GLIDING

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GLIDING

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CONTENTS

TITLE	AUTHOR	PAGE
B.G.A. News		146
Silver, Gold and Diamond		147
South African National Championships	*John Moore*	148
Instrument Flying for Glider Pilots	*Tony and Anstace Goodhart*	150
The Pyramid Flight	*R. Swinn*	154
Here's Hopping	*Ann Douglas*	157
Sailplane Race	*Philip Wills*	158
The Total Energy Venturi	*F. G. Irving*	160
British Two-seater Height Record	*A. W. Bedford*	161
Long Mynd's Best Wave Yet		162
Long Mynd to Lyneham	*R. H. Prestwich*	163
Waving at the Long Mynd	*Allan Pickup*	164
Cloud Streets	*R. S. Scorer*	167
Gliding at Cranwell R.A.F. College	*J. S. R. Salmond*	170
Synthetic Glues in Aircraft Construction	*H. G. Rodway*	172
A Lee-Wave in New Zealand	*S. H. Georgeson*	178
Clubs and Associations		179

Cover Photograph.—**A Slingsby T-21b** landing after making the first gliding flight over the Pyramids. See story on page 154.

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A Social Occasion

In recognition of the British win at the 1952 International Gliding Championships, a House Dinner was given on 26th November by the Royal Aero Club—the first it has held since the war. The Club's guests were Philip Wills, world gliding champion, the other four pilots in the team, all the ground crews, and the team manager, Ann Douglas (who, as we go to Press, has received the M.B.E.).

Lord Brabazon of Tara, president of the Club, in a speech congratulating the British team, outlined the history of gliding and soaring, and remarked how funny it was that none of the early flying inventors tried to copy the lazy soaring birds, but preferred to make wings that flapped. Yet there was nothing in a high-efficiency glider which could not have been manufactured thousands of years ago. One thing about gliding that appealed to him was that it depends on personal skill, unlike the many means of mechanical transport.

Mr. Wills, in reply, began by quoting, and disagreeing with, some words written by C. G. Grey in 1935: "Let us cut cant and recognise gliding as a useless game suitable for gentlemen to play." But Mr. Wills thought it is now accepted that gliding covers a wider field, as it did in pre-war Germany, which, he said, was the only example of an air-minded nation that has yet been seen. According to his experience when taking part in the first international contest in 1937, you could not land a sailplane in Germany without everyone being completely clued up; no-one blew down the pitot tube, and probably one or two boys in the crowd could have done a better flight. That was air-mindedness.

A lot of nonsense, Mr. Wills said, was talked about air-mindedness being helped by such events as the Farnborough Display, but in fact all the spectators come away with the impression that this business of flying is for super-men only, and thinking "thank God we are not that sort ourselves." The only way to achieve a national consciousness of the air, corresponding to that we already had of the sea, was through gliding, and it could be done for half the cost of a modern bomber per year.

A surprise was the presentation to the team by Stanley Dickson, of Derbyshire and Lancashire Gliding Club, of the original Union Jack flown on the airfield during the Championships. He and Basil Meads had run it to earth in the Madrid bank from which it had originally been borrowed.

After Mrs. Douglas had thanked the Club for all their help to the British team, as well as for the dinner, Mr. Slingsby, who received an ovation, said that only one sailplane at the contest was better than the Sky—the RJ-5—but it broke itself because it wasn't built in Yorkshire.

B.G.A. News

A.G.M. and Dance

THE 1953 Annual General Meeting of the British Gliding Association will be held in Londonderry House, 19 Park Lane, London, W.1, on Saturday, 7th March, at a time to be announced. There will be a dance the same evening.

Annual Awards for 1952

These have been awarded as follows:

De Havilland Cup (altitude) to Sq. Ldr. A. A. J. Sanders. Manio Cup (goal flight) to Lt.Comdr. G. A. J. Goodhart. Wakefield Trophy (distance) to W. A. H. Kahn. Volk Cup (out and return) to G. H. Stephenson. Stager Cup (best two-seater performance) to Flg.Off. E. J. Meddings and Ft.Lt. J. W. Reilly.

Easter Rally

The Midland Gliding Club announces a Task-flying Rally at the Long Mynd, Shropshire, from 3rd to 7th April inclusive, the first being a practice day. A trophy will be awarded to the aircraft scoring most marks; handicapping will be according to aspect ratios. The number of competitors will have to be limited, so early application is desirable to the Hon. Sec., S. H. Jones, 82, Ravenhurst Road, Birmingham, 17.

"Gold C" Regulations

The distance qualification for the Gold Badge may now be flown either in a straight line of at least 300 kms. or "in a broken line of not more than three legs, none of which may be less than 80 kilometres (49.71 miles) in length" (F.A.I. Regulations, paragraph 9.2.2.b.).

Jack Wareing Memorial

A Per Avia barograph has been bought with a generous gift of 50 guineas from Mrs. G. Parry in memory of her first husband, Jack Wareing. It arrived in time to be taken by the British team to Spain as a spare. Jack Wareing was an active and popular member of the Yorkshire Gliding Club. He took his A and B certificates in 1936, and his C at a notable club camp in August, 1937, flying a "Hols der Teufel." Born in 1900, he lost his life in a street accident during the black-out in 1943. The barograph is, like those forming the Kronfeld memorial, available on loan to pilots equipped with oxygen.

OBITUARY

IT is with deep regret we report the death of Flg. Off. Lawrence J. T. O'Sullivan in a flying accident in Germany on 29th July, 1952. A keen sailplane pilot and enthusiastic supporter of gliding, he was the first member of the R.A.F. College Club, Cranwell, to gain his Silver C, and has done much gliding in Germany and France.

C.M.H.

PROGRESS REPORT

THE last time we wrote about ourselves, in last Spring's issue, we had a sad story to tell : inflation had us in its deadly coils and was squeezing the life out of us, or out of our bank balance, which is nearly the same thing. Now, rather like on the best cross-countries, we are circling up out of the pit, and the sky seems the limit (*pace* Mr. Slingsby).

We cut our costs by using a lower quality paper, and appealed for still more support. Our circulation, which has since we started slowly increased issue by issue, leaped up in a way that would surely gratify both Mr. Slater and Mr. Cobb. We *adore* our readers, and our advertisers, and of course, ourselves.

What are we hoping to do? In spite of knowing how marvellous we are, we never cease indulging in an orgy of self-criticism of almost Communist intensity. After all, we are in the gliding movement ourselves.

We should like to be funnier. Will the many folk in the gliding world who always make us laugh so hard in their club bars please put themselves on paper ?

We should like to have a few more articles on construction and maintenance, like the Aerolite one in this issue.

We want some articles for beginners, please.

All subscribers answering the above calls will be paid at our usual generous rates—by the honour of being published in the best etcetera etcetera, and by the knowledge that they are Doing Their Bit for the gliding movement. If we had it, we might even add a bit of vulgar cash, but that glad day is not yet.

But would it be so glad ? Will we be glad or sorry, if the day arrives when winch-drivers are paid to drive winches, bunjie crews for stretching bunjies, or Club Chairmen for holding down their chairs? Horrors! We might all become rich, and take to aeroplanes, or marijuana, or worse.

Silver, Gold and Diamond

THE following lists, compiled from official records of the British Gliding Association, show:—

(1) All British pilots who have qualified for additional Diamonds to their "Gold C" badges (three is the maximum possible).

(2) All British pilots holding the "Gold C" badge, which is given for 300 kms. distance and 3,000 metres gain of height. Serial numbers on British list (Mr. Wills was No. 3 on the international list).

(3) British pilots who were awarded "Silver C" badges during 1952, with their serial numbers on the British list. Qualifications: 5 hours duration, 50 kms. distance, 1,000 metres gain of height.

Diamond for Goal Flight, 300 kms.

No.	*Name*	*Date*
200	R. C. Forbes	19.5.48
201	D. H. G. Ince	12.8.49
202	A. W. Bedford	2.5.51
203	P. A. Wills	17.6.51
204	H. C. N. Goodhart	23.4.52
205	W. A. H. Kahn	25.7.52
206	D. B. James	27.7.52

Diamond for Distance, 500 kms.

None.

Diamond for Height, 5,000 metres

300	A. W. Bedford	24.8.50
301	Prince Birabongse	23.11.50
302	P. A. Wills	11.7.52

"Gold C" Badges

1	P. A. Wills	1938
2	C. J. Wingfield	1947
3	R. C. Forbes	1948
4	L. Welch	2.6.49
5	Prince Birabongse	21.1.49
6	D. H. G. Ince	9.8.49
7	P. G. Mallett	25.4.50
8	A. W. Bedford	24.8.50
9	H. C. N. Goodhart	23.4.52
10	W. A. H. Kahn	25.7.52
11	D. B. James	25.7.52

"Silver C" Badges, 1952

No.	*Name*	*Date*
360	J. Condon	5.10.51
361	R. W. F. Cleaver	4.3.52
362	J. Barker	22.11.51
363	E. Pearson	12.1.52
364	S. R. Wiltshire	23.3.52
365	R. W. Neill	23.3.52
366	G. C. Varley	25.3.52
367	J. D. Jones	10.3.52
368	B. A. Clayton	7.5.51
369	D. M. Kaye	20.4.52
370	E. J. Wynter	11.4.52
371	A. H. Back	7.5.52
372	M. I. Freestone	11.5.52
373	R. Rutherford	27.4.52
374	Miss G. B. Gays	27.5.52
375	G. G. Lee	20.5.52
376	G. Kirby	9.5.52
377	J. Hodgson	2.6.52
378	R. H. Adair	24.5.52
379	I. D. Gray	24.5.52
380	C. Hughes	7.6.52
381	G. H. Nixon	7.6.52
382	D. C. Bell	21.5.52
383	R. G. Frecheville	3.6.52
384	L. R. S. Freestone	19.5.52
385	R. E. Travell	26.4.52
386	A. A. McDougall	22.6.52
387	A. C. Oram	5.7.52
388	P. C. Austin	28.6.52
389	H. M. Dingwall	5.6.52
390	K. Emslie	17.7.52
391	J. H. C. Bennett	26.7.52
392	W. A. S. Murray	3.8.52
393	C. M. Drew	3.8.52
394	Mrs. B. R. Alexander	5.8.52
395	V. H. James	28.7.52
396	Mrs. P. Foster	18.8.52
397	L. N. S. Leith	22.8.52
398	R. M. Cowburn	4.8.52
399	J. L. Cotton	11.9.52
400	R. M. H. Goodall	13.9.52
401	O. J. C. Cotton	18.9.52
402	S. J. Double	21.5.52
403	J. S. Boyle	13.8.52

CONVERSION TABLE

5,000 m. = 16,404 ft.	500 kms. = 310.69 miles
3,000 m. = 9,842 ft.	300 kms. = 186.41 miles.
1,000 m. = 3,281 ft.	50 kms. = 31.07 miles.

South African National Championships

by John Moore

Condensed from a Report written for "Wingspan"

THE Contests were held this year at the S.A.A.F. station, Bloemspruit, about 5 miles from Bloemfontein. All launches were done by aero-tow, and where possible retrieves were allowed by aero-tow. The best performance on each day was awarded 1,000 points, and the other distances received points in proportion.

The first day, Monday, 1st December, brought surprises and trouble. The Capetown Wolf hit a pole on landing away and wrote off three feet of wing tip, but was made serviceable again within a week. Helli Lasch in his Air-100 flew part way into Basutoland over the Drakensburg Mountains but returned to land at Maseru, 117 kms. Eddie Leeman made the best flight, 215 kms. to his nominated goal, Bethlehem, in the Spalinger 15.

More records were broken on 2nd December. Betty Rowell, a Capetown girl who works at the meteorological station, and who discovered and investigated the Table Mountain wave, completed her Silver C in Minimoa with a goal flight to Bethlehem. Helli Lasch decided to go into top gear and reached Bergville, 293 kms. Unfortunately, after six machines had been launched, the Tiger's tail-wheel and rudder parted company, so it was declared a "no contest" day.

The third day really produced results. Ken Newman made a Redersburg out-and-return flight in a Grunau Baby, 128 kms. "Pikkie" Hammond capped that with an out-and-return to Trompsburg in a Wolf, 236 kms. Arthur Luyt took the Capetown Minimoa to Kimberley, 155 kms. Ted Pearson made the best flight to a nominated goal, Griquatown, 304 kms. in the Spalinger 18! Unfortunately he had to land on the road and wiped off 8 feet of wing-tip.

On the fourth day all were airborne in three-quarters of an hour—and what a day! Ken Newman and Pat Beatty both declared and made a 254 km. out-and-return to Smithfield; Ken was 7 hours in the air. Helli Lasch declared and flew to Aliwal North and back, 360 kms. in 5½ hours—the first flight, he said, in which he never experienced a difficult moment. Eddie Leeman declared Gold C distance to Erin, and by achieving it added a Diamond—a very fine flight in the S-15. Norman Downie took the Capetown Mini 156 kms. to Rouxville.

December 5th was a repetition of achievements: Jack Pullen, oldest flying member of Rand Flying Club, 285 kms. in a G.B.; Pat Beatty, 285 kms. to Trompsburg and back, also in a G.B.; Helli Lasch, 254 kms. Heinie Michaelis just missed Gold C distance in Minimoa. Tim Biggs weighted the Wolf with rocks after landing at Colesburg (217 kms.) and went in search of help; the police would not be hurried, and meanwhile a storm lifted the Wolf and broke its skid. Eddie Leeman climbed to a comfortable Gold C height, and Ted Pearson, instructing in the Schweizer 2-22 two-seater, reached it twice!

The sixth day the weather began to fail, and Eric Tollis (Durban) claimed the 1,000 points for the best flight with 102 kms. Bill Teague, going 81 kms. in the G.B., sat over one farm heading into wind for two hours! P/O Ken Fitzroy, from the R.A.F. in Rhodesia, achieved Diamond height, 22,500 ft., in Air-100.

On Sunday, a rest day, Ted Pearson again reached nearly 10,000 ft. in the two-seater. Monday and Tuesday brought bad weather. On Tuesday, as a well-defined front with black threatening clouds approached, the two-seater was hurried into the hangar as Lasch hurried out with the intention of riding the front in the Air-100. A sudden gust of about 60 m.p.h. lifted the Tiger 20 feet and dropped it on its starboard wings. The pilot cut his switches, dropped onto the ground, and dashed across to hold on to the Air-100. Help had now arrived, and the Air-100 was wheeled into the hangar. A rather subdued crowd sat down to dinner.

The tenth day produced better weather, and Bill Teague made the best flight with 242 kms. out and return; in difficult weather in a G.B. this was an outstanding flight. Eddie Leeman flew 210 kms. out and

return, Helli Lasch 216 kms., and Pikkie Hammond, who hadn't until the Rally flown sailplanes for four years, 155 kms.

On 11th December no-one managed to get away, and the last day wasn't much better, but the two teams which were running neck and neck both managed to get their birds away before conditions deteriorated. The S.A.A.F. team with their Wolf was leading the Newman-Teague team in their G.B., their marks being 3033.2 and 3031.2. Both declared for Zastron and both reached Wepener, but Bill Teague landed on the aerodrome and Tim Biggs landed on the native location, 2 kms. less. So Bill's team won the team trophy by 18 marks. The day was marred by an accident to Eddie Leeman, who had flown brilliantly throughout the contests. In turning to avoid some objects when approaching in a strong wind, the machine stalled and hit the ground, shattering everything forward of the seat and breaking off a wing. Eddie had a broken ankle and superficial cuts on the face.

In the eight flying days, 9 machines flew a total of 3,929 miles. Cloud base on the better days was often 10,000 to 13,000 feet above the ground (Bloemfontein 4,424 ft. a.s.l.), so that little cloud-flying was done. In fact, in South Africa generally, little cloud-flying seems to be done. It isn't necessary; few sailplanes are fitted for blind-flying panels and very often oxygen would also be needed.

Results

PIDSLEY TROPHY for National Champion: won by W. Teague. Leading scores:—

W. Teague	2,000
H. Lasch	1,892.6
E. Leeman	1,870.3
P. Beatty	1,690.4
T. Mount-Biggs ..	1.687.0
E. Pearson	1.669.5
P. Hammond.. ..	1,478.8

GEORGE WARD TROPHY for Junior Champion: won by E. Leeman.

ARGUS TROPHY for Team Prize: W. Teague and K. Newman, 4,031.2 points. Runners-up, T. Mount-Biggs, P. Hammond and C. Ansell, 4,013.2 points.

SAILPLANES ENTERED, with pilots:

Air-100: H. R. Lasch (Johannesburg Soaring Centre).

Spalinger 15: E. Leeman, N. Arbuthnot (J.S.C.).

Wolf: T. Mount-Biggs, P. Hammond, C. Ansell (Defence Force).

Bowlus Albatross: E. Tollis, V. Knott, E. Jacoby (Durban Gliding Club).

Spalinger 18 : E. Pearson, L. Kaye (Rand Flying Club).

Grunau Baby: K. Newman, W. Teague (J.S.C.).

Grunau Baby: J. Solomon, J. Pullen (Rand F.C.).

Wolf and Minimoa: N. Downie, B. Rowell, A. Luyt (Cape Gliding Club).

Grunau Baby: P. Beatty, R. Lillienfield (J.S.C.).







At the South African National Contests. Left, Miss Betty Rowell, discoverer of the standing wave in the lee of Table Mountain, seen beside her Minimoa. Centre, from left to right: Heini von Michaelis, Jackie Pullen, and John Firmin, the chief organiser. Right: Eddie Leeman, Junior Champion and winner of the George Ward trophy.

Instrument Flying for Glider Pilots

by Tony Goodhart

with illustrations by Anstace Goodhart

MAY I say right from the start that I am *not* an expert at instrument flying; I have never done a course in it, nor have I ever received any dual blind flying instruction.

However, I maintain that I can fly a sailplane on instruments in fairly turbulent cloud sufficiently well to get by, and with a bit of luck, get somewhere near the top of the uplift (without the bit of luck I must admit I am apt to find myself in unconventional attitudes and have been known to spin—at least I think it was a spin).
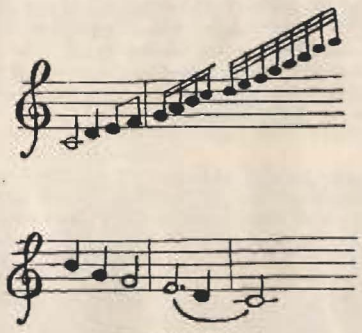


. . . unconventional attitudes . . .

What I am getting at is that entering cloud should not be regarded as something only done either by professional aviators who have been thoroughly instrument-indoctrinated, or by super-pundits with vast experience. The ordinary Olympia-standard pilot should be able to cope without undue difficulty and certainly without danger; obviously his skill will increase with experience but he must (if he wants to get on) start somewhere, and at the moment there are precious few high performance two-seaters available in which he can learn the "soft" way.

The point is this: with cloud base at its normal U.K. height of not much over 3-4,000 feet, cross-country flying is unnecessarily difficult if you are not prepared to enter cloud and take advantage of the many extra thousands of feet available with very little trouble on a good unstable day. If you want to make worthwhile cross country flights in this country it is virtually a requirement to be able to fly in cloud and to hold your thermal in it.

Let us imagine an Olympia with a fairly normal instrument panel of A.S.I., Altimeter, Variometer, Compass and Turn & Slip—the bare essentials.

Once you have committed yourself to cloud flying, you must also be prepared to go above freezing level, and accordingly, with basic instruments such as these, it is pretty well essential to have a non-icing pitot head, either the heated or the large bore type. It is just possible to use the "audio A.S.I.", but unless you are very musical it is not critical (I find that a "screaming crescendo" tells me I'm going a bit fast, while a "deathly 'ush" tells me I have just stalled—I am not musical!).



The Audio A.S.I.

As is, or should be, well known, the human being is quite incapable of blind flight without instruments (all to do with semi-circular canals and things inside one's ears); you will, of course, have heard of "so and so" who climbed 4,000 or more feet in cumulus with a defective turn & slip; "so and so" is not a superman, he was just jolly lucky.

As a first step it is well to practise out in



. . . things inside one's ears . . .

the open air; don't do this over the home site (or any other club's site for that matter either) but get away from your fellow sailplanes and get up to *a good height, say* 3,000 *feet*. Adjust your trim so that your Olympia flies hands-off at about 7 m.p.h. above stalling speed and use this indicated speed, whatever it may happen to be, as your basic speed.

Now comes the basic rule of blind flying: say to yourself (out loud if you like—it is still to yourself)

Needle
Ball
A.S.I.

and go on saying it as long as you are flying blind. As well as saying it, you have got to act on what you are saying.

What does "Needle" represent? It represents "Rate of Turn" (it doesn't actually—it is nearer "Rate of Yaw", but no matter).

What decides your rate of turn? Mainly angle of bank—so:

Keep the Turn Needle where you want it by aileron adjustment.

Incidentally, a common fault is to try to turn too steeply in cloud; the upcurrent is usually large enough to permit a fairly gentle, say 30-second, turn. Check, in clear air, what this means in needle deflection.

Being a competent Olympia pilot you will know about aileron drag, so that whenever you move your ailerons you will instinctively correct the drag with rudder; remember, though, that because of this drag you won't change the rate of turn immediately. Make a small adjustment and return your controls to their neutral position.

Now "Ball": This indicates Slip (or Skid if you like to call slipping outwards that).

What controls it? *Rudder*—so:

Keep your Slip Ball Central with Rudder.

You can, of course, correct slip by altering the angle of bank, but you have already decided on the rate of turn and are adjusting the angle of bank accordingly with aileron.

The Olympia flies so well that Rudder is by far the least important control—a little slip or skid isn't vital, so don't waste time trying to keep the ball dead central. Bear in mind that Rudder also has a considerable effect on the Turn Needle; so, to avoid muddle, all the more reason for using it sparingly.

Now "A.S.I.". This is fairly straightforward and you try to keep it near the basic speed with *Elevator*.

The vital thing is to keep on saying "Needle"—"Ball"—"A.S.I." (I find two seconds apart to be a good interval), to look at each instrument as you call and *act*. It is very easy when you find, say, the needle well out of position to gaze at it while you juggle with the ailerons to get it back—what time you forget the other two. Don't. Make a correction and then go on with the routine and check up on the Ball and A.S.I.



. . . juggle with the ailerons . . .

That is the basis of blind flying in a sailplane as I understand it.

It isn't quite as simple as that, but I was certainly surprised, in the 1950 National Contests, to find that I could cope reasonably well, knowing no more than what I have written above, and having never entered cloud before (except on one occasion with a U/S Turn & Slip which served quickly to remind me of the inadequacy of the human instrumentation).

There are, in addition, a variety of tips that should help:—

(i) STICK POSITION.—I find it a great help to know where the stick should be, fore and aft, for the basic speed, by keeping my elbow located against my hip bone: in this way the sailplane's attitude should stay within reasonable limits. The A.S.I. speed will alter quite a bit as the sailplane is struck by different gusts. In fact, attitude is more important than instantaneous speed, but with only basic instruments and without Stephenson's fore-and-aft level as described by him in the July, 1951, issue of GLIDING there is no direct attitude measurement. Be careful *not* to chase the A.S.I.—it has a considerable lag, and chasing it will soon result in violent oscillations in the pitching plane. If the speed starts getting over-erratic, or things start getting generally out of hand, it is *essential* to get the wings somewhere near level first—and *then* try to induce the speed to settle down. If you try without levelling up, the two extremes of what may happen are the spin and the spiral dive—both of them confusing to a novice in a turbulent cloud. In utter "extremis" it is feasible to let go of the stick and let your Olympia sort itself out—it is a remarkably docile beast and is distinctly stable in all three planes.

(ii) OVER-CORRECTION.—It is very easy to start over-correcting. Try to make smallish control movements and remember to make them back again to "neutral". Everybody knows that, if you move the stick well back, the nose will go on coming up until either the sailplane stalls or you "come to" and put it forward again. Out in the clear, you wouldn't dream of doing such a thing—but in cloud with no horizon it is quite easy to do.



. . . confusing to the novice . . .

(iii) WATCHING THE VARIOMETER.—Obviously, as you are trying to gain height, you must keep an eye, if you've got one to spare, on the vario. It will dance about a lot, particularly in your early flights, as your flying will certainly not be as smooth as it is out in the open. Don't worry unduly as long as it is showing mostly green. The up-going area in a well-developed cumulus is plenty big enough for you, and if you get started nicely centred under the inverted dome so frequently recorded (but as far as I am concerned, so seldom met), you should be able to stay in it for a thousand feet or so at any rate. If you *do* find yourself losing the lift there are various theories about finding it again—they are generally the same as those recommended for the open air—no doubt you have your own pet favourite. Try it in cloud by all means, but I would say that it is *very* difficult to re-centre in a turbulent cloud with no more than the instruments we have allowed ourselves.

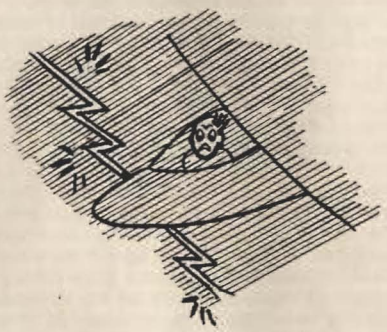
For what it is worth, my method is as follows: I find that part of my circle is in "up" and part in "down"—next time round when I get in the "up" part, I level up with full aileron (and of course anti-aileron-drag rudder), keep straightish for three seconds odd and then resume my circle without delay. When I find that I am no better off I try again!

(iv) SENSES.—These semi-circular canals again. They do report the most vivid sensations to one's brain—unfortunately, often, if not nearly always, wrong ones; so much so that one is strongly tempted to believe that the instruments have suddenly become defective. The only thing to do is to try hard to believe your eyes and to divorce yourself from these false reports from the canals (which are only doing their best—poor things).

(v) MENTAL APPROACH.—Try to approach flying in a cloud as just part of your normal progress as a sailplane pilot. Don't think of it as something only to be mentioned with bated breath.

Once you are in cloud keep calm and don't get ruffled—just carry on with your routine. When your pitot head freezes, because you have forgotten to operate the heater, and your A.S.I. drops back to zero —*Think*—try to use your audio A.S.I.—don't say "No Air Speed" and ram the stick forward to try to regain some. If you *do* get ruffled, the only thing to do is to straighten up and come out and then try again. Incidentally, it is remarkably difficult to find the upgoing air of a cloud when you enter it from the side rather than from underneath.

(vi) ESCAPE.—There may come a time when for one reason or another you decide that the moment is ripe for you to leave the cloud; you may be feeling thoroughly air-sick; the cloud may, although it is relatively unlikely in this country, have developed into a really powerful cu-nimb with unduly violent currents and accompanying vivid flashes of lightning. It is wise before entering a cloud to note which side of it you are and to decide on a compass course to lead you quickest into clear air; e.g., if you find your lift under the eastern side of a great mass of cumulus, make up your mind that your escape route will be *east*. Don't leave it till the time comes when you want to escape; by that time your somewhat befuddled brain may well report "west" as the course to steer.



. . . one reason or another . . .

It is not easy to settle on a compass course after a period of circling with nothing better than a magnetic compass. The compass performs a quite remarkable series of evolutions (rather than re-volutions); it swings—it stops—it spins the other way—Pay *no* regard to it while you are circling.

A suggested technique is as follows: level up and try and keep your turn needle central; the compass, after a few wild gyrations, will settle on some heading or other; it may be anything up to 180° out, but no matter; you should be able to estimate a turn of anything up to 180° within about 30°; make this turn, let the compass settle and then make the final adjustment. This takes practice and is another thing well worth practising in clear air.

The same method applies, of course, when you have got the worthwhile lift out of your cloud and want to set course along your pre-determined route; though you may often find that near the top of the cloud you get an occasional glimpse of the sun, so that —if you remember that before you entered cloud it was on your starboard bow—all you have to do is to steady up with it there again.

(vii) EXTRA INSTRUMENTATION.—There is no doubt, to my mind, though some of the real pundits will doubtless disagree with me, that additional instruments can help considerably in cloud flying and in the rapid gain of altitude for which you have entered the cloud.

An *artificial horizon* one might almost say is cheating. It provides the one thing one lacks—a datum. Although it is liable to a variety of errors, too abtruse to discuss here (even if I knew how), it essentially provides the horizon on which one normally orientates oneself, in clear air, as far as pitch and roll are concerned. As long as you are not worried about your compass heading it provides the main answer; though the A.S.I. should not be entirely neglected.

With an artificial horizon, re-centring in cloud is relatively easy; in fact, if you think you've got a rather poor up-current, it is possible to go exploring in your cloud, which with basic instruments is well nigh out of the question.

A *gyro direction indicator* is another very great help in that there is no question of waiting for it to settle; you can turn straight on to any course at will, and without delay.

The penalties you pay for both these instruments are extra weight, extra cost and extra upkeep, and they can probably be described as luxuries in that cloud flying is perfectly feasible without them.

The "*total energy*" attachment to the *variometer*, either the Kendall or the Irving

variety, is however neither heavy nor costly and requires little upkeep. It makes such a



. . . well-dressed pilot . . .

vast difference to one's rate of climb that it is virtually a "must" for all serious sailplane pilots, and I would say that in a very few years it is a thing no well-dressed pilot will be without.

Well, there you are! That is cloud flying as I understand and practise it. I rather fear some of the experts will wonder how I do "get by" on such elementary knowledge, but I hope some of the not-so-expert pilots will find something on which to cogitate which may serve to encourage them, after a few preliminary circuits in clear air, to make use of the really very easily gained thousands of feet to be found in cumulus cloud.

NOTE.—Don't go much above Gold Badge Height without oxygen; Diamond Height is definitely too high unless you have been checked in a decompression chamber, and even then it is unwise.

The Pyramid Flight

by R. Swinn

C.F.I., Egyptian Gliding School.

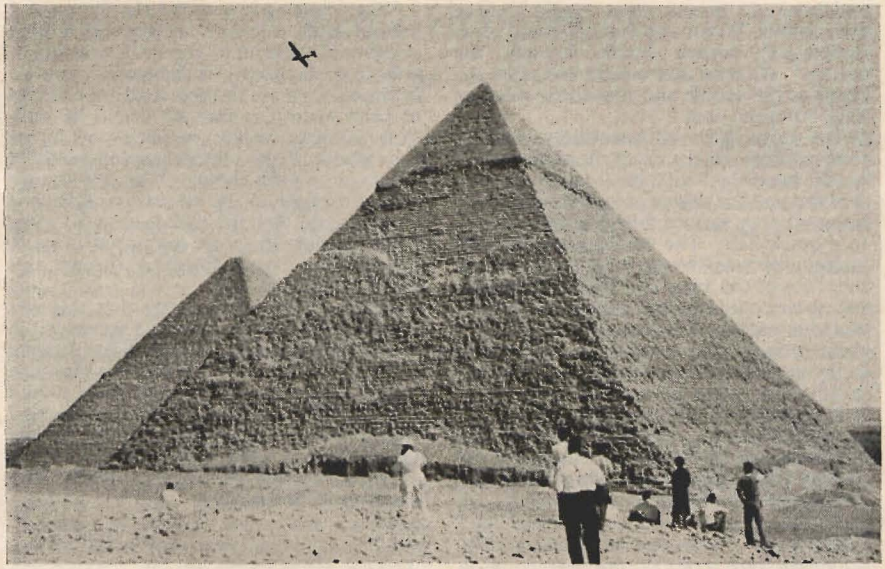
LOOKING at those towering Pyramids, the ancient monuments of bygone ages, it occurred to me how wonderful it would be to bring together these monuments of ancient splendour with some form of modern progress. As my thoughts ran along these lines, they turned to Gliding, and an idea formed in my mind to fly over the Pyramids with a glider and land at their foot.

My next step was to see if it was possible to land near them. I spent a whole day looking over the area near the base of the Pyramids, although I felt at times that my wanderings bore more resemblance to mountaineering than finding a landing area for a glider.

After much back-breaking effort I found an area near the foot of the second large Pyramid on which I thought I could land a glider. I measured up the area and estimated its slope, marking out the same sized area on our airfield, and practised landing on it until I felt certain that I could do the actual landing on the corresponding area at the Pyramids. The difficulties of landing on the area at the Pyramids were that there was only one direction of approach, and only one chance to effect a landing; if that failed, the machine would be a heap of wreckage. The area, surrounded as it was by ravines and jagged rocks, allowed of no error.

Having convinced myself that I could make the landing, I had to go on to the more difficult business of convincing other people in order to get permission to make the flight. The Director of the School Group, Captain Gazarine of the Egyptian Air Force, readily gave his consent, and after permission was obtained from the Egyptian Ministry of Civil Aviation, Ministry of Security, and Army Intelligence, the details of the aero-towing were soon arranged. I was lucky in so far as, though much questioning had to be gone through, no one thought to ask to see the proposed landing area; had anyone done so, I am sure the venture would have been squashed on the spot.

A time and a date were set for the Press representatives and photographers to be in place. Some of the more energetic persons climbed the Pyramids to get better shots. A large number of members of the School, together with the police, were present to



control the crowds and keep the landing area clear.

The aero-tow was made with a Moth aircraft towing our T-21B two-seater glider from the Royal Egyptian Air Force aerodrome at Heliopolis, some 25 kilometres from the Pyramids. The glider was piloted by myself, with Lt-Col. Husseini of the Egyptian Army as second pilot.

The tow over Cairo was uneventful and we arrived over the Pyramids at a height of 2,000 feet. We cast off the cable and began circling down. The air was quite smooth down to 1,000 feet, when some turbulence was encountered.

The details of the plan called for the circling of the largest Pyramid. Accordingly we swung round and round the Pyramid with our inner wing less than 5 metres from the side of the structure. Each time we came round on the downwind side of the Pyramid, the turbulence was so severe that it was difficult to control the machine and maintain a close position to the Pyramid wall. A quick wave of the hand to a friend whom I saw climbing the Pyramid nearly cost me a wing-tip as the machine was caught by a violent gust and flung towards the Pyramid side.

When two-thirds of the way down the Pyramid, I had to turn my attention to getting the machine into a pre-arranged position for the final approach to land. In making the turn away from the Pyramid wall, a strong eddy of wind drifted me temporarily back round the corner of the Pyramid and quickly swung the machine round until it was facing head-on into the corner of the structure. Literally scraping the corner, I was able to fly clear and turn my attention once more to the approach.

There beneath me was a milling throng of spectators scattered all over the place. The police and members of the School were endeavouring to keep our little landing area free for us, but still the odd character could be seen dashing across the all-too-small area. It was a most terrifying experience to sit up there knowing that we had only a small chance of making the landing if the ground was unobstructed, but what if at the last moment the younger element of the crowd got out of control and I had to make the decision to either crash into them or land into one of those gaping chasms that run round the foot of the Pyramids on their western side?

The machine came down lower and lower

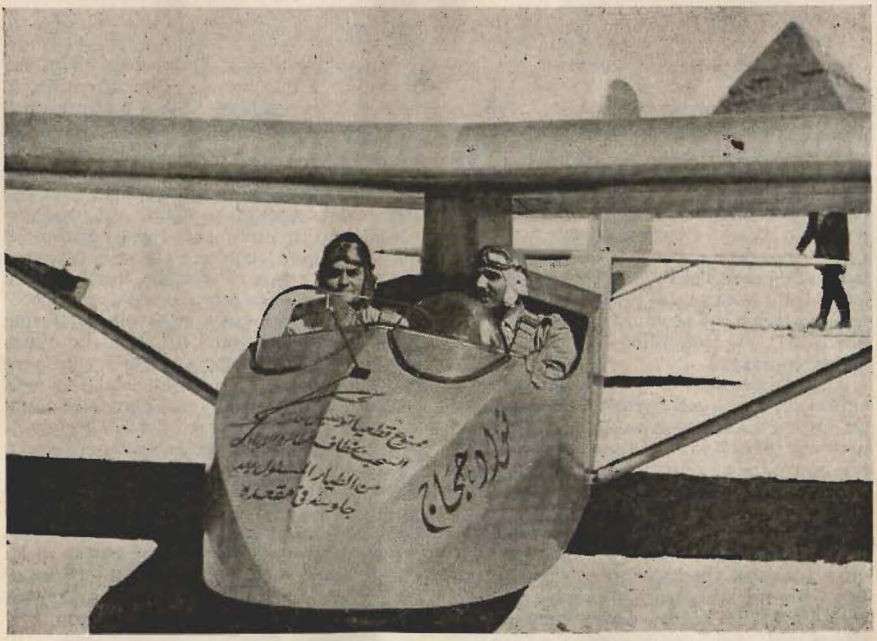
and those odd movements across the landing area ceased. Would this last, or would some thoughtless person break through the cordon? We were now almost level with the heads of the people and some little distance back from the area.

The glider behaved beautifully, and we touched down at the exact place marked: a quick movement of the control column forward and the skid of the glider was biting into the rocky surface, bringing the machine to a quick halt. The machine was immediately surrounded by the large crowds lining the sides of the area, and it was some time before we could extricate ourselves from the machine and the milling crowds of spectators sufficiently to give a lucid account to the many press reporters, and receive the congratulations of the School members.

I found it difficult to realise that we had accomplished the almost impossible, and looking again at the narrow margin of our plateau I felt more nervous than at any time during the actual flight.

When circling low round the Pyramids I had a most uncanny feeling—something undefinable and yet so very real, a feeling of a force so disturbing as though in a strange presence—and yet through it all ran a thread of calm assurance that all would be well. This strange feeling remained with me throughout. I am a logical person and hold no views on such things. Was this strange feeling brought on by anxiety, or does one have to look for the explanation to some deeper ancient Pharonic source? All I know is that I would not willingly go through this experience again.

Reading in the press later that this was the first time that anyone had succeeded in landing an aircraft at the Pyramids, I thought to myself that it was possibly the last time too. I personally could never bring myself to go through this experience again, and I found myself asking: would those ancient Gods of Egypt's Pharaohs smile so favourably on anyone daring to invade their territory from the sky?



After the landing: Robert Swinn (left) and Lieut.-Col. Husseini in the T.21b.

Here's Hopping

by Ann Douglas

MANY of us were solo trained, and look back upon our hopping days with pleasant memories. There is no doubt that it was great fun, and contained a pioneering atmosphere entirely lacking from sober dual circuits. Who does not remember the feeling of unknown possibility lurking within the omnipotent cry of "Let go!" upon which the double imponderables of beginner and bungey fused to produce, if not one more training flight, at least entertainment for the onlookers.

It was entertainment, too, because the old lightweight Dagling was very cheap, and rarely did much injury. Then "progress" creaked into action, and the winch and cockpitted primary combined to give a method of solo training far less funny because of higher costs, the increased possibility of facial and head injuries due to the cockpit, and the ability of the winch to haul the beginner higher sooner.

However, it is only fair to say that, if properly executed, solo training is, with one inherent failing, reasonable from the safety point of view. Provided—and this is vital—that the instructors are really able and experienced, are in constant practice, and can judge the temperament of their pupils with unfailing accuracy. Unfortunately, the one inherent failing is important. A pupil should obviously make his first elevator experiments as far from the ground as possible, but if he is learning solo he cannot get away from the ground until he has taught himself to use this control. Thus exists a very vicious circle indeed, which nothing—not even fixed or controlled stick inventions—can remove. It is misuse of the elevator on hops which is the most fruitful and damaging source of injury to beginners. Very good instructors can almost eliminate all other types of accident in solo training, and although they can reduce this one, they cannot hope to eliminate it—the odds against the pupil's inexperience are too great.

All this has, of course, been appreciated long ago by experienced instructors who, refusing to risk premature greyness, have changed over to the more soothing practice of giving dual. They have found, apart from the direct benefits of getting into the air themselves, that it is safer, and therefore cheaper, that pupil faults can be corrected before they become habits, and that it is at last possible to teach pupils to look round before turning.

This is why 85 per cent of the B.G.A. clubs train dual.

That we have not by any means yet developed the perfect technique does not mean that this conversion has not been the biggest single step towards efficient glider training that has yet taken place.

Unfortunately, the British Gliding Association has not yet got comparative figures for dual and solo accidents, as the last few years have been complicated by the steady change-over, but the Air Training Corps have generously allowed their January-June 1952 totals to be published. These give a good comparison, as there were nearly the same number of launches carried out by each method during this period—approximately 30,000. Dual training produced an accident/incident rate of 3.3 per 10,000 launches, whereas solo training had 9.4, three times as many. From these launches the Dual Schools gained 366 A's, 347 B's, and 8 C's, while the solo figure was 272 A's, 180 B's, and 3 C's.

Figures such as these over a big enough total to be a reliable guide make it difficult to understand why anyone should now consider letting themselves in for the nervous strain of teaching solo, even if primary gliders are cheaper in the first place. Let us now add the fact that the very small amount of solo training in the clubs this year was responsible for the deaths of two pupils, and compare it to the virtually unblemished record of the far greater number of two-seaters giving dual.

Are we really justified in continuing solo training, particularly in the new clubs, with its inherent hazards? It is not as though there were no alternative method. There is, and with the benevolence of Lord Kemsley to make it possible. Has not the time now arrived when we should seriously consider whether any solo instructor could go to an inquest on one of his pupils without possible misgivings?

Sailplane Race

by Philip Wills

JULY 11th, 1952, was the last flying day of the World Championships. The task, a race to Torresaviñan, was a repetition of the 77-mile course flown the week before, and the weather forecast was good.

There was a forecast of thunderstorms forming over the Sierras, but the Sierra de Guadarrama runs S.E.—N.W. to the North of Madrid, and as the forecast wind was west to all heights, and our course was around 60 degrees, it did not seem likely that we should meet any cumulo-nimbus on our short flight.

In the event, the upper wind produced a northerly drift which brought a very large storm over our course, and the height available in this storm (at least 30,000 ft. and probably more) would certainly have made very long flights practicable. But it was quite impossible to have foreseen this up to the time of take-off.

Following our invariable routine, the trailers set off to traverse Madrid, and await our first airborne messages at Barajas, the civil airport on the eastern side of the town. By 1.50, the time I took off, the ground temperature on the brown and dusty airfield at Cuatro Vientos was over 100°F., and the first dots of high cumulus were beginning to show on the course, whilst cumulus developing to towering cumulo-nimbus had already been in evidence to the north along the east-west line of the Sierras for some time. An unexpected sheet of high cloud started to drift south towards our course as I took off, which eventually grew to the aerial atomic explosion which ensued.

I was waved off, after an aero-tow to 1,500 ft., in a raging down-current, but flew straight ahead for the plantation of dark pine trees which had proved to be a good source of upcurrents, and at 1,300 ft. struck the usual 10 ft. a second lift which took me up in a dancing cloud of sailplanes to 9,000 ft. above sea level.

I told "Justin" (the call-sign of my retrieving team) that I was on my way. I crossed Madrid at a good height, and reached Barajas (14 miles) to find that the east-west sheet of high cloud drifting south from the Sierras was encroaching on the track, and tending to force me south of the course in order to keep within the sun and cumulus area. Thinking that this advance sheet of storm cloud was unlikely to have lift under it, I kept south of it for a while; but by the time I reached a point south of Alcala de Henares, the east-west line of cloud cut right across my 60-degree course, and ahead over Guadalajara it looked as if it had developed into a definitely active state.

I therefore altered course to 30 degrees to get under the advanced edge, and immediately struck steady lift. I flew along under this edge for some miles, the lift gradually increasing from 9 to 15 ft. a second, and over Guadalajara itself the leading edge of the cloud belled up into the customary dome-shaped under-surface which denotes big lift. I saw two Kranich sailplanes circling up into this dome, and under it the climb indicator hit the roof. Cloudbase within the dome was higher by at least 1,000 ft. than elsewhere, and was reached at 10,500 ft. The two Kranichs had disappeared.

What to do? The task was a goal-race; I was half-way to the goal with about 35 miles to go. If I went into what was clearly "big stuff", I might lose myself and miss my goal on coming out of cloud. On the other hand, the course ahead lay diagonally under the cloud, and as I got farther back from the front (and lifting) edge, equally powerful compensating downcurrents might be met. I wanted my Height Diamond award—but this should weigh little beside the prospect of winning the World Championships.

Finally, I believe instinct more than reason decided me. The instinct that, when fortune is on your side, you should accept everything she offers; and the instinct, almost physically overpowering, which prevents a sailplane pilot from straightening up and flying out of lift over the top of the climb indicator. We circled on into the cloud.

I needed just over 20,000 ft. on the altimeter for my Diamond Height. Circling in dead smooth lift over the top of the clock, we reached this height in no time at all, and I forced myself to straighten up on

the course for Torresaviñan, expecting quickly to fly out of the area of rising air. We went on climbing.

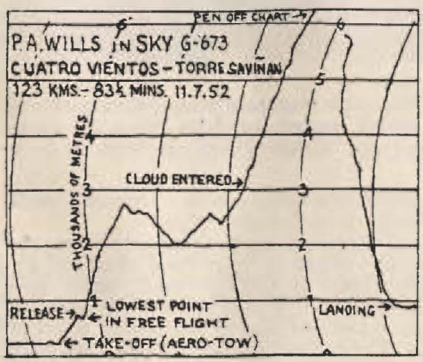
It now became clear that I really was in something very big, and the unpleasant possibility came much nearer that I might go on higher and higher, and blinder and blinder, for miles and miles. Indeed, if the course that day had been the reciprocal, and I had been flying towards instead of away from Madrid, a straight course might well have kept me climbing to 35,000 or 40,000 ft. for 50 miles or more; for the other end of the same storm passed over Cuatro Vientos —its leading edge, like a giant vacuum-cleaner, picking up so much dust that visibility for some time was down to three yards.

I turned south to fly out in front of the storm again, but went on climbing, still blind. I turned north for a bit, but realised that if I zigzagged about too much I should greatly increase the risk of emerging lost, and so I returned to my 60-degree course, climbing all the time.

I wanted a good deal of information from Justin, but for the first time during the whole championships the ether seemed too full: not of storm noises—the Pye sets seemed utterly unaffected by static—but of all the rest of our teams speaking at once.

Pride of place in the concert was being taken by Jock Forbes. He had gone into the cloud without a barograph, and without oxygen, not realising what he was taking on, and was now over 18,000 ft. Too little oxygen produces the same symptoms as too much alcohol. Jock must be very talkative in his cups.

Behind this general curtain of sound,



Lorne Welch was apparently in some trouble getting up into high ground south-east of Guadalajara and was trying to instruct his ground-crew on how to keep close to him, whilst Stephenson had, after making excellent time to within easy gliding distance of the goal, run into the large area of violent downcurrent behind the storm, and was faced with the bitter disappointment of landing short. He was anxiously asking his ground-crew for the surface wind direction to enable him to pick a suitable landing field, and they were having a hard time to answer at a time when the wind was waltzing round to all points of the compass like a merry-go-round, probably fanned on by Jock, who was now spinning out of the cloud in a chatty spiral.

I badly wanted to tell my ground-crew that I was now still climbing on a straight course, at over 20,000 ft. and so must guard against a serious risk of getting lost. Was there complete cloud-cover, and if so, what was the estimated height of cloud-base? This would give me some idea of how much height I would have to lose before seeing the ground again.

On the other hand, I was of course on oxygen, and had to remove my mask to talk. I was not quite sure how long it would be at these heights, with my mask off, before I began to lose the keener edges of my mental powers, which are the first to go, and which were at the time badly needed. Long, thin, pale blue sparks of static electricity were beginning to zip and prick from the quick-release cable to my left knee, and my main airspeed indicator had iced up. There did not seem to be much ice on the wings, but the entire inside of the perspex cockpit-cover was covered with white rime in which I scratched small holes when I wanted to look out. Although the cockpit is, in fact, only a narrowly-fitting shell of thin plywood, it was warm enough inside in my tropical suit and light overalls.

I made one attempt to talk, but got a reply asking me to repeat my message in five minutes. This I knew meant that Justin was rocketing up the last part of the gorge from Guadalajara to Torija, in which radio reception was poor.

The altimeter wound itself up to 24,000 ft. and possibly beyond but I had lost interest in it. I had now got my Diamond height, and the British absolute altitude and gain of height records (or so I thought, not realising that barographs could be so un-co-opera-

tive)* and I knew in my bones that Fortune was not going to let me down.

And then we struck "sink". Never before have I been so cheered at finding myself coming down. Simultaneously, Justin came through, and gave me the information I wanted: cloud cover complete, estimated height of cloud-base 10,000 ft. Minutes later, and the ground became dimly visible through a ragged hole beneath.

I dived down through this and anxiously peered around. I felt sure I had drifted south of the course, and flew north to contact the main road. In a few minutes I was able to radio that I had located myself. I had 14 miles to go with over 10,000 ft. to lose in it. Diving as fast as I dared, I found, when my airspeed indicator started registering again, that I was approaching the goal at 120 m.p.h.

This is not exactly a classic way to finish a race, indicating as it does that time has been wasted in gaining unnecessary height and then diving it off. But it sufficed. I shot over the finishing line in 1 hour 28½ minutes, to find myself World Champion.

*Mr. Wills' first barograph failed, his second recorded a height of 22,430 ft. and the pen went off the top of the chart. This gained him the British Absolute Altitude record, but not the Gain of Height record.

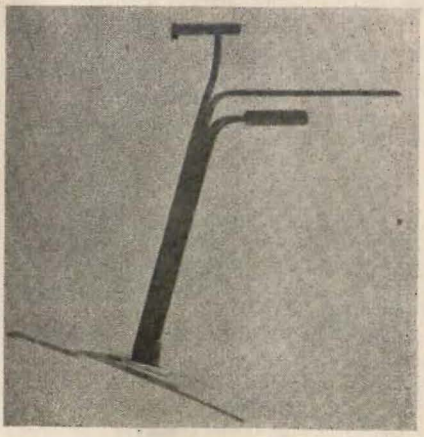
The Total-Energy Venturi

by F. G. Irving

THE secret of success in making a Total Energy variometer is not necessarily to understand pages 78 and 79 of the Summer GLIDING, but to devise a satisfactory arrangement for providing a suction equal to the dynamic head, $\frac{1}{2}\rho v^2$, and to connect this to the "static" side of a normal variometer. "Stick thermals" are then virtually non-existent, and finding the best lift thereby made easier. This arrangement does not, of course, remove the lag of the instrument, which must still be taken into account.

The author's device is shown in the drawing, and is quite simply made on a lathe. Its accuracy does not seem to be very sensitive to errors in manufacture, and it can either be mounted on some convenient part of the front fuselage or combined with the pitot/static. The latter arrangement was used for Lorne Welch's Sky in Spain, and the photograph shows the complete assembly, which included a Blanchard pitot-heater.

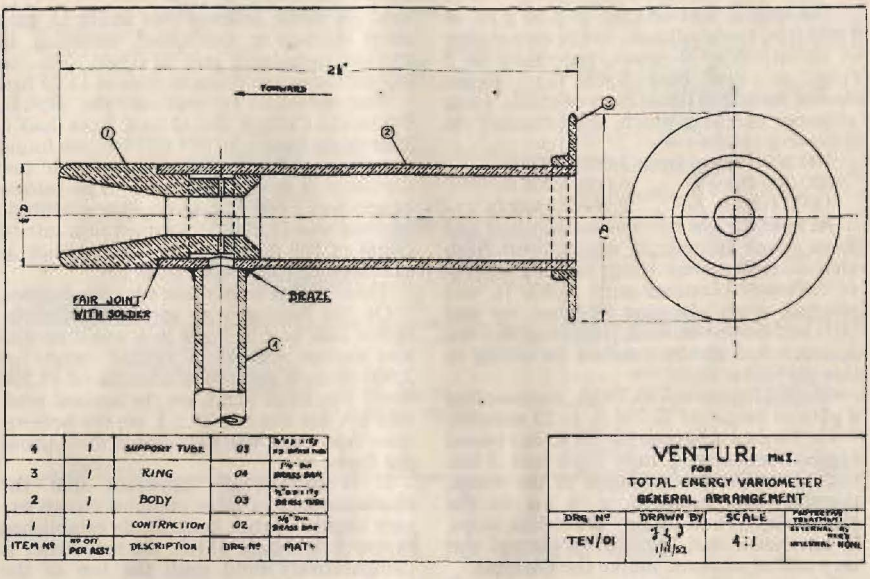
It will be seen that in essence it is a venturi, but with a sudden internal expansion downstream of the throat, and an external disc at its aft end. The objective of these peculiar modifications is to reduce its sensitivity to yaw. A conventional venturi was made for one of the Olympias which went to Switzerland in 1948, but was hastily removed when it was found that its main effect was to replace stick thermals by



Pitot with Blanchard heater, static and total energy venturi assembly fitted to Lorne Welch's "Sky" in Spain.

rudder thermals, due to its extreme sensitivity to small angles of yaw.

The present venturi is scarcely affected by angles of yaw up to 25°, and when tested in the Imperial College wind tunnel gave $\frac{1}{2}\rho v^2$ suction within about 1 per cent. It produces one slightly unexpected effect on a "Cosim" variometer—a rapid oscillation



of whichever piston is off its seat through about ⅛ inch, presumably due to the turbulence behind the rear disc. In practice one soon becomes accustomed to this, and at any rate it becomes immediately obvious when a piston is jammed. The purist may object that its drag is rather excessive, and that it is a revolting excresence on a clean glider. No doubt all this is true, but so far everyone who has flown with it reckons the absence of "stick thermals" is worth a little drag.

Unfortunately, such an angular object will ice-up rather easily, and I am sorry that Tony Goodhart's potential Gold and Diamond was blighted by water in the works. I really should have foreseen that one. It seems to me that the cure is to put a simple water-trap between the venturi and the instrument, together with a tap for venting it to cockpit static, so that at the worst one reverts to the old-fashioned state of affairs. No doubt a combined water-trap vent could easily be devised.

It is hoped that the venturi will shortly be manufactured commercially, and it should be said that much of the credit for getting a really workable prototype into the air is due to Lorne Welch, who has been advocating it for many a long year.

British Two-Seater Height Record

by A. W. Bedford

AFTER one unsuccessful sortie in the mid morning, when conditions were marginal, it was decided to pack up until after lunch. As usual, however, time, tide and weather wait for no man, and just as we parked the Kranich safely, a rapid build-up of cumulus occurred near Farnborough aerodrome. Ignoring lunch, we eventually got airborne at 13.23 hrs., when John Sowrey in the Storch with patience and cunning proceeded to deliver us under the right cloud some 25 minutes later.

The release was effected at 1.50 p.m. at 1,800 feet, fairly adjacent to the aerodrome, in initial lift of 2 ft/sec., increasing to 5 ft/sec. at cloud base (2,000 ft.). Roger Austin measured timed rates of climb, using altimeter and stop-watch, and obtained the following results :—

300-500 ft/min. from 3,000-6,000 ft.
600-700 ft/min. „ 6,000-9,000 ft.
1,000 ft/min. „ 9,000-14,500 ft.

At 9,000 ft. fine hail was encountered and some minor turbulence, whilst, apart from characteristic severe icing, nothing worthy of comment occurred until 14,600 ft. was reached, when alternate 20 ft/sec. up and 20 ft/sec. down occurred, indicating that the Kranich had almost reached its ceiling in this particular cloud.

The final figure was 14,750 ft., representing a gain of height of 12,750 ft. in 25 minutes.

Ice formed at about 10,000 ft. in a mixed ragged formation ¾ inch thick and 3 ins. high along the leading edge of the wings, together with lumps 3 × ¾ ins. on the aileron horns and canopy protection stops. It was noted that the aileron control was very stiff at altitude, unlike the Olympia.

On clearing the cloud, we were treated to a beautiful cloud panorama of 7-8/8 stratified cu with tops at 5,000 ft., with an occasional large cu bursting through to around 15,000 ft.—the one we left appearing some 1,500 feet above us with a very ragged top. A futile attempt was made to gain more altitude in this cloud, resulting in marked turbulence and 10 ft/sec. sink—so out we came, returning to base at 15.05 hrs.

The Kranich belongs to the R.A.E. Technical College and should have had a student on board, so at 15.51 hrs. we found ourselves airborne once more with one Coxan now in the rear seat. The release height was 1,600 ft. and maximum altitude reached was 11,700 ft. at an average rate of climb of 500 ft/min. The landing back at base was carried out at 16.48 hrs.

These flights were made on 16th August.

On 3rd August, with apprentice Guilder in the rear seat, a flight in a small cu-nim was carried out from release height of 2,600 ft. to a maximum altitude of 11,300 feet. The front A.S.I. on the normal pitot iced up, but the rear A.S.I. on the hollow-nose type pitot was serviceable throughout the flight.

It is increasingly apparent that the characteristics of large cumulus clouds are very similar in that, once firmly established in the central core of lift, the turbulence is comparatively mild until the top of the cloud is reached.

Severe turbulence occurs between the up and down-draught areas and near the top of these clouds, but not sufficient to result in a complete loss of control, providing one's instrument flying is not too rusty.

Long Mynd's Best Wave Yet

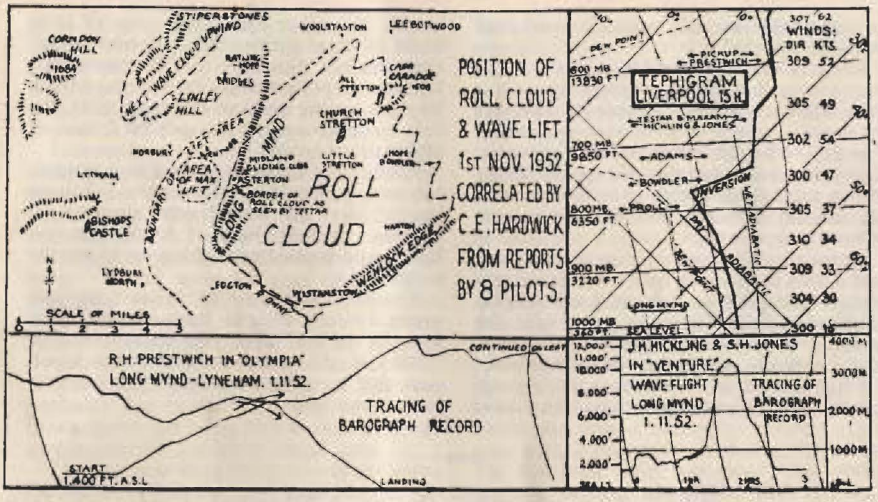
ON 1st November, 1952, at the Midland Gliding Club site at the Long Mynd, there appeared a standing wave which was not only exceptionally extensive and easy to contact but took two pilots to greater heights than had yet been attained at the site in wave lift.

One of them, R. H. Prestwich, reached 14,000 ft. a.s.l. in an Olympia (12,600 ft. above take-off), was in the air from 12.00 to 14.50 and made a cross-country flight to near Swindon, which he describes in a following article. Allan Pickup, flying an Olympia from 14.35 to 16.55, reached the greatest height of the day, 14,400 ft. a.s.l. He also describes his flight in an article which follows Prestwich's.

Both two-seaters made remarkable climbs. J. H. Hickling and S. H. Jones, flying the Venture from 14.00 to 16.40, reached 11,000 ft., Theo Testar and R. Maxam, in the T-21b from 14.30 to 17.00, reached 11,200 ft.

Three pilots went up in sailplanes without brakes and found difficulty in getting down again. Tony Adams, in a Tutor from 14.55 to 16.30, reached 8,900 ft., then lost height by going downwind and landing at Ludlow. Bruce Bowdler, in another Tutor from 15.23 to 16.23, reached 7,900 ft., then had to fly upwind to Bishops Castle before he could lose height and return for a landing. Teddy Proll, in the Kirby Kite from 15.25 to 16.25, reached 6,400 ft., then side-slipped back to earth.

Other pilots also connected.



Long Mynd to Lyneham

by R. H. Prestwich

DURING the last week in October a string of depressions passed north of the British Isles, giving varying stable and unstable conditions. Early on Saturday, 1st November, a front of almost 1,000 miles in length went through, leaving behind it conditions suitable for waves, with a W.N.W. wind of about 20 knots, and a distinct inversion at about 8,000 feet.

I was launched by car bungey soon after 12.00 hrs., straight into good lift under the leading edge of a mass of cloud lying along the Mynd. The base was at about 2,000 ft. above the hill, with a very ragged edge stretching about a mile out from the hill. Lift was everywhere and increased out over the valley to 350 ft/min. At about 5,000 ft. a.s.l. the lift decreased to about 150 ft/min., with my Olympia doing 45 knots against a N.W. wind to keep stationary. I headed further out until I was half way to the Stiperstones, and managed to get into slightly better lift.

This continued up to 10,500 ft. a.s.l., when the Olympia, from being rock-steady, began to pitch violently. It also felt as if I was flying through sink and lift alternately every 2 or 3 seconds. However, my pre-war Cobb-Slater, which is very sensitive to change, didn't move at all. Instead the lift increased slightly to 350 ft/min. and at 12,500 ft. I was again in smooth air.

At 14,000 ft. a.s.l. the lift had stopped, so I headed down wind. In under 2 minutes I was back at 11,500 ft. after hitting a big "down" behind the Mynd. However, I found another wave over Wenlock Edge which took me back to 13,000 ft., then pressed off again towards another wave cloud near Droitwich.

This seemed to be the last wave in that direction, so I headed across wind and found two more waves, one of which was directly between Worcester and Great Malvern. Then I saw the father and mother of all wave clouds, evidently coming off the Black Mountains. I headed towards it and it collapsed just like a broken poached egg.

However, down wind another small wave came to the rescue, giving about 2 ft./sec. along a two-mile front. I managed to gain 1,500 ft. when the lift gradually petered out. I pushed off again towards Cirencester, when I saw a long scraggy-looking roll of cloud lying across the wind. I flew for about 15 miles along the windward edge in

no sink to 2 ft/sec. lift, until I arrived over Swindon at 7,500 ft.

Directly downwind of me was a total clamp very low down, stretching as far as I could see over the Cotswolds. This was the front which had gone through earlier that day. I had about 30 miles of potential distance in hand, but decided against flying over a total cloud cover, so looked around across wind for more waves. They all seemed to have disappeared.

Three airfields were within reach and I had a look at them in turn. The third one looked occupied so I looped off surplus height and landed on the grass near the hangars. A large building near by proved to be the canteen, which was most fortunate.

I had soared seven waves in all, though only three of them had anything like a wave cloud. The other four were areas of little blobs of cloud which you could see through quite easily. Nowhere did lift exceed 200 ft/min. except for one period over the Mynd. There were big areas of downdraughts, the first one encountered being 1,500 ft/min. at 80 knots air speed.

About half an hour after I had landed, lenticulars appeared everywhere. I later learned that the Mynd wave stopped as soon as I had left, but at 15.30 hrs. came on again, and pushed everything up to terrific heights.

The total flight of 81 miles took just under 3 hours, over an hour of which was spent in the first wave. The squandering of 7,500 feet of height at the end was unfortunate, but an extra 30 miles is not worth a broken machine.

Waving at the Long Mynd

by Allan Pickup

ON Saturday, 1st November, 1952 I arrived at the Midland Gliding Club at 13.10 hrs. and found a lightish warm breeze blowing straight into the hill at between 10-15 m.p.h. Soon, Col. Benson landed in his Avia and reported that he had been up to 3,600 ft. wave-soaring and had come down for a barograph.

Looking up, I saw what seemed to be uninteresting cumulus over the Long Mynd at about 1,000 ft., and it seemed to me that if there had been any waving, it had now subsided or moved away from the vicinity. But I was told that Rick Prestwich was above cloud in the Blue Olympia, and had been flying for 1½ hours, so obviously there was some activity. Col. Benson described how he had found it rather difficult to descend from 3,600 ft. as there was 3-5 ft. per sec. lift to be found over a large area.

After lunch I prepared for flight in the Club Olympia, and as I was being towed towards the take-off point, looked again at the sky which consisted at low level of odd blobs and patches of cumulus, wtih a background of altostratus, still seeming rather uninteresting. The wind seemed almost too light for catapult launching, but everything that took off went up without any bother, and sailplanes could be seen soaring to about 1,000 ft. above the North end.

I took off at 14.35 hrs. and on turning south ran into very smooth, strong lift, and in about 3 minutes was flying at 2,500 ft. a.s.l. along and directly over the top of the ridge (Note : all heights from now on are a.s.l.). In order to sound the air for wave activity, I made several glides straight out over the valley to about ½ mile from the south end of the Long Mynd, but there was nothing more than the odd puff of slightly turbulent lift here and there which seemed to be associated with rather heavy-looking strato-cu covering most of the sky immediately upwind of the soarable section of the Long Mynd.

I continued these penetrations until about 15.25, when the dirty grey low cloud moved off. A few hundred feet below my level of 2,700 ft., very fine vertical wisps of cloud started to form only a few hundred yards upwind of the ridge, about 1 mile from the southernmost tip. As these wisps came nearer, they each grew into comparatively large, semi-transparent masses of grey about 50 to 100 ft. wide and 200 or 300 ft. deep. Directly over the ridge the variometer indicated no sink while I was flying in clear air, but on positioning myself to fly through one of these clouds, for the 20 or so seconds I was in it, mildly turbulent lift of 2-5 ft. per sec. was registered. Immediately upwind

of it 10 ft./sec., steadily tapering off to no sink about ¼ mile over the valley. Then I returned to the ridge and turning into wind again found that I could repeat this very fascinating procedure about four or five times with successive new clouds.

I remember looking down on to the ridge, and seeing other aircraft approaching below the clouds. These planes had been prospecting at the northern end of the Long Mynd, and seemed to me to have been meeting with little or no success during the past half hour. I had seen no sign of the Blue Olympia, which had taken off more than three hours before. I only saw one other sailplane that had climbed to my level, a Tutor, and for short periods it seemed to be a little higher than the Olympia. This was probably due to the Tutor having a lower flying speed and being able to remain in the updraughts for a slightly longer time.

I had by now been flying among the wisps for about 5 minutes, and had pushed my way up to 3,000 ft., almost as high as the tops of the little cumulus clouds that were forming just upwind of the ridge. So I decided to push on upwind, flying at 40 m.p.h. By now the sun was shining through a large gap in the alto-cu and there was a very definite visual sign of wave activity—a lenticular cloud at 7,500 ft., well defined, and about 4 miles upwind of the Long Mynd, and about 4 or 5 miles long. I was pleasantly surprised to find the air very smooth, and the variometer showing between 1.5 to 2.5 ft/sec. lift. From this point onward, I did not change my general direction until the flight had reached its peak.

At 3,500 ft. a solitary ball of cumulus came straight at me. I estimated its diameter to be about 200 ft. and passed inside it just above its base. It was turbulent inside with downcurrents ranging between 3-7 ft/sec. Leaving this cloud behind, the steady wave lift continued to give between 1.5 to 2.5 ft/sec. It is interesting to note that I entered this cloud about ½ mile out from the ridge, and it did not appear to belong to the family of clouds which I left over the Mynd some minutes earlier.

Up to this stage in the flight, I had been very busy looking out for other aircraft or the next cloud that might help to push me up a little faster. But now, flying N.W. in clear, warm and very smooth air, I relaxed and found time to look around at the scenery. By the time I had climbed 1,000 feet above the cumuli which were over the soaring ridge, I was able to see that these were part of a great area of small cu which extended far to the south and south-west. They were evenly spaced and gave horizontal cover of about three-eighths. Their tops were a darkish grey, indicating that the sun's rays were barred by a formation of clouds at a higher level, somewhere to the south-west, but these I could not see clearly because the sun was most dazzling on the not very clear perspex cockpit cover. I never saw what lay to the S.W. as I was quite content to keep the Olympia's nose pointing towards the lenticular to the N.W.

The view on my right hand side was one of low strato-cu sprawling about all over the northern quarter with the odd small sphere of cu dotted here and there. The sky above me was a ceiling of alto-cu, dark grey with a background of clear blue sky. The altimeter hand was slowly but surely pushing its way round the dial and had passed the 4,000 mark. My air speed was reduced to 37 m.p.h. and I sat there doing nothing more than looking round to see if there were any others of the fleet of sailplanes coming up with the Olympia. They must have been directly behind me, for the only one I did see—the Avia, I think—was still about 2,000 ft below me, flying close to the Long Mynd, just a little north of the hangar.

The club buildings were growing smaller and smaller, but the lenticular above and ahead did not seem to be growing any bigger. I remember thinking at the time that this cloud must be very high, and the idea of reaching it seemed to be vaguely in the nature of a dream.

Since leaving those little clouds near the south end of the soaring ridge, the flight had been quite uneventful until, at 6,000 ft., the variometer started to show 5-6 ft/sec. of lift, and gently I began to feel very pleased with this flight. The air was still very smooth, and in the sunshine I was as warm as toast.

The altimeter was now getting a move on, and at 7,000 ft. I was level with the base of the lenticular ahead of me, which was a thin dark grey line for the length of the cloud. On reaching 7,500 ft. I could see the top surface of it, which looked like a narrow flat fish, with wispy cloud growing from its backbone.

The village of Wentnor was now about 1 mile to the N.N.E. The Stiperstones lay to

the north, and as I looked down over my right shoulder I could see the northern half of the Long Mynd, with long dark shadows lying in its many gulleys, a sign that the sun was beginning to sink. At 8,000 ft. the variometer really did go to town, and painted it green to the tune of 10 ft/sec., and occasionally about 12 or 13 ft/sec. was registered, but only for about 15 seconds at a time. My air speed was now 40 m.p.h. It is interesting to note that the wind veered with height, at this height being about 20 degrees further north than at ground level.

After climbing another 1,000 ft. I was able to see another formation of cloud below and behind the Olympia, which until now had been hidden above and behind the main plane of my aircraft. This was a wave cloud, which seemed to lie over and well beyond All Stretton, extending from a point just S.W. of the south end of the Long Mynd.

By the time I had reached 11,000 ft. I noticed that the Olympia had moved backwards over the ground and was now almost vertically over the leading edge of the wave cloud, which blotted out the southern end of the Long Mynd from my view—an indication that at 11,000 ft. the wind had increased in speed to something rather more than 40 m.p.h. To be sure of moving forward again, I flew the Olympia at 55 m.p.h.

While I travelled out over the Onny Valley in a north-westerly direction again, I had another look at the wave cloud over the Mynd, and beyond the long ridge of its peak I could see another ridge indicating a third cloud. The second cloud was too deep for me to see a space between it and the third one.

Below and behind on the left-hand side of the Olympia I saw a Tutor. Its background was the white top of the wave cloud, and I guessed that its pilot must have been trying to reach Mother Earth again, for he was flying it north at a very high speed. Tutors must be a source of bitter-sweet experience when flown in strong and widespread wave lift, as, due to their flying limitations, the maximum permissible air speed does not allow the red ball much scope and there is not the alternative of spoilers.

My Olympia had now regained its forward position S.S.W. of Wentnor and the altimeter indicated 12,500 ft. The time was 16.15 hrs. and I thought that soon I must start my descent in order to make a landing on the Club ground in daylight.

I flew at 48 m.p.h. for a few more minutes. At this speed the Olympia seemed to remain stationary over the ground. On reducing airspeed to 40 m.p.h. the variometer again showed 10 ft/sec. of lift. Down on the Long Mynd I could see the Club buildings, the white roof of the main hangar showing up very clearly in the fading light. From 13,000 ft. it looked very small indeed, about the cross-sectional area of a matchstick. It was not until now that I noticed that my feet were beginning to get a little cold. I was wearing ordinary socks and rubber Wellington boots. The rest of my body was still quite warm. The sun was now beginning to move behind some high cloud, away in the west, and high above me the ceiling of alto-cu clouds were gold and dark grey in colour—a marvellous sight to see.

Another look at my watch and the time was 16.20 hrs., altitude 14,500 a.s.l., and I decided that now I must start my descent. I put on full brakes and raised speed to 55 m.p.h. The variometer indicated 20 ft/sec. sink, and soon I was down to 11,000 ft.

There is always something to learn in the sport of gliding and soaring, and at this stage of my flight I learned yet another lesson. My forehead started to give me great pain, a beating pain which I discovered afterwards to be a blood vessel bursting. I realised immediately that I had been descending too quickly for too long. The alternative was to reduce the rate of sink to about 5 ft/sec. About two minutes passed before the pain became less severe. In order to maintain 5 ft/sec. sink the Olympia had to be flown at 60 m.p.h. with the air brakes open just a little.

I flew north for a few minutes to see what was happening to the air just upwind of the north end of the ridge. The aircraft had still to be flown between 55 and 60 m.p.h. if the 5 ft/sec. sink was to be maintained. It was not until I came down to 2,500 ft. that I was able to reduce my speed to 40 m.p.h. and still continue on my downward flight.

At 700 ft. above the landing ground I prepared to make my approach and landed. As I came to rest about 50 yards away from the hangar, some of the pilots came running towards the Olympia, eager to know how high I had been—13,000 ft. above the Gliding Club, believed to be the greatest height yet attained from the Long Mynd in

wave lift. The flight had lasted 2 hours 20 minutes. I was very pleased with myself, and thankful to nature for having provided me with the chance of make such a flight. But I paid for it—my head ached with sinusitis for a week afterwards. So, beware all pilots who try soaring to great heights.

What a pity a barograph was not carried!

Cloud Streets

by R. S. Scorer

Cloud Streets are a common phenomenon but are most difficult to explain. It is easy to talk about Bénard cells and longitudinal rolls and point to laboratory experiments with aluminium paint to show that the cells get arranged into long rolls along the shear when shear exists; but in those experiments viscosity is important, but is not in the atmosphere. Secondly, such a motion would not produce isolated lines of cloud unless the top surface of the convection layer were very far from flat. The main objection, however, is that cloud streets seem to consist of bubbles of air just like ordinary isolated cumulus but arranged in compact rows: the bubbles rise and mix into their surroundings and sink away, to be replaced by successors very soon afterwards. Also, it is not especially on days of shear that streets are formed—rather the opposite, I would say. On the other hand, a wind is definitely required.

An isolated line of cumulus may stretch for many miles and may contain showers, and seems to be rather like an almost stationary weak cold front; but when streets in the form of two or more rows of cumulus occur, the clouds do not grow much and very rarely produce showers. They are, in fact, an orderly arrangement of fair-weather cumulus. They seem to require a fair wind and this suggests that they may stream away from some particularly good thermal source which happens to have some other good ones lying down-wind of it. Plates I and II show such an instance.*

But the "good sources fortuitously lined up along the wind" explanation won't work always because they seem often to drift slowly sideways across the wind, or to lie slightly off the direction of the wind. This is where the shadow explanation seems good: if the arrangement in rows once occurs, then it is perpetuated because their shadows arrange the heating of the ground in the same way.

Streets occur in their most pronounced form over the sea where there may be convection cells in the water which produces hot and cold lines on the surface, but it seems more likely that we must return to some sort of cell explanation.

We cannot have an exact analogy with laboratory experiments, but we can learn something from them. In order to get a good arrangement of cells in a layer of dilute aluminium paint, the heating must be very slow: if it is too great, the arrangement becomes chaotic. Thus we can expect an orderly arrangement of clouds if the heating is slow, but just enough to keep convection going. This situation does arise when air moves over the sea and the sea temperature rises slowly along the track of the air. The convection still seems to be predominantly bubble type, but the size achieved by the bubbles and their spacing is severely controlled by the rate of heating and the depth of the convection layer. Shadows can have no influence over the sea.

Over land, streets are common in the morning or late afternoon when heating is not very great and only just great enough to support convection. An example of this is in Plate III.

Rather than examine streets themselves, I think a more detailed study of fair-weather cumulus clouds and the conditions under which they become arranged in streets, or don't become so arranged, will throw up the explanation of how they are perpetuated. In any case the explanation is not easy and it seems that the predominant cause may not always be the same. Cloud streets were only seen at Madrid during the Competitions last July on one occasion, and that was when a layer of cirro-stratus reduced the heating to a small fraction of the usual. It seems that feeble convection is at least the main requirement for streets to occur.

* Photographs on following two pages.



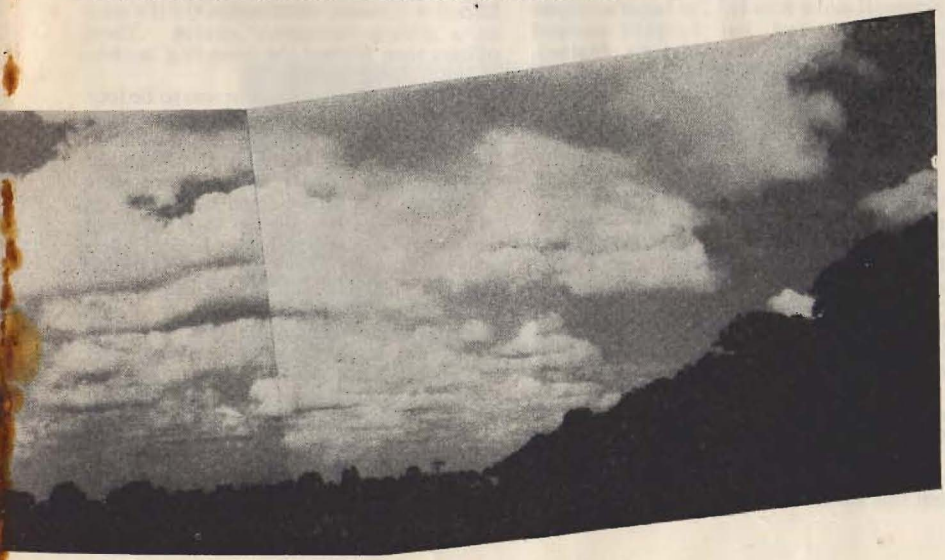
Plate I (above).—A Cloud Street, looking into wind. Photo taken at 09.30 G.M.T., 7th May, 1952, looking towards the S.W. The street was the only one in the sky and appeared to originate in the neighbourhood of Malden gasworks. The isolation and persistence of this street suggested an exceptional thermal source.





Plate III (above).—Streets forming in the feeble cumulus at 17.00 G.M.T. at Cranfield on 12th August, 1952. There had been no streets earlier in the day.

Plate II (below).—The central street is the same one as in Plate I, now viewed looking northwards at 12.00 G.M.T. The position of the street is slightly to the west of its former position and others are appearing to each side. At this time the sky over Wimbledon, Mitcham and Battersea contained no streets (to right of this picture). The cumulus are no better developed than earlier, indicating feeble convection.



Gliding at Cranwell R.A.F. College

by J. S. R. Salmond

WHEN the College reopened it was tentatively decided to include gliding and soaring in the post-war syllabus. Very little was known about this sport, so two officers visited Martin Hearn Ltd., sailplane agents, at Hooton Park in Cheshire. They reported enthusiastically on the Slingsby aircraft they flew there, but it was over two years before official approval for the innovation was obtained. In the meantime a Gliding Club was formed to foster interest until the aircraft arrived.

That winter, Squadron Leader Robert Kronfield, A.F.C., gave us a lecture one evening. Also, Martin Hearn's demonstration team, led by "Pop" Rimmer and Gerry Hancocks, paid the first of three visits. They brought along the gliders, and the local A.T.C. Gliding School (No. 107, Digby) kindly supplied winches and operators. In the week they stayed, as many people as possible were given circuits, mostly in Tutors, and a lucky few were aerotowed in a Kite II.

1947

The other two courses were held the following summer, using a Tutor, Cadet, Falcon II and a Kite II. The latter was spun in from 300 feet, but the pilot escaped uninjured. Nearly twenty B's were obtained. There was no further gliding at Cranwell until the winter of 1948.

1948

In April that year the first of many visits to Scharfoldendorf was paid. This is by far the best site to which we have access in Germany. It is 13 miles south-east of (Pied Piper) Hamelin, and is on the south end of a thickly wooded, 12-mile limestone ridge—"der romantischer Ith", which lies N.N.W. to S.S.E. and rises 800 feet above the maze of cultivated valleys dotted with cement factories in that district.

The west ridge is the one most commonly used, but the east and a separate north-facing one can be soared on occasion too. Thermals abound, so it is an ideal Silver C site. There is evidence of a standing wave, but this has not been properly investigated. The well-known Sepp Niederstadt is now chief ground engineer and winch driver there. A magnificent fleet of aircraft is available. The last time we were there it included: 3 SG-38s, 3 Kranichs, 6 Grunaus, 2 Minimoas, 2 Weihes, a Mu 13, Rhönbussard, Rhönsperber and Rheinlander.

Our courses there—we have had 12 so far—have been a great stimulus to College gliding, and we are indeed grateful to those concerned for their hospitality, forebearance and help.

August saw us at Hooton Park, with Martin Hearns again, and in the winter Elliotts of Newbury paid a one-day visit to Cranwell, giving aero-tows in an Olympia.

1949

In the spring, official approval for gliding to be introduced at Cranwell at last came through. It was to be partly an experiment to see if it would help powered-flying training and produce better pilots, and partly to develop initiative and an intimate knowledge of meteorology through soaring, in those taking part. It was decided not to include it in the already overcrowded syllabus, but to make it a voluntary activity.

During the Easter leave a second visit to Scharf. was made, and also ten Q.F.I's went on a gliding instructors' course. These officers then formed the operating nucleus of the training machine.

The original establishment was to be four Kirby Cadet Mk Is, 2 Mk IIs, 2 Sedbergh T-21Bs and two converted balloon winches. This equipment arrived very slowly and at first only one Mk II and a winch were delivered. The first launch was made on 14th May, and training up to B standard was begun with twelve Junior Entry Cadets who had been attending 107 A.T.C. Gliding School at week-ends, and had already passed the ground-slide stage.

Towards the end of term the two T21s arrived, and from then on dual only was given until a pupil was fit to go solo on the Tutor. This was a logical step forward, but we believe that the College was the first gliding school in the country to break with the old traditional methods of training. By the end of that term 41 Cadets were under various stages of training.

The following leave there were two further courses at Scharfoldendorf, and another for instructors at Cranwell.

1950

A Prefect arrived in the spring, and one of our T-21s was exchanged for a Kranich and a Grunau Baby. At the same time the three winches were replaced by improved ones with automatic feeds.

Easter again saw us at Scharf.

In May our first two cross-countries were flown. One, of 64 kms. N.E. to the coast, was the first Silver C leg gained from this airfield.

In the summer leave two Scharf. courses and others at Sutton Bank together produced rather more than the usual crop of certificates: 28 C's and 19 Silver C legs. The Sutton Bank camps were especially noteworthy. The Yorkshire Gliding Club kindly allowed us the use of their site, and we held four one-week courses, with fifteen people on each. We took up two of our winches, five aircraft and all domestic requirements, and camped on the site. One day R. L. Dimock soared a Cadet Mk. II for 12 hours 5 minutes, and only landed then as dusk was falling.

1951

The April Scharf. visit produced a number of Silver C legs, including two cross-countries.

Two officers were entered with the Kranich for the National Competitions. (Flight Cadets could not be given time off to take part). On his qualifying flight one of them flew 106 kms. to Elmdon. Altogether that term we had six cross-countries, two of them being Silver C distances. In the Competitions themselves the best flight was 102 kms. to beyond Oakham.

During the summer Scharf. visit five more cross-countries (two Silver legs) were flown. On one of them J. J. Parker just missed his Gold C height, with a climb of 2,900 metres in a cu-nimb, as described in the summer issue of GLIDING. A few of the party spent a week-end at the Wasserkuppe where the first post-war gliding meeting of the Deutsche Aero Club was being held. We took along, and flew, a Scharf. Minimoa. This was the only R.A.F. machine (or Mini) taking part and it attracted much attention. One of the party was lucky enough to have a flight in the new E.S.G.49 tandem trainer. Nearly all the Germans present (over 40,000) sported gliding badges. Silver C's were two a penny, and at least three Gold C's were spotted.

1952

Dr. Scorer amd Mr. Ludlam gave a most interesting talk on standing waves and cumulus, illustrated by some slow-motion films. In May Philip Wills lectured to us on Advanced Soaring. Three courses were held in Germany during the April and August leaves.



A Cranwell party at Scharfoldendorf.—

(Courtesy Journal of the R.A.F. College).

The Present Situation

Our present position is a very healthy one. The Club, in common with all activities at the College, is run by Flight Cadets, with an officer supervising. Q.F.Is only are allowed to instruct. There is a large and expanding pool of winch drivers. Our six aircraft are two Cadet Mk. IIs, a T-21B, Prefect, Grunau IIB, and a Kranich. Cable retrieves are done by Bedford 15-cwt. trucks.

Gliding can only be carried out at Cranwell in term time on Wednesday, Saturday and Sunday afternoons except on rare occasions such as mid-term breaks (if anyone stays behind) and the Queen's Birthday, so we usually miss the best part of the day. Nevertheless, several Silver C distance legs have been flown from the airfield, and also some heights; all the latter have unfortunately been unofficial as no barograph was carried.

Altogether, Club members have gained 211 B's, 97 C's, and ten Silver C's. Since May, 1950, 26 cross-countries totalling 725 miles have been flown. At present in the College there are 32 A's, 70 B's, 31 C's, 2 Silver C's and 27 assorted legs.

Two Flight Cadets gained their B2 Instructors' categories in October.

Synthetic Glues in Aircraft Construction

by H. G. Rodney, B.A.

Introduction

To a considerable degree synthetic glues owe their rapid development to the stimulus of the exacting needs of the aircraft industry; amongst many achievements in this field to which they have notably contributed may be mentioned the all-wooden de Havilland Mosquito; the Vampire, incorporating a glued carapace fuselage formed from curved "sandwiches" of plywood with a balsa "filling"; the Hornet; the Horsa troop-carrying glider; the English Electric Canberra, and now the Comet, making extensive use of "Redux" metal bonding in the wings and pressurized fuselage.

Aircraft structures lend themselves to adhesive techniques for fairly obvious reasons; they must be capable of withstanding exceptional stresses while at the same time they must necessarily be built from thin materials to satisfy a strict weight-saving economy. Aerodynamically satisfactory surfaces with skins free from protrusions are also a necessity.

A highly specialised aircraft, such as a sailplane, where the thicknesses of many ribs are measurable in fractions of an inch only, affords a good example of the value of a glued assembly. The perforations necessary to insert screws or rivets in such thin timbers would in many cases be both impracticable and inconvenient as well as dangerously weakening to the structure, while the fastenings themselves would add appreciable weight, would "work" under stress and ultimately become loose. (The extensive structural use which glider designers make of the adhesives is impressively illustrated in Fig. 1, which shows the wings of the now famous Slingsby Sky under construction. Every joint in this maze of nose ribs depends solely on "Aerolite" glue). A further important theoretical consideration is that a glued joint gives a cohesive force over the whole area of contact, and stress concentrations, productive of fatigue, are not so acute as those which arise at local fastenings such as rivets and screws.

Prior to the first World War, aircraft manufacturers employed of necessity the traditional carpenters' "Scotch" glue extracted by melting down animal tissues; but this, though it of course gave fair joint strength under certain favourable conditions, soon proved inadequate for aircraft work. Lacking the necessary endurance it was vulnerable to moisture, heat, microbial and fungoid attack, and, furthermore, could only be relied upon to give good joint-strength if the members were brought into perfect contact under pressure. This last condition proved very difficult to satisfy, especially in repairing damaged parts, where as a rule it was impossible to guarantee a

fitting closer than a thousandth of an inch between the adherends. For these reasons the then new casein glues, made from milk, which combined improved performance with some gap-filling ability, rapidly superseded animal glues for aircraft. But these in their turn failed to give complete satisfaction, and in the extremely severe conditions, often of tropical heat and humidity, in which aircraft were called upon to operate in the second World War, their marked lack of resistance to mycological attack and damp proved a most serious disadvantage.

Attention now turned to synthetic resins, which had been in commercial production since 1937 and had been used to some extent for the manufacture of high-grade plywood for special service. These possessed all the needed qualities required in modern aircraft construction with the single exception of gap-filling ability—a thick glue line was liable to shatter and disintegrate due to internal stresses set up by the slight shrinkage accompanying setting. One British firm, however (Aero Research Ltd.), applying itself to this particular problem was shortly able to report a successful outcome to its experiments. As a result a new range of hardeners, called the GB (patented) hardeners, for use with "Aerolite" 300, a urea formaldehyde resin, was made available. With this resin/hardener combination, stresses in the glue line were automatically resolved during setting and gap joints could be produced which would always give wood failure on testing.

This combination has now been widely adopted for assembly work by manufacturers of aircraft and for many years has been exclusively specified by the R.A.F. for repairs to load-bearing structures in wooden aircraft. It is also used throughout the construction of British gliders such as the

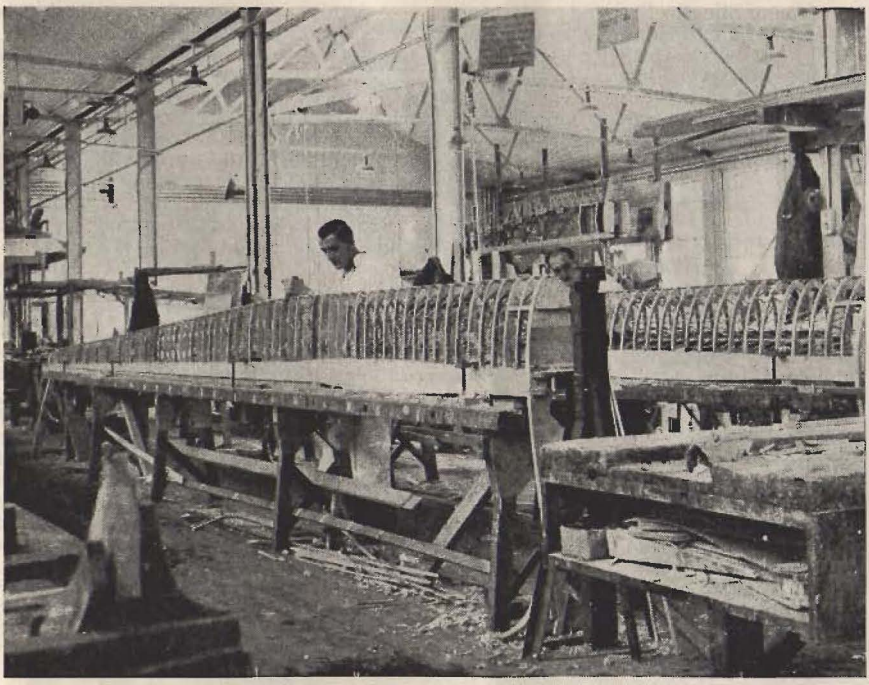


Fig. 1.—Each and every joint in this mass of nose-ribs in the leading edge of the now famous Slingsby "Sky" depends solely on "Aerolite" glue. The operator is preparing the nose to receive its ply skin, which is also attached by "Aerolite."



Fig. 2.—A wing assembly, showing ribs and spar being glued in place.

now famous Slingsby Sky, and models such as the Baby Eon made by Messrs. Eliotts Ltd. of Newbury. This last application is, of course, of special interest to readers of this journal but, before passing on to give some brief notes on typical gluing operations in the production of sailplanes, it is perhaps appropriate to first describe briefly the nature of synthetic glues for those who may be unfamiliar with the subject.

Nature of Synthetic Glues

Synthetic adhesives can be accurately termed "plastic glues". They are in fact plastics in liquid form derived from such basic materials as air, petroleum and water by a series of complex chemical processes similar to those used in producing the materials from which moulded ashtrays and radio cabinets are fabricated.

To the consumer they are, as a rule, supplied as two components in separate containers—a resin and a hardener (or catalyst)—and setting is by a chemical reaction which does not begin until resin and hardener are mixed together or brought into contact. Setting, for resins of the thermosetting type with which this article is concerned, is an irreversible process—in other words there is no means of "re-melting" the glue once it has hardened; the unique permanence of the bond is, of course, the nature corollary of this characteristic. (Note the contrast with animal glues which are thermoplastic and set only by a physical and reversible change.)

A feature of the use of resin adhesives is that setting speeds can be varied greatly, and regulated with scientific accuracy, by employing hardeners of differing strengths from the wide range available. The resins are also extremely heat-reactive during the setting process, and it is common practice to reduce the setting time to a matter of minutes, or even seconds, by raising the temperature of the glueline.

The main types of thermosetting synthetic adhesives for wood are:— (1) urea formaldehyde (U.F.), (2) phenol formaldehyde (P.F.), (3) melamine formaldehyde (M.F.), and resorcinol formaldehyde (R.F.). Of these, urea formaldehyde is chiefly of interest, for though in extreme test conditions it is surpassed to some extent by the others in certain aspects of performance, such as resistance to boiling water, its standard is far more than adequate for most purposes and it has the advantage of being much cheaper and simpler to use. It is also important to note that for gap-joints "Aerolite" 300 (a U.F. resin) with the GB hardeners usually gives superior strengths to those obtainable with P.F., M.F. or R.F. resins. (Tests of comparative performances have been made at the Forest Products Research Laboratory of the D.S.I.R. in 1948.)*

Assembly of Sailplanes

The following notes, based on data

* See *Aero Research Technical Notes*, Bulletin No. 79, July, 1949.

obtained at the works of Messrs. Slingsby Sailplanes Ltd. and reproduced by their kind permission, are intended to give some idea of the structural significance of adhesives in sailplane construction. The glue is "Aerolite" 300 with GB hardener and the 'separate application" method appropriate to this combination is used throughout. (Resin is applied to one surface of the joint and hardener to the other. Setting commences when the two surfaces are brought into contact.)

The wing ribs are built up from thin spruce strips, trimmed carefully to size, and assembled in jigs after applying resin to one surface of each joint and hardener to the other. Only the lightest pressure is used to hold the sticks, gussets, etc. together during the setting. Light nails are used, but only very sparingly, to provide suitable contact pressure where it is not conveniently obtainable from the jigs. As soon as a complete rib has been assembled the jig is clamped and removed from the bench for the adhesive to set at room temperature. Jigs of various sizes provide a supply of ribs while diagonal bracing members for the wings are also assembled in a similar manner from glued components.

Wings are—according to the type of model—either single-spar, nose-box type, or of double spar design. Assembly is carried out on a jig; the diagonal bracing members are passed through the ribs, which are pulled into their appropriate positions on the spar or spars. "Aerolite" 300 and Hardener GBP are next used to bond both bracing members and ribs to the spar(s), nails being used to provide pressure at certain points where it is impracticable to obtain pressure from the jig. In many places nails required only temporarily to provide light contact pressure during setting of the bond are driven first through a flexible ply



Fig. 3.—The tailplane of the well-known Kirby-Cadet series, some three hundred of which have been supplied to the R.A.F. A jar of "Aerolite" stands in readiness on the jig. (All photos by Slingsby Sailplanes Ltd.).

strip which is later peeled off with the nails it incorporates.

The glued assembly of spars, diagonal bracing members and ribs to form the structure of the wing is shown in Fig. 2. Metal fastenings are used to exert pressure during the bonding of the ply-covering to the nose box of single-spar models. (Fig. 1 shows the nose, for the "Sky" model, being prepared for reception of the skin.) Single-spar nose-box models incorporate light secondary spars carrying the ailerons, which are also of glued construction. Completed assemblies are later usually transferred to a large jig which takes both wings and enables them to be carefully matched. The frame members for the fuselage and the rudder are first assembled on a jig and longerons and diagonal bracing members are next glued in position.

The construction of tailplanes, also completely glued assemblies, is shown in Fig. 3 for the Kirby Cadet and Fig. 4 for the Sky.

Double curvature plywood noses are constructed from glued panels and these are in turn bonded with "Aerolite" to the frames. Nailed strips, described above, are used to obtain pressure during the setting of the bond.

Panels are similalry bonded to the remainder of the duselage; Fig. 5 shows clearly the details of assembly.

Skids consist of steel strips bolted to 3-ply glued laminations of ash, each ¼ in. thick.

Construction of "Horsa" Troop Carriers

The construction of the Horsa glider, used in airborne invasions of the Continent during the war, affords an interesting example of glued construction adapted to mass-production methods. The entire glider was constructed of wood, the fuselage being of monocoque type with stressed plywood skin, transverse frames and longitudinal stringers.

To avoid double curves, the fuselage was made up of six separate "barrels", each consisting of a plywood skin glued round circular frames with a bulkhead at the forward end.

Construction of the barrel took place on a rotatable fixture carrying a spindle on which the bulkhead and preformed laminated frames were threaded. Floor supports of box construction comprising spruce beams glued to plywood skins with "Aerolite" 300 were next fitted between the frames and glued to the sides of the frame webs. The structure was then curved with the skin which was pre-assembled from sheets of ply glued to parallel stringers coated with "Aerolite" 300 in a heated press. Skinning was simplified by arranging for the whole assembly to rotate, lathe-fashion, while the skin was wrapped round the glue-coated edges of the circular frames. Tacking strips were used to hold the four sections of the skin in place and final pressure applied by steel band clamps, tightened by a chain and sprocket. Jointing between barrels is



Fig. 4.—The tailplane of the "Sky" sailplane with jigs in the background used in the manufacture of fuselage frames.

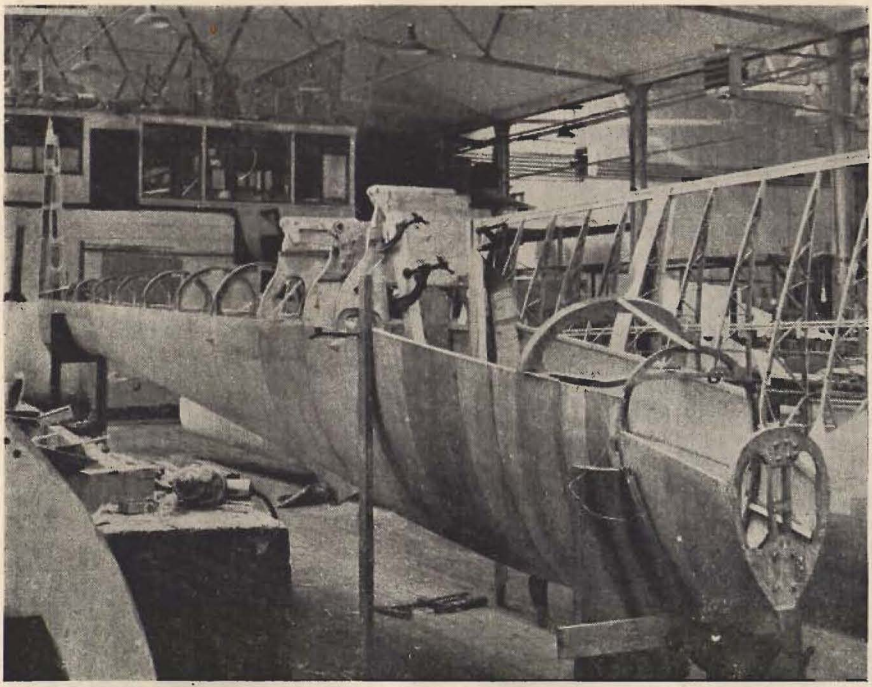


Fig. 5.—The fuselage of the "Sky" sailplane awaiting an application of glue and the addition of the remaining ply skin.

effected by expanding the after end of each barrel to fit over the bulkhead of the next and gluing it in place.

One of the main difficulties in assembling the wing and tail, also of glued construction, was the application of even pressure over the entire surface at the same time when gluing on the skin. The problem was solved by the use of a special pneumatic clamping device. The whole surface was covered with air bags which were inflated to a pressure of 30 psi. It was found that tailplanes and other components subjected to this method of clamping showed perfect joints between the plywood skin and the frames.

The great strength of the glued wooden construction in the Horsa glider is shown by the fact that from many of the major operations carried out by glider-borne troops, up to 85% of the aircraft were able to be recovered for further service.

Repair of Gliders

In the repair of gliders "Aerolite" is used very extensively and some remarkable examples of restoration have been achieved.

It is often of great important to be able to effect repairs with speed, especially during competitions, and those responsible for the maintenance of gliders report that synthetic resins here show a very marked advantage over all other glues in this respect. As setting takes only a very few hours at air temperature, and can be shortened to minutes if some sort of heating is applied, a number of operations to the same component can be applied in a short period. Furthermore, the fact that setting does not commence until the components are brought together is obviously advantageous and saves much inconvenience and wastage of glue.

A Lee-Wave in New Zealand

by S. H. Georgeson

A wave flight to 10,600 *feet in New Zealand was described by Mr. Georgeson in our Spring issue, page* 22. *He has now capped it with a climb to* 13,000 *feet, which he describes in the following extracts from a letter to Philip Wills.*

At the present moment I am up country recuperating from my spell in hospital, so have had time to consider the Mackenzie Basin from a gliding angle. It really offers amazing possibilities for hill-soaring on a grand scale and also wave-flying. I have done about 15 hours' flying in this basin in the Prefect, which is ideal for explorations of new air, owing to the fact that it can be landed on a pocket-handkerchief.

I am afraid I am a little worried about flying the Weihe in this country, especially as I have had no experience of flying high-performance sailplanes, and I am so afraid of damaging it in landing. I am therefore examining possible landing sites from the ground, and have also been helped by the fact that a number of stations are now putting in airstrips for rabbit-poisoning from the air.

At Christmas time I am trying to organise a gliding school up here with the Christchurch Gliding Club's two-seater. Peter Renshaw will probably be here with the Prefect and I want to have a go at wave-flying in the Weihe if weather permits. This will be New Zealand's first gliding meet if it comes off.

Just before I sold the Prefect, I had a glorious flight in lee waves, about 30 miles from Christchurch. Ground wind was N.E.; above 2,000 ft. was N.W. about 20 kts., with a sky full of lenticulars. I was towed in rough air toward the lee of the Southern Alps. I was hoping to get forward of a lenticular lying about 10,000 ft. However, air became so turbulent that I got out of line with the tow plane and was forced to release. I was then 15 miles N.W. of the airfield at 8,000 feet. I was annoyed at having to release, so decided to return to the airfield and try again. Shortly after turning down-wind I found the air became smooth, so I turned into wind and found I was going up around 15 feet per second. When the altimeter showed 13,000 ft., I thought I had better find a way down, in case the lift became excessive and I got into the oxygen area.

I went forward and soon found "down", so I turned back to the lift and found to my surprise a beautiful lenticular cloud lying across the wind. Evidently I had been sitting right on the front of it and going up with it as it developed. I was about 200 ft. above the top of it. I then found that this was the third of a series of lenticulars. The one I was after in the first place was still in front of me and a huge one was in front of it again.

Lenticulars were stacked up to about 25,000 ft. to the south of me, and far above the lot, stretching as far as the eye could see north and south, was a cirrus cloud, smooth at the front and trailing off to cirro-stratus and small patches of cirro-cumulus. I guessed the height 40,000 to 50,000 ft. I got no higher, but from the lenticulars it was obvious I was in the wrong place, and I should head south. However, as it was ate in the day, I decided to play about where I was, which I did for an hour. I eventually reached a point 30 miles from aerodrome so decided to return before dark.

I unwound the 5,000 ft. which I had gained very rapidly indeed. However, I got back to the airfield before dark. It was very interesting and showed the possibilities of wave flying. Unfortunately, the Aeronautical Research Committee have decided not to investigate this phenomenon, so technical and financial assistance won't be forthcoming as was originally hoped.

I am looking forward tremendously to getting the Weihe, although I am a little awe-inspired at the thought of flying such a machine. I have been advised by ground engineers out here to avoid clear dope on wings, etc., as the sun will rot the fabric very quickly. I believe the Weihe has clear-doped wings; therefore it may be advisable to spray the clear part silver.

Clubs and Associations

New Zealand Gliding Association

THE year 1952 will undoubtedly retain an honoured place in the history of the sport in New Zealand. This year Club flying has recommenced in both islands after an unduly long recess caused by World War II.

In the middle of the year, the AUCKLAND GLIDING CLUB's T-31 was test-flown successfully, and since then has logged over one thousand flights for a total flying time of more than 70 hours. She has carried 75 people, 34 being pilot members and the remainder associate members. There is keen competition among the pilot members to hold the T-31 duration and altitude records of the Club. At the moment the figures are 40 minutes and 3,200 feet respectively, but both are expected to be increased before the season is over. The Auckland Gliding Club has purchased an Eon Baby sailplane from the Midland Gliding Club in England and members are eagerly awaiting its delivery, so that they can experience the thrill of solo soaring, and not merely soaring under instruction.

The CANTERBURY GLIDING CLUB's T-31 was test-flown more recently—a little over a month ago, but from reports received its flying hours are mounting even more rapidly than the Auckland Club's two-seater. The airfield from which it is being operated at present is within only a few minutes' drive from the centre of Christchurch, so that it is quite possible for keen members to have some dawn flying and then appear at work at the required hour. By virtue of this circumstance and also because the present method of launching is by aero-tow, the logbook of the Canterbury T-31 is rapidly being filled. Future plans of the Canterbury Club include the overhaul of a winch, and the transfer of operations to an airfield outside the control zone.

A group in the MANAWATU district has a T-31 kitset being shipped out from the U.K. at the present time, while there is a possibility that a Club may be formed in DUNEDIN and that one or more of the Aero Clubs that have been forced to cease flying operations, owing to high costs, may take up gliding.

Among the private owners there is a keen sense of competition that matches the enthusiasm of the Club members. The Prefect, which has been flown in the Christchurch area for the past two years by S. H. " Dick " Georgeson, has been sold to Dr. Peter Renshaw of Dunedin. Both these pilots received their initial training at Dunstable, gaining Silver C's there, so that in a few weeks' time when they get together at a gliding camp in the McKenzie country, even better performances than last year should be achieved. Before he parted with the Prefect, Dick Georgeson took it for a second trip into a standing wave, and rose to 13,000 ft. Now, however, he has taken delivery of the Weihe that was formerly owned by the World Champion, Philip Wills, and New Zealand records are expected to be set at a level nearer overseas standards.

The Auckland Olympia owners have benefited from the recommencement of Club flying, as more willing helpers are on the spot to assist in getting the sailplane into the air. The ridge at Clevedon discovered by Ralph Court has proved to be a first-class slope. It is about six miles from the airfield at Ardmore where the Auckland Gliding Club operates. The technique is to catch a thermal after an auto-tow launch, and then, if the wind strength is suitable, head off downwind to the slope. Eventually (with luck) the thermal conditions will improve sufficiently to allow the return flight upwind back to the airfield, thus saving a retrieve and the necessity for derigging. This has been accomplished four times within the past six or seven week-ends, so it has almost ceased to be a matter of luck.

The Olympia made its first Gold C climb last week-end, when Gordon Hookings took it to 11,500 ft. from a launch to 800 ft. He reported that everything went according to the text-book descriptions, including the formation of ice on the leading edges, canopy and pitot head. Gold C distance will be more difficult to achieve from Auckland, and Diamond distance virtually impossible, but perhaps before twenty years have elapsed, as many radical changes will have taken place as have occurred in the past twenty years as far as New Zealand gliding is concerned.

Surrey & Imperial College Gliding Clubs

An outstanding recent occasion was Daisy's 10,000th launch ; Daisy, of course, being the Imperial College's T-21B. And this, in under four years, we consider to be not bad going. It cannot be claimed that she has come through the years unscathed, but the one or two scathes have at any rate been minor ones. She is now in the workshops on her C. of A.

We held three courses in September : the first was for the Iraq Petroleum Company's members ; the second, for a fortnight, for non-members ; and the last, running concurrently with the second, was for five officers from the Ministry of Civil Aviation. Four A's were obtained during these courses and two of the M.C.A. officers got their C's. Two further C's were obtained by two of our Australians, Alan Patching and Rupert Brown, who were helping Paul Blanchard, Ron Macfie and David Ince (who is now a member of the Surrey Club) to run the courses.

Two of our lady members, Benedicte D'Arcy and Kitty Jackson, went solo on the week-end of the 6-7th December, the week-end of the London fog : Frank Irving averred that, when driving Mephisto back to South Ken that evening, " the fog was so thick that I couldn't see the ground from the cab ".

The Christmas party, the following Saturday, was well attended, and it was nice to see lots of visitors from other Clubs. Much ingenuity was shown in the Fancy Dress Competition, the theme of which was " What one would do if there was no Gliding ". This was won by Beryl and Geoffrey Stephenson as Man and Wife. Second was Tony Goodhart as a skeleton with the notice " No Gliding : No Living " on his back. Third, Mickey Gilbert as a Flying Saucer, and fourth a visitor, A. E. Slater, who came as a Doctor (the only one we know who plays a penny whistle through a stethoscope). This was followed by a Pantomime " Ikkle Rude Gliding Bed " and, though bearing no resemblance to its title, it was well received.

The next day we had a race for Austin Sevens. We regret that the Editor of this magazine was unplaced, as was the writer of these notes. The Bombing Competition, using Daisy and a Tutor, was won by Ann Douglas. Later that day more serious flying took place and Benedicte collected her B.

As from the Christmas party week-end we are not flying for a bit, so that we can concentrate on the C's of A, but we hope to re-start on 10th January, when Daisy should be airworthy. As an experiment we are keeping Greeno at Friston this winter so that Olympiaites can get some cliff-soaring.

H.T.

Central African Gliding Association

Air Chief Marshal Sir Quentin Brand K.B.E. has consented to become the Association's first President. Sir Quentin was the first man to fly to the Cape.

Since the last publication there have been two events of interest in Central Africa. Mr. Eric Burditt, Chairman of the Salisbury G.C., put his H-17 Sailplane in the back of a small vanette and set out to explore the possibilities of the Eastern Districts, which are composed mainly of various types of hill formations. It was thought that this would produce some interesting hill-soaring sites, but in this respect it was disappointing owing to the difficulty of finding level ground for both launching and landing in this rugged country. On the other hand, the expedition proved that a small sailplane could be easily transported in a vanette without any damage over extremely rough country.

The second event was the Air Day held in Salisbury jointly by the Salisbury Gliding Club and the Civil Service Flying Club. It was attended by the Acting Governor. Apart from demonstrations of winch-launching, auto-towing and aero-towing, a great many people had flips in the Club's two-seater, including the Acting Governor. The Club put up 30 auto and winch launches and 10 aero-tows. It was interesting to find that the T-31 two-seater was easily towed by the Club's somewhat second-hand (£50) Tiger Moth at a density altitude of 7,000 ft.

Sqn. Ldr. Lamond from Gwelo tells us that the Club there have done 1,000 launches in their first six months, which is good going. They have just purchased a T-31 kit from Umtali which they are now assembling. They hope also to purchase an intermediate sailplane in time for the Centenary Rally in Salisbury in September, 1953.

There has not been much flying at Bulawayo, as they have been concentrating

on building their new winch. This is a V.12 engine on a self-propelled chassis, and should be good.

The Unvukwee Club are trying to get their T-31 finished by a professional in order to save them time.

Army Gliding Club

ACCORDING to *Lift*, the club magazine, operations at Lasham up to 30th September, 1952, covering seven months flying, have resulted in 4,802 launches, 633 flying hours, and 700 miles across country. Certificates taken : 18 A, 19 B, 11 C. Silver C legs : 6 height, 2 distance, 1 duration. The T-21B two-seater has contributed 254 hours from 2,600 launches. The same period in 1950 accounted for less than 1,000 launches, some 35 hours flying and 80 miles across country.

Correction to last issue (p. 136) : a reef knot, with which the club mends the piano wire used in auto-launching, is found to wear out in about 100 launches, not 10.

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The first supply of covers for 'Gliding' has now been sold out, but we have now available an improved type, taking 12 issues (3 years) per volume. This can be obtained from the B.G.A. in maroon leather cloth, with gold-lettered spine. Price 15/- post free.

Royal Air Force Gliding & Soaring Association

Moonrakers Gliding and Soaring Club

THE idea of a R.A.F. gliding club for the Wiltshire area was first envisaged by Group Captain J. D. F. Bruce, at that time Commanding Officer of Melksham. As a result of his efforts, assisted by Sqn. Ldr. (now Wing Commdr.) E. T. Symonds, the Moonrakers Gliding & Soaring Club was formed during 1951.

The initial financing of the club was made possible by generous grants from the P.S.Is and Messes of R.A.F. Stations Colerne, Compton Basset, Hullavington, Melksham and Yatesbury.

After several months of work under the supervision of Sqn. Ldr. Sheppard at Melksham and Sqn. Ldr. E. F. Thornicroft at Hullavington, two Cadets Mk I were built from ex-A.T.C. scrap. Midway through 1951 the first flight of the Moonrakers G.S.C. were made, using auto-tow from the runways at Hullavington.

At this stage the newly formed R.A.F. Gliding & Soaring Association came forward with a new T-31 dual trainer. Ab-initio training was then commenced, using the dual all-through method.

In 1952, owing to powered flying at Hullavington, the site was changed to the disused airfield at Keevil.

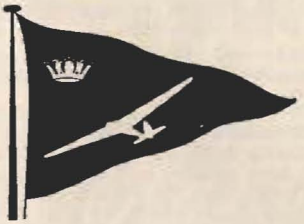
Since its formation in 1951 the Moonrakers has made 1,700 launches and members have qualified for 26 certificates. A standard method of training and recording was introduced by the C.F.I., Sqn. Ldr. E. F. Thornicroft, A.C.F., D.F.M., early in 1952.

The Club instructors, Flt. Lt. Clark, Pilot Off. Loveland, Flt. Sgt. Owens and Corporal Paddick have all attended the Home Command Gliding Instructors' Course at Detling.

A Wilde winch has recently been made available and winch launching is now used generally with auto-tow as a standby. Recently the Club acquired the Gull I in which the late Flt. Lt. Miller made the first post-war crossing of the English Channel. Work is now in hand to restore this sailplane, which has been somewhat neglected prior to its allocation to the Moonrakers.

J.C.

Royal Naval Gliding & Soaring Association



Branch Clubs

DURING the 1952 season our Branch Clubs have only achieved a moderate amount of flying, a total of 2,703 flights compared with 3,770 during 1951.

Portsmouth Naval G.C.			1,564
Heron Gliding Club			573
Gannet	,,	,,	395
Condor	,,	,,	24
Fulmar	,,	,,	147

Why is gliding making such slow progress in the Senior Service ? The answer to this question is a twofold one.

First, instructors. Nearly all our clubs continue to suffer from a shortage of instructors. In no case was more than one regular instructor available ; at one club the only (part time) instructor went to the Far East in July, and at another the only one was required frequently to be absent elsewhere on duty. As a result of the regular Dartmouth Cadet gliding courses each summer, a certain number of power pilots are being indoctrinated into the technique of instruction, and the R.N.G. & S.A. hopes very much that some of these will come forward and help if they find themselves appointed to Naval Air Stations where gliding clubs are struggling for survival.

Second, money. As in many other spheres of life, paths would be made smoother if more money was available. For instance, one club was unable to continue because it could not meet its insurance outlay ; another has only an SG-38 for training, and its parent Association has insufficient funds to be able to buy a two-seater to help it. One of our better-endowed service opposite numbers is able to employ a full-time paid instructor, with the result that its annual launches

regularly reach 5,000 ; another is able to buy dual trainers and high-performance sailplanes with which to equip its branch clubs.

We might charge higher fees, but it is doubtful if that is the right solution ; in the present-day fighting services, facilities for practically every sport—except, as far as the Navy is concerned, gliding—are provided, with little or no cost to the individual, so that it is rapidly becoming unnatural to have to pay towards one's recreation.

All is not gloom, however ; most of our branch clubs have progressive ideas for the 1953 season, and quite a few pilots are only awaiting the opening of the new season to start cross-country flying and to complete their Silver Badge qualifications.

High Performance Flying

During the 1952 season members of the Association, flying the Meise, chartered from the Admiralty, have flown 553 cross-country miles, have exceeded Gold Badge height on four occasions, and have established a United Kingdom speed record for the 100-kilometre triangle and a speed performance for the 100 kilometre goal flight (this latter twice, as the performance was bettered shortly after the first flight).

Summer Camps

The innovation of organising summer camps for Naval personnel at civilian gliding clubs was a marked success, and it is hoped that it may be possible to run similar camps in 1953.

A.G.G.

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London Gliding Club

We have acquired the Sky which was broken in Spain, and have nearly finished putting it together again. Frank Foster is renovating a Meise which he acquired from Newcastle, and A. Ivanoff is having a new Camel built, this time with cantilever wings.

The club expects to have reached 2,000 hours by the end of 1952, after a specially good day, 21st December, brought us within 10 hours of the target. A notable contribution towards the total was a five-hour flight in the Grunau by Herrick in a gale of such intensity, on 17th December, that commercial air services were grounded all over the country.

Our last cross-country of the year was an arrival, not a departure, when Prof. Varley came from Oxford in an Olympia, 34 miles in 55 minutes.

An out-and-return contest has been instituted, with prizes from the Jack Hanks memorial fund. Pilots will be handicapped according to type of machine, and, though they need not be witnessed at the turning point, they must satisfy the Committee that they have done the flight claimed.

Three of the club fleet have been flown for over a thousand hours each since they came to the club: the prototype T-21 two-seater, the Prefect and a Tutor.

Southdown Gliding Club

The most outstanding flight since the last report and most interesting of the year was made by Ray Brigden in the Olympia on 14th September. He was bungy-launched at our hill site at Firle into a northerly wind. After an hour hill-soaring, he climbed in a thermal to 2,700 feet and then flew across the gap in the Downs at Lewes. Soaring the hill to the next gap at Steyning, which he crossed with 250 feet to spare, he continued along the Downs to Kithurst Hill, where after soaring for a further hour hoping to get enough height to continue, he landed 27 miles from his launching point, having been in the air 4½ hours. He said that cross-country flying in thermals was preferable as during the hill soaring he felt that he was always too near to the ground.

The Olympia was taken to Lasham for three weekends at the end of August. Sunday, 17th August, was one of those rare occasions when there were thermals over Friston; these were accompanied by a light north wind. Flights of up to 45 minutes were made; Don Snodgrass reached 3,500 feet in a Tutor and flew inland as far as the Long Man at Wilmington; the T-21b went up to 3,000 ft. On Sunday, 28th September, the wind was strong from the south, which made soaring good along to Beachy Head. Ron Tull reached 2,400 ft. over the Head; both he and Barry Smith got their five-hour durations in the Tutors.

Hereford Gliding Club

We are still in the grip of snow and ice in the West Country but it is relaxing at last. No flying was possible in November, but with the barometer now falling we are hoping.

After losing the use of the Hereford Airfield (when it closed) we operated at Madley (ex R.A.F.) airfield on a temporary permission, as its future was uncertain also. Soaring took place at Coppet Hill, near Goodrich, when conditions and primary training commitments permitted. The Club found (as others have also) that winching on tarmac runways was quite uneconomic, particularly with training, and changed to auto-launching with piano wire with better results.

Due to the inaccessibility of Madley, intake of new members fell, and the T-31B two-seater and winch were sold. Flying went on with Kite, Tutor and Cadet, but finally the club was asked to vacate Madley as the R.A.F. wanted it. Need it be said that to date no developments seem to be taking place there! Temporarily, therefore, the club is without a primary site.

Some members have joined the Midland Gliding Club and at the moment Avia and Tutor are at the Long Mynd. The Kite is down for C. of A. and to have brakes fitted. Members are particularly keen to try the Avia in light wind conditions at Coppet Hill. It is found to be a delightful machine in these circumstances and has already been referred to as the "hydrogen-filled monster". Geoff Benson soared it to 5,500 feet in the Mynd wave and, like "Teddy" and others, became more concerned in getting down in daylight than in going on heavenwards! Another member soared it for 1¼ hours on a day when even T-21 could not stay up.

J.A.B.

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Midland Gliding Club

We have had a very successful year, as can be judged by the hours flown, now numbering over 1,500. A proportion of this total was contributed by the ever-increasing number of visitors with their own aircraft and by camp members who used our equipment. Statistics show that during the peak months of July and August, 700 hours were flown by visitors, Air Training Corps, Royal Naval G.S.A. and the Midland Club ; flying took place on almost every day.

September was very mixed for weather. On the 2nd a promising day tempted A. A. J. Sanders into golden aspirations, but he was unfortunate and landed at Honiley, 53 miles. Meanwhile, several pilots at the Mynd were wafted up to about 7,000 ft. in a wave. Doc. Cotton used waves to fly 23 miles to near Tenbury Wells.

The Club's camp from 6th to 14th was very poorly served by the weather, and the only sparkle was John Cotton's completion of Silver C with a 60-mile flight to Usk in the blue Olympia. Dr. Cotton, not to be outdone by his son, completed his Silver C a week later by taking the blue Olympia to near Gloucester, 45 miles. Then John Cotton flew her down to Langley, Bucks., 125 miles in 2½ hours, on the 21st, reaching 9,000 ft. near Stratford-on-Avon on the way; he was only forced to land by T. & S. battery failure.

On 27th September Christopher Wills took a faultless C, reaching 3,000 ft. a.s.l. in a flight of 1 hr. 10 mins., and John Hickling explored the 14 miles of Wenlock Edge.

A Slingsby Prefect arrived on 12th October, and the club also has now a pukka V-8 retrieving vehicle.

The week-end 25-26th October produced 60 hours' soaring in 70 flights, mainly on the hill, though C. E. Hardwick and Rich Prestwich found a small wave up to 3,800 ft. a.s.l. Bob Neill did his 5 hours just in time before joining the R.N.A.S.

A detailed report of that amazing day, 1st November, appears elsewhere. Bruce Bowdler and Tony Adams in Tutors reached 8,000 and 9,000 ft. respectively ; Teddy Proll, our ground engineer, after his tussle with the wave up to 7,500 ft. now intends fitting hinged barn doors on the Kite's upper wing surface. Other pilots better equipped could take greater advantage of the conditions. During the morning, Rich Prestwich in Blue Olympia made the most successful flight : he reached 14,000 ft. near the Mynd and, by using seven other waves, arrived at Lyneham, Wilts, 81 miles —a flight which raised the Blue Olympia's 1952 mileage to 1,000.

During the afternoon Allan Pickup made the best height ever done on our site in waves—14,500 ft. in the club Olympia. Theo Testar and R. Maxam took T-21B, complete with new semi-enclosed canopy and colour cine camera, to 10,600 ft. The Venture with Hickling and Jones reached 11,000 ft. while on a test flight. Other flights, normally newsworthy, were made by Hully, Anstey and Col. Benson, who bagged his Silver C height in the Avia.

It has been calculated that the total gain of height on that day was 85,000 ft.

Visitors with their own aircraft intending to visit us during 1953 should contact the secretary early to avoid disappointment. A big Easter Rally is planned : see separate announcement.

J.H.H.

Deeside Gliding Club

The summer of 1952 was a somewhat disappointing season, during which flying at Sealand was confined to the single aircraft available, the primary S.G. trainer, and some eager members migrated to other clubs to obtain their C's, two succeeding at Cambridge.

The autumn started well with the return of the Kite from repair after its unfortunate landing on a timber stack in June. The long-hoped-for flights from sites in the Welsh hills, near Ruthin and at Prestatyn, have at last materialised. Three members have obtained their C's by soaring the Prestatyn ridge ; others have had flights from the launching site near the Clwyd Gate Café. Unfortunately neither of these locations is suitable for landing back at the top, and hence, after landing in a field in the valley below, a retrieve, with consequent de-rig and rig, is necessary before the next flight.

However, a promising site near Dyserth, which will avoid this labour, is under investigation and, if negotiations with the owner and others are successful, our problems will be greatly eased.

V.B.



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Cambridge University Gliding Club

For the academic year ending in September, 1952, the Club has flown 450 hours, flown 668 miles across the countryside and has completed 2,688 winch launches during 180 days of the year. Six new Silver C's were awarded and club members completed seven more legs for this distinction.

The Club held two camps at hill sites, one at the Mynd in March and the other at Camphill in June. Both camps were marked by Alan Macdougall's considerable climbs in wave lift, one 9,200 ft and the other 8,000 ft. The Mynd was also the start for Steve Wiltshire's 104-mile flight. A private camp was held with the Olympia at the Clwyds in September.

Later in the Summer, Kit Drew flew 65 miles to Coltishall and climbed to 11,000 ft. going there.

Two parties went to France: one reached Pont St. Vincent, the other St. Aubin. One member visited the Stockholm Club and felt the pulse of the Swedish movement.

The beginning of the academic year saw Ken Machin as C.F.I., and George Whitfield was appointed a club instructor. Ab-initio training has been carried out throughout the term with Bluebell, our T-21B. Later in the term our hard-working ground engineer, Ted Warner, and enthusiastic secretary, Alan MacDougall, both became full instructors. Though the autumn mist, fog, and mud has hindered the training, John Worsley has just gone solo from a scratch start in his first term of gliding—a point worthy of note and demanding considerable sustained enthusiasm.

On the last day of October Philip Wills visited the Club and gave a very interesting and amusing account of the World Championships.

This particular week-end the Sky arrived. No. 2 Test Group are test-flying the aircraft to find the polar curve for the machine fitted with only a skid instead of a skid and a wheel, as they did last year to a similar machine; 8,000 ft. of aero-tows are the order of the day, and it is expected that the tests will take three months as some 25 aero-tows are needed. Ken Machin is chief test pilot, while Lionel Alexander, David Martlew and George Whitfield are the other pilots of the group.

For the future it is intended to double the size of the present hangar and to rebuild the Olympia trailer. On the flying side a camp at the Long Mynd in March is projected, and the Olympia is visiting the Clwyds this Christmas.

J.C.R.

Oxford Gliding Club

The club has now completed its first year of operation. Membership has risen from under 20 to over 70. Most are beginners, but there is a sprinkling of power pilots, and members of other clubs have joined us to taste the local thermals (some of which are contaminated by smoke from the cement works).

In the year there have been 2,400 launches. Nearly 1,000 of them were taken in the Eon Primary, which has had 14½ hours free flight. The T-31 two-seater, which arrived in June, and spent almost the whole of July out of action, has had 700 launches and 31 hours. The Cadet has been active since April, and keenness increased when it was provided with a Horn variometer in September. A Grunau Baby has just been bought.

Privately owned sailplanes have done well with winch launches and an occasional aero-tow. The Olympia flew most, with 274 launches and 67 hours. Since the last report Goodall has done his 1,000-metre climb and qualified for the silver badge, and Stafford-Allen flew to the other side of Swindon, just over 50 km., on 13th September. No-one has yet completed 5 hours duration in the club, but we have hopes for 1953. Varley has stayed up four times for two hours or more in thermals, but the fifth occasion was a goal flight to Dunstable on 25th October, which was reached in 55 minutes, and the remaining hour and a half was literally hill-scraping.

On 26th October, Ann Douglas and David Ince of the Instructors' Panel made a very welcome visit, and Stafford-Allen and Varley were given the dual instructors' ticket. The T-31 was on its best behaviour, and produced for David Ince by far its most convincing spin. Our early attempts had produced only steep turns, but we now find that an attempt to pick up a wing at the crucial moment in a slow turn will cause the nose to drop almost to the vertical. Needless to say, recovery is quite normal.

G.C.V.

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Yorkshire Gliding Club

ONE of the most encouraging results of our Rally in August was the number of new flying members gained. In spite of some difficulty in finding enough voluntary instructors with time to spare, training has gone ahead most week-ends in spite of frost and snow and wintry weather (we bask in sunshine, high above prevailing fog). We have at the moment 16 ab-initios, and since the summer Peter Lockwood and Jack Sanders have qualified for their C's. (Sanders came to us from the Midlands Club where he had done most of his training).

The Middleton St. George Gliding Group have joined us for hill-soaring, and during the last week in October three or four of them, camping in the clubhouse, put in 65 hours flying. P. A. de C. Swaffer and D. Ellis got their C's and M. Bishop, J. Ellis and W. J. Pearce gained their Silver C duration legs. On the flight after gaining his C, Swaffer contacted a thermal at 150 ft. which took him to cloud base at 2,800 ft.; from there he travelled 25 miles to a point seven miles beyond Malton, and then, since he had no maps, no barograph and no retrieving vehicle nearer than Middleton St. George, he decided he had better return, which he did, as far as Cawton, 8 miles from Sutton Bank.

We have schemes on hand (if a little in the air) for building an open trailer, a T-31; another winch, and for making down sleeping-bags for the dormitory, a roll of strong nylon sateen and the feathers of 50 geese having been donated.

Next year we hope to have a resident instructor/ground engineer and are planning to hold:

Two Long Weekend Rallies—

1. At Whitsuntide.
2. From 21st-24th August inclusive.

Competitions will be arranged in three classes: (a) for Silver C pilots; (b) for C pilots; and (c) Open Events. Prizes will be awarded for the best performances.

Four Training Camps—

1. During Easter week, 4th-12th April inclusive.
2. Immediately after the Whitsuntide Rally, from Tuesday, 26th May to 2nd June (Coronation Holiday).
3. From Saturday, 27th June to Sunday, 5th July (provisionally).
4. From 5th-13th September inclusive.

Further details will be given later. Those interested are asked to write to the Hon. Sec., Miss Parke, "Norlands", Middlecave Road, Malton, Yorks.

S.P.

Derbyshire & Lancashire Gliding Club

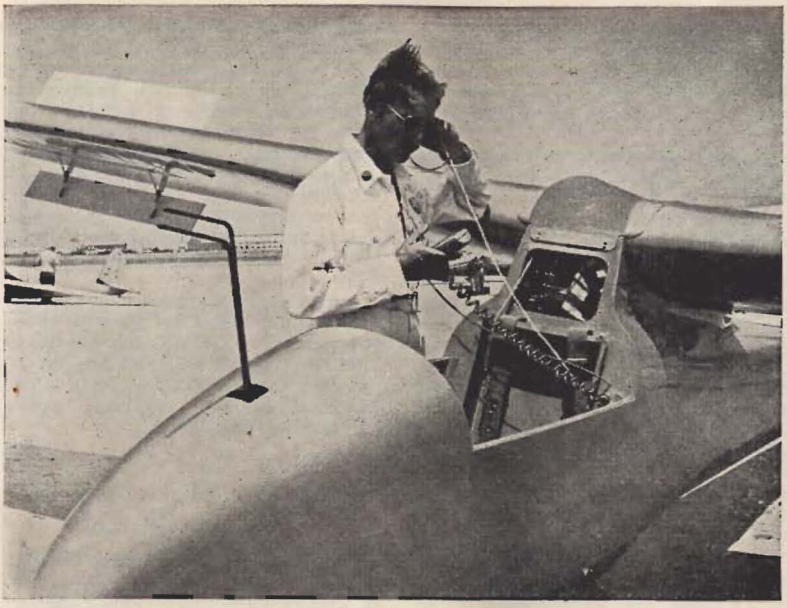
ONE of our 1952 targets, that of 700 hours' flying by the club fleet of aircraft, was passed during November, and even if we do no flying at all in December our club flying time for the year will show a 36 per cent increase over 1951. Taking the several machines separately: the T-31 heads the list with 162 hours (at 7 minutes per launch), followed closely by the Olympia with 156 hours (average 42.3 minutes per launch), while the least used machine is one of the Tutors with 59 hours (at 19.1 minutes per launch). A real effort is to be made this year to analyse separately the cost of flying and the cost of launching; and we hope to be able to publish some interesting facts on this subject shortly.

No very outstanding performances have been put up by our members this year, the best being 11,000 odd feet in a cu-nim by "Curly" Bulling and a distance flight of 123 miles by Fred Breeze, our ground engineer. Training, on the other hand, has shown an increase in number of launches, flying time and certificates gained, for at least the third year in succession: i.e. continuously from the time we started dual training.

The five weeks' Air Training Corps camp, which was still in progress when our last notes were written, had poor training weather to finish up with. Fortunately a number of disappointed candidates from the earlier periods were able to attend part-time during the final week, with the result that 26 C certificates were obtained.

The twin-drum, permanently housed, Diesel winch which will ultimately take care of all west wind launches, is coming along nicely. The engine and mounting are at Camphill and excavations for the foundations of the house have started; but there is a lot to do yet and we should not care to guarantee the date of the first launch.

G.O.S.



Radio-Telephones were used with great success by World Champion Philip Wills and his team-mates during the 1952 World Gliding Championships in Spain. Each of the competing gliders was equipped with one of the new lightweight Pye "Walkie-phones" whilst Pye mobile units were installed in the retriever cars.

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Scottish Gliding Union

THE last of the 1952 series of summer courses took place from 6th-12th September. These were fully booked and as highly successful as usual. The course secretary, Bob Porteous, the instructors and winch drivers deserve thanks and congratulations. For the third year, a special course for Air Rangers was included.

The thermal soaring season stopped this year with many hopes and aspirations unfulfilled. A few early standing waves would have compensated for this, but apart from one occasion, these elusive manifestations have not appeared at week-ends. The exception was Andrew Thorburn's flight in the Olympia, in which he used a thermal as a stepping stone to the rather weak wave, after a winch launch from Balado. In a 1½-hour flight he reached 5,000 ft.

The prevalence of northerly winds recently provided an impetus to find a suitable site from the many north-facing slopes in the area. Two have been selected for a trial, using the Fordson tractor winch, which is eminently suitable for rough country, though rather slow on the open road.

D.H.

Newcastle Gliding Club

LOOKING back on the history of this club we seem to move from one crisis to another. Fortunately we have always had a fair number of stalwarts whose backs go up whenever the existence of the Club is threatened. The latest crisis was caused by two very serious crashes to the T-21, before we had an opportunity to get our fledglings airborne after the long site-less period. Add to these difficulties the fact that our portion of the Aerodrome is waterlogged, making flying possible during frosty weather only. What keeps the Club alive is its City Headquarters.

A spot landing competition was arranged for November 9th and five solo pilots took part with the Tutor and Kite. Landing marksmanship was so good that no decision was made.

The Club has disposed of the Olympia.

Andy Coulson has acquired a Kite II, which is in our workshop for overhaul. Tony Morphett has gained his A and B and it is hoped he will reach Silver C before returning to Australia.

Bill Tweedy delivered an instructive gliding lecture on 29th October to an audience of non-flying members, but the pilots for whom the lecture was intended were missing.

Miss Anne M. Gray has taken over the duties of Hon. Secretary, and Jack Anderson has become Flight Secretary. Miss Dorothy Trueman has shown efficiency and enthusiasm in the City Headquarters and at all Club events.

Large working parties have changed the City Headquarters by painting and distempering the four flights of stairs and landings, together with the large lecture and games room. Following this, Len and Margaret Hartley organised the most successful Tramps' Party.

A.P.M.

College of Aeronautics Gliding Club

SINCE our last report, members have been enjoying some good soaring, both here at Cranfield and in the camp at the Mynd. Keith Emslie got Silver C height with a climb of 4,100 ft. during a very nice flight of 2 hrs. 50 mins. in the Grunau at Cranfield. He completed his test with a 40-mile cross-country from the Mynd to Norton Canes, again in the Grunau. At the same time, the end of June, Mick Henney climbed 3,800 ft. in the Tutor from a winch launch at Cranfield, but without barograph. The next day he struggled hard in the Grunau but could only gain 3,000 ft.

At Summer Camp, as already reported by the Midland Club, whose excellent hospitality we enjoyed, we gained 8 C's, and in the fortnight 12 members shared 125 launches and 78¾ hrs. We took both our Tutor and Grunau, and this proved so successful that already we are trying to organise two camps there for 1953, at Easter and during the summer.

On 22nd November our first attempt to hold a party was a great success. Jack Rice showed his slides of the Spanish Internationals.

The two-seater training programme got away to a good start with the new student entry, and the New Year should prove to us its full value. We gained 4 A's, 6 B's, 9 C's, and one Silver C last year.

M.L.H.



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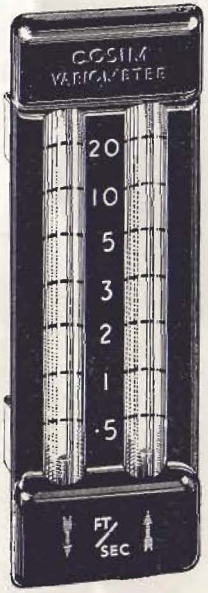
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