THIS IS A CHEAP AND NASTY COVER FOR:

THE

ADELAIDE UNIVERSITY GLIDING CLUB'S NEWSLETTER

- OCTOBER 1981 EDITION

* RATBAG REGATTA NEWS *

REGISTERED FOR [illegible]

EDITORIAL

The highlight of flying at our Airfield at Lochiel each year is the Ratbag Regatta. This is traditionally a Sports Class contest reflecting our own interests in the aircraft available. There are many reasons for this interests but, excluding sociological factors, they mainly relate to cheapness and ease of repair. Our lower performance aircraft have smaller tasks which, nonetheless, require similar amounts of skill on the part of the pilots as in the fibreglass classes. The smaller tasks require shorter retrieves, a distinct advantage in these days of high fuel costs. It is interesting to watch the trends in the other classes overseas (more later).

As advertised our Ratbag Regatta will be held on October 3 & 4, assuming availability of petrol. To enable more people to participate in a fun contest, as the Ratbag Regatta is supposed to be, we have opened it to all gliders. While this takes it out of the realms of a true Sports Class contest handicapping of higher performance aircraft and, perhaps, some modification of tasks will allow fair comparison of pilot skill. Above all, however, this is a contest designed to be low-key, relaxing and enjoyable. It is a contest in which the participation, not the winning, is important.

Your participation will be important and this Newsletter will give some information on contests in general and then some more detailed infomation on our own Ratbag Regatta and your role in it.

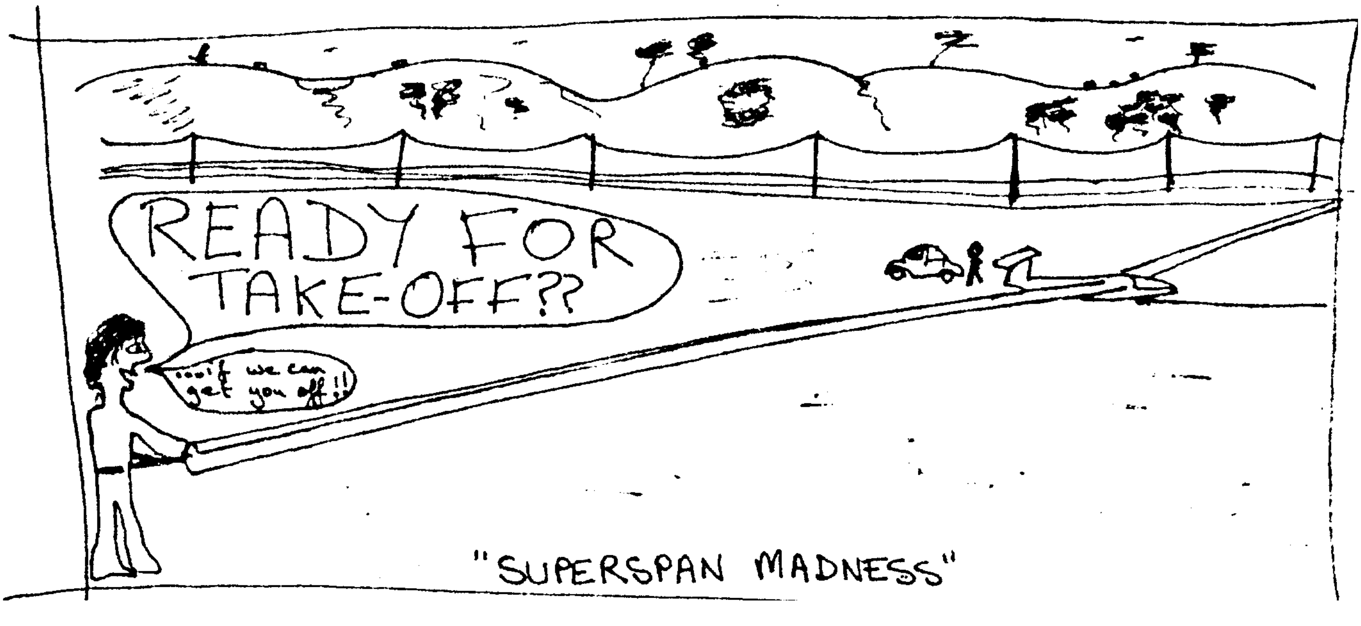
Aircraft - classes

Allowing for the inconsistent inclusion of two-seaters at some early World Championships only one class, Open Class, existed until 1956. The next World Championship competition in 1958 at Leszno, Poland, saw two classes - Standard and Open Class. Many definitions of Standard Class have been made, from the very simple originally, to the now more complicated. The addition of flaps to this Class, first flown in World Championships at Waikerie in 1974 (but with a production history going back much further), spawned the birth of 15M Racing Class which has now been flown as a separate class in tw World Comps (1978, 1981) and in Australian Nationals since 1977. Sports Class has been redefined more times than Standard Class while Club Class even now has different definitions in different countrie Two seaters have the greatest difficulties fitting into any of the other classes or even into a class of their own.

Open Class

No limits here - anything goes. The latest generation of aircraft have a span of 22 - 23m., a maximum all-up weight of 750 kg, maximu wing-loading of 45 - 47 kg/sq.m. and a maximum lift/drag (L/D) rati of 55:1. (Mathematicians will have already worked out the aspect ratios to be in the 30's.) They have flaps, retracting gear and lot (300 kg.) of water ballast. Price tags are not inconsiderable. New types include the ASW-22 from Schleichers and the Nimbus 3 from Schempp-Hirth. There is also the LS-5 but whether this enters serie production is unknown especially in its present form with a 22m. tw piece wing. Other 22m span ships have been produced earlier but these relied on now out-dated technology.

The older generation of Open Class ships most commonly have a span of 20 - 21m and an L/D max of 47 - 48:1.



Standard Class

This class started out with the intention of allowing cheap competition, thus retractable undercarts, water ballast and flaps were initially not allowed. Other factors, including price and types of airbrakes fitted, have also been included in past definitions. These restrictions were gradually eroded after the introduction of fibreglass. The one constant feature has been the limitation of span to 15m. Now retracting undercarts and water ballast are standard but flaps and variable geometry technology is banned. At the last World Comps. pneumatic turbulators were included in one aircraft and they were judged allowable.

Current Standard Class aircraft have a max. L/D of 35 - 40 depending on the aircraft and who measures it. Types commonly in use include Libelles, Cirruses, ASW-15's, ASW-19's, Hornets, DG-100's, Standard Jantars and the new LS-4 which took the first seven places at the 1981 Worlds Comps at Paderborn. Partly this must have been due to the fact that 16 of the class (of 27 entries) were LS-4's.

15M. (Racing) Class

Although derived from Standard Class this class of glider is really no more than Open Class limited to 15m. span. This is now the most popular class and hence more innovation has occurred here than in any other class. While Open Class allows greater performance by increasing span any improvements in 15M Class have to come from technological changes - flaps, variable geometry, thinner airfoils with greater runs of laminar flow, more ballast and new construction materials strong enough for the other changes.

L/D maxes. range generally from 38 to 42:1 with 44:1 being claimed for the new Ventus. Types include LS-3 and LS-3a, ASW-20, Mosquito, Mini Nimbus, Ventus, Glasflügel 304, Vega and DG-200.

Sports Class

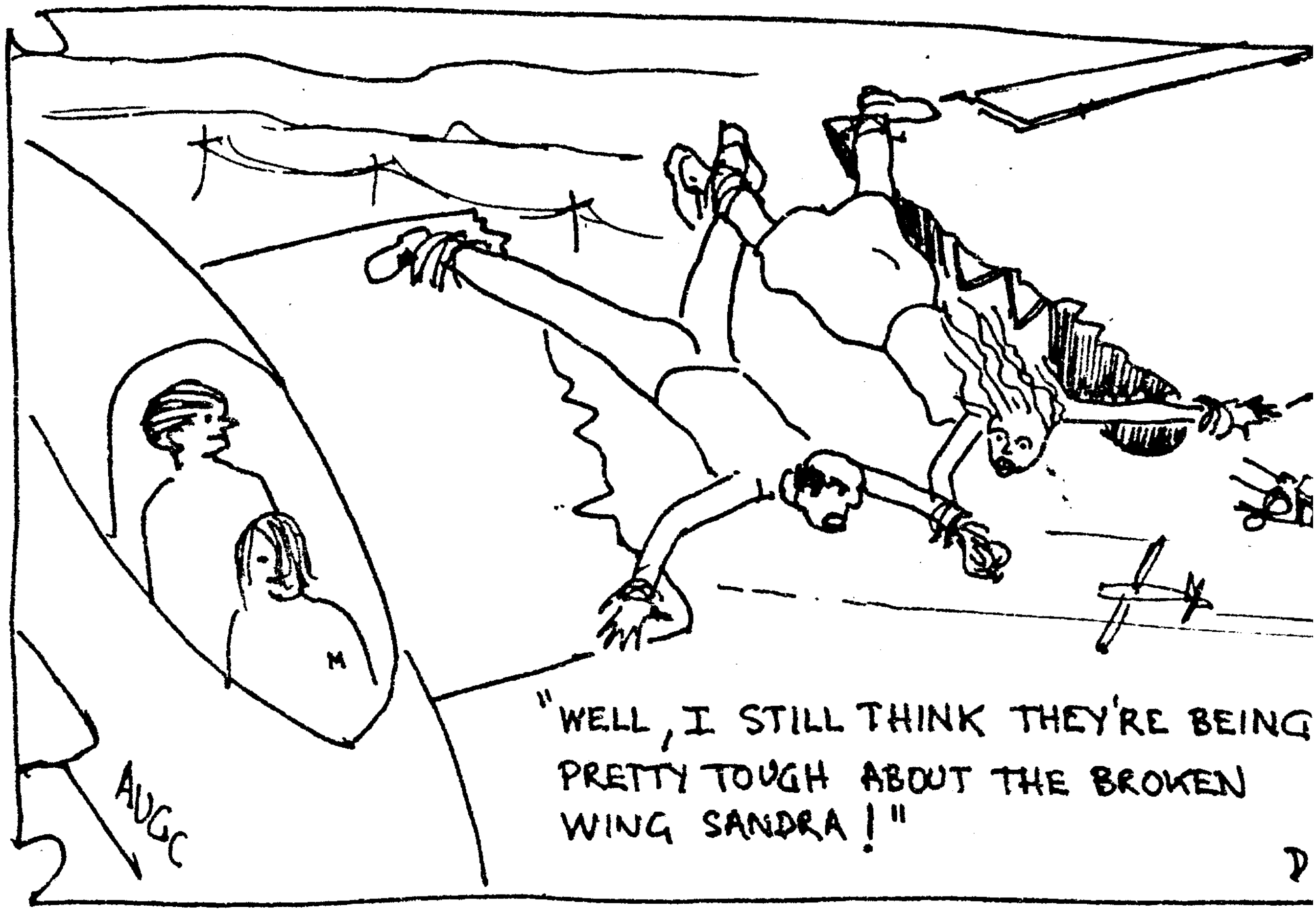
Only about two years ago, after years of pitting aircraft of a wide range of performance against each other at scratch, a much more sensible system of handicapping was begun in this State. The new system has been adopted in other States.

Sports Class contains lower performance (nominally 34:1 or less) that do not fit into the other classes. Lower performance two-seaters are also included. Handicapping is simple and based roughly on polar curves and the aircraft's performance on good days. Thus problems arise on weak days, and also in some outlanding situations. These problems have been accepted as part of the simplicity of the system as no-one wants to get bogged-down in the American Sports Class Handicap system where handicaps depend on the weather of the

The class contains a wide variety of types that include former Open class standard class aircraft. Types include the Boomerang, Arrow, Ka-6, K-8, Salt Segitta, Skylark, LO-150, Dart, Std. Austria, Grunau Babies, Cherokee, Olymp Mucha, Spruce Goose, Super Goose, Pirat, Foka 5, Pilatus, Club Libelle, ASW- Astir Jeans, Blanik, Bocian, Kookaburras, K-7, K-13 and IS-28. Other aircraf could (and can) be entered when a suitable handicap is worked out. This allo the new two-seaters, which, by strict definition, should fly in open class wh they do not have a chance of winning. Sports Class offers some degree of fai

Club Class

At times this has been a low perfomance subset of Sports Class. In Europe the moment, it is defined by a cost limit, fixed undercarriage and no water ballast. Generally they are variations of production aircraft of the other l classes. Thus aircraft include the Sport Vega, Astir Jeans, a variant of the ASW-19 and Club Libelle.



Competitions

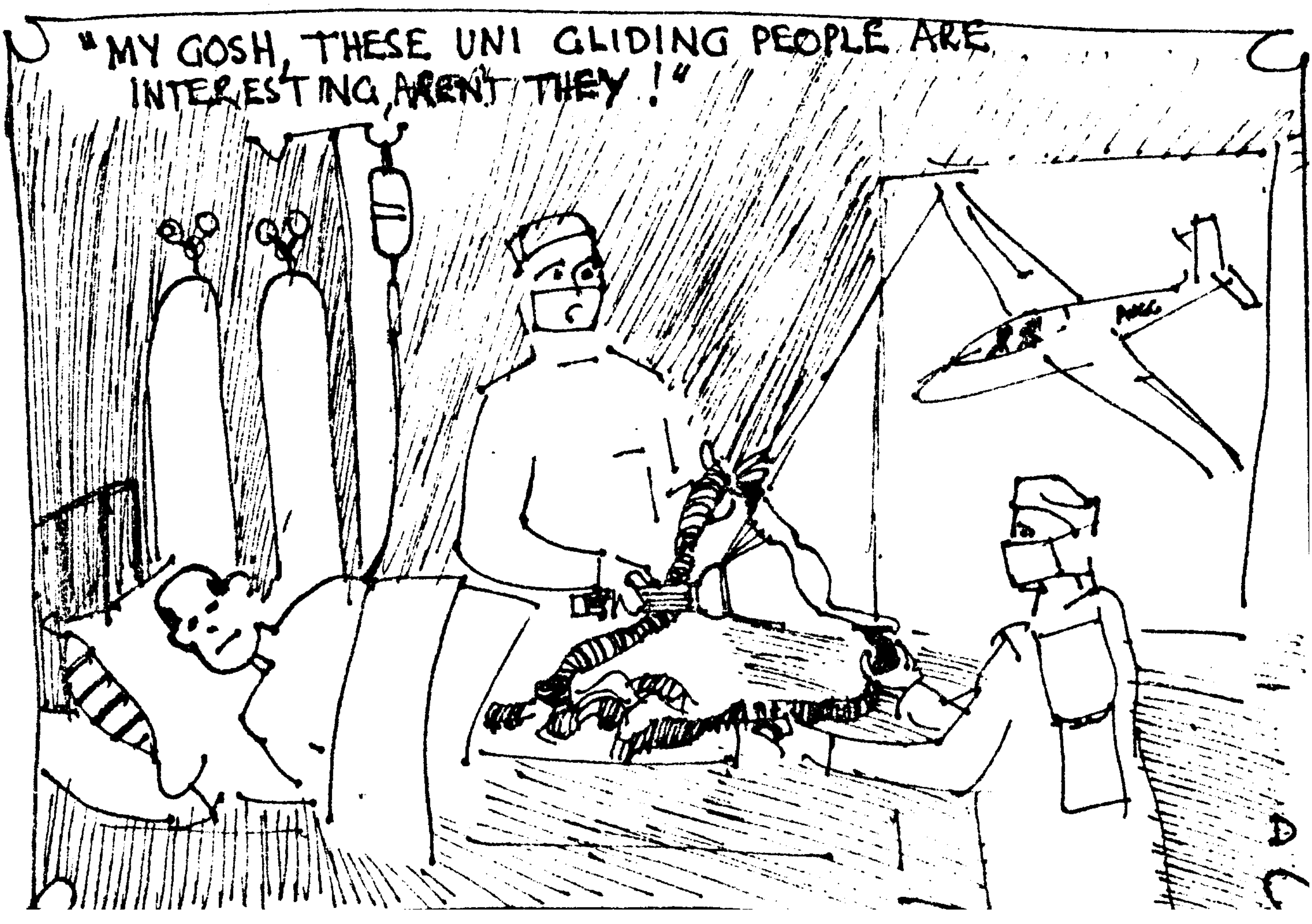
So called "properly run" contests are very formal affairs with detailed weather briefings following the essential morning temp. trace flight, the phone call to the local met. office and perhaps a look outside to see what the weather really is like. Following briefing everyone washes down their gliders, fills them with water and then tows their aircraft to the grid making sure that they obstruct as many people as possible, raise as much dust as possible (to dirty everyone else's craft) and generally put their aircraft in the spot that it shouldn't be in (especially when the grid has been organised earlier so that everyone knows where they should go).

Then, after launch, everyone mills around in the air trying to push the gaggles out of the thermals around the field. Eventually someone is brave enough to go through the gate and then they're off. (AT the last World Comps. on one day in 15M Class over thirty aircraft went through the gate in less than five minutes.) Then the race is on......but that's another story. Eventually those who are going to make it home get home by racing through the finish line and then performing the most incredible and unsafe manoeuvres possible before landing in a fashion most likely to make impossible for the person on his tail to land safely.

It will not be so at our Regatta. For a start we will have a simple gate without any mirror or radio-interference detection devices as demonstrated at Kimba a few years ago (and since written up in A.G.). Our start and finish lines will be the fences. There will be free height starts so binoculars would be appreciated on field. Finishes will be conducted in a safe and orderly manner with a good circuit before landing.

If the weather does not allow tasks to be set but it is still flyable we will have spot landing contests and flower bombing contests. The bullseye in the latter will be drawn in the cross-strip. If these events take place there will be flying available to everyone in the club we hope.

Anyway come along and help make the Regatta a success and help promote the Club

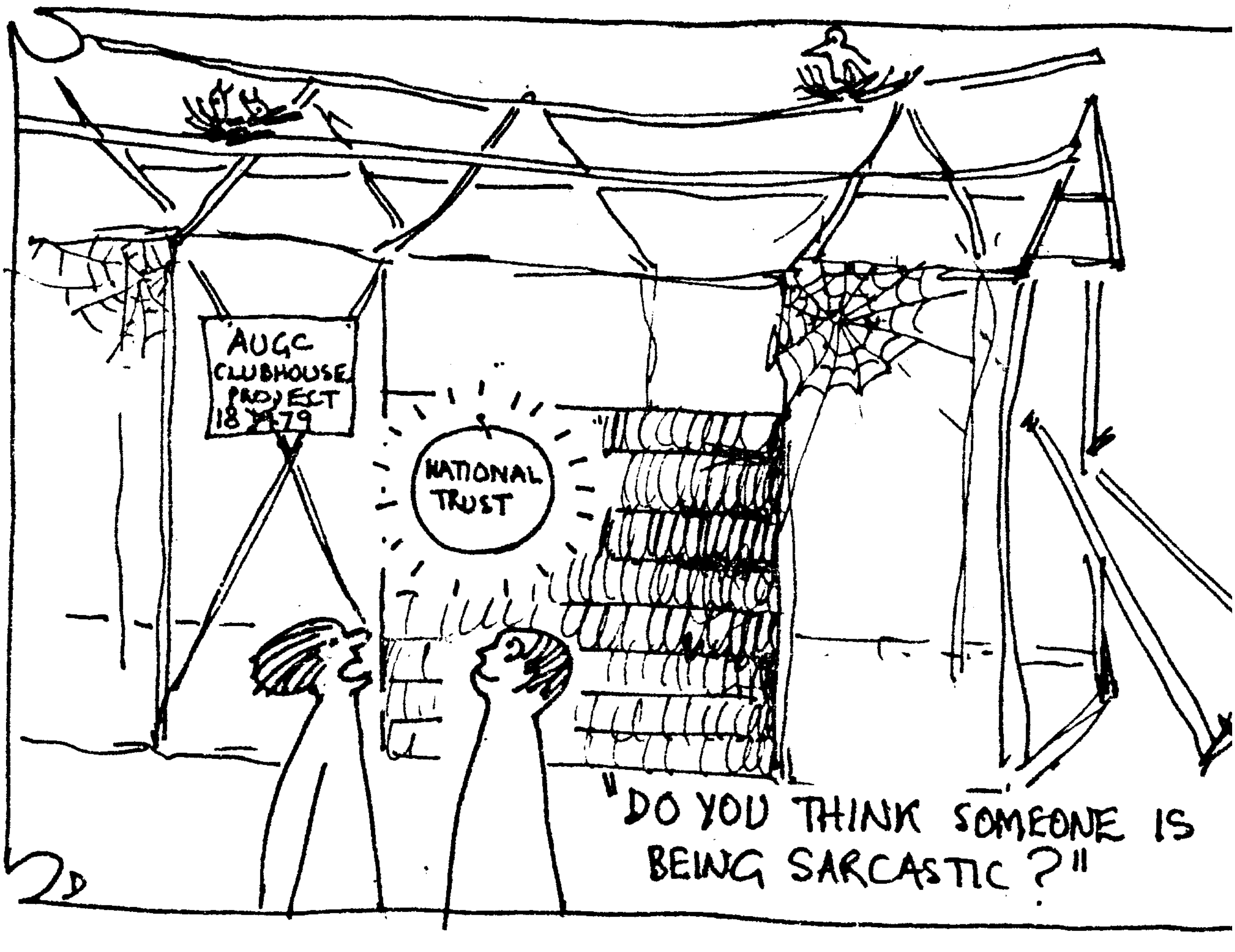


CONTEST ROSTER

This has been drawn up on the basis of people having stated that they wil attending at least on the day they are rostered:

Comp. Director	Guy Harley	Guy Harley
Winch	Andrew Sawyer	Mark Forster
	Redmond Quinn	Richard Brownrigg
Wing Tip Runner	Neil Boroky	Rob Duckmanton
Radio Operator	Jane Boroky	Ezra Douek
Start Gate and Finish	Bob Giles	Andrew Smith
Flying Bocian	Guy Harley	T.B.A.
	Ezra Douek	T.B.A.
Ka-6 (HA)	Mark Forster	Don Hein

Catering - in the care and capable hands of Andrew and Sandra Sawyer.
All the other jobs (rigging, marshalling, retrieving, unravelling tangled cables, working on the club house etc.) decided on the day. The more that attend the easier and the more fun it all becomes.



There will be a barbecue on the Saturday night a the shearers quarters. T will be catered for by the Sawyers. Please ring them as soon as possible s they have a better idea of who (or what) is attending.

AEROBATIC RECORD: CLAIM FROM MULGAWINKIE (via DRY DOG CREEK)

as reported by Denby Holmes

It is satisfying when glider pilots from Australia are read of, in the World's Press; Ingo Renner, winning the Smirnoff race across America, John Rowe breaking the 750K Triangle, and now Cyril Johnson's claim for a world aerobatic record.

Cyril Johnson (our foundation member and life elected CFI) had always had the feeling that he would make fame in the flying world, but had no conception, that as he hung by his straps in the shuddering, inverted, on the brink of a stalled Kookaburra – that history was about to be made.

At that instance he recalled the series of events that led to this undignified and quite horrific experience.

Without doubt, the first stepping stone to this introduction to an inverted spin, commenced the night he was helping his son, with a correspondence school project on the life of Alexander Constantinovich Glazunov, the famous Russian composer – for while thumbing through the Encyclopaedia Britannica he accidently came across a section on Gliding. To his astonishment, he read of another Russian, who in 1935 broke the American, Jack O'Meara's record of 96 consecutive loops in a glider – the Russian managed 300!

Cyril's imagination was stirred, his ego challenged, the dreaded Russians, who claimed to have invented the potato, were about to have their top aerobatic champions shipped to Siberia for the purpose of instructing in primary gliders for the term of their natural non-thermalling, flying careers.

For some years it was known that Cyril was a bit cagey about doing any form of aerobatics. While instructing, gentle to medium stalls were in order, providing he was on the controls the whole time, for after all "it's just to give you the feel, that's important" and spins were really a rare occurrence – something to do with "the air's a bit rough today, might exceed the VNE" or "she really doesn't do a stable spin" or "you haven't quite reached the stage to do spins".

Until Marjorie (the niece of Reg Hargrave, the wool classer from Dingoes Hole) made regular visits to the strip.

Cyril was injected with new blood, a bravado started to shine through the newly aquired Brylcreemed haircut, that had been lying dormant all these years.

The club's Kooka cavorted over Reg Hargraves' milk shed with gay abandon, chandelles from one horizon to the other became a common sight – and the day he performed a magnificent tail slide, following a distinctly awesome attempt at a stall turn – shall never be forgotten; "just a matter of holding the controls firmly, until she decides she's had enough of screaming flat out backwards", he said on landing in a most convincing manner.

And now this mad Russian – it was all that was needed.

The attempt was to be carried out in the most efficient manner. The Guiness Book of Records people were contacted, but a representative could not be present, for the auspicious occasion of breaking the World Record of 300 consecutive loops. However Fred Cluttertank, the constable from Gin Billy Lagoon agreed to come over and give an air of authority and credibility for the sake of the official claim.

There was a feeling of great anticipation as the whole club turned out (the wives growing tired of the "new Cyril image", stayed at home to show their disapproval). So the four of us lay on our backs with Fred, binoculars focussed on the Auster, struggling to tow the Kooka to 12,000 ft. but at 6,000 decided to expire and return to the nest.

So it Began.

Cyril not caring about his AFTHHH and LLL's went straight into his repertoire – nose down, great thunderings of air howling as the old Kooka raced to keep abreast of the 85 showing nervously on the ASI. Blindly (quite literally, for Cyril in actual fact, at that altitude was more than petrified), heaving back on the stick commenced the first loop. On opening his eyes, he noticed the ASI showing a steady 103, so he commenced the second, which in reality was the third, as without knowing it, while his eyes were closed he managed two complete loops! The next was a magnificent affair – a large round orbit, with the Kooka slowing to 75 on the top and straining at the bit to accelerate into the next down hill dash.

By this stage, Cyril was taking precautionary steps, so that the speed would be retarded and the old lady be allowed to settle her feathers – so, slowly and judiciously he pulled in back pressure – the feathers must have settled down a bit too much, for with neck straining back to catch a glimpse of the horizon appearing upside down, Cyril failed to notice the ASI unwinding rapidly as he went beyond the vertical.

Then came this horrible shuddering, while inverted.

To regain speed, he pushed the stick fully forward, away from his inverted stomach, with its rare collection of inverted butterflies within.

The wing dropped and the inverted spin commenced.

Oh! what a glorious sight it was! We were sure he had dismissed the thought of a mundane looping record, and now was throwing himself into belittling the Ruskies with a 5,000 ft. inverted spin.

Even Marjorie stopped munching her apple throughout the duration.

Cyril now entered a deep zone of severe shock, locked into the classic hold, stick fully forward and at least 160 lbs. of steel to the rudder pedal. He hung from his harness in the inverted position, with his body aching to be hurled through the canopy.

All he could say repeatedly was "oh! no!"

It was after the 23rd revolution (according to Syd Pickering) that Cyril applied opposite rudder and through some unexplained reflex action – or convulsive jerk, he brought the stick back to a more neutral position, realizing he was still upside down, but at least, the sickening spinning and whipping action had ceased.

We observed a sort of yawing, half roll, half loop as our geriatric Kooka regained a mild form of composure, at about 700 ft. and then, hesitantly, making her way in for one of those more interesting landings!

On running up to the glider, we found him just sitting there with a matching colour to that of the Kookaburra, a sort of yellow – a ghastly sort of yellow, muttering between clenched teeth "oh! no! oh! no! oh! no!"

Sun Flower Shepherd was estatic with the whole performance, having subsequently sent off detailed copies (duly witnessed by Constable Fred Cluttertank to

The USSR

The Federation Aeronautique Internationale claiming a world record and one to Marjorie, who last Saturday, married a commercial traveller flogging blades for a new type of shearing clipper □

Ka-6 REPAIR NEWS

NB is now around at the Boroky's place and the starboard wing is in their cellar. Work has hopefully started by time you read this. Andrew's roster will start again.

FLYING COWS

Anybody would think that after spending 20 hours couped up in an aeroplane the last thing someone would want to do is get back into the air again........and they're right! I thought that first of all I would see what Canada was like from the ground before taking off again.

It took me 3 weeks to get around to looking for a gliding club! Finally I found S.O.S.A. gliding club (don't ask me what S.O.S.A. stands for - Southern Ontatio Soaring Association, or something lik that), the largest club in Canada and it just happened to be a few miles down the road. One afternoon at their site was enough to conv me to look elsewhere; with over 150 members this club was too big, with fees to match.

A week or two later, having recovered from the shock and with th weather brightening up again (it must have been up to 22°C) I ventur out again, this time finding the London Soaring Society, a little further away in the opposite direction. I arrived at approximately half past ten expecting to see things well under way, but finding people just starting to rig gliders (A.U.G.C. must be the only club in the world that gets to the airfield at 9 o'clock in the morning) Talking to people there, they seemed to think that it was going to be a good day. I smiled in agreement as I stood there shivering wit my sweater (that's Canadian for jumper) on.

By one o'clock or so we had all the "hot-shots" off the ground in their assortment of American homebuilt gliders, an ASW-15, Diana Skylarks and (Guy will be so proud) a Ka-6. So it was just about time for me to get to fly. Everybody was interested to see how well could fly having spent all my flying time "upside down" in Australi

My first flight in Canada was to be in a Schweizer 2-33 affectionately knicknamed "The Cow" by the club members. For those who have never seen a 2-33 it is a training glider of gross dimensions with strutted wings and a "back door" for the instructor to get in. An average-size person (like myself) can easily stand up under the the wing at the root! Much to my surprise, after using a foreign pre-takeoff check, we soon took to the air behind what looked like an undersized tow-plane (especially for this monster, er, sorry.... ..cow). After five or six minutes we were at 2000 ft, had released from the tug, and were still flying, much to my amazement!

Actually, truthfully speaking the 2-33 isn't such a bad glider t fly, very docile and has loads of room in the cockpit (I was waitir for the hostess to come past with the drink tray until I remembered I wasn't in a DC-10). The day turned out to be much better than I h expected and we had a flight of about an hour, getting up to about 4500 ft. The countryside is very different to Australia. Everywhere you look are green fields with farm houses dotted about en-masse and a number of reasonable size towns within a radius of 20 miles or so. No long, hot walks here if you land out. But navigation may be a little more difficult with such a cluttered countryside and a more hazy sky due to the moisture in the air.

Well, before too long it was time to come down which proved interesting as the dive brakes leave a bit to be desired and because of the height of the 2-33 you feel as though you're flaring out 2 or 3 feet too high. It was getting to be time for the "hot-shots" to return from their cross-country jaunt. Meanwhile one of the guys left on field climbed into his Pitts Special which he had built himself (he and his father own an aircraft maintenance and repair business in nearby London.....handy for the gliding club). Soon the Diamant appeared, doing a beatup across the field and pulling up to a few hundred feet. Close on his tail was the Pitts Special beating up the field and pulling up a couple of thousand feet!!

I joined the club last weekend after waiting four weeks for decent weather agai[n] It turned out to be a really good day, by Canadian conditions, with 4 - 5 knots to 6500 ft.

For those who are interested here are a few facts and figures about the London Soaring Society in Ontario, Canada.

Aircraft: 1 Schweizer 2-33
1 Blanik
1 Schweizer 1-26
1 Schweizer 1-34
1 Tow plane (type unknown to me at the moment)
Numerous privately-owned aircraft (mainly metal)

Membership: Approx. 40 members (with 6 trainees)

Fees: $100 initiation ($A1.00 = $C1.30)
$300 p.a. membership
Tow fee - $4.00 to 2000 ft regardless of time.
Flying - free

To fly solo in Canada each person must have a medical by a qualified aviation doctor and then apply for a student's permit. After satisfying the C.F.I. that he can really fly the potential pilot must then get a licence from M.O.T. providing that he passes a written examination.

It's much more complicated that in Australia.

-From our Canadian Correspondent

David Ellis

Soaring to win in the 21st century. . . .

FLYING THE ALTOSTRATUS I

by JOHN McMASTERS

Events seldom begin where they seem to begin, and that's true in spades for World Championships. This article's title claims we're going to talk about flying the *Altostratus*, but soaring usually starts on the ground so we'll wander around a bit before we get to the flying part of the story and describe the improbable sequence of events which sometimes occur in getting a pilot together with his sailplane for a world event.

For me, the story began one muggy afternoon in August when I strolled into the Holighaus-Schempp-Hirth German factory in Montreal. You'll recall they'd moved there a decade earlier after German airspace limitations had banned all sport flying except hang gliding. My old friend Rolfe Holighaus was his usual gray-haired, grizzled self — very tired and brimful of enthusiasm. After a quick tour of the main plant, Rolfe led me to a low shed behind some trees, shielded from prying eyes by a tall hedge of gorse bushes. In this shed was the *Altostratus I.*

In fact, rather little of the *Altostratus* really existed that August. There was the slender ogival canopy, a few machined parts, a number of spools of aromatic Ultimat® roving, and a large stack of hyperballoy ingots waiting to be machined and bonded into the complex box of the pencil-slim 25-meter wing. In succeeding months, as time permitted and when I could get a visa, I helped with the construction and gained a great deal of respect for the health hazards involved in fabricating advanced sailplane structures.

A year later at the U.S. Open Class Nationals in Edmonton (which I was lucky enough to win in a rather elderly Holighaus-Schleicher), I met Rolfe again and got the latest update on the *Altostratus* flight trials. I was green with envy at the thought of a lucky Canadian team member flying the ship at the upcoming Worlds in Hobbs. Throwing caution to the wind and ignoring for the moment how seriously relations between the U.S. and Canada had deteriorated since we had annexed the western provinces to get the final drops of North American oil, I boldly asked Rolfe if I might have the ship in the unlikely event the Canadian champion turned it down.

Around Christmas the good news came. The Canadians had decided that the *Altostratus* was too radical (an overly emotional prejudice against flying wings, in my view) and I could have it — if I could figure a way to get it across the border.

The next two months were spent contacting every government agency in Washington and drawing a blank at every turn. Stymied, I final wound up at the SSA Convention in Mexico C where I was scheduled to speak. During the question period, I was asked what I'd be flying the upcoming Worlds and I spilled the whole story. Later that evening a short dapper Easter type walked up, introduced himself only as Howard, and asked a few questions. Half an h later, after a brief phone call by Howard to the State Department, I had my authorization to ir the *Altostratus!*

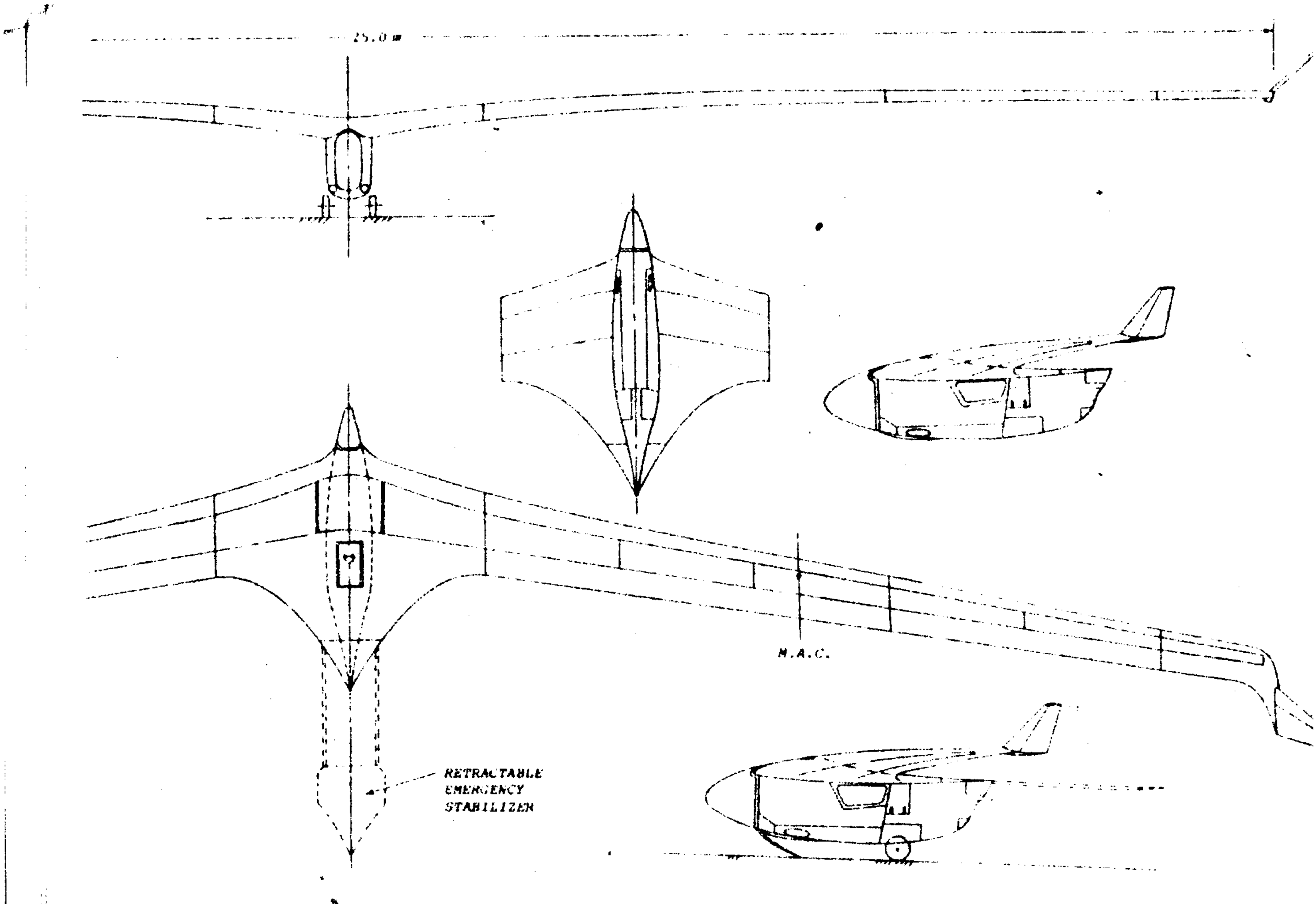
Within a week, arrangements were made wi Rolfe to smuggle the *Altostratus* across the bor Niagara Falls, disguised as a crate of contrabar seal pelts for which the government paid the outrageously stiff duty as well as other bribes. followed a grueling eight-day Amtrak trip witl sleeping on top of the precious crate the whol

Finally, with only a few days to spare, we a in Hobbs, ready to fly and praying that the unopened crate contained the ultimate in sailp rather than the fragrant carcasses of 500 unfortunate fur seals. It did, and the rest is n history.

A full technical description of the *Altostratus* been published several times, and I'll not you again with all the details of its many inter features. Suffice it to say that during the week before the Worlds opened, I was continually amazed to discover the degree of genius Rolfe famous father, Klaus, had passed on to his so The machine and its systems were marvelous frightening and made me wonder many times whether I'd made the right choice.

When all systems worked, the *Altostratus* w pure joy to fly. But, alas, the beast was, after prototype and suffered from many of the relia problems to be expected of such a craft. For example, the automatic stability augmentation system kept the otherwise unstable machine v the bounds of control of even an average pilot it required continuous alertness to sense an impending failure of the system and deploy tl small auxiliary tail which was mandatory in th event of augmentation system failure.

I'd been warned by Rolfe not to punch in T Mode, since, he warned, I'd likely find mysel



ALTOSTRATUS I
R. Hollghaus via J.H. McMasters

pile of wreckage before I could deploy the auxiliary if the stability system failed in the middle of the maneuver. Fortunately for me, on the one occasion when I was forced to use that mode for evasion, the system kept working splendidly, but I was certainly lucky that time. More often than not, I wound up crossing the finish line with that little auxiliary stuck out in the wind while the sweat poured off me as though the cockpit were a sauna.

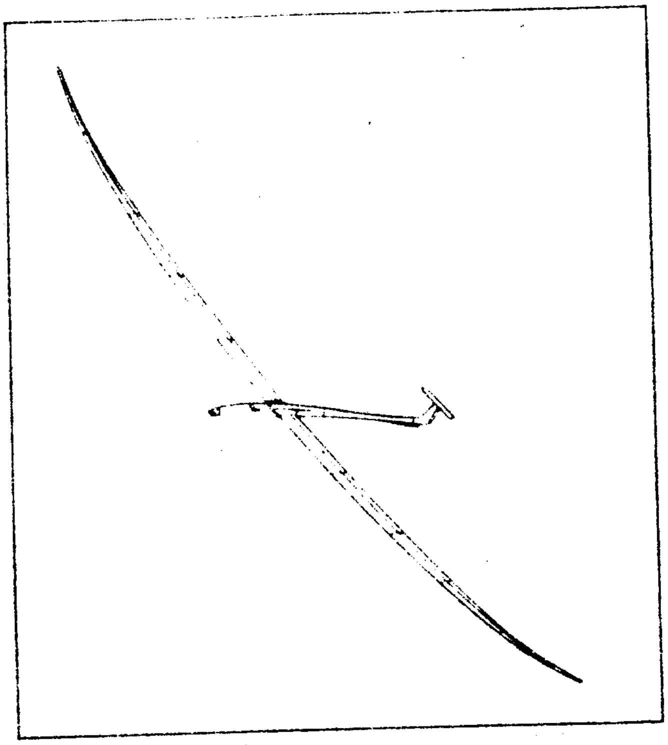
The boundary-layer control system suffered its fair share of problems, too, but in general worked very well except when the sky was overcast for long periods. Usually, however, by climbing to 10,000 meters or above, I could get enough extra juice through the solar cells to charge the batteries for an extended run at lower altitudes. Only once did the slots clog asymmetrically (with ice, as it happened). The microwave debugging system on the leading edges usually worked well enough to keep the slots free from that source of contamination.

As I said, with all systems operative, the *Alto* was pure joy. And as you all know, my luck held during the contest, although the final day was a very close thing.

A great deal has been written about the World Championships at Hobbs and the statistical data is a matter of record. I won by a mere 100 points after coming up to the final day with a margin of over 300 with the Chinese in 2nd place. The Chinese were good that year, but the *Altostratus* ultimately made the difference. Statistics tell only part of the story and I've not been able until now, a full

To begin with, I woke up with a foreboding sense of malaise. Usually I look forward to the rush of those 10g electro-magnetic catapult launches. This time I dreaded it, but somehow I found myself recovering from blackout at 3000 meters, everything under control, and with complete amnesia from the point at which I slid the slender nose cone shut. The task for the day had been set as a simple triangle with turnpoints north of Wichita and Akron — no big challenge, if I could just collect my muddled senses enough to steer the course intelligently. I elected to start at 1116 and immediately located a region of strong lift and proceeded to climb to 6000 meters. The sky was almost clear except for an occasional puffy cu and I began to feel a bit better.

The rectangular screen of the heads-up display of my thermal detector/evaluator system nearly filled my field of view forward. I irrationally found the display of lift profiles and digital aircurrent velocities irritating and distracting and almost shut the system off so I could enjoy the view for a while, but I got hold of myself and punched in the coordinates of my first turnpoint. After waiting a second for the flight management computer to do its thing, I lay back monitoring the course corrections (due to windage in the jet stream) necessary to bring me optimally to the turnpoint after climbing through a wave I'd spotted on the display a few kilometers off course to the south. So far, so good; the first leg went by rather uneventfully.



The Spirit of Deng Xaoping

I photographed the first turnpoint, climbed again to 8000 meters, and set out on course across Kansas for Akron. Punching my favorite old Merle Haggard cassette into the quadraphonic tape deck, I lay back munching a sandwich and sipping a cup of coffee to pass the time. It was around Goodland, Kansas, that things began to get tight. My tail warning radar showed a blip a hundred kilometers back which turned out to be a leech who'd started half an hour before me, gotten confused around the first turnpoint, then loafed around on the second leg, hoping to pick up someone like me who would lead him on to at least a finish. My leech was too far away for me to make a visual sighting, so I couldn't identify him, but since he was holding steady behind me, I decided to let him be until later on. You all know my opinions on leeches, and I had fully in mind taking care of this scum when I was sure I had the race in the bag, but in the meantime I still had a lot of flying to do.

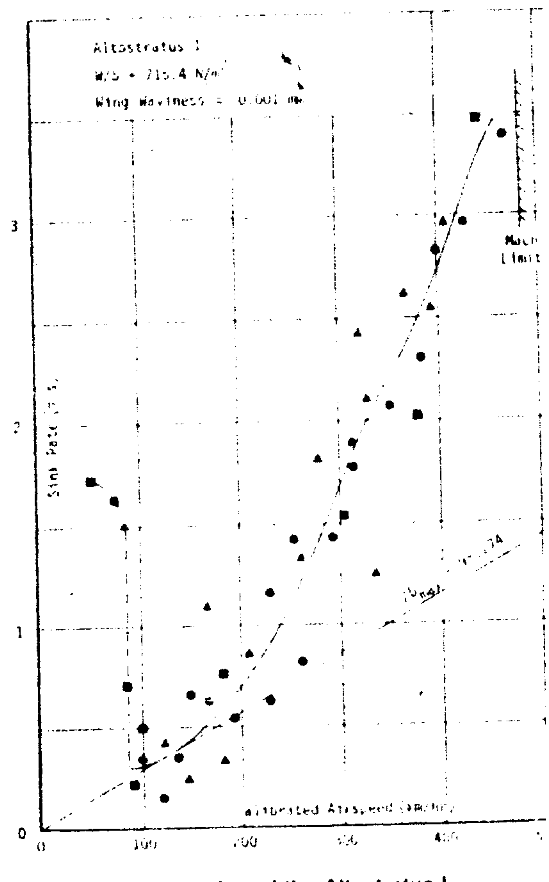
Around Goodland, I suddenly got a second blip on the tail warning radar, and *this* one was no leech. It was gaining on me in a long flat glide from perhaps 3000 meters higher. I guessed by the speed it was my Chinese adversary. About the time we reached Akron, I caught sight of the machine. The monster glistened in the sun like a pair of crossed knitting needles. As extreme as the *Altostratus* was, I still had to marvel at the 40-meter brute those clever Chinese had fielded. Those flapping Katzmayr-Lamson aspect-ratio-fifty wings were just too much. And the performance of the thing was nearly as good as mine at speeds up to 250 km/hr. Now with a height advantage it was overtaking me at a fierce rate.

I still think if I'd been in that gal's place, I'd have used the height advantage to just pass me by and make a race of it. Apparently though, she felt my point lead was a bit too much and figured the only sure way to win was to force a DNC on me. She was clearly going to zap me at the turnpoint if she

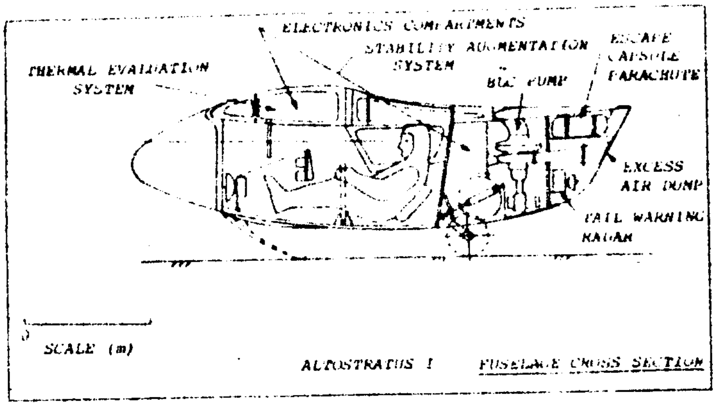
You all know my strong feelings about the u
missiles in contests. I was very disappointed w
the CIVV finally voted to allow them. Howeve
lobbying effort mounted by the Swiss, Zimbab
and Japanese carried the day. Only the French
threat of a veto kept them from allowing explo
warheads into the bargain. The argument that
the electronics we fly with now takes the sport
of competition was pretty persuasive, I'll have
admit. And I must confess, it was *fun* to blast
poor Swiss out of the sky the third day of the
Worlds. I'd only meant to cripple his electroni
with a legal dose of electro-magnetic pulse, bu
bias was wrong on the second missile I fired,
the thing hit his tailplane. I'd have been very
if he'd been hurt, but was relieved when his c
opened and he finally made it back to Hobbs
the final ceremonies. *C'est la guerre.*

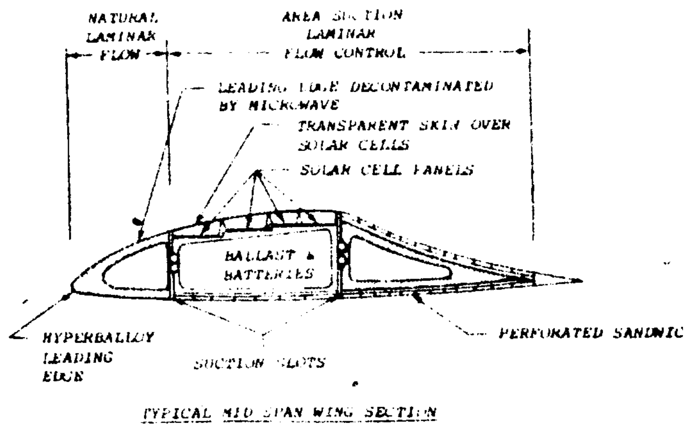
So much for that. My problem now was tha
Chinese woman gaining rapidly on me by the
second. I chose my moment and turned into
The fire control radar showed her just coming
range when I pushed the first missile firing b
and immediately got a "FAULT" signal. Ditto
the second and third. I was in *trouble*. The firs
her missiles missed. I had only a split second
mindlessly punch in "TUMBLE" — and then
world fell away.

I kept it in the tumble for as long as I dare
then praying that the stability system was stil
functioning, I punched in "LEVEL FLIGHT"
held my breath. Good old Rolfe. With a fierce
the *Alto* righted itself. I could see I still had a
thousand meters altitude and was right side



A Flight Test Evaluation of the Altostratus I
— John Dickson and the Dallas Gliding A





Then all hell broke loose. I hadn't lost my adversary by tumbling — her missile was right on target! There was a sudden blinding flash as my whole instrument panel short-circuited. My electronics went bonkers. Shaking like a leaf, I fought the controls to hold the bucking *Alto* level while madly cranking out the auxiliary tail with the emergency hand crank. After some panicky moments, I finally had the *Alto* just barely under manual control. It seemed to be suffering from no structural damage, however, and I gritted my teeth waiting for another missile to finish me off. Only my lead-lined flight suit with its double-shielded cod piece could save me now.

The third missile never came. Instead, I incredulously watched a long, blood-red, wing panel fluttering down less than a hundred meters to my right. I suddenly realized what had happened. My witless leech had overtaken us during our missile duel and had blundered into the middle of the melee. Seemingly oblivious to his surroundings, the fool had collided with the Chinese machine, severing one of its outer wing panels as well as his own wing at the root. While I'd been fascinated by the fluttering wing panel falling to my right, the unfortunate leech had plummeted behind me and to my left. The Chinese would have followed if she hadn't quickly jettisoned her other outer wing panel, evening up her span to a truncated 20 meters and stabilizing at roughly my altitude.

There was no time for missile dueling now. We both had our hands full trying to fly our suddenly modified machines in the turbulent low altitude air over the Colorado sand hills. Calming a bit, I assessed the situation. My glide ratio was down to a measly 50 to 1 now. I had to gain some altitude quickly. That would be difficult without any electronic thermal evaluation system. In fact my whole flying gear consisted of a pink yaw string and the ancient Ball mechanical integrating variometer which I had mounted on my panel as a sentimental good luck charm. Fortunately I had connected its plumbing before I had taken off and a few taps on the dial face showed that it was apparently working. I've taken a lot of ribbing for carrying that vario and even more for the yaw string, but they certainly saved the day for me that time.

As luck would have it, I spotted a dust devil about a kilometer ahead and both the Chinese and I went for it. Dumping ballast, we gained 3000 meters for our trouble. Off to my right the vast eastern Wyoming strip mine stretched off the northern horizon and I headed back to Akron to take a second turnpoint picture with my backup Brownie camera. Then, catching a second thermal, I managed to climb to 6000 meters and set course by dead reckoning for Denver.

Well, it was a sweat-and-panic trip back to Hobbs that afternoon. And whoever named that Chinese sailplane *The Spirit of Deng Xiaoping* was right on the mark. It never gave up the fight. Reaching Denver, I managed to climb again until I found the wave I'd been hoping for. I never really saw the city itself. Despite being half-abandoned, it was still totally enveloped in a dirty brown haze.

We finally arrived in a photo finish at Hobbs. It was after dark and from 150 km out I could see the lights of the long casino row leading to the National Soaring Oasis. We landed and dashed to the contest center to turn in the turnpoint pictures and then I was off for a hot shower and a soft bed, completely exhausted.

When the final scores were posted I had won by a mere one-hundred points, coming in a poor second that last day. The Chinese had beaten me by one-hundred points and picked up a second hundred as a bonus for besting me in the missile duel. But I'd won the World Championships again, and, after all, soaring to win is what counts!

SOARING February 1981

NEXT CLUB MEETING:
OCTOBER 7th 7.30p.m
JERRY PORTUS' ROOM

CAMBER CHANGING FLAPS

by Mal McCleary.

Reprinted from Airflow

GENERAL

Camber changing flaps are certainly not a new invention for are as old as gliding itself. The earliest gliders used wing warping for lateral control and to slow down on landing. Down flap gives more camber and so a greater obtainable lift coefficient, allowing the aircraft to fly slower without stalling. Flaps on powered aircraft are usually designed to generate more drag at the same time so that a slow but steep approach is possible. Camber changing flaps on sailplanes allow a greater range of speeds, both low and high speeds without the added drag, which provides for improved cross country performance. The landing phase is normally controlled by dive brakes but landing flap is an added bonus. Large flap deflections, up to 90° down, are very effective for glide slope control and are used on some sailplane designs, e.g. E. Schreder's HP series, as the only landing aid.

WING LIFT AND DRAG

There is a fixed relationship between lift coefficient, aircraft speed and wing loading. This relationship is shown in Fig. 1 at sea level for two wing loadings. The figure shows that if an aircraft flies at 50 knots and a wing loading of 5 lb/ft² (at sea level), the lift coefficient must be 0.60. Alternatively, if the aircraft was loaded up with water ballast, such that the wing loading is now 8 lb/ft² the lift coefficient must be 0.95. The aircraft complies to the equation $C_L = \frac{297\,W}{V^2}$ for sea level conditions, where

C_L is lift coefficient

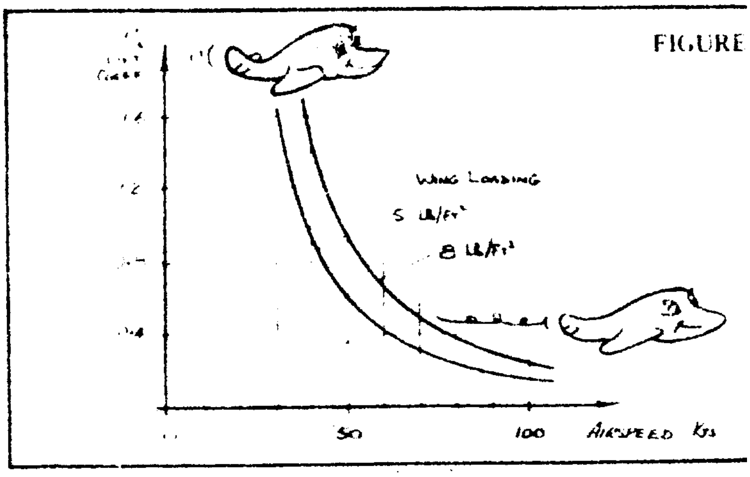
W is wing loading in lb/ft²

and V is airspeed in knots

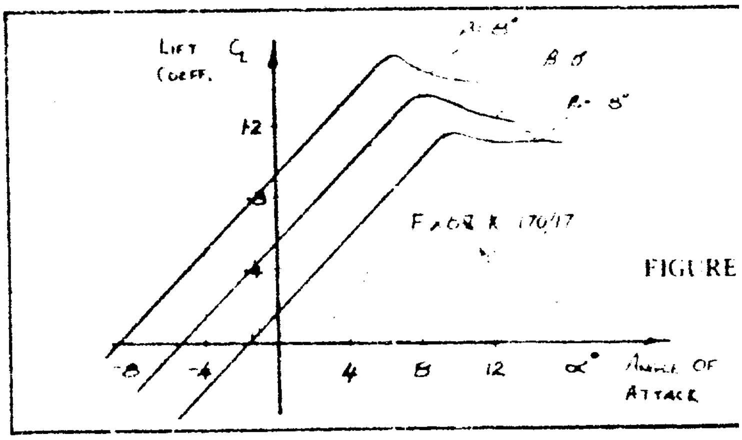
The lift coefficient of a Wortmann wing section against angle of attack is shown in Fig. 2. These curves are the result of wind tunnel tests carried out by Dr. F.X. Wortmann.

The section chosen is the FX67-K-170/17 used on the Nimbus II, Janus, Kestrel and many other modern types. This section has an amount of built-in camber so lift is generated at zero angle of attack at zero flap setting. (Sections without camber, i.e. symmetrical, produce no lift at zero angle of attack). The curves show that the lift coefficient, for any flap setting, increases linearly with angle of attack until quite suddenly linearity ceases, maximum lift is achieved and any further angle increase does not produce any more lift, in fact, the section then stalls. One of the features of the Wortmann sections is that the stall is very docile; this can be seen by the way the lift coefficient curve remains constant with further increases in angle of attack beyond the stall angle.

Positive (down) flap increases the lift coefficient and negative (up) flap decreases it at zero angle of attack. This



FIGURE



FIGURE

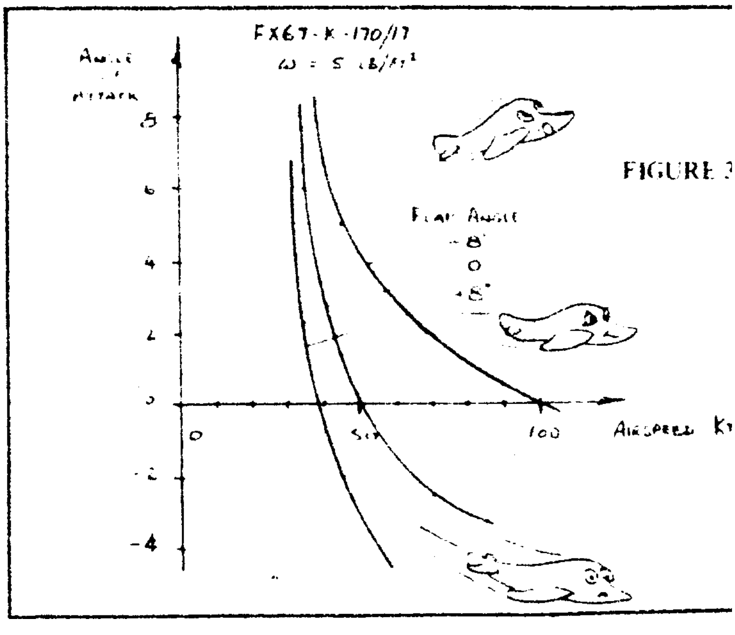


FIGURE 3

is because positive flap [illegible] further camber, [illegible] lift, while negative flap reduces camber so less lift. The maximum lift coefficient for positive flap angles are higher than the zero flap setting but occurs at a lesser angle of attack while alternatively the negative flap angle settings result in lower maximum lift coefficients but at greater angles of attack from the zero flap setting.

By combining the lift coefficient relationship versus airspeed of Fig. 1 with its relationship versus angle of attack of Fig. 2, Fig. 3 is drawn showing the airspeed against angle of attack for the three flap settings. This relationship is drawn for an infinite wing because the wind tunnel results are obtained on that basis. Extraction of exact data from this diagram relating to a particular aircraft with finite span cannot be done without adjustment for aspect ratio.)

Examination of this figure illustrates how the angle of attack changes for different flap settings over the airspeed range. Positive flap angle of 8° gives wide angle of attack excursions for very little speed change. The negative flap angle of -8° has a large speed range for little angle of attack change. Note that these curves are drawn for a wing loading of 5 lb/ft². A set of curves for 8 lb/ft² or any other wing loading can simply be obtained from Fig. 1 and drawn accordingly.

The airfoils developed[a] by F.X. Wortmann have significant laminar flow at low Reynolds numbers. The airfoil selected for this discussion has laminar flow developed on both upper approximately 50% of chord and lower approximately 78% of chord surfaces.

Figure 4 shows the laminar flow limits for upper and lower surfaces against angle of attack at zero flap setting at a typical Reynolds number. Examination shows that the upper surface laminar flow gradually reduces. At a set angle the laminar region suddenly halves with a resultant increase in drag. Similarly the lower surface loses its laminar flow at a negative angle of attack. This also results in increased drag. So when operating an airfoil of this nature, the best performance is obtained when the angle of attack is kept within the laminar limits.

Wind tunnel testing produce airfoil data on lift coefficient versus drag coefficients for various Reynolds numbers.

Figure 5 shows the curves for the referenced airfoil at Reynolds number of 1.5×10^6 at our three flap settings. The values of the drag coefficients for smooth wing sections are mainly a function of Reynolds number and the relative extent of the laminar boundary layer, and it is moderately affected by thickness ratio and camber. Consistent with the breakdown of laminar flow with angle of attack, Fig. 4, the laminar flow sections have low drag over a certain range of lift coefficients. Outside this range the drag is considerably higher due to the onset of turbulent flow. This low drag range is known as

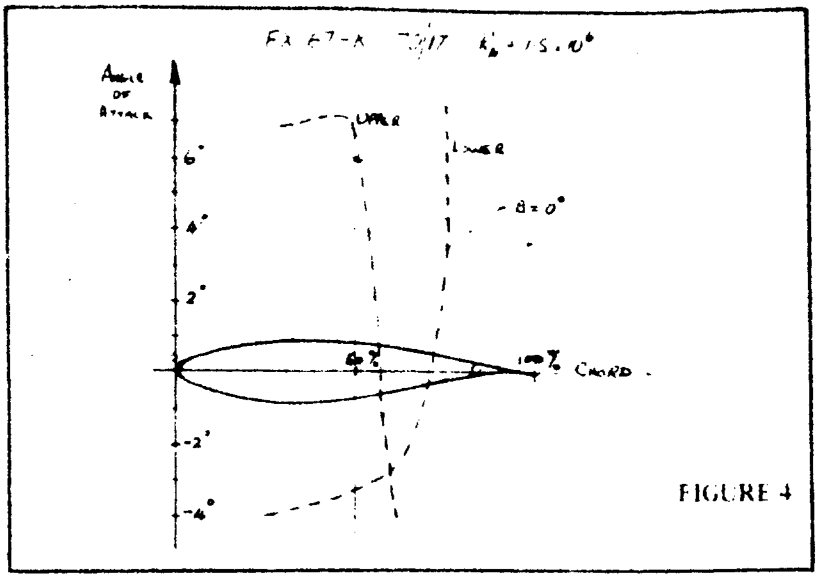


FIGURE 4

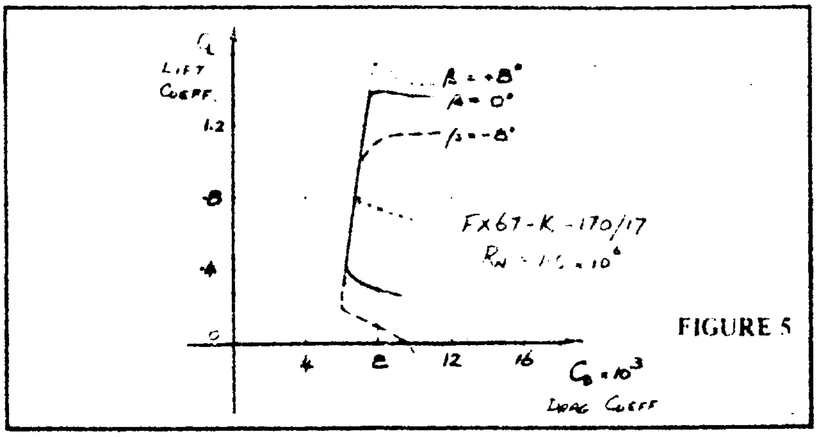


FIGURE 5

[illegible] bucket"). Flaps have the ability to shift this low drag region to a higher or lower lift coefficient range, see Fig. 5. With positive flap the drag bucket moves into the higher lift range and similarly with negative flap the drag bucket moves to the lower lift coefficient range. What this means is that for positive flap setting the aircraft can fly slower and still maintain laminar flow over the major area of the wing. At the other end of the scale negative flap allows the aircraft to fly faster and maintain laminar flow. This is achieved because the laminar flow range at each flap setting occurs at much the same angle of attack range, see Fig. 6. The common drag bucket range falls within zero and plus seven degrees.

By inspecting Figure 6 it can be seen that the lower angle of attack end produces lower drag. Therefore the lower angle of attack region would be more profitable provided you could continuously fly there. The means for doing this is obviously the correct selection of flaps for the airspeed you are flying. And the correct selection is the flap setting for minimum drag.

FUSELAGE DRAG

The wing is not the only criteria for flap selection. The fuselage drag can be significant in the overall picture. It would be advantageous if the angle of attack of the aircraft was kept at or about the minimum fuselage drag angle. For example, in the case of the Taylor J. sailplane the fuselage drag curve is drawn superimposed on Fig. 6. The fuselage minimum drag angle occurs at 2½° so the obvious conclusion would be to continuously set the aircraft at or about 2½° incidence by the use of flaps. Referring to Fig. 3 the following flap settings would keep the aircraft at 2½° incidence angle, at 38 knots set flaps at +8°, at 42 knots set flaps at 0°, and 64 knots set them at -8°. The settings for this example are true provided the wing loading is 5 lb/ft². For higher wing loadings the above flap settings would occur at greater speeds.

TAIL LIFT

There is one further parameter that is effected by the use of flap, and that is the moment coefficient. Fig. 7 is also obtained from the wind tunnel results for the airfoil. These curves show that at zero flap setting there is a negative value for the moment coefficient which substantially remains constant for changes in angle of attack. Positive flap increases the negative value of this curve, while negative flap reduces the moment coefficient.

The sign convention for the moment

coefficient has nose up pitch is positive. Negative moment coefficient therefore produces the nose down pitch. [illegible] The nose down pitch has to be corrected by a down load on the tail. The aerofoil moment is calculated from the formula

$$M = \frac{1}{2}\rho V^2 S C_m \bar{c}$$

where

M = moment (ft. lb)
ρ = air density (slugs)
V = velocity (ft/sec)
S = wing area (ft^2)
C_m = moment coefficient
$\bar{c}$ = aerodynamic chord (ft)

Since the moment is dependent on the square of the speed the balancing tail load is increased accordingly. Negative flap selection, as mentioned, reduces the moment coefficient value and this in turn reduces the down tail load. In other words, with negative flap selected the resulting tail load increase with airspeed is much less than with zero flap. Flying fast with positive flap is not very profitable and can add ten percent on the sinking speed at 65 knots just due to tail load effect. Tailplane lift effect on sailplane performance will be the subject of another article in the future.

PERFORMANCE POLAR

Finally, what effect has flaps on the performance polar? Fig. 8 is the performance polar of the Jantar 1 sailplane with zero, -4^0 and -8^0 flap settings at a wing loading of 30.0kg/m^2 (6.14 lb/ft^2).

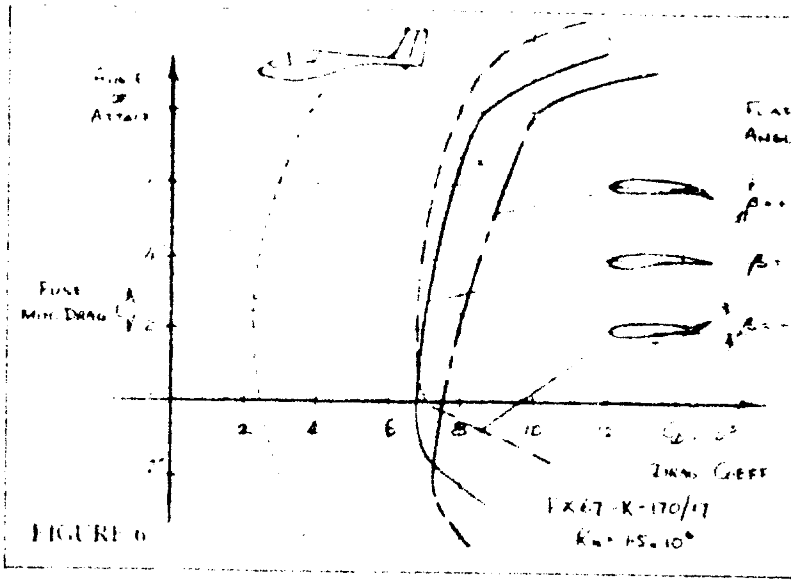
Inspection of these polars show that the zero flap setting is best for low speeds up to 100 km/hr, -4^0 from 100 km/hr (54 kts) through 120 km/hr (65 kts), and -8^0 with speeds beyond 120 km/hr.

An analogy can be made on the effect of the performance polar with flaps and water ballast. As we all know water ballast improves the high speed region of the polar but at the expense of the low speed end. Negative flap has a similar effect to water ballast. It improves the high speed end of the polar, but also at the expense of the low speed end, except that there is no compulsion to keep negative flap at low speeds. A change to zero or even positive settings gives the low speed improvements. Releasing water, of course, will improve the low speed end but this is a once only decision. Once dropped the water polar is no longer available for that flight. With flaps all polars are possible at any time throughout the flight.

CONCLUSION

To obtain the optimum performance from a camber changing flapped sailplane would require continuous alteration of the flap settings to maintain the appropriate angle of incidence for minimum drag. To do this the flap lever must be shifted as the airspeed is changed. It would require the use of both hands. As the speed is increased so the flap angle is decreased and vice versa. To adequately reduce the pilot work load, however, there are automatic control systems available that will do this job. (Reference "Technical Soaring", Vol. IV, No. 1.)

The simplified approach for a good day when your MacCready ring calls for high speeds is perhaps more practical. Multiple settings of flap are unnecessary.



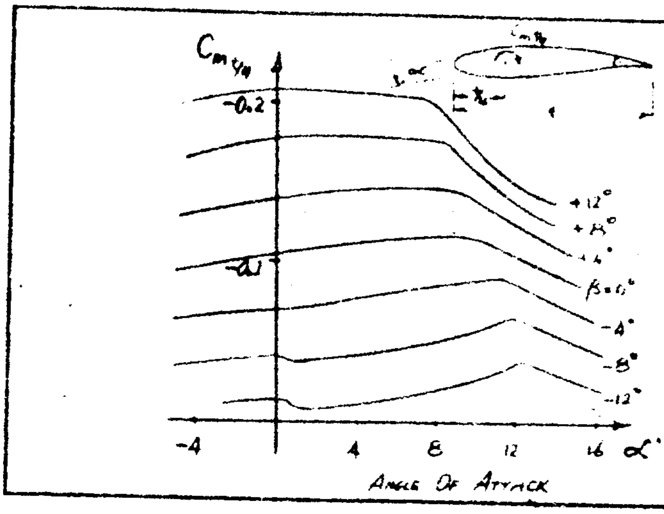


FIGURE 7

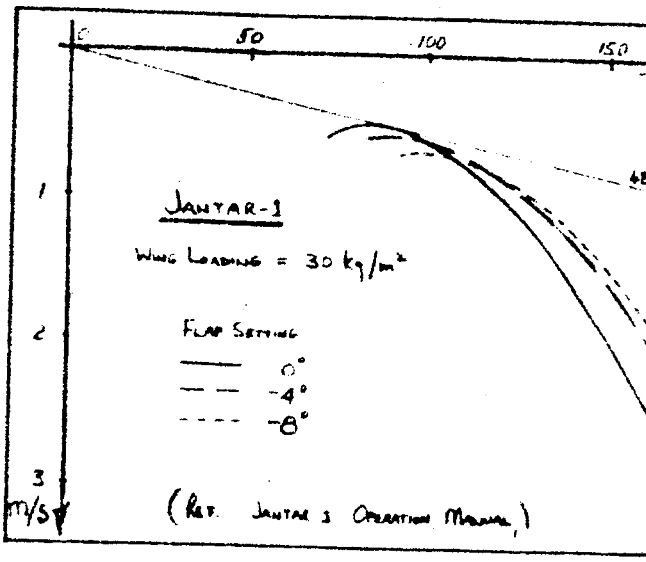


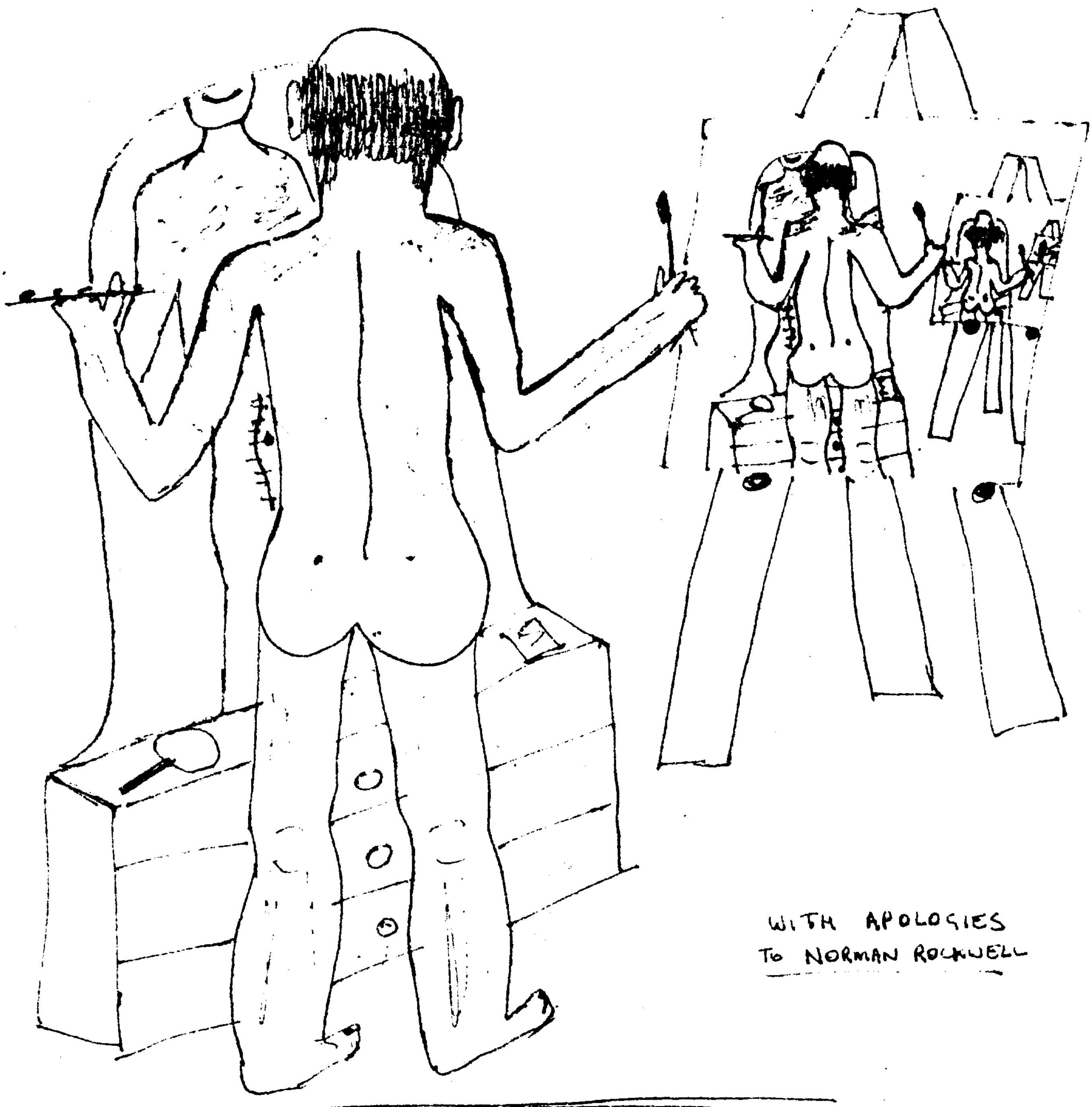
FIGURE 8

On leaving the thermal, having used the positive flap, one should immediately go to full negative flap for inter-thermal cruise. If the fuselage drag was very dependent on alignment with the airflow, this approach could be modified slightly, but since the angle of attack will only alter by 4^0 over this speed range it is perhaps hardly worth bothering about.

To conclude, speed should [illegible] allowed to go outside the drag [illegible] range for the flap setting. This [illegible] pecially true at high speeds [illegible] profile drag is most importan[t] [illegible] those final glides, for example [illegible] start can easily lose a third of [illegible] ratio flying 5 kts too fast.

BACK PAGE:

DON'S BACK!!



WITH APOLOGIES TO NORMAN ROCKWELL

DON'T FORGET
- RATBAG REGATTA
- CLUB MEETING