THE AUSTRALIAN HOMEBUILT SAILPLANE ASSOCIATION

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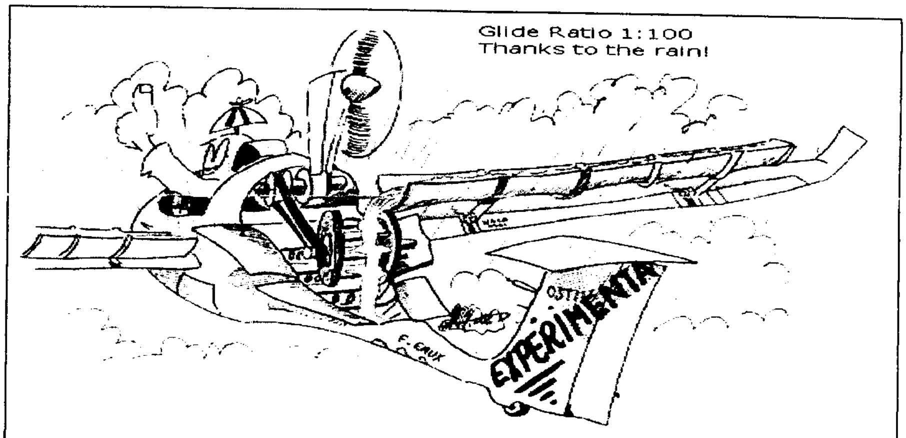

(Courtesy of Mondial Visions No. 5 - 1997 bulletin of the 25th World Gliding Championships)

PLUVIAL MOTOR GLIDER

G'day!

Our cousins in the USA call us the people from down under. I'm confused, aren't they upside down? Can any body help me please!

This is issue number 12 and it is my third year as Editor of this Journal and I can not deny that running this journal is a very demanding task but it's been made possible because I have behind me a very good team that I call the AHSA servants.

As I said before, this is your journal and you are the force behind us, without your input this could not be possible.

I would like to take this opportunity to thank two persons that are helping me with no compromise, one is Peter Champness and the other our cartoonist Sergio Jacobi, they are doing a great job!

Thank you fellows!

A.H.S.A. is a non profit organisation and the fee that you pay just cover the production and mailing the journal. During our annual meeting last year, we decide to increase the subscription to $ A 20(in Australia) and $ 25 (to overseas) I think that the journal is a good value for money and the increase will not upset your pocket or piggy bank.

This issue marks the end of the subscriptions for the year 1998/99. All subscriptions are now due for renewal. You will find a renewal form at the back of this issue. Send it back to me as soon as possible because your humble Editor will take a few months holidays overseas. But I will be back for the next issue!

James Garay

Inside This Issue

President's Corner
From the oval Office

By Gary Sunderland

This year, 1999 marks the 50th anniversary of the formation of the GFA.

You may have read the article by Alan Patching in the February A.G. on page 13 asking that we celebrate!

This gets Alan my monthly CRAP award. CRAP is a subject dear to my heart and stands for Completely **Wrong** Accepted Principles. These are not as bad as Strongly **Held** **I**ndefensible **T**enets, but you get the idea.

From now on I shall be giving these awards as and when required to the many deserving people in the GFA and elsewhere.

We need to remember and celebrate the formation of the GFA and our **exemption** from the regulations by which the beaurocrats control commercial aviation.

I doubt we should celebrate the airworthiness **Delegations** foisted upon us, as part of the deal and which have proven to be such painful head ache to everyone of us who operate gliders.

So one **CRAP** to Alan, for forgetting the difference between **EXEMPTIONS** AND **DELEGATIONS** and for putting this blooper into print.

For any reader who may still not dig the difference, the British have complete **EXEMPTIONS** from their Regulations.

British gliders are not registered and the BGA runs all aspects of gliding, including airworthiness, as they see fit.

Back in OZ, we need to remember our history, particularly because we are about to fight the same battle as to who controls gliding, all over again.

What has this to do with the homebuilt movement? Quite a bit if we recall the history.

When the GFA was formed all those years ago, there was no airworthiness system, only the homebuilt glider movement, which existed in a state of complete freedom and anarchy.

From the date of it's formation the new GFA relied upon our homebuilders to set up an airworthiness system as the movement expanded. One major step was the formation of a National Gliding School located at Gawler. The airworthiness par of the school was initiated by amateur designers and builders like Ron Adair, Keith Jarvis and Kevin Sedgman. They laid the basis for all that followed.

Later on the maintenance specialists like Alan Patching and Reg Pollard took over and developed the school emphasis to care for factory built gliders. Reg Pollard and I laid down the basic procedures for airworthiness which, in 1966, were written up into what became the MOSP Section 3.

One part of these procedures, which you can blame on me, was to control not only inspections but the quality of repair work carried out on gliders.

During the early years of NGS our homebuilders emphasised the vital importance of quality and workmanship in all repair work.

At the time this was a major concern because the (then) Department Of Civil Aviation were grounding old wooden aeroplanes and were threatening to do the same to old gliders.

Alan Patching and I looked at the problem, which seemed to indicate only bad maintenance and repair practices in the aviation industry resulting in aeroplanes literally falling apart in the air!

How could we, a bunch of amateurs, tackle the problem of old aircraft when the professionals had failed ?

The problem seemed to be one of control. The DCA had very tight control, perhaps too strict, of the quality of aircraft welding, but absolutely no control on making wood joints and repairs.

Any aircraft inspector, or worker,could get stuck into a wood aeroplane repair. This is still the situation at the present time.

From the beginning the NGS had its " Standard Part" used by Ron Adair, to teach pupils the art of aircraft woodwork. Therefore it was logical to for us to treat wood repairs in the same way we were to authorise welding within the GFA.

Therefore, when the "authorities" were made up for gliding it was logical to not just appoint "daily" and "yearly" inspectors, but also "wood" repairers, steel tube (welding) repairers, metal (rivetters) and even the (then) very new FRP repair people.

Incidentally the "yearly" inspectors were similarly classified, but I never did intend to divide up the "daily" inspectors in the same way. This just happened by accident, but you can blame me!

So you can now see that the foundation of the whole of the current GFA airworthiness system, which has an excellent record by any measure was based on our local homebuilders.

We need to remember these pioneers with thanks and with pride in our individual connection with this vital and important part of the Australian and world wide soaring movement.

Let's celebrate that folks!

MAIL BOX

Dear Ed,

G'Day! How are you going? Things are very busy here for me right now. I am in the process of re-building an ASW-15b that crashed near Bathest in NSW last February. The boom was snapped aft of the wing, the fin was twisted off, the nose had spiral cracking and assorted broken bits in it, the wing has been damages due to flexing rearwards during it's arrival.

The project is to finish off my Major repair rating for FRP that I have been working towards for the last 5 years.

I plan to have it finished by June if all goes to plan (HAHAHAHA!) After that I will be going to Japan again to do some (body work) up there. Since that is going to happen, (getting married) I need to change the long running add to sell my WOODSTOCK project.

Please put this in the next issue of the magazine if you can.

Ed's Note. *I have to oblige. No other alternative.*

"SAYONARA SALE"

One WOODSTOCK project that wants to be worked on again and gotten into the air. Fuselage at boat stage with tail feathers, spars complete, most wood to complete project, steel, nuts, bolts and some instruments included in the price. I'm leaving the country for a while (due to an ultimatum from my fiance) so the WOODY needs a new home.
All I ask is $1,500 O.N.O, it's gotta go so make an offer. Phone or fax Mark on (08) 85413 227 any time.

By the way, congratulations on the 1998 Symposium, it looks like it was a great success and it's good for me to see the association still growing into a group that people look to for advice and guidance, this was one of the objectives when I suggested to others that there was a need for this style of association in this country and you Jim & Peter Raphael have been an important part in this process as Editor & Co-Editor of the Newsletter.

I wish to take this opportunity to congratulate all the executives and members of the association for making it what it is today.

It is a far cry from our little group of 10 members that we began with.

I am also enclosing the master copies of the first seven newsletters. They may be of interest as the years roll on for members in the future. They are pretty basic and really are "cut and paste" style as I spend many hours sitting on the floor surrounded in paper scraps and glue to put out the next issue of the newsletter (as opposed to stuck to the floor surrounded in timber shavings).

Well that's it for now so I'll leave you to it, take care.
Mark Stanley.

Ed's Note. ***On behalf of all AHSA members we want to wish you all the best in the near future. Yes..! as you say.... we are growing and this is your brain child and we will make it bigger and better. She's apple's sport...! Dinky dye Aussie.***

Dear Ed,
I have received a letter recently from Grace Iggulden, who was at one time married to the late Fred Hoinville, telling me that she has arranged for Fred's popular book " Halfway to Heaven " to be reprinted.

I think the book would be of great interest to some members of A.H.S.A so I am enclosing an order form for the book from which you may like to write up a brief news item to let members know that the book is once more available.

Continued congratulations on the newsy content of each issue of the A.H.S.A newsletter. I always read it with interest.
Best wishes for 1999. Regards, Allan Ash.

Ed's Note. *Read more about this book somewhere in this journal.*

Dear Ed,
Thank you for your recent note. We appreciate your comments! We are envious that you are in the midst of summer, it has been very cold here. We are awaiting the long days and the summer!

Thanks for the kind comments about Janice's work as editor of Sailplane Builder, feel free to reprint any of it that is helpful.

We are hoping to some day come to Australia during our winter. Janice strongly wants to spend a Christmas there in the sun. We will have to see how the Windancer plan sale goes! We have a number of friends from Australia, such as Steve Moyes and the Moyes hang glider pilots, who come here to the Unites States during your winter/our summer. It is always good to see them.

We enjoyed the G'Day. jpg-thanks for sharing it with us!

Gary Osoba is running for President of the SHA (he is running unopposed). We are very pleased and look forward to working with him.

Take care and keep in touch. We appreciate the camaraderie between the SHA and the AHSA. Regards, Janice and Daniel Armstrong. "Sailplane Builder" USA.

Ed's Note. *A student from Germany sent to our secretary Peter Raphael (The Erudite) the letter shown below. If any member can help with the request, contact him or pass the information to us. Reply has been e-mailed advising of the GFA web site and link to other organisations.*

Dear Ed,
I'm studying Aerospace engineering at the university of Stuttgart, Germany and I am a member of the Academic Flying Group of Stuttgart (www.uni-stuttgart.de/akaflieg). From October '99 until March 2000 I want to get some practical experience on a professional level (and would like to travel to Australia). Therefore I'm looking for aviation companies which are producing and/or repairing any kind of airplanes, where I could work during this time.

If you could help me with any kind of address and further information, I would be very glad.

If I can give you any help on problems concerning the different projects going in your association, let me know.
Greetings,
Lukas Bucher.BucheAir@studbox..uni-stuttgart.de.

HOOP PINE FOR GLIDERS

By Gary Sunderland.

Hoop Pine is a local timber, from Queensland, that has been used for the construction and repair of aircraft in Australia since WW 2. In recent times there has been some difficulty in obtaining selected grades of hoop pine, suitable for use in aircraft, but a new organization has been set up to provide local timbers for aircraft construction and repair.

Graham Kevin is the proprietor of PRO-MARK (QLD) Pty.Ltd, a CASA approved Organisation, number C 541685, who select, test and distribute the best Hoop Pine timber obtained through the local industry. Not plantation timber, this bush timber is some 20% heavier, and stronger, than Spruce, and is direct substitute for Douglas Fir (Oregon) and American Mahogany, European "Redwood" (Polish Pine) or Kiefer and African Mahogany (Gaboon).

Many of these original timbers can be difficult to obtain in Australia, so that Hoop Pine may become an important alternative timber in construction and repair.

PRO-MARK do not supply large flitches, but specialise in small orders, made up to the finished dimensions of parts, to suit each individual builder. Each timber order is identified and tested, and a written compliance statement accompanies the timber. There is no wastage, so you only pay for usable timber.

Test results from PRO-MARK indicate that their selected Hopp Pine may be used as a direct substitute for Douglas Fir (BG-12 and Woodstock timber) and Kiefer (ES 49 and KA 6, Polish Pine 9 Bocian etc,etc.)

It may be possible to obtain lower density timbers for use as Spruce substitutes, where weight is a factor. (As it usually is with gliders).

PRO-MARK are also starting the manufacture of plywood, in conjunction with a local plywood manufacturer, and can now provide the equivalent of USA marine Grade mahogany ply, as used in the construction of the BG-12 and Woodstock.

For more information in Hoop Pine timber and ply contact: Mr Graham Kevin Pro-Mark (QLD) PTY.LTD. 100 Berry St. CHURCHILL Queensland 4305.

Acrylic Facts

Characteristics of the material

Watch out for static electricity when working with acrylic plastic.

Half the weight of glass Impact resistant Unaffected by sun or salt spray Temperature range of -30 to 160° F for continuous service

Cleaning

Wash with mild soap or detergent, with plenty of lukewarm water, dry with soft cloth or chamois. Grease, oil or tar can be removed with hexane or kerosene. Solvent residue should be removed by washing immediately. **Do Not Use** window cleaning sprays, scouring compounds, acetone, gasoline, benzene, carbon tetrachloride or lacquer thinner.

Masking

When working with the material, leave the paper masking film on the sheet as long as possible. Except for intricate detail work you should remove the masking only when your project is completed.

Working with acrylic sheet

DO

Keep masking on as long as possible. Use metal cutting saw blades and drills which are ground for acrylic sheet. Make sure all tools are sharp.

Use water or drilling oil as a coolant when cutting sheets over 1/8" thick or drilling sheets over 3/16" thick. Wet the material before cleaning.

DON'T

Use saw blades with side-set teeth. Saw teeth ideally should be ground with 0° of rake and be of uniform height and shape.

Cutting Acrylic Sheet

Cutting with a knife or scriber

Acrylic sheet up to 3/16" thick may be cut by a method similar to that used to cut glass. Use a scribing knife, a metal scriber, an awl, or a utility knife to score the sheet. Draw the scriber several times (7 or 8 times for a 3/16" sheet) along a straight edge held firmly in place. Then clamp the sheet or hold it rigidly under a straight edge with the scribe mark hanging just over the edge of a table. Apply a sharp downward pressure to break the sheet along the scribe line. Scrape the edges to smooth any sharp corners. This method is not recommended for long breaks or thick material.

Cutting with power saws

Special blades are available to cut acrylic. Otherwise use blades designed to cut aluminum or copper. Teeth should be fine, of the same height, evenly spaced, with little or no set.

Table and circular saws

Use hollow ground high speed blades with no set and at least 5 teeth per inch. Carbide tipped blades with a triple chip tooth will give the smoothest cuts. Set the blade height about 1/8" above the height of the material. This will reduce edge chipping. When using a hand held circular saw, clamp the sheet to the work surface and use a length of 1x3 wood to distribute the clamping pressure and act as a guide for the saw. Feed the work slowly and smoothly. Lubricate the blade with soap or beeswax to minimize gumming from the masking adhesive. Be sure the saw is up to full speed before beginning the cut. Water cooling the blade is suggested for thicknesses over 1/4", especially if edge cementing will be performed.

Saber saws

Use metal or plastic cutting blades. The blades you use to cut acrylic should never be used for any other material. Cut at high speed and be sure the saw is at full speed before beginning the cut.

Hand saws

Good results are possible, but very difficult. Be sure the acrylic is clamped to prevent flexing. Flexing at the cut may cause cracking.

Routers and shapers

Use single fluted bits for inside circle routing and double fluted bits for edge routing. At the high speeds at which routers operate it is critical to avoid all vibration. Even small vibrations can cause crazing and fractures during routing.

Drilling

For best results, use drill bits designed specifically for acrylic. Regular twist drills can be used, but need modification to keep the blade from grabbing and fracturing the plastic. Modify the bit by grinding small flats onto both cutting edges, so the bit cuts with a scraping action. If the drill is correctly sharpened and operated at the correct speed, two continuous spiral ribbons will emerge from the hole.

Finishing Acrylic

Scraping

The first step in getting a finished edge is scraping. The back of a hacksaw blade is perfect for scraping. Simply draw the corner of the square edge of the blade along the edge of the acrylic.

Filing

A 10 to 12 inch smooth cut file is recommended for filing edges and removing tool marks. File only in one direction. Keep the teeth flat on the surface, but let the file slide at an angle to avoid putting grooves in the work.

Sanding

If necessary, start with 120 grit sandpaper, used dry. Then switch to a 220 grit paper, dry. Finish with a 400 grit wet/dry paper, used wet. Grits as fine as 600 may be used. Always use a wooden or rubber sanding block. When removing scratches be sure to sand an area larger than the scratch. Sand with a circular motion, and use a light touch and plenty of water with wet/dry papers. Almost any commercial power sander can be used with acrylic. Use light pressure and slower speeds.

Polishing

Final polishing will give acrylic a high luster. Power-driven buffing tools are recommended without exception. Buffing wheels are available as attachments for electric drills. A good buffing wheel for acrylic consists of layers of 3/16" carbonized felt, or layers of unbleached muslin laid together to form a wheel. Solidly stitched wheels should be avoided.

The wheel should reach a surface speed of at least 1200 feet per minute. Speeds of up to 4000 feet per minute are useful for acrylic. Acrylic should be polished using a commercial buffing compound of the type used for silver or brass, or you can use a non- silicone car polish that has no cleaning solvents in it. First, however, tallow should be applied to the wheel as a base for the buffing compound. Just touch the tallow stick to the spinning wheel, and then quickly apply the buffing compound.

To polish, move the piece back and forth across the buffing wheel. Be careful not to apply too much pressure. Keep the work constantly moving to prevent heat buildup.

Never begin polishing at the edge of the sheet. The wheel could easily catch the top edge and throw the piece across the room or at you.

Forming Acrylic

Acrylic can be heated to make it pliable. It will become rigid again when it cools. Never heat acrylic in a kitchen oven. Explosive fumes can accumulate inside the oven, and ignite.
A strip heater is the best tool to form acrylic. This tool will only form straight line bends. Buy one from your acrylic dealer. The strip heater will heat just the area to be formed.
Heat the sheet until it begins to sag at the bend line. The bend should be made away from the side exposed to the heating element. Sheet thicker than 3/16" should be heated on both sides for a proper bend. Use forming jigs or clamps for best results, and wear heavy cotton gloves when handling heated acrylic.
Forming other than straight line bends will generally require specialized equipment and jigs.

Joining Acrylic

Solvent cement is recommended for joining acrylic. There are two techniques for solvent cementing, capillary and dip or soak methods.

Capillary cementing

This is the most popular method for joining acrylic. However, this method will not work at all unless the parts to be joined fit together PERFECTLY.

Make sure the parts fit properly. Then join them with masking tape or clamp them in a form to hold them firmly in place. It is important that the joint be in a horizontal plane, or the cement will run out of the joint.

Apply the cement carefully along the entire joint. Apply from the inside of a box-corner joint, and on both sides of a flat joint. A needle-nosed applicator bottle is recommended. The thin cement will flow into the joint through capillary action and form a strong bond. Maximum bond strength will not be reached for 24 to 48 hours.

Soak or dip cementing

This is suggested only for THICK joints.

Viscous cementing

Viscous cements are used for joints that can't be cemented with capillary or soak cementing, either because the joint is difficult to reach or because the parts don't fit properly. Viscous cement is thick and will fill small gaps. It can make strong transparent joints where solvent can't.

You can make your own viscous cement by dissolving chips of clear acrylic sheet in a small amount of solvent.

Apply a small bead of cement to one side of the joint, join the pieces, and tape or clamp in place until cured.

WHAT'S NEW?

NEW MEMBER.
We have new member to welcome to the group:
Jack Mc. Martin. 1-A Dundas St. Wangaratta.Vic 3677

WELCOME ABOARD Fellow ! and we look forward to a long and mutually association.

At last! The long awaited republication of "Halfway to Heaven" by Fred Hoinville

Fred's original book was first published in 1960 but has been out of print now for many years. This newly republished edition is available by mail order, through aviation magazines and flying and gliding clubs.

Fred was a well known glider pilot who set a number of records in Australia before his untimely death in a glider crash in 1959.

As an adult his sport was surfboard riding (he introduced the hollow board) until at thirty five, he learnt to fly. He became a glider pilot of world standing, an aerobatics expert and stunt flier, and finally in 1952 Australia's first commercial skywriter, known through his Sky Ads to hundred of thousands of Australians.

Fred Hoinville was the founder of the Aircraft Owner an Pilots Association and was involved in the founding of the Gliding Federation of Australia. The annual "Hoinville Award" for Outstanding service to gliding Operations is named after him.

HALFWAY TO HEAVEN still makes me laugh out loud or weep unashamed as no other book in any genre. If I was King for a day it would be issued with every student pilot license and be an addendum to all flight manuals" **Thomas Capell, commercial pilot. 31/7/98**

"When I was in 4th year at High School I borrowed the book HALFWAY TO HEAVEN from the school library. The book took my heart and caused a dream of flying to become a reality. I now have approximately 2500 hours of gliding and motor gliding and 600 of power flying and it is Fred's fantastic book that made my dreams come true" **(Private Pilot & AOPA Member, 18/3/98.**

Halfway To Heaven by Fred Hoinville is available only by mail order through the Publishers, Sage Pages (PO Box 2171 Warwick WA 6024) 84 Vickers St. Hamersley WA 6022.

Paperbacks A$ 29.95 each. Hardcover A$ 49.95 each.

Plus Postage & Handling: One book add A$ 5.95 Two or more books add A$ 8.95.

Or contact by: Phone (08) 93448474. Fax: (08) 93443603.
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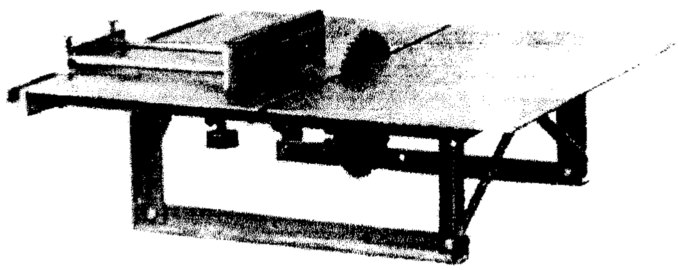
HINTS & TIPS

SMALL POWER SAW FOR THE WORKSHOP **By Roy Simmonds**



Not long ago our Erudite Co-Editor and multifaceted skills Peter Raphael presented to us his Disc Sander built with a minimun expenditure of money.
Now we are presenting to your consideration this home made small power saw. Probably you will say... What for? When we can buy already of the shelf the stuff coming from Asia... Well....! That is also true my friend... if you are a wealthy filthy rich person.. But....we the Sailplane home builder... are not...! and we have to save those bucks to buy the material to make our dreams come true. Prices of the simples machine tools, suitable for a home workshop have rocketed , far beyond the maximum which the home builder is usually prepared to pay. But there is a solution to this difficulty. Build your own.
A comparatively simple, yet more effective, and useful is this small circular saw and its cost should not exceed a few dollars.

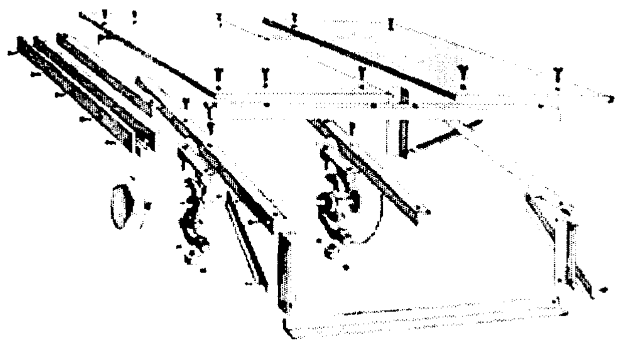
This saw has given excellent results. It will satisfactorily cut timber up to 2 ins by 3 ins. It is an amazing time saver. Using "ripping" blade it will saw across and down grain equally well. It will operate successfully from a ½ h.p electric motor (from an old washing machine) coupled directly to the saw by a rubber vee belt.

The original saw works at a speed of about 3600 r.p.m. slightly slower than that generally recommended for an 8-in.blade, but this does not interfere with the good results.

The tool is of all metal construction, which gives rigidity and a firm base for working longs lengths of timber. If you have not a drill suitable for mild steel or iron work, a local garage man or a friend would no doubt carry out the job if all hole centres were punched or marked beforehand.

Then, if components are cut and drilled, assembly is merely a matter of bolting.

CONSTRUCTION



The frame "chassis" is built up of lengths of 1.1/4 x 1.1/4 x 3/16 in. black angle iron bolted together (as shown in the illustration). The working table consist of two sheets of 3/16 in. black iron 12 in. x 24 in. and the "rip" and "cross cut" guides are built up from standard sections of bright mild steel and angle iron.

(a) **Base:** It vastly simplifies the job if the heavier angle iron can be sawn by the steel merchant into lengths required. A little extra is charged for this but it is money well spent.

Incidentally, ensure that the supplier gives you sawn lengths and NOT guillotined sections, because the latter method of cutting distort the ends of the angle iron and makes it difficult to line up the frame.

Once this has been done, mark the angle iron lengths for 5/16 inch and ¼ inch holes, as shown, and assemble, using the two 20.1/2 in. pieces as the sides of the "chassis". Bolt the cross pieces A and D into position first, and set the frame, which will now consist merely of four angles.

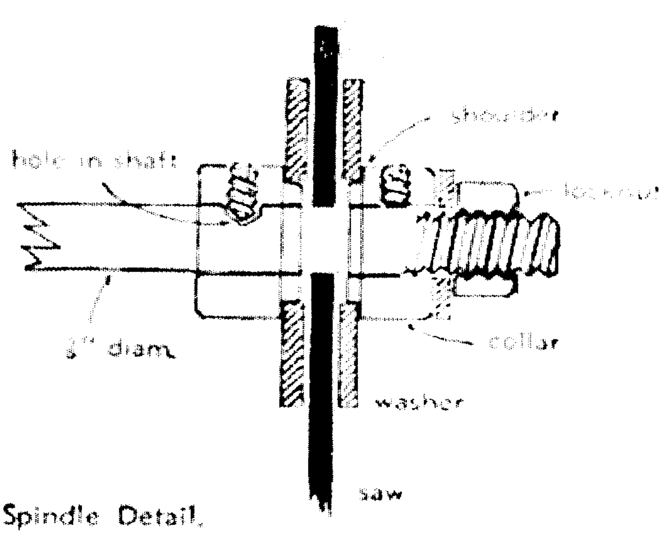
Now drill the four 7 in. leg sections 5/16 in. where marked and ¼ in. on the opposite faces to take the bolts holding the four light ½ x ½ in. angle braces. Bolt the legs temporarily to the frame.

Now bolt in the two 18 in. cross members B and C which should have been drilled to take the holding down bolts of the two 5/8 in. plummer blocks. These cross pieces could be drilled for the plummer block bolts after assembly into the frame. Make sure, however, that you line up the blocks so that the saw shaft will eventually be carried centrally across the two angle iron cross members B nd C and at right angle to the saw slot in the table top.

Cross member D should have been drilled with three ¼ in. holes where shown, to carry the built up, bright steel channel along which the cutting guides will slide. You should now have the "backbone" of the saw completed-four sides, standing on four braced legs.

(b) **Spindle and Bearings:** Cross members B and C as mentioned, will carry the plummer block bearings through which the 5/8in. saw shaft will run.

The saw shaft, in the original, is a piece of 5/8 in. bright steel rod, 12in. long. It would be an improvement to use a heavier shaft, even up to 1in. in diameter, although this would require the use of lager plummer blocks, which would, without modification to the design carry the cutting edge of the 8in. saw too far below the final level of the table. (The chassis and the table, however, could carry a blade of larger diameter and a heavier shaft, providing that the length of the legs was increased to give the bottom of the saw blade ample clearance).

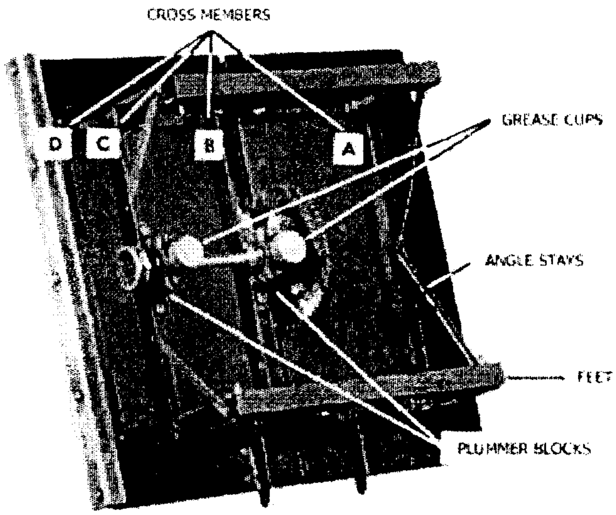


Spindle Detail.

Using the 5/8in. diameter rod, the spindle is built up merely by 5/8in. SAE, or similar, medium thread nut (*see drawing*). The thread in this case must be the normal right hand type so that pressure against the rotating saw blade tends to tighten the nut. The collars holding the saw blade on the original were built up from two 5/8in. collars (threaded for 5-6in. grubscrews) and two large washer (as shown). The washers fit over two small shoulders which were turned on one end of each of the two collars sot hat as the lock nut is screwed home the washers press evenly and securely over the centre of the saw blade.

The inner collar is secured to the shaft by its grubscrew, which fits into a 5-6in. hole about 1/8in. deep, drilled into the shaft. This makes a substantial "stop" against which the saw blade can be locked. The grubscrew in the outer collar is slackened off while the lock nut is being tightened to the maximum. Then the grubscrew is screwed home to the saw shaft. The collar in this way acts as a "safety lock" to prevent the saw blade vibrating should the lock nut become loose for any reason. With normal use, however, the lock nut should remain perfectly tight, particularly if a large spring washer is placed between the nut and the outer collar (as shown).

A third collar is locked to the shaft by its grubscrew, close to the far side of the plummer block bearing, but allowing slight to-and-fro play of the saw spindle.



Now the plummer blocks can be bolted into position on the cross pieces B and C and the saw and shaft fitted and tested. It should run freely. On the original saw, as the pictures show, the caps of the plummer blocks were drilled and tapped to take large grease cups fitted with screw-down caps, to ensure adequate lubrication of the bearings. Grease gun nipples would do as well. A 2in. vee belt pulley is fixed to the free end of the shaft.

(c) **Fitting the Table:** With the saw and shaft set in position in the bearings, place the two sheets of 3-6in. steel symmetrically on either side of the saw, allowing 3/8in. between them to give the blade plenty of clearance. Mark and drill the two sheets to take 5-6in. countersunk bolts and bolt down.

(d) **Sawing Guides and Channel:** The channel, along which the ripping and cross cutting guides run, is built up from three bright steel sections - ¾ x ¾ in. and 1½ x ¼ in. - all 24ins. Longs. The drawings show how these are bolted together and to the angle iron cross piece D, with five hexagon head bright steel bolts (¼ x 1¾in.) to form the guide channel. The channel assembly should be absolutely parallel to the saw blade.

If the channel is not quite parallel it can be packed out with thin "shims" inserted between it and the cross member D, to correct the alignment.

The picture of the cross-cutting guide itself is more or less self-explanatory. It is built up on to a 12in. length of ¾ x ¾ in. section should be a "nice" sliding fit along the channel assembly.

If the guide does not run smoothly in the channel, file the sides of the ¾ in. section carefully and finish with a fine emery cloth.

The "stay" piece on the guide is then fitted and drilled to take the fixing studs. The cross cut timber guide should now move freely backwards and forwards, constantly at right angles to the saw blade. Next, the stay piece should be drilled so that the guide can be set at a 45-degree angle for mitering. The ripping guide is built up from the 2 x ¾ in. bright steel section and two ½ in. bright steel rods. The rods are tapped into the 2 ½ x ¼ in. bright steel plate and are secured at the required distance by means of the two set screws (5-15in). tapped into the larger bright steel block (*see photograph*). The block will fit snugly into the guide channel without moving. The ripping guide can be removed simply by lifting it out of the channel when it is not needed. The last fitting (not shown) is the **Saw Guard** or **Parting Blade** which is fitted round the rear of the saw's circumference above the table. It will probably be simpler to have this made up and it can then be bolted into place between the two "table" sheets.

On the original saw, a petrol tin was cut and fitted under the saw and table to collect the sawdust. This is of course, not necessary, but is a useful addition.

SHOP TALK

FLYING AT LOCKSLEY

During our summer camp get together with the Vintage Glider Association at Locksley, I had the opportunity to fly the Blanik owned by Les Webster who is the Mangalore G.C. President.
I went up with the Club's Secretary Allan Weeks and we had a very pleasant flight reaching a height of 8.500 feet.
The surrounding view was magnificent and we found ourselves in the middle of "thermals galore".
I would like to express my sincere thanks to Les for the deference to this humble Editor for allowing me to fly his glider (of course free of charge). For more details about Mangalore Gliding Club see our classifieds.

HOME BUILDING ALIVE AND WELL IN AUSTRALIA by JohnAshford

Readers of AG will have noticed a report in the Jan/Feb issue from the Australian Homebuilt Sailplane Association. In that report there are a number of people crawling all over a powered sailplane called the "Windrose". It is an appealing photo of it and the owner/builder/test pilot Paul Johnson. This was taken just after Paul had completed his first flight (can't you tell) of this interesting Jim Maupin/Irv Culver design. This duo were responsible for the Woodstock and the Carbon Dragon. More about this in a moment

Paul's Windrose is the 120th homebuilding project on the GFA books. They did not all get completed but then to offset this there are gliders in the ordinary part of the register which were made from plans or kits. My own K8b was constructed from a kit made by Schemmp Hirth! and the superlative and beautifully restored K2b of Mike Valentine's was built from plans by the Illawarra Gliding Club(club not existing now).

In the early days of gliding in Australia many clubs got into existence by building their own gliders either from scratch or from kits. Judging from the ever increasing price of modern gliders we may well see a return to kit building. Some of the powered stuff around like the Europa show what a good kit design can achieve. Some of our glider pilots have built the Europa and are impressed by the quality of the kit and the finished product. When will some enterprising designer come up with a good kit built 2 seater? When you consider that an ordinary factory built 2 seater will set you back in the vicinity of AUD80,000 and a really good one nearer to AUD180,000 there has to be plenty of scope for someone out there.

The Carbon Dragon

At the last OSTIV conference we were visited by some of the leading USA hangliding and lightweight gliding experts and one of the highlights was an address by Gary Osoba. Gary is an out and out gliding guru who it is said tried at 12 years old to get airborne on a pair of cardboard wings by jumping off the house roof. 30 Years later and Gary is setting records in a 3 axis control glider which weighs 70kg empty, the Carbon Dragon another Maupin Inspiration. The Carbon Dragon does not have much carbon in it really and is built from plans but not recommended for someone trying home building for the first time unless they have a lot of aeromodelling experience with large models.

What Osoba has discovered is what he calls "microlift" and has found that on days when everyone else sits on the ground or just does circuits he is flying very long distances without even turning. This starts early in the morning, it would want to, for a glider that he says should not be flown faster than 40 knots flights of 500km or more (already achieved) are going to take quite a while. a lot of this goes on at less than 400' so it is not for the faint hearted or unskilled.

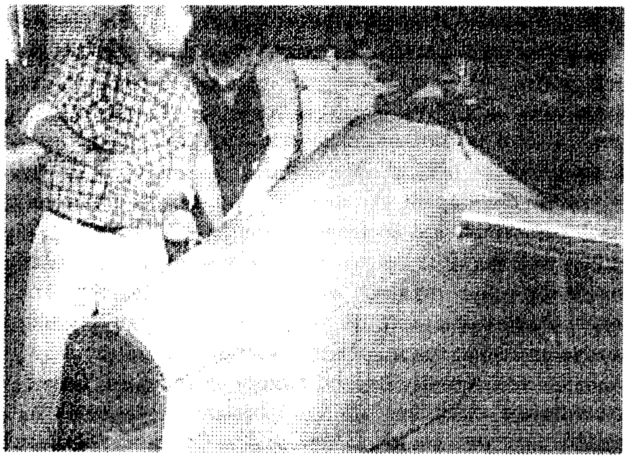
There are 3 Carbon Dragons in Australia only one of which is operated by a GFA member although two pilots were trained by a gliding club. Whether they realise what potential this lightweight machine has remains to be seen. It would be interesting to see one of our outstanding cross country pilots from either the Gliding or hang gliding disciplines see what they could do with one of these gliders.

For more info about the Carbon Dragon try
www.jcpress.com/JMaupinLtd/home.htm
Good contacts have now been established with a variety of people in the USA where all sorts of interesting things to do with lightweight gliders are happening. All of these by necessity are homebuilt. Maybe a new age is dawning where people design build and fly gliders just for their fun and edification and we cannot see it just yet. between myself and James Garay we will try and keep everyone in both the GFA & HGFA informed.

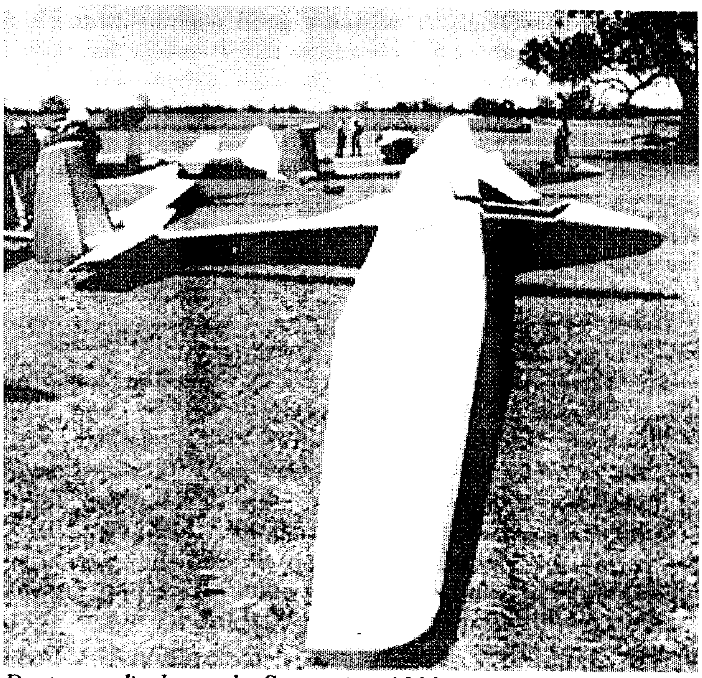
The Duster

By Peter Raphael (The Erudite)

Jim has asked me to write a little about our Duster, which is rapidly approaching completion. It all started, for us anyway, back in 1992, when I spotted an Ad. for an 80 percent complete Duster for sale in Australian Gliding. Having recently completed the Woodstock with my building partner Terry Whitford it was in a moment of weakness that I suggested that this would be an opportunity to utilise our now redundant building skills in a practical way. After making enquiries and examining some photos of this project it was decided that an inspection was in order. So it was that Malcolm Bennet and myself left Melbourne on a Friday evening September 18 1992 with the empty "Woody" trailer in tow. With a planned overnight stay in Beechworth, we would pick up the 2 other prospective syndicate members, Terry Whitford and Kevin Parkinson. This was not without event as some short distance from Beechworth the trusty 'Cruiser blew a tire and perhaps there was an omen in this?



Malcolm Bennett and Peter Raphael making the canopy.



Duster on display at the Symposium. 1998.

The next morning some time was spent in Wagga acquiring another spare after which our journey began in earnest. Nowra was our destination and the home of Bernie Morgan, the then current owner of the Duster. He was in ill health and felt he was unable to complete the aircraft and had offered it for sale. The remainder of our journey was uneventful and aside from the breathtaking drive down the mountainside to the coast . Arriving late in the afternoon we took time look over our prospective purchase. The fuselage was fundamentally complete and painted. The centre section had been skinned while the wings had the ribs attached and most hardware other hardware attached. While there was some evidence of rework being required our enthusiasm for the project dictated that these problems were not insurmountable and the entire project would be a good head start.

Enthusiastically, we loaded the components into the trailer along with some additional materials required to complete the project. The journey home went smoothly and it wasn't until late Sunday night that we finally arrived back in Melbourne with our new possession in tow. Several weekends were spent taking stock of this new acquisition and a careful inspection was made of the structure. While the materials and glue joints were of sound construction warps were evident in the centre section,tailplane and fin ,poor finishing technique had resulted in damaged ply veneers on the tail surfaces. While it was possible to assemble the wings it was evident that the main fittings were unacceptable also. With a list of items of concern in hand we invited Mike Burns to inspect the project and express his opinion on the course of action we should take. After his inspection the sawdust began to fly as we disassembled parts of the structure.

For about 18 months serious work progressed on the glider until our collective attentions were diverted to the development and construction of the Smithfield Soaring Group. Several seasons were spent in the construction of hangarage and facilities for the members, and during this time little attention was given to the project. Our priorities have always been foremost with our flying activities as this after all is our ultimate goal.

At this time the aircraft had reached the stage that it required to be kept assembled to complete rigging details, it was therefore relocated to a larger workshop belonging to Malcolm. From here work has progressed steadily with top wing skinning being

completed in a weekend. This was a good opportunity to invite people around for a look and at the same time have enough pairs of gloves available to put them to work in the glue spreading department.
All the controls have been made functional, the canopy is in place and the cockpit details are being attended to. The Duster has full ply skins and therefore does not require the complication of fabric finishing. Painting is progressing in stages and is being done with plasticised acrylic lacquer. Of course, once the major construction is complete the fiddley bits seem to take forever, however, as the permit to build the Duster was originally issued in 1979 it is our intention to complete the project 20 years after this date. Therefore we aim to have the aircraft flying in 1999, 20 years on! And so far we are on track. Unfortunately, (fortunately) we are experiencing an excellent summer which dictates that we spend our time away from the shed and in the air. I hope you can forgive us this indulgence!

¼ SCALE WOODIES

To ours cousins in USA.
Here's a bit of news that may be of interest to current or prospective Woodstock builders, the aeromodellers amongst us, or indeed anyone with an interest in gliders. Sir Colin Collyer, one of our members and a noted scale model builder, has in the pipeline drawings for the ¼ scale Woodstock. The construction will be simplified and designed to appeal to first time scale model builders. Sir Colin is on the lookout for suitable pictures of "real" Woodies on which to base the model layouts on. If you have any reasonable pictures or know of any in other countries could you feed this back to the editor and he will pass this on. As there are only 2 Woodies flying in Australia the scope is fairly limited here.
Here is an opportunity to sample your potential project or hang some inspiration from the ceiling so we will keep you posted on the availability of the plans.

Edgley EA9 Optimist

Courtesy Paul Dalziel.
Reproduced with permission from an article by Bob Rodwell appearing in "Pilot" (UK Magazine) August 1998.

John Edgley's sailplane kit comes flat-packed like MFI furniture, its assembly simply 'aeromodelling writ large'. Developed with some State aid, it is the first new production British sailplane since 1981.

SEEN AMID ACRES of shiny, efficient but visually boring white GRP at Dunstable's crowded launchpoint, the Optimist is a colourful reminder of a vanished age–finished overall in a BP-ish green relieved only by pale yellow tips, cheat line and lettering.
It even *feels* like the fifties. Rap a knuckle against the fuselage or leading edge-that surely must be wood? Drum your fingertips on taut fabric aft of the D-box and you think it's doped Irish linen, like aircraft used to have. The depredations of your departed years are forgotten. Instantly–but, alas, only momentarily–you're back in your joyous salad days again.
But the surprising thing is that the Edgley EA9 Optimist is every bit as much a modern plastic aeroplane as any surrounding it, while in recently evolved structural techniques it is the newest of them all. And its simple low-man-hour assembly from precision pre-cut components reads straight over into other GA sectors, so development and now commercial production of the Optimist in the shape of self-assembly kits has big implications for powered lightplane pilots too.
Both a civil and aeronautical engineer, John Edgley demonstrated his gift for innovative thinking in the early '80s when he designed the distinctive twin-boom ducted fan Optica observation aircraft. Offering helicopter-style surveillance at lightplane operating costs, the bug-eyed Optica seemed destined for a successful career before two cruel blows of fate. The first Optica to be delivered to a customer, the Hampshire Constabulary, crashed spectacularly on its maiden operational sortie, when it was being flown by two rank-and-file coppers rather than a specialist aviator. Later, assemblies and materials for some thirty Opticas were lost in a disastrous Old Sarum factory fire.
In 1989, largely at the urging of renowned gliding guru and former Lasham CFI Derek Piggott, Edgley turned his mind to sailplanes, as he was evolving new structural techniques.
His basic material is Fibrelam, developed at Cambridge by CIBA-Geigy. This has been around for about thirty years for use as airliner flooring. A pre-cured composite material of thin unidirectional glass fibre skins, sandwiching a Nomex honeycomb core, Fibrelam is light, strong and extremely stiff, and is available as flat boards in various gauges off the shelf.
Edgley designed the EA9 to use only two thicknesses, with most of the 240 Fibrelam components in 6mm sheet and the more highly stressed cut from 10mm boards. Conventional wet lay-up glass fibre moulding is used for only two components: the compound curved nose cone and the turtledeck fairing over the mainspar stubs and control connections.
Trickery is used to employ the very rigid Fibrelam in the wing leading edge D-box too. Without one of the skins it flexes in one dimension easily, so the inner skin, already bonded to the Nomex core, is wrapped around a leading edge mould and only then is the outer skin applied.
In the Optimist prototype the mainspar caps are aluminium with Fibrelam webs. But in production models they are carbon fibre, with Fibrelam webs and pre-cut ribs behind.
The spar caps are, again, a proven 'pultrusion', available commercially and simply cut to length. And, yes, I hadn't heard that word before either; it is an extrusion in reverse ie. it is pulled through its mould rather than pushed. Use of both Fibrelam and the carbon-fibre pultrusion ensures materials of the highest possible strength-to-weight ratios and minimum resin content.
At Edgley Sailplanes' recently opened factory in Bideford, Devon, computer-controlled machines cut the Fibrelam components far more precisely that you could do by hand. The main fuselage panels are assembled by fitting pre-cut tongues into matching slots; offered up dry, they can then be bonded with the appropriate epoxy resin adhesive.

Though Fibrelam boards are incapable of compound curvature, angled components can be made by the cut-and-fold technique–scoring and routing the Fibrelam on one side, then folding and bonding. It is all strikingly similar to assembling a model aircraft kit, which most glider pilots of any age will have done sometime: indeed, assembling the Optimist is simply aeromodelling writ large.

So easy is the building that Edgley claims the basic fuselage can be assembled by two keen amateurs within a day. Five hours is a reasonable time to make the tailplane. No autoclave is required.

The fuselage consists essentially of two main sub-assemblies: the cockpit and centre fuselage module to which is bolted the tailboom. Should the latter be broken in, say, a groundloop, it can very easily be replaced.

The lack of compound curves gives the Optimist a sharp-edged look–again reminiscent, for the elderly, of the '50s and the distinctive Triumph Mayflower razor-edged family saloon. Angles are not detrimental provided they go with the slipstream, Edgley says, and are sometimes more aerodynamically beneficial than more expensive curves.

And if the Optimist reminds one of the Schleicher Ka-18 the resemblance is no accident. Edgley unashamedly admits that he used the Ka-18 as the model for his own design, his intention being to prove his structural techniques rather that to design an entirely new glider at that time.

He raised the tailplane part way up the fin, to make it less vulnerable to crop damage on outlandings, marginally reduced the span to the rather odd choice of 15.7 metres, and updated the wing section from the Ka-18's ageing NACA to more modern Wortmann profiles–a change most noticeable when you fly the Optimist and sample its markedly better penetration. Otherwise, its handling is very similar indeed to a good Ka-6E or -18, without the marked longitudinal twitchiness of the Ka-6E and its all-flying tailplane.

"Beautifully harmonised, remarkably light"

I sampled the prototype, HPJ, on one soaring flight after an aerotow to 2,000 feet at Dunstable on a strongly convective day, followed by two low winch launches the next morning, in what were not Dunstable's best conditions (and of which more anon).

The big and bulbous canopy is side-hinged, the spacious cockpit wide enough to take even the most beamy pilot. Some fittings have clearly been taken from a cannibalised Ka-18, including the rudder pedal adjusters which, theoretically, are operable in flight. But I found them so fiddly to set, even on the ground, being placed up high on the cockpit sides beneath the sills, that I didn't like to try in the air.

The canopy lock also came from a Ka-18, I was told. If this was so, it was not a good idea, being a particularly cranky device. The seat is non-adjustable in the well-used prototype-there is space enough to install an in-flight adjustable one which is infinitely to be preferred. In the fixed seat, one's posture is definitely back in the '50s too, being rather more upright than in most modern types.

The upshot for me, only five feet five inches tall but relatively long-legged and short-bodied, is that the instrument panel and radio were a bit of a stretch, but operable with extended fingers. I heard one Dunstable pilot complain that he found even the joystick a bit too far forward for him without an adjustable seat.

My main comfort complaint is one easily rectified; the prototype cockpit is neatly furnished but, after an hour, I was dying for more cushioning beneath my bum.

Trim is through joystick spring-loading, and is set by moving the adjustment lever through a lengthy rack of detents on the left; on a fraught approach after a difficult winch launch it sprang back on me as I adjusted it on final.

A nice touch is the sandwich/map/drink stowage built into a sidewall fairing at one's right elbow-much better than the usual seam-split pouch hanging limply on the cockpit wall.

I flew the Optimist the day after Derek Piggott had test-flown and approved it with a reduced rudder; I don't know what it was like before, but now the controls were beautifully harmonised and, in all three axes, remarkably light.

Aerotow limit speed is seventy knots, which the Dunstable tug pilot, who presumably hadn't towed the EA9 before, seemed determined to exceed. But from the moment I had the aircraft rolling on its wheel I was instantly at ease.

With the radio inoperable in transmit, I rode the slightly too fast tow comfortably, the ailerons as crisp as one would hope in marked turbulence. Off tow at 2,000 feet, it was nice to be riding a Ka- 18 surrogate in thermals rather more vigorous than those I normally encounter at home, and I was soon at 4,100 feet and ready to explore the envelope.

I didn't have a stopwatch, but 45-degree bank reversals were satisfactorily quick and stalls innocuous–preceded by a not particularly forceful buffet and a wallow before any tendency to drop a wing. I suspect the ASI was over-reading, as she stalled at 37 knots IAS when I was expecting the g break somewhat lower at about 32 or 33 knots. This might explain the apparent excess speed on tow.

There was instant recovery with a mere easing of backpressure and minimal nose drop. On one occasion, when I inadvertently induced an incipient spin while thermalling in a well-banked turn, recovery was equally quick.

In the vigorous conditions I chose not to push the Optimist up to the 125-knot Vne, but was impressed with it up to 95 knots and the remarkably flat attitude it maintained to 72 knots; a few knots beyond that speed and you know you're really coming down. In the prevailing conditions, and as a visiting pilot in Dunstable's busy airspace, I also skipped any aerobatics, though with the generally delightful controls and responsiveness I didn't imagine they would pose any problems within my modest repertoire.

The air brakes are very positive and progressive and the approach control excellent; once on the ground, wheel braking results from hauling back on the air brake lever rather than through a dedicated control. If you do overbrake, are landing on uneven ground or have to stop suddenly to avoid the upwind hedge you have the comfort of another '50s touch–a skid beneath the nose.

Many London Gliding Club pilots were keen to try the Optimist on what was its first appearance at Dunstable at the start of a nationwide sales demonstration tour, which is still proceeding and will include an appearance at the SBAC Farnborough show. So I deferred until the next morning the chance of trying the EA9 on the wire, just as blue thermals were beginning to brew and there was some considerable turbulence over the Dunstable-Tring road which runs parallel to the famous site.

The placarded max winching speed is 59 knots. On what was only the second wire launch of the day into a north-east wind along the ridge, I chickened out and pulled the large yellow T-handle of the release as my ASI was indicating 65 knots and rising.

I had scarcely 600 feet. Nonetheless, such is the Optimist's tractability that I ventured some thermal turns as I drifted down the west side of the field. It slowed my descent to add a few minutes to what would otherwise have been a simple circuit.

On the next launch the wire back-released as I was climbing steeply and comfortably at about 800 feet. The attempt to soar, or at least arrest my descent, was ill judged and less successful, for running into horrendous sink I ended with a nail-biting low-energy approach into the extreme south-west corner of the site. My inelegant, scarcely flared thump-down as the slope rose to meet me at least demonstrated the Optimist's ruggedness.

Flat-packed kits

You will probably be pleased, and certainly surprised, to know that Optimist development has been substantially aided by the State. Edgley Sailplanes has won £380,000 in the form of three DTI SMART (small firms merit award for research and technology) grants and one under the SPUR (support for products under research) programme.

In each case the award was for development of new aircraft structural techniques rather than of a sailplane *per se*.

Production of the first batch of kits is now under way at the Bideford factory where Edgley has installed CNC machinery. Its establishment has been helped by an additional £20,000 from the Treasury as a selective industrial development grant.

Complete and finished aircraft are *not* being marketed. John Edgley reasons that whether purchasers be clubs, syndicates or individuals, they will be keen to save money by doing work which they can easily do themselves-and soaring people are generally handy and resourceful types.

"We believe it is much more attractive as a kit and makes more economic sense. Any gliding club has access to plenty of free labour, and nothing more than an ordinary modest workshop is required."

Kits are on offer at three stages of comprehensiveness and completion. The basic kit comes at £9,995 excluding VAT and delivery. It includes all the preformed components ready to assemble, but without any hardware items as the buyer may wish to source these independently.

The intermediate kit, at £12,150, includes hardware and has the more difficult bonding done with only the easier joints left to the customer.

With the deluxe kit at £17,500 the aircraft is largely complete with all bonding done. Its final assembly is no more work than the major refurbishing of a conventional metal and steel tube-framed sailplane. In all kits, Ceconite fabric covering and finishing materials are not included.

An example of John Edgley's clever thinking is the fact that when your flat-packed basic or intermediate kit arrives, the medium density fibreboard packing case can be cut out along scored lines to form the only jig you'll need.

His thoughts are now turning to a tandem two-seat Optimist development, for which funding will be sought for a maiden flight in the first months of the new century. Both he and Derek Piggott believe there is a very ready market for an intermediate two-seater at a fraction of the cost of current offerings from Poland, France and Germany.

Able to be sent out packed flat–just like a piece of MFI furniture–or even as computer tapes and materials in the case of a possible foreign licensee, Edgley believes there could be a very substantial export market too.

With not a single production sailplane manufactured in Britain since 1981, when Slingsby closed down its Vega assembly line, let's hope he is right.

Dimensions

Wingspan	15.7 m
Length	6.95 m
Aspect ratio	18.85
Wing area	13.06 m²
Aerofoil Wortmann (root)	FX61-184
(tip)	FX60-126
Weights and loadings	
Max wing loading	25.6 kg/ m²
Empty weight	210 kg
Max auw	345 kg
Useful load	135 kg
Performance	
Best LID at 41 kt	34
Min sink at 35 kt	0.6 m/sec
Stall	32 kt
Vne	125 kt

Manufacturer: Edgley Sailplanes Ltd,
Handy Cross, Clovelly Road, Bideford,
Devon EX39 3EU. Tel: 01237 422251,
fax: 01237 422253.

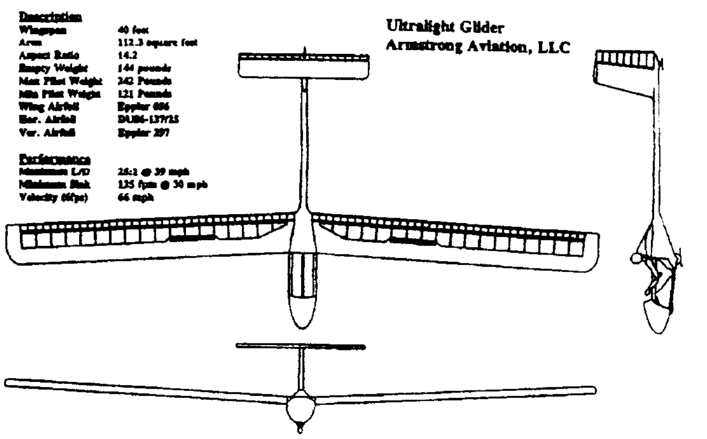
WinDancer Ultralight Sailplane

By Dan Armstrong
Armstrong Aviation, LLC

Background

The ideas for the WinDancer have developed over the last 23 years of flying hang gliders and sailplanes. I have found strengths and weaknesses of the various soaring alrcraf that I have had the chance to fly and they have influenced what I would like to fly. A number of common factors have emerged from aircraft that I have enjoyed flying. They must be safe, have good handling qualities, have excellent glide path control, set up and break down quickly and easily, and have sufficient performance to accomplish my flying goals.

WinDancer



I flew a standard Eipper 18-foot Flexi-Flyer for several months when I began hang gliding in 1975 and then bought a new Sun III. The performance was limited for both gliders and allowed soaring only in strong conditions. I wanted more, so I bought a Sunriser (Icarus 2B rigid tailless biplane airframe with Easy Riser airfoil) kit from Ultralight Flying Machines (UFM) and put it together. The kit was very complete, including dope and fabric and the instructions were good. It took about 200 hours to build using clear dope over yellow colored Dacron fabric. The Sun-riser had very good performance for the day (9 to 1 best glide ratio) and soared well. It also had good handling and was comfortable to fly for long flights. I kept it in a large box (18"deep by 4 feet wide by 16 feet long) on top of my Datsun truck. The big problems with the Sun-riser were the relatively unsafe method of pilot retention, long setup time, poor visibility and sensitive pitch control. I scared myself several times with launches off cliffs while hanging from my armpits. There were a number of fatalities in 1975 and 76 due to falling out of this type of glider. I solved this problem by buying a new design harness. It took about 45 minutes to assemble the Sunriser. The box worked well, but was difficult to remove from my car. It also reduced gas mileage about 4 mpg. It was difficult to see other pilots when climbing in thermals or ridge lift due blind spots caused by the wings. The blind spots were a little worse than a flex wing hang glider, but could be worked around. The glider was very sensitive in pitch control. Moving your head back a few inches was enough control to coordinate a medium banked turn. During take off and landing, the pilot had to switch positions, involving potentially large center of gravity changes. I missed putting my feet on the forward carry through a few times, which resulted in whipstalls close to the ground. That will really wake you up!

The Sunriser was destroyed in a huge dust devil in 1976. The next year, I built an Easy Riser from another UFM kit that solved several problems. The Riser had even better handling and performance and could be assembled in about 6 minutes from the box to ready to fly. It had substantially better control and took much less effort to fly than the flex wings of the day. I made several flights in winds up to 40 mph. The Riser could be trimmed to fly at 40 with no pilot effort and was very comfortable. Both the Sunriser and the Easy Riser had good glide path control by deflecting both rudders at the same time. The glide ratio was less than 4 to 1 with both rudders out at high speed. The visibility and pitch sensitivity was about the same as the Sunriser. I left the box on top of my truck for about 3 years and always had my wing with me wherever I went. The Riser was prone to minor holes in the fabric, which required frequent maintenance. I put an engine package on the Riser and foot launched it a number of times, but found the launches and landings very scary.

By this time, many good new flex wing hang gliders were coming out with improved performance and ease of use. I had a Phoenix 8, 180 Olympus and 194 Condor and found improved ease of operation. The Riser still had a better glide and took less effort in the air, but I found myself opting for the flex wings most of the time.

In 1979, the Fledgling II from Manta began making a big splash and I had to have one. The Fledge took a little longer to set up than a flex wing, and it had a couple of assembly steps that took a lot of strength to accomplish. We all learned how to do it reliably, but it took some effort and about 30 minutes to set up. The Fledge was easy to fly, had good handling and good glide path control. It also had better glide ratio and penetration than the flex wings of the day. On landing, both rudders could be deflected, pitching the glider up sharply and allowing an easy flare. I flew two different Fledges over several years and liked them very much. The biggest problem was the set up time and effort. When the Comet came out, I bought one and eventually sold the Fledge. The Comet had about the same glide, better climbing ability and was much easier to assembly and disassemble. I flew flex wings until the Carbon Dragon became available.

In 1982, I moved to California and met Jim Maupin at the Sailplane Homebuilders Association Western Workshop in Tehachapi. We lived near each other in the South Bay area near Los Angeles and he offered to let me help on the Carbon Dragon. Helping Jim was an excellent experience that I continue to treasure. Jim provided many opportunities to meet people and learn things about building and soaring. One result was that I learned to fly gliders in 1982 at Hemet. In 1986, I met Janice Hagen and in early 1987, we were married. The Carbon Dragon was finished in 1987 and test flown in Tehachapi, where Jim and Margaret and Jan and I had all moved.

The Dragon had phenomenal climbing ability and a remarkable glide. It was very easy to fly, taking less effort and skill to fly than anything that I had flown to that point. It was and is very successful as a proof of concept for ultralight sailplanes. It had a number of deficiencies that kept it from being my ideal glider, including poor visibility, lack of glide path control and poor allowable weight range. The Dragon has a high wing and the pilot's head goes up between the wing halves. This reduces visibility substantially, particularly for tall pilots. I had to lean forward to see below the bottom surface of the wing. While thermalling, I could not see the gliders at my altitude most of the time. I found this very unsettling. The prototype did not have a spoiler fitted to it until just before it was sold to Gary Osoba. The CD would not come down very well, using only flaps for glide path control. I could only generate a sink rate of about 350 fpm and reduce the glide ratio to about 12 to one, which seriously limited the size of the fields that could be utilized for landings. I flew with the spoiler only once, but found that it solved the glide path control problems. The last significant problem is the lack of weight range. The maximum weight pilot that could be accommodated for tested limit load was 156 pounds. I weighed 210 pounds at the time and accepted the risk of overloading the glider. I never felt comfortable about it, however, and limited my flying to very smooth conditions. The Carbon Dragon certainly had the performance to carry my weight, but didn't have the structure designed in to carry it safely in heavy conditions.

After the Carbon Dragon was sold, we bought a HP-18 sailplane, flew it two seasons and then bought an LS-3a sailplane. During the time from 1982 to 1995, I flew 185 Comet, 175 GTR and 155 XS hang gliders and now fly a 225 Falcon hang glider. I liked each of the hang gliders very well, but found the 155 XS bladewing too small for easy landings. The direction of increasingly smaller hang gliders is not for me. As I age, I find that I want gliders that land slower and easier. I also found the performance too limiting for emended cross-country flights in heavy turbulence.

I fly the 225 Falcon on light condition days and for local XC flights. When the days are strong, I take the LS-3a cross-country and usually get home at the end of the day. Both the Falcon and the LS are good solutions for me in most ways. They both assemble well, have good or even excellent handling, are easy to fly, have excellent glide path control and have excellent visibility. The disadvantages are fewer but still present. The Falcon becomes uncomfortable after about two hours and if the day is good, I frequently want to fly longer. The performance of the Falcon is not a big problem for me, because my goal for it is fun flying on mild days. I would enjoy it more if it climbed as well as the Dragon does, but it climbs as well as most of the hang gliders and paragliders in my local area.

The LS-3a is a joy to fly. It does have a few disadvantages, though, and the biggest disadvantages are its expense and assembly/disassembly. The costs to fly the LS each year are about 5 to 6 times as much for me as flying hang gliders. On a marginal day, I may opt to fly the hang glider just because of lower direct operating expenses. The wings of the LS weigh about 165 pounds each and I sometimes have trouble finding someone who can help me assemble and disassemble. I frequently cut my flights short to get back to the field before everyone who can help me take the wings off has left. One-man rig systems are available to allow assembly/disassembly without help, but they do not work very well in high winds. A very big plus for the performance of a sailplane like the LS-3a are the long and high flights that can be made on good days. Almost all flights that I make on good days are cut short voluntarily at around 4 or 5 hours. The cockpit is very comfortable and the glider requires very little effort to fly. Flying the LS in the Owens Valley is not scary at all on most flights, in even very strong conditions. It is easy to get very spoiled while you are flying in the Sierras or the Owens Valley in good conditions. After all, that is why Jan and I live here!

This discussion of the advantages and disadvantages of various hang gliders and gliders provides the foundation for the goals for the WinDancer ultralight sailplane.

Launch Methods

Launch methods were a critical issue in designing the WinDancer. Quite a range of methods are available to put soaring aircraft into the air, including foot launch, bungee launch, auto tow with static line, auto tow with payout winch, powered winch, ultralight aerotow, regular aerotow and self launch using a motor. Being able to safely use most of the methods provides the best capability. The least expensive methods are foot launch, auto tow with static line and bungee launching. Payout winches are available for about $2000 and will put hang gliders and sailplanes over 1500 feet in the air for a direct operating cost of $2 or $3 per tow. Powered winches offer excellent capability for sites large enough to accommodate them. Initial cost is a little high, but operating costs are low and operator training is easy. Particularly important over the last few years is the ability to tow behind ultralight aircraft due to the popularity and increasing availability of this launch method. Initial costs are high if you provide the towplane and continuing costs are high. Special training is required to operate the towplane. Regular aerotow is available at most existing glider sites. The operating costs are high and tow speeds are usually 50 to 75 mph.

Self-launch (motorgliders) requires moderately high initial costs and moderate operating costs. Maintenance can be time consuming and some do not like the noise, vibration and mess involved with operating engines.

Most of the ground launch methods do not provide as good an opportunity to contact lift, as do the aerotow methods. Foot launch and bungee launches are quite comparable in capability and launch times can coincide with thermal passage. Several people are usually required to help with a bungee launch. Your local conditions and the availability of sites and equipment will decide the method(s) that you use. Again, the best operational capability results from having a large number of good launching methods.

The WinDancer is being designed to use all of the launching methods listed above except self-launch. I can imagine foot-launching the WinDancer at several local sites near Tehachapi in winds of 15 mph or greater. The same sites will work well for bungee launching when the winds are light. All of the ground launch options will work well with a suitably located tow hook. Aerotow capability behind both ultralights and conventional towplanes narrows the wing loading range to about 3 to 5 pounds per square foot. The foot launching capability puts a cap on the wing loading at about 3 pounds per square foot even with effective high lift devices.

Goals

From my experiences with various hang gliders, gliders and launch methods, I've developed a series of goals that I would like the WinDancer to meet. The glider shall: · Be fun to fly and operate.

· Have sufficient performance for extended cross-country flights on good days and for
climbing well on weak days.
Have excellent visibility.
Assemble and disassemble quickly and easily. Be safe and strong.
Handle well and be easy to fly.
Last a long time (3000 or more hours). Have excellent glide path control.

Be capable of foot launch, bungee launch, ground launch (static line auto tow, payout winch and powered winch) and aerotow behind ultralights and conventional towplanes up to 70 mph maximum tow speed.

· Be economical to operate.
· Be aesthetically pleasing.
· Be available from plans and kits.

Note that the goals described above could fit a hang glider or sailplane except for performance, some launch options and economy of operation. These three goals bracket the area that defines the configuration and size of the WinDancer. The glide ratio probably needs to be about 25 or better to allow extended cross-country flights. The large number of effective launch methods can allow very economical operations. Excellent climbing capability also can allow regular long and high flights from ground launch, normally the least expensive launch option.

Rules and Regulations

Existing rules and regulations have a strong effect on the design of any aircraft. The rules having the most effect on the WinDancer design come from three organizations, the Federal Aviation Administration (FAA), FA/ CIVL Commission (hang gliding) and FAI International Gliding Commission (IGC-gliding). In addition, JAR-22 airworthiness requirements will be used as guidance for design and testing.

The FAA is responsible for all aircraft operating in US airspace. Federal Aviation Regulation (FAR) Part 103 is the regulation covering ultralights. FAR Part 103 has a simple definition for ultralight gliders; an ultralight glider must have an empty weight less than 155 pounds. An allowance of 24 pounds is available for gliders having a ballistically deployed parachute. A further allowance is available to gliders having boat hulls or floats for operations off of water. FAR Part 103 has remained unchanged since about 1982 and is not likely to change in the near tenn. The CIVL is responsible for setting classes and administering world records and world championships for hang gliders. The definitions for various kinds of hang gliders are contained in Section 7 Class O of the FA/ Sporting Code. The general definition of a hang glider is "A glider capable of being carried, foot launched and landed solely by the use of the pilot's legs." Classes O-l, 0-2 and 0-3 must be able to"... demonstrate consistent ability to safely take off and land in nil-wind conditions. "For the purposes of demonstration, nil-wind shall mean a headwind of less than 1 m/s (3.6 km/h; 2.2 mph)."

In brief, Class O-1 aircraft are flexwing hang gliders, Class 0-2 aircraft are rigid wing hang gliders and Class 0-3 aircraft are paragliders. Class 0-4 is defined as, "hang gliders that are unable to demonstrate consistent ability to safely launch and/or land in nil-wind conditions." The nil-wind definition and Class 0-4 were defined about two years ago after Gary Osoba provided documentation of his World Record attempts in the Carbon Dragon in Class 0-2. Classes O-1 through 0-4 appear to be stable in the near term A recent proposal to make changes to these class definitions was voted down by the CIVL.

The IGC is responsible for setting classes and administering world records and world championships for gliders. The definitions for various kinds of gliders are contained in Section 2 Class D of the Sporting Code. A Class DU ultralight glider is defined as a glider that has a maximum takeoff weight of 220 kg (484 pounds) and is not a hang glider. A Class DU glider must have a useful load (,pilot plus gear) of at least 90 kg (198 pounds). This gives a maximum empty weight of 130 .kg (286 pounds). This definition was modified about 18 months ago and should be stable in the near term.

The new Class 0-4 hang glider definition is the primary design driver for the Win Dancer. The wing area is sized to allow easy foot launch in a wind of 15 mph or greater and still allow conventional aerotow.

WinDancer Basic Description

The WinDancer will have a basic configuration like most gliders. The pilot will sit forward of the wing and the conventional tail will be mounted on a fuselage boom behind the wing. The pilot will sit between two large tubes in a sling harness and above a keel tube. The stick will mount to the right hang tube. Rudder pedals will be mounted in a fairing enclosing the pilot's feet. Spoiler and brake handle and flap handle will be mounted on the left hang tube. Tow release will be mounted in the control panel in front of the pilot. Some specifications follow:

The primary structures will be built from carbon/epoxy composite materials. The wing will have a D-tube for it's forward half and will be fabric covered behind the spar. The control surfaces and tail will have similar structures to the wing. The fuselage fairings will be carbon/epoxy and the removable canopy will be molded Plexiglas. The main landing gear will be fixed and be mounted forward of the center of gravity.

Conclusion

Janice and I are both very excited about the progress of the WinDancer. As of May 1 st, we are both working full time on this project. Building is starting and will progress at a quick pace this summer. We are both planning on attending the SHA Central and Western Workshops to discuss the progress. We hope to have the WinDancer (however complete it is at that point) on display at the Western Workshop here in Tehachapi in September and also at the El Mirage Ultralight Sailplane Fly-in in October. It is our hope that this ultralight sailplane will allow many pilots to economically and safely increase their flying opportunities. There are very few pilots that wouldn't enjoy a booming, good flying day in the WinDancer.

Wing Area:	113 square feet
Wing Span:	40 feet
A/R:	14.2
Wing Airfoil: Eppler 654	
Horizontal Airfoil:	Wortmann FXL III-142 K 25
Vertical Airfoil:	NACA 0011
Glide Path Control:	Schempp-Hirth type spoilers
L/D max Open:	25/1
L/D Enclosed:	30/1
Min Sink Rate:	120 feet per min
Stall Speed:	25 mph with 210 lb
Vne:	100 mph

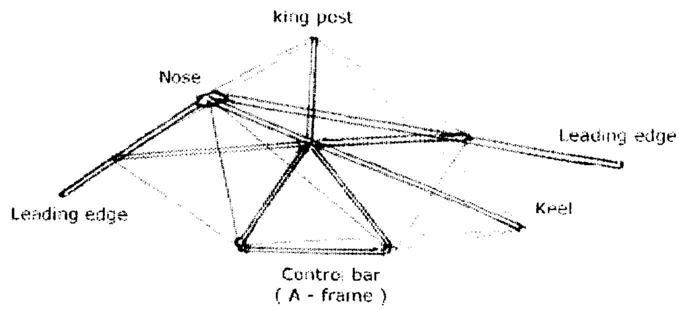
FOOT LAUNCHED GLIDERS - Part 4

By Peter Chamnpness

After the Wright brothers the development of foot launched gliders fell into decline. A few gliders were produced here and there including Australia. The main interest of gliding enthusiasts however was in heavier machines launched from skids or on wheels and towed by cars, aircraft or winches. The early primary gliders probably had worse performance than the foot launched gliders but better streamlining, enclosed cockpits and other improvements led to fairly rapid improvements.

Foot launched gliders seemed to have little to offer. They were similar in size to other gliders and hence were awkward and difficult to transport to the flying site. The low wing loading necessary for take off at running speeds dictated light weight and fragile structures which were easily damaged. Most inconvenient of all was the requirement for a gentle hill slope facing in to the wind for take off. Such sites are relatively rare, especially in Australia and are often far from where people live.

The breakthrough was a design study by Dr Francis Rogallo, a NASA research scientist working on designs for steerable re-entry parachutes for space vehicles. References to Dr Rogallo's original design are hard to come by now but I recall seeing a drawing in the mid 1960s in an airspace magazine showing a space capsule suspended below a familiar dart shaped hang glider sail with inflatable tubes for the leading edges and keel. The steerable re-entry parachute never got beyond the design stage but the idea was noticed.



Hang glider construction with sail removed

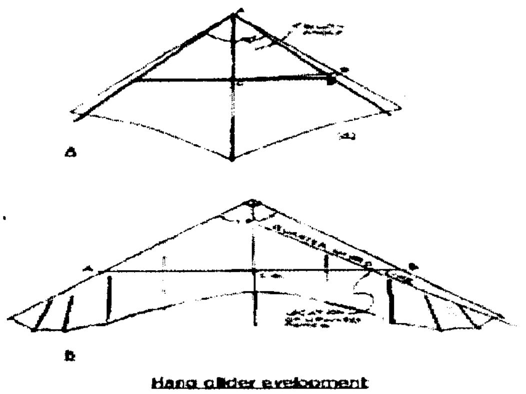
The precise history is obscure but the next item I recall was an article in Sport Aviation with a picture showing a primitive hang glider constructed of bamboo struts and a hardware grade clear plastic sheet sail skimming down a hill slope. The idea was so fascinating that I began construction of my own hang glider. Soon after I saw Bill Moyes flying his hang glider constructed out of aluminium tubes, sail cloth and yacht rigging wire at the Royal Melboune show, launched by a car tow. The Champness glider needed a few revisions after that. Some years later I bought a glider and over a few years made some very memorable flights including a ridge soaring flight at Stanwell Park, NSW, near the site of Lawrence Hargreaves original experiments with Box Kites in the 1890s.

The construction of a standard hang glider is so simple that almost anyone can construct one. The framework is self explanatory. The sail is the most difficult part to get right and this is usually contracted to a sail maker. Despite the poor performance, the idea was enormously popular. For a few hundred dollars at the most anyone could have their own glider and enjoy flights from the tops of hills and dunes for no cost and requiring no particular assistance to take off. The gliders are robust and easily repaired in the event of a minor accident. Most important of all is the portability. A hang glider folds up in minutes into a thin bundle, is easily transported on top of a car and can be stored on the wall of the garage.

The standard rogallo hang glider probably has an L/D of about 5. Despite the very poor performance soaring flights of long duration can be made on ridges and dunes. Even simple glides down slopes in ground effect are a lot of fun. Improvements to the standard design soon appeared. The most important innovations were: increased aspect ratio, sail battens to maintain a suitable aerofoil and the adoption of a horizontal pilot position to decrease pilot drag. The sum of these improvements increased L/D to about 9. Importantly the improved designs did not sacrifice the basic advantages of simplicity of construction and portability.

Within a short time pilots found that thermal flights could be made by soaring in ridge lift on inland hills, then picking up thermals generated on the ridge. Cross country flights of 50, 60 and more miles were reported. In suitable terrain flights of over one hundred miles were achieved and are now common place.

The initial enthusiasm for hang gliding was accompanied by a high toll of deaths and severe injuries. Despite the very limited understanding of the aerodynamics of sailcloth wings and delta planforms most of the accidents seem to have been due to poor pilot techniques, especially given the very demanding conditions of flight very close to the ground in moderate to high winds and turbulence. The rate of injuries now seems to be very low, probably less than in general aviation. The most likely reason for the improvement in safety is probably the fact that the hang glider craze has now past leaving only a small number of committed enthusiasts in the sport. The larger number of participants with only passing interest have moved on to skate boarding, indoor rock climbing, go-karts and other endeavors.



Hang glider evelopment

A. Standard Rogallo wing
B Higher performance glider - increased aspect ratio, tighter sail with sail battens to maintain aerofoil shape increased wing area toward wingtips reduces tendency to tip stall

This is not to denigrate the efforts of the hang glider federation to provide improved instruction, nor the manufacturers and experimenters in creating better controlled and better performing gliders. Hopefully there will be further developments with possible applications to all gliders, especially in the field of low speed handling and variable geometry airfoils. I may present a few ideas in a future article.

A little bit of Gliding in Australia

By Allan Ash. (Con)

Edward Hallstrom.

One of the early members of the league was a 23 year old furniture manufacturer named Ed Hallstrom who, in later life, became Sir Edward Hallstrom, head of a large engineering and manufacturing company, a wealthy philanthropist and a keen amateur zoologist. He was knighted in 1952 and died in 1070. He became the practical builder of the League.

Taylor saw the possibility of flying machines for use both commerce and defence and was enthusiastic about the potential of Hargrave's boxkites, He had several kites built at his workshop at Redfern and took them to the northern beach suburb of Narraben where he, Hargrave and Hallstrom flew them while staying at the home of Mr. and Mrs. Charles Schultz.

Taylor encouraged Hallstrom to produce experimental boxkites up to 30 feet long. These, Taylor proposed, should be used by the Army to carry observers to great heights.

During 1909, Tauylor inspired Hallstrom with the idea of making a man-carrying glider based on the kites of Hargrave.
To be continued.

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By Peter Raphael (Web Master)
pete_raph@yahoo.com

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This new medium will be used to periodically include new information regarding our association as it comes to hand.

Thus far, it includes:

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I, ______________________ *Signed:* ______________________ *Date:* ______________

of (address) ____

____

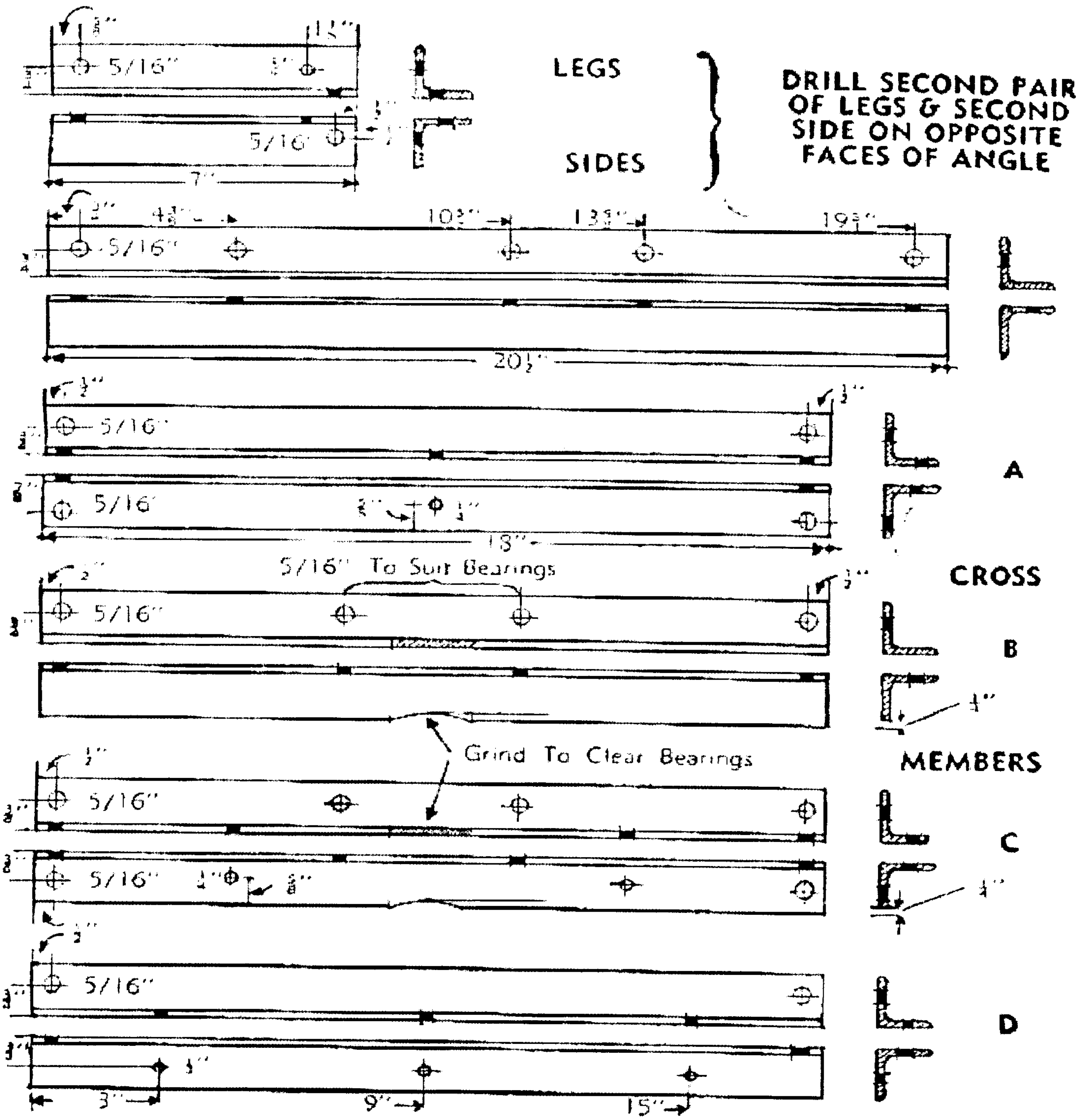
*Wish to **rejoin/not rejoin** the A.H.S.A for one year. (If you do not wish to rejoin could you still forward this form to the above address so we can adjust our records).*

If rejoining, please forward this form plus membership fee to the above address.

The MEMBERSHIP FEE FOR THIS YEAR IS $20 (Australian) and $25 (Overseas - only Australian currency can be accepted).

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

Please Note: This is your final newsletter unless you rejoin the A.H.S.A



MATERIALS REQUIRED

ANGLE IRON—
½ x ½ x ⅛in.
2 pieces 8in. long.
2 pieces 11in. long.
¾ x ¾ x ⅛ in.
1 piece 11in. long.
1 x 1 x ⅛ in.
1 piece 12in. long.
1¼ x 1¼ x 5-16 in.
4 pieces 7in. long.
6 pieces 18in. long.
2 pieces 20½in. long.

BLACK IRON—
3-16in.
2 pieces 12 x 24 in. (flat and squared).

BRIGHT STEEL—
¾ x ¾ in.
1 piece 24in. long;
1 piece 12in. long.
1½ x ¼ in.
2 pieces 24in. long for channel.
1½ x ¼ in.
2 pieces 12in. long (for guides).

BRIGHT STEEL ROD—
½in. diam.
26ins. (or 2 x 13in.)
⅝in. diam.
12in.

NUTS AND BOLTS—
Whit. bright hex. head:
5-16 x 1 in.—One doz.
¼ x 1¾ in.—five.
¼ x 1 in.—four.
¼ x ¾in.—seven.
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5-16 x 1 in.—14.
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Four nuts for lock nuts on plummer blocks (to suit size of thread).

One 8in. circular rip saw blade—⅝in. centre hole.

Two ⅝in. plummer blocks.

Three ⅝in. collars with grubscrews.

One V-belt pulley (say 2in. diam., ⅝in. boss—or to suit motor, speed, etc.).

Two grease cups (say 5-16in. gas thread, or to suit).

Two black washers, 2½in. outside diam x 1/16in. or 3/32in. thick, 1in. inside diam.

Assorted spring and flat black washers.