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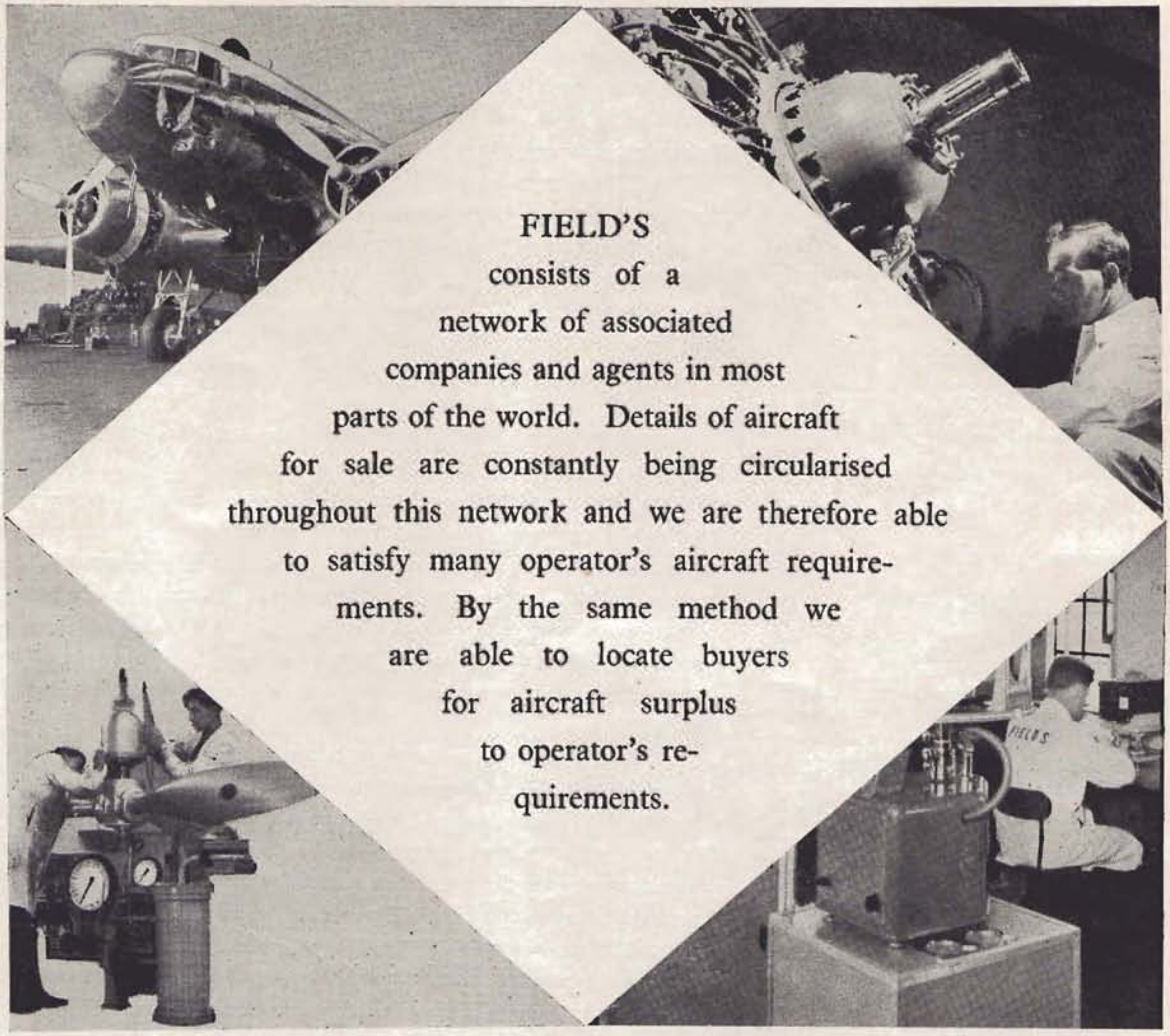

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Sailplane and Glider

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THE FIRST JOURNAL DEVOTED TO SOARING AND GLIDING

OCTOBER 1953 ★ Vol XXI No 10

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London SW1
PHONE: SLO 7287

The *Sailplane and Glider* is published on the 5th of every month. Price Two Shillings per copy: 25s. 6d. per year posted. Advertising Rates on application.

Published for the licencees, Glider Press Ltd., by the Rolls House Publishing Co., Ltd., and printed by The Mendip Press, Ltd., London and Bath.

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Cover Photo:
Soaring at Lippstadt, Westphalia, Germany. D. H. Lewis.

Editorial

AS always at this time of year, the big event in the flying world has been the Farnborough Show of the Society of British Aircraft Constructors. As always, too, it was an enterprising Show, exciting and exhilarating, an affair of gleaming motors and screaming jets. But at least one small voice was heard to ask 'Where are the gliders? Don't we build any?'

Where was the 'Eon Olympia'; the champion 'Sky,' the little 'Skylark,' and the other runners from the Slingsby stable? Perhaps there are questions of expense or high policy we know nothing about, but how grand it would have been if that vast public could have watched and enjoyed a little light relief in the form of a SILENT aerobatic display. Aircraft with engines are getting increasingly complicated and increasingly expensive, both to build and maintain. We foresee the day when the general public will no more think of flying its own aircraft than of offering to captain the Queen Mary. If we are to keep people air-minded as successfully as they have been kept small-boat-minded, we must give them something simple and cheap to mess about in, something they can afford to buy or build for themselves and can maintain in reasonable condition without too much interference.

Here we come up against safety regulations, of course. Well, perhaps they are too stringent after all. Nobody inspects your dinghy to see if it leaks, nobody stops you setting out in a canoe to cross the Channel; if you are fool enough to do it without proper precautions that is your own fault. The trouble is that we are not yet sufficiently air-minded to take the hazards of flying as matter-of-factly as we take the hazards of going to sea. Safety is all-important, but it depends much more on the personal factor than on the aircraft. Training and experience are what makes the difference between a safe pilot and an unsafe one. We must concentrate all our efforts on first-class instruction and on cheap flying. How shall we set about it?

One of the problems that most bedevil a Club is the eternal question of shortage of cash. There does seem to be a part solution of this in England by means of the Covenant system. Two Societies this past week have sent out forms to their members suggesting that they should pay their annual subscription by means of a seven-year Covenant. The member's share of the subscription remains the same as before but the Income Tax paid on that amount can be recovered by the Society. This can of course only be done where it does not benefit the member directly, but perhaps by these means one might be able to benefit one's Club? An increased income might enable a Club to pay for the upkeep of one more sailplane and so benefit all the members by giving them more opportunity to keep in training. It becomes in fact a kind of Government subsidy towards the cost of running a Gliding Club. At any rate, it is a suggestion worth enquiring into, for it would give at least a temporary relief.

We shall be grateful for any other ideas from our readers for anything that can bring down the cost of flying training or help people to fly more hours for less money; only by cheap flying can we keep up a high standard of pilotage.

'HKS-1'

The First German Sailplane with a Laminar Flow Wing Section

Technical Data :—

Span	63 feet.
Wing area	200 sq. feet.
Weight empty	approx. 705 lb.
Weight loaded	approx. 1,145 lb.
Sweep-forward at 30% chord	5°.
Dihedral angle of the wings, upper surface	1.5°.

IN view of our present economic situation, the choice of the equipment for successful gliding activities needs careful consideration. Our sailplane designers are fully aware of this situation, although there is no organised development. There is evidently a limitation to the tremendous variety of new ideas, and that is at the point where a reasonable price can still be maintained with the conventional methods of construction. Roughly speaking, this limit appears to be at a gliding angle of 1 in 27. Experience with a few designs showed that a gliding angle of 1 in 30 entailed 50% more expense. If German gliding wants to catch up with the international standard of performance it will have to make a corresponding contribution towards the improvement of the performance of sailplanes.

Systematic work in other countries, especially in the United States by Dr. August Raspet, has shown how it is possible to improve the performance without making the construction unbearably expensive in carrying the classical features of high performance to their extremes, and without interfering with the handling properties or other desirable qualities of the aircraft. The main idea is to shape the whole surface of the sailplane by design and by craftsmanship in a manner that there is a fall in pressure in the direction of the airflow over a maximum portion of the surface, i.e., that the laminar boundary layers remain stable over a maximum distance. This demands a construction which does not only produce greatest smoothness, i.e., absence of roughness as well as waviness, but also guarantees this condition with all states of stress, especially where the wing is concerned. It is necessary to construct the skin of the wings, the fuselage, and the tail unit so that neither weather, loading, nor internal stresses cause any uncontrolled deviation from the desired geometrical shape. According to Dr. Raspet's observations the contour should be true to ± 0.05 mm. (0.002 in.) in the direction of the airflow over a measuring base of 50 mm. (2 in.).

Apart from this main feature the following requirements have to be met in designing a sailplane of conventional dimensions and maximum performance :

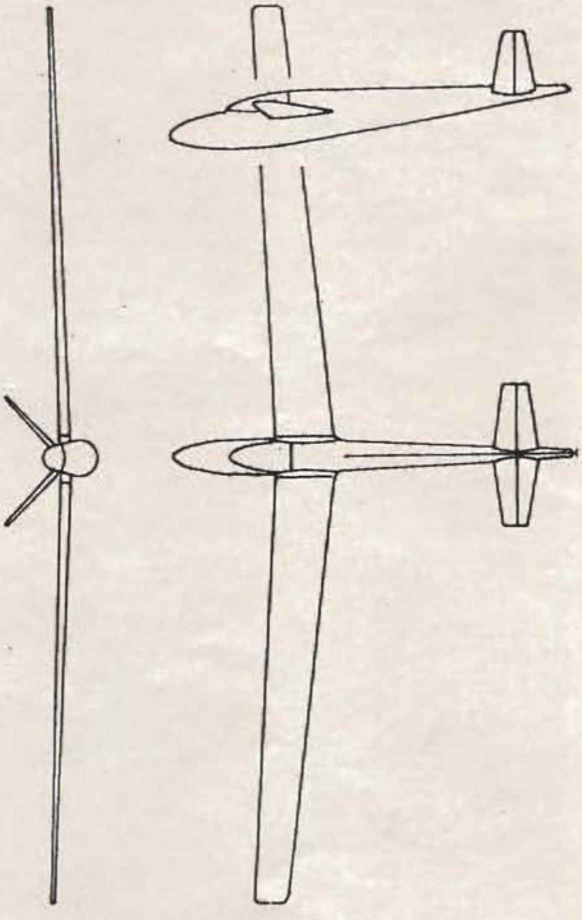
1. Efficient wing section.
2. Clean nose.

By KARLHEINZ KENSCHE

3. Tail unit sections with laminar flow over a considerable portion.
4. Prevention of losses due to gaps in the wings.

Inspired by the experience made in Spain, the result of the record attempts at Klippeneck in August, 1952, and especially by Haase's world speed record over the 100 km. triangular course in a 'Condor IV,' the research group Haase-Kensche-Schmetz ('HKS') have made an attempt to fulfil these requirements with the new design 'HKS-1.'

In order to stiffen the skin of the wing, the entire leading edge and on the upper surface also the space between mainspar and auxiliary spar are covered with sheeting consisting of three layers. The ribs



are reduced accordingly. The covering is made up from an inner layer of 0.6 mm. (0.024 in.) plywood, a layer of foamed resin (Polyzell), 6 mm. thick (0.24 in.), and the actual stressed skin, 1.5 mm. thick at the root (0.06 in.) and 0.8 mm. at the tip (0.032 in.).

This support of the outer skin results in a very high shear strength (failing load : 330 kg./cm², i.e., ca. 4,700 p.s.i.), apart from the extremely small divergence from the true profile. The fins of the butterfly tail are constructed in a similar way. The nose is covered with plywood. This skin carries a layer of balsa which has been trimmed to the proper shape.

In order to comply with point 1 an airfoil was developed which is based on N.A.C.A. results. According to the system designed by Abbot and Doenhoff for 6-series-profiles this airfoil has the number 65 (215) 714. It has a rather wide laminar range at $C_L = 0.7$ of width 0.4 and a high, not too sharp C_{Lmax}.

The shape of the fuselage is based on similar lines, although the demand for a spacious cockpit and an optically clean canopy, i.e., a one-piece blown Perspex hood, which requires its own special profiling, had to be taken into account. This compromise was willingly accepted since laminar flow over a distance of about 7 feet cannot be expected even with the cleanest shape and the best finish, owing to the high Reynold's numbers of the fuselage.

The airfoil of the tail unit was chosen on the same principle.

Requirement 4 has been satisfied by the omission of air-brakes and ailerons. Lateral control is effected by elastic camber change of the rear third of the wing section. The camber change which produces an aileron effect increases in magnitude from the root to the tip. It starts from zero, the increase is linear, and the differentiation is 2 : 1. At the same time it is possible to change the camber on both wings symmetrically, downward for increased lift and upward for speed. The twist of the wing can also be changed. It is preferably 0°, but can be given a negative value of about 2°. The necessary degree of twist with regard to performance and stability is determined during a test-flight and adjustments are then made on the ground. This symmetrical change of camber is superimposed by the unsymmetrical change for lateral control described above. The entire upper surface of the wing is thus completely free from gaps. The mechanism of the camber change will be described in detail in a later article. This system has already been applied to the flaps of a ' Condor IV.' A test-piece stood up to 250,000 load changes with full deflection up and down without showing any sign of damage of the elastically distorted members.

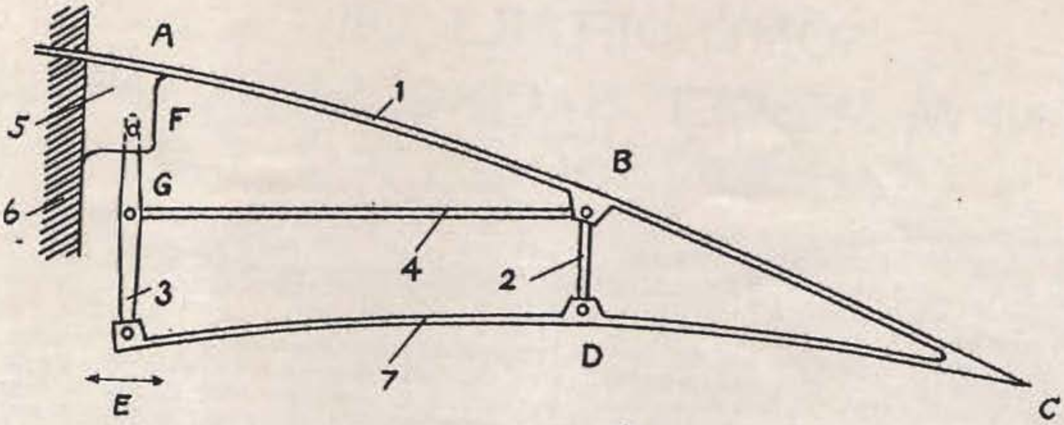
As a landing aid a small parachute is used which is kept in a plywood tube at the end of the fuselage and can be brought out in emergency and on landing, together with the undercarriage. The advantages of a braking parachute are :—Appreciably lower weight than ordinary air-brakes, no brake slots in the wings, and the possibility of limiting the speed of the fuselage in case the wings break up, so that the pilots can bale out safely.

The aircraft had a successful maiden-flight at Duesseldorf on 19th July, 1953. As far as an opinion can be formed from this one flight of about 1 hour as a single-seater, it can be stated that the expectations concerning the performance of the wing without twist, the data of the wing section, the lateral control and lift increase by change of camber, and the braking parachute have been fulfilled. Performance figures are not yet available, but the float observed especially on landing is very encouraging.

With regard to the technique employed for the trimming of the upper surface of the wing it can be said that the difficulties were not as great as expected. However, it was found necessary to proceed with greatest accuracy from the very beginning. Control jigs for the wing profile in the uncovered and covered states at intervals of about 4 feet are indispensable for a continuous check. The profile contour has to be true within about 0.1 mm. at the control points. Allowing for an error of 0.1 mm. with the jigs themselves, a maximum divergence from the true profile of 0.2 mm. is to be expected. The contour is first established at the jigs and the surface of foamed resin is then trimmed to the correct shape between the control points. This is done with sandpaper stuck to a long straight-edge which has to be kept accurately in the required direction. The glue-spread should be uniform so that no clusters are formed. It may be of interest that a shear strength (failing load) of 330 kg./cm² (ca. 4,700 p.s.i.) was found with a piece of wing covered with the same skin (1st layer 0.6 mm. plywood, 2nd layer 6 mm. of Polyzell, 3rd layer 1.5 mm. plywood), regarding only the outer layer of plywood as stressed.

After the wing had been covered it showed a waviness of ± 0.15 mm. (0.006 in.) as a mean value, and ± 0.2 mm. (0.008 in.) in a few places, measured by means of the instrument developed by Dr. Raspet with a measuring base of 50 mm. (2 in.). About 60 hours' work with scraper and sandpaper eventually produced the desired waviness of only 0.05 mm. (0.002 in.).

Concluding this article, a few details about the mechanism of the camber change are given. The structure of the ribs can be seen from the illustrations. Fig. 1 shows the principle employed. The steering acts at points E in 6 places along one wing. Due to the position of point G on arm 3, the movement of point B is controlled to produce smooth curvature. Member 2 is hinged at B and D and serves the mutual support of 1 and 7 which may be under tension or compression. The triangles BCD and ABG transmit the bending moments and shearing forces with good stiffness and act on the control system at point E. The forces acting on the under surface are transmitted to the steered ribs by the stressed skin 13 which consists of 3 layers. The grooves shown render this skin stiff in spanwise direction and flexible in the direction of flight. Fig. 3 shows the position of deflection in diagram. Control compensation which could easily be effected by spring loading, has not been installed yet. The forces required to move the stick (lateral control) and the camber change lever are so small that it will have to be decided after a longer flight whether compensation is necessary at all.—Translation from *Aero*, Munich, August, 1953.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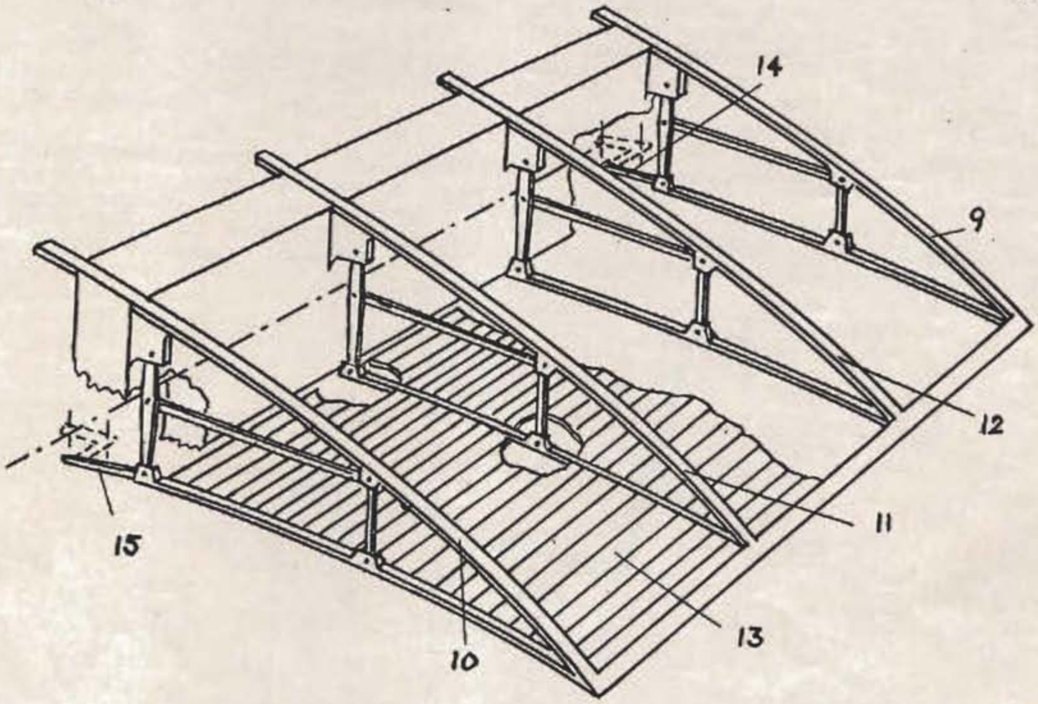
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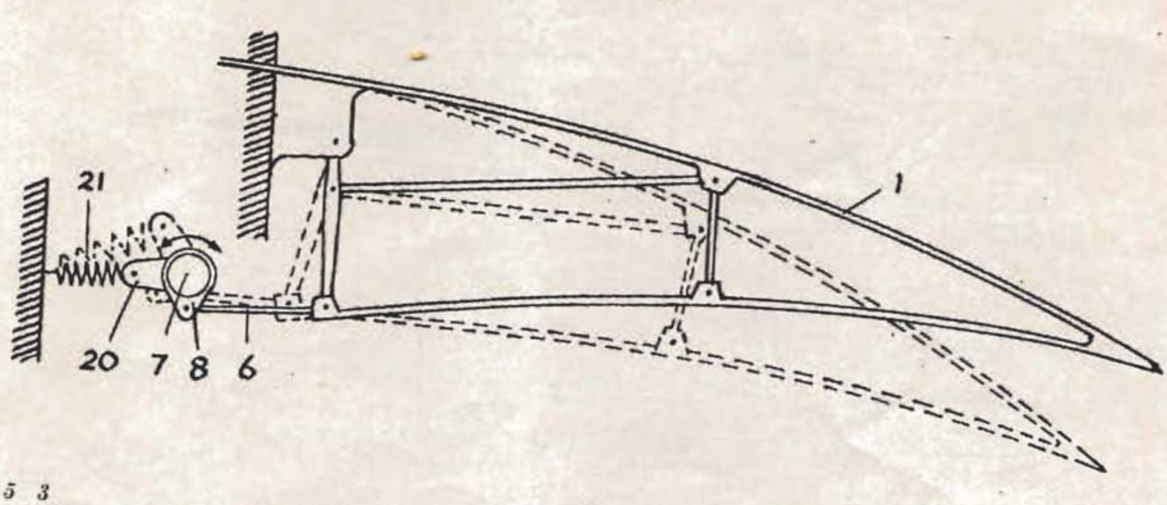
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SOME DETAILS OF A NEW MIDGET RACING SAILPLANE

By H. F. V. M. Schwing

JAN K. HOEKSTRA is one of the best known sailplane pilots in the Netherlands. He has Silver 'C' number 1 and is the holder of the national record for duration since 1937 with 24.04 hours.

About 20 years ago a big two-seater was designed and built by him but soon after the first flights, it was blown over by a severe gust and damaged beyond repair. After this 'H-1' he designed a small aircraft and now he is studying the project 'H-3,' a midget sailplane with a very high cruising speed.

The 'H-3' has a span of only 10 metres (33 feet) and a wing area of 5 m^2 (the 'Olympia' has 15 m^2). Thus the aspect ratio is 20. With an all up weight of 180 kg. (395 lbs.), (including 100 kg. or 220 lbs. for pilot plus parachute, radio etc.), its wing loading works out to be 35 kg./m^2 (72 lbs./$feet^2$) which is very high for a sailplane.

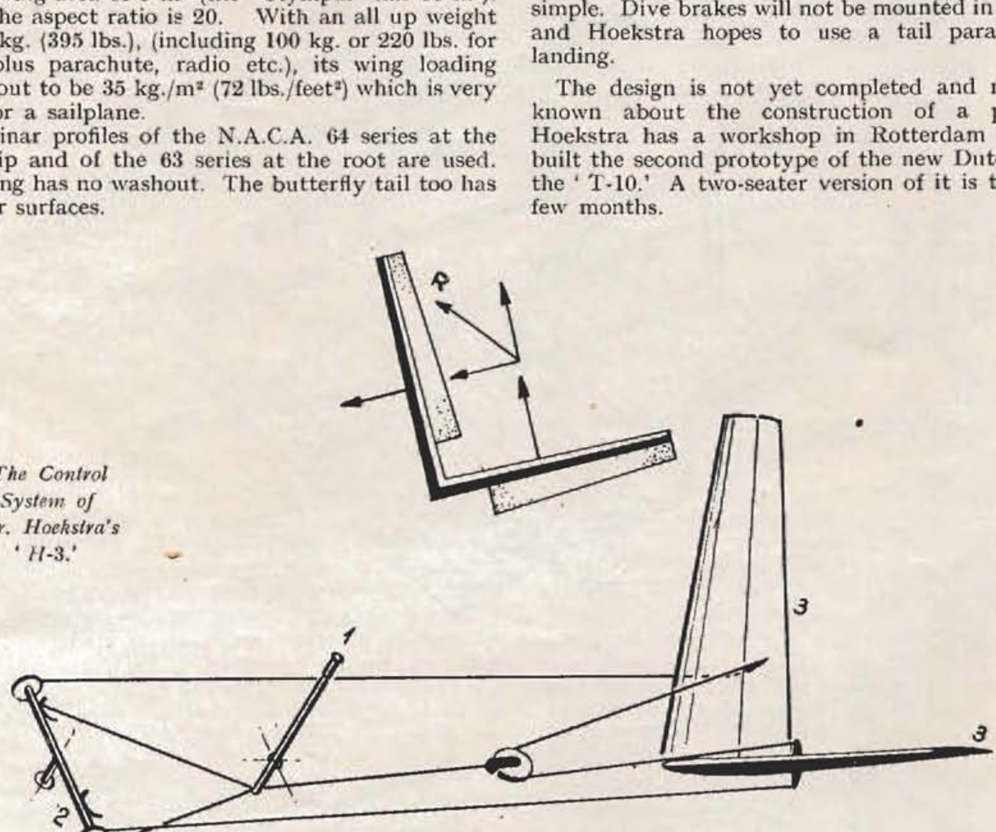
Laminar profiles of the N.A.C.A. 64 series at the wing tip and of the 63 series at the root are used. The wing has no washout. The butterfly tail too has laminar surfaces.

The calculated best gliding angle is 1:35 at 100 km./h. (62 m.p.h.) and the best sinking speed 75 cm./sec. (2.5 ft. p.s.) at 90 km./h. (56 m.p.h.). Minimum speed with flaps down is 62 km./h. (39 m.p.h.).

The construction of the 'H-3' is entirely of wood. Both wing and fuselage will be made of sandwich construction, without spars. The circular fuselage has a double skin. The space between the two skins is filled with some sort of light material.

The control system of the butterfly tail is very simple. Dive brakes will not be mounted in the wings and Hoekstra hopes to use a tail parachute for landing.

The design is not yet completed and nothing is known about the construction of a prototype. Hoekstra has a workshop in Rotterdam where he built the second prototype of the new Dutch trainer the 'T-10.' A two-seater version of it is to fly in a few months.

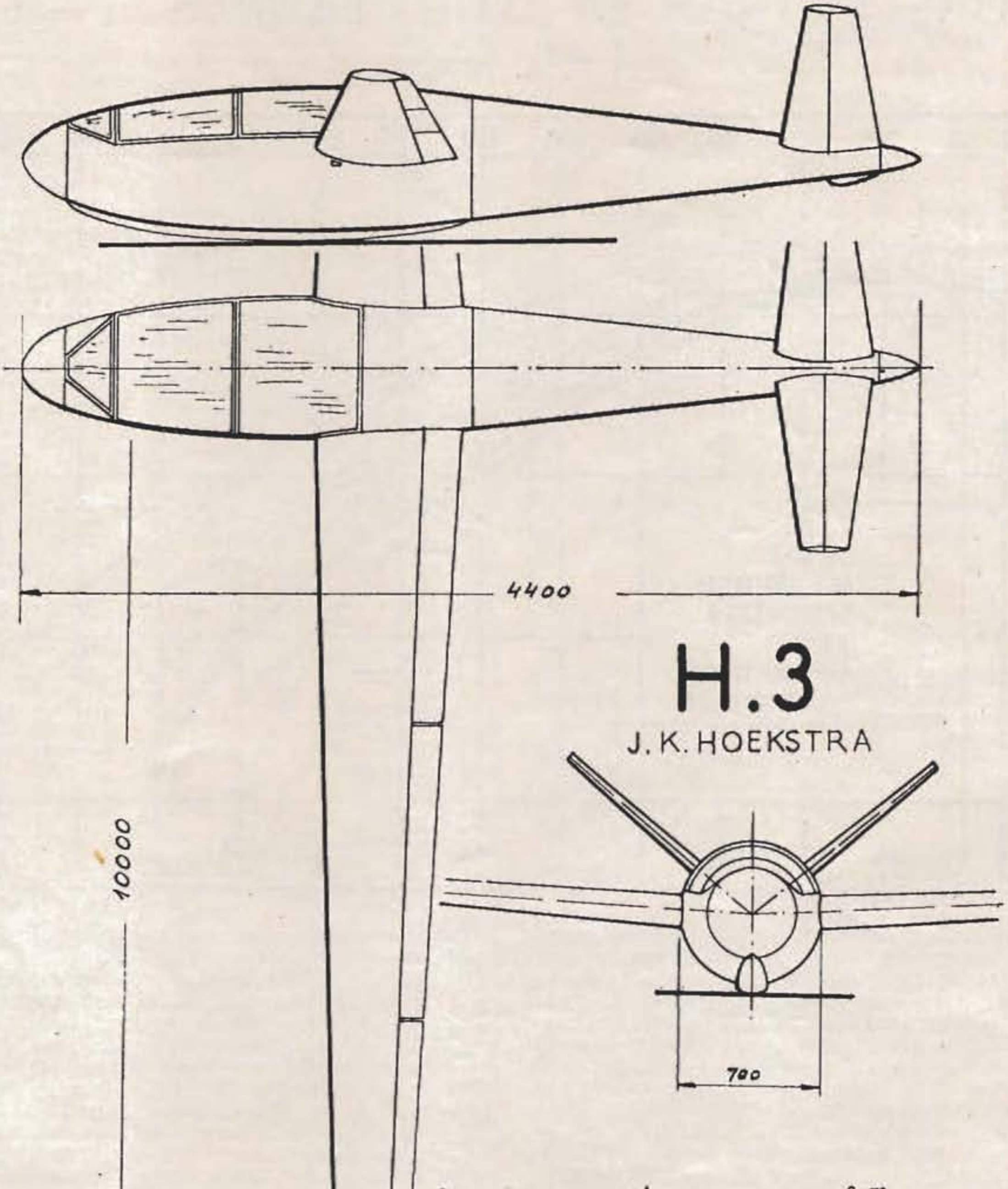


The Control System of Mr. Hoekstra's 'H-3.'

LONDON GLIDING CLUB

ALL flying charges, except for two-seater instruction, have been reduced by half for flying before 10.30 a.m.

By this measure the yearly flying hours should be greatly increased.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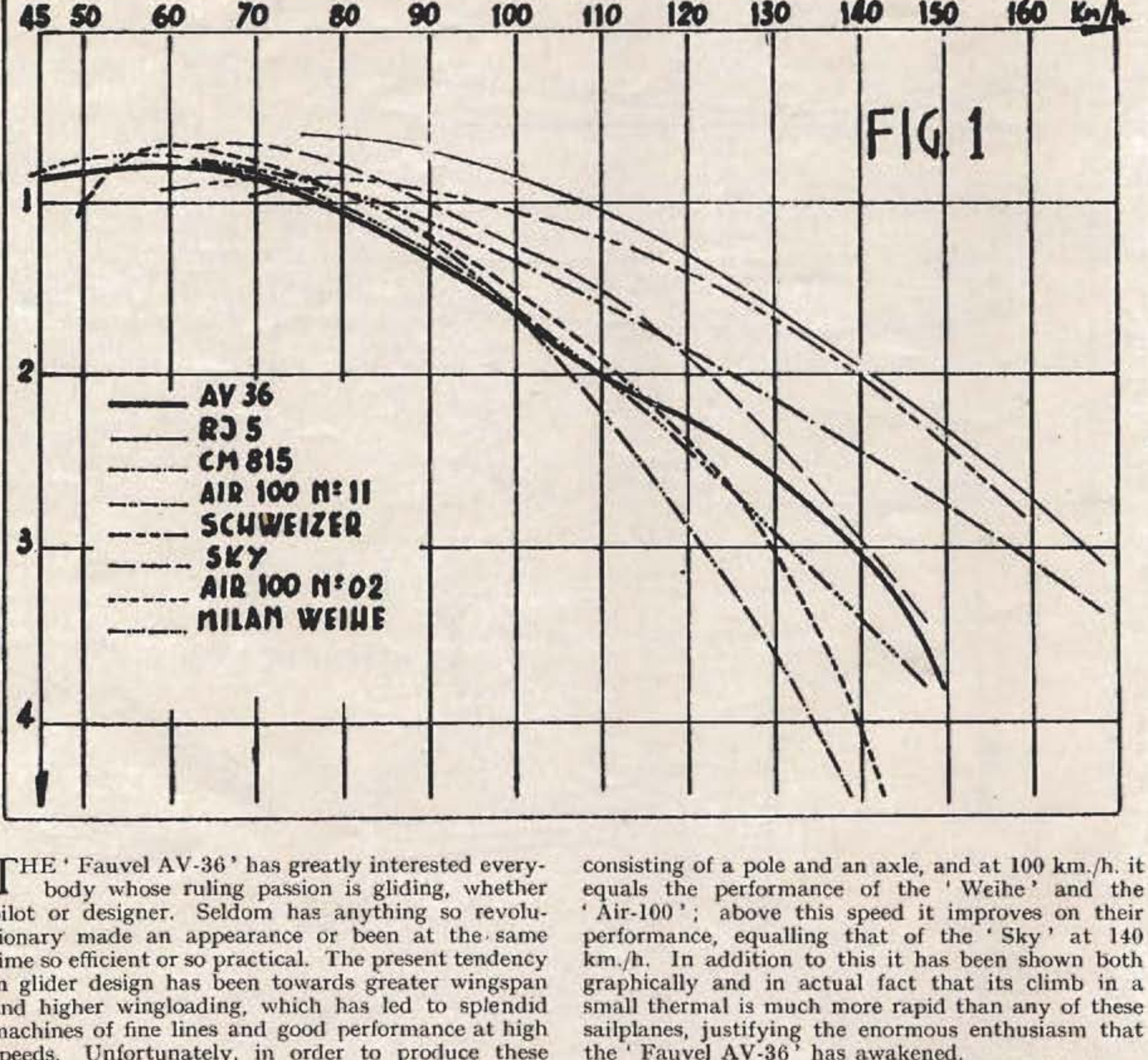
MORE DETAILS OF THE 'FAUVEL AV-36'

By G. A. BERON



THE 'Fauvel AV-36' has greatly interested everybody whose ruling passion is gliding, whether pilot or designer. Seldom has anything so revolutionary made an appearance or been at the same time so efficient or so practical. The present tendency in glider design has been towards greater wingspan and higher wingloading, which has led to splendid machines of fine lines and good performance at high speeds. Unfortunately, in order to produce these results it has proved necessary to sacrifice a capacity for tight turns and low speeds, besides which the time necessary to build these sailplanes has increased their cost, as has the rising price of materials.

All these things have made more distant the dream of possessing one's own machine, as well as putting it outside the power of the clubs to buy or build sufficient high-performance sailplanes for their needs.

The 'AV-36' flying wing does not pretend to be a super-sailplane comparable to the 'Sky,' the 'RJ-5,' or the 'CM 8-15,' but it is definitely superior to the 'Olympia'; and it can be built in from 800 to 1,000 hours, it costs three times less, it can be stored in a very small space, it needs only the simplest of trailers consisting of a pole and an axle, and at 100 km./h. it equals the performance of the 'Weihe' and the 'Air-100'; above this speed it improves on their performance, equalling that of the 'Sky' at 140 km./h. In addition to this it has been shown both graphically and in actual fact that its climb in a small thermal is much more rapid than any of these sailplanes, justifying the enormous enthusiasm that the 'Fauvel AV-36' has awakened.

The calculations have entirely satisfied the Aeronautical Technical Service of France and the Flight Experimental Section has confirmed the excellent stability, both longitudinal and transversal, of the sailplane and also proved that it is impossible to spin it, on purpose or by accident. The gliding angle is 1 : 24, and with a pilot weighing 75 kg., the minimum speed of descent is .83 m./s. at 67 km./h., or 1.63 m./s. at 100 km./h. With a pilot weighing 85 kg., these figures become .87 m./s. at 72 km./h., and 1.5 m./s. at 100 km./h., with the best speed being 78 km./h., for the lighter pilot and 84 km./h., for the heavier.

After being tested and improved by its designer the prototype 'AV-36' 'Monobloc' was put at the disposal of S.A.L.S. for further tests early in June, 1952. On the 23rd July on the first distance test, Eric Nessler made a flight of 460 kms. During the month of October the 'Fauvel' totalled 115 hours in 130 flights, being flown by twenty-six different pilots, designers, week-end pilots, professionals, French and foreign, of every age and every stage of training, with entire success.

Instructor Nicaise of Beynes in the course of his flights made some perfect loops and other aerobatic manoeuvres, although the flying wing was not designed for aerobatting. But as with other pilots and the designer himself, Nicaise was quite unable to put her into a spin.

During test flights at the Centre, Charles Fauvel reached speeds of 180 km./h., without brakes and 125 km./h., with them, recovering at 4.2 g., but there was no tendency whatever to vibrate or warp.

Using the Hosli method, which shows the ability of a sailplane to climb in thermals, it is easy to see the good qualities of the 'AV-36.' On this graph the rate of descent is compared to the rate of turn, taking as a base the speed in level flight and assuming that the turn is correctly banked. (Fig. 1).

By Fig. II we see that with a turn of radius 75 metres the 'AV-36' is only beaten by the best sailplanes and by only a few centimetres, but if the turn is made narrower—for example, a radius of 50 feet—the flying wing is better than any other sailplane except the 'Air-100.' This shows that it is an aircraft capable of making the best of any type of thermal. In wide thermals there is no appreciable difference between the different types of sailplanes.

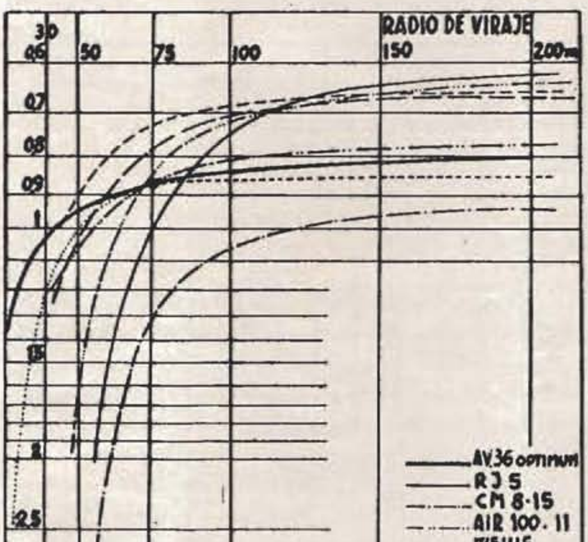


FIG. 2 SPEED OF DESCENT RELATED TO RADIUS OF TURN

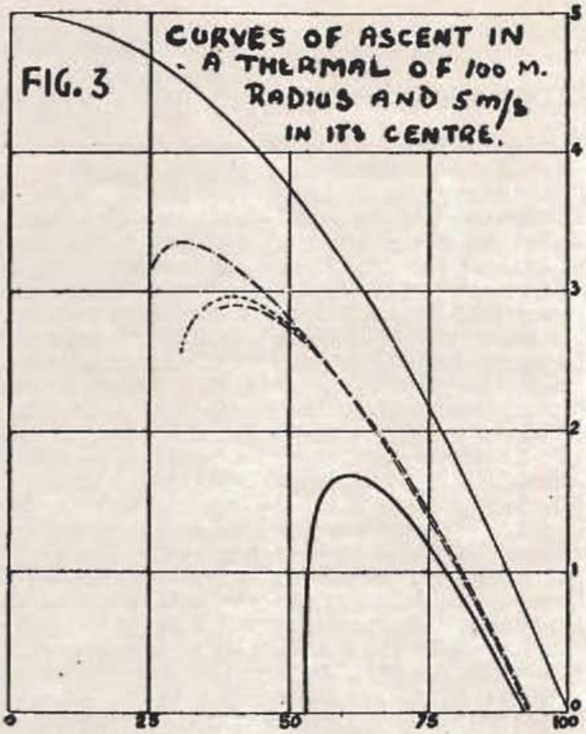


FIG. 3 CURVES OF ASCENT IN A THERMAL OF 100 M. RADIUS AND 5 m/s IN ITS CENTRE.

If we take a thermal of 5 m./s. (Fig. 2) at its centre and a radius of 200 metres, the differences are not yet remarkable but they already exist; for instance, whereas the 'Sky' can climb at 0.67 m./s., faster than the 'RJ-5,' the 'AV-36' climbs 0.15 m./s., faster than the 'Sky.'

If we take a thermal of equal strength but of only 100 metres radius (as used in the Hosli method and in the R.S.A. bulletin to compare the performances of competing sailplanes in Spain) (Fig. 3), the differences are noticeably marked. At its best the 'Sky' will climb 1.2 m./s., faster than the 'RJ-5,' and the 'AV-36' 1.65 m./s., faster than the 'RJ-5'—i.e., 0.45 m./s., faster than the 'Sky.'

We might add that the Hosli method is not entirely accurate as it makes no allowances for the build-up of forward resistance in the turn. Nevertheless, this resistance is far greater in a sailplane of wide span and long fuselage ('Weihe,' 'Air-100,' or 'Sky') than it is in a small sailplane, especially a flying wing of small span like the 'AV-36.'

Comparison of 'Olympia' and 'AV-36.' Fig. 4. Comparing the curves of the two machines we get :—

Minimum sink	'Olympia-Meise'	0.75 m./s.
Best glide	,,	23.5.
Sink at 100 km./h.	,,	1.80 m./s.
Minimum sink	'AV-36'	0.80 m./s.
Best glide	,,	22.2.
Sink at 100 km./h.	,,	1.65 m./s.

The best glide of the 'Olympia' is a little better and its minimum sink likewise, but the curve of the 'Fauvel' is longer. The 'Olympia-Meise' is only superior at speeds between 57 km./h., and 67 km./h.—

DIGEST REPORT

GERMAN NATIONAL CHAMPIONSHIPS—Oerlinghousen, 1953

With acknowledgments to *Weltluftfahrt, Thermik* and *Aero.*

Sailplanes.

There were 26 participating sailplanes, 18 of which were two-seaters, most of which were flown solo. There were no class distinctions between single or two-seaters. The interesting laminar flow and warping wing ' H.K.S.-1 ' two-seater will be described elsewhere. One ' Condor IV ' also had warping inner wings, it was originally used to flight test arrangements designed for the ' HKS-1.' There was one 15 m. span ' Spatz ' and of course, the Yugoslav ' Kosava ' two-seater and a French ' Air 102.' See list for other types.

Classes.

There were three classes designed to encourage the participation of the younger generation in national competitions. Class I for pilots experienced in competitions. Class II for elder pilots who had no competition experience. Class III for pilots under the age of 30 without competition experience. All pilots were marked according to the same rules.

Tasks. With distance marking only.

- I. Goal flights with multiple goals in a straight line.
- II. Triangular flights with as many circuits as possible.
- III. Goal flights.
- IV. Out-and-Return flights.
- V. Triangular flights.

All goals and turning points were selected by the organisers.

Marking system.

No bonus for attaining a goal. Projected distance along track determined by where an arc of a circle, centre the unattained goal, radius the point of landing, cuts the straight line track between the last goal or turning point and the one which was not reached.

The relation between distance marks and speed marks was of great interest and simplicity. If all sailplanes landed at the goal, 100% marks would be given for speed and none for distance. If 90% of all sailplanes landed in the goal, 10% of the marks would go for distance and 90% for speed. If 80% attained the goal, 20% for distance and 80% for speed, etc., etc. If no sailplane reached its goal, 100% marks would be awarded for distance and none for speed. The best performance of each day gained 800 points, those competitors who did not obtain 20% of the best performance would not receive any marks at all.

Daily tasks.

28.7.53. Triangular flight of 38 km. As less than eight sailplanes completed the flight no marks were awarded.

29.7.53. Triangular flight of 38 km. (50 km. including the approach). Eleven competitors gained marks. Pierre completed two circuits.

30.7.53. Triangular flight of 28 km. No marks awarded.

31.7.53. Triangular flight of 28 km. No marks awarded.

1.8.53. Triangular flight of 30 km. Five sailplanes completed the circuit. Twenty-one gained marks.

2.8.53. Triangular flight of 30 km. Pierre completed 5 circuits. Twenty pilots gained marks and made two or more circuits.

3.8.53. Goal flight with Speed and Distance marking. First goal 88 km. Second goal 141 km. Only Hanna Reitsch and the Yugoslav Komac reached the second goal and received speed marks. Two others passed the first goal. Only eleven pilots qualified for marks.

4.8.53. Triangular flight of 100 km., with as many circuits as possible without speed marks. No marks were awarded.

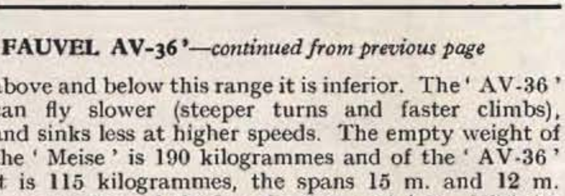
5.8.53. Triangular flight (30 km. ? ?) bad weather. No flights.

6.8.53. Goal flights, 136.5 km. Komac, Roethemeier, Wiethuchter and Haase reached it, Pierre and Laur dropped short by one kilometre. 20 competitors gained marks.

7.8.53. Out-and-Return with distance and speed

' FAUVEL AV-36 '—*continued from previous page*

above and below this range it is inferior. The ' AV-36 ' can fly slower (steeper turns and faster climbs), and sinks less at higher speeds. The empty weight of the ' Meise ' is 190 kilogrammes and of the ' AV-36 ' it is 115 kilogrammes, the spans 15 m. and 12 m. respectively and the lengths 7 m. and 3 m. With its



great simplicity and high pilot safety factor the ' AV-36 ' can be used for training.

In conclusion we would point out that 30 sailplanes, type ' AV-36 ' are under construction in France, it is about to be constructed in Switzerland, plans have been requested by Jon Carsey, president of the Soaring Society of the U.S.A., and by a group in the Argentine, and all hope to be building in the near future.

marks. No competitor succeeded in leaving the site.

8.8.53. Triangular flight 100 km., with distance and speed marks. Twelve pilots completed the circuit. Haase set up a new German record of 70.7 km./h. A total of twenty-one pilots gained marks.

9.8.53. Triangular flight 100 km. Nine pilots passed the second turning point. Fifteen pilots gained marks.

Final Results.

Class I.

	Pilot.	Points	Sailplane
1	Pierre—France	4,680	'Air 102'
2	Haase—Herzogenrath	4,572	'HKS-I'
3	Komac—Yugoslavia	3,960	'Kosava'
4	Hanna Reitsch—Wetzlar	3,560	'Kranich III'
5	Medicus/Quinten—Munchen	3,232	'Spatz'
6	Kensche—Herzogenrath	3,202	'Condor IV'
7	Dr. Frowein—Freiburg	3,078	'Kranich III'
8	Roethemeier—Bielefeld	2,586	'Weihe'
9	Spaete—Frankfurt	2,502	'MU-13 E'
10	Edgar Dittmar—Schweinfurt	1,371	'Condor IV'
11	Rolf/Reese—Detmold	1,167	'Spatz'
12	Kuerten—Dortmund	1,032	'Kranich III'
13	Thamm—Guetersloh	468	'Condor IV'

Class II.

1	Wiethuechter—Kirchheim	4,227	'Weihe'
2	Hujer/Wittstock—Celle	1,428	'Condor IV'
3	Lang/Kuehl—Berlin	858	'Mu 13 E'
4	Becker/Kessel—Duesseldorf	819	'Kranich III
5	Katzner—Gladbeck	580	'MU-13 E'
6	Hesse/Heissmann—Gutersloh		

Class III.

1	Laur—Laichingen	1,963	'MU-13 E'
2	Lemke/Hohmann—Aachen	923	'MU-13 E'
3	Von Scheidt—Koeln	901	'Condor IV'
4	Diesperger—Freiburg	671	'MU-13 E'
5	Braun—Munchen	309	'Spatz'

Foreign Participation.

It is very interesting to note that although these were the German National Competitions, Pierre of France and Komac of Yugoslavia were not labelled 'hors de concours.' Their participation must have been especially useful to establish a competition standard after twelve years without competitions.

British Participation.

It is with great regret that we read about two incidents. Shortly before the start of the competitions tracked vehicles, presumably tanks, seriously damaged the landing field at Oerlinghausen. A great deal of work was required at the last moment to repair the airfield surface.

On the second competition day and on presumably the third flight of the new 'HKS-1.' Haase lost height after his first circuit and force landed on the British airfield at Detmold. He was informed that his sailplane would be confiscated and that he would have to pay a penalty of 60 DM (£5. 10. 0.) should he force-land there again.

Public Attendance.

About 50,000 people attended the opening and it is estimated that about 200,000 people visited the site during the competitions. The great number of short triangular flights greatly assist in making the competitions interesting to the spectator.

Cloud Flying.

Cloud flying by German sailplanes is prohibited by the Allied authorities in West Germany. WHY? Cloud flying outside Controlled Airways and Control Zones should be permitted without any restriction, and inside Airways and Control Zones provided the sailplane carries VHF. RT. These restrictions are not based on any operational or safety requirements. The ground radar surveillance network is sufficiently large and on an active basis, and does at present, assist Airways and Zone Control to prevent collisions between powered aircraft. Unless radar networks are active on a 24-hour basis and continually presented with new and surprising problems to solve, their efficiency will drop. It is suggested that radar networks should, wherever they identify a sailplane, attempt to vector it to the centre of strong convection clouds or cloud streets and provide special navigational assistance. The Radar network will benefit even more than the sailplane pilot by this service.

Finally it must be repeated that the present prohibition imposed on German sailplanes lacks all justification and is grossly unfair as the sailplanes flown by members of B.A.O.R. and B.A.F.O. clubs in the same air space do fly in cloud and do not have these restrictions imposed on them. It is high time that National Aero Clubs co-operated a little more in protecting the rights of private pilots against the tyranny of bureaucracy.

O.W.N.

EXTRACTS FROM THE ANNUAL REPORT OF THE GERMAN AERO CLUB

Gliding Clubs, 1952/53 :—840.

Serviceable Sailplanes :—514 (16 of these are held by private owners). 45% Two-seaters.

Serviceable Winches :—162.

Sailplanes under Construction :—534.

Winches under Construction :—217.

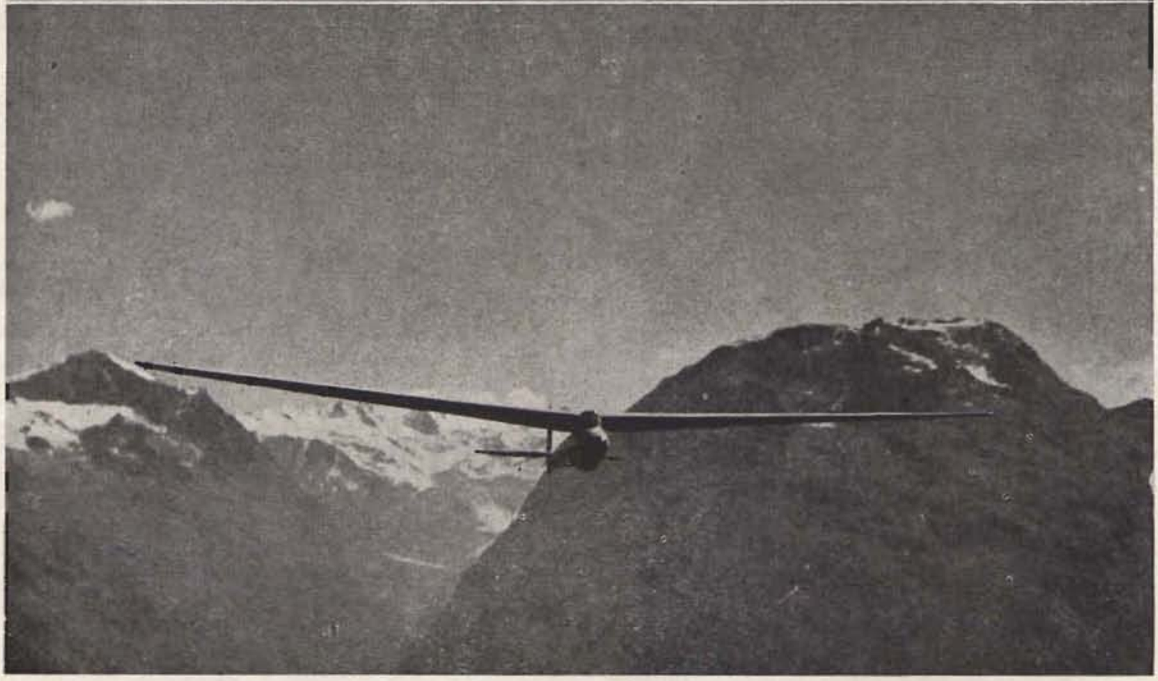
Hours Flown :—8,926 from about 150,000 launches.

Badges Awarded :—459 'B's', 367 'C's,' 9 Silver 'C's,' For legs gained during the war: 28 Silver 'C's,' 2 Gold 'C's.'

Records :—1. World Record, recognised by the F.A.I. in 1952, Class D-2, 100 km. Triangular Course, Speed :—E. G. Haase in a 'Condor IV' on 13th August, 1952, at Klippeneck. Speed 80 km./h. (50 m.p.h.).

2. National Record, recognised by the German Aero Club in 1952, Class D-1, 100 km. Triangular Course, Speed :—Heinz Kensche in a 'Weihe' on 12th August, 1952 at Klippeneck. Speed 58 km./h. (36.2 m.p.h.).—From *Aero,* August, 1953.

SCENES OF



Top : Sailplane in the Engadin, Samedan
Bottom : 'Weihe' over Rosegtal

SWISS GLIDING

Pictures by PHOTO HELLER

Top: 'Weihe' over Muottas Murail
Bottom: Young and old inspect Soaring Bird invader

THE 'MINIMIDGET'

By Fred Hoinville

I ASK all glider pilots all over the world to support this scheme to boost gliding, reduce costs, increase the amount of soaring which each of us can do, and make possible more and better contests.

All these things can be achieved by one major act. We must develop a new class of sailplane which must be the smallest, cheapest, simplest design which is capable of giving the owner a satisfactory performance for pleasure soaring and is good enough to be used as a standard contest sailplane.

It is possible to get a glide angle of 20 with a span of 25 feet—(7.6 metres)—and a weight of 100 lbs. (45 kg.) and a minimum sink of 2 feet per second or less. Such a sailplane can fulfil our requirements.

I therefore ask that all sailplanes should be divided into classes in the same way that sailing boats, boxers, racing cars, etc., are divided into classes by size or weight.

I ask that all contests should be run on the lines successfully demonstrated by the German gliding movement, and almost universally used in all other sports; that is, around selected circuits back to the starting point.

I ask that contests be restricted to the standardised classes and that unlimited-class sailplanes be used only for attacking open records, for private use, or for research and development.

I ask that each new class of sailplanes should be allotted its own set of national and world records, as with sailboats and cars, etc. Each nation is free to adopt this plan on a national scale without involving the F.A.I., but if we can also get the F.A.I. to adopt the plan then world recognition will be assured, which will be much better.

I ask that the new classes be as follows: The smallest class be restricted to 25 feet span and 100 lbs. weight; the second class to be restricted to 45 feet span and 400 lbs. weight; the third class to be unlimited. For two-seaters, the smallest class to be of 33 feet span and 200 lbs. weight; the second class 50 feet and 500 lbs. weight, and the third class unlimited.

It may be that some readers may approve the general scheme but disagree with the figures that I have chosen. While not claiming to be a better judge than others, I would answer those people by pointing out that we must have some figure as a basis, and I am suggesting a basis for discussion. I have checked these figures with well known designers and they are sufficient to do what we need. Whether they are the best is something for all of us to decide.

There will be many who will argue that 25 feet is too small for the minimum class. To these I say: The smallest class MUST be the smallest possible, without compromise. Those who want better performance can move up to the next class, but they must not increase the difficulties and costs of those who NEED the smallest class—and they are legion in number. Once we start making small alterations and concessions in size, we will gradually get right away from the one essential requirement and find ourselves back where we were.

Advantages to be gained under this plan are many. Those who cannot afford to buy or build a super sailplane will have the incentive of records and championships to compete for, so they will build 'Minimidgets.' Those who belong to clubs and get only a little soaring each year will build the 'Minimidget' class for their own use, and will build it in a few weeks and fly it every weekend.

When international or national contests are held, each centre will have such a large number of 'Minimidgets' in the district that it will be possible to supply each visiting pilot with one for use in the contest without requiring him to bring his own sailplane for thousands of miles or across oceans. These midgets will give all pilots equal opportunity and will be quickly and cheaply replaceable if damaged.

Contests are supposed to find out which pilot is the best. It is not necessary for record distances to be flown to do this. Even if nobody exceeded 200 miles in the whole contest (a figure within the reach of the 'Minimidget') the desired result would be obtained and the costs of running the contest would be greatly reduced. The German system of running the contests around circuits would simplify the contests even further, and would reduce the cost to a figure so low that almost any country could afford to stage a World Championship with gliders provided for visitors in the same way that Spain so generously provided them in 1952.

Owing to the low cost of the 'Minimidget' class, it would also be possible for the visiting pilots to guarantee to pay for any damage done to borrowed gliders. This was not possible in Spain, because the gliders were so expensive and many visitors were from countries which had currency restrictions and so could not guarantee large sums, even if they had it to give.

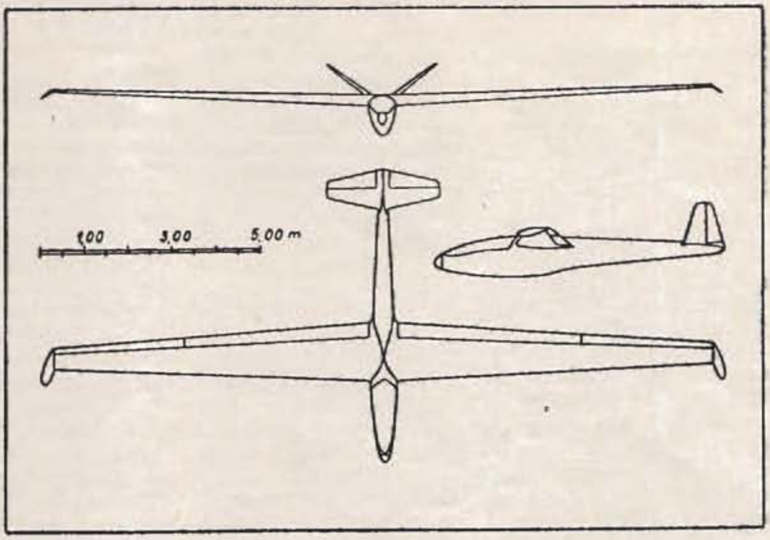
I have tested the suggestion of the 'Minimidget' in Australia and pilot response has been overwhelming. Not only glider pilots but power-plane pilots too have indicated that they will build the 'Minimidget' class as soon as the plans are made available. Many pilots have stated that the idea is the one which they have really wanted for years. Many power-plane pilots stated that they will change over to gliding because of the high costs of flying, but they could not do so before because gliders cost too much and were not available in sufficient numbers.

I ask readers to accept the figures which I have selected for one special reason: If there is great debate and argument about changing the exact figures, it will take many months for agreement to be reached, or it may never be reached at all.

SOUTH AFRICA AND THE 'BJ-1'

IT is well-known that South Africa is one of the most promising centres for gliding. By reason of its climate and the terrain it is very probable that soon great flights will be coming in, especially as they have some excellent pilots.

From previous experience it is obvious that there is need for a new design of sailplane which can make the best of the meteorological conditions of that country. Very strong thermals of great width allow the use of sailplanes with a large wing-loading, and we know that a large wingload means greater speeds.



This is allowed for in a new prototype of South African design, product of two South African pilots; Pat Beatty and Fritz Johl. Various characteristics make this single-seater machine even more interesting—the accentuated aerodynamic lines of the 6.5 metre fuselage, the butterfly tail, so successfully used in the most recent designs, the very modern deflexion of the wing tips in order to reduce drag. Flaps right along the trailing edge provide better results at slow speeds. It is interesting to note that the 'BJ-1' is still classified as a medium-performance sailplane since its span is only 15.4 metres. The slight two-degree wing slope although it does not help at stalling speed improves the efficiency at higher speeds. The dihedral is 3.58. The wing area of 13.9 sq. metres and with the great weight of the aircraft (340/365 kg.) the wing loading is 25,36 kg./sq. metre.

The sailplane is completely aerobatic owing to its very robust construction in wood. The prototype is at present under construction and according to its designers it is in no sense complex, as one might expect in such an aircraft. Pat Beatty and Fritz Johl are quite confident that their 'super-sailplane' will prove to be of higher performance than any other now in flight.

VUELO SILENCIOSO.

THE 'MINIMIDGET'—*continued from previous page*

Also, if each country decides upon a different basic figure, then it will delay international agreement and F.A.I. recognition, perhaps for years.

I ask you all to approach your National Gliding Authority and ask that this plan be implemented as soon as possible, and to ask your local designers to produce 'Minimidgets' quickly so that the type may be flown and tested and improved with as little delay as possible. I believe that quick action along these lines will result in a great growth of gliding as a sport and in more and cheaper soaring for those who just want to fly.

Here's to good soaring, and may there be more of it.

NOTES

Holland. The F.A.I. Gliding Commission Conference was held at the Hague from May 14-22. Suggestions were made for the 1954 Championship rules, and international regulations for cloud flying and use of radio in gliders were discussed.

U.S.A. The West Coast Soaring Contest took place at El Mirage Field, Adelanto, California, from August 1 to August 9.

Canada. The Western Canada Soaring Meet and Contest took place at Swift Current, Saskatchewan, in July.

U.S.A. The American Navy are testing a new type of back parachute which weighs five kilogrammes less than the present ones, and has a different method of opening. The refolding can be carried out quickly by one man instead of the usual two.

Holland. Charles Atger was presented with the Lilienthal Medal at the 46th F.A.I. Conference at the Hague. This was in recognition of his magnificent duration record of 56 hrs. 15 min., made in 1952.

Poland. The women's two-seater distance record, previously held by Betsy Woodward and Anna Saudek (U.S.A.), 274.1 km., was beaten by Miss Adamkova in a 'Kranich II' with a flight of 350 kilometres.

France. The National Championship was held from the 1-14 July. The results were as follows :—

Pierre (4,864 points); Lambert (3,912 points); Trubert (3,597 points); Weis (3,577 points); and Philip Wills (3,505 points).

THE PHILOSOPHY OF MOTORLESS FLIGHT RESEARCH

This article has been condensed from a paper by August Raspet, of the Aerophysics Department, Mississippi State College. The author, pleading the logic of improving performance by reducing drag rather than increasing power, refers to the possibilities of fully developed boundary layer control techniques which, he suggests, could increase the range of aircraft such as the 'Comet' by 750% and might yet realise Leonardo da Vinci's dream of flight by muscle power alone.

IN motorless flight there are but two avenues for progressive improvement: one is to seek better sources of power available in the atmosphere and the other is to improve the aircraft itself. Today's aircraft designers have all too often pursued a third avenue of improvement, that of increasing the power of the engine. Current jet engines having powers up to 20,000 horsepower are now attainable. High-powered aircraft place our pilots in the sad plight of carrying a heavy load of fuel even if intermediate ranges are to be flown, in order to take care of the requirements of high fuel consumption. Heavy loads lead to high take-off and landing speeds. But we need not look only to the heavy jet bombers for evidence of the aircraft designers' recourse to adding power instead of improving aerodynamics of aircraft. A small four-place aircraft tested for performance was found to require only 52 horsepower to propel it at its top speed, yet it required an engine of nearly three times this power to attain its top speed. If this same aircraft were to be improved by aerodynamic means so that it could cruise on 52 horsepower the fuel consumption would be about one-third of the present rate and the fuel load one-third for the same range. When a designer adds power to overcome high drag, he burdens his aircraft with ever increasing high landing and take-off speeds.

Since the energy present in the atmosphere is fixed by the sun's heat radiation, all soaring contestants are treated equally by nature in so far as power availability is concerned. The only course left to the progressive sailplanist is to improve the aerodynamics of his sailplane. To this end, he employs the latest knowledge in boundary layer theory, because most of the energy losses at high speeds come from the friction of the air against the outside surfaces of the sailplane. By utilizing motorless flight research techniques, R. H. Johnson developed his sailplane, 'RJ-5,' from a mediocre performer with a glide ratio of 30 to 1, to the world's most efficient aircraft having a glide ratio of 40 to 1. The drag of this sailplane is now far below that of any jet aircraft. This high performance was achieved after some thousands of hours of modification, testing and diagnosis which dictated in each case additional modifications and improvements.

Yet we must hang our heads in shame when we compare 'RJ-5' with one of nature's own sailplanes, the black buzzard. By means of sailplane research methods, consisting of tracking wild buzzards with a sailplane and measuring the relative performance of the buzzard with respect to the sailplane, it is possible to determine the performance of the bird. From such measurements, the author found that the bird has a drag coefficient one-half of that of 'RJ-5.'

At Mississippi State College, we are investigating a process which nature may perhaps employ to reduce the drag of its high performance birds. The process consists of sucking a portion of the slowed-down air near the surface of a wing or fuselage into the interior and exhausting this air after accelerating it to the speed of flight. The air is sucked through more than a million small holes pricked or drilled into the sailplane's wing. Not only can this process of suction boundary layer control be used to achieve low drag, but it can also be used to prevent the stalling of a wing.

A wing of a sailplane, which in conventional design stalls at 40 m.p.h., stalls at a speed of 30 m.p.h. with suction applied by a blower system requiring only 1.4 horsepower. The potential of this technique is still not exhausted; each step in the research results in a further reduction of stalling speed. When our technology is developed to the stage where the flow over the entire surface of an aircraft will be laminar, the drag of an aircraft of the 'Comet' type will be 10% of that of the present craft; and with the same fuel and speed, the range will be increased 750%.

Seven years ago Grover Loening, a noted aeronautical engineer of some forty years' experience in aviation, made the comment that the ideal personal aircraft will take off at 20 m.p.h., and have a top speed of 200 m.p.h. We are, of course, still far from this goal. The best aircraft today lands at 60 m.p.h. and tops 180 m.p.h., a ratio of 3 to 1, instead of 10 to 1. This ratio is directly related to the maximum lift and the minimum drag, both parameters now being intensively studied by motorless flight methods. In addition, much more of the available engine horsepower must be put into effective propulsion. Means for measuring the effectiveness of propulsion have been developed from motorless flight research techniques. Suction applied to the control of the boundary layer will permit lower landing speeds and higher top speeds. We can at least say that the 20-200 m.p.h. aircraft is no longer a vision, it is well nigh a possibility; and we in motorless flight research are willing to accept the challenge of investigating the possibility by means of actual full-scale flight research.

We know that we have progressively reduced the losses of our sailplanes so that were the sailplane 'RJ-5' to be re-designed to weigh at flight 250 lb., this craft could fly on 0.56 horsepower, and the power output of man has been measured and found to be of 0.55 horsepower. We could therefore fly with muscle power alone if we had an efficient propulsion system. However, it might be best to design a completely new muscle flight sailplane employing suction boundary layer control and lightweight structures. In order to permit an easy take-off, the muscle power is coupled to a wheel which permits the craft rapidly to accelerate to take-off speed at which point the propeller takes over. The hollow-bladed propeller is used also to provide suction for the boundary layer control. The turned down tips close in the flow which would spill over the tips, thereby reducing the drag at least until the sailplane gets some height above the ground.

The philosophy of motorless flight research is principally the desire to reduce power losses rather than to increase power. We feel we are getting something for nothing when we soar. In getting this something, a little energy from the atmosphere, we try to waste as little of it as is technically possible. For this reason every effort is made to understand completely the behaviour of the airflow around an aircraft. We cannot bluff our status by adding a few thousand more horsepower.—Reproduced by the courtesy of *Shell Aviation News*.

MOTORLESS FLIGHT

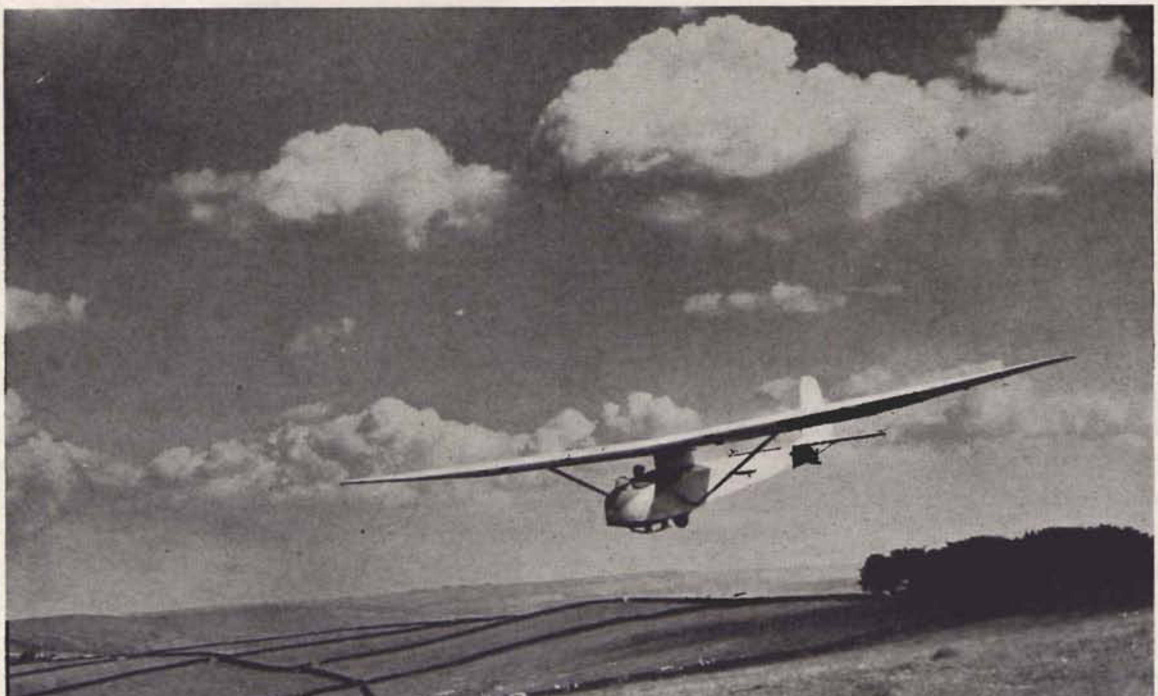
By Uncle Wilbur.

When all goes well, there is nothing difficult in towing a trailer a long way without a companion: if you stop before doubtful turns instead of after taking the wrong ones, there need be no unhitching or manhandling. It can all be quite easy, but nevertheless I was feeling faintly pleased with myself when I arrived in Church Stretton, alone with a 'Standard 14' and an 'Olympia' in its trailer, just five uneventful hours from Dunstable.

From Church Stretton up to Long Mynd the road—call it a track perhaps—climbs perhaps 800 feet in the first half mile or so, with the stiffest hill at the start. Light-heartedly I charged up the hill in first gear and reminded myself about my brakes.

The thing about my brakes is, that when moving forward they have a powerful servo action when firmly applied. The unhappy corollary is, that when going backwards they unservo themselves to a similar extent. So I reminded myself that in any emergency stop on the hill, the brakes must be applied while still moving forward. Otherwise Sir Isaac Newton and Mr. Devitt would both come in.

The emergency promptly arose in the shape of a stout closed gate across the road at its steepest point.



Two-seater at the National Contests, Camphill. *Photo: 'Sheffield Telegraph.'*

We stopped, in gear, and—dismayed by the impressive gradient—chocked the trailer wheels with pieces of Mynd before opening the gate.

Attempts to restart produced clouds of smoke and a smell of charred clutch lining, followed by an engine stall. At the sixth attempt we ran back over the chocks, stopped just before jumping out in panic, and promptly replaced the chocks by huge boulders torn from the hillside. It is a good car but there is a limit to what 14 h.p. can start up a slope like a roof.

The trailer must now obviously be unhitched and the car go for help. But the trailer blocked the road and must somehow be got to one side. Once free of its chocks it would end by demolishing the Midland Bank in Church Stretton. Have you tried moving a chock jammed under a wheel on a slope, delicately, an inch at a time? Instead, I demolished a neat section of wall which I suspect was privately owned, built a sort of Stonehenge under each wheel, and waited for strong arms and wise counsel.

Down the hill came a tiny car containing a weedy little man of slow understanding. It was not until he perceived that he would otherwise sit at his little wheel all night that he reluctantly left his seat to help.

Slightly hindered by his feeble pluckings at the greasy towbar, we got the trailer slewed round and ran it—a little more violently than intended, but the change of shape was slight—into the rocky bank. Released from the trailer, the car sailed happily up to the club house above.

Rescue party wanted? No trouble at all. The Ford is just going down to Church Stretton. Its new super-low gear-box is guaranteed to pull Sedberghs up from Asterton. Leave the Standard on top and go down in the Ford. Drop Teddy Proll in Church Stretton, reducing the party to two including myself —load cans of petrol, roar back up the hill, hitch on after further complicated chock-work, and we are ready to drive up for supper.

The engine stalls at the first attempt and does not re-start. Check everything. Flog the starter. Check again. Flog. Check. Flog. Pour in eight gallons of petrol in case petrol does not flow uphill. No joy.

The Ford, which will not go forward, cannot go backward until the trailer is again eased down. To be sure of leaving the road clear for a wide car, full of jolly farmers coming from a shoot on the Mynd, and with their help, we shunt it on to a side lane. We let the Ford down carefully backwards, turn it into an opening, push till our eyeballs protrude, and she rolls downhill. Just before the bottom she fires, and the jolly farmers leave us. The sun sets behind lonely hills.

The game now becomes like one of those railway shunting puzzles in the Children's Encyclopaedia, and to follow it you must draw a triangle ABC in the margin, with sides about half a mile. Side BC has kinks in it. A is Church Stretton. AB is the uphill leg on which we have stalled at 8. The hill road up to the club continues from B as an extension of AB. AB is level, and BC is of course downhill. The trailer is now parked on BC at a level bit near B.

The driver now has an idea. The trailer towbar is facing towards C, so we will drive from A to C, thence reverse up CB and hitch on, then drive downhill from B to C to A and so get a good run at the hill, with the gate already open.

Reversing up from C to B, with one wheel over a precipice and the other bulldozing trees and rocks, we realise that this narrow track is quite untrailerable. Arriving shaken at B and hitching on, we reverse gingerly on to AB, re-chock, and try another standing start. As I lie under the towbar tying fantastic knots in a frayed 'safety rope,' a gentle sprinkle from above becomes a downpour. Puzzled by the absence of rain elsewhere, I discover I am drenched in petrol from an overturned jerrycan, a potential human torch. My temperature falls steadily for the rest of the evening as I evaporate. But we are now ready to go, and laughing lightly at the mishaps of the past hours, we climb aboard. The engine again stalls and refuses to restart. We are in exactly the same situation as we were an hour ago, except that it is darker.

To avoid manhandling the trailer on to BC again (we are getting weak by now; our speech is slowing and our pupils are veiled) we decide to leave it blocking AB where it may automatically collect helpers. We lower it away from the Ford, twisting and unchocking and rechocking, an inch at a time, until we have room to reverse the Ford on to BC. Unable to push the Ford across the level bit, which is a row of muddy holes, we put her in gear and unashamedly use the starter until she rolls downhill in reverse. She disappears into the night, and I walk down to find her, silent, at the lowest point in the landscape at C. The moon is rising.

From a telephone box on AC we call the club for skilled help. A long wait follows. The Standard, up at the club, is full of food and drink.

At last a Landrover appears, crammed with stout bods. Protesting their ignorance of motors, they find the air lock in the petrol system and clear it; the Ford roars to life and we are soon back at B. This time we are going to be certain. Just in case the Ford should run downhill, we station the Landrover ahead as an anchor, and secure it to the Ford by ropes passed through everything in sight. As soon as the Ford starts, the Landrover will move ahead and perhaps add some pull. For the first time, the Ford starts the trailer up the hill and we relax at last.

The Landrover stalls on the road ahead, and the Ford, pulling strongly, has to stop. It overruns the ropes and wraps them about itself.

Somebody is now quietly sobbing by the roadside. With our last remaining strength we unravel the ropes, send the Landrover far ahead, and make our last start.

We arrive at the club at midnight. Five hours from Dunstable to Church Stretton, and five hours from there to the club. As far as I know or care, the gate is still open and Church Stretton is full of sheep. The road at B is littered with rocks and rope ends and blood. That's gliding.—(With acknowledgments to the *London Gliding Club Gazette*).

MAINLY FOR BEGINNERS

GLIDING! For thrills galore and honest to goodness sport there's nothing to beat it. All you require is spruce, linen, blue-prints, a bottle of embrocation and a touch of insanity.

Would you explore the Death Valleys of the air, shoot the foaming Niagaras of an atmosphere vaster than the watery seas that yield to man? Would you sail this ocean whose landmarks are the heavenly signs, which makes us, its mariners, kinsmen to the sun and beaconing stars? If you would, then here's my hand and cead mile failte!

In this Atomic Age you would expect that every child between eight and eighty would know how an aircraft 'works,' and you would, of course, be as far out as a lighthouse. Aerofoil? Lift? Drag? These are so much abracadabra to that immortal ass the Average Man, who has never been higher than the top of a double-deck bus and who possesses the imagination of an adult hen: his kind is legion. But—let's away from the madding crowd, let's leave the multitudinous long-eared to their braying!

You, my friend, are a brand snatched from the burning. Climb into the cockpit and get acquainted. Stick . . . rudder . . . release knob—are these straps strong enough you say? Why of course they are strong enough: it's the same stuff they use in Glasnevin for lowering coffins. We'll hook you up for your first slide now. Relax. Slack up . . . all out and you're away! The port wing drops and the nose swings. Never mind the rudder just now—stick hard over to haul up that wing. Steady as she goes. Do everything gently. Stick into neutral position, and slightly back to keep your nose out of the turf. There! Do that in the air and you will have the elusive thing called straight and level flight.

By the time your ground slides and the grey hairs on the C.F.I.'s head together total twenty, the machine begins to answer to your touch more as an aircraft should and less like a maddened stallion. You no longer traverse the field picking up imaginary handkerchiefs with alternate wing tips—in fact you feel confident and ready for a flight at the considerable altitude of 5 ft. a.g.l. (above grass level). Five feet becomes fifteen, and fifteen leads to fifty. Your first landings off the cable are a bit bouncey, but you smooth them out by trial and error, and climb by increments of ten to respectable hops of 150 and 200 feet.

Problems seem to come in geometrical progression: remember how wing balancing gave place to elevator control, how rudder movement succeeded that? Next came height gauging and landings, and now—turns. You have read all about it and can hold a 45 degree bank right through a turn of 180 degrees (on a motor bike). You take off feeling it's a cinch. Next time you take off with rather different views on the subject! But, eventually you master the gentle art, until, at 300 feet, you can lace a skilful figure S into your flight path.

Comes the memorable day when the C.F.I. scans your log book, peers at the wind sock, and says in a matter of fact way that he wants you to do a circuit; would you like to try? You stammer something which he takes to be yes, and minutes later you see the world from 600 feet. As you climb skyward the horizon races away in all directions, disappearing in the blue haze of distance. The rolling plains of Meath stretch away on your right, and as you turn, the Wicklow mountains rear ridge-upon-ridge on the eastern skyline. A little to the north is a patch of sparkling blue and silver—the Irish Sea! There's Dublin, too, a cluster of buildings with its faint umbrella of dust and smoke. But look—you are losing height, and as you turn again westward on the approach, the river Liffey appears below you bright and placid. You clear the boundary hedge at regulation height and to finish off the flight you produce your very best landing.

Congratulations! You have gained your 'wings.' Now you can enquire knowingly where a chap could pick up a barograph on the cheap, and pass judgment on all the advanced sailplanes of the day. You can tell yourself that you came up the hard way (P.I.), and not, as in certain other countries (!) cuddled and spoon fed in an old two-seater pantechnicon! You can wave your dog-eared log book about, remarking that it's your fifth, and explaining how the other four fell out of the cockpit during inverted flight. And with your huge experience you can look patronisingly on first time ground sliders as they career across the field like a woman driver—oh, sorry, Eileen—sorry, Helen . . . er . . . I didn't think you were listening—that is . . . please—hey, fellows H-E-L-P.

CORRESPONDENCE

Peter Fletcher, Esq.,
London Gliding Club.

Dear Peter,

I was delighted to read your account in *The Sailplane* of the July course at Dunstable.

Permit me, however, to make a plea regarding the amusing reference to my flight in the thunderstorm. The white 'Olympia' which was already on the ridge, landed before the storm broke because visibility decreased. Cloud was down to ground level just North of the site and South of the Zoo. The 'Prefect' had no parachute, and its T. & B. batteries were flat. Powered 'stuff' was flying about. I was hastening to a clear region, at 50 on the clock, when the 20 f.p.s. lift occurred. There was a very strong smell of piggery in the lift. The barograph failed to work.

I appreciate your efforts which brought very successful results to the course, and trust you will be interested in the facts recorded above.—**Carl Beck, 116, Marlborough Park (Central), Belfast, N. Ireland.**

THE CANADIAN NATIONAL SOARING MEETING

GLIDERS and gliding enthusiasts started their annual convergence to the site of the 1953 Nationals in sunny, hot weather. This year the Waterloo-Wellington Flying Club at Breslau, Ontario, was host to the gathering during the Meet, which officially ran from August 2nd to 8th.

The facilities of the Flying Club were put at the disposal of those attending the Meet and nobody went without a bed or hangarage for an assembled glider. (It usually took a fancy bit of manoeuvering to get all the gliders into the hangar.) Breakfast was served each morning in the club lounge and a sandwich lunch was available on the field at noon.

A Day-by-Day Account.

Sunday saw the Meet get off to a good start with Maurice Boudreault making a 41 mile flight in the 'Olympia' to complete his requirements for a Silver 'C.' On the same day John Agnew soared to 5,200 feet for an altitude gain of 4,100 ft.

For those who didn't have gliders in which to enter into the cross-country competitions, the Sherbrooke boys with their 'TG-2' were doing yeoman service in checking people out and giving training flights. Out of Sunday's 77 flights the Sherbrooke 'TG-2' made 22, and before they left for home on Friday the glider had made close to 70 flights. During the Meet the Club 'C.F.I., Jack Codere had soloed three students.

What happened Monday? This editor will never make a reporter! It must have been another good day for Stan Rhys chalked up points for the National Championship by making a 68 mile goal flight to Grand Bend in the 'Mu-13.'

Tuesday was, without a doubt, a total washout—literally and figuratively. In other words, RAIN.

The next day looked more like soaring weather with its cumulus-spotted sky. Stu Glen of Montreal took advantage of the weather change to make a 64 mile flight in the 'Mu.' And enough other people were interested in the possibilities to put in more than 40 hours of soaring that day. In the evening the films of the S.A.C. film library were shown—these included the perennial 'Prelude to Flight,' pictures of the 1950 Meet at St. Eugene, the Buckingham Gliding Club, and in addition a film in the nature of a travelogue of Kitchener and district was shown.

Several notable cross-countries were chalked up again on Thursday. John Agnew proclaimed a goal of Goderich, 70 miles distant, which he reached in 3½ hours in the '1-23.' Stan Rhys, flying the 'Mu' declared an out-and-return goal flight to Brampton, approximately 40 miles away, which he also accomplished. Other cross-countries were made by Maurice Boudreault (55 miles) in the 'Olympia'; Bill Duench (37 miles) in the '2-22' and Charlie Yeates (40 miles) in the 'TG-3.'

Friday—and still soaring weather! The 'TG-2' from Sherbrooke put in another good day's work before the boys packed it on the trailer and headed for home. Larry Gerlein from Elmira made a 55 mile flight in his '1-23' and another 40 hours of soaring were chalked up for the day. In the evening the club lounge again became the centre of activity and hangar flying. Piping hot corn on the cob, by the bucketful, with plenty of salt and butter was served on the porch; a sing-song around a campfire was going on further out on the field and inside people like Al Pow, Guy Joyce, and Don Ryan (Rochester) were showing their colour slides.

The sound of rain woke up most of us on Saturday morning. Fortunately the storm was short lived and by 10 o'clock the sky had broken and the clouds looked quite promising. Charlie Yeates took full advantage of those clouds to soar to an altitude of 9,800 feet while on a 60 miles cross-country. The annual spot landing contest, using the Gatineau Club's 'Grunau,' was held on Saturday afternoon. Since the 'Grunau' has a skid and not a wheel the contest called for maximum skill by the pilots. Eric Wimberly, of the Gatineau Club, on his second solo flight walked off with top honours by practically stopping on top of the spot. And then there was Peter Shaw—(also of the Gatineau Club—that is if the other members still consider him such)—who landed 330 paces and two fields back of the airport—a potato field, wasn't it Peter? However, Peter redeemed himself as the article following this shows.

Contest flights and times were now being turned in for tabulation and judging. In the evening the results were announced by Al Pow, who presented the winners with their trophies and prizes.

Results.

Meet Champion.—Stan Rhys, Montreal, 240 points, and winner of the Shell Trophy.

2nd.—Charlie Yeates, Hamilton, 160 points. Prize, Duflex Camera.

3rd.—John Agnew, Montreal, 148 points. Prize, Sports Shirt.

Winner of N.C. Schneider Trophy, a silver water pitcher, was Stan Rhys for making the best flight of the Meet.

A special prize of an emergency light was presented to the Sherbrooke Gliding Club for the high utilization made of their machine during the Meet.

Spot Landing Contest.

1st. Eric Wimberly—Table Lamp.
2nd Ron Claudi—Pen and Pencil.
3rd Shorty Boudreault—Sports Shirt.

Awards for best duration flights over the field were given to Larry Gerlein (4 hrs. 36 min.), and Stu Glen (3 hrs. 45 min.).

Summing Up.

This year's National Meet can undoubtedly be considered the most successful to date. On looking back through past *Free Flights* we gather the following interesting statistics of the National Meets:

Year	1949	1950	1951	1952	1953
Glider time hrs.	80	+100	189	139	230
No. Flights	348 (60 winch)			271	300
Cross-country miles			+600	550	+600
No. Gliders	7	10	13	13	18

The location of the Meets were as follows:

1949. Kingston.
1950. St. Eugene.
1951. Kitchener.
1952. St. Eugene.
1953. Kitchener.

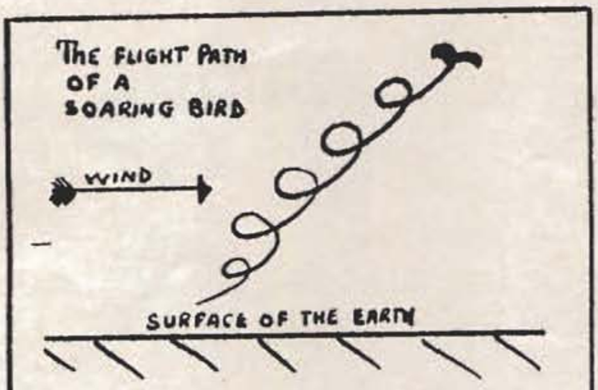
Post Script: The Gatineau Club are convinced there's truth in the adage—'Time to spare.'— Reproduced from *Free Flight.*

EARLY THERMAL STUDIES

THAT pilots have been studying the flight of birds ever since there were any pilots to study them is called to mind by the finding the other day of an extract from *The Aero* (forerunner to the present *Aeroplane*) dated October, 1912. The author was Mr. Henry S. Wildeblood, M.I.C.E., who was at that time living in India. While there he built several aeroplanes, both biplanes and triplanes, but his pet project was to be a crescent-shaped machine with trailing wing tips which could be used both as elevators and as controlled balancers for greater stability; he was also experimenting with a theory of negative-angle balancing planes, based on his study of the flight of soaring birds. (At that same time G. Howard Short was making a study of soaring birds in England and had decided that for pure soaring either sunshine or wind was necessary).

In the belief that it will interest many of our readers we reproduce the relevant passage from his article :—

' One of the first impressions I formed was that the soaring birds preferred to be on the wing when there was a wind blowing, and that a certain amount of horizontal movement of the air, apart from the question of accidental soaring currents, is necessary for soaring. It appears further that in order to gain altitude in soaring, it is necessary for the bird to describe spirals as indicated in figure 1, gaining speed while ' banking ' across the wind and gaining height



while facing the wind. It is further necessary that the head resistance and weight of the bird should be reduced to the lowest possible limit and that the lifting efficiency of the wings should be raised to the highest limit.

I believe that when our mechanical ingenuity enables us to approximate more nearly to the bird structure, we shall be able to build an aeroplane which will at first be able to fly and soar in a strong wind with a very low-powered engine, and will later on be able to fly and soar in such a wind with no engine power at all.'

DUBLIN GLIDING CLUB

WITH 4 club aircraft and one privately owned, we are much stronger than when we started to fly last year. Some of the gliders require repairs which will be done over the winter. As we have two tow-cars we will be all set for a big expansion of the club early next year.

To relieve the monotony of circuits at Seixley's Aèrodrome we are going to do some ridge soaring. The site is at Ballinakill, Co. Leix, where there is a good west-facing ridge and a road laid on right across the top. It is, however, 60 miles south-west of Dublin so only an occasional visit will be possible because of the expense.

We got the use of Baldonnel Aerodrome for a month early in the year and hope to go back again soon. We have also applied for the use of the Curragh. This magnificent site of about 16 sq. miles

Jack Buckley, Mrs. Anson and Noel Anson on arrival at Leixlip with their ' Olympia ' meet some members of the Dublin Gliding Club.

would be ideal for winch-launching. It would give Silver ' C ' distance to Dublin and in the right direction for prevailing winds.

The big event this summer was the arrival of an ' Olympia ' owned by Jack Buckley and Noel Anson of London G.C. They relied mainly on aero-tow but found the weather unsuitable for thermals. Buckley, landing at Baldonnel, got a warm welcome from the O.C. Col. Quinn, who was a prominent member of the pre-war Army Gliding Club. Anson, after shooting up Dublin airport and landing in front of the control tower, got a slightly different reception there! During their visit they each got about 7,000 odd feet over Kippure mountain. We profited by getting some badly needed publicity as they created quite a stir.

We are putting up a Nissen hut due to overcrowding of the hangars with powered craft, building a trailer, fitting out another tow car, painting and patching. *Nostri complaince laboris !*

W.F.

ROYAL AERO CLUB CERTIFICATES

(Issued under delegation by the B.G.A.) **AUGUST, 1953**

CERTIFICATES 'A'	..	209 (16629-16837)
'B'	..	211
'C'	..	45
Silver 'C'		4
Gold 'C'		1
Goal Diamond		1

'B' CERTIFICATES

No.	*Name.*	*A.T.C. School or Gliding Club.*	*Date taken.*
8869	I. R. Mitchell	Scottish G.U.	27. 8.53
9841	A. Robertson	Scottish G.U.	10. 8.53
10999	R. J. Harris	Bristol G.C.	9. 8.53
12291	B. I. Luke	No. 2 G.S.	23. 7.53
12784	G. Anderson	No. 2. G.S.	28. 6.53
13516	I. E. G. Sheppard	Bristol G.C.	22. 7.53
13533	P. C. Dirs	Bristol G.C.	31. 7.53
14436	D. Allardice	No. 1 G.S.	24. 5.53
14437	J. Gibson	No. 1. G.S.	3. 5.53
15016	G. D. Hall	No. 102 G.S.	5. 7.53
15134	F. G. Hatcher	Bristol G.C.	30. 7.53
15713	C. N. M. Rountree	Scottish G.U.	25. 7.53
16390	D. H. Sutcliffe	Coventry G.C.	4. 7.53
16629	N. H. Vellani	No. 166 G.S.	3. 8.53
16630	R. M. Vidal-Hall	No. 166 G.S.	30. 7.53
16631	N. S. Rollings	No. 166 G.S.	2. 8.53
16632	P. J. Gozzett	No. 166 G.S.	1. 8.53
16633	R. S. Guy	Midland G.C.	22. 3.53
16634	P. T. Etheridge	Bristol G.C.	28. 7.53
16636	S. M. Ahmad	R.A.F., Halton	28. 7.53
16637	B. Hesketh	No. 125 G.S.	5. 7.53
16638	D. J. Gill	No. 166 G.S.	15. 3.53
16639	J. Jones	No. 45 G.S.	12. 4.53
16640	M. J. McAllister	No. 122 G.S.	15. 4.53
16641	M. C. Pender	No. 82 G.S.	5. 7.53
16642	R. D. Sims	No. 166 G.S.	24. 5.53
16643	K. D. Harvey	No., 89 G.S.	7. 6.53
16645	D. Willets	No. 42 G.S.	10. 5.53
16646	P. Lonsdale	No. 126 G.S.	19. 7.53
16647	K. E. Chevertou	Bristol G.C.	28. 7.53
16648	F. C. Hollis	No. 89 G.S.	13. 6.53
16649	A. Cook	R.A.F., Halton	18. 7.53
16650	J. C. Neale	RA.F., Halton	18. 7.53
16651	R. A. Morris	No. 42 G.S.	19. 7.53
16653	G. D. Preston	No. 2. G.S.	2. 7.53
16657	J. J. Oakes	No. 92 G.S.	7. 6.53
16658	J. R. Norman	No. 166 G.S.	1. 8.53
16659	F. R. P. Musson	No. 125 G.S.	2. 8.53
16660	J. Winter	No. 166 G.S.	1. 8.53
16661	T. E. H. Lemon	No. 166 G.S.	1. 8.53
16662	D. L. Bywater	No. 48 G.S.	31. 7.53
16663	D. A. Marks	Bristol G.C.	1. 8.53
16664	D. K. Gammon	No. 82 G.S.	2. 8.53
16665	A. G. Pearce	Bristol G.C.	28. 7.53
16666	K. Neretnieks	Bristol G.C.	29. 7.53
16667	A. J. Hammond	London G.C.	10. 7.53
16668	I. G. Frow	No. 125 G.S.	28. 7.53
16669	M. K. Fripp	No. 161 G.S.	5. 7.53
16670	D. L. Trimm	No. 125 G.S.	2. 8.53
16671	E. Bruce	Midland G.C.	29. 7.53
16672	P. D. Harrison	No. 89 G.S.	13. 6.53
16673	R. J. Gibson	No. 2 G.S.	3. 7.53
16674	J. B. Guildford	No. 166 G.S.	1. 8.53
16675	E. C. Martin	Handley Page G.C.	2. 8.53
16676	J. W. Jenkinson	No. 168 G.S.	25. 7.53
16677	P. A. Mack	Scottish G.U.	12. 6.53
16678	D. M. Abbey	No. 23 G.S.	2. 8.53
16679	P. H. Gausden	No. 166 G.S.	3. 8.53
16680	A. H. Parr	Deeside G.C.	16.10.49
16681	P. M. Fisher	No. 125 G.S.	2. 8.53
16682	D. J. Priest	No. 166 G.S.	30. 7.53
16683	A. T. Durbridge	No. 122 G.S.	23. 8.53
16684	D. Abbott	No. 166 G.S.	1. 8.53
16685	A. J. Hilliard	No. 89 G.S.	15. 7.53
16686	E. N. Struys	No. 168 G.S.	3. 8.53
16687	D. G. Catt	No. 125 G.S.	2. 8.53
16688	Elizabeth Eyers	Bristol G.C.	21. 7.53
16689	A. J. Wilson	No. 48 G.S.	31. 7.53
16690	J. K. Cross	Scottish G.U.	3. 8.53
16691	A. F. Heinzl	Scottish G.U.	3. 8.53
16693	G. M. S. Duff	Bristol G.C.	29. 7.53
16694	D. L. Hunt	No. 122 G.S.	24. 5.53
16695	E. G. Ostine	No. 122 G.S.	8. 8.53
16696	M. D. Brown	Derby & Lancs. G.C.	5. 8.53
16697	R. Hayward	No. 166 G.S.	2. 8.53
16698	V. G. Hopkins	No. 104 G.S.	7. 8.53
16699	H. W. Symonds	No. 104 G.S.	6. 8.53
16700	J. A. Beattie	No. 104 G.S.	7. 8.53
16701	P. J. Partridge	R.A.F., Luneburg	7. 6.53
16702	J. B. Dickens	Bristol G.C.	8. 8.53
16703	G. P. Bolitho	No. 122 G.S.	8. 8.53

SOARING

Your Emblem

Have you earned a gliding or soaring certificate? Then you have something which very few people in the country, and even in the world, possess.

The A 

GLIDING BADGE

The B 

GLIDING BADGE

The C 

SOARING BADGE

Silver C  **and Golden C**

SOARING BADGES

The A, B, C, Silver C and Golden C badge you received is different from the usual emblem you see people wearing. In most cases the buttons in people's lapels signify that their subscriptions are paid up. In your case it means more than payment of dues. It means you've done something. It means that, without a motor, you are striving to outdo the flight of birds. Wear your badge—and wear it proudly!

'B' CERTIFICATES—*continued*

No.	*Name.*	*A.T.C. School or Gliding Club.*	*Date taken*
16704	B. A. Finch	Avro G.C.	7. 7.53
16705	W. D. Hargreaves	No. 122 G.S.	7. 8.53
16706	R. H. Taylor	No. 122 G.S.	8. 8.53
16707	W. B. Harman	Surrey G.C.	7. 7.53
16708	J. T. Beer	No. 82 G.S.	2. 8.53
16709	Barbara Cleece	Avro G.C.	8. 8.53
16710	A. Dawson	No. 23 G.S.	2. 8.53
16711	D. E. Edwards	No. 141 G.S.	9. 8.53
16712	L. J. Sillis	No. 102 G.S.	9. 8.53
16713	H. Tamsley	No. 104 G.S.	6. 8.53
16714	D. J. H. West	No. 104 G.S.	6. 8.53
16715	C. J. Mann	No. 125 G.S.	2. 8.53
16716	D. A. Boxall	No. 122 G.S.	6. 8.53
16717	C. W. Pickard	No. 166 G.S.	2. 8.53
16718	J. Fitzgerald	No. 141 G.S.	9. 8.53
16719	G. C. Gilroy	No. 31 G.S.	8. 8.53
16720	G. B. H. Sim	No. 2 G.S.	10. 7.53
16721	R. Dare	No. 168 G.S.	25. 7.53
16722	D. Claridge	No. 130 G.S.	15. 3.53
16723	A. A. R. Henderson	No. 2 G.S.	10. 7.53
16724	J. C. Taylor	No. 48 G.S.	31. 7.53
16726	R. R. A. Craig	No. 2 G.S.	23. 7.53
16727	K. G. Evans	No. 104 G.S.	14. 8.53
16728	J. R. Pole	No. 168 G.S.	25. 7.53
16729	G. R. MacInnes	No. 122 G.S.	22. 3.53
16730	D. Pickering	No. 104 G.S.	12. 8.53
16731	G. K. Beeston	No. 44 G.S.	19. 7.53
16732	D. Calne	No. 104 G.S.	13. 8.53
16733	E. J. Martin	No. 42 G.S.	2. 8.53
16734	A. Scott	No. 2 G.S.	17. 7.53
16735	D. S. Scott	No. 2 G.S.	17. 7.53
16736	S. G. Shimmin	No. 48 G.S.	31. 7.53
16737	K. Twist	No. 186 G.S.	9. 8.53
16738	T. J. Whittingdale	No. 104 G.S.	14. 8.53
16739	B. Perks	No. 125 G.S.	28. 6.53
16740	B. West	No. 22 G.S.	9. 8.53
16741	J. Appleby	No. 22 G.S.	28. 6.53
16742	R. Bee	No. 22 G.S.	9. 8.53
16743	B. B. Burdett	No. 166 G.S.	11. 8.53
16744	C. J. Game	No. 166 G.S.	11. 8.53
16745	R. S. Rickard	Scharfoldendorf G.C.	17. 3.53
16746	R. S. Squires	No. 143 G.S.	16. 8.53
16747	A. B. Weller	No. 143 G.S.	16. 8.53
16748	R. P. Galyer	No. 143 G.S.	16. 8.53
16749	B. A. Briggs	No. 123 G.S.	16. 8.53
16750	J. Branson	No. 166 G.S.	15. 8.53
16751	M. St. Vincent	No. 166 G.S.	15. 8.53
16752	C. S. Clumpus	Bristol G.C.	15. 8.53
16753	C. R. Walton	No. 166 G.S.	15. 8.53
16754	T. A. Smith	No. 168 G.S.	2. 8.53
16755	E. J. Roach	No. 31 G.S.	16. 8.53
16756	J. N. Burgess	No. 104 G.S.	13. 8.53
16757	E. G. W. Johnstone	No. 106 G.S.	21. 6.53
16758	M. J. Harman	No. 143 G.S.	16. 8.53
16759	B. Perrin	No. 104 G.S.	15. 8.53
16760	R. L. Thomas	No. 104 G.S.	5. 8.53
16761	G. Wise	No. 125 G.S.	16. 8.53
16762	H. B. Hall	No. 168 G.S.	4. 8.53
16763	A. W. Clarke	No. 169 G.S.	16. 8.53
16764	A. G. Gilbert	No. 166 G.S.	15. 8.43
16765	B. Granthier	No. 166 G.S.	14. 8.53
16766	R. H. Kane	No. 166 G.S.	15. 8.53
16767	M. J. Howard	No. 102 G.S.	16. 8.53
16768	M. L. Kelly	No. 123 G.S.	16. 8.53
16769	R J. S. Rowe	No. 123 G.S.	16. 8.53
16770	J. A. Savin	No. 104 G.S.	13. 8.53
16771	H. C. Thompson	No. 166 G.S.	1. 8.53
16772	D. Waller	No. 31 G.S.	9. 8.53
16773	J. D. Beckett	Bristol G.C.	16. 8.53
16774	M. G. Bruce	No. 166 G.S.	14. 8.53
16775	B. C. Davies	No. 104 G.S.	13. 8.53
16776	D. J. Webb	No 123 G S.	16. 8.5?
16777	T. E. L. Lloyd	No. 123 G.S.	15. 8.53
16778	D. Norman	No. 123 G.S.	15. 8.53
16779	K. Knight	No. 168 G.S.	2. 8.53
16780	A. H Robinson	No. 31 G.S.	16. 8.53
16781	D. J. Shute	No. 125 G.S.	2. 8.53
16782	M. J. Bywater	No. 43 G.S.	10. 8.53
16783	C. W. Hill	No. 126 G.S.	24. 5.53
16784	C. E. P. Jackson	Heron G.C.	18 7.53
16785	B. Rutherford	No. 31 G.S.	16. 8.53
16786	A. A. Keeler	London G.C.	19. 8.53
16787	F. Franklin	No. 143 G.S.	15. 8.53
16788	A. A. Stowell	No. 143 G.S.	16. 8.53
16789	L. G. Cooper	Derbyshire & Lancs G.C.	31. 7.52
16790	R. E. Smith	No. 125 G.S.	29. 7.53
16792	R. E. Vanson	Southdown G.C.	2. 8.53
16793	M. O. Caplan	Bristol G.C.	15. 8.53
16794	C. P. Cowper	No. 166 G.S.	11. 8.53
16795	R. F. D. Sibbring	No. 166 G.S.	12. 8.53
16796	A. E. Stocks	No. 104 G.S.	13. 8.53
16797	D. Brewster	No. 123 G.S.	16. 8.53
16798	B. V. Dolman	No. 44 G.S.	31. 5.53

'B' CERTIFICATES—*continued*

No.	*Name.*	*A.T.C. School or Gliding Club.*	*Date taken*
16799	R. F. Jeavons	No. 141 G.S.	9. 8.53
16800	E. A. Brawley	Scottish G.U.	10. 8.53
16801	A. E. Flower	No. 168 G.S.	16. 8.53
16802	K. R. C. Lawson	Scottish G.U.	7. 8.53
16803	A. Roberts	No. 186 G.S.	16. 8.53
16804	W. E. Yuille	Bristol G.C.	15. 8.53
16805	A. L. Brown	No. 92 G.S.	19. 7.53
16806	P. B. Christian	No. 166 G.S.	1. 8.53
16807	W. Hoy	No. 203 G.S.	21. 6.53
16808	N. Bishop	No. 89 G.S.	3. 8.53
16809	P. D. Jerden	Southdown G.C.	19. 8.53
16810	E. W. Smith	No. 89 G.S.	19. 8.53
16811	D. A. Minto	No. 166 G.S.	14. 8.53
16812	K. T. Owen	London G.C.	19. 8.53
16813	J. C. Taylor	No. 43 G.S.	9. 8.53
16815	A. R. Pohlman	No. 106 G.S.	25. 8.53
16816	I. Kerr	Scottish G.U.	9. 8.53
16817	I. Paul	Newcastle G.C.	24. 7.53
16818	V. G. Smith	No. 125 G.S.	9. 8.53
16819	R. T. Stamforth	Avro G.C.	20. 8.53
16820	D. B. Bathurst	Dartmouth Cadet G.C.	25. 8.53
16821	M. C. Godfrey	No. 122 G.S.	6. 8.53
16822	G. E. Harwood	No. 122 G.S.	3. 8.53
16823	J. G. Toogood	H.C.G.I.S.	17. 8.53
16824	A. S. G. Tucker	No. 166 G.S.	1. 8.53
16825	M. J. J. Madden	H.C.G.I.S.	20. 8.53
16826	F. J. Leck	Midland G.C.	2. 8.53
16828	G. C. Knowles	2nd T.A.F.G.A.	24. 4.53
16829	A. R. Francis	Wessex G.C.	9. 8.53
16830	F. H. F. Hinds	Dartmouth Cadet G.C.	26. 8.53
16831	K. Johnstone	No. 31 G.S.	9. 8.53
16832	D. J. R. Butler	No. 168 G.S.	3. 5.53
16833	R. A. Bebbington	No. 42 G.S.	2. 8.53
16834	H. N. E. Brown	Bristol G.C.	25. 8.53
16835	D. N. G. Law	No. 168 G.S.	16. 8.53
16836	J. F. Roden	Moonrakers G.C.	7. 8.53
16837	W. G. Wardle	No. 42 G.S.	19. 8.53

'C' CERTIFICATES

6065	D. F. Poole	No. 186 G.S.	8. 9.52
6132	H. J. Prowse	R.A.F., Gutersloh	26. 7.53
8640	T. A. Hendry	Scottish G.U.	29. 7.53
8882	E. J. Sjoberg	Midland G.C.	18. 8.53
9165	T. A. F. Sheppard	Wessex G.C.	9. 8.53
9438	D. F. Clarke	No. 5 G.S.	2. 8.53
10938	R. W. Newstead	No. 122 G.S.	2. 8.53
11473	K. G. R. Hallam	R.N.G. & S. Assoc.	30. 7.53
13027	D. S. Hill	Scottish G.U.	19. 7.53
13500	J. A. Douglas	Midland G.C.	12. 7.53
13504	J. W. North	Midland G.C.	16. 8.53
13561	R. W. Pembleton	Scottish G.U.	5. 8.53
14461	H. C. F. Derrick	No. 80 G.S.	26. 7.53
14562	D. L. Contostavlos	London G.C.	21 8 53
14819	B. Stubbs	No. 130 G.S.	27. 7.53
15288	J. Ivelaw-Chapman	No. 80 G.S.	7. 8.53
15476	J. M. Fleming	Scharfoldendorf G.C.	13. 7.53
15521	R. B. Godwin-Austen	London G.C.	21. 8.53
15543	L. A. Macpherson	No. 80 G.S.	11. 8.53
15945	K. R. Coombs	No. 80 G.S.	30. 7.53
16032	R. V. Snook	No. 80 G.S.	30. 7.53
16067	C. E. Goulding	No. 80 G.S.	26. 7.53
16086	D. C. Hodder	No. 89 G.S.	19. 4.53
16129	D. M. Burrill	No. 31 G.S.	3. 8.53
16360	G. C. Hudson	Hameln G.C.	4. 8.53
16394	R. F. O Kemp	Hameln G.C.	4. 8.53
16398	B. Chart	Southdown G.C.	15. 7.53
16553	A. F. Haye	Handley Page G.C.	3. 8.53
16575	M. S. Hall	Scottish G.C.	29. 7.53
16633	R. S. Guy	Midland G.C.	18. 7.53
16671	E. Bruce	Midland G.C.	30. 7.53
16675	E. C. Martin	Handley Page G.C	3 8.53
16680	A. H. Parr	Deeside G.A.	8. 1.52
16690	J. K. Cross	Scottish G.U.	5. 8.53
16691	A. F. Heinzl	Scottish G.U.	5. 8.53
16696	M. D. Brown	Derby & Lancs. G.C.	5. 8.53
16701	P. J. Partridge	R.A.F., Luneburg	7. 6.53
16707	W. B. Harman	Surrey G.C.	2. 8.53
16739	B. Perks	No. 125 G.S.	5. 7.53
16745	R. S. Rickard	Scharfoldendorf G.C.	18. 3.53
16783	C. W. Hill	No. 126 G.S.	19. 7.53
16786	A. A. Keeler	London G.C.	21. 8.53
16789	L. G. Cooper	Derby & Lancs. G.C.	1. 8.52
16812	K. T. Owen	London G.C.	21. 8.53
16828	G. C. Knowles	2nd T.A.F.	26. 4.53

SILVER 'C'

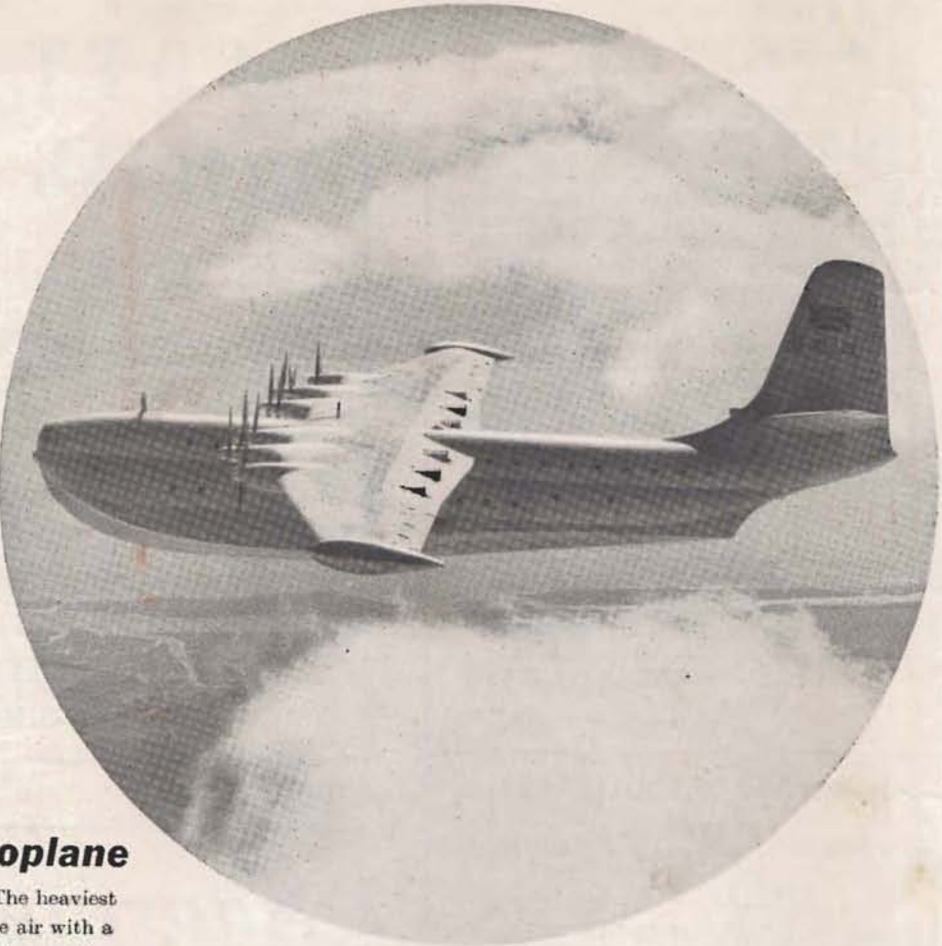
431	E. R. Stow	Oxford G.C.	3. 8.53
432	A R Adams	Derby & Lancs G.C.	1. 8.53
433	F. C. Worley	Midland G.C.	26. 7.53
434	R. P. Brown	Surrey G.C.	18. 8.53

GOLD 'C'

14	G. Stephenson	London G.C.	3. 8.53

GOAL DIAMOND

208	G. Stephenson	London G.C.	3. 8.53



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The pilot

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SHELL and BP Aviation Service

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