schoolboys who designed, built and flew a series of successful gliders before 1914. It seemed appropriate to start again here. At first the aspiring pilots and engineers lived in hastily assembled wooden shelters. During the inter-war decades this became

the place where many of the great German aircraft designers and pilots began their careers. There is still an active gliding and soaring operation there, now with hangars, club rooms, hotels, cafes and souvenir shops.

The development of the sport is remembered and displayed in an outstanding museum. A large extension, more than doubling the space previously available, is being built. It will be possible next year to display fifty one full-sized, historically important sailplanes. Space will also be available for model aircraft.

Peter Selinger is already well known for his outstanding sailplane photography and several earlier important books, on Schempp Hirth, Schleicher and the Hortens, for example, in this new work he describes, and illustrates with well chosen photographs, each of the types represented in the museum. (Some of them remain in storage until the new exhibition hall is opened.) The book is much more than a catalogue. The background of each design is explained in detail, beginning with the Lilienthal hang gliders of 1891 and 96, continuing with the Darmstadt boys 1912 record breaking *FSVX* and Willy Pelzner's hang gliders of 1920 - 2.

The Hannover *Vampyr* was the first true sailplane. It made flights of more than an hour in 1922, and on the next day exceeded three hours. The museum *Vampyr* is not the original (which remains in greatly reconstructed form in the Deutsches Museum in Munich). The Wasserkuppe replica was built with meticulous attention to accuracy after extensive research.

Most of the other exhibits are originals, which were airworthy and in use until, one way and another, usually by donation, they found their way to the Museum. Only when no original could be found, were new copies built from surviving plans. Full credit is given in the book to those who did the immense work. For instance, the *Rhonadler* was built by Klaus Heyn, vice chairman of the museum's governing board, in the attic of his home. A hole had to be made in his roof to get it out. Heyn was also responsible for the *Musterle*, the FS 3 *Besenstiel* and the Grunau 9 *Schadelspalter (Skulsplitter)* primary glider. He rescued the *Falke* from a Swiss mountain ski lift shelter, and restored it. The *Hols der Teufel* was built and flown by Mike Beach in England, the aerobatic *Habicht* by the Wasserkuppe's own Old Timer group.

Moving forward, the exhibits described include some of the earliest 'laminar flow' sailplanes, such as the *HKS-1* of 1953 and Rudolf Kaiser's *Ka* 6. Also included are sailplanes produced in the old East Germany, the Lom 58/11 *Laminar* and the two seat *Lehrmeister*.

The arrival, in the late 'fifties of fibre-reinforced plastic sailplanes is recognised with the most graceful *Phonix* of Herman Nagele and Richard Eppler, the Schleicher *ASW 12, the* Braunschweig Akaflieg's *SB- 8* and, the youngest exhibit in the museum, the Lemke Schneider *LS -1*

Selinger's book concludes with chapters on the development of motor sailplanes and a look to the future. Here are photographs of some of the newest sailplanes and champion pilots. The sailplane parachute rescue system is shown in action.

Finally there is a list of thirteen soaring flights exceeding 2000 km distance, mostly by Klaus Ohlmann in Argentina, and a chart comparing world records in 2003 with those from 1967.

Any sailplane pilot, model flier or aviation enthusiast should visit the Wasserkuppe
Museum if possible, and will be able to buy Selinger's book there for less than $20. It will cost twice as much by surface mail, but well worth this price. The text is of course in German but not difficult or technical, and the photographs speak for themselves.

Published April 2004 under the auspices of the Deutschen Segelflugmuseum mit Modellflug, Chairman Theo Rack.
(ISBN 3-00-0116494 *Hardback, 180 pages, 230 x 240 mm, German language, Photographs: 246 black and white and 30 coloured. Bibliography.*
Order from Stiftung Deutsches Segelflugmuseum mit Modellflug,
Wasserkuppe 2
D - 36129 Gersfeld/Rhon
Germany. Price 20 Euros by surface mail, I0 E in the Museum shop.)

HINTS & TIPS

Catenary Lead

Eds note:
Here's another good idea from the files of the **Erudite.** *(Famous around the world).*

Not long after setting up the Woody wings on the long table I tired of moving electrical leads back and forth to perform routing, drilling and other operations requiring the use of mains power.

The idea presented to install a catenary wire the length of the shed, this is simply a suspended electrical lead, above head height, running on slides. After this it was always easy to position the power outlet anywhere along the length of the work area as required.

Installation is a relatively simple operation involving a length of fencing or clotheline wire and a few plastic rings. Simply stretch a wire the length of the workshop at a safe height above your head using a couple of eyebolts and a turnbuckle for tensioning. In my case, as slides, I used rings cut from some 40mm conduit and attached the loops of cord to these with cable ties. Scout the Hardware shelves, you may find something suitable in plastic curtain rings or plastic chains links that will also be suitable.

Long extension cords are readily available from most hardware and department stores, economically priced, and most suitable to the task. In place of the standard socket on one end, a purpose made pendant fitting is a better idea.

These are obtainable from electrical suppliers and are fitted with a power switch and hanging hook in order to take the strain off the cord. Also usually incorporated on the fitting is a thread that can be mated with a shroud on the plug to prevent

the appliance dropping out. Allow about 1 ring per metre, more or less, dependent upon the headroom you have available, then attach the cable to the rings with cable ties so it forms in coils when bunched up at one end.

How your cord gets back to a source of power is up to you , but keep things safe and route any lead to avoid the possibility of it sustaining damage. If possible incorporate a Residual Current Device, always a good idea in a workshop where the possibility of lead damage or tool failure is always high. Give the catenaries lead some thought. You will wonder how you got along without one.
By the way, our illustrious Editor saw my set up and now he has one in his workshop.

IT IS ALL ABOUT STRENGTH TO WEIGHT
By R.S Hoover.

Eds note. *This article has been taken from the Internet Newsgroup. R.S Hoover, aka Veedubber, is a prolific contributor to the rec.aviation.homebuilding newsgroup. His writing area well respected source of information on aviation related matters and are always worthy of reading.*

Feathers aren't very strong. But then, birds aren't very heavy.

Fabric is stronger than feathers, except for the quill. Even cotton fabric. Or resin-coated paper. And wood makes pretty good quill-stuff. Or even grass. Bamboo is grass.

One of the tricky bits is carrying the load around a corner. Loads concentrate at corners. As they go around the corner the load often twists, converting simple bending moment calculations involving compression and tension into load-paths so complex we're forced to kneel at the alter of Delta Vee and work them out one prayer at a time.

Ultimately it comes down to the Fastener, the way we attach the vanes of the feather to the quill and the quill to the wing and the wing to the body of the bird.

Aluminum alloy scores high for practicality, being as strong as mild steel but only one-third the weight. To carry the load around the corner you simply bend the aluminum, trapping the load inside. To transfer the load you bend it again, poke a hole through it, plug the hole with an aluminum pin and hammer it tight, the number of pins determined by the load. (Hint: See 'Riveting 101')

But wood scores highest for practicality because it is universally available and less expensive than metal or fiberglass or foam or castaway string bikinis.
(ANYTHING can be made to fly.)

To turn a wooden corner we use gussets. And our fastener is usually glue.

All modern glues used in aircraft construction are stronger than the light, strong softwoods normally used for aircraft construction. Rather than telling
us how many fasteners to use, with wood the load tells us how much surface area we must slather with glue. This is when we learn that a quarter-inch square is not a quarter of a square inch but only a sixteenth. With a butt joint only a sixteenth of an inch square even the strongest glue fails when the load tries to turn the corner. That's where the gusset comes in because a gusset allows us to multiply the area of the glue joint by a factor of at least 10. If the load is very large we add blocks at the corners, increasing the glue area still further and shortening the path the load must follow as it navigates the turn.
The strongest corners are formed with glue blocks AND gussets, allowing us to multiply the gluing surface to WHATEVER is required to produce a safe joint.

Of course, that makes them heavier. Such belt & suspenders methods are only used when know the extra weight is justified by the need for additional
Strength.

THE NATURAL ORDER OF THINGS

There is a natural order to the universe, such as the need to sow before you can reap, and in the universal constants of gravity, motion and so forth. Long before there were things as science or engineering there were Natural Philosophers, fellows who studied the natural order of things and tried to understand them. That's not allowed today. Today, birds fly strictly in accordance with scientific principles and bumble-bees are forced to walk :-)

But the natural order of things continues to exist. Just as there is a natural order to the planting of crops or the erection of a house, so too is there a natural order to building a airplanes.

Plywood is the most commonly used shear-web material found in wooden airplanes.
It is also the most commonly used gusset material. In the natural order of building wooden airplanes, gussets are made from the residue of plywood left over from paneling operations, such as building the sides of the fuselage or making a built-up wing spar.

In the natural order of wooden aircraft construction you begin with a large plank of suitable wood and cut it to create your spar caps and longerons and stringers. In this way the largest and longest pieces are created first and the smallest pieces of wood, typically those used to make ribs, are made from the residue of the earlier cuttings.

In the natural order of wooden aircraft construction the fabrication of the ribs is not addressed as a task in isolation. Fabrication of ribs is a minor event incidental to the construction of the airplane as a whole. During
fabrication of the spars, tail feathers and fuselage, when you find yourself with a few spare minutes, you make a rib. Or add gussets to one already made.
Or sand a rib. Or varnish it. No matter how many ribs are required, you will have finished them long before you are ready to assemble the wings and at the expenditure of no time at all since the effort has been distributed across all the other chores.

The small sticks used in the typical rib give it an airy, fragile appearance. In fact, when properly assembled, that fragile looking rib is overly strong by a factor of two or even three. Which is another way of saying an airy rib could be airier; that it is over-built and too heavy because of it. But so long as ribs must be assembled by humans with sausage-sized fingers

we must accept quarter-inch sticks as the smallest practical size for ribs. In effect, we humans are the limiting factor when it comes to optimized ribs. This is a reflection of the Practical Factors versus those which are possible.
Frankly, the extra mass is no big deal. The typical light airplane has only two dozen ribs or so and the difference between optimal and practical is usually less than a pound even in an airframe that may gross out at half a ton or more.

The Practical Factors are why the gussets used on most airplane's ribs are overly thick and far heavier than needed. That's because gussets are free, the by-product of earlier steps in the construction.

If the builder has plenty of money they may opt for a sheet of ply specifically for their gussets but common sense usually prevails, especially after they run the numbers and see that they've just spent forty dollars to save three ounces.
Twenty dollars a pound, we can live with. Two hundred dollars, we can't.

THE UNIVERSAL GUSSET

If you wish to save both weight and money on your gussets stop thinking of plywood and look elsewhere. Indeed, gussets and corner blocks represent a crude solution to the problem of carrying a load around a corner. The only reason we are still sawing out corner blocks and nailing down gussets is because that's how de Havilland did it in 1916.

Nowadays we have fiberglass. And staplers. And urethane glue.

Need a quick gusset? Saturate some fiberglass with glue and wrap it around the parts to be gusseted.

Messy, eh?

Try this: start with a pallet of some sort; cardboard or plywood. Lay a piece of plastic food wrap over the pallet and put your fiberglass on that. Now saturate it with glue and put the thing in place by handling the plastic wrap.

Not so messy, eh?

Urethane glue expands as it cures so it's customary to install a clamp or apply some weight to the sandwich until the glue has cured. In many cases you can leave the cardboard pallet in place and simply staple it down, driving the staples THROUGH the cardboard. Or put a weight on it. Or sandwich it between scraps of metal or ply and clamp it with clothes pins.

Fiberglas is too expensive! (I heard someone say.) They're probably thinking of fiberglass fabric, which is rather dear if ordered from an aircraft supplier.
Local suppliers of fiberglass typically charge about half the amount asked by aircraft suppliers. (San Diego, CA.) Fiberglas tape is very handy for gusseting chores since the woven edge keeps it from unraveling. (But beware!
Tapes are typically woven from six to eight ounce fabric; fine for gussets on a fuselage but much too heavy for those on a rib.)

If you want some lightweight fiberglas you can find it at any lumber yard.
They call it Drywall Joint Tape. It comes in rolls, typically two inches wide by whatever length they happen to sell. Locally I can buy it in rolls as small as one hundred feet or as long as the market will bear. Professional drywall installers use rolls holding 500 feet and more. Cost is usually less than two cents per foot, dropping to about a penny per foot for the largest, commercial-grade rolls.

Most look at the eighth-inch mesh of drywall tape and turn up their nose. You can't make a cowling out of stuff like that nor cover the wings of a KR or Notsoeze. But it does a fine job at making gussets.

How? By folding it over or layering it until you have sufficient strands to give you the strength you need.

Glass fiber is stronger than steel. You can prove this for yourself by cutting a piece of drywall tape about a foot long then peeling off ONE STRAND of the stuff. Use a surgeon's knot to tie one end to a dowel or other bobbin of significant radius and the other end to the handle of a bucket. Then add weight to the bucket until the strand breaks. Now go weigh the bucket. Do that eight or ten times and average the result, you'll know how strong the stuff is. But doing it just ONCE should give you a good idea as to its usefulness.
How strong of a gusset do you need? (Be careful here; remember, your ribs were already twice as strong as needed.) You really don't need the strength of eighht-inch birch ply for a rib gusset. Nor even that of sixteenth inch in most cases. We only use those sizes because of the Practical Factors.

Making small ribs, such as for the Practice Wing? Then try two layers of drywall tape. As a matter of fact, before using this stuff you will have to learn how, and while you're doing so, go ahead and make up several different layers of fiberglass.

Remember that mention of the Natural Order of things? There is a natural rule for gusset strength too. Make a sample T-joint, allow it to cure, then break it. The sticks should ALWAYS break first. If your drywall gusset tore or came loose, try it again with an additional layer of fiberglass.

Why glue instead of resin? I think the proper question is. Why NOT glue instead of resin? We don't need the added strength of epoxy or vinyl ester resin; the weakest component in the structure is the WOOD and all modern glues are stronger than wood. Besides, the glue is right there, ready to go. In fact, urethane glue appears to be better for this type of thing than does resin because the glue expands as it cures. One it has cured you trim away any excess and are left with cellular type of structure that is much lighter than a solid chunk of resin.

(If / When... Santa arrives with a digital camera, photos of this method will be posted in the Practice Wing file in the 'files' archive of the Fly5kFiles mailing list over on Yahoo.)

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Flying is all about strength to weight. Says so, right there in all the books.

But in modern-day America flying has become more about MONEY than anything else. Fiberglas gussets are universally available and inexpensive. They aren't in any of the books, of course. And never found at those wonderful seminars. Alas, the guys who are trying to keep grassroots aviation alive in America often can't afford either the books or the seminars. But they still fly, usually behind converted car engines and sometimes with a bit of dry walling on their ribs, not because of all the books or those expensive seminars but in spite of them.

R.S.Hoover
PS - If you think the 'Practice Wing' project is only about wood, it's not.
But the wooden wing comes first because it is the least expensive and its materials are universally available. Once it's finished I'll show you how to
do the same thing using aluminum but I will assume that you've already completed the practice wing in wood. This is because of that natural order business. About 85% of what you need to know to build a wing is COMMON to ALL wings, the only things that change are the materials and the methods.

SHOP TALK

More Bradley Ramblings

By Alan Bradley

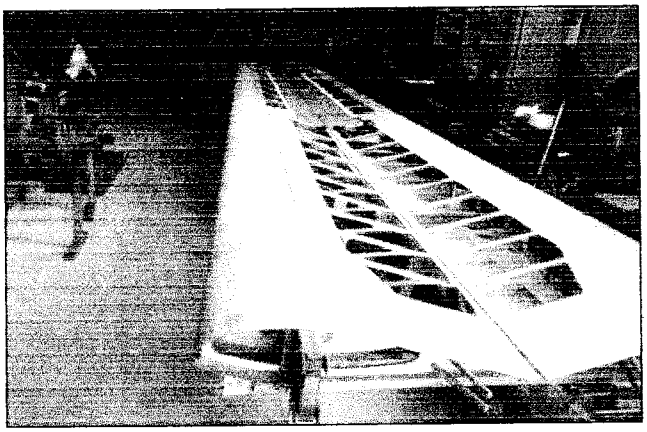
Ed's Note:
Beside been a home built glider constructor, Alan is a qualified Ornithologist.(B/Sc. Biology) very well known around the world for his work studying the behavior and habitat of birds.

Its now 4 weeks since Marilyn and I moved North for our annual review of the lifestyles of the Australian Queenslanders. We have settled in a caravan park at Maroochydore for the second successive year to continue our study of the local birdlife. Marilyn loves to go to the hinterland to watch the "parrot" species. My main interest is in the sea birds.

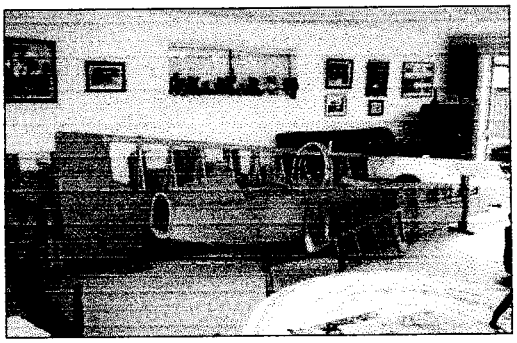
The Maroochy River hosts scores of "pelicans" which recently have experienced magnificent soaring weather. Moving around on to the beachfront, the most prevalent species leave their nests late morning to make a spectacle for about 3 hours- it is of course the " Brown Bodied Bare Breasted Booby Bird".

The natural habitat of the "BBBBBB" is generally considered to be North of the latitude through the Gold Coast. They are scattered along the East Coast of Queensland with another colony at Broome on the west coast of Western Australia. This bird is not to be confused with the "White Bodied Bare Breasted Booby Bird". This is a migratory bird which moves up from the southern states about this time each year. Over a period of about 2 to 3 weeks it goes through shades of pink and finally stabilises at the same colour as the "BBBBBB". At this stage the two are almost indistinguishable. Marilyn expects us to continue our studies for another even or eight weeks. Well, I guess someone has to do it.

Enclosed are a couple of photos showing the stage at which I left my Woody. The wings were joined together for the first time two days before we hooked the van onto our wagon and moved out.



The other photo shows how I left the Woody in storage. Over the last couple of years I have stressed to you the importance of not only building up brownie points, but also ensuring that your wife/partner is aware of and appreciates the effort you have made. My points score has obviously reached a record level. This has resulted in Marilyn suggesting that I bring the Woody into our living room for safety while we are away. How many of you have had your wife plead that you bring your bird inside? If you haven't it's time to build up your score. Incidentally the accrual of brownie points should be treated just as a business treats money – take the profit at the end of the year and set about exceeding your new budget for the coming year. The photo is the proof.



To keep me occupied while not "bird watching" I have brought with me the assembled framework of my Woody's winglets. These will become the plugs for fiberglass moulds. They comprise a wingtip rib, winglet root rib and winglet tip rib glued to a sweptback spar. These have been made from MDF, which I have found to be quite stable. The infill is rigid urethane foam. They have been designed using data published by "High Performance Engineering Inc.". I will make standard wingtips for comparison. At least the wingtips will look sexy if nothing else. It's been a very interesting project in itself. The other thing I am doing is bringing my preliminary drawings for various molds up to completion for formal acceptance.
These comprise:-

- Fuselage extension to move pilot 100mm forward
- Wingspan increases from 12 to 13 metres
- New laminated beech spar for above.
- Forward hinged moulded canopy
- Motor installation including fuel tank.

- Wider main wing fittings
- Steerable tail wheel
- Retractable wingtip wheels
- Winglets

Today I spent the day at Coolum watching the Oceania and Pacific Region Model Aircraft International Aerobatic Championships. Competitors from Japan, China, Hong Kong, Thailand, New Zealand and Australia. Boy- can those chaps fly. It was interesting that all models were checked for full throttle noise level before proceeding to launch.

M.Bee's WOODY

The continuing saga of STREX, the 14.3 m Woodstock.
By Malcolm Bennett

Progress is slow but progressing with the construction of the handling gear, the trailer and mountings to fit the parts into the trailer for transport.

The Wing Walker

Fibreglass wraps of the top and bottom of the wing at the fitting location have been laid up by rolling cooking foil on the wing taped in place and laying up two layers of 1 1/2oz chopped strand mat over this. The lay-ups are trimmed when set and contact adhesive is used to attach thin carpet or felt inside to protect the wing surface when in use. In my case the wrap is joined at the trailing edge.

I have formed a frame out of 25 x 25 aluminium square tube reinforced with pop riveted gusset plates This was then fibreglassed to the wrap. A trailing link fork was welded up to carry a Childs bicycle wheel sprung with rubber cord.

As the wrap is fixed together at the wing trailing edge it will not take a lot of holding at the leading edge, as towing loads are toward the leading edge when the aircraft is towed tail first.

Because the plane has a fixed elevator and requires transporting laying on its side, a wheeled cradle has to be constructed.
Wraps are formed on the fuselage as per the wing technique These are located on major frames for support purposes. Steel tube profiles are formed to match the wrap profiles and bonded to same. These padded wraps are then joined with two 25 x 25 steel tube longerons welded to the wrap support tubes.

The cradle is anchored to the side of the fuselage with webbing straps and a ratchet tensioner. This cradle then mounts on a four wheeled cradle, allowing movement in and out of the trailer. It also secures the fuselage in place in the trailer for transport.

Making these items takes a lot of time but must be thought through and constructed carefully as they determine how user friendly the glider is to transport and assemble. Plus there is less likelihood of damage to the parts in transport.

As these wings are longer than Peters standard Woodstock the trailer needs to be approximately 1.5 metres longer. Peter Raphael mounts both wings on one stand and lifts them both into the trailer as one unit. My wings are larger and heavier so each wing will enter the trailer on a separate cradle.one tube track will be welded to the side of the trailer and have grooved wheeled cradles running on same. I have already made these wheels.

The next major step is to cut and weld the trailer frame from the tube that is laying in my driveway.

The materials that will be used are:-
19 x 19 x 1.6 RHS for the bows and fuselage frame.
25 x 25 x 1.6 RHS for the base.
65 x 38 x 2 RHS for the drawbar and spring mount frame.
The floor and frame will be clad in colourbond ribbed sheet.
Only when I have the aircraft mounted in the trailer frame will I then spray the fuselage colour paints and detail. I estimate that there are still several hundred hours of work required to complete the job.

¼ SCALE GLIDERS NEWS

By Colin Collyer

As I write this. The blossom is out. The grass is green again, and the temperature is in the 20th C. Perhaps a sign that winter is behind us, and spring is here. Being in Melbourne, there's probably more Winter still to come. This Winter has not provided too many good flying days, and its even been a bit cold in the shed, so Winter has not given much to write about, but I have been reading....and it has provided a good subject

Why do we choose to BUILD? when we could BUY
The modellers had a journo from the UK come to our Bordertown 2000 event, and his presentation was in 2 parts.....1. that Scale Gliders can be completely convincing....even the noise they make is realistic !!! As he had just seen his first turbine powered model, they also got into the completely convincing class. Up until then, a Spitfire with a screaming 2 stroke was the best powered scale models could do !

The 2nd part of his talk was - scratch building versus ready built models. These days, you can buy fully molded models of many full size sailplanes....Nimbus's, ASW's, DG 200, 300 ,500, and 1000's, some with up and go power plants, etc, etc, etc. Not cheap, but they are out there...

The other way to do it, is to build your own, and in model size, any of the above, plus any of the vintage stuff, and even the homebuilt, can be done. Now a good "scrounger" will be able to build for about 1/10th the cost of a ready built model, he should be able to build a really good model in under a year, and he should finish up with lots more detail, and 'character'..... AND look at the things that he gets 'FREE'.....He will have to do some research on the subject, and will invariably learn about the designer, the people and the clubs that flew them, the design philosophy, the way they were built, the underlying structure, the colour schemes..... He will then have to exercise the grey matter, and try and duplicate as much of the detail as possible, and in doing so, will learn about almost every thing the home builder learns about, in miniature, he will learn to control weight, design and build sound control systems, he will learn about adhesives, centre of gravity's, washout, covering materials, canopy moulding and a million other things that make up a sailplane

that fly's...and when its finished, it will be HIS....something he CREATED.....One of a kind !... and he had the wonderful journey, with its ups and downs, highs and lows, to remember, long after the model's gone.
Very satisfying!

What bought all this up? As a winter project I decided to build a 'stitch and glue ' plywood canoe, and while researching the subject, I read the following.....

.Most of these builders are motivated, at least in part, by a dream. Many have been harboring the urge to build something beautiful for decades, while they raised children and pursued careers, and only now, at retirement age, are they in a position to do some things for themselves. I am always amazed at the number of people who find the decision to build a small boat a pivotal point in their lives.

Maybe this is because building a good boat has all the components of a life under control. Working through the building, step by step, from thoughtful preparation and careful execution to the reward of a finished boat is a pattern of living that makes since. Learning to respond and to work in harmony with materials can tell us something about getting along with our selves and others.

Finding a fair curve requires looking at a line from many different perspectives before making up your mind not a bad lesson either, when you think about it.....inclined to take me for a perfectionist, but the truth is, after 27 years building wooden boats, I have yet to build one that wouldn't be different next time. Perfection is a journey. The point for me and I hope for you is to take pleasure where you are today, believing that it will be some where else tomorrow....(From Ted Moores in the book CANOECRAFT)

Put's 60/1 and a $100.000 in to perspective....don't it !..... the PRIDE of doing it yourself.

As for the scale models, the busy time is coming up Lameroo (a bit to the left and down a bit from Mildura) on September 11th & 12th, then Horsham on Melboune cup weekend in November, and Bendigo on the last weekend in November.

Anyone wanting details, phone 9807 6462, or www.scalesoaringaustralia.com

A LITTLE BIT OF AUSTRALIAN GLIDING HISTORY

By Allan Ash

Geoff Richardson at Code 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 s 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 Garret 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 realized the need for a more advanced machine and began the design of a sailplane of 44 feet wing span; it was named ***Golden Eagle*** and took three year of construction.

THE MELBOURNE GLIDING CLUB AT COODE ISLAND.

In the autumn of 1931 the Melbourne Gliding Club arranged an agreement with the Larkin Aircraft Company to fly from Coode Island aerodrome, which was situated a few miles to the west of the main city section of Melbourne (the site of the present sprawling complex of interstate trucks terminals).

The Larkin company had several hangars and buildings on the aerodrome where they carried out maintenance work and ran an assembly line of imported DH9A and Moth aircraft. The site was very convenient for gliding and allowed car-tow launches to respectable heights.

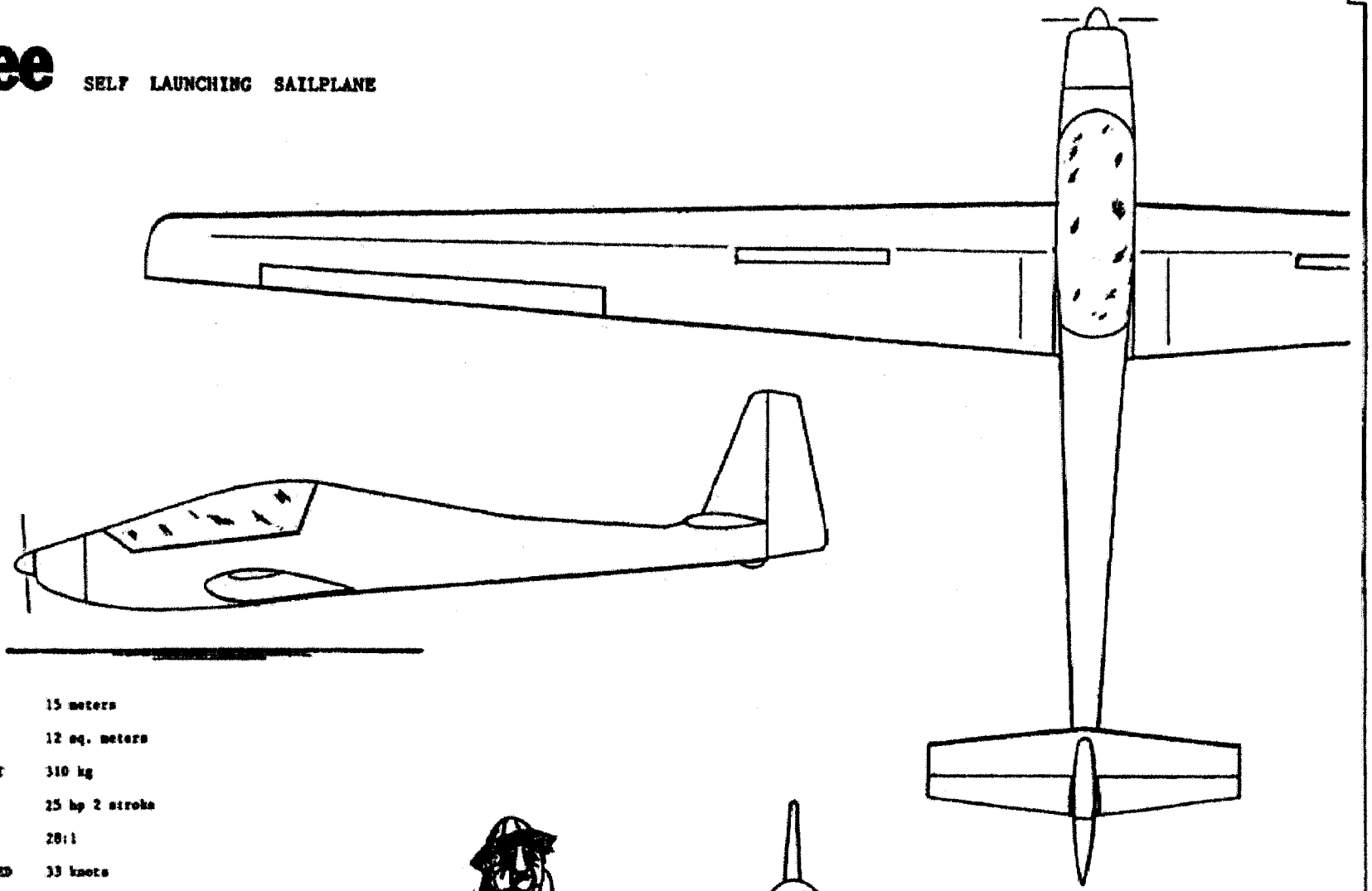
As members gained experience, launches to 1,000 feet were common in the open primaries, especially when the centre of gravity position for the tow-hook was introduced during 1932. To prevent the solid wire from tangling after being released Ken Davies devised a drogue parachute which was attached to the glider end of the wire and lowered it gently to earth as the tow-car slowed down. To stow the drogue during the launch the club tried several novel ideas. One was to stuff the drogue into a tin can fixed to the front of the skid. Another was to stuff it up the leg of the pilot's trousers. Both systems worked equally well. Among the members flying at the time were H.E. (Ham) Hervey, Carr Withall, Fred Gascoyne, and Ken Davies. Members paid an annual subscription of one pound plus another pound a year if they were flying members. Launches cost a penny each by bungy and sixpence by car-tow.

For comparison, an advertisement in an American magazine of that time quoted an American gliding club offering membership at $50 a year and $5 an hour for flying.

During 1933, when Carr Withall was secretary of the club, the Rhon Ranger was fitted with a nacelle consisting of a light wooden frame covered with fabric. The modification added only seven pounds to the aircraft's weight but resulted in a marked improvement in its a nacelle consisting of a light wooden frame covered with fabric. The modification added only seven pounds to the aircraft's weight but resulted in a marked improvement in its performance, especially for slope soaring. Experts in the club estimated that the glide ratio had been improved from 11 to 14, but no proper tests were made.

Taree

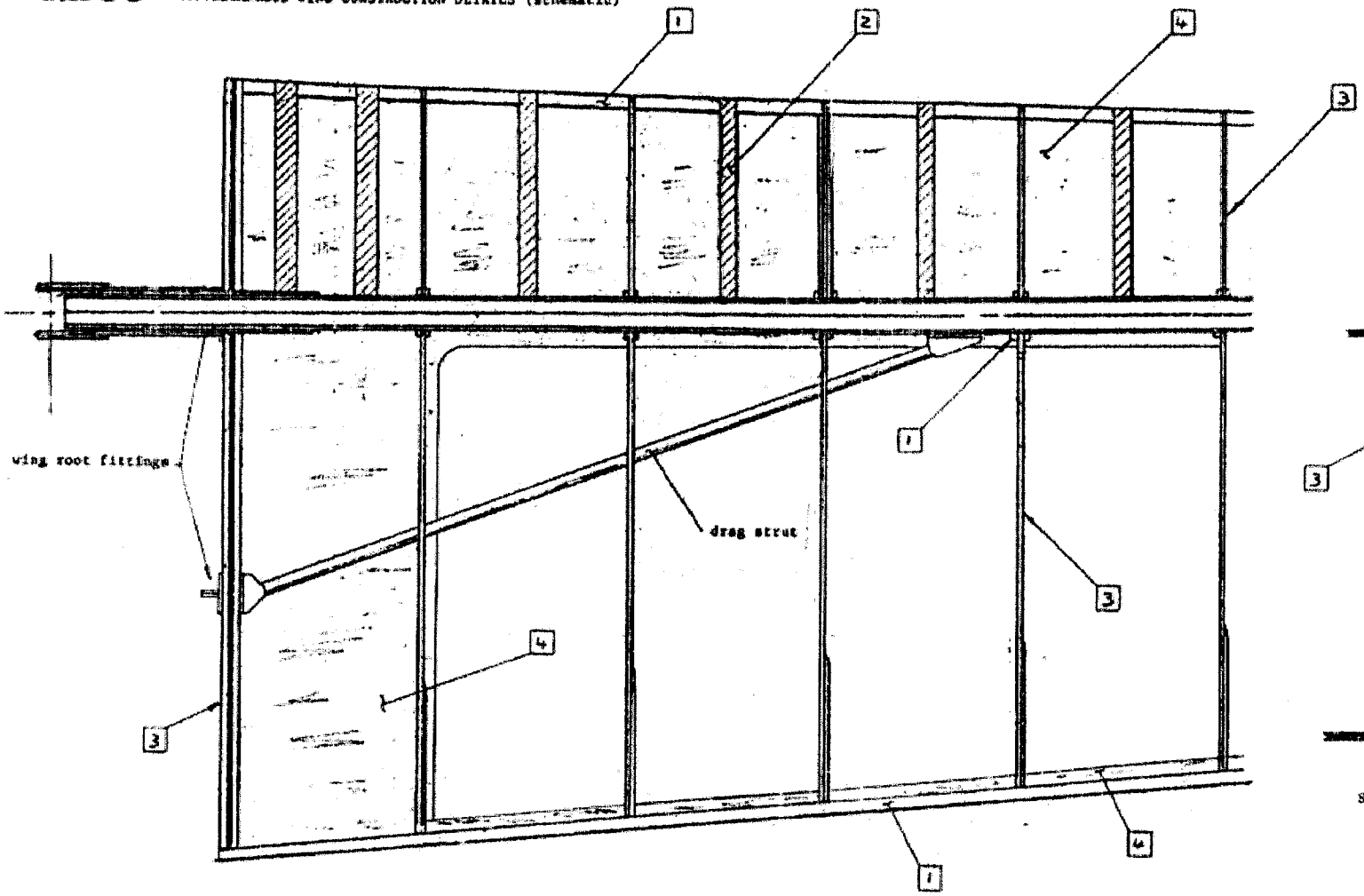
SELF LAUNCHING SAILPLANE

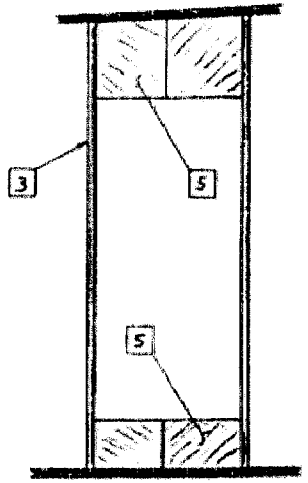


SPAN	15 meters
WING AREA	12 sq. meters
GROSS WEIGHT	310 kg
POWER	25 hp 2 stroke
BEST L/D	28:1
MINIMUM SPEED	33 knots
BEST CLIMB	375 ft/min

SHEET 1 of 4

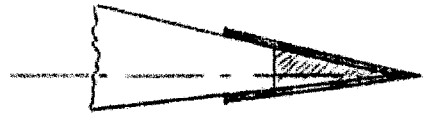
Taree MISCELLANEOUS WING CONSTRUCTION DETAILS (schematic)





SPAR CROSS SECTION

1	GRADED PINE	(non structural)
2	PVC FOAM	(stiffening)
3	HOOP PINE MARINE PLYWOOD	(structural)
4	AIRCRAFT BIRCH PLYWOOD	(structural)
5	DOUGLAS FIR	(structural)

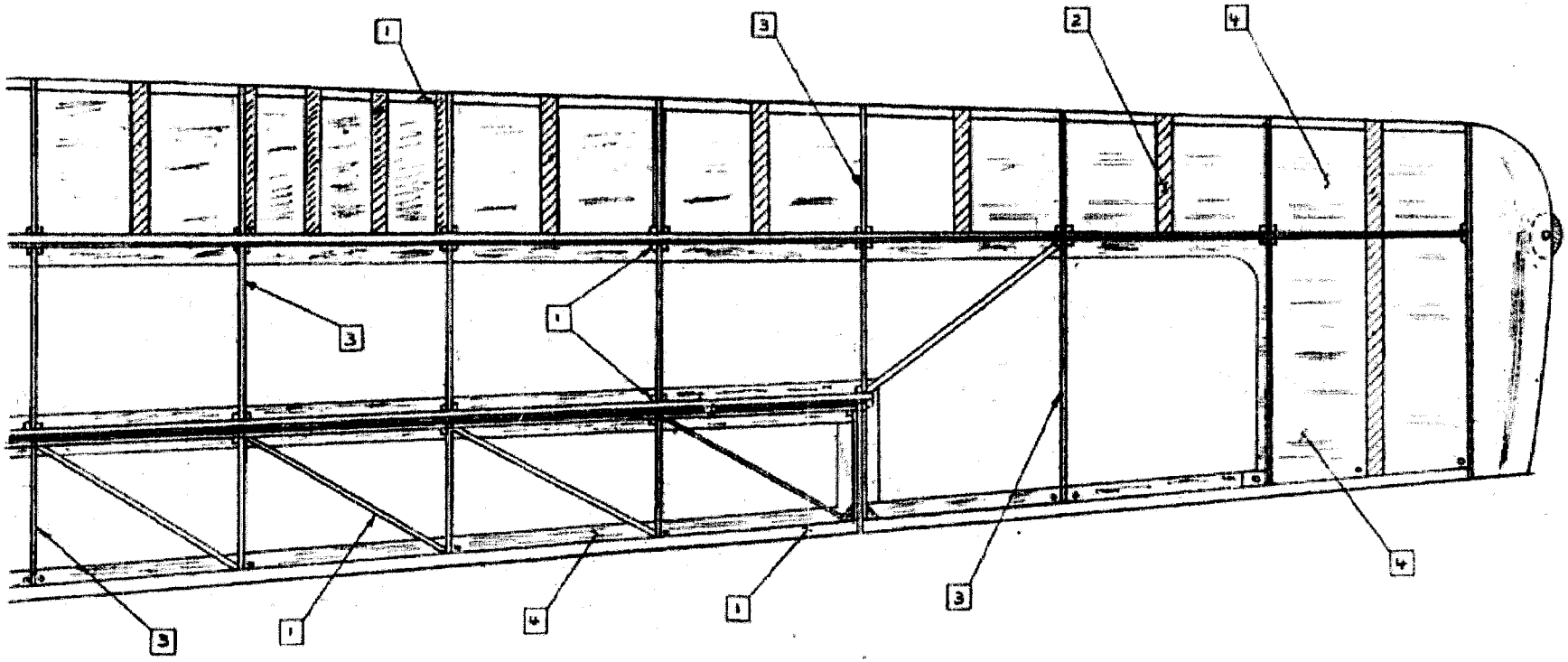


TYPICAL TRAILING EDGE

SHEET 4 of 4

Taree

MISCELLANEOUS WING CONSTRUCTION DETAILS (schematic)



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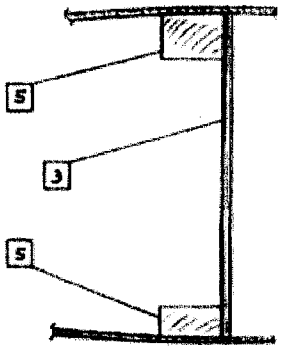

SPAR CROSS SECTION

CLASSIFIEDS

AUSTRALIAN GLIDING MUSEUM NEWSLETTER

Editor: Geoff Hearn, 50 Jeanette Street. Bayswater. Vic 3153.Phone 03 9729 3889.
Membership AU$ 15
Museum Postal Address: 2 Bicton Street. Mount Waverley, Victoria 3140 Australia. Phone: (03) 9802 1098.

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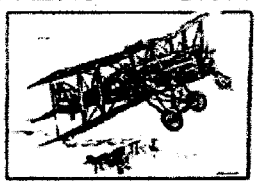

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