

HOMEBUILT

JOURNAL OF THE EXPERIMENTAL AIRCRAFT ASSOCIATION OF SOUTHERN AFRICA



VOLUME 1 - NUMBER 4

JUNE 1973

ON THE COVER

Owen Pilcher airborne over the Natal countryside in his VW-powered Smith Termite. (Photo: S. Crutchley)

STATEMENT OF POLICY

The Experimental Aircraft Association of Southern Africa is a body representing individuals involved in the construction and operation of homebuilt aircraft and the restoration of antique aircraft.

Subscriptions of R4,00 per year include affiliated membership of the Aero Club of South Africa and quarterly issues of "Homebuilt".

Editor: S. Crutchley

CORRESPONDENCE

All correspondence to the Association should be addressed as follows:

The Secretary, E.A.A. of S.A.,
21 Charles Boniface Rd.,
Bisley,
PIETERMARITZBURG.
Natal.

EDITORIAL

Mr Murray Cohoe, our representative on the Aero Club of South Africa, has been negotiating at length with the Division of Civil Aviation regarding the new regulations governing amateur-built aircraft. He reports that translation into both official languages is now underway and the regulations should soon be ready for distribution.

Some of the points contained in the revised regulations are as follows:

An amateur-built aircraft may not under any circumstances be used for hire or reward. For this reason it may not be operated by a company or by a flying club. A partnership consisting of any reasonable number of members may however be formed to build or buy such an aircraft. In this case each and every partner will be required to sign the relevant documents and accept full responsibility for the aircraft. This is to ensure that everyone concerned is aware of the conditions pertaining to the issue of a Permit to Fly. However, notwithstanding the above, another licensed pilot may fly the aircraft providing there is no infringement of the "for hire or reward" restriction.

Flying training in homebuilt aircraft, even from the initial stage, will be permissible providing the student is a registered owner of the aircraft. In the case of a single seater aircraft it is obvious that dual time must first be obtained in a suitable aircraft, whereafter an instructor must supervise the conversion of the student to his aircraft.

The inspection of homebuilts during the course of construction has long been a problem for the appointed D.C.A. inspectors (normally holders of an Aircraft Maintenance Engineer's Licence) and to builders themselves, who have often had great difficulty in locating such an

inspector. The Commissioner for Civil Aviation has now authorised the selection of suitably qualified persons from a far wider field than before. Nominees will be required to have at least one of the following qualifications and they will be expected to offer their services gratuitously to their fellow members within the Association.

- (a) Be in possession of a current Aircraft Maintenance Engineer's Licence.
- (b) At some stage in the past have been in possession of the above, or other approved certificate such as S.A.A.F. or R.A.F. Maintenance Inspector.
- (c) Have built and completed the testing procedure of an amateur-built aircraft and been issued with a Permit to Fly.
- (d) Have other acceptable specialised knowledge in the field of, for example, testing of timber.

Inspectors will be authorised to sign all documents up to, but excluding, the granting of a Proving Flight Authority, and they will be required to accept full responsibility for the integrity of the aircraft.

Every effort will be made to put the E.A.A. of S.A. Inspector programme into operation as soon as the new regulations are issued.

GROUND RISKS INSURANCE FOR HOMEBUILT AIRCRAFT.

Another attractive facility has been arranged for owners of Ultra Light Aircraft who are members of our association.

Members who have built their own machines are able now to have cover for:

FULL GROUND RISKS, MATERIALS ONLY.

at a premium charge of:

0,50% per annum, based on the value of the materials. Minimum premium R10,00 per annum plus charges R2,00.

The normal premium rate for "Ground Risks Only" to non-members is between 1½% and 2%, thus our association has achieved a valuable concession. Please forward enquiries direct to:

AVIATION INSURANCE BROKERS,
P.O. Box 1603, DURBAN.

IN-FLIGHT STRUCTURAL TESTING OF HOMEBUILTS

The regulations governing amateur-built aircraft require that in-flight structural tests must be conducted before a Permit to Fly can be issued.

Aircraft intended for non-aerobatic operation will have to be subjected to an acceleration load of at least 3,8 g.

As an accelerometer is not an instrument normally fitted in a homebuilt E.A.A. of S.A. has purchased a brand new one for the use of any member who may require it.

To cover the cost of postage and postal insurance and to encourage a prompt return to headquarters it is the intention to charge a rental of R1,00 per week.

Anyone wishing to use this instrument is welcome to contact the Secretary.

EXPERIMENTAL AIRCRAFT ASSOCIATION OF SOUTHERN AFRICA ANNUAL CONVENTION

Annual Convention.

All members and interested persons are cordially invited to attend the Association's annual fly-in which will be held at Pietermaritzburg Aerodrome from Saturday 7th July to Monday 9th July. YOUR support will be most welcome and will contribute towards making this a successful function.

Annual General Meeting.

Notice is hereby given that the A.G.M. will take place in the clubhouse of the Pietermaritzburg Aero Club at 19H30 on Saturday 7th July, 1973.

BITS AND PIECES FOR THE PAZ.

by Julian Hobbs.

When we bought our Pazmany PL-2 plans we didn't realise the magnitude of the problem of obtaining the materials (or the time — but that's another story). Now that we have assembled everything we need to complete the project we can perhaps save other builders, of metal aircraft in particular, some of the frustrations we suffered.

The first thing to do is to write to The Director of Imports and Exports, Private Bag 192, Pretoria, and ask for an import permit to import RX 000 worth of aircraft construction materials for the purpose of building an aeroplane which will be for your own use and not for sale. Mention that the materials are not locally available. Contrary to popular belief it is not too difficult to get an import permit. We spent a lot of time and effort trying to buy what we needed locally i.e. in South Africa, and found that virtually nothing was obtainable and what we could get was exorbitantly expensive.

Once you have your permit you can start drooling over catalogues. The American firms we found most helpful are:

Art Air Aviation, 3577, Minto Court, San Jose, California 95132. He stocks hardware i.e. nuts, bolts, screws, fittings etc.; sheet aluminium alloy which he will cut to size; radios; instruments; Lycoming and Continental engine spares, wood, fabric and all sorts of other items.

Aircraft Spruce and Speciality Co., Box 424, Fullerton California 92632, supply 4130 steel sheet and tube, structural aluminium tubing and round and rectangular section aluminium alloy bar stock as well as hardware, wood and fabric. Their catalogue is well worth the \$2,00 deposit, refundable on first order.

Wag Aero, P.O. Box 181, North Road, Lyons, Wisconsin 53148, specialise in spares for Cubs, Aeronca 7 ACs and Taylorcraft etc., flying wires, hardware, instruments and radios.

Aircraft Components Inc. P.O. Box 1188 Benton Harbour, Michigan 49022 concentrate on bargains and send their catalogue quarterly.

Stits Aircraft Supplies of P.O. Box 3084 Riverside, California 92509 are now concentrating on their Polyfiber covering but gave us excellent service with 4130 steel tubing and sheet and all sorts of odds and ends.

If you haven't seen a copy of 'Trade A Plane' (\$5,00 for 6 months with 3 issues a month) Crossville Tennessee 38555 you've really missed something. In this we found U.S. Air Tools, 13543 Auburn, Detroit, Michigan 48223 who

supplied us with a rivet gun with a range of sets for \$20,50 and Century Instrument Corporation 4440 S.E. Blvd. Wichita, Kansas 67210 who supplied a guaranteed turn and bank for \$12,50 and advertise other instruments at comparable prices.

We located some hard-to-get parts by writing to other Pazmany builders in the States. The addresses of builders and their projects appear every now and then in Sport Aviation. In this way we contacted Brace Mueller Huntley Inc., P.O. Box 1340 Syracuse N.Y. 13201 from whom we bought all our 2024 alloy sheet, plate and bar stock, where necessary cut to size.

It pays to have only large orders shipped by ocean freight because there is a minimum shipping volume of, I think, 80 cubic feet which costs about R40,00. This is a practical proposition if you can get most of your requirements together in one place. We had two shipments, one from Brace Mueller Huntley and the other from Pazmany consisting of the spar cap extrusions which he supplies and some odds and ends which he gathered for us. This shipment was arranged by Forwarding Agents (C.L. Hutchins & Co Box 2568, San Diego California 92112.) Otherwise we have had everything sent parcel post. The severe limitation here is the maximum allowable parcel size. The cost is not excessive and it certainly works out cheaper than buying locally. Import formalities for ocean freight are best handled by customs clearing agents. Parcels through the post are cleared by the Post Office. There is no duty on aircraft spares, only sales tax which doesn't amount to much.

We have sent cash with all our orders (by registered post naturally) and included estimated postage costs. We have had no problems with suppliers not sending the goods ordered and without exception they have been scrupulously honest about refunding excess postage etc. You can obtain a bank draft payable in U.S. dollars from the nearest branch of your bank.

Being accustomed to dealing with South African firms it was quite an eye opener to do business with the Americans: postcards saying "Thank you for your order of The goods will be dispatched within 2 () 3 () 4(x) 5 () days." arriving ten days after posting the order; all correspondence air mail; each of six questions in a letter answered, not just the first one; etc. etc.

I hope that this information will be of assistance to some builders. If you have any specific problems about suppliers drop us a line; we may be able to help you.



Photo: T. Wills

FIRST FLIGHT OF TERMITE ZS-UDY by Owen Pilcher

Pietermaritzburg, December 26, 1972. 1700 hours. Light wind straight down runway 16. Cloud nil, temperature 75°F. This is it.

One more run up (engine 1600 c.c. V.W.) She turns the 54 x 32 prop at 2700 r.p.m. static. Figure this to be 40 h.p. and at 710 lb gross weight should be okay for climb out. Anticipate revs to increase to 3000 at cruise.

So, I'm belting down the runway letting her build up to 50 m.p.h. At 40 indicated she appears to be running nose down. I ease the stick back and she leaps off. Now well and truly airborne with 35 on the A.S.I. I say to myself "Okay Buster, don't blow your cool!"

The runway lights are moving past the lift struts about as fast as in a 150, controls respond well and she's climbing, though sluggishly. The angle of attack eyeballs about 5° to 7° with the horizon. Must be a dud A.S.I.

We stagger up to 2000 feet A.G.L., level out, wait for the sensitive altimeter to settle down and we have 45 m.p.h. indicated cruise.

What about r.p.m.? The tachometer is glued on 2700. Don't tell me this is also on the blink!

Time to check the stall approach. Throttle back but she keeps flying with the A.S.I. off the scale. We join circuit and keep 50 m.p.h. indicated on finals. Flare out for quite a long float and she greases onto the runway. (Haven't done one like it since).

Taxi away quickly and hide behind the hangar until I stop vibrating, then walk up to the spectators and say "Nothing to it boys!"

Investigation showed the A.S.I. to be okay but under-reading by 25 m.p.h. due to incorrectly positioned pitot head and static tube.

Moral of the story is to be prepared for a surprise! If I were to do the exercise again I'd fit a simple A.S.I. vane somewhere as a back-up instrument.

Now r.p.m.? I badly overestimated rev. increase with forward speed, so off with the prop! Blade angles checked out okay except near the centre. However the Clark Y profile was too thick and clumsy. (My first effort at prop carving). Narrowed the blade slightly and cleaned up the aerofoil section. I now get 3050 static and the aircraft performs much better.

Another not so clever thing I did was to rig 1° "wash-in" to improve the stall characteristic. This made her feel very mushy when landing and definitely spoilt the climb. Anyway, re-adjusting the rear struts to bring the wings absolutely level solved the problem.

Other improvements such as reducing cowl frontal area, streamlining the struts and fitting a rudder trim tab have improved climb-out.

I must admit that after the first flush of success in getting my project airborne I was disappointed in her performance —

she seemed so sluggish. I think we all feel this way during transition from flying commercial aircraft to a V.W.-powered ultra-light. Now that I've got to know my little bird better she really is fun to fly.

Speed? She tops out at 75 m.p.h. and I have had her up to 8000 feet. (I still think that rate of climb is more

important than speed so I'm making another prop.)

Well, that's about it. I made the first rib in April '67 but the project stopped for two years when we moved to Pietermaritzburg. On two occasions I very nearly threw in the towel, but the engineering education plus the fun from the final result were worth every effort put into it.

LETTERS TO THE EDITOR

HARCOURT HOUSE,
P.O. Box 4870,
JOHANNESBURG.

Dear Editor,

In your most recent issue an article by Mr. Ian Parker was published, headed "What to build . . . ?". The article in itself was interesting reading — but clearly biased towards wood and fabric aircraft. I would mention that I am currently busy with a Pazmany PL-2 and would be more than willing to answer (or assist) with any queries, which any of your readers may have with respect to all-metal aircraft and in particular the Pazmany. In response to Mr Parker's suggestion to "ask anyone who is building (or trying to build) one of these machines", I might add that I am BUILDING . . . not TRYING to build! Furthermore, I disagree strongly with Mr Parker's general feelings about all-metal aircraft, wherein he states. "Unless you are an experienced, well-equipped metal worker, forget about (several aircraft) . . . and Pazmanies."

I am neither well-equipped, nor experienced and can say quite honestly that to date I have had no serious problems (nor can I foresee any in the future), and I am very pleased and proud with what I have achieved. My results are far in excess of what I had hoped. The extrusions required for the Pazmany do not present a "major problem" In fact, even if I could bring about the manufacture of what I require HERE in South Africa, I would PREFER to buy the Main Spar caps extrusions from Mr Pazmany. Even if he INSISTED that NO OTHER extrusions were used as a condition of being supplied with the blue-prints, I should be quite happy. After all, should your "bird" fall out of the sky due to a poorly produced Main Spar . . . it is HIS design which might get a bad name, and the fact that he had no control of the quality of the extrusion, is not readily obvious.

I do not agree that "anyone who intends building an aeroplane is faced with an agonising decision." The Pazmany provides all the characteristics that any average home-builder can look for in any light aeroplane. There are few OTHER aeroplanes that can boast this (except for the "Sprite", which is currently in the design stage and which, in my opinion, is little more than a copy of the Pazmany PL-2).

I would suggest that anyone who wishes to read a comprehensive, un-biased bit of literature on the merits and de-merits of different methods of building an aeroplane and the merits and de-merits of the different materials used, should obtain Mr. L. Pazmany's book

"Light Aircraft Design", which is (or was) obtainable from the Magazine Centre, 92, Commissioner Street, Johannesburg, or directly from Mr. L. Pazmany, Pazmany Aircraft Corporation, Box 80051, San Diego, California 92138, U.S.A. The cost is approximately R8,00 and a further \$2,00 is required for postage. Mr Ladislao Pazmany is an aircraft designer by profession and, I should imagine, knows what he is talking about.

I have sent a copy of the above article to him and have invited him to write a short article on this subject, since we are apparently in great need of articles for our magazine. I attach his article for your interest. Any enquiries may be addressed to me at the above address, and I shall make every effort to supply whatever information is required — even if I have to get it from Mr Pazmany myself. I am quite sure he will continue to be as helpful as he has proved to be in the past.

Yours faithfully,
T.J. THEUNISSEN

Box 80051,
San Diego,
CALIFORNIA 92138.

Dear Editor,

For your information there are six PL-2 projects in South Africa. I have already shipped several sets of spar cap extrusions and other materials to these builders. If they cannot find the materials in S.A. they can easily order from USA suppliers. Of course the PL-2 Spar Cap Extrusions which I sell for \$250,00, ready for assembly, are a special item. I challenge Mr Parker to make an equivalent piece of structure for a 28ft span wing, and a 1500 lb airplane stressed to +6g (limit) but using some other "Easier Materials" and still keep the weight, the strength and the cost at the same level.

I disagree with most of Mr. Parker's statements, but basically I consider sheet metal construction as easy as wood. I built the PL-4 prototype myself using a band saw, a drill press, an 18" bench brake (cost \$ 15,00) a disc and belt sander and an assortment of hand tools. I could write many pages about this subject but most of my philosophies are contained in my two books : LIGHT AIRPLANE DESIGN and LIGHT AIRPLANE CONSTRUCTION. I have sold thousands of copies of these books all over the world to amateur builders, designers and also to schools and colleges which use them as text books.

I am enclosing a copy of the PL-4 INFORMATION BROCHURE. Please note in page 11 the photo of Mrs R. Borden building another PL-4. She did not have any previous experience in light airplane construction, and she is doing a good job.

The PL-4 and the PL-2 plans are the most complete ever made for any amateur built design. This may confuse some builders when they compare them with other designs. Everything is there. It looks complicated! Well, what is better? To see the solution to the problem or to ignore it until later. The builder has to turn into designer because of lack of information. No doubt it looked simple to begin with!

THE CONTROVERSIAL BD-5 by Peter Booth

In this article I shall try to answer some of the many questions which people ask about the Micro.

The design was first made public in April, 1971 and at that stage Bede Aircraft Inc. had only just made the mould for the glass fibre fuselage shell. The primary structure was to have been fabricated from aluminium angle sections.

However, as a result of the phenomenal interest shown by the public and the number of orders received, it was decided that the production rate of glass fibre shells would be inadequate and the design was changed to all-metal semi-monocoque construction. The wings remained as before except for a slight increase in area.

At about the same time, the empty and gross weights of the aircraft were increased and there was a change from the Fuji Industries engine to the Kiekhoeffer powerplant. Both are two-stroke motors with capacitor discharge ignition.

At this stage the empennage was of the Vee-tail type, but the first flight of the prototype on the 13th September, 1971 revealed unsatisfactory directional stability. The aircraft was subsequently fitted with a conventional fin/rudder combination and swept tailplane. The area of the elevator was later increased to give the desired control. At about this time too, the Kiekhoeffer engine was replaced by a Hirth unit.

The design was then finalised and six options are now available, comprising a combination of 40, 55 or 70 h.p. engine with either a short or long span wing. The short span is used for aerobatics and high speed while the long span is used for power gliding and endurance flying. The wings are interchangeable.

The PL-2 is the only "amateur built" design already in service as a military trainer (58 airplanes built by the Chinese Air Force) — also built or in construction by the Air Forces of several other countries: South Vietnam (1), Thailand (2), South Korea (4), Indonesia (1), also built for certification in Japan. This is not a coincidence. The reason these countries selected my design is because it is The Best. The amateur builder can select perhaps a cheaper or even an easier project but that does not make it better. If you want the best, it is going to cost you more. You never get something for nothing.

Yours faithfully,
L. PAZMANY

The aircraft is of all-metal construction, with low cantilever wing fitted with flaps. The undercarriage is retractable and the control column is of the off-set wrist action type. It has a pusher propeller. The short wing version is stressed to $\pm 9g$ acceleration, while the long wing version could be classified as semi-aerobatic.

Considering the low engine powers used the speeds are impressive. Under standard day conditions and at gross weight the 40 h.p. short wing combination gives a maximum level speed of 195 m.p.h. The phenomenal interest in the design is probably due to the high flying speeds attainable, but added to this is the low building time of approximately 500 man-hours. Many modifications have been made to simplify construction.

The changes of engine were for rather obscure reasons, as was the change in fuel tank location from fuselage to wings. Other changes made were an increase in the nose wheel diameter and a beefing-up of the main gear legs.

All these modifications were incorporated in the production prototype and it would seem that all problems have been resolved as the basic test flying programme has now been completed.

The astonishing performance claims made for the Micro at the beginning of the publicity campaign have not been met, but the performance realised has, in fact, come reasonably close.

The original short wing 70 h.p. version was, in theory, supposed to have a top speed of 285 m.p.h. The figure actually realised during flight tests was 241 m.p.h.

Performance figures for N501BD, the production prototype, are as follows:

STANDARD DAY CONDITIONS	Short wing			Long wing		
	40	55	70	40	55	70
Max. speed at sea level (m.p.h.)	195	221	241	189	213	232
Cruise speed at 750ft. (m.p.h.)	187	215	237	185	210	229
Sea level rate of climb at gross weight (f.p.m.)	760	1 420	1 890	880	1 480	1 920
Empty weight (lb.)	315	335	335	335	355	355
Gross weight (lb.)	620	640	640	640	660	660
Optimum range with 30 minute reserve and 170 lb pilot (miles)	975	825	730	1 415	1 215	935
Lift/drag ratio	15	15	15	21	21	21

CLASSIC AIRCRAFT



Illustrated here is ZS - AYK, manufactured in 1946, and now with over 3 200 hours on the airframe

Photo: J.M. Cohoe

AERONCA 7AC CHAMP by Murray Cohoe

"A delightful little aeroplane." This was the comment of a very experienced pilot after a short flight to renew his acquaintance with the aircraft in which he did his initial training many years ago.

Fly into a strange field and pull up at the pumps. In a few moments you are surrounded by a group of both youngsters and the not so young. "What aircraft is this?" "Is it a Cub?" and an older voice from the back of the group says — "No Sonny — it's an Aeronca!" And you see the wistful look in his eyes, and soon the stories begin, about the time we flew one of these machines to

It has a tradition long in aviation history, a contemporary of the "Cubs" and "Taylorcrafts", it is one of the classic trainers of all time. Yet it is reasonably modern, with a completely enclosed cabin. You can take your girl friend for a ride without ruffling her hair. And from that greenhouse you have the most perfect view of the passing

ground, inviting low and slow, and enjoyable cross country's.

With a whole 65 horses (if you are lucky) — a lot less on the Reef — this machine gives fantastic value for the 15 litres per hour it burns. (Yes, litres, — not gallons). At a cruise of about 80 indicated, you can go a long way in a long time, but as the fuel capacity is limited to 50 litres, you have the opportunity to come down for refreshments at reasonable intervals. The biggest problem is to find airfields with both fuel and Coke, sufficiently close together.

And you can do all this at a flying cost of less than R2,00 per hour.

This is real "Fun Flying" — and at a price you can afford.

Is it any wonder Bellanca put this machine back into production?

THE IDEAL HOMEBUILT by Godfrey Knight

Most of us, when we first consider building a homebuilt aircraft, look for a design which is a miniature version of a Mustang, Spitfire or Hurricane; and although we would admit that our ability as a pilot would never allow us to fly one of these planes, we feel that a miniature version would be much more manageable. In all probability a miniature fighter aircraft would be more difficult to manage than the original prototype and even if well designed with a low wing loading it would require a well experienced pilot to fly it; and very few of us have that sort of experience.

Factors causing difficulty in handling the small aircraft are as follows:

- a) Short span wings which tend to be very sensitive laterally.
- b) A short tail moment arm (i.e. distance between the tailplane and the wing) makes the plane sensitive in the pitching plane causing "grasshopper" take-offs and landings and difficulty in flying level.
- c) Winds which were formerly only 5% of the full size plane's speed are now 20% of our plane's speed affecting safety when manoeuvring close to the ground.

Having established that the miniature fighter plane is not our ideal homebuilt, let us look into the various factors which affect the flight of our plane, these being Lift, Drag, Power, Weight and Stability.

Lift — Three factors govern lift at any particular airspeed and they are, area, span and aerofoil section. Obviously a large area will provide plenty of lift and ultimately a low landing speed. Wing area alone does not give the whole story; wing span being a very important factor. For a given wing area a wing of greater span will give greater lift, and, most important, less drag. The high span wing will climb faster and have a higher ceiling.

The aerofoil section should have the following qualities; high lift, low drag and gentle stalling characteristics. Highly cambered sections — thick or thin give high lift. The old-fashioned thin highly cambered sections give a great deal of drag whereas the modern thick sections of high camber give less drag for the same amount of lift. A high value of lift/drag indicates an aerofoil of high efficiency. Aerofoils of 13-15% thickness/chord ratio are the most efficient.

Drag itself can be reduced by reducing the camber and the thickness of the aerofoil but the lift itself is also reduced to a much greater proportion than the drag. This factor on investigation will bring us back to a moderately cambered aerofoil of 13-15% thickness/chord ratio as the best for our plane.

Aerofoils with a well rounded nose and maximum thickness 25% to 30% from the nose will give the best stalling characteristics. At the speeds that our planes operate "sharp" leading-edged aerofoils are not any "faster" than the rounded ones and they always have very sudden stalling characteristics leading to one wing dropping before the other at stall.

From a structural point of view a thick wing is necessary to give adequate spar strength. For the deeper the spar the stiffer and stronger it is. For any particular strength requirement a deeper spar can be designed lighter than a shallow one.

Drag — The plane you build should be as clean, aerodynamically, as possible. The modern sailplane should be taken as an ideal and any feature in conflict with this ideal such as struts, "dirty" undercarriages, flying and landing wires, gaps between wing and fuselage, uncowed engines, open cockpits and biplanes should be viewed with suspicion.

Power: Usually the person who wants to build his own plane is not overloaded with money and as horse power is expensive, a plane requiring low power is desirable. As the power of the engine produces the thrust and this is balanced by the drag of the aircraft, it is obvious that an aerodynamically clean plane will have less drag and this requires less horsepower to produce the necessary thrust.

Usually the V.W. engine is the automatic choice for a single seater plane, and at present, aircraft engines of between 65 and 125 H.P. for two seaters.

Weight — The lower the weight of the plane the lower the power required. This lowering of the power is not just proportional to the reduction in weight, but rather better than proportional. For example, assume we have a plane designed to have an all up weight (A.U.W.) of 1000 lb. requiring an engine of 100 H.P. If we re-design carefully to save weight and the plane now has an A.U.W. of 950 lb. it would theoretically require an engine of 95 H.P. But in addition a 950 lb. plane would require 6 square feet less wing area saving another 8 lb. in weight on top of the 50 lb. already saved. Now a less powerful motor will also weigh less and therefore we will need still less wing — etc., etc.

Unfortunately, the reverse is very true for planes built overweight, so we must choose a lightweight well-designed aircraft and build lightly.

Stability — Generally a large span plane with a long tail moment arm, adequate dihedral (2° for a high — and 4° for a low-wing aircraft) and generous empennage areas, will produce an easy-to-fly, safe plane for the homebuilder. The large empennage areas will damp out the effects of

gusts etc., very rapidly without any action by the pilot. Model aircraft which have very large empennage areas fly quite satisfactorily without a pilot at all! High wing planes having the centre of gravity below the centre of lift have an additional stability called "pendulum stability". Low wing planes with plank wings (i.e. no dihedral) are easy to build, but having no natural lateral stability require to be "flown" all the time, which can be very tiring on a cross country flight.

From the above it can be concluded that our ideal plane would be a high wing monoplane with a generous wing span and fairly long tail moment arm. i.e. of Piper Cub proportions. This is no coincidence as Piper knew what they were doing when they designed the Cub.

Modern commercial aircraft are more compact, streamlined and, of course, more powerful. As we are not in the power stakes, we have to return to the old formula. With our present-day knowledge of clean and lightweight construction methods, a smaller plane can be built with the same, and frequently better, performance.

The one serious problem with a high wing is its poor visibility upwards and in turns, and this has largely brought about the popularity of the low wing aircraft; in addition the low cantilever wing has structural advantages in its favour.

So far, we have mainly considered the flying characteristics, but we also have to build the plane. We have four different methods of construction available to the amateur, namely: sheet metal, all wood, mixed steel tube and wood and glass re-inforced plastic construction.

For most people of average ability, planes of wooden constructions with fittings of mild steel would probably be the best. Some problems in obtaining aircraft quality spruce and birch plywood locally, are encountered.

The next best, but requiring some specialised knowledge and tools, is sheet metal construction. The material is available locally and people who have built planes by this method claim that it is very fast.

The mixed steel-tube/wood fabric covered construction is well proven, sturdy, easy to repair, but is time-consuming. The constructor has to acquire skill in both metal and wood construction and the two do not mix in one workshop. Another point to remember is that when you've finished riveting your aluminium fuselage or glued your wood/plywood fuselage you have virtually completed it, when you have finished welding the tubular steel fuselage you are only about half way with the construction.

Fibreglass and foam constructions offer tantalising opportunities to build beautifully streamlined, lightweight aircraft quickly. These advantages have been obtained by very few commercial aircraft companies and I would therefore advise that the amateur stay away from this type of construction.

In conclusion I have listed below aircraft that I feel fill the bill for the amateur constructor and which would be

suitable for flying in all parts of South Africa, whether it be in the hot high parts or the cool lower regions.

SINGLE SEAT.

Name:	Type:	Engine:	Construction:
Bowers Fly Baby	low wing monoplane	65-100 H.P. A/C engine	all wood, wire braced wings
Druine Turbulent	low wing monoplane	V.W.	all wood, cantilever wing
Evans Volksplane	low wing monoplane	V.W.	all wood, strutted wing
Jodel D 9 (Bebe)	low wing monoplane	V.W.	all wood, cantilever wing
Luton Minor	parasol wing monoplane	V.W.	all wood, strutted wing
Pazmany PL4	low wing monoplane	V.W. belt drive	sheet metal cantilever wing
Smith Termite	parasol wing monoplane	V.W.	all wood, strutted wing
Tipsy Nipper	shoulder wing monoplane	V.W.	wood wings, steel tube fuselage

TWO SEATER

Druine Condor	low wing monoplane	65-100 H.P. A/C engine	all wood, cantilever tapered wing.
Druine Turbi	low wing mono tandem seating	65-100 H.P. A/C engine	all wood, cantilever parallel slotted wing
Jodel D 11	low wing monoplane	65-100 H.P. A/C engine	all wood, cantilever wing
Luton Major	high wing monoplane	65-100 H.P. A/C engine	all wood, strutted wing
Pazmany PL2	low wing monoplane	85-125 H.P. A/C engine	sheet metal, cantilever wing
Piel Emeraude	low wing monoplane	65-100 H.P. A/C engine	all wood, cantilever elliptical wing.

MAKING A FIBREGLASS COWL

by John Dunbar

Members may be interested to hear of my efforts at making a fibreglass nose cowl.

It will be observed that I made a female plaster mould as I felt that the easiest and quickest way of producing a mould was to cast it on an existing cowl. This method worked, but had certain disadvantages.

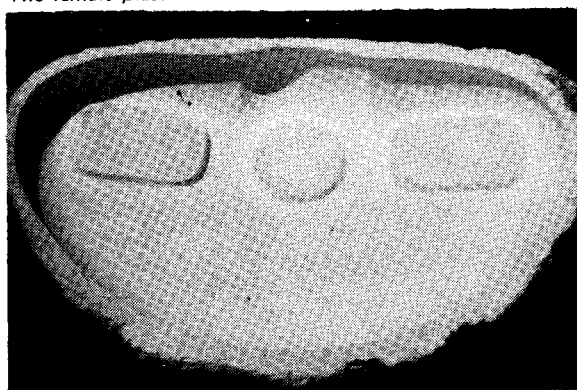
- It was difficult to obtain a second-hand metal cowl in perfect condition. Most have been dented and straightened at sometime or another and are therefore imperfect.
- I found it nearly impossible to iron out all the irregularities in the shape of the mould which only really become apparent on the moulded article and by that stage it is too late.

- I experienced quite a lot of difficulty in removing the fibreglass cowl from the mould owing to the lap recesses around the cowl edges. In fact quite extensive repair work had to be done to the mould after making two cowls.

I must point out that the finished articles were quite usable. However I always like to strive for improvement and have therefore started from scratch and am at present building a male mould out of galvanised sheet iron profiles, polystyrene and plaster. This is in my opinion the only way to obtain a perfectly symmetrical shape and reduces eyeball engineering to an absolute minimum.

In due course I will be able to report on how successful this method is.

The female plaster mould



The completed cowl

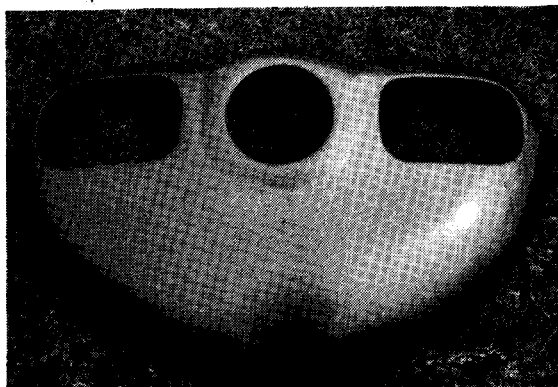


Photo: J. Dunbar

JOHANNESBURG CHAPTER'S SIMBA AIR SHOW by Bill Keil

How lucky can a chapter be? Lucky to have a sponsor like Simba Quix (Pty) Ltd., and the enthusiastic support of their Public Relations Officer, Moira Allen. Lucky to have the co-operation of the East Rand Flying Club and the Springs municipality. Yes, lucky. Right down to the weather which turned out to be perfect. Looking back on March 17th one remembers such things as 'Buck' Jones bellowing over the P.A. system in an attempt to control the crowds, one remembers aeroplanes arriving from all directions — Tigers, Toy's Mini Ace, Beech Staggerwings, Fairchilds, Barrie's EAA Biplane, Johnny in the Pitts, Phil Gears in the Nipper, a Hornet Moth, a Chipmunk you name it! One remembers the frantic attempts to keep the show going; the spectacular, if unscheduled, air to air collision of the R.C. models; cowpokes Levine and Kay in their flying cowboy act; the little old lady (Tony Wessels) who made off with the Chipmunk and caused a near riot. Highlight of the show was probably the breathtaking aerobatics of first Johnny Woods and then Scully Levine in the Pitts.

And so the day went on. Crowds queueing for flips, a gyrocopter zipping up and down the field, queues for hot-dogs, for ice-cream, for beer. Announcers shouting, kids bawling, planes roaring, dust blowing . . .

That's how it all ended. The crowd finally drifted off at about 5.30 and an exhausted gaggle of flyers and helpers gathered their last few ounces of energy to enjoy a hilarious braai at the club-house to round off a perfect day.

CAPE NEWS by Ruth Hobbs

Dave Hart's Sirocco is coming along nicely. He has completed the fuselage, empennage and mainspar. There is a lot of work in that retractable undercarriage. Dave and Dennis Lee of the Transvaal made contact recently through the homebuilder Directory and have exchanged mutually useful information.

The three Volksplanes are still in formation, with those of Avron Bane and Geoff Ritchie (see picture) filling Geoff's garage to the exclusion of all else. Viv James, with only one VP1 in his garage has a little more space in which to breathe. Viv's tail surfaces are finished, ready for covering, and with his fuselage hoisted into the roof out of the way he is ready to start assembling the wing. He is taking a lot of trouble and his workmanship looks excellent.

On our return from Cape Town we stopped at Swellendam to see Boet Groenewald. Poor Boet is so in demand as tug pilot for the gliding club that he hardly gets a chance to work on his Mustang. He has added canopy frames to the fuselage, and has made up the two built-up, tapered mainspars — also excellent workmanship — all metal edges properly finished and rivets correctly set.

Like all good shows, it should be concluded by a credit list of those who put in so much time and effort. Names that spring to mind are those of Ron and Penny Johnston, Chris Immelman and his wife, Frikkie Stopforth, Stan Hewitt and many, many more. People who came back on Sunday to clear up what appeared to be a cross between a municipal dump and a bomb site. People who sat down at the end of it all and said "We're gonna do it again next year, bigger and better!"

TRANSVAAL NEWS BY by Barrie Walker

We have had our A.G.M. and there are numerous changes in the committee. New chairman is Bill Keil, with Ron Johnson as vice-chairman, Gerald Scott as treasurer and Buck Jones as secretary. There are also four ordinary committee members.

The Springs Fly-in went off well in spite of a few snags, and was financially quite rewarding. A sum of R100 will be donated to E.A.A. of S.A. headquarters for purchase of a typewriter. (This gesture is sincerely appreciated- Ed.)

I have sold the Daphne to Stan Hewitt and have sent for Pietenpol plans. It seems I just can't resist open cockpits! The fuselage is welded steel tube and the wings are of course wood. I plan to use either a Rover V8 or Alfa Romeo 2000 motor.

Godfrey Knight is going great guns on the Turbi and he now has the engine mount completed. With the 100 h.p. Lycoming motor it should perform well, even up here on the Reef.



Happiness is a VP-1 in your garage!

Photo: R. Hobbs

REPUBLIC AIRCRAFT PARTS

(PTY) LTD.

The ONESTOP parts
organisation for all your
aviation requirements.

WONDERBOOM AIRPORT

Note new Telephone
No. 57-2451
P.O. Box 23185
PRETORIA

Sole Owners: Eddie and Marie Pelcher



CARLETONVILLE TRANSPORT (PTY) LTD.

Republic-Wide Furniture Removals
18 Railway Street, Oberholzer.

THE PLOUGH HOTEL

★★ TYYY

282 Longmarket Street : Phone 28981
Pietermaritzburg

THE SOCIABLE HOTEL

We now specialise in Outside Catering,
Weddings, Social Functions and
Private Parties.

THE MERRI-AQUA

Ladies' Bar and Grill Room

HOTEL *Cansonic*

96 Longmarket Street - Pietermaritzburg
Telephone: 22251

THE POPULAR RENDEZVOUS

- All Rooms with Bath and Radio
- Harold's Air-Conditioned Ladies Cocktail Bar
- La Mirabelle Restaurant
- Ye Olde Tavern for a Drink and a Light Meal
- Beer Garden and Patio

**AVIATION INSURANCE
BROKERS**

R.W. SUTCLIFFE (PTY) LTD.

INSURANCES FOR:—

- AIRCRAFT GLIDERS
- ULTRA LIGHT AIRCRAFT
- BALLOONS PILOTS
- PARACHUTISTS
- EQUIPMENT
- THIRD PARTY LIABILITIES

* * *

75 Salisbury House, Smith Street,
Phone: 316994 / 316998
P.O. Box 1603 : Durban.

BUY THE ALPHA TEN

VHF RADIO

R272

WITH ONE CHANNEL

ADD UP TO TEN FREQUENCIES
OF YOUR OWN CHOICE

D.C.A. APPROVED

FIELD AVIATION

P.O. RAND AIRPORT PHONE 51-8961

SOLE DISTRIBUTORS

3M SOUTH AFRICA (PTY) LTD.

***MANUFACTURERS OF AVIATION
QUALITY***

**ADHESIVES
ABRASIVES
DECORATIVE MARKING AND
STRIPING FILMS**

***FOR THAT EXTRA HIGH CLASS FINISH TO YOUR
"HOME-BUILT"***

OFFICES AT: JOHANNESBURG • CAPE TOWN • PORT ELIZABETH
EAST LONDON • BLOEMFONTEIN • PRETORIA • DURBAN • WINDHOEK

