THE AUSTRALIAN HOMEBUILT SAILPLANE

Editor: James Garay

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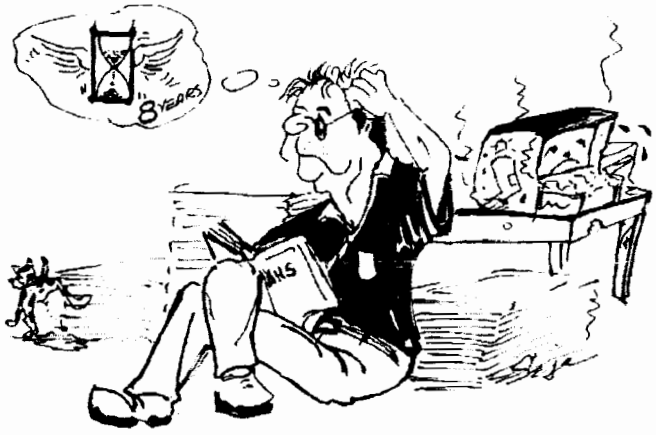
Editorial



G'day mate!

Here I am again with another issue of the Australian Homebuilt Sailplane, with this issue I complete (8) **eight years as Editor**. It's incredible that eight years ago I volunteered for this position.

Many things have been happening in the Australian Homebuilt sailplane scenario and our group is still alive and surviving with the support and enthusiasm of those who are behind me...they know very well who they are! Have a read inside this issue and you'll find them.

This Newsletter has been very well received by the subscribers and we try to diversify the contents to make it a pleasant reading but it is impossible to please every one....so...be patient and tolerant.

Once again I have to tell you that at the moment my folders are completely empty, I need your help for the next issue which is due in June 2004. Take pen to paper now and write to me about your project and let us share your knowledge and experience.

This is the time of the year when all subscriptions are due for renewal. I appreciate your support and I hope you will continue with us. Find the renewal form inside and send it to me with the report on your project.

In this issue, Peter Raphael (The Erudite) is giving a full report on our Summer camp at Bacchus Marsh. Also Peter Champness, tells us his experience on out landing, I was there to retrieve him with Malcolm Bennett and The Erudite Peter Raphael. Alan Bradley tells us "It's still happening to me" and Malcolm Bennett lets us know what is happening with his project the Bennett Special.

Build your own glider. It's every prospective homebuilder sailplanes dream. Thanks to the generosity of the brilliant, flamboyant, bombastic designer **Peter Raphael (The Erudite)** who has published his plans for FREE on the Internet, you can make your dream come true. In this issue you will find the plans, photo copy them and have fun building it and do as I did, hang it on the ceiling of your den.

James Garay
(Editor)

Address all correspondence to:

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Kings Park Victoria 3021
Australia

Inside This Issue

MAIL BOX

Dear James,

Having drawn your attention to our new address in Baxter, the postal authorities have now changed our postal address to Frankston South, together with a change of post code. We haven't moved again, but the postal boundaries have. Please note the change in your records.

Allan Ash
70/8 Robinson Road
Frankston South, Vic 3199

Dear James,

Interesting story by Neil Ake -Sandberg from Sweden on the subject of motor glider/engine maintenance.
I wonder if you have a policy of not publishing e-mail addresses, as many of these stories could be enhanced by photos. There are several options available to swap stories and methods on the internet via Yahoo work groups. Regards John Thirwall.

Eds Note. Yes John you are quite right we have a policy of not publish addresses to protect your privacy unless you agree so.

TECHNICALITIES

FURTHER COMMENT ON FINNISH PLYWOOD

By G Sunderland

Finnish plywood, to grade GL 1 and GL 2, has been used in the manufacture of sailplanes in Australia, both commercial and homebuilt, for 30 years with no problems.

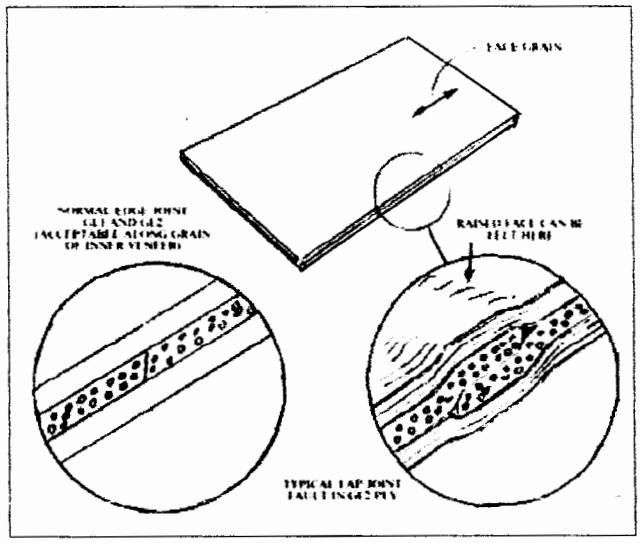
I was surprised to read some time ago that Stan Hall had never found a defect in GL 2 plywood. By definition, such defects must exist, otherwise the ply would be graded GL 1.

My own experience with GL 2 is that the defects are usually very obvious during a visual inspection. In addition to knots and other variations in the grain, a common problem I have found in GL 1 is faulty edge joints in the inner ply.

These are easy to see. They should not be permitted in any part of the glider's structure and must be cut out of the plywood completely.

The below drawings shows what these faulty joints look like edge-on. Normal sanding of the faces for gluing would, of course remove most of the face veneer and leave the ply weak in the face-grain direction.

In some instance, cutting out the obvious defect in GL 2 means that the remainder of the sheet complies in all respects with GL 1 specifications, apart from sheet width dimensions. Provided that the builder/inspector checks the remaining plywood carefully, including the inner ply, by the back lighting method, then the sheet can be used in any part of the structure where the dimensions allow.



WHAT'S NEW!

THE BENNETT SPECIAL

Malcolm Bennett continues to forge ahead on his much modified Woodstock, one which could more appropriately be named the "Bennett Special" in respect of the special effort that Malcolm has made to customize this unique aircraft.

As detailed in previous editions of this newsletter, Malcolm has introduced extensive modifications to the basic airframe in a desire to lift the performance and payload limitations inherent in the original design.

Additional features to simplify rigging of airbrakes and accommodate a future self- launching capability have also being incorporated.

With the extra time on his hands courtesy of shortened working hours, Malcolm's aircraft is rapidly approaching the finishing phase of its construction. With some wing covering already commenced and fabrication and hinging of the canopy well in hand it will not be long before the finishing touches are applied and Mals attention will turn to the mundane task of trailer construction.
Eds note: I saw it and it look terrific, Malcolm has made a complete transformation of the Woodstock and I am sure it will be unique when finished. Stay tuned.

Progress Report on the Bennett Special

By Malcolm Bennett

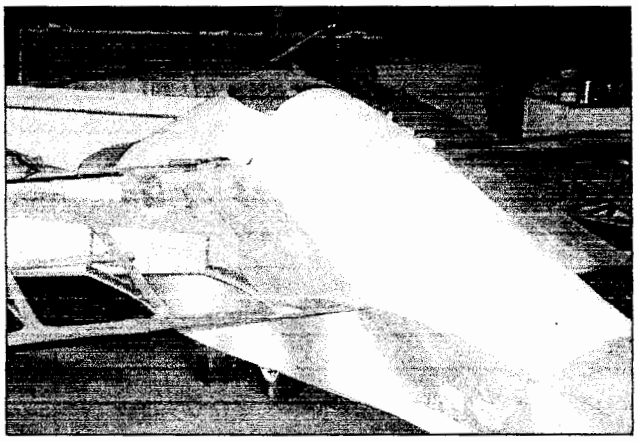
After surviving the possible destructive testing of the wings with one Ton (1000kg) of sand (5G at maximum all up weight) the project has progressed as follows.

The wings are now fabric covered with the first coat of Poly-brush applied. This seals and fills the weave of the Stits fabric,

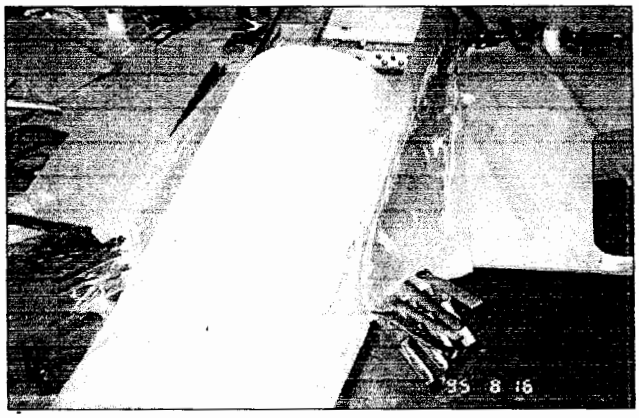
finishes the bonding of the fabric to ply covered area and makes sure that pinked edges on surfacing patches lay flat. If any of these edges lift; with the Stits System you just iron them down again at 200 degree F which softens the basic edge adhesive called Poly-tack.

Any lumps, lap edges or wrinkles in the glued edges can be ironed smooth with an iron at the right temperature and a little bit of patience.

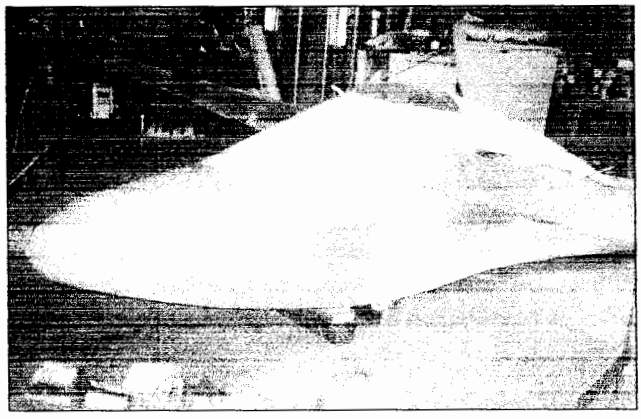
The wings have been fitted to the fuselage and the canopy frame formed, hinged, welded and ready for the acrylic.



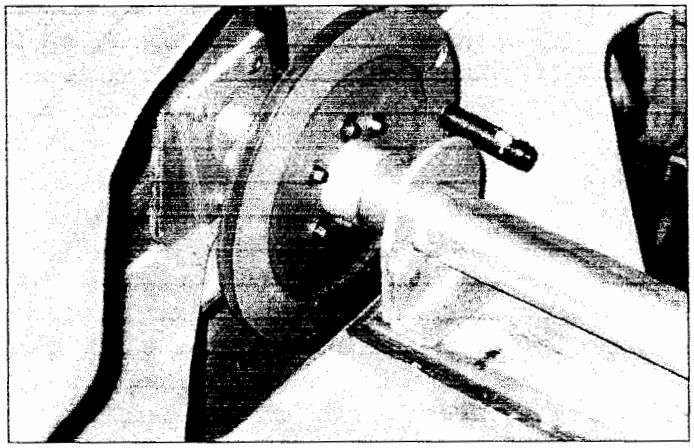
Turtle deck is formed and fitted constructed of 10 x 8mm stringers over bulkheads planked in 1 mm ply to a double curvature shape. (see photo). Fillets from turtle deck to wing underneath formed in 1 mm ply. These clean up the junction of the wing to fuselage quite nicely.



I have rolled up some heavy paper to the acrylic size and cut a template for the sheet.



The top hat molding I have is too thin so we will have to vacuum form another from 3 mm sheet before the canopy can be completed.
The air brake torque tube drive is fitted other than two turn around pulleys in the fuselage to complete the installation. See the photo of assembled plane before fabric on the wings.



Canopy frame is hinged at the front corner with an offset hinge line at the rear. This is recessed into the wing skin just in front of the spar allowing the canopy to lift and go sideways and mostly clear the wraps around the front of the wing down to sill level to just about the outside of the cockpit area when open.
Still to go is the finishing of the wing fabric and painting of the complete glider, fit off and plumb instruments and electrics, Build a trailer and mounts for the plane and last but not least, tap another oil well to pay for it all.

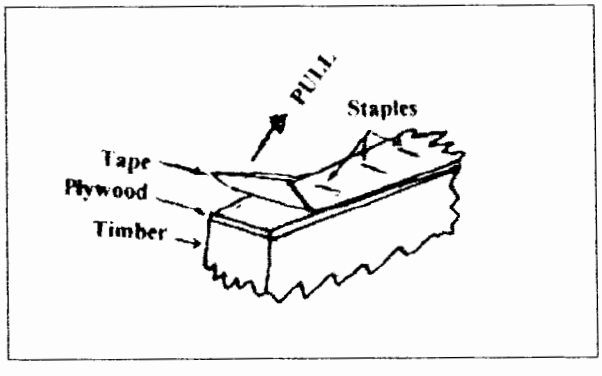
HINTS & TIPS

HOW TO REMOVE STAPLES

By Allan Ash

Alan Bradley has asked for a simple method of removing stales from tack strips, One method that I have used is to lay a strip of stout tape (e.g. canvas, leather, or such) onto the material to be stapled and drive the staple through it to fix the two glued pieces together. After the glue is set, the tape can be ripped off, pulling out the staples in the process.

Of course, fragile materials being glued require careful removal of the tape to avoid damaging the structure. As with most things, it would be best to practice this method of removing staples on some scrap timber before trying it on valuable glider structures.



It's Still Happening To Me

By Alan Bradley

I read with some empathy the agonies experienced by our editor James Garay (December 03 issue) and the fallout in announcing his intention to build his "everlasting dream". It seems to me that he approached the "affair" with insufficient planning (because that's what his relationship with his new "bird" will become). It appears that he was almost seeking approval to proceed. THIS ANNOUNCEMENT IS ACTUALLY STAGE 1 OF THE CONSTRUCTION PROGRAMME. IT IS THE MOST IMPORTANT AND CHALLENGING PART OF CONSTRUCTION AND CONSEQUENTLY REQUIRES CAREFUL AND INOVATIVE PLANNING. I SUGGEST IT COULD PROCEED SOMETHING LIKE THIS.

A(1) Make it known and accepted that all people need an ongoing and absorbing interest (In this case our Editor ,especially in retirement). In this case our editor

(2) Promote with enthusiasm a project that will have appeal to your partner (I built 2 boats entailing some 5,000 hours).

(3) Build a shed big enough to build the boat and house it afterwards (and build a glider).

(4) When the boat has been used for a year or so (in my case 20 years over the 2 boats) promote caravan touring as an addition to boating.

(5) Buy a caravan and use it sufficiently until it becomes a preferred alternative to boating.

(6) Sell the boat and plan to leave the caravan out in the rain thus releasing the shed for building a flying machine.

B When you reach stage (4) above commence a programme of little chores designed to build up heaps of brownie points. It goes without saying that the chores should be designed to create an illusion that much is being done but time and effort should be minimal. I have mentioned some of these previously and some others are added for your consideration. For me they worked and collectively have built up an acceptable number of points.

(1) Making the bed gets me off to a good start every morning. Importantly it takes little more time and effort than when I was helping my wife. She can then do the washing up which I hate.

(2) Vacuuming the house is something I do because my wife developed a shoulder problem. This actually entails additional work for me but one can't always win (I think her shoulder problem is legitimate!!!).Giving me the opportunity to give her a good massage. With the lot..??

(3) I learned some time ago that I was not really wanted when Marilyn went shopping. I now regularly offer to help her shop confident that the offer will be rejected.

(4) I recently suggested that I would like to get dinner one night a week. I built up a good relationship with the local fish and chips shop and can now confidently place a phone order and have the choicest fish and chips prepared to my wife's specifications on time. A bottle of "white" tops it off.

(5) Over the years I have been trained to wipe down the shower alcoves after use. We both showered adhoc and consequently both wiped down the shower. With Marilyn having a bad shoulder?? I suggested that I always follow her into the shower (don't get any funny ideas) and consequently I clean the shower. This entails no additional work for me but Marilyn thinks it's great. She happily does the dinner dishes while I shower etc. (I win too).

There are many things that one can do to build up such a credit that these little chores become more important than ones presence. If you can reach this stage you have got it made. You can now make a statement "Darling, I'm going to build a glider" and she will reply "That's a wonderful idea love, how much money do you need, because **I'm going to New Zealand with a boyfriend"...??** ***"It's true it still happening to me...One can only dream!***

IMPRESIONS OF FLYING JIM'S" WOODY-ROO" (IKL)

By Rob Benton

Last week I was lucky enough to have a flight in Jimmy Garay's lovely work of art... being his "Woodstock" homebuilt glider. I had previously got non-committal response to my expressions of interest, but, with the glider out on the field, and it being a nice day, I was a bit more determined with my questioning.. and drooling! I had just seen Malcolm Bennett perform a check flight, and obviously flew well.

When I had been given the OK for a flight by Jimmy, it was time for a quick walk around to familiarize with the 120Kg 12 Mtr span airframe. I have a lot of aeromodelling experience, and the saying goes, "if it look right, it should fly right".
In this case the proportions and layout looked just fine. Perhaps a little more dihedral would be traditional. The next thing was to try the fit in the cockpit. The canopy is a separate removable item, like on a Libelle, so this was carefully removed. I could appreciate

the amount of work which had gone into making and fitting that item by Jimmy. Fortunately, I am not a large person, and with a parachute on and no seat padding, we were able to check the canopy fit over my head was just right. Lucky me!.. Just like Goldilocks, "This chair is too big... This chair is too small...bur this chair is JUST right! "It is obviously not a complicated machine, and the controls all came to hand easily. The feel of the spring loaded air brakes was different to the club machines I am used to, but who wants to take their hand of the air brake lever once you have started glide control anyway? I can appreciate why instrument panels are mostly matt black. Any pale colours reflect on the inside canopy. Malcolm gave a couple of pertinent bits of advice, like not expecting the air brake to be super effective, and that side slipping could be useful. I mentally thought that I would probably not be side slipping in for a first landing on type, but nodded in what I hoped was an agreeable way. Bacchus Marsh is a big field, and I haven't missed it yet. His advice regarding the aero tow was to use the high tow position, adding that he had had homebuilt tows, especially behind Pawnee which felt as though he was being hauled very steeply into the sky with only Pawnee and sky to look at.

That sounded OK to me, and the tug pilot who was in attendance. The limiting speeds were quite low, and I note these. In fact when in flight it was not a problem, everything just happened at a lower air speed. I would have to have more flight time to be specific, but thermal turns were made at under 40kt, and very comfortable, and pushing back into the light breeze at 60 Knots seemed hurried enough.

That still left more than 20kt to max still air speed. The elevator trim arrangement of a spring loading of the control column was pretty ineffective, but really the stick forces are negligible, so it could almost be dispensed with, and that would give just a bit more space around the stick for your legs.

I liked the light elevator and aileron stick forces, and they matched pretty well to give you a feeling of light agility. In normal flight the rudder was just fine, too, but on a couple of occasions when I decided to turn NOW, and whacked the stick over and a boot full of rudder...(Yes I know that does not sound very elegant)... Anyway the outcome was a smart roll, and a lazy yaw, so I reckon that I need to change my habits and lead with rudder. Other more experienced fliers have alluded to other types which require a good rudder lead for a smart turn. In retrospect the lay rudder was also apparent when in a steep turn, and using a bit of top rudder to keep things just so.

Twice I found the nose dropping away despite the top rudder. Maybe I just need to fly it more,(please Jimmy). My flight was not long due to a light easterly having its usual effect at Bacchus Marsh, but I did make a significant height gain in a narrow thermal over the quarry. Boy.., you can turn these light gliders in small radius. It could make for unsociable behavior, wanting to turn inside other folks in a shared thermal. I extended my flight a bit over the city facing slope by the rifle range, where a K-13 was the only other glider in sight. I would have liked to have spent more time there, getting a relative idea of performance, but I did not seem to be matching him in the very light lift, and I was mainly concerned with making an easy return to the circuit.

When I had it safely back on the ground I was left with a feeling of respect for Jimmy's neat and attractive building work, and the qualities of this design. It would be an aircraft which you could set yourself some decent flight targets in. Malcolm Bennett has done 300 km in his and also Peter Raphael (The Erudite) and their enthusiasm for the design was probably reflected by me as we all had a beer together at the club house after the gliders had been put away.

PS. My flying experience is some military flying a LONG time ago. Lots of aeromodelling over a lifetime, and club gliding with Beaufort and Bendigo Clubs for about nine years. Now I want to build the quarter scale "WOODSOCK" for radio control designed by Colin Collyer and the kindness of James Garay who facilitate his set of full scale plans to Colin. Rob Benton.

A LETTER FROM JAPAN

G'Day Jim,

Hello again to you down there. Long time no hear. I received an email from Peter Raphael the other day saying that you had requested me to drop you a line with my email address.
That bit is easy. The direct email address in Japan is as follows tomiya@di.mbn.or.jp or you can still reach me at my old one vh-mws@riverland.net.au. Either one is OK to use, they both end up here.

Peter tells me that in October 2004, it will be ten years since we started the association. It is almost unbelievable that 10 years has almost passed since then. It doesn't seem that long, almost unbelievable!
I said to him that I don't really feel a part of it as I have been out of it for so long. I am very happy to see that the association is still going strong, this has so much to do with all of the efforts that your self, Pete and all of the other volunteers have put into keeping the group going, keeping the interest alive in homebuilding and keeping up with the newsletter, a task that I am sure some people still don't appreciate the amount of work required to get the next issue out

Pete said that he passed the information regarding the prototype Windrose that I came across up here in Japan.. If anyone would like more info, they can contact me via email, snail mail or fax.
My address here is 3-5-23-505,Takahama, Mihama-Ku, CHIBA 2610003, JAPAN.
Ph/Fax +81+(43) 279 6373.

Homebuilding up here is really a non event, the regulations are very strict and although it is not impossible to get something flying, it is much more difficult than down there. Even a simple task such as servicing a TOST release, it must be sent to Germany to TOST to have it done, no one here can sign them out. The freedom there in Australia really needs to be appreciated and it is only when you don't have to that I think you realize just how much of a Lucky Country it really is.

Perhaps many years ago, homebuilding was the way it all happened but I am not sure at present, it would need to be checked out. I know there are quite few old gliders sitting around doing nothing as 'new' is good, old is not so good. Some people appreciate the older aircraft but generally speaking, the young people don't really like the older aircraft.

The weather conditions up here are not very good for having aircraft just sitting for long periods as winter is very cold with snow in many places and summer generally has high humidity. Many gliders sit either outside all year or live in trailers, mostly outside.

There are many examples of gliders in excellent condition but these usually have a hanger to live in or a large container truck that has been modified to suit the task (Club hanger).

Most airfields are situated on river banks so when it floods, everything must be moved so that is the main reason smaller clubs don't build hangers on the airfield.
Some larger clubs do have hangers over the opposite side of the large levy banks that surround the rivers.
The aircraft are moved in one way or another over the bank each day they want to fly, it's a bit of a hassle but they seem happy with it. I guess they don't need to rig the gliders each time so that would be a bonus.`

Anyway, this is a bit short but time is a bit of a problem up here. As time permits, I will try to put something together and let you know what is happening.

Take Care
Mark & Machiko Stanley
Japan

2004 Homebuilders regatta

By Peter Raphael (The Erudite)

Once again a successful regatta has been conducted by Australian Homebuilt Sailplanes in participation with Vintage Gliding Australia. The regatta was conducted at the Bacchus Marsh airfield less than an hours drive east of Melbourne between the 3rd and 10th of January. Weather can be a variable when gliding fields are in close proximity to the coast and while a couple of days were lost due to high winds most other days provided acceptable conditions which allowed soaring to the allowable ceiling of 4500 feet. This location of the field under the Melbourne approach steps does present an impediment to cross country flight when conditions allow higher climbs.

The event generally attracts visitors from all parts of Australia and this year was no different with a Foka 5 even being trailered all the way from Queensland for the occasion. As for the homebuilders activities our contingent comprised of a brace of Woodstocks and the Duster. As usual most of the organization of these events is undertaken by the Patching Family and the family did an exceptional job of catering and administrating the entire event.

Day one for us was on Sunday when our attention turned to assembling the gliders and settling in on the camping are next to the clubhouse. Strong winds and some showers threatened to get things off to a poor start but by the time we were ready to fly the day had taken a turn for the better and we were able to tow out to the launch area.. This day we were unable to witness winch operations more suitable to some of the older gliders as we took our turn for an aerotow. Jim took to the air in his WoodyRoo and later indicated that he found the conditions quite rough, a condition not uncommon when flying such a lightweight glider.

Unfortunately as the week progressed it became increasingly difficult negotiating with the Flight Training School to coordinate operations and no further winch launches were possible. Aerotow launches continued courtesy of the Pawnee and the next 2 days provided suitable conditions for soaring in the local area. One highlight in this period was the retrieval of Peter Champness from the plateau to the north of the field. Being some 1500 feet higher than the field Peter found himself quite low and rather than face an uncertain glide down the valley he made a wise decision to land . Once he had found his way back to the field (that's another story) the rest of the exercise was uneventful and we soon were back at the field in time for dinner.

By Wednesday the weather had soured somewhat and while weak conditions allowed some short local flights the threat of showers drove most to hanger their aircraft. Other chose to take the opportunity to visit the glider restoration workshop in Ferntree Gully or the Point Cook Aviation Museum.
The next day we were greeted with strong winds and a continued poor forecast so in the interests of productivity Mal and I returned home until things improved on Friday. In fact while driving home with a tail wind I was able to keep pace with cloud shadow at 80 Kmh
The week closed with 2 days of excellent soaring which allowed us to explore areas away from the field and both the Duster and Woody were able to visit local points of interest such as Mount Anakie to the south and Fiskville in the north. On these last 2 days we were able to savour what is for inland fliers an unusual experience of viewing the skyline of the City of Melbourne and the large expanse of Port Phillip Bay.
A lovely dinner at the Bacchus Marsh clubrooms on the Saturday night and the presentation of a bottle of wine to Woodstock HNW as best presented homebuilt was an unexpected surprise that capped off a successful week for both the AHS Members and our Host, Vintage Gliding Australia.

Scale Models

By Sir Colin Collyer

All aeromodelling is good, but gliders are better, and scale gliders are better again. They can be built very real scale, including the structures, in any scale from about 1/6 up to maybe 1/3, the bigger ones are quite convincing in the air often being mistaken for full size. They can be launched by winch, aerotow, or slope-soared off a hill. They make a perfect scale sound.

There are only 2 hard bits:
1) As most sailplanes have a large "glass house" canopy, they therefore need some good cockpit detail.
2) Documentation is hard to find -- There is no such thing as "too much" documentation for a scale model.

So where to look. Well, Janes All The Worlds Aircraft book could be a good start. No sir! no gliders, and precious little civil aircraft. Plenty of military or airliners. Lots of other books cover the subjects similarly. So where does the sailplane modeller look.

- Janes All The Worlds Sailplanes book, good to find a subject, and some idea of shape via the 3 view, but no structural details.
- Australian Gliding magazine good to locate subjects, quite often colour photos, a good collection comes in handy.
- Soaring, the SSA magazine with some great subjects over the years, sometimes 3 views and colour schemes, but a long way to travel if you need to research a subject
- Martin Simon's Fine Books the "bible" started with vintage sailplanes, followed by Slingsby Sailplanes, Schweizer Sailplanes, Sailplanes 1945 – 1965, Sailplanes pre 1945, and maybe soon a Sailplanes 1965 on. All with accurate 3 views, colour plates and photos, plus a good read. By far the best reference material. The other choice is to build Australian, as I have, and take your own photos, and chase 3 views, sometimes hard to find. One of the advantages, is that you get to meet some interesting people along the way.

My first subject was the Golden Eagle, built to celebrate it's 50th Birthday in '87. At 1/3 scale, it turned out very accurate, even with a slim Ian Patching inside still flying in 2003.

Next came a KA6E. Only one in Australia at that time, already done - so I chose a British subject (177)

Then came MOBA - factory drawing off Gary Sunderland. High aspect-ratio, different cockpit entry, huge glasshouse, retract, flaps. Having full size available helped greatly. A really efficient soarer, it has done 2hrs and 3 ½ hours, both times landing to check batteries.

Schweizer 1:26 - lots of colour schemes from "Soaring", but the real detail was not available. It can do scale aerobatics though!

Then came the Woodstock, factory drawings scale structure, user friendly size at 1/4 scale, but almost no colour schemes. (Peter Raphael is going to do his, and James Garays was still being built). So James, lets have lots of photo's of homebuilts, for example BG12, Miller Tern, Cherokee, Pelican 2, Pioneer 2, and there must be others.

To help me with my 10 year Plan", I'm looking for interesting Australian schemes for the following ....

- Pilatus B4.
- Pirat
- 15m Cirrus
- Boomerang – I seem to remember an Australian Gliding magazine cover with TT on the Fin/Rudder Red on white/white on red.
- KA6e - I only known of the Paul Clift one.
- KA8B - I have a photo from the web of a K8 at Mildura in about 1985 – GPD was the rego, red fuselage, with a white "K8" and bird motif on the nose. I'm really keen to get more details, as I have a K8 ready to paint.
- Australian KA14 motorglider

That sounds more than a "10 year plan"

Any info can be sent to:
Sir C. Collyer
37 Cleveland Rd.
Ashwood. 3147
Phone 98076462
Email c.collyer@AEROSONDE.COM.

I'm happy to copy and return thanks,

THIS DAREVIL DAD

An excerpt from rec.aviation.homebuilt

Jim.
This poem was sent to me by my all grown-up aspiring to be a writer daughter. Hope you enjoy it....I did...
Dave

I jam the doorway of my father's 1500 sq. ft. shop he built.
It's bigger than my apartment in the city.
It has it's own air conditioner.

He spends hours in there,
curved over his workbench,
fiddling with parts and pieces,
working power tools like toys.

My eyes tumble over his crusty knuckles, his curvaceous hands,
his "I still got five fingers" hands,
his "do-it-yourself" hands,
his "I grew-up-on-a-ranch hands.

Hands that make quick work of sheet metal
the way a baker knowingly shapes dough into pretzels.
methodically tracing, bending,
melding scraggy bits into
something tasteful.

He steps to the blueprint with a magnifier,
following the line with one tan finger
while turning the piece of metal
he made with the other,
comparing.

"Aren't you afraid of making a mistake?" I ask.

His deep, earthy eyes rise from concentration and
fall on me, daughter spying from the doorway.
He sighs at the question, shakes his head,
gets that half-grin twisted up in his mouth until a smile breaks loose.

"I guess we'll find out if I do!" he jokes.

Joke that isn't funny. It won't be the first time I've had to watch my father hop in a cockpit of a plane he pieced together with epoxy and liquid metal and taxi the runway and take off and transform into a tiny bird while we hold our breath wondering whether or not he will ever come down from that cloudy perch, whether or not we will be fledglings left in the next with mouths wide open, whether or not we will have to

hear, or rather - not hear, the sound of the prop faltering
or the engine sputtering or the bird exploding in the sky
like a puff of God's cigar smoke.

He interrupts:
"I could hire a test pilot for the first flight, but if I made
even one mistake..."
trailing off his eyes go far away, contemplating the
outcome
of one missed bolt, one loose connection.
"well...I just wouldn't be able to live with myself."

I am at once terrified and humbled by this daredevil Dad,
this person who built a 1500 sq. ft. shop
so he could construct this plane,
so he could hang in the sky dangling in front of his maker,
so he could dangle in front of us all
and make us wonder
if we'll ever see him again

Bradley's Woodstock

By Alan Bradley

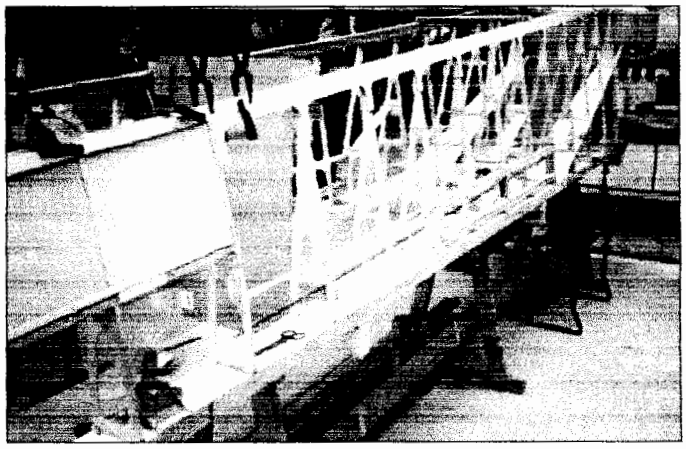
In December I reported that I was just about to start building the jig to assemble the wings. That proceeded quite smoothly and today (21st Jan) I am ready to turn both wings over to do all the nose ribs and torsion box etc.

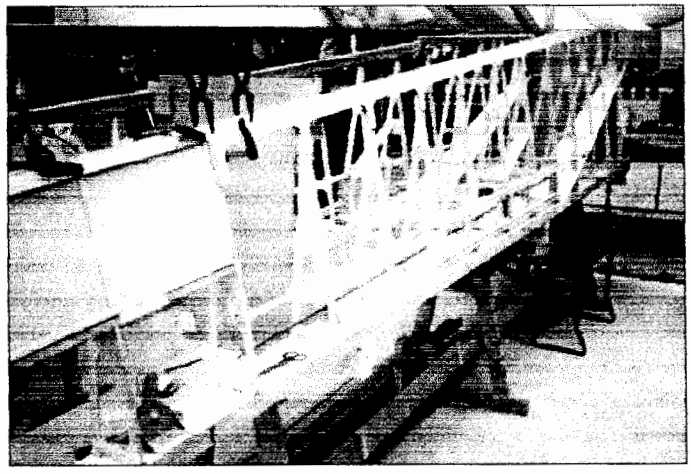
The construction notes suggest fitting the nose ribs first but seeing Mal Bennett assembling the aft section of the wing first made lots of sense to me and that is the way I elected to go. The jig was pretty much a copy of Mals but enable me to build both wings at once. The spars were set up true and a 38 X 25 galvanized fencing rail (these are very straight) jigged above the spars, accurately following the line of the underside of the trailing edge. Quarter inch square blocks were glued rib thickness apart at each rib station and the trailing edge clamped to fencing rail. The ribs were then fitted and glued into position.
The ailerons were built into the wings at this stage and hinged as were the spoilers and drag spar. The controls and pushrods etc. were fitted to the ailerons and spoilers and then the ailerons covered with ply. I really feel that I am now making headway. I must say that it really worried me at one stage that most of the gliders under construction or recently finished were commenced by someone other than the finisher. I did not want mine to go that way.

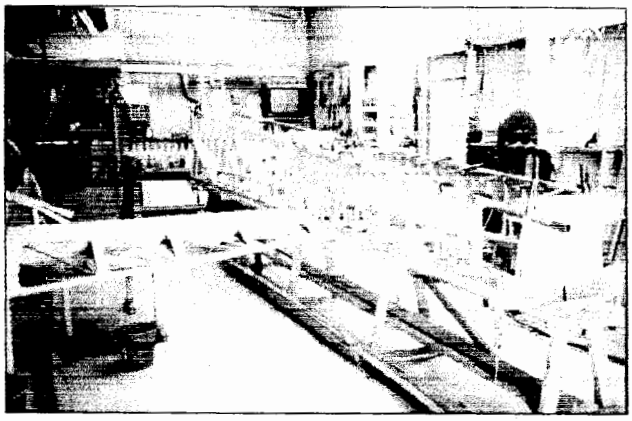
My main wing fittings are different from the original both in size of the material and the bolts. I have a lesser number of bolts but they are all within aluminium bushes. This presented me with an interesting problem- how to drill out the holes to take the bushes dead accurately Bolt size holes were drilled using the fittings as a template and the drilling jig, all as described in the Woody construction notes- this works very well. After a week of experimentation and failure trying to drill dead accurate bush size holes, I settled on this:-

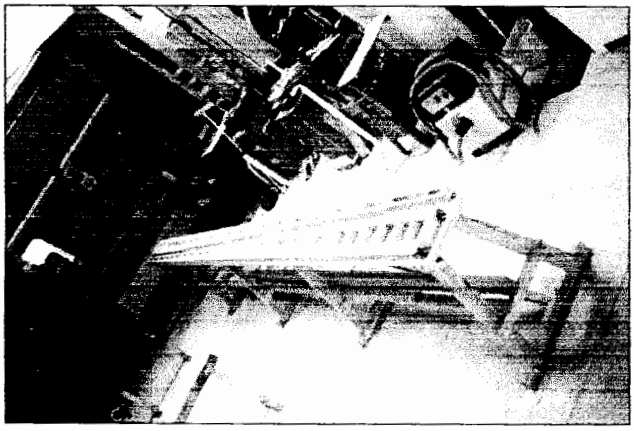
I made a drill jig comprising a piece of 38mm diameter by 75mm long round mild steel, welded to a
100 x100 x10mm plate. The plate was then faced in a lathe and a bush size hole drilled through the centre of the round. A spindle was then machined to slide through the drill jig and machined to bolt size one end. The jig was then centered over the holes in the spar using the spindle as a feeler gauge. The jig plate needed shimming each time so that when clamped the spindle slid smoothly in the spar. The bush size holes were then drilled half way from each side. The other problem that I experienced was sharpening the drill so it would cut smooth without jagging. I finally used a standard "off the shelf" point with cutting edges ground flat for about 2mm. It's great for opening up existing holes in timber and for drilling aluminum. Useless for anything else.

I am enclosing some photos which you may be able to use.









Build Your own Glider

Peter Champness

Build your own glider. It is every prospective homebuilders dream. Now you can do it too. Thanks to the generosity of the brilliant designer Peter Raphael (The Erudite) who has published his plans for FREE! on the internet and also in this issue. Peter offered me the full construction kit one evening at Bacchus Marsh on the last evening of the homebuilders regatta. I was feeling rather frustrated with gliding at the time having spent several short flights finding the sink and almost out landing in the paddock next to the airfield. None the less I accepted the offer and set to work the following evening building the rudder initially to get the hang of things.

The design is the famous K7 two seat trainer. Normally one of these beauties would set you back about $25,000 on the second hand market but if you are prepared to put in the time and hard work you can build your own for about 20 cents. The kit even comes complete with a detailed and attractive blue and white colour scheme in the Bendigo Gliding Club colours which saves a lot of time in painting and finishing and virtually ensures a nice outcome. Peter used a computer design program to create the plans and all the parts are very accurately drawn at 1:1 scale.

Construction

The rudder was completed satisfactorily and I then felt confident to attempt some of the major parts. The wings were next. Normally forming the curvature of the upper wing skins and the nose section is a complex process of steaming and soaking but Peter showed me how to form the curvature by rubbing the skins across the sharp edge of the table. A word here about the glue. It is a firm principle of aircraft construction that only approved glue should be used. Peter recommends PVA (white glue) for this design but I used a UHU glue stick because I had one handy and it seemed appropriate for this type of construction. This turned out to be a mistake. The UHU glue tends to grab at the first contact which makes slight final adjustments impossible but it also requires firm pressure on the glue line to get a good bond. On this aircraft it is difficult to apply clamping pressure to the glue lines especially at the centre wing join without crushing the wing and damaging the airfoil section. The glue joint therefore tended to creep under slight pressure and the dihedral angle kept collapsing despite re-gluing it several times. I solved the problem eventually by using superglue at the wing junction. I would however advise the use of PVA adhesive as the designer recommends.

The fuselage sides are all made in one piece. The rear fuselage is basically a square box, but the top deck is pitched like a little roof. The sides are folded and scored at the fold lines and the top deck overlaps at the glue line. It is fairly easy to get the rear fuselage straight but the front section is more difficult as the sides and bottom must be drawn together and glued under tension. The construction is entirely monocoque with no internal framing or load bearing structure whatsoever. The stressed skin construction is remarkably strong but it is all rather floppy until the structure is complete. This is most noticeable from the wing seat forward. The wing centre section is part of the fuselage structure. The fuselage is not very strong until the wing is fixed in place. I wondered whether a bulkhead at the level of the wing seat might improve stiffness and help accurate assembly. I might suggest it to the designer and the GFA and see if it could be made an approved modification.

It is important to get accurate alignment of the wing so a trial fit of the wing is indicated before applying the adhesive. It will be noted that the top edge of the fuselage helps to define the lower surface of the aerofoil which resembles a Wortmann section, being convex at the front and under cambered at the rear. When all seem satisfactory glue the wing ensuring , as far as possible, that the wing is square to the fuselage.

Complete the front fuselage by drawing the sides and the lower surface together, gluing the tabs and working progressively toward the nose. A gentle touch is required to avoid squeezing the sides and creating a hollow cheeked look. The skid and wheel are then glued in place. A pair of tweezers are helpful for this as well as other parts of the construction. The tailplane can then be glued in place attempting to keep it parallel to the wing, both in the plan view and the frontal view. The final item is to fit the canopy. It is always a difficult job to get a nicely fitting canopy on any aircraft. The aerotow hook is at the extreme nose and is fitted at the same time as the canopy.

Weight and Balance

The overall weight is dependent on the materials used but the completed aircraft is inevitably tail heavy and requires extra weight in the nose. The designer suggests that a 5 cent piece is about right. Not wanting to get into complex mathematical calculations I adopted the method used by model builders of supporting the aircraft under the wing at the required point of balance and then adding nose weight until the aircraft just tips

nose down. Since the wing is swept forward the balance point is close to the leading edge at the side of the fuselage. The balance point is forward of the wheel and the aircraft rests on the wheel and the skid, when on the ground.

Wing Proof Loading

The designer has not at this stage published full details of the stress analysis and hence proof loading of the wing seemed like a good idea before commencing the flight trails. Those who are regular readers of the newsletter will recall the accounts of the proof loading of Malcolm Bennett's Super Woodstock. Normally in these tests the wing is turned upside down and weights (sandbags) are placed on the wing based on the wing area of each station, with perhaps an allowance for the reduced lifting efficiency at the wing tip. In this case I adopted a simplified procedure to avoid the calculations and to make it a one man job. A block was placed under one wing tip and the opposite wing tip was carefully jacked up until the fuselage was lifted off the ground. This test places a lot of stress on the wing and I would not attempt in on any other aircraft. In normal flight the effective centre of lift of a taped wing is between ¼ and 1/3 of the way from the wing root to the tip. Also the weight of the wing itself is distributed over the lift area and does not contribute to the "weight of the non lifting parts". In the wing tip test, however, the full weight of the wing is added to the stress on the wings and, since the wings weigh about half of the empty weight of the glider, we may conclude that the wing tip test is equivalent of applying about 6-8 G in normal flight. When the glider was fully supported at the wing tips I estimated the wing deflections and was I unable to detect any deflection at all. Just to make sure I added a further weight to the fuselage equal to the full weight of the glider and repeated the test. Once again the wing survived the test with no apparent wing deflection. I was truly impressed by the strength of this wing which is entirely a stressed skin structure with no ribs or spars at all. 16G on the static load test, incredible!

Flight Trials

All was now ready for the initial flight tests. Not wanting to wait any longer these were conducted near home in a suitable clear space. Launching from a altitude of about 3-4 feet I was able to achieve a stable glide of about 2:1. Other builders may achieve better results and if so they might like to inform us of their experiences.

I expect that the Raphael K7 will become a very popular homebuilders project. I have built two already as I was not quite satisfied with the first one. James Garay has built one and I expect that Peter Raphael has a number of prototypes. What is needed now is a suitable tug aircraft to launch all these little gliders. I am hoping that Peter might have something for us soon.

Out Landing at Bacchus Marsh

By Peter Champness

"Pride Goeth Before a Fall" so they say and so it seemed to me as I contemplated my position in a paddock 20 km from Bacchus Marsh during the Homebuilders and Vintage Regatta 3 -10 Jan 2004. Having recently achieved a 300 km flight at Benalla before Christmas I was keen to repeat the performance. The day seemed suitable with cumulus clouds forming at about 5000ft with light southerly winds. Admiitedly I had not made any preparation for a cross country flight. I had no mobile phone, no tie down kit and my wallet was back in the car. Indeed I had not even got around to taping the wing gaps or the "filler cap" cover over the spar join fitting. None the less if the conditions seem suitable for cross country one should try it, especially at Bacchus Marsh since the conditions don't necessarily occur all that often.

For those who are unfamiliar with Bacchus Marsh the airfield is located about 20 km west of the outskirts of Melbourne. The new suburbs of Melton however are rapidly expanding westward and Bacchus Marsh itself is a mini boomtown with some of the highest rises in land and house prices in the country in recent times. The airfield has two long sealed runways of 5000 ft each and is located in farming land. From 4000 ft one gets good views of Melbourne with Mt Dandenong beyond. To the south lies Port Phillip Bay and the local peaks of the YouYangs. Large jet aircraft are often seen practicing circuits and other procedures at Avalon airfield which is only 35 km south of Bacchus. Passenger jets from Perth and Adelaide pass close over head on descent into Melbourne Airport. Sometimes they are so low it seems as though there might be some confusion about the height of the 4500 ft step. Unlike many other glider sites there is still a lot of green about even in mid summer, especially in the forested areas of the Great Dividing Range to the North and the Brisbane Ranges to the West of the airfield.

The major challenges to gliding are the controlled airspace steps which impose a height limit of 4500 ft above the airfield and 3500 ft to the east of the airfield and the local weather. Bacchus Marsh is south of the Great Dividing Range which often means cloudy conditions and strong winds. The sea breeze usually comes in early in the afternoon on the good days.

The only direction available for cross country flying is to the West. The way East is blocked by the controlled airspace over Melbourne. The Great Dividing Range to the North is all forest with no landing areas. South is blocked by Avalon airspace and Port Phillip Bay. The next controlled airspace step is 20 km west, beyond which glider flying is allowed up to 7500 ft. The line on the map passes over a feature marked as Mt Wallace. In my calculation it should be possible to duck under the 4500 ft step at Mt Wallace and reach the airfield in a straight glide especially with a slight tail wind. BM is 500 ft above sea level. Allowing 1000 ft for the circuit leaves 3000 ft of height loss from the 4500 ft step with 20 km to travel; ie a glide ratio of 22:1.

My immediate goal was to fly to Mt Wallace and then climb above 4500 ft, which is a task I have not yet achieved at BM. After that if conditions seemed suitable it might perhaps be possible to try Ballarat and return or if conditions became very good Ararat return (about 200 km). The best way to find thermals in the vicinity of the BM airfield is to look for other gliders circling. There are usually quite a lot of gliders on a good day. Moving from one thermal to another in this way I made my way westward reaching the Brisbane Ranges in about 30 minutes. From this point I was on my own. After some searching about I found a thermal on the east side of the Ranges

which took me up to 4500 ft which was sufficient to cross the Ranges to the west side. From this point on things became quite busy and time was running out.

The first thing on my mind was to locate Mt Wallace. I was expecting to see some sort of a hill but all I could find was a group of farm buildings. The terrain looked quite flat. Perhaps Mt Wallace is a local sheep station? It was soon apparent however that I had very little height and that finding lift was a matter of urgency. The terrain on the west side of the Brisbane Ranges is approximately 1000 ft higher than on the east. It was now about 10 minutes since I had left the last thermal and it was becoming clear that I was soon going to land. I tried to divert to a couple of nearby clouds. The clouds however had not been a very good guide to thermals east of the ranges and the clouds to the west looked even less promising, being rather thin and wispy. Moderate sink was found under each one. Should I try to land close to a near by group of farm buildings and confront the owners dogs? In desperation I turned back towards BM. My first choice of landing paddocks turned out to have cows in it so I pushed on. The next two paddocks were wheat paddocks but the grain had not yet been harvested. I picked to next one and swept low over the fence heading down wind.

There was just enough height for a turn into wind. It was a real effort of will to put the nose down to pick up speed as I was flying below "safe speed near the ground". Keep the bank angle as steep as possible. It has been argued convincingly that a glider cannot be stalled at greater than moderate angles of bank. It is a least a theory that I subscribe to, but don't let the wing tip hit the ground. If necessary land cross wind even though it is the short axis of the paddock. Within moments I was aimed into the wind and leveling out. Pull the dive brakes, flair and hold off as long as possible. The territory west of Melbourne is the famous and fertile Western District of Victoria and is formed from Basalt outflows from extinct volcanoes. Unfortunately it is full of rocks. The grass in the paddock was mid calf to knee high. High enough to conceal plenty of rocks. Therefore as soon as I touched down I pushed forward on the nose skid and put on full brake to keep the landing run as short as possible. Fortunately there were no rocks in my path. I got out to survey my situation.

The first thing I noticed was Mt Wallace fairly near to the south. Mt Wallace is a low gently sloping mound, invisible from the air above but quite an obvious feature from ground level. I had landed on the very edge of an escarpment about 1000 ft high. At the eastern edge of my paddock was a very steep valley. A road ran down into the valley and east direct to BM. I tried to radio BM but got no reply. I did a quick check of the glider and noticed that the filler cap was missing. I did a careful search back along the landing track but was unable to find it. Since I had no tie down kit I left the glider where it was and walked to the road. The paddock had two gates but both were chained and locked.

A vehicle had passed along the road just after my landing heading toward BM so I decided to walk toward BM and hitch a ride. Unfortunately the road was rather lonely and I saw only a few vehicles, all going the wrong way. After walking about 2 miles I flagged down the next vehicle going the wrong way which was an old ute with two young men and two dogs aboard. This turned out to be a fortunate decision. I asked about the owner of the property on the top of the ridge and was told the owner lived in Melbourne. The two young men however were jackaroos on the property which is obviously quite large and one of them had the key to the gate! I was driven to the homestead and one of the men then drove me to BM. I organised him a flight in the two seater K3 as a reward.

It was by now quite late in the afternoon and the other were packing up. Malcolm Bennett, Peter Raphael and James Garay all kindly agreed to help with the retrieve. That is one of the nice things about the Homebuilders regatta. There are always plenty of good friends willing to help. The retrieve was fairly uneventful except for the fact that I drove past the open gate and had to reverse the trailer on a narrow road with deep culverts on each side which was a bit tricky. There was a discussion on the way back about what would have happened if I had glided over the edge of the escarpment and into the valley beyond. Because the terrain falls steeply away by about 1000 ft this would have meant a landing in the valley below but about 5 km nearer to BM. As I had suspected when I decided to land on the ridge there were no suitable landing areas in the valley. Peter Raphael was confident that the strip of grass on the edge of the road would have been quite suitable however for the Woodstock.

The sequel to this story is that I almost did the same thing the next day. I had pushed out to the limit of gliding range from the airfield and encountered sink most of the way back. I was about to land in the paddock adjacent to the airfield in which the farmer was harvesting his wheat. A little thermal at the last moment was just enough to lift me over the fence at the far end of the cross wind runway. My landing went unnoticed and no one came to pick me up so I had another long walk back to the flight line!

TRAILER TALK 4

How to Measure the Weight of a Glider Trailer using Bathroom Scales

Peter Champness

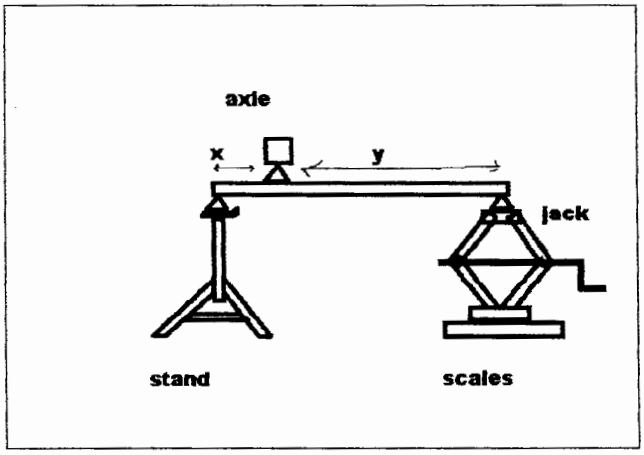
The weight of a trailer and the axle loads could be measured directly if one had a large set of scales or access to a public weighbridge. In the case of a newly constructed trailer it might be necessary to produce a weighbridge certificate to obtain trailer registration. In my case however there is no public weighbridge handy. They might also charge a fee. Therefore I have been wondering how to measure the weight of my trailer using a set of bathroom scales.

A single seat glider trailer typically weighs about 500kg empty and about 750kg with the glider inside. A set of bathroom scales will weigh up to 120kg. Therefore one requires either several scales located at various points under the trailer or some system of levers so that the scale only measures a small proportion of the load which is then multiplied mathematically by the lever ratio to obtain the weight of the trailer. System 1 (multiple sets of scales) will require 7 sets of scales to measure the fully laden weight. It also presents a complex problem of

placing the scales under the trailer in such a way that they all take about the same weight. Jacking and lowering the trailer onto each set of scales would be a lot of work. Therefore system 2 (levers) is a better proposition.

In the end the measurement was easier to perform than I had at first thought it would be. Only a small amount of equipment is required: bathroom scales, axle stands, beam and tape measure. A number of small pieces of angle iron can be cut to act as loading points which makes the measuring more accurate.

The weight on the trailer hitch can be measured directly because it is less (or should be less) than 120 kg. Place an axle stand on the scales and adjust it to the same height as the tow ball on the car so that the when the trailer hitch rests on the stand the trailer is level. Use the jockey wheel to manouvre the trailer and then lower the hitch onto the axle stand. When the jockey wheel is off the ground and the scales are taking all the weight record the weight. If you normally remove the jockey wheel when towing you should remove it before measuring the hitch weight. Finally, after removing the trailer, measure the weight of the axle stand and subtract it from your first measurement to obtain the hitch weight.



Now measure the weight on the main axle. This procedure is best performed on level ground both for accuracy and for the sake of safety. Firstly jack up one wheel and place an axle stand under the axle near the wheel. Place a mark at this point and measure the location from the inner wheel flange. Now jack up the other wheel and place the measuring system under the axle at the same relative location from the wheel as the other axle stand.

Assuming that the axle carries a load of about 700 kg, the load on the measuring system will be about 350 kg. Try to arrange the beam and the angle iron supports so that the ratio of distances x:y (stand to axle vs axle to scales) is about 1:4. This will give a load on the scales of about 70 kg. Raise the jack until the wheel is raised off the ground and record the actual load. Take a tape measure and measure accurately the distances: stand to axle and axle to jack. Now lower the jack until the wheel is again taking the weight of the trailer and note the weight on the scales. This residual weight is the weight of the jack, beam and angle iron supports which should be subtracted from the measurement to obtain the axle load measurement.

A simple calculation is now required. The axle weight is 2 times the load on the measuring system since we are only measuring load on one wheel. The load on the measuring system is distributed between the stand and the scales in the ratio: x:y and taking the moments about the stand we obtain;

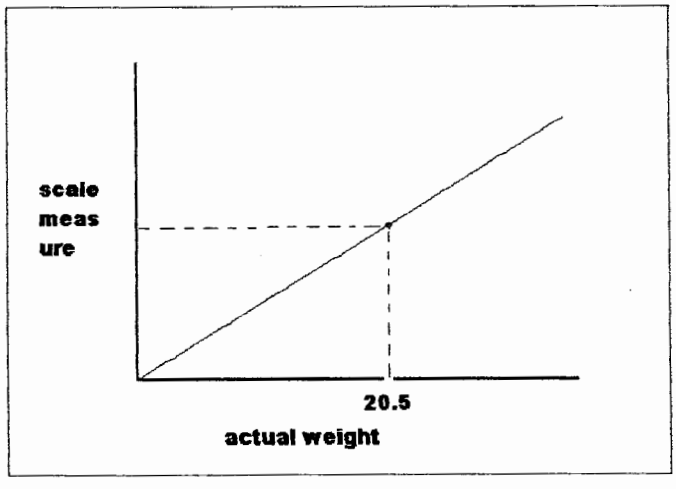
$$W = M*(x+y)/x \text{ times } 2.$$

Where W= weight on the axle
M= corrected measurement on the scales after subtracting the residual weight
X= distance stand to axle
Y= distance axle to scales.

Trailer mass equals W plus the weight on the hitch.

All this takes longer to describe than it does to actually do. The whole process takes about 5 minutes once the equipment has been assembled which is much less time than it takes to hitch up and drive to the nearest weighbridge.

For improved accuracy there is one more thing to do and that is to correct the scales. At Bunnings warehouse they have a selection of bathroom scales. I measured myself on a number of different scales and found variations of 5-6 kilograms which is rather a lot and indicates that bathroom scales are not very accurate. However the mechanism is quite robust and relies on stretching of a spring. The springs obviously vary a bit which leads to the variations observed. Each scale however gives quite reproducible readings because springs follow Hooke's law. Robert Hooke (1635-1703) found that the extension of a spring is directly proportional to the force applied to it. To correct the scales we need to measure the weight of a known mass. Take an empty plastic bucket and weigh it on your wife kitchen scales. An empty bucket weighs about 500 gm. Add water measured with a measuring jug. One litre of water has a mass of one kilogram. A bucket holds 20 litres and one then has a known mass of 20.5 kg. Adjust the scales so that they read zero with no weight then weigh the bucket. A simple graph is then constructed with scale measurement on one axis and the known mass on the other axis. The graph is a straight line because of Hooke's law and passes through the origin.



Schleicher Ka7

Drawn by Peter Raphael 2003

Fold tabs out
to support tailplane

Glue

Glue

Australian Homebuilt Sailplanes

Australian Homebuilt Sailplanes

Cut and fold Tabs in

Glue Wing on here

Elevator

Skid

Rudder

AHS

Glue

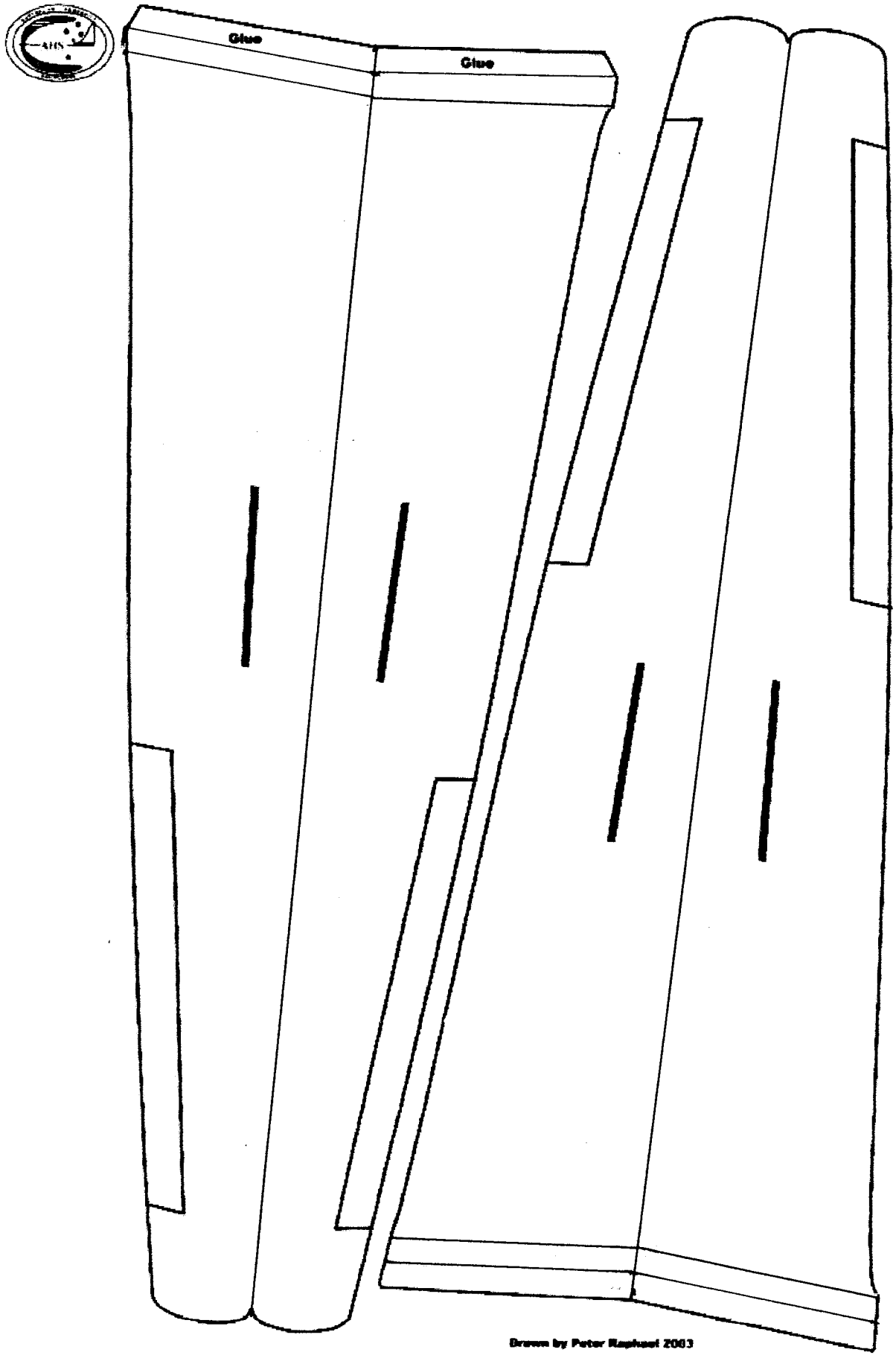
AHS

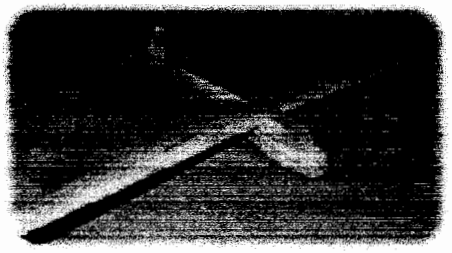
Glue

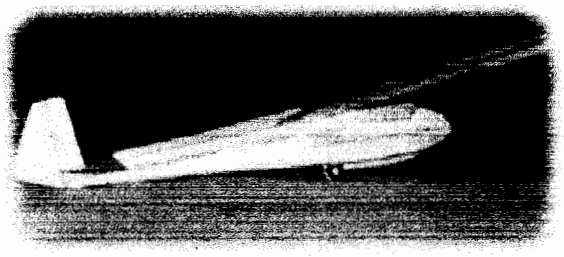
Wheel

Fold tabs and glue to inside
of fuselage sides. Glue underside first
then canopy. Start at canopy crease line
working forward and back in stages

Fold wheel and glue
to rear end of skid


Glue
Glue
Drawn by Peter Raphael 2003

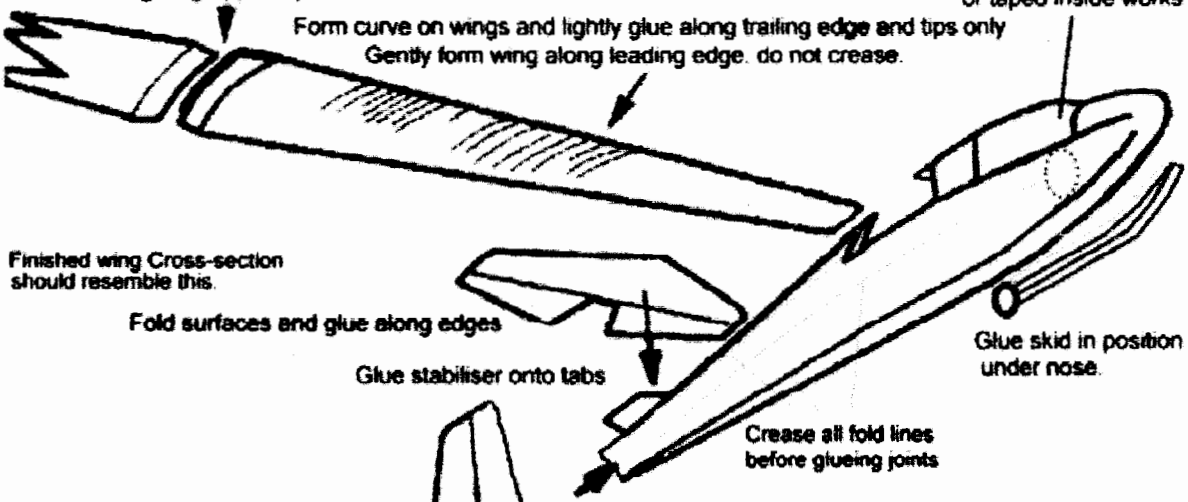




Insert one wing inside the other
Glue lower lap first
then raise one wingtip 20 mm
before gluing upper lap to form dihedral

Add ballast to nose to
bring balance point near
the leading edge (a 5cent coin
on the front of the canopy
or taped inside works well)

Form curve on wings and lightly glue along trailing edge and tips only
Gently form wing along leading edge. do not crease.



Finished wing Cross-section
should resemble this.

Fold surfaces and glue along edges

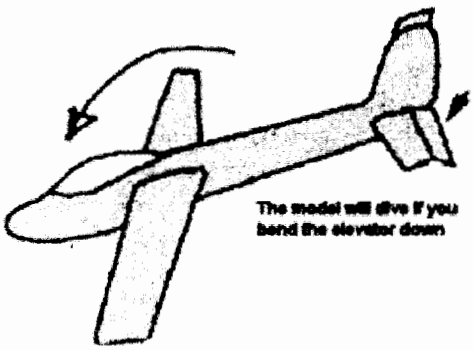
Glue stabiliser onto tabs

Glue skid in position
under nose.

Crease all fold lines
before glueing joints

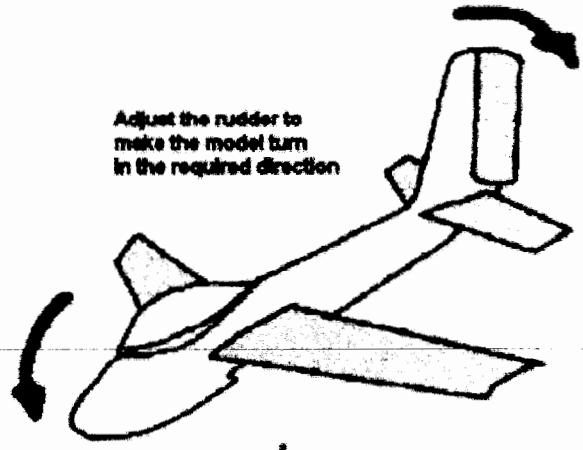
Insert and glue rudder between fuselage sides

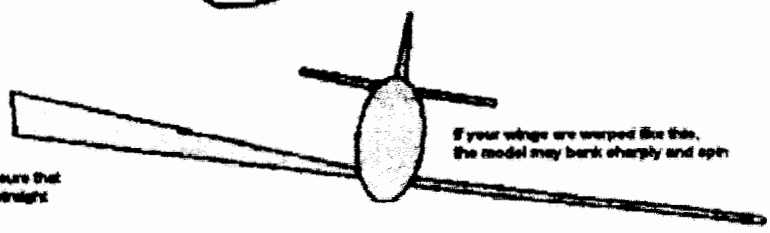
White glue or PVA works well,
but use sparingly



The model will dive if you
bend the elevator down

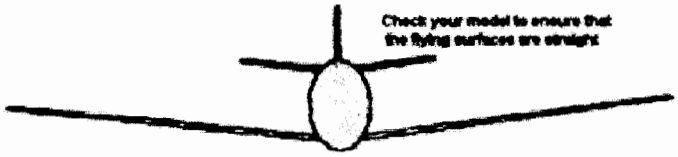
Adjust the rudder to
make the model turn
in the required direction





If your wings are warped like this,
the model may bank sharply and spin

Check your model to ensure that
the flying surfaces are straight



Always launch your model into the wind

If the model dives and stalls, add a little more ballast
or bend the elevator down slightly.

CLASSIFIEDS

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