THE AUSTRALIAN HOMEBUILT SAILPLANE

Editor: James Garay

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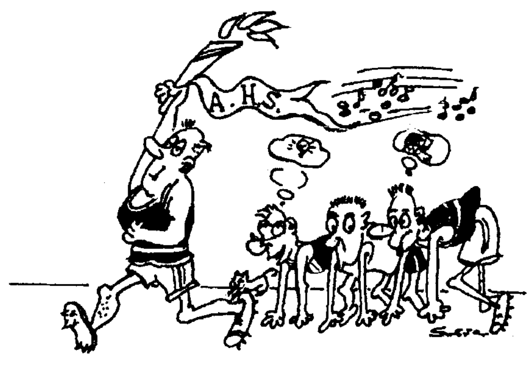
G'day folks,

Olympic Games - Sydney 2000 AUSTRALIA



Welcome once again to a new edition of our Newsletter. Coming up soon in the not to distant future are the Olympic Games, and the attraction will be centered on many different events. So...before you get too engrossed on the Olympics, have a read of the contents of this issue.

The "newsletter interchange" matter has been resolved. The response from the members has been very supportive in my position of criticising such an affair. As a result I would like you to know that we are taking another direction and advise that we are no longer an Association with office bearers. It's been five years since Mark Stanley founded the group and very little has been achieved for the benefit of the members. We used the word " Association" but we are not associated to any body and even the GFA does not officially recognise us. So, we will now be known as the "Australian Homebuilt Sailplane". As an " Association" we are prone to legal liabilities, and to be "Incorporated" costs a big amount of money which we can not afford. Therefore the position of President has been made redundant and is no longer required as we are becoming a "Group of Interest" only to share knowledge and experience. This means that we only need a Chairperson who will be the group's representative and this task will be fulfilled by **Mike Burns** who is very well known amongst the Australian gliding fraternity for his friendly approach , rectitude and integrity..

I look forward to co-operate with Mike and I will continue with the editorship of the Newsletter and deal with the inquiries and correspondence. From now on, we will have a new format for the Newsletter. All the people involved with the past production who appeared on the left hand side of the first page have to be taken off and will remain as anonymous and silent contributors.

Peter Raphael (The Erudite) is still travelling around Australia and the last news that I had from him (postal card) was in the Northern Territory. He has had several clinches with some crocodiles, fighting mosquitoes, spiders and venomous snakes. Fortunately his state of the art four wheel drive Toyota Land Cruiser has been performing very well.

My "Woody-Roo" is waiting for him to do the last coat of paint. I have been working on it at the weekends, thanks to the generosity of Malcolm Bennett who is helping me to get it in the air before Christmas.

Happy reading!

James Garay

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Inside This Issue

MAILBOX

Dear Ed,
Firstly thank you for sending the newsletter to me. There is a lot of information in there and I look forward to receiving the next one. You are to be congratulated on the high quality of the content.

I really enjoyed the Symposium at Bacchus Marsh in spite of the cold weather. The enthusiasm of the members of the AHSA is quite infectious. After years of procrastination, I have decided to take the plunge and order a set of Woodstock plans. I don't quite know where I can assemble it as my workshop is about a metre short, but realistically that may be a year or two off, so I will have time to sort that out.

No doubt I will need to rely heavily on the experience of yourself, Peter Raphael and Malcolm Bennett and other members until I aacquire some more knowledge. I hope they are able to tolerate this. Cheers. Dete Hasse,

Dear Ed,
Your reminder for renewal is simple but effective. My renewal subscription fee will arrive soon, via international money order.
I was very happy to receive issue 17 and read about the Jet propelled Caproni. I looked at the Internet web site and was even more interested. The GM aviation address was not present. I hope they will complete the information about the TRS 18-046- Microjet with price tag and static thrust.
I think the future at long last is here and the jet is available in big numbers. Any way I had to admit that the people Down Under, are pushing the frontline. Congratulations to you all.

Launching gliders/sailplanes in last issue by Peter Champness tells a story, but I do not agree with the solution. Questions must be rise like this way of thinking, is killing the sport.

Why buy two planes just to get one of them airborne by the other one?

Why not combine them into one solution?

Peter must be right, but we must look to the horizon and further. N. A Sandberg

NEWS FROM SWEDEN

By Neil Ake Sandberg

Last Autumn I completed an " environmental consequence description" in translation from Swedish, to the authorities for my gliding club. It is to build our runway 200 metres longer and that can be a difference to our environment. The cost of such as consultancy was in the range of 24.000 Skr (AU/DL=4.60 Skr). We found it very productive to do it ourselves. Only five sheets of A4 were needed, we made from our own point of view. It silenced the authority by now for more than eight months.
Many clubs will have to do a similar description in the future ,even for minor changes in their activities.

WINDEX POWER PLANT

The progress in the Windex power plant has not yet resulted in positive reports. Bench tests were OK, but so far no report about the operation mode have reached me. Minor problems may have raised and otherwise the world has known about the success.

Our gliding club is a self-launching operation. But our Bergfalke SE-SXP would be more convenient with a microjet as it is the only one which may stay in the hangar except for one week a year. The aero tow week is a tradition and I love to fly the old Berfalke in thermals. It is the last one to land every day. I would like to se it as a trial for a microjet engine project, so we can use it over a long period.
I would like to see more of this type of project around the world.
Maybe gliding will renew itself, by homebuilt power! Happy landings.

Dear Ed,
My motor glider is still in its box at Camden as my KR-2 super -structure is under construction.
I hope to joint soon and should be finished in 4-5 weeks as I am working full time now on the KR.

I would liked to have got down to Melbourne for the Symposium on Queen's birthday weekend but I was busy making my canopy.

The KR will get to Bacchus Marsh in about three hours so I hope in the future to get down your way in the autumn. G.Morgan.

Dear Ed,
Please find enclosed my renewal subscription. Sorry I am late with it as I have been down South rebuilding a broken Libelle, it's fuselage was a real basket case but it is all back together again and flies like a bird. Also I had to build a trailer for it to go in.

This is the 4th trailer I have built for gliders so should have it right this time.

Hope to get back to my homebuilt project at year's end, presently finishing off a house up here at Bowen,so should return to Grafton soon.

If you are interested in it, I could send you an article on how I designed and built the plug for the fuselage mould. We have pulled three fuselages out of it so far. Keep up the good work. Regards. Des Muir.

Dear Ed,
I am sure I am not alone in thanking you and the team Peter Raphael and Malcolm Bennet for organising the recent Symposium. I only regret that a personal crisis at the last minute meant that I was unable to fully attend.

I enclosed my review of Henry Millicer's Aerodynamics for Soaring Pilots, I hope you will find a space for it in the journal.

I enclosed both a printed version and a disk version in both Word 4.0 and RTF; note that my over-decade old Macintosh only puts out 800 K (double sided) floppies. I do not think you will have any problems, but if you do, please do not hesitate to ring. Yours faithfully. D. Lowe.

Ed's Note: The following note was sent to G Sunderland and he passed it on to me for you to read.

Dear Gary,
You may remember me as the editor of SHAP Talk long ago. I admired your Moba and printed the material you sent. For the past few years I have been trying to get people in SHA to help build a prototype for my SA-4 design. You have read about in Sailplane Builder.

Thus far I have done the mockups, but no one has come forward with more than encouragement. No real builders.

After much thought, I have decided that your treatment of the front portion of fuselage is by far the best way to deal with ingress-egress, canopy hingeing and sealing, etc. So have made a plywood and aluminium angle mockup to work it out. The idea is to use an aluminium central beam, 6"x6",sheet metal of .032", angles to be 1"x 1" in form of a box with angles at corners. Rollers to follow angles and take loads. Nose canopy to mount on the roller carriage.

Such a front portion would assist me in getting out, as I have arthritis and I am 80 years old, but I think that it would be a benefit to all pilots and help smooth the airflow, while avoiding the formidable hinge problem.

Please be so kind as to give me your advice and help on designing such a front end for the SA-4. Sincerely yours. Donald Santee.

Gary's reply,
Dear Don. I shall be happy to help with your project, the design of the SA-4 sailplane, in any way I can.

Please find enclosed a copy of MOBA 2c Load 7 Stress report in some relevant pages, which may assist. Your letter has prompted me to compile my thoughts on an improved design of a nose cone, as per the attached paper.

Our AHSA recently hold a Symposium on the Design of Sailplanes, which I was unable to attend. However this paper can be my contribution to proceedings. Thank you for your suggestion!

The younger generations seem to be very reluctant to do anything with their hands, like building a sailplane, and even more reluctant to do anything with their brains, like designing something knew.

Perhaps the SA-4 project may generate some renewed interest somewhere. Good luck! G. Sunderland.

Dear Ed,
With reference to the article by Darwin resident Terry Baxter (The Tiger) who professes a great interest in devices of the flapping wing variety, namely ornithopters.

He is currently building an ornithopter with sailplane ability and intends to launch himself from the local cliffs. Terry intends to flap the trailing edge of the wings to gain altitude.

In 1929 Dr. Alexander Lippisch, designer of successful gliders, produced a man-powered ornithopter, incorporating a high wing layout of some 38 feet span with an open pilot seat and covered fuselage behind it. The wings were moved by the action of the legs, similar to that used in rowing. Each wing had a strut support underneath and on the end of each strut cables moved the joint in a guide rail fastened to the fuselage.

Control of the machine was by stick for elevator and rudder. There were no ailerons as it was considered that differential speed of flapping the two wings would give some form of lateral control.

Lippisch added small flexible sections to the trailing edges to improve the propulsive action. From a shock-cord launch at the first attempt a flight of 300 yards was achieved. In 1960, Dr. Lippisch expressed the view that flapping wing propulsion still as a great potential, especially as a non-stationary wing modifies the flow around the wing, improving performance in gliding. Later experiments have shown that rather than have the whole wing moving it would be better to have a fixed centre-section with flapping parts only at the outer portions.

A rotating flapping motion similar to the wing movements of birds and insects is far more efficient than a simple up and down movement as we aeromodellers have found with our ornithopter models.

Incidentally ,one could fill pages describing the differences between bird and insect flight.

As Gary Sunderland has predicted, powered ornithopters will be flying in the future with the quieter propulsion and short take -off characteristics of these aircraft. It has been calculated that in order to house suitable powerful muscles for flight, humans would require shoulders six feet broad, thus an independent power source would be essential. Beats me how Daedalus and his son Icarus got off the ground! Regards. William Wood.

Dear Ed,
Australia has always been dear to me. During WW-2 I almost got to see some of it, but fate and Admiral Halsey intervened and I was privileged to visit Guadalcanal instead. The army decided that our infantry division needed a rest after a year in the Solomon's and we went to Auckland for a very welcome "vacation". Too soon it was time to leave for New Caledonia and training prior to the Luzon Campaign.

Anyway, I know some Aussies and love 'em all!

My SA-4 project languishes for lack of helpers. People volunteer, but nothing happens. A lot of the design work is done. Mockups made, etc. At present working on a carbon spar, it is half scale and meant to familiarize me with the material.

I will try to prepare an article on the SA-4 for your magazine. Thank you for the sample copies. You are doing a splendid job as editor.

Maybe I can find a builder among your members, who is looking for a project, to help me get a prototype flying.

I am speaking on the subject of the " sliding nose" at Tehachapi in September. Will keep your publication in mind. Sincerely yours. Donald Santee.

TECHNICALITIES

MORE ON PLASTIC CANOPIES

By Stan Hall

An excerpt from the book "The Collected work of Stan Hall"

Thermal Expansion or Contraction in Plexiglas.

One statement that really caught my eye, and one which forms the basis of this article, is that organic plastics have a relatively high coefficient of thermal expansion. What this means is that when cold, it shrinks considerably more than many other materials. And when hot expands more, of course. In sailplane canopies this implies structural problems, like cracking at the attachment to the frame.

Most people who work with plastic know that it changes dimensions rather liberally under wide temperature differences, but the February Homebuilders'Hall may have left the impression that this is not important. It is.!

The paragraph in question referred to the flat-wrap canopy on my sailplane, "Ibex." In it I offered the opinion that the screwed and cemented plastic attachment to the wooden frame would probably be okay, even at very high altitudes, because the coefficients of thermal expansion of both the wood and the plastic are close to zero. This statement takes more liberties than are justified or intended.

The presumption that the coefficients are close to zero has little to do, actually, with whether the attachments are, or are not, highly stressed at allow temperatures. What matters is the *difference* in coefficients. If the canopy shrinks faster than the frame, which is commonly the case, the attachments do indeed take a beating.

Bolted connections are particularly vulnerable to overloading and special care must be taken to permit the canopy to expand and contract within the frame without unduly loading the plastic around the bolts.

Determining Loads

To give you a rough idea of the size of the loads involved at the attachments, consider an aluminium-framed canopy made of 1/8 inch thick Plexiglas 60 inches long. Assume that on a Standard Day you took this canopy from sea level (59°F) to 30,000 feet (-48°F). The temperature difference is 107°F.

The Rhom and Haas booklet gives a coefficient of thermal expansion of 0.00005 inches per degree F. Nominally; then, the plastic would be expected to shrink 0.321 inches along its 60-inch length. At the same time, the aluminium frame, having a coefficient of 0.00013 inches per inch per degree F, would shrink 0.083 inches, leaving a difference of 0.238 inches.

There is a simple little formula for determining how much load is required to stretch a material a given distance, and this will give us an idea of how much load is in the bolt and in the plastic - if we make some simplifying assumptions. This formula is $P=\delta EA/L$, where P is the load required in pounds, δ is the deflection in inches, E is the material's modulus of elasticity in pounds per square inch, A is the cross section area in square inches, and L is the length in inches. If we consider an isolated strip of plastic two inches wide (about one bolt's worth) and 1/8 inch thick, A, the cross section, turns out to be 0.250 square inches. The deflection, δ, is 0.238 inches as computed earlier. Rhom and Haas show E to be 450,000 pounds per square inch, and L is 60 inches. Substituting these numbers for the letters in the formula we get:

$$P = \frac{0.238 \times 450{,}000 \times 0.250}{60} = 446 \text{ pounds}$$

Now, this is not an accurate figure because the canopy doesn't comprise a bunch of isolated strips; the 'strips' work together and influence one another. Besides, the entire canopy load on the bolt pattern will be distributed among all the bolts in a manner that, without a computer, would be almost impossible to figure out. Nevertheless, that 446 pounds may not be grossly in error - and that's a lot of load to expect a thin piece of plastic to handle across a bolthole.

If the canopy frame were fastened rigidly around the aircraft's periphery, one might expect the plexi to let go and big cracks develop. At 30,000 feet or more this could prove embarrassing.

Letting the Canopy "Breathe"

Although canopy frames are not secured in this manner and thus might be expected to have been a little under the influence of the shrinking plastic and receive the load a little, some of the frames I've seen appear to be extremely rigid themselves - and this might be just as bad. If the coefficient of thermal expansion of the frame and plastic were nearly the same, it wouldn't matter if the frame were rigid or not. The two structures would shrink about the same amount and loading in the attachments from this cause would be absent.

According to MIL-HDBK-17, Plastics for flight Vehicles (at last report, available from the US Government Printing Office), you can achieve this noteworthy objective by making the frame of nylon with an acrylic resin binder.

If your frame is made of metal, you'll need to provide a 'soft' joint between the bolt and the plastic. MIL-HDBK-17 shows several ways of doing this. On the I-26 and 2-32, Schweizer uses half-inch diameter holes around the periphery of the plastic and secures the plastic to the frames with small screws passing through metal washers that are larger than the holes in the plastic. By not pulling the nuts up too tightly, a moderate amount of friction is created which apparently allows the plastic to "breathe" sufficiently in the frame to do the job. There is some opinion to indicate that filling each hole in the plastic with a rubber bushing or washer might even be better.

But whatever technique you use on your new homebuilt, be it Schweizer's, someone else's, or your own, if you expect to operate over wide temperature ranges, you'd best design your canopy to "float" in one manner or another.
By the way, the size of the canopy would appear to have little to do with the size of the loads at the plastic attachments.The attachments of a small canopy might have loads equally as high as those on a large one, and vice versa. You can see this by combining the equations for thermal expansion and load resulting from shrinkage; the L's (the lengths) cancel out.

What does matter is the material thickness; a piece of plastic say, 0.060" which would exert half the shrinkage force of one twice as thick. However, it would also be half as capable of taking the load at the connection.

Now, back to the" Ibex" canopy. How do I defend the fact that the plastic is screwed and cemented firmly to its wooden frame and doesn't float? I don't, really. However, the plastic is quite thin 0.060" and the frame is relatively light and flexible. I would expect the frame to flex a little under the influence of plastic shrinking, thus taking some of the load off the attachment. Also, the screws are not asked to taken any load (although they probably take their share), the many square inches of cement area being given that responsibility.

I fly for fun, not for fright, and I don't expect to prove the integrity of the plastic/frame attachment in high waves at Bishop or Colorado Springs. But if you do, watch those coefficients of thermal expansion! Table I might help. And get copies of both the Rhom and Haas booklet and MIL-HDBK-17 (Part II only, if you can order it that way) and spend plenty of time at the local glideport examining how the pro's design their canopies.

How Others Are Doing It
You might also heed the words of George Taylor, Duster builder and editor of the Dust Rag. In a personal communication, he writes of his experiences with the canopy on his new Duster:

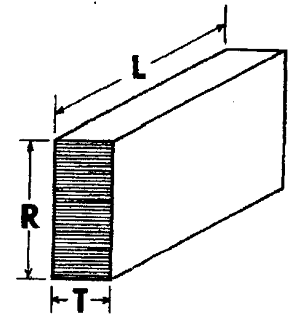
"The hardware kit included a thin sheet of Plexiglas. After many hours of work on the canopy frame, I bent the plastic carefully and fastened it down with small wood screws and tinnerman washers. The saber saw I used for trimming the plastic and the drill I used for the screw holes started hundreds of small cracks, and around the holes looked like spider webs. (I have since learned that the way to avoid this is to cut the Plexiglas by hand and use a special drill). Having produced this mess through great pain and suffering, and needing help in a hurry, I prevailed upon a friend to place the canopy in his annealing oven overnight in hopes of eliminating the cracks. The next morning I realized that all my problems had thus been solved - because I could, with a clear conscience, now throw the whole thing away! Instead of having a canopy with no cracks, I now had one with two eight inch long quarter inch wide cracks running upwards from the frame.
"Later by chance I discovered a product made by General Electric called LEXAN - and it's great! It drills and forms beautifully. You can't even break scraps by folding them. I paid $26.00 for the new piece and I wouldn't accept a sheet of Plexiglas as a gift!" (Rhom and Haas, please note!).

Tony Burton, RS-15 builder of Mascutan, Illinois, writes of cutting Plexiglas with a thin, one inch diameter abrasive disc driven by his Dremel tool. He says the process is slow because of the low power of the motor, but very effective. At 20,000 rpm the disc seems to melt the plastic more than cutting it. the result is a smooth, nick free edge. Tony considers it mandatory that the operator wear safety goggles because of the large spray of plastic droplets that comes off the material.

Table I
Coefficients of Thermal Expansion (α)

Material	α (in./in./deg.F)
Plexiglas[1]	.00005
Alum. Alloy	.000013
Steel	.000007
Nylon/Acrylic[2]	.000028
Fiberglass/Polyester[2]	.000010
Wood[3]	

	Tangential (T)	Radial (R)	Longitudinal (L)
Spruce	.000018	.000013	.000002
Douglas Fir	.000024	.000016	.000002



[1]From Rohm and Haas, *Fabrication of Plexiglas.*
[2]From MIL-HDBK-17, *Plastics for Flight Vehicles.*
[3]From ANC-18, *Design of Wood Aircraft Elements.*

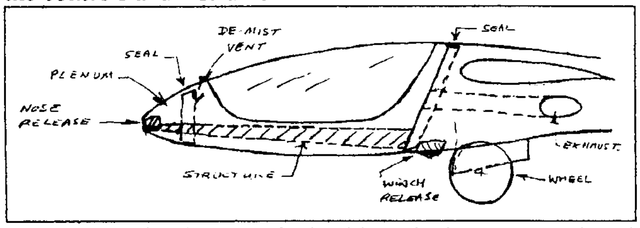
WHAT'S NEW?

DESIGNING A SECOND GENERATION SLIDING NOSE CANOPY FOR SAILPLANES
By Gary Sunderland.

The design of the MOBA-2 sailplane is now 25 years old. The glider first flew in December 1979.

Unknown to me, at the same time, the famous Swiss designer, Alfred Neukom, was also building a variant of his "Elfe" sailplane with similar sliding nose canopy arrangement. This flew at about the same time as MOBA, but unfortunately I did not contact Neukom to exchange notes before he was killed in an ultralight crash.

The MOBA-2 sliding nose and canopy has proved practical in most respects. It is particularly good for maintenance, when the whole nose cone may be removed to expose all the controls and instruments.

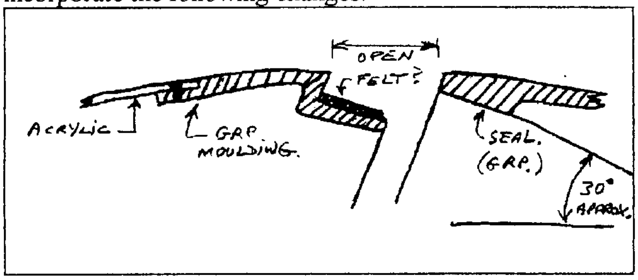


In the air it is also practical, although the rear seal and leakage needs to be improved. Unfortunately the MOBA-2 design, of a three-piece wing, makes this difficult to improve.

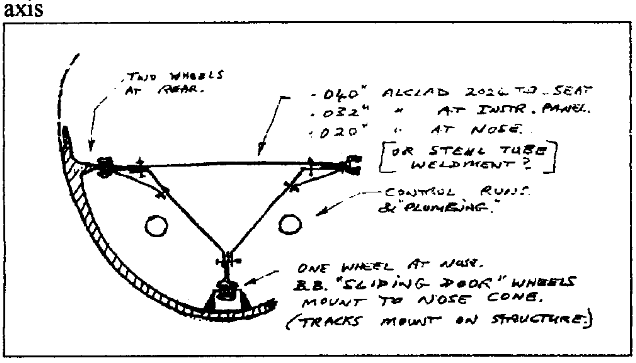
A two piece wing, which would allow an uninterrupted seal, would be the way to go.

Another problem with MOBA is in having only a belly tow release. A nose release would be a distinct improvement, in providing more stability on aero tow and in preventing ground loops.

An improved second generation design of nose, should incorporate the following changes:



The ring type seals, at nose and rear, should seat on a cone of felt or similar material, set at about 30 degrees to the axis



The sealed area at the nose release acts as a plenum for ventilation air, MOBA had a demist vent plus a ball type vent for the pilot on the left side, which is adequate.

Cockpit exhaust air escaped from the general leakage around the rear seal of MOBA. If an improved seal were achieved then some ducting from the cockpit would be necessary, exhausting just aft of the wing.

MOBA canopy was based on the moulded acrylic shape of the Glasflugel KESTREL, which was the largest stock canopy I could obtain at the time. A purpose formed shape, as on Neukom's ELFE could be made deeper, so that the pilot could look straight down, as well as to the side.

The MOBA nose cone was formed by GRP over a balsa core. A GRP sandwich with a modern lightweight foam core would be stronger and lighter.

The MOBA nose cone slides on plastic in cupboard tracks of Aluminium.
There are four plastic slides and two tracks under the floor seat.

An improved method would use three steel rollers in three tracks, providing more stability and control.

Also the forward nose structure to support the three tracks, is more efficient
As a triangular shape, the forward fuselage should resist a 12-G emergency (crash) load. For this case, the forward fuselage structure acts a column in pure compression, for which the most efficient cross section shape happens to be a triangle.

The emergency jettison of the MOBA nosecone consists of a tee bar (pull) handle connected to a cable. The cable goes from the base of the instrument panel to a pulley in the extreme nose structure, then back to terminate at the bottom rear of the nose cone.

Pulling the jettison handle back to the pilot's head, moves the whole canopy forward, to a position forward of the instrument panel. With the MOBA set up, there is a possibility that, in a bail out situation, the airflow might blow the canopy nose back, and interfere with the pilot egress. An improvement would be a ratchet type lock to prevent this.

The structure of the forward fuselage should follow that of a primary glider, or the Maupin's WINDROSE. That is the triangular shape beam mounts the nose release, rudder pedals, canopy, instruments console, controls, and seat.
In the seat area the structure shape transitions to a square, or rectangle cross section, to accommodate the belly release and wheel mounts, with the wing attachments above these.

A non-structural GRP fairing covers the central box structure. In MOBA these are epoxy glued in place. An improvement would be to have this fairing screwed onto the structure, and be removable for maintenance.

In the MOBA design, the nose cone is latched back with a single catch on the left side at shoulder height. There is no clear vision hole cut in the canopy. Unlatching the canopy in flight provides clear vision by sliding it forward about four inches.

Flight tests were carried out, from stall up to Vm=2 Vs, which proved this is safe. Noisy and a bit draughty, but no problem. Incidentally, the nose did not blow back.

There is a remote possibility that the pilot could be incapacitated in the cockpit which is locked from inside.

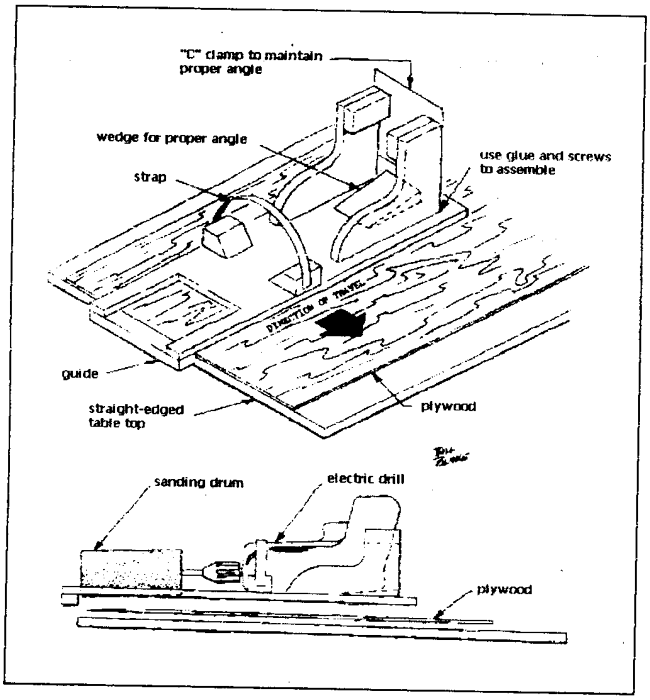
It would be then necessary for the outside crew to break in through the acrylic. In the event of an accident, which is the most likely reason for the pilot being out of action, it is more than likely that the nose cone would not be operating, due to it being damaged,

So we come back to the external crew having to break in. The author welcomes any other comment or suggestions.

HINTS & TIPS

SCARFING SANDER

By W.H.Buckman.



Here is a little gadget I came up with while searching for an easy way to scarf plywood for my project. It's simple, inexpensive and, above all, foolproof!. All the other methods I have seen involve feeding the plywood into a saw or some other piece of equipment. This way, the plywood remains stationary

All edges to be scarfed must be well supported to insure an even cut. This can be easily done with an extra sheet of commercial plywood (3/4 in) or by using the edge of the workbench. Clamp or otherwise secure the wood being scarfed so that it cannot move. Practice first on some scrap to get the hang of the thing.

I have been able to get scarf joints nearly three inches wide on 1/8 in. plywood with no trouble at all, which I am sure will make the inspector quite happy.
All that is needed to make this thing is a little scrap plywood, an electric drill (you are building an airplane without one??) and a sanding drum easily purchased at any power tools store. The cost is peanuts, but the time and effort saved are worth a fortune.

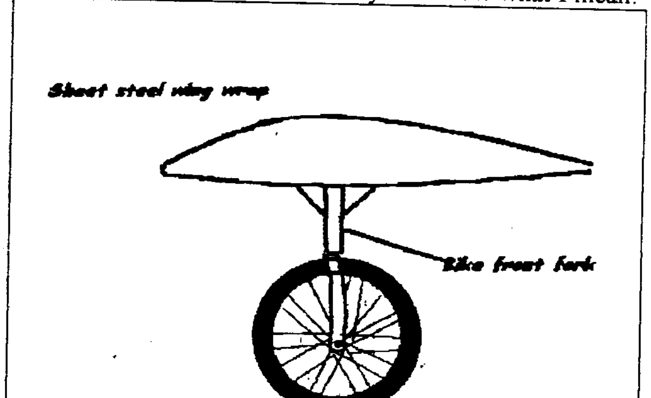
WING TIP ON WHEEL

By Peter Champness

On the last occasion I visited our editor, James Garay, I found him busy deconstructing an old baby pusher he had found on the roadside, left out for the hard rubbish collection. This probably explains why the council rubbish truck doesn't come for at least a week after the due collection date. By the time they come by, most of the rubbish has disappeared and found new homes.

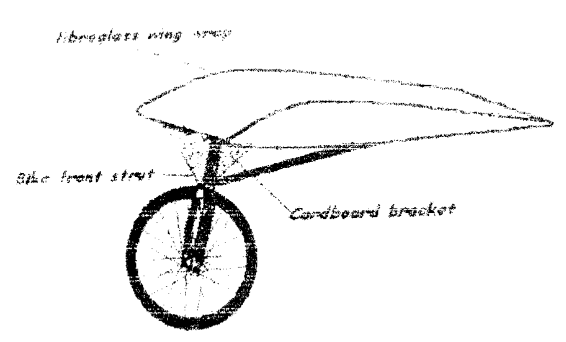
James claimed that he was making a wing wheel from the rubbish, using the design of Peter Raphael (see the article titled "Mr. Walker") in the AHSA Journal about a year and a half ago. The "Mr. Walker" design is highly commended ,but people being as they are , someone always want to do things differently. I have noticed quite a variety of wing wheels in use and reproduce some of the designs here for those who want to try something different.

The first design is the simplest in concept but not necessarily the easiest to make due to the sheet steel wing wrapper. You can purchase one of these from the Wings and Wheels web site, an USA webs business dealing in glider components, for a couple of hundred dollars. There is no suspension at all in this design. The wing itself acts as a spring, which is fine for the up and down axis. The main problem is the lack of any fore and aft spring. This is likely to cause severe twisting forces on the wing if the wheel strikes bumps or small stones. The twisting force is greater if the wheel strut is swept forward and less if the wheel is swept back. I don't understand the physics of this but if anyone else has tried to ride a push bike over a curb without lifting the front wheel they will know what I mean!

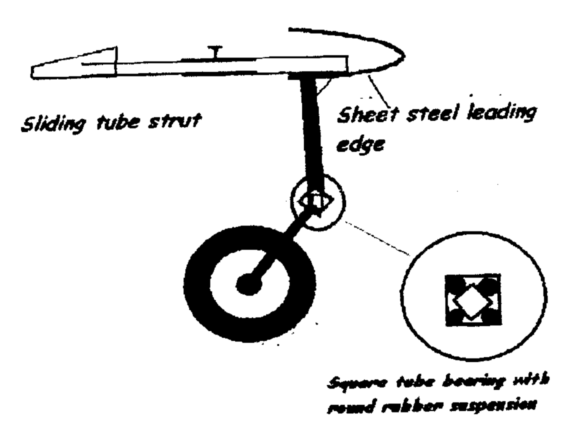


The second design comes from Emilis Prelgauskas of the Adelaide Hills Soaring Club at Monarto near Adelaide. Emil is an avid recycler so naturally his design also features an old bicycle wheel and front fork.

Emil likes to build quickly and keep things cheap. He told me he built his wing wrap directly on the wing surface, which he sat on its trailing edge, propped on some cardboard. I didn't like the idea of putting my wing on its thin and weak trailing edge, but he said this works OK if the load is spread over a reasonable length. He taped some carpet over the wing and then covered it directly with a single layer of fibreglass cloth and resin. The wheel fork was attached to the underside and then reinforced with a large cardboard gusset to resist the side loads. The cardboard was covered with a layer of fiberglass cloth and resin, adding stiffness and strength. A trailing strut completes the frame. Emil's wheel has been trailed all over the rather rough airfield surface at Monarto and apparently works well.



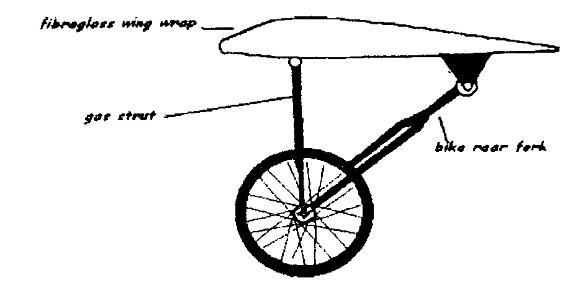
The third design comes from Laurie McKinley of the Gliding Club of Victoria at Benalla. Laurie is an expert welder and likes to make bits and pieces for the club gliders. His wheel features an industrial wheel with a nice half flat tyre. A half flat pneumatic tyre is an excellent device for easing the wheel over the bumps. When the Dunlop air tyre was first introduced it was hailed for the soft ride over the bumps – like floating on air. The other feature is the trailing "knee" action suspension. The bearing is constructed of two short sections of square tubing, one of which fits inside the other. The corners are filled with rubber, which compresses and allows limited rotation before it springs back. The rubber comes from a thick rubber "O" ring used on toilet "S" bend connections.



Laurie doesn't use fiberglass. His wheels feature a sheet steel leading edge section and a bracket, which holds the wing at the trailing edge. The design I have drawn shows the IS28 wheel, which fits on the wing tip end plate.

The owner of a new ASW27 used the design which I like. I don't know his name. He used a gas strut as the suspension. Gas struts can be obtained second hand but they are a bit stiff unless most of the gas has leaked out. A reconditioner shop can adjust the gas pressure to an appropriate level. The original design featured a bicycle front fork but this required some welding and the provision of a hinge. I have found that the rear fork can be used which is longer and the pedal shaft bearing is retained as the pivot. Old bicycles had a mudguard, which is removed. The bolt hole for the mudguard attachment provides a convenient place to bolt on the gas strut. The gas strut attaches to one side of the fork only. This means that the forces are asymmetrical but I don't think this will be a problem as the compression forces on the gas strut are not great.

other struts of the bicycle back wheel frame are cut off.



There are probably many other better designs which may be even easier to build. If you have a better idea why not write it down and send it in to the newsletter. I haven't built my wheel yet ,so you can possibly save me some effort and trouble.

SHOP TALK

SYMPOSIUM 2000
10^{th}-12^{th} June
Bacchus Marsh

By Peter Champness

A group of homebuilders and other interested people gathered at the Bacchus Marsh gliding airfield near Melbourne for the 4^{th} Homebuilders Symposium over the Queen's Birthday Weekend. The topic of the meeting was Sailplane Design.

Three new members joined at the Symposium. Brian Rebbechi, Dete Hasse and Scott Barrett, who are all hang glider pilots. Brian is interested in building a Carbon Dragon and Dete, a Woodstock.

A variety of aircraft were bought to the meeting. We were thrilled to see Graham Betts' Carbon Dragon, which was flown late on the last day, demonstrating car tow launching. Paul Johnson flew his Windrose powered sailplane on the Sunday and Peter Raphael and Mal Bennett demonstrated their Woodstock and Monerai gliders. Mal had his pylon mounted Konig engine fitted and demonstrated impressive climb rates reaching 800 ft before the end of the runway in zero wind conditions.

On Saturday, Ian Patching was busy packing the Ron Adair Altair on a trailer for removal to some other place. This was another opportunity to inspect an Australian designed and constructed glider. The Altair was a contemporary of the Slingsby Skylark gliders and is said to have had an L/D of 30:1. Ron died very recently aged 74.

Scott Barrett and Peter Champness set up their hang gliders. Scott has an Enterprise 160, which represents contemporary hang glider design, with many advanced features. Peter Champness brought his 28 year old Mustang hang glider, which was an unusual design for the time with a number of novel features, including a 'V' tail. The keel of Peter's hang glider fractured during the setup at the base of the tail. The fracture was probably mostly due to corrosion after 20 years of inappropriate storage. However, applying some of our design knowledge acquired at the symposium we also decided that the bolt placement through the keel tube was incorrect and likely to raise the stress causing metal fatigue!

Colin Collyer lead a delegation of VARMS members who brought their ¼ scale Woodstock model gliders and flew them on Sunday towed by a model Piper Cub at scale speeds of over 100 knots. Normal glider flying was occurring at the same time. Once the model gliders got off tow it was easy to confuse the models with the full size gliders which being further away looked about the same size.

The activity on the first day was covering of the elevators of a Piper Pawnee using the Stits Polyfiber process. Dave Derbyshire, the owner of Aviaquip took us step by step through the process of preparing the framework surface, priming, cutting, gluing, ironing and shrinking until we had a very nice, taught covered surface ready for painting. Everyone took turns and got their hands covered in fabric glue. This, I feel sure will have quite a few delegates nipping home to try covering a surface for themselves.

The model glider builders turned up by mid morning and showed off their ¼ scale Woodstock models. Colin Collyer developed the model design with the help of the plans and scale drawings from James Garay's glider. The model design required some departures from the full size in the interest of simplicity and quicker construction. Some of the features were quite interesting such as self-connecting elevator controls. The model designers had adopted full size design features such as suspending the fuselage from pins at the front and rear of the wing root rib rather than the main spar.

Model design and construction can be a very useful aid for the sailplane designer. A ¼ or 1/3 scale model can be constructed for a fraction of the cost of a full-scale aircraft and takes comparatively very little time. The recent Genesis sailplane was built first as a 1/3 scale model to test the design and some of the flying characteristics.

The next day was the start of the serious talk. Doug Lyon the designer and builder of the Zephyrus discussed a wide range of design topics from spar dimensions to wing sections and hinge designs. Doug feels that some poor design features are present in the approved designs for Homebuilt sailplanes and that there is room for improvement. Many design modifications have been approved by the GFA and can be supplied to registered builders.

Alan Patching followed up with talks on fatigue in aircraft structures and flutter problems. The causes of flutter are fairly well understood but predicting the conditions that may induce flutter is not so easy. Alan had a small booklet that, he says, contains many practical suggestions for reducing flutter problems. Designers are encouraged to obtain a copy.

John Ashford contributed with a discussion of the operational envelope of flying speed and G loading with consideration of maximum design speed Vs VNE. He also made some interesting comments about the wing loading resulting from gusts which can be 25% higher than predicted from the stall "g" loading at given airspeeds.

The final day featured talks by Graham Betts on the construction of his Carbon Dragon and Mal Bennett and Peter Raphael (The Erudite) about their building of the Woodstock, Monerai and Duster gliders.

Graham showed us some parts that he had made from carbon fibre. Having considered hinge design with Doug Lyon,we were startled by the extraordinary lightness of his carbon fibre hinges. The Carbon Dragon incorporates undercarriage doors in the fuselage pod so the pilot can stick his feet out for foot launched takeoffs and landings. Graham says he doesn't intend to foot launch his glider and could have saved a little weight if he had made it without the doors.

Graham carries a skydiving reserve parachute in the cockpit for emergencies. Since Carbon Dragon is so light there is no need to jump out if the wing fails. The parachute bridle is connected to the aircraft structure. Graham just has to throw the parachute bundle out the open side panel of his cockpit. The parachute lowers the glider safely to the ground with the pilot still inside. The idea has been seriously promoted for heavier gliders, because accident analysis shows pilots have considerable difficulty jumping out of a damaged, diving glider , but it has barely reached the testing stage.

Mal Bennett and Peter Raphael (The Erudite) finished the session by showing us a video of the gluing of the wing skins on their recently completed Duster. I would recommend this video to anyone about to try gluing wing skins as it contains many good tips for doing a good job and keeping out of trouble. I expect Peter would lend it to members if requested. Mal and Peter then told us about the problems involved with their Duster, which they purchased in a partially completed state. Some of the previous work was unsatisfactory but this was not apparent until they had brought the aircraft home from NSW. Therefore it was two steps back for one step forward as they had to unmake some sections before making them again. Mal titled his talk "Why do I persevere?" The pictures of the completed Duster provided the answer, which is a very handsome glider, guaranteed to frighten the smaller eagles out of the sky with its Christen Eagle like colour scheme. We hope to see the Duster and the James Garay Woodstock at the next Symposium.

HOMEBUILT SAILPLANE IN AUSTRALIA

By Alan Patching

Almost 60 years ago when I became interested in doing some gliding, the only practical way of acquiring a glider was to build one. This in fact had been the way most pilots had been able to get flying beforehand. Just as today, there was a scarcity of plans available to chose from and eventually we managed to find a partly built pair of Primary wings of unknown origin from which we designed a fuselage and made our own glider.
The first homebuilts were Primaries made from plans printed in magazines, leaving much to the builders own initiative.
Nevertheless there is no record of any of these machines suffering from an airworthiness problem, they may have been difficult to control. However since the flight time was usually measured in seconds, there was not much time to get into serious trouble.

Allan Ash has covered most of the gliders built and flown in this country in his book " Gliding in Australia" which unfortunately is now out of print. Ask around and you will probably not have too much trouble getting a loan of a copy.

For all the gliders and man-powered aircraft that have been designed in Australia contact ***David Craddock. 78 Kent Street, Epping, NSW, 2121.*** He has published four volumes so far which cover the period from 1868 to 1950.

As might be imagined there were some innovative designs which luckily did not do any serious flying. I became aware of some when all matters concerning gliding were referred to me at the Aeronautical Research Laboratories. In a few cases the inventors or designers had fallen into the trap of building a small scale version to prove that their design would fly. Two examples of traps in this approach are the standard paper glider and the circular wing which only work well in the small scale versions.

There have been many very successful local designs but apart from the Jack Munns "Falcon" and the Ted Pascoe "Spruce Goose", only one example of each has been produced by the designer.

Nevertheless, there have been many gliders built by homebuilders using overseas designs. All of them have been made from drawings apart from a Slingsby "Kadet"; Slingsby T-31.Two, a Schweizer 1-26 and Slingsby "Dart" were imported as kits.

Emilis Prelgauskas, P.O.Box 1, Bridegewater, S.A.5155, has copies of most drawings, including the Martin Simons collection of Slingsby drawings, and arrangements can be made to view these.

Building your own glider is a task that requires a lot of dedication, and is best done when you are single. The fact is that apart from Norm Hyde designing and building the UT-1 in three moths ,every other project has taken at least two years. The longest being "Zephyrus" which took a mere 15 years and had its proof loading before it flew.

The skills required are easily learnt if needs be, and the tools minimum- ask any SAAA builder. All you need is enough space-like the lounge room- hence the need to be single, not essential, it just helps!. Any reasonable garage can be turned into an excellent workshop.

The SAAA library at Clifton Hill contains a number of books and videos on building your own aircraft. There is no difference between making an aeroplane and a glider structure. The same principles and techniques apply. Later this year thanks to Peter Carr, SAAA and Geelong Gliding Club member, Ian Jacobs "Werkstattpraxis" or "Workshop Practice" will be available in English.

Choosing a glider to build is more difficult since the availability of plans for gliders with a glide angle of 30 to 1 or more is almost nil. There is a project being mooted at the RMIT to design such a glider for the Australian homebuilder and I hope that it comes to fruition in the not too distant future.

The PW-5 plans were to be available and there is still a possibility that this could happen.

The GFA have always been helpful to Homebuilders who often see the need for making improvements to the original design and of course the Experimental Category makes this an even easier task.

However I would ask that you make use of the expertise that exist amongst our members and seek advice before making something that may not be correct and have to be discarded.

Words cannot describe the feeling of having built your own aircraft and then flying it, no matter what the performance may be. Another moment is of course when you let someone else fly your glider and you can only stand and watch it fly off into the distance.

BOOK REVIEW

by Monsieur Dominic Lowe

Aerodynamics for Soaring Pilots, by Henry Millicer Published by the Gliding Club of Victoria, 1976.- A (very late) review.

The description of Fred Thomas's " Fundamental of Sailplane Design" in March 2000 issue has finally spurred me to mention, for those who may not have heard of it, Henry Millicer's "Aerodynamics for Soaring Pilots".

The late Henry Millicer was a record-breaking glider pilot(selected to represent Poland in the 1940 Olympic Gliding Championships}, an aircraft designer of some note {responsible for the Victa Airtourer}, and principal lecturer in Aerodynamics at RMIT , when not flying his Libelle.

His slim little volume is highly recommended for anyone seriously interested in glider performance or design. Distilled from a series of lectures Millicer gave over the years to the Melbourne gliding community, it benefits from being written in the plain well-expressed English of another professional era. While neither as ambitious or comprehensive (at only 70 pages} as the Thomas text, it packs a terrific amount into 17 chapters, with a keen eye to practical examples. It naturally requires a smattering of higher math's (but not too difficult} helped by Graham Law's many drawings-each very clear and to the point. Although some references date it, it remains essentially classic. Apart from the summary, he covers: 1- Lift, drag and pitching moment, 2- Equations, 3- The Reynolds number and scale effect, 4- Types of air flow, 5- Profile drag, 6-Induced drag, 7-Pitching moment and tail load, 8- C.G.-Weight envelope, 9- Manoeuver envelop 10- Gust envelope, 11-Instrumentation and position error, 12- Performance, 13- Practical and structural problems affecting performance, 14- Dynamic stability and controllability, ground looping, 15- The deep stall of sailplanes, 16- Variometers.

As examples of Millicer's straight talking, the following three quotes are eye-catching. I apologize for not being able to put them in context. You'll have to read the book...

The only avenue left to the designer who wants to decrease drag is to increase both the wing span and area at the same time.

It may be of interest to the club bar flier that the difference between L/D=50 and 49 at 50 knots amounts to only ½ inch per second1 1...the above difference would require a glide of 10 N.M. in absolutely still air in order to measure the difference = 25 ft. Thus it can be easily understood why it seldom pays to circle at an angle of bank more than 50 degrees.

Millicer's experience up to the time he wrote this book was gained before high-performance personal computers and very exotic materials. To be fair, this is a book about aerodynamic and not structural performance, but he does have the following to say about structures and glassfibre performance in high-speed conditions: 'Please note that the wingtips are lifting Downwards [in the example due to the combination of torsional deflection and 'wash-out'], giving a very peculiar lift distribution and a very high induced drag...the structural implications...can be serious...When pushing your high performance glass sailplane to a high speed final glide, watch those wing tips closely. If they have any tendency to twitch and bend down... you are dragging [them] behind you and your loss of L/D is high in spite of what your Mac Cready ring says..!

In my journey of understanding gliding principles, I've found it both accessible and enlightening and firmly recommend it. Unfortunately, my own copy is now too battered to loan. However, I'm reliably informed that the Gliding Club of Victoria still has a few left; the price is $ 10 plus postage. According to my July/August 98 copy of Australian Gliding, their details are: Gliding Club of Victoria,PO Box 46, Benalla Vic 3672; Ph.(03)5762 1058. Fax. (03) 5762 5599.

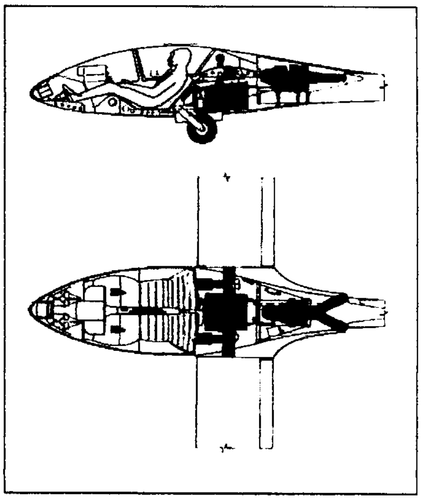
A self launch JET sailplane?? WHY NOT ???

by Mike Burns

The first installment of an article outlining the application of a small jet engine to a self launching sailplane.

Back in 1922 the National Advisory Committee for Aeronautics presented a study paper which examined the comparison between state of the art piston engines and the "jet" engine which even in 1922 was a gleam in many engineers eyes They got it right. They predicted a long slow gestation period before a viable jet engine could be coaxed into flying

The First "JET" engine flew in Italy around 1935. well, almost a jet, it performed poorly, used fuel like a fire hose, but that signaled the start of what has become the normal power plant for heavy transport and military aircraft building up a tremendous history in safety and reliability world wide.



1935 was 65 years ago. So it seems logical to assume that "Jet" by now has been accepted in all areas of aviation , not just airlines, charter. commuter and agricultural flying. Not so. It has not been able to make much impression on General Aviation Recreational or Sport flying.
Why ??
There have been 2 basic problems which have kept it away from the "grass roots" areas.

Firstly, the cost per engine has been extremely high. Far higher than other comparable piston engines , secondly the fuel consumption has been poor, to say the least.

Fortunately those problems are diminishing and within the next decade we will see pure jet and turbo prop engines filtering into sport and general aviation with some very exciting results. This is already being seen in Australia with at least 6 projects underway involving small pure jet or turbo jet engines in ultralights and rotorcraft.

The "jet" which flew in 1933 was built by the Caproni Aircraft Factory in Italy, a factory dating from 1911 and a leader in aviation innovation and development. During the early 1960's , the Caproni Directors set a goal to design and manufacture the best 2 seat sailplane in the world. They started with a series of single seat all metal sailplanes which led to the A21 side by side 2 place sailplane which first flew in 1972. A 20 metre span and a 43:1 glide angle. It was undoubtedly the best performing 2 place sailplane built up to that time. Composite materials were too new for Caproni to use in structural areas, so they drew on their enormous metal working skills to create metal laminar flow wings, a. most difficult exercise

The factory also built the A15, 25 meter, single seater using A21 parts which turned in 1:50 in 1976.

The A21 being "side by side seating", of course, cut across the gliding "establishment" which frowned on the side by side configuration:, neglecting the huge social benefit of side by side seating and the vast improvement in instructor/pupil contact. To prove a point, Caproni measured the drag of an early Libelle fuselage and the A21 fuselage (twice as wide) and the A21 was the lower of the 2. It was the correct profile and as laminar as possible, back to the wing.

But the Caproni Directors had another agenda. They had seen the efforts made from the 1920's onward to create self launch sailplanes that met all of the basic needs of a good self launcher. They had seen all sorts of engines, propellers and airframe configurations dreamed up, most of them falling down in some way or another. Caproni believed that the solution was a "Jet" engine, hoping its marriage to a high performance airframe would create for them the best powered sailplane to fly up to that time.

Meanwhile over in France, a significant amount of development was being done on the design and development of a range of small jet engines. One of the first prototype engines, putting out around 78kg of thrust, was mounted into a wooden Fauvel AV45 tailless sailplane and flew quite successfully. That range of engines ended up being developed and manufactured by the French company Microturbo who still manufacture the same engine in a very advanced form.

Back in Italy the Caproni people set their eyes on the Microturbo engine and started to develop the A21 SJ or "Jet Caproni" as it became known. So what were the Caproni people looking for ??

(A) They wanted a simple engine. The Microturbo engine has one moving part
(B) They wanted a light weight engine. The Microturbo weighs 42 kg ready to run with all accessories
(C) They wanted an engine which did not change the glide ratio of the sailplane, while the engine was on or when the engine was off, particularly during engine failure.
(D) They wanted the simplest and safest engine management to reduce pilot work load to an absolute minimum, believing this in itself would promote flight safety.
(E) They wanted reliability and long life The Microturbo engine was certified by the American FAA and the French CAA, based on it being "burst proof' allowing installation inside a man carrying airframe. The overhaul life exceeding 600 hours.

From 1972 through to 1984 the Caproni factory worked their way through 6 Jet prototypes using the Microturbo engines, starting around 78 Kg thrust and ending up at 102 kg thrust. One of those Jets went to Saudi Arabia and while out exploring the desert one day attracted the attention of a heat seeking missile. Then there were 5 !!!

From 1984 onward the Caproni factory was absorbed into the Augusta conglomerate and work on sailplanes and jet sailplanes ceased. Caproni only had one problem with the Jets they built, the engines were very expensive, grossly expensive, making the product almost unsaleable. On the other hand they probably did create the best self launcher in the world at that time and even today in 2000 there is not much that will even come close to it. In 1990 the residual parts, engines etc where bought by an Australian enterprise with the view to continuing the Jet work here. It took a while, but in late 1997 the decision was made to produce the Australian version of the Jet Caproni. That work ended up with successful flight trials during June 2000. Now that we have first hand experience and knowledge gained from the project, we can comment on the original Caproni "dream" to create the perfect self launcher.

WHY IT WORKS

A cake is only as good as the ingredients, enhanced by the way it is cooked. Similarly a sailplane is a "package" of aerodynamics and structure enhanced by careful manufacture. The Caproni factory came up with excellent aerodynamics which creates, even in 2000, good performance . The A21 S (no engine) has very good cross country performance with very pleasant control co-ordination and stability. That only came after much development of the earlier A21. Then the challenge was to take that standard sailplane, cut it and shut it, put in an engine and not change any of those good features at all.

WEIGHT and BALANCE

The fuselage diagram shows that the engine is fitted behind the wing. That "unbalance" is corrected by fitting batteries, solenoids, voltage regulator in the nose. The fuel tank goes in under the wing and the result is a better in-flight C.G position with pilots, than as a pure sailplane. By running a progressive weight and balance program in the computer, weighing everything that came out and everything that went in ,we had control of that right from the start. The gross weight goes from 644 kg to 765 kg which allows for 2 pilots at 90 kg each and 70 litres of fuel.

ENGINE ALIGNMENT

Once the engine was behind the wing, the decision had to be made about its alignment. Any readers who have experimented with the thrust line of a model aircraft or a powered aircraft will know that a degree or 2 can significantly change rate of climb and cruise speed. Similarly with the jet engine.

Caproni had taken the view that alignment for best cruise was the way to go. Our belief was that we needed the shortest take-off distance and best climb rate. That meant a different alignment of the engine thrust. We-felt that best lift off and early climb would be with about 8 degrees of flap down. (Thermal mode in the sailplane) So the engine was aligned accordingly. Then of course came the question " Will the engine pitch the sailplane nose up or nose down when the power is applied" ??

ENGINE DEVELOPMENT

Before putting the engine into the airframe some 18 months of elapsed time were spent with the engine on a test stand. The purpose was to develop up the installation such that full power could be guaranteed with all systems working to specification. Little problems like: The electrical system is 24 volt serviced by a starter/generator. The system charges the batteries through a voltage regulator. The electric fuel pump must run at 27 volts or higher for maximum engine performance. This is a system in conflict, because to achieve the 27 volts minimum at the pump meant overcharging the batteries. Careful selection of an adjustable voltage regulator, a keen eye to minimum voltage drop through the wiring looms and the end result is the pump and the batteries get what they need (just) while keeping the systems simple.

The prime purpose of the test stand was to develop the "Trouser Leg" jet pipe. The pipe is bifurcated as shown in the fuselage drawing to steer the jet away from the tail and rear fuselage. Simple mathematics show that the bigger the angle in the jet pipe the more actual thrust is LOST. Since we wanted the best possible takeoff performance and climb we reasoned that we needed the lowest losses possible in the jet pipe. So with some development we were able to cut the original Caproni jet pipe angle by about 50% and still not have rear fuselage or tailplane interference problems. The result being, of a possible 102 kg thrust we have 97kg actual pushing the airframe.

The Sa-4 project

By Donald Santee

It has been many years since a new homebuilders sailplane has appeared. It is time to apply the energy and talent within our organization toward the design and construction of a prototype that will fly better and be more "buildable" than what we have today.

As a group, we can accomplish much more than we can as individuals. SHA should have several designs teams working on a variety of soaring machines. One team might devote itself to ultra-lights, while another would tackle motorgliders. By this approach each member would be represented in his particular area of soaring. For many years I have been thinking about this subject of cooperative action to help our dreams come to fruition. We have engineers, draftsmen, computer experts, artist, all sort of technicians, and so forth—that can contribute to a common goal.

It is a fascinating prospect and one that can be realized if we will share our abilities and join "the team".

Since our last SHA Convention at Tehachapi I have been doing some designing on a plane that I call the Sa-4. It is intended to be an entry level sailplane that would encourage people to get into homebuilding and flying .Stan Hall did engineering on the wing spar. The other parts have been designed and static tested. Construction is mixed. Performance will be proven when it flies, but I estimate 28:1. A lot depends on small details that add up in their aggregate.
Remember TINY MITE began as 20:1 and gained nearly ten points by smoothing and refinements.

THIS IS AN INVITATION TO PARTICIPATE IN THE CREATIVE PROCESS!...*Let's work together for the future of soaring!*

Editors Note: OK, people from Down Under. How can we help our cousin from the Up Side Down land. Any suggestion?

USA UPDATE from John Ashford

I just spent 8 weeks in the USA with Alan Patching and the Golden Eagle. We started off from Tehachapi where Dan and Janice Armstrong had been looking after us until the Eagle landed at Los Angeles a few days after we arrived by 747 Non stop from Melbourne.

The gliding movement really looks after it's own. Jeff Byard loaned us his Ford 150 pickup, thus solving a big logistics and finance problem of buying a truck and selling it again at the end of the journey. Jeff owns quite a few gliders most of which are Vintage and is currently re-building a Baby Bowlus. In his workshop I spied a Weihe, a T21, a Standard Austria. Jeff was very busy fitting a TG2 into a trailer, which was never designed for it, so that he could take it to the IVSM at Elmira where we were headed. Elmira is on the opposite side of the USA to Los Angeles. We took about 9 days to do it so we could see a bit of the country.
On the way over, we stopped at Albuquerque where George Applebay put us up. George was busy fitting his Nelson Hummingbird into a trailer it had never been in before, so that he could take it to the IVSM. I started to think this must be a national pastime for American glider pilots! George is the designer of the Zuni and runs a comprehensive glider workshop. George has also mastered canopy manufacture and has a large oven for heating the acrylic sheets. More on canopy manufacture in a later issue. The Golden Eagle being a one off certainly was the oldest home built at the IVSM and very nearly the oldest glider being piped by a 1932 Franklin ,which we understand had been resurrected from a heap of junk. We claimed to have the oldest glider, which has been in continuous service. No one challenged that!

The highlight for the homebuilder at Elmira was the presentation by Steve Arndt of his very finely crafted Carbon Dragon. This glider is the best finished homebuilt I have ever seen. Steve is a hang glider pilot thus showing that you don't have to be a glider guru to do a good job of a homebuilt.

After the IVSM ,we visited Washington DC and were able to see the insides of the Garber facility at Maryland. This is where the Smithsonian restores all the many airplanes they have collected. We were lucky as currently they were restoring two gliders, a Bowlus Albatross and a Grunau Baby IIb. The Bowlus being skinned in Mahogany plywood looked absolutely stunning and would turn the eye of any woodworker , not just the glider freaks. The Grunau still had its original paint and was very original. Much valuable knowledge was gained about restoration at this facility. If you are visiting Washington DC this is a must, but you have to make an appointment beforehand.

After this interlude , we traveled to Oshkosh via Niagara Falls and a brief trip through a little part of Canada. Along the way we stayed with Geoff Richardson's nephew at

Detroit and at the Ford museum we could enter the Wright brothers original workshop that had been brought there from Dayton.

Oshkosh was its usual stupendous event and I will not write about it here, as you will be able to read about it soon in every aircraft magazine on the shelf of your newsagent. From Oshkosh we returned overland to Tehachapi in five days via Denver where I was able to visit Univair who manufacture Piper parts. If you like, they will make you a parts certified Super Cub. I saw a complete fuselage in its welding jig nearing completion.

Back at Tehachapi we were able to get a few days R&R at Dan & Janice Armstrong's. Due to pressure of work Dan has been unable to progress the Windancer very much.
Making a living comes first I guess. When we have recovered there will be a night at the Bacchus Marsh clubhouse where we will show pictures and elaborate fully on this odyssey.

"WINDANCER" UPDATE

By D&J Armstrong

We have been very busy with work and other things, and as a result, haven't had much time to do work on the building of the WinDancer, Dan has continued doing analysis on it, and is making progress.

The present plans for the WinDancer are 220 kilogram maximum flying mass, with a 20 Kg/square meters maximum wing loading. The span will be 14 meters. It will be fully flapped, with a modern airfoil, retracting gear, and tapered wingtips. It will be of conventional configuration, with a T-tail. It will be mostly composite.

The L/D max should be around 37, with the minimum sink rate about 90 feet/minute.

Towing operations are the key driver of the WinDancer design, with the goal to offer as many towing possibilities as possible, including using existing towplanes, ultralight towplanes and ground launch (including bungee launch). This range of possibilities will provide many more options to pilots.

The project is being done to fit into our lives. We are not planning to publish a schedule, as we have many other worthwhile activities going on in our lives, including aerospace consulting and involvement in the Sailplane Homebuilders Association. Janice teaches and does some consulting, plus a little nursing. Dan likes to soar at least 100 hours every year, and enjoy his LS-3a and his hang glider. We live in a place that is superb for both sailplanes and hang gliders, and we refuse to let the possible soaring hours go by.
Dan is currently putting in about 15 hours a week on the WinDancer. We plan to offer plan sets for sale, but not kits.

In the meantime, surf's up out here in Tehachapi-see you at the airport! There's great ridge lift and wave and thermals and a wonderful shear line… and the Sierras are within glide…See you at cloudbase!

A DATE TO REMEMBER

As usual the next year from the 6th to 13th January 2001 we will join The Vintage Gliders Australia for our summer camp at Bacchus Marsh airfield,

Resident clubs at Bachus Marsh are going away on summers camps, so the vintage gliders will have the run of the place.

Accommodation is available in the club house, reasonable shared rooms and facilities at $ 8.00 per night. Motel and Hotel accommodation is available in Bacchus Marsh, 7 kms from the field. Limited Caravan and camping sites available. For those who still like to rough it , there is plenty of space to doss down in the hangars.

With the clubs away, we can expect hangarage for up to 30 gliders. Towing will be provided with up to 3 Tugs. 2 x Super Cub, 1x Pawnee and the vintage gliders . are currently negotiating the use of a winch. The vintage gliders are expecting a wide range of gliders intending to come, there will be plenty of two seaters with Ka2, Ka4, Zephyrus, and a flock of Short wing and Longwing Kookaburras. Single seaters from H 17 to first timers Slingsby Dart. Throw in some Ka6's, Olys ,Boomerangs and others things. Should be a whole lot of fun.

As usual, a presentation dinner will be held, probably on the Friday night. If you are intending to assist this gathering, let me know ASAP so we can arrange our presence with our vintage glider cousins.

☺ SMILE....by public demand!

Mr. Daniel Armstrongrich, a businessman from California, walks into a Bank in New York City and ask to see a loan officer. He says he has to go to Europe on business for a couple of weeks and needs to borrow $5000. The officer explains that the bank would require some kind of security for such a loan. The businessman hands over the keys to a brand new Rolls Royce that's parked at the kerb in front of the bank. The loan details check out, and the bank agrees to accept the car as collateral. A bank employee drives the Roller into the bank's underground garage and park it there.

Two weeks later, the businessman returns, repays the $5000 and the interest, which comes to $15.60. The loan officer say's, "We're very happy to been able to do business with you Mr. Armstrongrich, and the transaction has worked out very nicely. But we're a little puzzled. While you were away, we checked you out and found out that you're a multi-millionaire. Why would you bother borrowing $5,000?"

Mr. Armstrongrich replies, "Where else in New York can I park my car securely undercover for two weeks for 15 bucks?'

NEW MEMBERS

We have new members to welcome to the group, this time namely:

Donald Santee - 4510 N. 13th Ave. PHOENIX, AZ 85013 USA
Paul Bayley - PO.Box 183 Kalorama.Vic 3766
Scott Barret -.67 Murphy Rd Pakenham. Vic. 3810
Dete Hasse - 4 Scullin Court. Sunbury. Vic.3429.

WELCOME ABOARD fellows and look forward to a long and mutually satisfactory association.

CLASSIFIEDS

VINTAGE TIMES.

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

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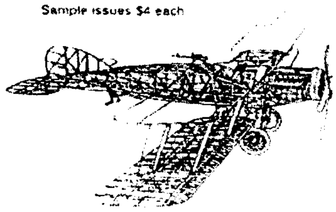

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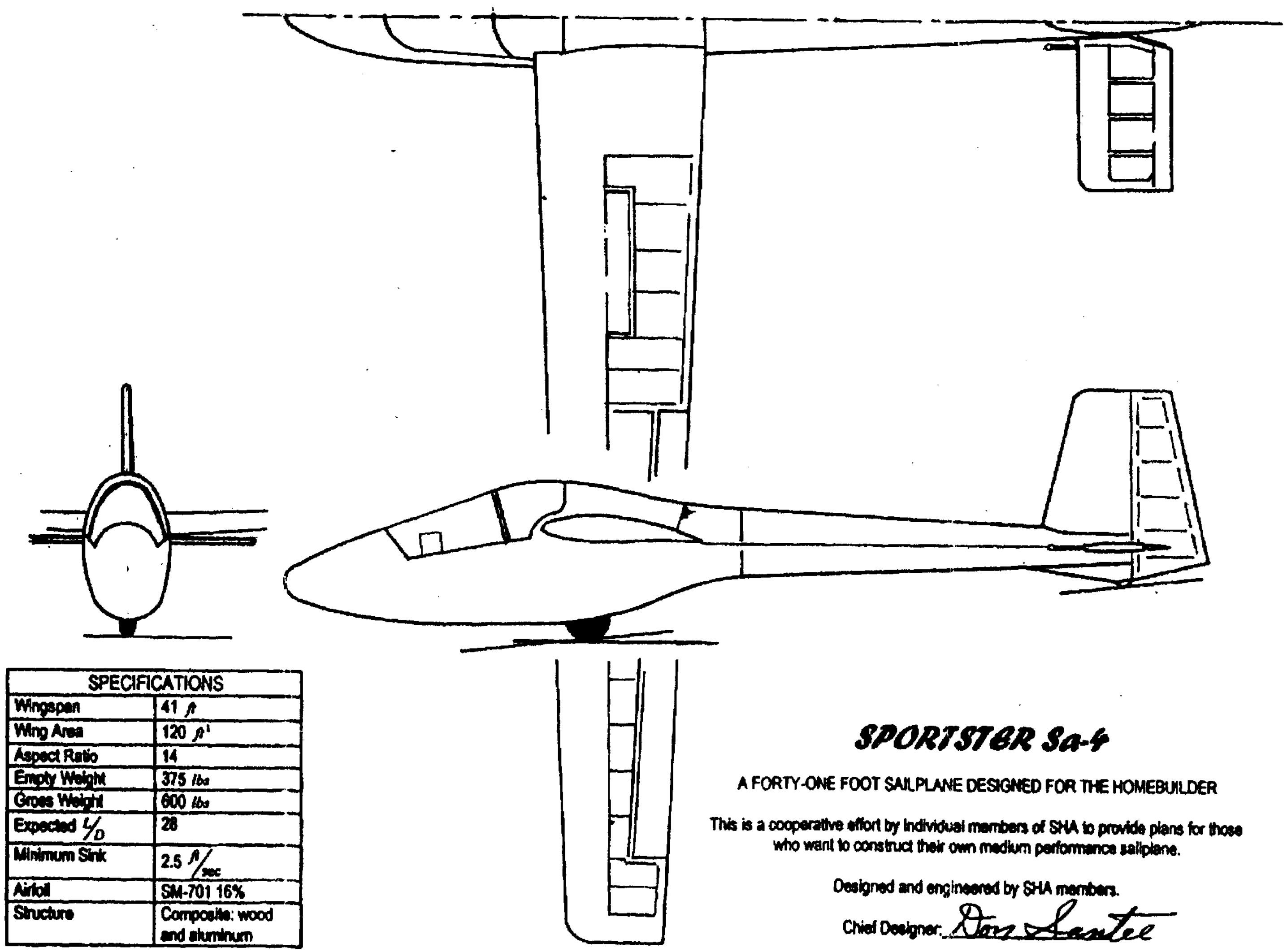

SPECIFICATIONS	
Wingspan	41 ft
Wing Area	120 ft^2
Aspect Ratio	14
Empty Weight	375 lbs
Gross Weight	600 lbs
Expected L/D	28
Minimum Sink	2.5 ft/sec
Airfoil	SM-701 16%
Structure	Composite: wood and aluminum

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