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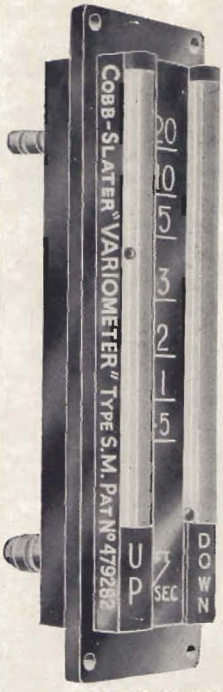
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Sailplane and Glider

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WHAT NEXT? – A PLAN

THE recent letter which appeared in our columns from "Amor Borealis" (no prizes offered for the correct translation) has certainly started something. A good many people have let off steam, not all of whose letters have appeared in print (some were *too* offensive), and this has been all to the good. Out of the welter of high lapse rate thermals several facts have appeared which are both interesting, encouraging and important.

First there is clear evidence, even from those who deny it, of a good deal of latent enthusiasm. There is also evidence of a lively vitality among those who propose to help themselves and almost scorn the idea that any help is needed. But there is also evidence that if there were but a little help to get things started, a good deal more might be accomplished. We agree that it is best to help oneself if one can. Also that the Lord and the Government are most likely to help those who do help themselves. But any self help schemes at the moment are but local efforts by those who have not the equipment, even if they had the will, to plan anything on a larger scale.

We repeat, therefore, that what is wanted is a National Plan for a much larger Gliding Movement than has so far been imagined.

We at least have faith that the enthusiasm is there, and that if they are shown how, the number of gliding enthusiasts who will come forward and give both time and energy to the sport will surprise a good many unbelievers.

Most Clubs we hear of can take no more members. Most Clubs now have their full complement of elementary and intermediate Sailplanes. There is still a lack of two seaters but an announcement elsewhere in *Sailplane* this month bids fair to remedy this deficiency.

If we might make a suggestion what is wanted is a development of the idea in operation by the Midland Club, which has its several satellite elementary gliding sites where beginners are to be brought to the soaring stage, presumably at the Mynd.

If the existing Clubs, who have the nucleus of what skill and experience is required for the job, were to lay plans for extension on these lines and then to approach the Government, we believe that they would obtain a very different reception from that given to the "blank cheque" request of the B.G.A.

If the plans went further, and included a two seater instructors school, we should be well on the way to a complete plan which could not fail to impress the Ministry of Civil Aviation, who now appear to be waking up to the realities of the Civil Aviation situation.

Plan big and aim high and stick to it and we might even believe it ourselves. We are certainly more likely to get the support of the big aviation interests, with whose backing the task will be a good deal easier. We in *Sailplane* have reason to believe that this support would be forthcoming in no uncertain measure if we showed willing.

There has recently been formed in London the *Soaring Club* of Great Britain, whose aims at the time of going to Press have not been announced. If they were to include anything on these lines they would be the impetus the Movement is waiting for. Whether it does so or not time will tell, but if not there is an opportunity for someone to earn the gratitude of the great crowd who, because of the lack of facilities must, for the present remain "the outsiders".

LATE NEWS.

Extract from Hansard (House of Lords) Tuesday, 26th November, 1946. Page 349.

Lord Nathan (Minister of Civil Aviation): "I feel also that club and private flying have great contributions to make. The private flying clubs were responsible for producing some of the finest pilots who served with the R.A.F. in the last war. I am very anxious to encourage private flying and also gliding, which, perhaps, teaches air-mindedness to a greater extent than almost any other form of use of the air. Consequently, I have decided to set up a committee representative of interests closely concerned with club and private flying, to advise me on the matter generally, and with special reference to the development of light aircraft suitable for the future needs of club and private aviation in this country, and which shall at the same time be as cheap and economical as is possible in matters of production, and subsequent operation and maintenance. The Committee will also be asked to advise on the needs of the

(*Continued on page* 14)

HIGH ALTITUDE IN FLORIDA

By PAUL TUNTLAND

On July 26 Paul Tuntland, flying an LNE-1 for the Thunderstorm Project at Pinecastle Army Air Field, Orlando, Florida, established a new world's altitude record for two-place sailplanes of 18,700 ft.

AS a native Californian I was sure that the local Chamber of Commerce had something to do with the weak thermals I was getting in Florida. After an airplane tow in an attempt to get into a cumulus I was making a straight glide to an auxiliary field. I encountered no lift that was sufficient to distract me from reviewing the age-long controversy between Florida and California. Needless to say, as a loyal son and objective reporter, I decided that California not only had better climate and oranges, but also better thermals.

The tow-plane followed me into the field just in time to keep me from packing my things for the trip back to the West Coast. We took off again and I was wearing the expression of one who " has been through this before." After fifteen minutes of towing I chose a cumulus that was about 3,000 ft. thick from base to top, and which seemed to be growing. Because it was from under a similar cloud that I had recently returned to earth, I thought it best to tow right up to the cloud base before releasing. At 3,900 ft. we were at the base of the cloud and I pulled the release knob.



Paul Tuntland and the LNE-1 used in the record breaking flight

I turned on the camera and instrument switches for recording the data collected during the flight, began a spiral, and entered the cloud immediately with lift at 5 ft. per second. The lift increased to 7 and then 10 ft. per second, but this seemed like many of the other clouds I had entered in this area. Ten minutes after release the altitude was 7,000 ft. and I was getting light turbulence. Then the rate of climb jumped to 1,500 ft. per minute and it was very pleasant to watch the hands of the altimeter spin around. 10,000 ft. was passed quickly and the lift increased to 2,000 ft. per minute. The turbulence was also increasing and I began to get the first intuition that this might be an eventful flight. I was in radio contact with the ground monitoring station, giving them periodic readings of the instruments, and I remember interposing a remark as to how happy I was to find such a good cloud. Little did I realize how differently I would be feeling in a few minutes. I was now at 14,000 ft. and going up so rapidly that I thought it would be wise to go on oxygen. I reached for the helmet and oxygen mask on top of the radio and tried to put them on. The turbulence was so heavy that I could only devote one hand to the operation and practically no attention. I gave up the idea of getting the oxygen mask on and decided to concentrate on flying the ship.

I was encountering light rain and the temperature was close to 0°C. The vertical speed was still 2,000 ft. per minute, the altitude 16,000 ft., and the turbulence heavy. Two minutes later, at 19,000 ft., I noticed rime ice on the wings and the vertical speed began dropping to 1,000 ft. per minute. I felt a couple of very severe gusts above the steady turbulence and was finding the physical problem of moving the controls difficult. The ice on the wings was getting thicker and the canopy began icing up. I was now at 22,700 ft. indicated, but not very elated about it. Right then I entered a severe downdraft and had difficulty controlling the airspeed. The controls were getting quite heavy and I decided to leave the cloud. I had been in the cloud for only twenty-one minutes, but the lack of oxygen coupled with the extreme physical forces needed to move the controls had me feeling weak.

I called the ground tracking station to ask for a vector out of the cloud. From the radar scopes they were able to plot my position inside the cloud and gave me a heading which would take me out. While flying this heading I ran into some very heavy updrafts and downdrafts that had me on the ropes. I flew for seven minutes on this heading and was not yet out of the cloud.

Altitude was 20,000 ft. and I was really worried. The loud crack of an electrical discharge jolted me mentally. " Lightning ! " I thought. Then I smelled smoke and thought, " Brother, this is it ! " I turned around to see what I could, and this momentary distraction from the instrument panel resulted in a spiral dive in which the airspeed hit 140 and in which I lost 7,000 ft. in two and a half minutes, although I didn't realize it at the time. (This was all shown on the 16 mm. movie film of the instrument panel.) The spoiler dive brakes were frozen shut and I must have tried every method of recovery including both hands on the stick and feet on the instrument panel. I was certainly not thinking about lightning or fire during this period. How I came out I don't know except that all of a

(*Continued on page* 14)

DIRECTIONAL AND LONGITUDINAL STABILITY IN A CANARD GLIDER

By ROBERT LOPEZ

Presented at the 1945 Motorless Flight Conference, U.S.A.

IT is necessary as an introduction that reasons underlying the desirability of a Canard type aircraft as a glider be mentioned.

When one gets the soaring bug in his blood and proceeds to design a glider which will remain in the air and will travel to predetermined cities or localities, one becomes thoroughly familiar with the importance of the drag on performance. Its sources are numerous and for some basic items cannot be avoided. However, by close inspection and with a careful study of these sources, improvements can be accomplished.

After fiddling around for a good many days on choice of airfoil, C.G. location, aspect ratios, etc., it will be apparent that L/D ratios of from 30 to 33 are about the ceiling that can be reached with a conventional type of glider. What is principally meant by conventional type of glider is one that obtains longitudinal stability through a down-load on the tail. In powered airplanes, the drag of the tail is of such magnitude that its effect on performance is negligible. In a glider where performance is a function of L/D and Vz (sinking speed), the contribution of the tail to the total drag cannot be ignored. The difference between a lifting tail and a conventional tail affects the L/D as follows : $\frac{L + L'}{D + D'}$ in the first case and $\frac{L - L'}{D + D'}$ in the second. To have a quantatitive idea of this effect, figures from the stability computations of a particular glider will be taken :

At the attitude of $(L/D)_{max.}$ for $C_m = O$ (trim)

$C_{Lw} = .460$ $\qquad C_{Lt}\frac{S_t}{S_w} = .063$

$C_{Dw} = .0086$ $\qquad C_{Dt}\frac{S_t}{S_w} = .002337$

$C_{Dfw} = .00114$

$$L/D \text{ (conventional tail)} = \frac{.460 - .063}{.01207} = 32.8$$

$$L/D \text{ (Canard)} = \frac{.460 + .063}{.01207} = 43.3$$

This particular comparison was made from the stability data of a Canard. The tail lift coefficient in a conventional configuration, however, could be reduced to even O at $(L/D)_{max.}$; then the figure of L/D = 32.8 would increase to 38. This, of course, assumes a rigid control on the C.G. location that will allow trim at $C_{Lt} = O$. It is quite obvious that such a control is extremely difficult to obtain in actual practice.

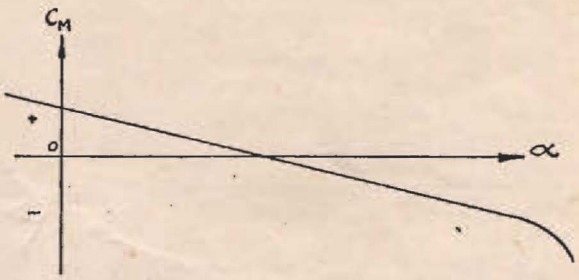


Figure 1

At this point a quick analysis of a conventional glider with lifting tail is of interest. Stability can be obtained with an up-load at the tail by proper tail length and tail surfaces. The C.G. is then located back of the a.c. so that positive moments created by the lift about the C.G. are nullified by negative moments due to the tail forces. The locus of the resulting moments along the flight range will yield the desired negative slope.

Considering that glider performing a pull-up or pull-out manoeuvre, the fact that the C.G. is located back of the a.c. will mean a critical up-load at the tail, the magnitude of which will depend on that rearward C.G. location. In reality, the C.G., by itself, does not make the up-load critical. The mass distribution and the moment of inertia about the Y axis are the important factors. Nevertheless, C.G. location is an indication of mass distribution.

The critical up-load at the tail is developed at the beginning of the pull-up manoeuvre for a particular elevator deflection function. In general, this up-load designs the tail even in a forward C.G. location configuration. The mechanics involved in finding this up-load are beyond the scope of this paper and it is felt that the method is a familiar one to most aeronautical engineers and, consequently, the effect of rearward C.G. on the design of a tail can be fully appreciated.

The fact that lifting tail gliders are rare, if existing, is also due to the reasons that it can be difficult to have an arrangement which will permit a substantially rearward C.G. location and that for adequate stability a sizeable increase in tail length and/or tail area is necessary.

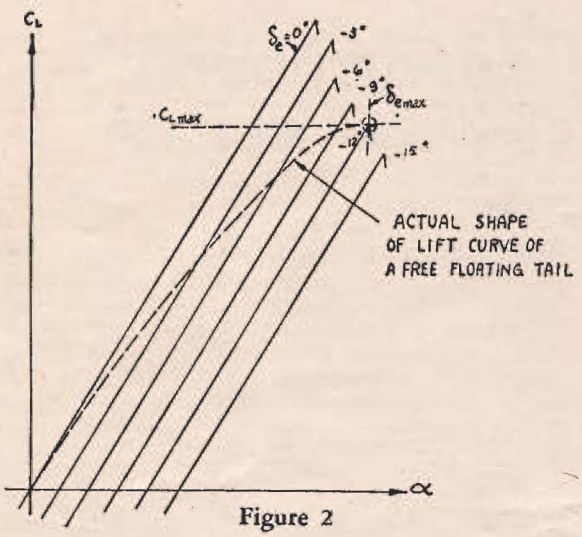


Figure 2

A desirable characteristic in a glider is one that will permit a high L/D and low Vz at both high and low speeds. This will allow the riding of small and big thermals at approximately the same sinking speed and still permit a relative high speed at best L/D for cross country. To give some significance to this statement, performance figures particular to a canard glider will be given :

V = 65 m.p.h. L/D = 40 +
V = 38 m.p.h. Vz = 2.0 —

It is evident that these figures can only be obtained with the intermediary of a flap. The use of a flap means high negative pitching moments, thereby making very difficult, if possible, the solution for a lifting tail which will lift for both flaps-up and flaps-down conditions.

The Canard configuration offers, in addition, safety against spin. Dr. Foa's statement in his article in the *Journal of Aeronautical Sciences* of December, 1942, " A Canard must, and fortunately can be made safe against stall," is believed not to be a correct one. If static stability is considered, it is possible to design a tail that will develop a C_{Lmax} of such a magnitude that stall will not be obtainable.

The necessary and sufficient relation can be expressed as

$$C_{Mw} + C_{Lw}\,\frac{x}{c} + C_{Dw}\,\frac{y}{c} + C_{Mf} \geqq$$

$$C_{Lt} + \frac{St}{Sw}\,\frac{lt}{c} + C_{Dt}\,\frac{St}{Sw}\,\frac{yt}{c} + C_{Mt}\,\frac{St}{Sw}\,\frac{Ct}{Cw}$$

in the vicinity of stall.

C_L = Lift coefficient
C_D = Drag coefficient
C_M = Pitching Moment Coefficient
lt, x, y = C.G. coordinate
C = M.A.C.
S = Area

Subscript w and t refer to wind and tail respectively.

Unfortunately, static conditions only exist on paper. In flight, inertia forces are present, and where statically a stall is impossible, dynamically it can be achieved on any airplane that manoeuvres. Analyzing the motion of an airplane during a stall, it is to be noticed that while pitching down for recovery the wings remain stalled up to an angle of from 40 to 60°, depending upon the particular airplane. In a Canard equipped with a floating tail, whipped stall should not occur because the tail will remain effective. The fact that the tail is not stalled does not mean that the airplane will increase its positive pitch beyond stall ; a typical curve of C_M vs. α shows exactly the opposite (Fig. 1). For the same reason that whipped stall can be averted in a Canard, the possibilities of spinning are eliminated through the continuous control of the tail.

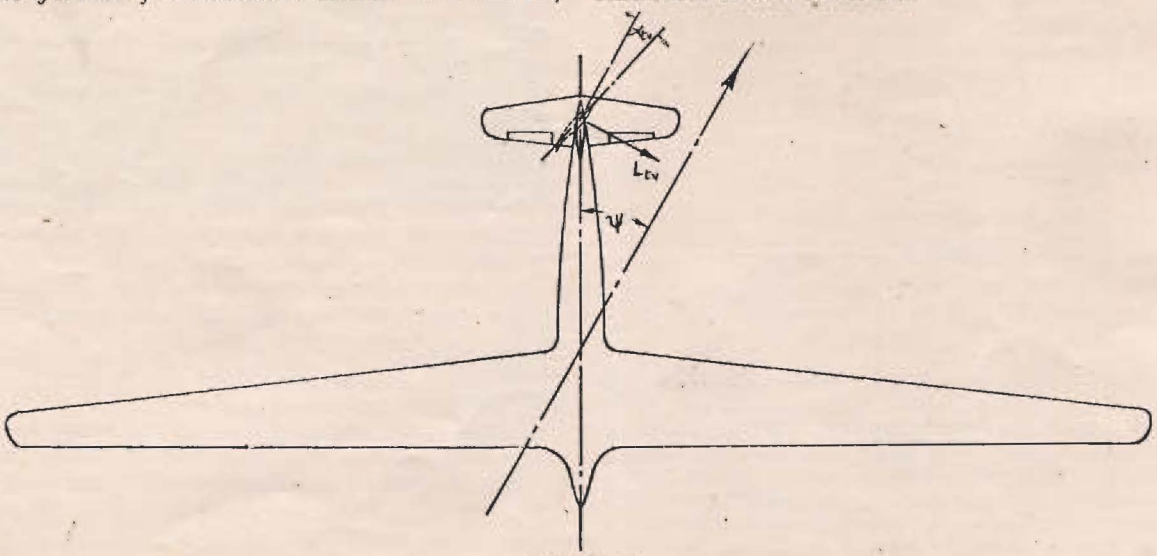


Figure 3

Nevertheless, it would be erroneous to think that because of the various means available in a Canard to control the stall and the spin this type of airplane is the foolproof thing. When one drives an automobile, one is supposed to stay in the road and not crash into a display window.

There is a fundamental logic in the tail first arrangement so far as the interaction of forces during flight are concerned. Let's consider a conventional glider in flight. If it is desired to increase the lift as for climbing, a down-load or a decrease in up-load at the tail is necessary. If it is desired to make a right turn, right rudder will give a right yawing moment but the moment of the force on the vertical tail will result in a left roll opposing the desired right roll. It is understood that this adverse roll is of small magnitude. However, in a glider, every little aerodynamic improvement is of value in the final performance and, if it is possible, as in a Canard to obtain climb by increasing the lift at the tail, to perform a right turn with a resultant right rolling help due to the vertical tail, it is a decisive step towards optimum performance. This can be very noticeable while riding a thermal when continuous spiralling combines right or left turn with down-elevator. In other words, the airplane polar for a Canard is considerably flatter than that of a conventional glider.

Another advantage of the Canard glider is that it is a natural instrument to investigate the possibilities of dynamic soaring. Little is known about this sort of flying and it would be interesting to uncover this field of flying technique.

Longitudinal Stability

The stability is analyzed here rather as a qualitative discussion than a mathematical one.

Tail first airplanes have been built before with little success so far as stability is concerned. Failure to attain desirable stability has been shown by Dr. Foa to probably be due to the lack of attention to the effect of C.G. location on $\frac{dC_m}{dC_L}$ at various flight conditions. That paper indicates that the maximum C.G. travel should be limited to a small per cent. of the M.A.C. However, his letter of March, 1943, to the *Journal of Aeronautical Sciences* indicates that a floating type of tail would increase the tolerance to a much greater value. Inasmuch as that letter covers adequately the longitudinal stability with a free floating tail, only a few explanations will be added to his statements. By hinging the horizontal tail forward of the a.c., a given trim setting will insure a constant value of lift coefficient for any airplane pitching motion. The airplane stability will have the same value as a stability tail off minus the distabilizing moments due to the wing and tail drag (assuming that the M.A.C. is above the C.G.). The tail can be set for trim at a given configuration with elevators or tabs. It is interesting to note that the location of the tail hinge will be determined by the pitching moment, elevators neutral, regardless of control deflections required.

Attention must be paid to the fact that the elevator motion which will give the maximum lift coefficient obtainable for the particular hinge location might be of the order of 10 to 18° and care should be taken not to exceed that value. Figure 2 shows what is meant.

Directional Stability

The Canard directional stability offers a more complex problem. The mehtods which have been used to obtain it are conventional ones; *i.e.* side area on the back of the C.G. and sweepback. Because of the particular shape of the Canard, the tail length is small and to obtain a satisfactory degree of stability big vertical tail area is required. The XP55 is an example of it. Furthermore, if wing end plates are used, a considerable amount of sweepback would follow. Sweepback, aside from structural complications, introduces bad stalling characteristics by shifting the load towards the tips. These problems can, of course, be solved but at the expense of drag, lift and weight.

A more direct and inexpensive way of obtaining directional stability is to use a free floating tail in front of the C.G. in the vicinity of the horizontal tail and similarly hinging it forward of the a.c.

Let's consider Figure 3 and assume that the airplane is yawing to the left so that the relative wind strikes the airplane from the right. The moments on the tail will rotate it to an angle equal to the yaw; *i.e.* the angle between the tail and the longitudinal axes of the airplane will be equal to ψ. Let's now connect the hinge line at the fuselage with the tab or rudder so that any relative deflection of the tail to the fuselage will result if a tab deflection opposite the tail rotation. An increase in angle of attack will follow, thereby creating a moment opposing the yaw.

By proper ratio of elevator to tail deflection, any amount of directional stability can be obtained within the limitation of tail area and tab deflection. If so desired, a suitable mechanism can be devised to vary the amount of stability to fit some particular condition of flight. For example, in a take-off a maximum directional stability might be desirable while during manoeuvring flight (riding a thermal) a minimum degree of stability would be sufficient. The rudder pedals would then act through a flexible system on the tab or rudder, regardless of tail swing.

This discussion has so far neglected to include the frictional effects. Although with proper design a minimum value of friction might be obtainable, it is, nevertheless, true that no matter how small the friction it will decrease the stability in the vicinity of zero yaw; *i.e.* the stability curve would flatten out as a function of friction. Considering dynamic stability, this flattening of the static curve near the neutral point will tend to produce "hunting." "Hunting" can be eliminated by incorporating in the rudder or tab a certain amount of internal balance. A properly sealed 60 per cent. balance can be designed to give over-balance by choosing the intake orifice at a point on the airfoil where the pressure will be of such a magnitude as to over-balance the rudder hinge moments. This, of course, means that no feel of the control forces will be transmitted to the pilot. This undesirable feature can be remedied by having a spring loading system to transmit loads corresponding to flight, or by installing an additional rudder or tab without balance which would provide control alone while the other one takes care of the stability.

As a conclusion, it is felt that the all movable surface of free floating tail offers a simple and direct solution to the problems of longitudinal and directional stability in a Canard glider.

THE ANGLE OF ATTACK INDICATOR

By AUGUST RASPET

Presented at the 1945 Motorless Flight Conference

NO instrument in aviation has been so neglected, and yet offers such a possibility for indicating the attitude and flight condition of the aircraft, as has been the angle of attack indicator. The Wright brothers used an angle of attack meter, consisting of a ribbon in the flight stream of the air in front of the main airfoil, to indicate the relative wind on the main plane. The very fact that the angle of attack indicator gives a true indication of the reserve lift of the airfoil makes its contribution to the knowledge of the pilot much more valuable than any other indicator on the airplane. The airspeed indicator is, in contrast, an instrument which indicates a history or summation of the past attitudes of the aircraft, whereas the angle of attack indicator gives an immediate knowledge of the flight attitude of the airplane. It is for these reasons that soaring will be more efficiently performed by the use of the angle of attack indicator.

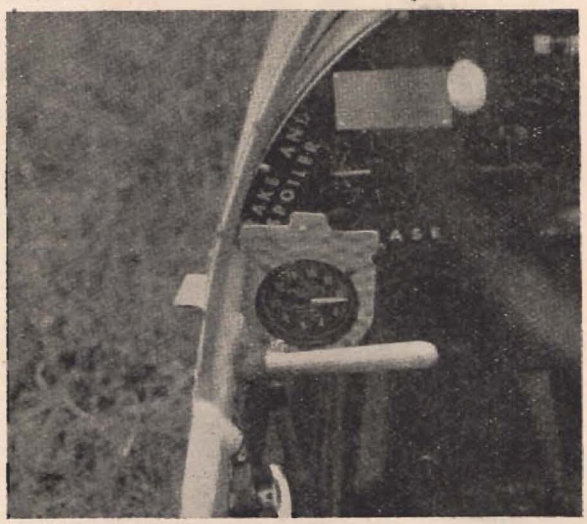
In some of the early gliding of the Germans an angle of attack indicator consisting of a ribbon on the top of the fuselage was used This indicator also indicated the relative slip or skid of the glider. However, the upwardly deflected flow over the fuselage caused errors so that it did not give a true indication of the angle of attack. It is, perhaps, for this reason that its use was not explored further.

An angle of attack indicator is a much simpler instrument than any of the pressure types of instruments; such as the airspeed, the altimeter, and the rate of climb. Essentially, it is a wind vane which always points in the direction of the relative wind at the position where it is located. If the vane is located on the side of the fuselage rather than the top, as was done in the German experiments, it will give a much more exact measurement of the angle of attack of the wing. Since the vane is on the side of the fuselage, it is difficult to observe it inside the cockpit and therefore, a remote indicator is required. Figure 1 is a simple configuration of such an instrument. The vane is on a rotatable shaft mounted on a bearing in the side wall of the fuselage and inside the cockpit is a long needle which is read against a scale fastened to the side of the cockpit. If it is desired to indicate on a circular scale instrument similar to an altimeter, a gearing is required to transpose the motion of the vane through 90°.

If the vane is to be stable and if the indication is to be a steady indication, due consideration must be given the design of the vane. In particular, the vane must be very light and should have a relatively high aspect ratio in order for it to be stable. The stability of wind vanes has been studied* and the results of the study can readily be used in the design of a finished instrument.

* "Theory of Soaring Flight," Part 7, W. B. Klemperer, SOARING, May-June, 1945, Vol. IX, Nos. 5-6.

The application of the angle of attack indicator to soaring flight is particularly promising because soaring flight requires an accurate and immediate knowledge of the attitude of the wing with respect to the flight path. It is this attitude which determines the reserve lift of the wing. Every soaring pilot has at one time experienced a stall due to the fact that the stalling speed in a turn is somewhat higher than the stalling speed in machine flight. If the pilot begins circling without increasing the speed to compensate for the increased loading on the wings due to centrifugal force, a stall is imminent. It is immediately apparent then that for this condition the airspeed indicator is not sufficient as a true indicator of the reserve lift of the main wing. It is also a well-known



The angle of attack indicator as installed in the SSA'S Laister-Kauffmann

fact that the best $\frac{L}{D}$ of a sailplane occurs at one fixed value of angle of attack. This is, of course, also true for the angle of attack at minimum sinking speed. In contrast, the indicated airspeed at best $\frac{L}{D}$ changes with the wing loading of the airplane. Therefore, a heavy pilot must fly at a higher speed than a light pilot. Future advantages inherent in the use of the angle of attack for informing the pilot of the flight condition of his sailplane are immediately apparent. Fundamentally, the angle of attack indicator is really a stall warning device and, therefore, it can very easily eliminate many of the accidents occurring in the training stages of soaring. If it is desired, a warning signal can be given when the angle of attack reaches a dangerous stall. For one of the

finest treatments of the angle of attack indicator as a flight condition indicator, the reader is referred to Wolfgang Langewiesche's " Stick and Rudder."

It has been mentioned that the attitude of an aircraft is not absolutely determined by the airspeed indicator. This is because the airspeed indicator gives the pilot information about the kinetic energy of the sailplane rather than the immediate attitude of the sailplane. In other words, the airspeed indicator can be indicating 60 miles per hour when the sailplane is really flying upside down. An angle of attack indicator, on the other hand, would indicate a negative value of angle of attack and would, therefore, at once inform the pilot that he is in inverted flight. The advantage of the angle of attack indicator is, therefore, similar to the benefit derived from the use of an artificial horizon of the gyroscopic type. The gyroscopic horizon has, however, not been utilized in sailplanes because it requires so much more energy to drive it than is available from the venturi on the sailplane. The angle of attack indicator being self-actuated requires no external source of power and, therefore, is an ideal instrument for blind flying. Many soaring pilots are familiar with the 1, 2, 3 system of blind flight and these same pilots will admit that this system is nerve wracking and tiring in blind flight conditions especially if the air is rough as is often the case in cumuli. The 1, 2, 3 system may be used in blind flight with much more facility if the angle of attack indicator is substituted for the airspeed indicator as a primary instrument and the airspeed indicator used as a secondary instrument. When this is done, the pilot need not change the attitude of the airplane in order to determine whether he is inverted and whether his speed is due to diving. The angle of attack indicator, therefore, makes an ideal instrument for blind flight in sailplanes where no source of power is available for the artificial horizon. It has the further advantage that it is a much less expensive instrument than the artificial horizon and also requires little or no maintenance.

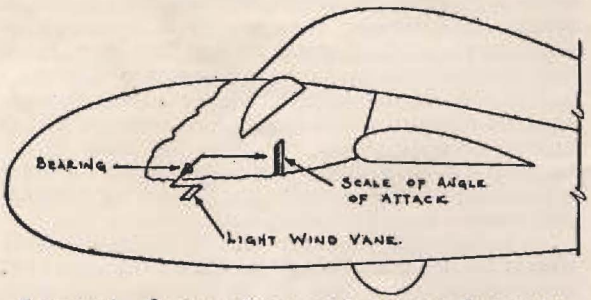


FIGURE 1 SIMPLE ANGLE OF ATTACK INDICATOR.

Although the two above-mentioned functions of the angle of attack indicator should recommend it to all soaring pilots in the future, there is still another function which is even more desired by the sailplanist and that is the possibility of using the induced angle of attack as a means for detecting thermals. A vertical convection in the atmosphere, when encountered by a sailplane, causes an increased angle of attack because the air appears to be coming from below the horizon. See Figure 2. When the angle of attack is increased by vertical convection, the angle of attack indicator will immediately indicate this fact and tell the pilot that he is encountering upward vertical convection before the rate of climb indicator and variometer. The angle of attack instrument is really not a predicting device for convection but it is an immediate detector of the convection rather than a delayed detector such as the variometer. It is entirely possible that by the use of the angle of attack indicator dynamic soaring may be possible since all dynamic soaring theory requires that the pilot have an immediate knowledge of a gust being encountered. In Figure 3 is shown

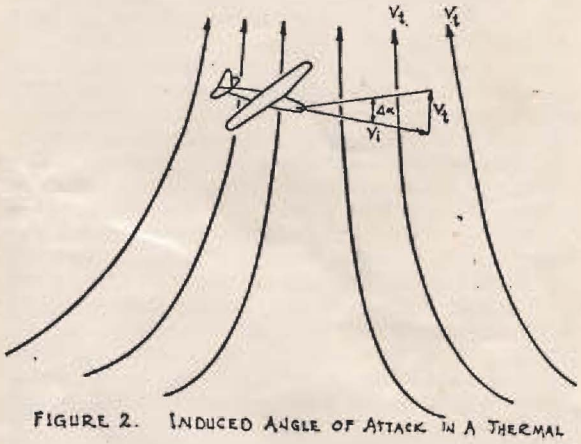


FIGURE 2. INDUCED ANGLE OF ATTACK IN A THERMAL

the effect of vertical convection on a wind tunnel model encountering a gust. The immediate response of the angle of attack indicator to such a flight condition is evident. It is, in fact, possible to determine from the characteristics of the sailplane, from its forward speed and from the increase in angle of attack, the vertical velocity of the thermal. For example, a vertical velocity of 10 feet per second in a thermal when the sailplane is going 40 miles per hour should result in an angle of attack change of 10° if the thermal is a sharp edged thermal. If the thermal is diffuse this change will of course be less but, in general, the angle of attack will show a definite increase when upward convection is encountered by a sailplane. This detection of upcurrents by an angle of attack indicator is immediate and positive and should furnish ideal correlation to a low lag rate of climb indicator.

In the first test of the angle of attack indicator in a Schweizer TG-3A made at Elmira in July, 1944, by the author and Emil Lehecka, the ease of detecting upcurrents was quite vividly portrayed. The needle of the angle of attack meter began to rise gradually and then steadily bump upward. Upon starting a spiral in this area, a rate of climb was immediately realized. The surprising ease of interpreting the action of this instrument for upcurrent detection was apparent in spite of the fact that the vane was not too highly stable, having a natural vibration of its own due to vane instability.

For those people engaged in the design and aerodynamics of motorless aircraft, the angle of attack indicator furnishes a convenient means for flight testing the sailplane. In Figure 4, is shown a lift

curve obtained by means of the angle of attack indicator and a calibrated airspeed. The angle of attack indicator probably had some inherent errors but these can be eliminated by proper consideration. The value of such flight testing to motorless aviation is fundamentally connected with furnishing evidence to substantiate the performance estimates being made from various wind tunnel tests. In the past there has been too much extrapolation from wind tunnel tests, and not enough actual flight test data available on which to make predictions for other types of sailplanes .By means of the angle of attack indicator it should be possible to catalogue many of our American sailplanes and determine in basic parameters the fundamental advantages of each sailplane design.

As in the case of pitot static heads the wind vane also has its problems of position error. Very little work has been done on the accurate determination of errors inherent in angle of attack measurement. In Figure 4, mentioned previously, showing a coefficient of lift versus angle of attack in a sailplane, no consideration was given position error, but it is apparent that the upwash in front of a wing causes an apparent increase in angle of attack. In locating the angle of attack indicator of the simple type shown in Figure 1, it is important that the instrument be located in such a position that it is readily readable by the pilot. Since this is so it becomes necessary that the scale be made for the angles so the errors of aerodynamic position are eliminated. This can readily be done, for example, in the case of the TG-3A, by constructing a scale on which each degree of the scale is 1.39 degrees of true angle of attack.

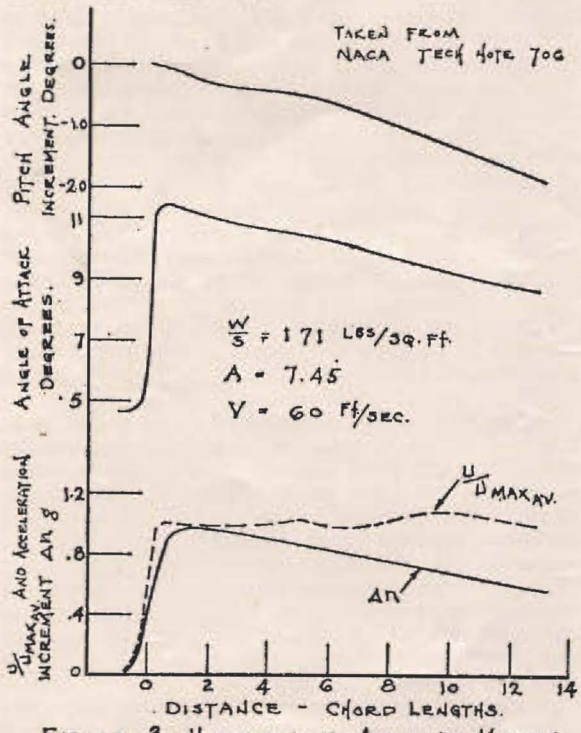


FIGURE 3 HISTORIES OF AIRPLANE MOTION FOR A TAPERED WING IN A SHARP-EDGED GUST.

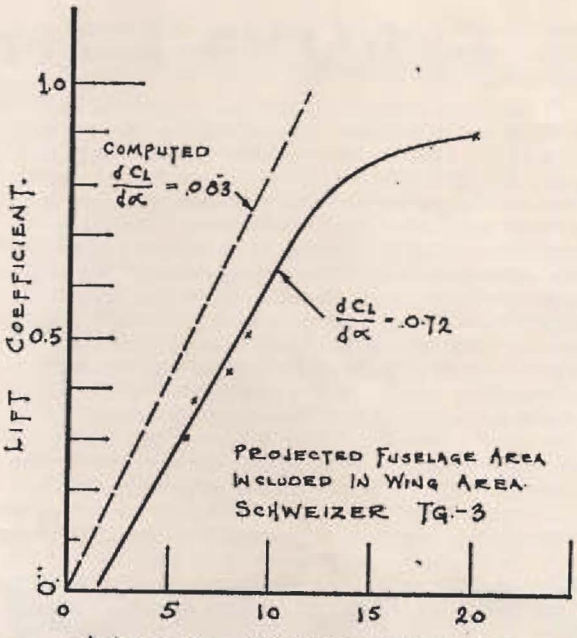


FIGURE 4. LIFT CURVE OBTAINED WITH ANGLE OF ATTACK METER.

By this means the instrument is corrected for the inherent position error and at the same time requires no complicated remote indication.

In the above discussion no mention has been made of the origin of the scale for angle of attack measurements. It is desirable, if the instrument is to have a maximum of utility, that the zero angle of attack of the indicator correspond to the angle of attack of the main wing at which no lift occurs. It is impossible in flight testing a glider to achieve the zero lift condition without imposing severe stresses on the sailplane. In order to obtain the origin of angle of attack measurement, therefore, it is necessary to calibrate the angle of attack against the airspeed and plot the lift curve as shown in Figure 4. When this is done the zero lift point of the lift curve will occur at some angle of attack positive or negative. It is merely necessary, then, to move the scale of the angle of attack indicator until the zero of the scale coincides with the position of the vane at zero lift as obtained from the calibration.

In conclusion, the wide use of angle of attack should furnish the glider pilot with a ready means of determining the reserve lift on his wing, the flight attitude of his sailplane, and a means for detecting upcurrents in the atmosphere. To the more serious sailplanists it offers a means for aerodynamic study and to the instructors it offers a simple means of avoiding stalls during initial training periods. Many instrument manufacturers are already building angle of attack indicators of the remote indicating type, but it should be no difficult matter for the glider enthusiast to build his own. The widespread use of the instrument should enable soaring records to be broken in the immediate future.

With acknowledgment to "Soaring."

OUR FORMATION GOAL-FLIGHT

By F/LT. CYRIL HUGHES, O.C. SALTZGITTER B.A.F.O.

FRIDAY, 13th September, dawned with a promising-looking blue sky and, although the wind was too far West to make it a good cross-country day, Met. forecast good thermals, so Jock Forbes and I decided to try a formation cross-country to Wesendorf.

Flying was uneventful until Jock got away in "Weihe 3" at 11.15. The arrival of some visitors prevented me from following him immediately, and he spent an hour flying up and down a cloud street which was forming south of us over the Harz mountains, and travelling N.E. in the direction of Brunswick.

At 12.11 I managed to get off in another "Weihe," and after an uneventful circuit had decided to land when at 100 metres, I struck a ½ metre/second thermal which increased to 1½ m./s. This took me up to 400 m., where it faded out, but flying back into wind I found a rate 1, which increased to 2½ and took me up to cloud base, where Jock was waiting for me.

By this time we were about 14 kilometres from the club, at 1,000 m. We left the cloud together and headed across wind for some Cu which was forming W of the cloud street. Very little life was to be had there, so we returned to the cloud street and climbed to 1,100 m. under a good Cu before setting off slightly across wind for the next cloud, which we reached over Wolfenbuttel.

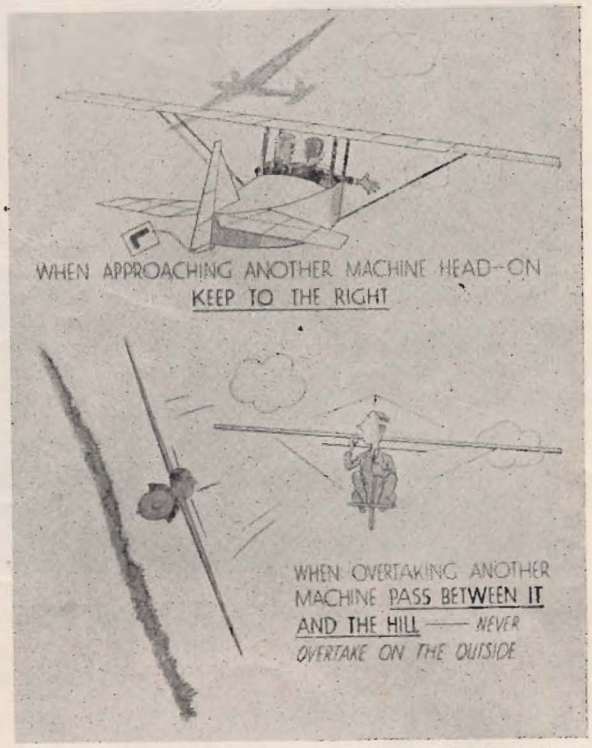
There were great heaps of grand Cu to the East, while to the next the sky was clear. The Russian border being where it is we had to be satisfied with the Western fringe of the cloud streets.

The Wolfenbuttel cloud took us up to 1,150 m. before we left it, and headed across wind for No. 4, which was building up nicely just East of Brunswick. This took us up to 1,200 m. at 2½ to 3 m.p.s. From the cloud base I could see the railway and the village of Fallersleben, which I knew was on the 50 kilometre boundary. The sky to the north looked a bit dubious, so to make sure of getting my Silver "C" cross-country I headed down wind for Fallersleben. In the process I got somewhat ahead of Jock, so waited for him under a cloud just south of the village.

Our next length wasn't quite so easy. From Fallersleben we flew dead across wind for Gifhorn, where I arrived at 250 m., having found nothing but two areas of zero lift in the way. Jock was more fortunate and maintained his height all the way over. When we reached Gifhorn I had my eye on a large field and was making rapid calculations as to wind speed and the possibilities of being towed by an "Auster" when my variometer started moving up steadily till it stopped at 3 m./s. Jock was in the same thermal about 50 m. above me.

We covered half the distance to Wesendorf while climbing in this thermal, which we left at 800 m. Then followed some tight formation while Jock argued the toss as to whether we should carry on to Celle aerodrome or not. One look at the large wooded areas, and a marked absence of decent cloud decided me on Wesendorf, where we were sure of a good meal, both the C.O. and messing officer being friends of ours. A short climb in a rate 1 took us to 120 m., after which we made our way down to the aerodrome, where, after some aerobatics and a "beat-up" to lose height, we landed in formation at 14.45.

The "Rule of the Road" for Gliders



Reproduced from illustration hanging on the walls of the London Gliding Club.

NEWCASTLE GLIDING CLUB

Progress continues.

On the training side, the "Primary" still gives sterling service. Randall, on his second ground slide, hit one of the higher grade bumps on the Cramlington field, became momentarily airborne—repairs are nearly completed.

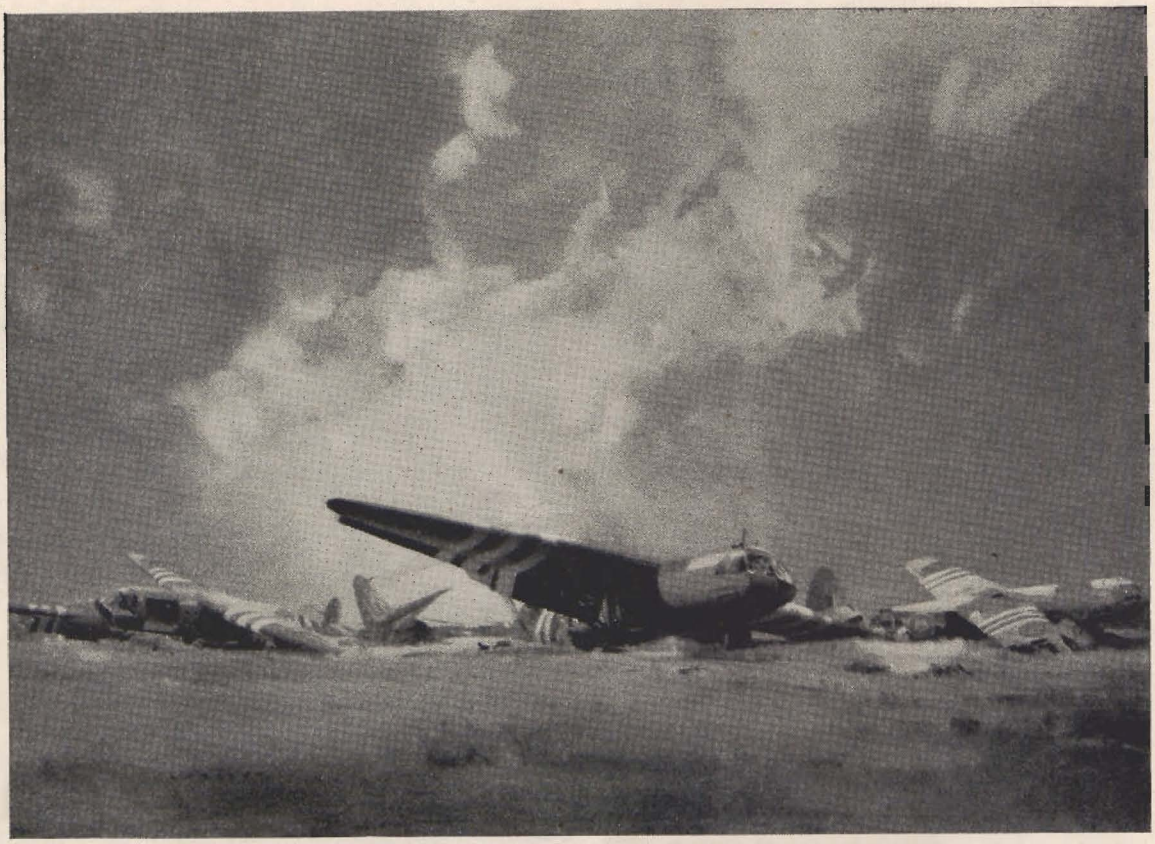
The nacelled "Dagling" has not yet appeared.

"C" pilots have made good use of the "Tutor". On Oct. 13th. Fidler gained this club's first "A" and "B" licenses, followed a fortnight later by Dunford. Both had previous power experience.

Allan, Fidler and Varley went to Hartside on Nov. 9th to prepare for research work on the Helm wind and reconnoitre our pre-war hunting grounds in that area.

The "Olympia" allocated to the club for research work on the Helm in co-ordination with other interested bodies, is now undergoing repairs by Elliotts of Newbury who are doing the job free of charge: a nice gesture to the gliding movement.

Dec. 12th and the Heaton Assembly Rooms are the date and place of another of this club's successful and very enjoyable dances. Dancing is from 8 p.m. until midnight and late transport to the main towns in the area is available.



"GLIDERS AT CAEN"

By
FRANK WOOTTON

Coloured Prints 17" × 12" can be obtained from the Appeals Department, Airborne Forces Security Fund, Greenwich House, 10/12 Newgate Street, London E.C.1., price 10/6 each or one guinea if signed by the Artist. Proceeds of the sale of this picture are devoted to the Security Fund. (*See page 20.*)

SYNTHETIC TRAINERS

By Dr. W. E. HICKS

THE expense and loss of flying time resulting from damage to training machines have, in the past, led to a number of attempts to devise more or less simple gadgets, practice on which will give the pupil some idea at least of what he must do when he becomes airborne. The results have been disappointing on the whole, although, as far as the writer is aware, no club has collected figures showing the effect of any form of synthetic training on the rate or cost of learning to glide. However, the general feeling undoubtedly is that the only way to teach a pupil to fly is to get him into the air, which is undeniably true; one cannot learn to fly on a synthetic trainer, unless its behaviour and the attendant circumstances so closely resemble actual flying as to be, to all intents and purposes, the same thing. Nevertheless, it may be possible to make a reasonably cheap synthetic trainer which will give the pupil some of the knowledge he requires for his first hops, and thereby accelerate his progress and reduce the risk to training aircraft. A suitable device of this kind has the further advantage of maintaining pupils' interest and encouraging prospective members on non-flying days.

It is proposed to discuss first some of the principles which must underlie the design of such an apparatus; it will be clear from these why many attempted solutions failed to come up to expectations. Some practical considerations will then be mentioned, which, it is hoped, will give some idea of what can be expected of different kinds of synthetic trainer, and the technical problems involved.

KINDS OF KNOWLEDGE.

Piloting knowledge has to do, on the one hand, with what we may call long-term planning—*e.g.* deciding on a compass course, a method of approach to a landing, etc.—and, on the other, with very short

term planning—decisions relating to something like half a second of future time, after which they are liable to be superseded. We might, if we liked, speak also of intermediate-term decisions. The practical point is that we can distinguish between those decisions which could be made as well by an experienced passenger who had never touched a joystick in his life as by the person manipulating the controls, and those which can only be made satisfactorily by the latter. The passenger may be able to assess the general situation as well as the pilot, and decide, for example, that a 180 degree turn should be made; he may know equally accurately how long it will take, how much height it will cost, and so on; but only a pilot can do it.

The pilot is expected to have both kinds of knowledge, of course; to some extent, he acquires them concurrently in the course of his flying practice. But if we are considering special ground aids to training, their separation is the first stage in the analysis, because different methods are clearly required to teach them. Let us call them *assessment* and *manipulative skill* respectively.

TRANSFORMABLE KNOWLEDGE.

You can tell a pilot where to fly to get the lift, and he may do it; you may show him a photograph of a cloud formation, and he may utilise the knowledge in a subsequent flight; a pupil may learn a valuable lesson from watching a crash. These are examples of knowledge being given in one form and expressed by the pilot in another. But the most exhaustive knowledge of aerodynamics will not, by itself, enable its possessor to fly half as well as a snub-nosed schoolboy with dive-brake ears who has had half an hour of actual flying practice. In other words, manipulative skill is not readily transformable; it has to be learnt in the form in which it is to be used. The reasons would take too long to discuss here, but briefly they have to do with the amount of detail to be learnt, the accurate estimation of unfamiliar physical quantities, and the rapidity and number of the decisions which have to be taken—particularly the latter. More will be said about these things below when we consider the signals on which the pilot bases his control movements.

TRANSFER OF TRAINING.

If we have two tasks, A and B, we may find that people trained on A do better initially on B than untrained people; there is then said to be positive transfer from A to B. Sometimes, however, task A interferes with task B, so that *untrained* people are initially the better performers on B; the transfer in such a case is negative. If the tasks are different in every respect, there is no transfer; if they are identical, there is complete positive transfer; if they are superficially alike but in some important respects different, there may be negative transfer. A striking instance is that of reversed elevator mechanism, where the negative transfer usually has fatal consequences.

A synthetic trainer giving marked negative transfer would, of course, be worse than useless. What usually happens is that the transfer is positive in some respects and negative in others. Negative transfer is a transient phenomenon, usually rapidly overcome if the pupil realises exactly what part of the transferred skill he must eliminate; but it may reappear several times, in moments of stress or absent-mindedness, before finally disappearing. For example, an experienced pilot who survived long enough in a machine with reversed elevators might either assume he had no control and had better review his past life—*i.e.* jettison all his skill—or he might discover or guess the true state of affairs, and try to eliminate only that part of his skill which had to do with direction of movement. He would undoubtedly make a very fair show of it with a few minutes' practice, as long as his attention was not distracted.

It is probably impossible to avoid some negative transfer in passing from a synthetic trainer to real flight, just as it always occurs in passing from one aircraft to another of different handling qualities. The main thing is that it should not involve the more important and difficult elements of the skill, or operate in such a way as to produce startling or dangerous results. The question we have to ask is what will happen if the pupil moves the controls in the same way, in response to the same signals, in flight as he must have learnt to do on the trainer. (By " signals " is meant the indications the pilot has of the position, attitude, and motion of the aircraft.) When, as we shall see, none of the signals is quite the same or means quite the same thing, and many are missing in the trainer, the question is by no means easy to answer, even with a detailed analysis of the situation.

GENERALISATION.

This is closely related to transfer. As we know, a pilot trained exclusively on one machine will experience considerable negative transfer on passing to another. But after practice on a few machines of widely—but not too widely—differing characteristics, he will have little difficulty with machines even outside the range of his previous experience. He can not only interpolate, but to some extent extrapolate. The flying of the first machine is learnt as a unique task; as experience accumulates, the features common to the behaviour of the whole range of machines are gradually perceived and abstracted in the form of general laws. These general laws are naturally of use to the pilot in flying any machine which obeys them. Nevertheless, each machine represents a particular case, and the pilot can only find out which particular case it is by trial, aided perhaps by his judgment from its appearance or what he is told about it.

Clearly we do not want the pupil to learn the synthetic trainer as a unique task, but rather as a typical task. If its handling qualities are sufficiently realistic to be regarded as like those of any particular typical aircraft, then we can and should make them adjustable to simulate several different types of aircraft. We may then expect that the pupil will learn something of use, whatever training glider he is subsequently put into. The same applies to the display—*i.e.* the means by which the visual, auditory, and other signals are simulated and presented to the pupil. There may be many possible forms of display, depending on technical considerations, and all with different good and bad points. The pupil should practice with several of them.

(*To be continued.*)

SOME ADVICE ON LANDINGS FOR "C" PILOTS

PILOTS who have reached the " C " licence stage and consequently have not acquired a great deal of experience in landing under trying conditions, will undoubtedly find appreciation in the foregoing illustrations. It is not intended to attempt to survey all the various difficult problems that face the pilot during his landings, but to outline briefly some typical cases.

The Normal Approach.

The normal approach for a landing will be slightly in excess of the normal gliding speed. This extra speed is gained by increasing the angle of glide, the speed being necessary to permit effective control during the levelling out near the ground, allowing a smooth touch down. Without this margin of speed the glider would maintain its sink until coming in contact with the ground and to attempt to flatten out would only increase the rate of sink causing an unpleasant hard landing—the stall landing.

When flying near to the ground during an approach for a landing, the speed of the glider appears to be greater and a pilot should not permit this false impression to lead him to believe he is really flying faster and has sufficient speed in hand to level out. He will learn by experience to judge his correct speed by the sound eddies of his particular glider and also by the feel and pressure on his controls. Excessive speed will be noticed by the increased stiffness of the stick and the greater effort required to move the elevators or ailerons will be sufficient warning to guard against any overcontrolling thereby upsetting the graceful approach.

Landings During Hot Afternoons

Under normal conditions a landing made on windless days in quite simple and permits the pilot to concentrate on his attempt without any additional problems. However, conditions sometimes exist during hot sultry afternoons either with a gentle wind blowing or in a perfect calm that calls for particular care when landing. During these days the air appears to have little " lift " and the pilot notices his glider flies heavy and sluggish and the controls lack the normal response. If this is noticed, the pilot must exercise every precaution. His speed must be substantially increased as he nears the ground where the area of " thin air " becomes more pronounced. Low turns should be avoided. In fact the rate of sink will increase so rapidly as the ground approaches that the pilot will find turning most difficult. Under these conditions the glider should approach from upwind and only make gentle turns when necessary. The two following examples will illustrate the severity of flying conditions during hot afternoons.

" During our tour in Canada in 1933 we stopped at a little town and proceeded to demonstrate before a small gathering of people—mainly children who had been given a holiday from school to see the Canadian Glider Boosters perform in their glider. The afternoon proved close, still and very, very hot. My first flight by auto towing was a struggle for height, even at full speed. I just managed to complete a 180 degree turn and sink heavily to the ground, the air having little lift and the glider's controls proving extremely sluggish. My flying partner was the next to demonstrate. He failed to leave the ground at all and although I towed him at full speed, his 160 pounds against my 145 pounds kept him earthbound. His second attempt also ended in failure. As a last resort to give our spectators a worthwhile show, I removed all objects from my pockets, discarded my shoes and leather flying jacket and cap. On my next flight I was rewarded with about 200 feet of height and managed to circle the crowd and once again landed sluggishly in the field. This incident was one of the most remarkable of any of my several hundred flights."

" Only recently while on a visit to a gliding school in the Air Training Corps, I witnessed an instructor land on his wing tip, after failing to observe the presence of sluggish air near the ground. He had picked up a thermal over the field during a circuit, lost it, and flew back downwind, turned low in the usual manner, stalled in the thin air and sank through his turn on to the wing tip, unable to regain control. Should he have observed the local conditions, his turn would have been made with reserve speed to offset the lack of control in the ' thinned ' air."

(To be continued).

SAILPLANE 1/6

THE Directors of the Glider Press Ltd. regret to have to announce that as from the January issue it will be necessary to raise the price of SAILPLANE AND GLIDER from 1/- per copy to 1/6, due to increase of costs of production. Cost of blockmaking has risen twice in the past year and the cost of printing has again risen recently. The Directors had also been hoping to increase the size of the page and the number of pages, but while the latter may be possible the former most certainly is not now possible.

Subscriptions already in being will be honoured, but fresh subscriptions from this date will be 19/- per annum. December 1st, 1946.

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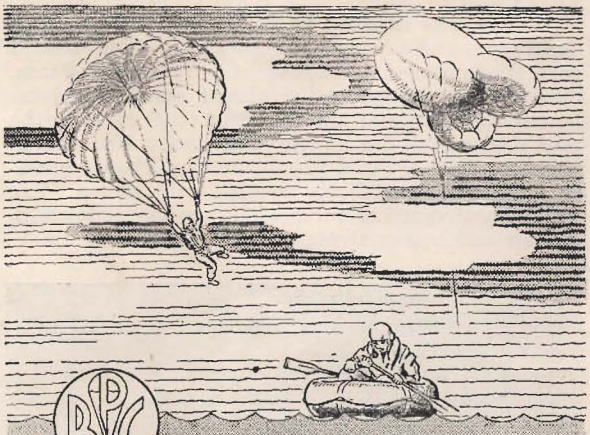
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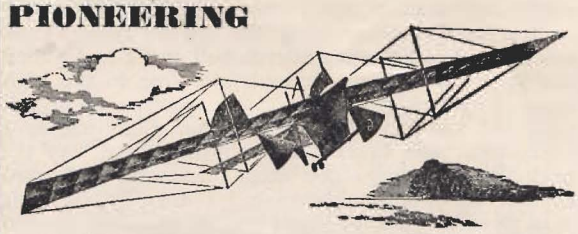
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HIGH ALTITUDE IN FLORIDA—*Contd. from page 2*

sudden I was straight and level and it was raining. This seemed very odd, and I picked up the microphone to tell the monitoring station about this strange phenomenon of rain at 23,000 ft. when I took another look at the altimeter and realized that it read 13,000 ft. ! A few minutes later I was out of the cloud and put on the oxygen mask to recuperate.



I could see Pinecastle Army Air Field ten miles away and headed for it in a very satisfactory smooth glide during which my blood pressure returned to normal. After landing, an inspection of the ship showed that lightning had struck the left wing navigation light and had blown out the wiring plug at the wing root causing the smoke that I had smelled. The left wing aileron bell crank had pulled out of the wing root, undoubtedly due to the high speed in the spiral dive. An inspection of myself indicated the need for a few Vodka Collinses, so a hasty path was taken for the nearest bar. At the beginning of this story some character indicated disdain for Florida thermals. I take it all back even though it means that I may be excommunicated from the order of Loyal Californians.

Note : There is no category for a pilot flying a 2-seater without a passenger.—Editor.

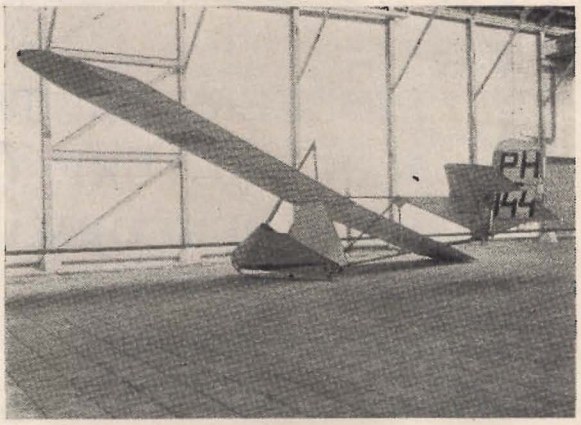
LATE NEWS—(*continued from page 1.*)

gliding clubs. As I have said, I am most anxious to encourage them as a means of providing the cheapest facilities for the greatest number of interested people to gain useful and pleasurable experience of the "feel" of the air and of a form of recreational flying which ought to enjoy a much wider popularity than it has enjoyed hitherto. It is our wish to encourage private flying and gliding as a measure towards establishing and maintaining this country as a leader in the air age, and I am glad to say that Mr. Whitney Straight, Chairman of the Royal Aero Club, has agreed to become Chairman of the representative Committee.

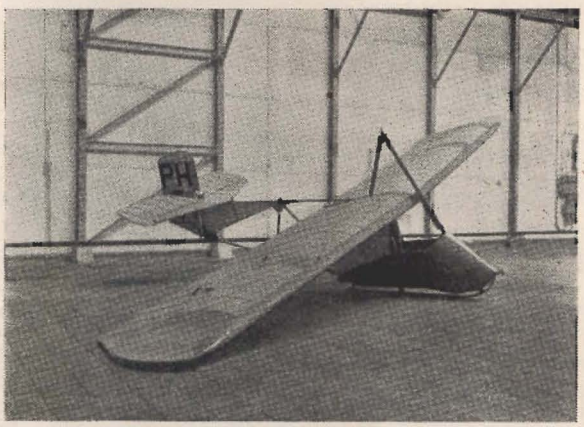
"De Schelde" All-Metal Primary

THIS glider, of which six have been delivered to the Royal Aero Club of the Netherlands, is made by the aviation department of the well-known Flushing ship-yard "Koninklijke Maatschappij De Schelde." It is built in the new factory at Dordrecht, Holland.

The glider has the same dimensions as the wooden "ESG" or "Grunau 9," but is entirely made of dural tubes and sheet. It has been designed so that a minimum attention is required.



The fuselage consists of two parts, both made of dural tubes and a nacelle of dural sheet. The forward part, the king post, is built up of two tubes of 60 mm. diameter and 1 mm. wall thickness, and a triangular horizontal box spar on to which the nacelle, the pilot's seat and the skid are fastened. The nacelle is partly built of dural sheet, avoiding double curvature, the rear part being covered with fabric. The tail is constructed of tubes of 35 mm. diameter with gussets and hollow rivets.



Both wings consist of three parts and are covered with fabric which is glued to the metal with normal "Sikkens" dope. The two spars are made of 1 mm.

sheet with flanged edges. The ribs are pressings of 0.4 mm. sheet and are provided with flanged lightening holes. The steel drag bracing in the inside of the wing can be adjusted by removing the leading edge, which is fixed to the spar with stop nuts. At inaccessible points pop rivets are used. The wing tip is partly covered with sheet and stiffened with a T-section for rigidity when resting on the ground.

The two elevators are identical with the rudder, in order to simplify production. When used as a rudder, a small leading edge section is added to the upper part. All fittings are made of sheet steel. Wings, fuselage and tail surfaces are built in jigs to ensure interchangeability. The makers have many spare parts in stock, and these are at disposal of the clubs in case of repair. This way the damaged parts of the glider can be easily replaced.

MUSCLE-POWER FLIGHTS

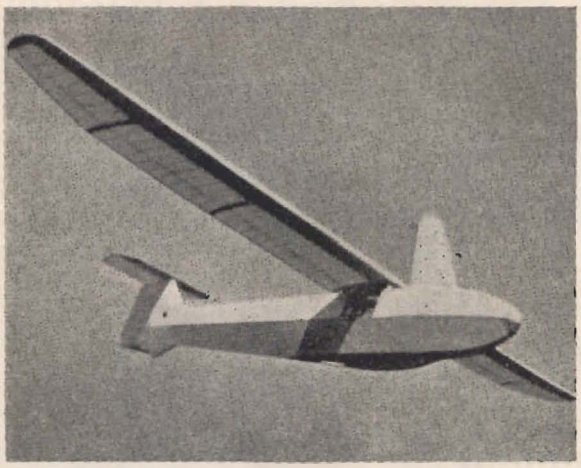
THE first successful flights ever performed by human muscle power were achieved on August 29th to 31st at Frankfurt Aerodrome, Germany, when the pilot Dünnebeil, of Erfurt, flying a machine designed by Dipl.-Ing. Haessler and Franz Villinger, of Dessau, achieved the following officially observed flights :—

Date	*Time*	*Duration*	*Distance*
29th	11.10	17 secs.	120 m. (131 yds.)
29th	18.22	20 secs.	195 m. (213 yds.)
29th	18.43	18½ secs.	177 m. (194 yds.)
30th	7.45	24 secs.	235 m. (257 yds.)
30th	8.14	14 secs.	150 m. (164 yds.)
31st	17.55	21 secs.	220 m. (241 yds.)
31st	18.44	20 secs.	204 m. (223 yds.)

The first landing resulted in a slight breakage, and the last flight on the 30th ended by the pilot stalling his machine and damaging its nose. The flights were carried out mostly at a height of about one metre. The machine is worked by pedals, which actuate a propeller situated at the top of a streamlined projection rising in front of the pilot. Otherwise the aircraft is like a monoplane glider, except that the wing is movable instead of the elevator.

Two years ago the Frankfurt Polytechnic Society offered a prize of 5,000 R.M. for the first German to fly by his own muscular power to a point 500 metres away and back again, without touching the ground ; further, he was to be allowed to store his energy for half an hour beforehand in an apparatus to be carried on the flight. The only advantage Dünnebeil took of this last condition was to stretch a rubber rope from the machine to a pin in the ground, to help him with the launch, afterwards winding it into the machine, though *Flugsport* says that on this occasion he did not wind it in, but took an equivalent amount of ballast instead. The offer of the prize, by the way, lapsed on September 2nd, having already been extended for an extra year.

Hitherto the balance of technical opinion has been against the possibility of flight by human muscular power alone. Theorists have suggested that a wind very near the ground can exercise lift on an aerofoil by means of gust energy, or even the velocity gradient; weather reports, however, show that the wind during the three days in question was only of force 1 or 2 (*i.e.* between 1 and 7 m.p.h.).



An historic occasion : the Haessler-Villinger human power flying machine on one of its first flights, piloted (and pedalled) by Herr Dünnebeil.

(Reproduced from "Flugsport."

An article by H. Haessler, published in *Flugsport* on January 10th, 1934, is of interest as showing the lines on which he has been working. He draws a graph whose co-ordinates are horse-power and minutes of time respectively, and plots three curves showing the maximum power that can be expended over a given period. The first is drawn on Dr. Brustmann's assumption that 80,000 metre-kilograms of energy are available ; this gives a hyperbola stretching to infinity both ways (impossible, of course, in practice). The second is that of a trained professional runner, and shows that he can maintain 1.3 h.p. for a minute, or 0.8 h.p. for 10 minutes. For an untrained but muscular cyclist the corresponding figures are 0.7 and 0.4 h.p. As the trained man also weighs less, he is the obvious one to choose for a pilot.

For the first experiments, says Haessler, the machine must only weigh 20 kgs. (with a 60 kg. pilot) ; a safety factor of only two is needed, as it will be flown straight and low down, while it should be longitudinally and laterally stable (for the latter, the span should not exceed eight metres), so that the pilot need only worry about directional steering. He lies on his back, propped up, so as to ensure a small fuselage height. A propeller efficiency of 0.8 is assumed.

Reprinted by request from the October (1935) issue of "Sailplane and Glider."

THE BRITISH GLIDING ASSOCIATION

ANNOUNCEMENTS

General Meeting.

A GENERAL MEETING of B.G.A. Clubs was held on Friday, October 4th, as previously notified.

Please note that under the new Constitution :—

(*a*) *The Memorandum* which defines the objects of the Association cannot be altered.

(*b*) *The Articles of Association* can be altered at a General Meeting and any changes notified to Somerset House.

(*c*) *The Bye-laws*, which are the working rules of the Association, can be altered at will by the Association, provided they do not clash with (*a*) and (*b*) above. No notification to Somerset House is necessary. The final effect is that the B.G.A. now has a free hand to alter its Bye-laws to suit developments and requirements, which was not the case under the previous Constitution.

Printed copies of the Articles of Association will be circulated to all Clubs, as soon as they are ready.

New Clubs.

The following have been elected Associate Members of the B.G.A. :—

No. 84 Group R.A.F. Gliding Club.
No. 151 Repair Unit R.A.F. Gliding Club.
No. 13 O.T.U. R.A.F. Gliding Club.
Soaring Club of Great Britain.
4th Armoured Brigade Gliding Club (taken over from 22nd Armoured Brigade Gliding Club, which please delete from your list).

Olympic Games 1948.

The International Olympic Committee has decided that it will not be possible to include gliding in the 1948 Games, to be held in the United Kingdom. The main reasons for this decision are :—

(*a*) The number of sports which are to be held is already on the high side.

(*b*) The time for preparation is too short.

(*c*) The "Amateur" rules have to be decided next year.

The British Olympic Committee, in forwarding the above information, wish to make it clear that this decision applies only to the 1948 Games, and it is not anticipated that there will be any queation of gliding not being included in the 1952 Games.

F.A.I. International Gliding Competitions 1948.

The above ruling of the Olympic Committee was discussed at the General Conference of the F.A.I. which was held in London last month, and it was decided to hold instead an International Gliding Competition in 1948, under F.A.I. rules. The F.A.I. Gliding Committee is now drafting the rules, and the locality and conditions of the proposed competition will be notified early next year. It will thus be possible to include contests for different types and classes of sailplanes instead of limiting the competitions to a single type as is required by the Olympic Games Rules.

Government Economic Survey for 1947.

The Ministry of Civil Aviation is required to supply to the Government figures relating to estimated Civil Aviation Manpower requirements, and has requested the B.G.A. to assist.

Letter Headings.

Clubs are requested to incorporate the following information upon the next reprinting of their headed paper :—

either (*a*) "Member of the British Gliding Association"

or (*b*) "Associate Member of the British Gliding Association."

The term "Affiliated to the British Gliding Association" is no longer correct for individual Clubs, though the Association as a whole is now affiliated to the Royal Aero Club.

Gliding Records

FIVE types of International Gliding Records are recognised by the F.A.I. Similar British National Records are recognised by the Royal Aero Club.

There are two categories : Category 1 (Single Seaters) and Category 2 (Multi Seaters).

INTERNATIONAL RECORDS ON 1st OCTOBER, 1946

Category 1 (Single Seaters).	*Official Performance.*
1. *Distance* (Distance en ligne droite) *U.S.S.R.* Miss O. Klepikova, in "Red Front 7," Moscow to Otradnoie (Stalingrad), 6th July, 1939.	749.203 km. (465.6 mls.)
2. *Out-and-Return* (Distance a but fixe avec retour au point de depart). *U.S.S.R.* Boris Kimelman, in "Red Front 7," Toula-Riajsk-Toula, 23rd July, 1939.	342.370 km. (212.7 mls.)
3. *Goal Flight* (Distance a destination fixe). *U.S.S.R.* P. Savtzov in "Red Front 7," Toula to Mikhailovka, 31st July, 1939.	602.358 km. (374.3 mls.)
4. *Height* (Hauteur au dessus du point de depart). *Germany.* E. Ziller, in "Kranich," Hirschberg, 21st November, 1938	6838 m. (22,434 ft.)
5. *Duration* (Duree avec retour au point de depart). *Germany.* Kurt Schmidt, in "Grunau Baby" at Korschenruh (East Prussia), 3rd/4th August, 1933.	36 hrs. 35 mins.

Note.—A record of 55 hrs. 52 mins. was set up on 23rd/24th September, 1943, in Germany by Ernst Jachtmann. In 1945 the F.A.I. decided to cancel all records set up during the war years.

Category 2 (Multi Seaters).	
1. *Distance* (Distance en ligne droite). *U.S.S.R.* I. Kartachev pilot, P. Sabtzov, passenger, in "Stakhanovetz" from Moscow (Ismailovo) to Ouchinia (region of Tchernigov), 17th July, 1938.	619.748 km. (385 miles).
2. *Out-and-Return* (Distance a but fixe avec retour au point de depart). *U.S.S.R.* I. Kartachev, pilot, V. Chechoulkine, passenger, in "Stakhanovetz," Toula-Riajsk-Toula, 23rd July, 1939.	342.370 km. (212.7 mls.)

3. *Goal Flight* (Distance a destination fixe).
   U.S.S.R. I. Kartachev, pilot, A. Gorokhova, passenger, in "Stakhanovetz," Moscow to Gorki, 1st June, 1939. — 395.730 km. (246 miles).

4. *Height* (Hauteur au dessus du point de depart).
   Spain. Luis Vicente Juez Gomez, pilot, Juan Jose Jurado Bembibre, passenger in "Kranich E-C 2-28," Huesca, 25th September, 1945. — 5,723 metres) (18,776 ft.)

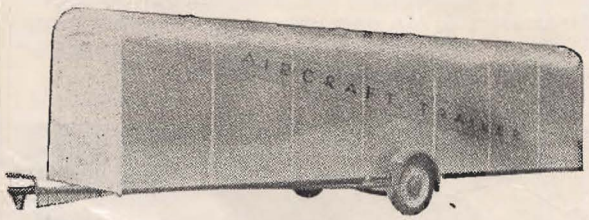
5. *Duration* (Duree avec retour au point de depart).
   Germany. August Bodecker and Karl Heinz Zander in "Kranich," Rossitten, 9th/11th September, 1938. — 50 hrs. 26 mins.

NATIONAL BRITISH RECORDS ON 1st OCTOBER, 1946.

		Official Performance.
Category 1 (Single Seaters)		
1.	*Distance.* P. A. Wills in "Minimoa," Heston (Middlesex), to St. Austell (Cornwall), on 30th April, 1938.	209 Statute Miles (336 km.)
2.	*Out-and-Return.* Squadron-Leader W. B. Murray in "Rhonbussard," Ratcliffe Aerodrome to Castle Bromwich Aerodrome and return, on 7th April, 1939. 34 miles each way.	68 miles (109 km.)
3.	*Goal Flight.* P. A. Wills in "Weihe," White Waltham (Berkshire) to Leiston (Suffolk), on 27th July, 1946.	113 miles (182 km.)
4.	*Height.* P. A. Wills in "Weihe," at Long Mynd (Salop), on 23rd June, 1946.	15,247 ft. (4,647 metres).
5.	*Duration.* Sub-Lieutenant A. N. Young in "Falcon II," at Long Mynd (Salop) on 18th August, 1938.	15 hrs. 47 mins.
Category 2 (Multi-Seaters).		
1.	*Distance.* Lieutenant-Commander (A) J. S. Sproule and Lieutenant (A) J. Suthers in "Kranich," from Peplow (Salop) to Owlswick (Buckinghamshire), on 6th July, 1946.	103 miles (166 km.)
2.	*Out-and-Return.* No award.	
3.	*Goal Flight.* Instituted 1.4.39. No award.	
4.	*Height.* Squadron-Leader E. J. Furlong and Lieutenant (A) E. R. A. Johnson, R.N., in "Kranich," at Peplow (Salop), on 5th July, 1946.	3,601 ft. (1,097 metres).
5.	*Duration.* Flight-Lieutenant W. B. Murray and J. S. Sproule in "Falcon III," at Dunstable (Bedfordshire) on 9th/10th July, 1938.	22 hrs. 13 mins. 31 secs.

The address of the B.G.A. is now Londonderry House, Park Lane, W1. (Telephone number not yet allotted.)

Sailplane Trailers





This Trailer is designed and built by practical enthusiasts—arising out of years of experience in the use of Sailplanes in the hills and over the moorlands of the north. Of light weight, it will hangar your Sailplane against wind and weather—it will follow you faithfully and deliver your machine fit to fly wherever you will.

FEATURES

★ All-steel welded chassis ★ Tubular steel axle ★ Wide track ★ Long springs ★ Maximum spring base ★ Easy ride ★ Automatic Braking ★ Light composite superstructure

TYPE DE LUXE FOR KITE II AND OLYMPIA

£250

(*finished polished aluminium*)

List of other model trailers and trailer chassis on application to the manufacturers :

KENNING AVIATION Ltd.

Derby Airport, BURNASTON

Telephone : *Etwall 123*

Argentine Notes

By LEO FOLLMANN

THE first Argentine Aeronautical Exhibition was held in Buenos Aires in September. We had a stand in which we showed a " Condor I " (Albatros), a " Schweizer SGU-2-22 " two-seater exhibited by the representative of that firm, a " Spahlinger SIB-III " (Albatros), 1 " Olympia " (Gonzalez Chaves)—the first one to be finished here—I "Rhonbussard Chiesa " (Albatros), and a " Grunau Baby II " (Albatros). Furthermore, we had a towcar Ford 35, radio receiver and transmitters as used here for instruction, an open parachute and other items. We sold little models of gliders and descriptive booklets to help out our sad finances a little.



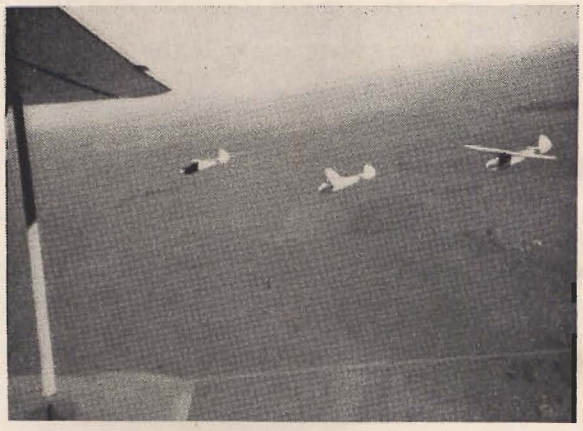
Conde, Vague, Moreno in their Buzzards. A triple tow at the aviation week.

By courtesy of the British Council we also had a gliding film called " Prelude to Flight," which we showed here every night. It attracted many people.

We took part in the official display at San Justo airfield on the 29th September to close the Aviation Week. We sent two " triple launches," three " Babies " and three " Bussards," the latter passing over the crowd at 150 feet, one " Bussard " transmitting to the people by means of ultra short wave. The " Baby Grunaus " continued up to 2,000 feet and landed some minutes later after having done aerobatics. It was a very neat job. The snapshots are some I took from our third " Pelikan," " Salesito " flying.

In the same Exhibition there is a modified "Grunau Baby IIA " with gull wings built by Aerodinos. It looks very nice. Later I'll take some pictures and send you details of its performance—it has not been test-flown yet.

The weather has been frightful lately—lots of rain, so our soaring season has not yet started. The " Viking " is meanwhile being fitted with efficient airbrakes designed by Sales. It should be a great improvement.



Arriving in triple tow at tne San Justo. Laplace and Chourrout gave an excellent displsy of aerobatics.

SAILPLANE AUTOGYROS?

UNDER the title " Glider Without Wings " the New York correspondent of the *London Times* (Nov. 4th) writes :—

" The successful development of a wingless glider which gets its sustaining power from two free swinging (unpowered) rotor blades instead of from fixed wings is announced by the General Electric Company.

" Flight tests have shown that the craft can land in an area 60 ft. in diameter. The 120 lb. machine is towed into the air by an aeroplane and there it is said to be capable of sustaining 300 lb. besides its own weight. When cut adrift it descends at a speed less than that of a parachute as the free swinging rotor blades act as a brake on falling.

" The new glider is simple in construction and with rotors so mounted that they can be easily detached it can be carried anywhere in a small vehicle. It has a framework of uncovered metal tubes welded into the shape of a pyramid. There is an open seat for the pilot and two 9 ft. rotor blades are mounted on top. The pitch of these can be varied from the pilot's seat. The machine has a vertical tail and, it is claimed, can be easily steered."

There would not appear to be anything outstandingly novel in the General Electric Company's development of the wingless glider, for in March, 1944, SAILPLANE AND GLIDER published extracts from the claims of a German inventor who had applied for a patent on what was evidently a similar idea.

This idea was developed by the Germans who produced the " Rotor Kite " for use by submarines in reconnaisance work.

Clearly the G.E.C. machine is a development of the autogyro which the Germans had already used with some success.

SAILPLANE DESIGN COMPETITION

Two-Seater High Performance Sailplane

General.

THE machine should be suitable for club or private owner use. However, emphasis should be on cross-country flying characteristics rather than slope soaring ability.

It is desired to encourage the incorporation of the latest aerodynamic and structural ideas.

The machine should be capable of easy and quick rigging and easy ground handling.

Subject to these and the following requirements being met, the machine should be as small, light and cheap as possible.

Particular Requirements.

Layout.

Sufficient room shall be provided in the cockpit(s) to ensure reasonable comfort for two pilots 6 ft. tall wearing parachutes. Full dual control is to be provided.

Both pilots shall have easy access to all secondary controls and a good view of all instruments.

The cockpit(s) shall be closed. Clear vision panels must be provided.

The view shall be such that either pilot can fly the aircraft with ease and safety in all circumstances.

Provision shall be made for all the usual forms of sailplane launching.

A built-in wheeled undercarriage is required.

Aerodynamics.

The minimum sinking speed shall not exceed 2.4 f.p.s. at a speed not greater than 40 m.p.h. The sinking speed at 80 m.p.h. shall not exceed 10 f.p.s.

Dive brakes shall be fitted, which, when extended, limit the terminal velocity to 90% to the Design Diving Speed. (4.5 Vs.).

Structure.

The following requirements shall be met when carrying as disposable load :—

2 pilots with parachutes ..	Not less than 400 lbs. (181 kg.)
Normal flying instruments	8 lbs.
Allowance for special equipment ..	50 lbs.

(The last item need not be included in the performance estimates).

(*a*) The glider shall have proof and ultimate factors of 1 and 1.5 respectively under aerodynamic forces normal to the flight path of 5W at Climax ; and any value between O and 4W at a speed of 4.5 Vs.

(*b*) The glider shall also have proof and ultimate factors of 1 and 1.5 respectively under up and down gusts normal to the flight path of 65F. ft./sec. E.A.S. encountered when in straight level flight at a speed of 3 Vs. F. is the alleviating factor to convert the gust to an *equivalent sharp-edged* gust and can be taken as 0.3 4/wing-loading lb,/sq. ft.

General Recommendations.

Controls.

The machine should be easy to fly " blind." Attention should be paid to the provision of high directional and longitudinal stability, also to the question of " feel " and harmony of the controls.

The aircraft should have viceless stall characteristics. It should not spin from a stall with rudder central.

Miscellaneous.

It is desirable that the span should not exceed 60 ft. When dismantled no part should exceed approx. 30 ft. in length.

The possibility of extensive operation from runways should be borne in mind.

Competition Rules.

(1) All entries for the contest, which is open only to British nationals, must be received by the Secretary of the British Gliding Association, 119, Piccadilly, W.1, not later than 31st March, 1947.

(2) Intending entrants, who may be individuals or a group, should apply immediately to the Secretary of the British Gliding Association for a competition number. Every drawing or paper submitted shall bear this number, which shall be the only form of identification appearing on the entry.

(3) The decision of the adjudicating committee shall be final.

(4) The British Gliding Association reserves the right to have aircraft built to any of the designs submitted, for research or record-breaking purposes without fee. Any aircraft which may be built commercially for sale shall be the subject of financial agreement between, and to the satisfaction of both the designer and the constructor.

Form of Design Submission.

In order to facilitate the work of judging the designs, some uniformity between all the entries is desirable.

In general, the material should be such that it could be handed over to a Draughting Office for detailing with a minimum of subsequent supervision on the part of the designer.

As a rough guide, the following is suggested :—

(1) *Designer's Remarks.*

The designer should describe special or unusual features of the design, together with their construction, function and purpose.

(2) *Drawings.*

(*a*) 3-view G.A. drawing showing principal dimensions.

(*b*) G.A. of wing showing location and dimensions of major structural components.

(c) G.A. of fuselage showing location and dimensions of major structural components.

(d) Drawing(s) or layout(s) showing location of controls, control runs, and installation of equipment. (These need not be dimensioned.)

(e) Drawing(s) or sketch(es) of wing-fuselage fix.

(f) Drawing(s) and/or sketch(es) of special or unusual features, together with such detailed description as may be necessary.

N.B.—Original drawings and documents should not be submitted, as no guarantee can be given as to their safe return.

(3) *Type Record.*

This should contain the following :—

(a) Aerodynamic Data Sheet (loading, wing sections, etc.).

(b) Detailed weight and C. of G. estimate.

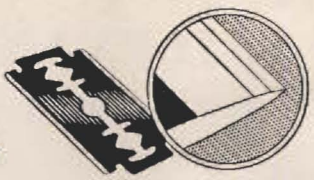
(c) Detailed performance estimate, including polar curve and curves of sink and L/D against speed.

(d) An estimate of longitudinal stability.

(e) Preliminary stress calculations, showing loads on main members and their reserve stiffness.

N.B.—References to sources of information should be quoted.

Gillette put shoulders behind each edge!



Every edge sharper than a surgeon's scalpel, shaped in three facets, forming supporting shoulders to make it more durable. Precision-tested at every stage. Gillette's ceaseless research proves this the best way to make blades — for shaves that are better-looking and more economical.

2/6 FOR 10
INCL. TAX



'Good Mornings' begin with Gillette

The Duke of Sutherland's Prize

SINCE the recent announcement that the Duke of Sutherland, K.T., a Vice-President of the Royal Aero Club, has donated £125 to the British Gliding Association, to be used as a prize for a design competition for a high-performance two-seater sailplane, over thirty competition numbers have been applied for and allocated, and numerous enquiries, with a view to further entries, have been received at the B.G.A. Offices.

This enthusiastic response to the competition emphasises once more the skill and keeness latent in the British Gliding Movement, but it needs more encouragement than it is receiving now from the Government, bot financially and morally. The Movement is entitled to expect that it should be assisted as Gliding Movements in other European countries are being assisted.

It is emphasised that the competition is not limited to individuals or groups of people, but is open to firms as well.

"AIRBORNE"

THIS latest publication of the Airborne Forces Security Fund contains many excellent pictures of parachutists and glider-borne troops taken while training, and during actual operations. It will be of great interest to all ex-members of Airborne Forces.

Copies of the book can be obtained from the Appeals Department, Airborne Forces Security Fund, Greenwich House, 10/12, Newgate Street, London, E.C.1. The price is 5/-, and all proceeds are devoted to the Airborne Forces Security Fund, which looks after the welfare of the airborne soldier and his dependants.

On page 10 we publish a small scale (black and white) reproduction of Frank Wootton's "Gliders at Caen," which this well-known artist painted in the Orne Bridgehead less than a month after "D" Day. The cost of this magnificent painting is 10/6, or one guinea if signed by the artist, and is also obtainable from the Appeals Department.

WINTER LECTURES

Invitations are being sent to all Gliding and Flying Clubs to attend a series of lectures in the canteen of the Fairey Aviation Co., Ltd., Station Road, Hayes, Middx.

The fourth lecture, entitled "Formation and Operation of a Gliding Club," will be given at 8 p.m., by Mrs. Ann Douglas, A.R.Ae.S., Hon. Secretary B.G.A., on 19th December.

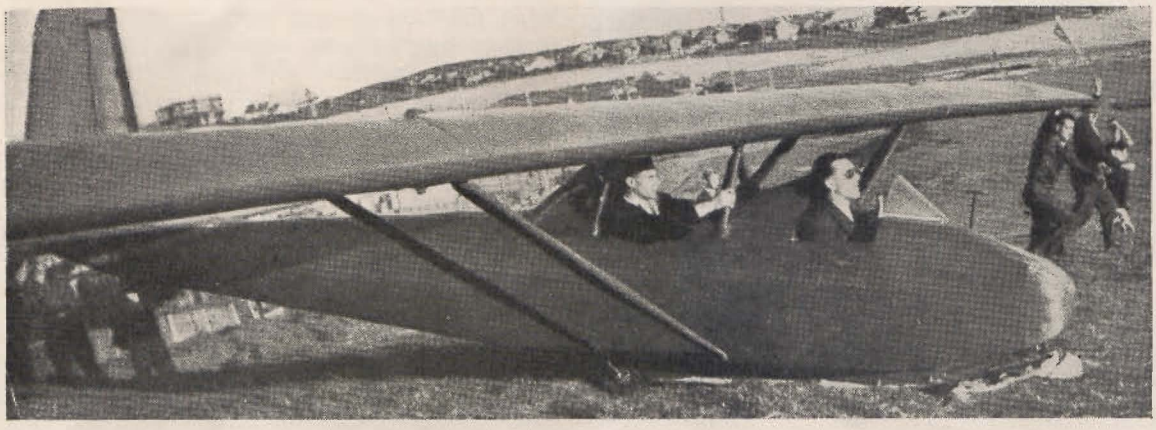
AUSTRALIAN GLIDING ASSOCIATION

NEW SOUTH WALES.

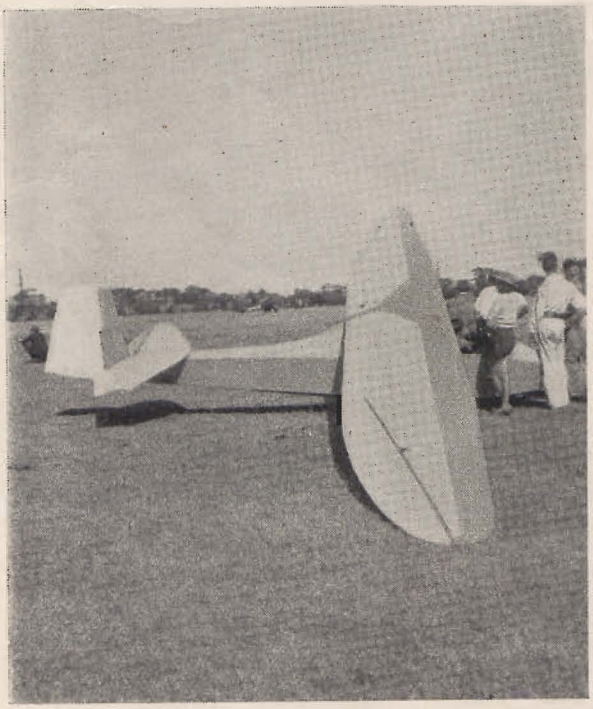
A.W.A. GLIDING CLUB.

Fleurs Airstrip.

Mr. Gil Miles has forwarded the following report :— " A.W.A. Club members were busy all morning making slight repairs to primary glider skid (ply coming away from frame). While this was on I had 2 circuits in my " Prufling." Harry Ryan and Ron Cosstick also each had a circuit in the " Prufling," and then I had a circuit (my first) in the " H.17," and apart from the fact that I purposely flew it fast I enjoyed it. By mid-day the breeze had freshened to Force 6 and blew right across the strip, and aileron balancing in the primary was all that could be done."



Mervyn Waghorn in front cockpit of Jack Munn's (Home Design) "Falcon."



"Grunau Baby II."

SYDNEY METROPOLITAN GLIDING CLUB

Mrs. Dorothy Davis has been appointed Honorary Secretary of the Club. Her address is : Golden Fleece Hotel, Liverpool, Sydney.

VICTORIA.

THE GLIDING CLUB OF VICTORIA.

Flying Report : 21/7/46 to 20/8/46. The weather has been very poor and gliding had to be postponed on this account on 4 week-ends. Flying was carried out on one day only in a Force 3, west wind at Somerton. Seventeen launchings were made with the " Grunau," for a total of 1 hour 28½ minutes in the air ; winch No. 2 being used. Heights of 600 feet were reached on the tow in cross wind conditions.

Jim Darbyshire was admitted as a Flying Member on 19/8/46.

Overhaul, including renewal of fabric covering of wings and control surfaces, of the Club's " Grunau Baby II " sailplane, was commenced at Fawkner on 4/8/46.

Modifications and improvements to the Club's big open trailer were commenced on 21/7/46, and loading and unloading of machines will be greatly facilitated thereby.

Lecture Night, 9/8/46. There was an attendance of 28 members and Mr. N. Hyde delivered a paper on : " Efficiency in launching methods and maintenance of Club aircraft," and Mr. R. Duckworth on : " Maintenance and operation of Club launching equipment."



Keith Ellis in " Utility Trainer" No. I.

ASSOCIATION OF VICTORIAN CLUBS.

The Gliding Club of Victoria wishes to make known that the reports in August *Aircraft*, page 44, and August *Eagle*, page 19, of its alleged refusal ot invitations to join the proposed association of Clubs, are not based on fact.

The facts are : On 2nd March, 1946, a letter was received by the Club from Mr. H. G. Richardson suggesting that the Club should assist in convening a meeting to form an association. Mr. Richardson was asked as a member ot the Club to appear at a Committee meeting of the Club on 10th April, 1946. He explained his proposal and stated that he was acting on his own initiative in the matter and not on behalf ot other Clubs. He was informed in a letter on 10th April, 1946, as follows :—" It is not proposed to take any action towards convening a meeting on the lines suggested in your letter ot 3rd March, 1946. This Club is an Association and is open to membership to all persons interested, subject to the procedure set out in the Articles ot Association, and there is also provision for affiliation of other Clubs and organizations with similar aims and objects."

On 16th May, 1946, the Club was invited by the Committee of the Victorian Motorless Flight Group to attend a meeting for the purpose of : " Furthering cordial relationships between the two clubs."

The Club *accepted the invitation* and the conference took place on 11th June, 1946.

On 9th August, 1946, a letter was received from Mr. John Wallis, *pro tem* Secretary of an Association representing Victorian Motorless Flight Group, Beaufort Gliding Club (Melbourne), Geelong Gliding and Soaring Club and Southern Central Gliding Club, and inviting the Gliding Club of Victoria to attend a meeting on 19th August, 1946, with 4 delegates.



" Grunau Baby II."

The invitation was the *first knowledge* that the Club had of the existence of a new organization, and it was found *on attending* the meeting it had held 5 *previous meetings* to which the Club *had not been invited*, viz., 3rd June, 1946, 24th June, 1946, 8th July, 1946, 22nd July, 1946, and 5th August, 1946.

4th Armoured Brigade B.A.O.R. Gliding Club

IT has been the intention of this Brigade to open a Gliding Club for some time. The opportunity only recently presented itself as a result of the unfortunate winding up of 22nd Armoured Brigade Club, from whom we gathered a nucleus of gliders and instructors.

The Club opened on 31st August with a display. The weather was kind to us on the occasion, and the display was first-class. Training throughout all the early stages was demonstrated; the "Grunau Baby" was looped, and, at the end, the "Rhonsperber" showed its paces. At the end of the display, the first members joined, and a few received their first ground slides.

The Club was then closed until Saturday, 7th September, for repairs to the airfield. Since that date training has been progressing very fast, and during the past three weeks, pupils have received a total of nearly a thousand launches. Already five pupils have received "A" certificates, and three have received "B" certificates. A large number of pupils should receive their "A" licences within the coming week.

The airfield itself (Reinsehlen Airfield) has no ridge, but is situated in the middle of Luneburg Heath, in excellent thermal country. Unfortunately part of it has already been ploughed and put under potatoes, but there still remains about 1½ square miles of perfectly flat airfield. We have a large hangar, and are in the course of acquiring an excellent clubhouse.

Our equipment at present consists of:—

1 "Rhonsperber."
1 "Grunau Baby IIb."
3 "S.G. 38" primaries.
2 Towing Cars.
1 Winch (powered by Ford V8 Engine).

All initial training is carried out by auto-towing. Shortly after receipt of the "A" certificate, pupils go on the winch. The "Baby" and the "Sperber" are fitted with Centre of Gravity launching attachments, and already the "Baby" has been winched to a height of 780 metres. We hope later to be able to winch to a height of nearly 1,000 metres, using 2,000 metres of cable on the winch drum.

During the winter *ab initio* training will continue, and the Club will increase its number of aircraft. We hope by the Spring to be in a very strong position, and that the excellence of our instructors, our airfield and our equipment, will enable us to challenge the R.A.F. at their own game.

NEWS FROM THE CLUBS

ULSTER GLIDING CLUB

THE early part of the year found us in much the same position as any other Club—plenty of enthusiam, very little money, three elderly members, one ancient "Kite," no launching tackle and no site. Accordingly a Most Extraordinary General Meeting was held and the bald patches vigorously scratched.

The chief problems were the site and the means of launching. The former, at Magilligan Strand, was still a Controlled Area and littered with anti-invasion obstacles. William Liddell generously solved the launching problem by promising to present the Club with a towing vehicle. Inspired by his example we decided to "blow" the whole of our assets and order a "Tutor" from Martin Hearn. With the aid of caution, spoilers and some luck, we hope to be able to use this both for *ab initio* training and secondary soaring.

William Liddell still had his "Gull," and we eventually recovered our "Kite" from the quarry in which it had stood in its trailer since the end of 1939. The weather and the rats had not improved the trailer, but the "Kite" was more or less intact, so it was sent to Martin Hearn for a complete overhaul.

Two new members appeared out of the blue and were hastily mulct of their subscriptions by the Secretary. Both very keen and anxious to work notwithstanding the little we have to offer them. One, ex-Fleet Air Arm and the other a local M.O.

Meanwhile we had been granted permission to use our site and a demolition squad was formed to remove the obstacles. Enough of these had been dealt with by the beginning of May to enable us to get a machine off, so on the 12th William did his stuff in the "Gull" to the tune of two flights, totalling four hours. An auspicious start, but rumour hath it that he took rather longer than usual to make up his mind to come in to land on the first occasion!

May 19th. The wind being in the wrong quarter, we concentrated on obstacle removing, road building and stream damning until mid-day on the Sunday, when the wind suddenly went round to the North. The "Gull" was hastily rigged and William floated round the mountains for a cool three hours. By the time he returned the stream was damned and the entrance road completed.

May 26th. A South wind again. More demolitions. Wind North after lunch, so up went William. Alas" he returned to earth after 45 minutes when the wind departed whence it came.

June 2nd. The wind in the right quarter but frequent heavy rain storms and low cloud. In spite of this William took the "Gull" up and managed 1,800 feet and one hour and a quarter.

June 20th. The "Kite" returned resplendant in cream and blue and, unable to resist the urge, the Secretary sneaked away from his job and took the air for the first time for seven years. He managed a very shaky 38 minutes and succeeded in putting her down in one piece, but not exactly where he intended. Even the Fleet Air Arm could see that all was not too well!

July 6th. The demolition squad declared the beach clear of obstacles and after tea Liddell and the Secretary took turns in the "Kite,"

scraping along the cliff tops in a falling wind. Our spies tell us that Doc. Clarke became involuntarily air-bourne with the A.T.C. at Ballykelly.

July 7th. There being no wind worth speaking of, the Fleet Air Arm tried his hand in the " Kite." The name of MacDermott heads the list of post-war Ulster certificates. Good show !

Aug. 14th. Five weeks of unsuitable weather before he had another opportunity. This time he soared good and proper and got his " C " with a flight of one hour and forty-five minutes. Drinks all.

Aug. 16th. Heavy rain in the morning, but after lunch things improved and the " Gull " and the " Kite " were rigged. Liddell and Siderfin got off and chased each other round in weak and scattered thermals. Total time, 3 hours 40 minutes.

Aug. 17th. A perfect day—wind just right, cloudbase at 2,800 feet, and plenty of thermals. Bill Adcock and some of the A.T.C. lads visited us with one of their " Cadets " and tried their hand at soaring. Later, Bill had an hour in the " Kite " and showed the boys how it should be done. Liddell in the " Gull " completed his two hundred hours, excorted by Siderfin in the " Kite " a respectful hundred feet or so below. Doc. Clarke off the ground again—this time of his own free will. Total flying time for the day, eight hours.

Aug. 19th. MacDermott and the Secretary turned out after tea with the Doc. in the towing car and flew the " Kite " until dark. An overcast sky but steady lift everywhere. Siderfin reached 3,000 feet in sixteen minutes, but had to pack up on account of the failing light.

Aug. 25th. Very little wind. William ventured up in the "Gull " but was back again in five minutes. The others tried their hand in the " Kite " but fared no better.

Sept. 1st. Ten tenths cloud. William took the " Gull " up and stayed around cloudbase for five hours., while the A.T.C. boys soared their " Cadet " along the cliff tops. They collected the odd " C," but it must be noted that one of them caused a spot of heart failure among the onlookers by appearing to collect a stray turf from the cliff top as well.

Sept. 8th. The morning was poor, with considerable rain, which put paid to everything until after lunch. The Secretary then soared the " Kite " for an hour but had to come in when the rain returned accompanied by cloud below the cliff tops. The towing car also decided to pack up and was later found to be suffering from big end trouble. Spares for American cars being almost unobtainable, we fear the worst.

October. Our tears about the " Packard " proved to be only too true, and it looks as though we may be *hors de combat* for some time. The only consolation has been the fact the weather has been quite unsuitable for any sort of outdoor activity. Meanwhile the Doc. has been slogging hard with the A.T.C., and is itching to lay hands on the " Tutor," which is due to arrive at any moment. Which will arrive first—the big ends or the " Tutor " ? We keep our fingers crossed and pray hard for the former.

And that, for the time being, is that.

YORKSHIRE GLIDING CLUB

THE month of October has been as near a complete wash-out as makes no matter. Flying practice took place on the 5th (25 minutes' hill soaring), on the 6th (11 launches including one hill soaring flight of 15 minutes by Barker) ; on the 13th (13 launches), and, finally, on the 27th (6 launches for 55 minutes' difficult slope soaring).

The wind has been mainly in the N.W. or N.N.E. throughout the month ; there has been a good deal of entirely Q.B.I. weather, and having no club-house on the top, there has been a consequent shortage of attenders ; No. 28 A.T.C. school has put in some good practice, but very little soaring.

General. A few odd jobs have been done around the place, and a lighting set has arrived ; there are several lines of investigation open for a suitable club-house building. A dance is to be held at the Golden Fleece in Thirsk on the 30th November, and the demand for tickets is strong ; the affair should be a success, but by the time these notes appear it will be a thing of the past, and we hope to have seen some of our more distant friends at the gathering—if any have missed it, and would like to come to the next one, please send name and address to the Hon. Secretary. It is disappointing to have so little news to set down, but as we try to keep these notes as a faithful record of what we have done—or are doing—and not what we'd like to do if we had a lot of money and a firm grip on the throat of the Minister of Supply (figuratively speaking, of course) . . . . we'll be honest, and make an end of it ! Dare we say better luck in November—of all months ?

G.A.H.

No. 2 GROUP R.A.F. GLIDING CLUB

AT least every other week this News Letter is started with a foreword on the weather and each time after the first page is written, it invariably finds its way into the waste paper basket and a less ambitious subject is brooched. Why one should want to write about the weather may well be asked, and the inquirer would probably supply the answer himself and state that being an Englishman how natural to turn to the pet national standby when one has nothing to write about. Reasonable though this appears, it is really far from the truth when considering gliding news, for not only is gliding inevitably bound up with weather conditions but information about certain weather conditions could not and cannot be obtained without the assistance of gliders and the gliding enthusiasts who fly them. The glider pilot is entirely dependant on weather conditions for success at his sport, whilst the power pilot, the only other who normally explores the air above, is only dependant on the weather in so far as when conditions are bad, things are made a little more difficult for him. Ask a power pilot what he knows about Cumulo Nimbus clouds and he will tell you that they are a particularly unpleasant type of cloud specially created for peace-loving people like himself, and the further that he can keep away from them the better he will be pleased. But ask an advanced glider pilot and you will find that he can give you as much detailed and accurate information about them from his personal experience as the Met. Man, and if his gliding experience is extensive, you will find that he can probably tell you quite a number of things about the

Cumulo Nimbus that your Met. Man would only guess at. The reason for all this is that the glider drifts with the weather as a cork drifts with the tide. The glider moves up with the up-currents, along with the wind and down with the down draughts, and so when turning tightly it is from the point of view of observing and recording, practically stationary apart from its movement within an area of about 100 metres radius, thus can be observed and recorded the changes that occur in a particular mass of air through direct contact and personal observation. The importance of gliding for the purpose of making metereological observations is being realized more and more, and it seems likely that in the near future gliding will become a normal part of the Met. Man's training and that practical experience of the weather conditions through this medium will be a necessity.

84 GROUP GLIDING CLUB.

AS the year draws to a close gliding weather over here deteriorates rapidly, and flying is mainly confined to " circuits and bumps." As I look outside I can see the start of winter. It began this morning as heavy rain, changing to sleet at lunch-time, and soon after to a heavy snowfall.

We are debating how long it will take for the snow to reach to the window-sills. Very " unglidable " weather ! ! !

No opportunity to glide was missed during October, but even so there were only 20 days or parts of days when flying was possible.

There were no thermals all the month. Each day we thought that the morrow would surely bring at least a hillwind.

It was not until October 28th that the first south-wester began to blow, and we were quick to take advantage of it.

F./O. " Jock " McCallum was " bungied " off the top of the hill in a " Mu 13a." and he struggled at tree-top level for about an hour, when the wind increased to about 12—15 m.p.h. and carried him up to a safe height. This hill-wind lasted about 7 hours, and McCallum finally landed when the wind died away after remaining airborne for 5 hours 21 mins. 30 secs. This was the first leg of his Silver " C." Mitchell, Schuller and Joele gained their " C " certificates the same day, each with a flight of half-an-hour.

Earlier in the month we experienced a miniature Standing Wave. It actually occurred on two different days when conditions were similar—25 m.p.h. North North-East wind, and Stratus cloud at about 4,000—5,000 feet. The initial rate of ascent was over 3 metres per second, dying away to zero at about 2,000 feet. The area of lift was approximately half a mile wide and two miles long, and its limits were very sharply defined, there being proportionate down currents all around.

On each occasion this " standing wave " lasted about two hours, and quickly died out, although the wind speed and direction apparently remained unchanged. On the first occasion Walton and Elmsley stayed up for half-an-hour each in a "Grunau." They swore they came back only because it was so bitterly cold.

On the next occasion McCallum and Mattock climbed rapidly to about 2,000 feet by just heading into wind, but this up-current faded out after about 40 mins. All four gained their " C's " in this lift.

A total of 1,232 launches were carried out, including 81 catapult launches, and 18 aero-tows. The aero-tows were not with the object of finding thermals, but were for experience only.

Twenty pupils qualified for their " A " and " B " certificates, during what has been the poorest month of the year.

R. C. FORBES, F./O.
Chief Flying Instructor.

BRISTOL GLIDING CLUB

GLIDING enthusiasts in the West are at last able to find a practical outlet for their feelings in the re-formed Bristol Club, whose present headquarters are at Lulsgate Aerodrome, some eight miles from the city on the Bridgwater road.

Permission to use this fine aerodrome, long and untiringly sought by members of the Committee, was at last obtained shortly before the much-delayed arrival of the Club's first post-war aircraft, a " Cadet." Hangar space and a building suitable for a clubroom and stores have also been made available to us, and the fullest use is being made of this practically ideal training site.

As it has not so far been possible to convince the Ministry of Supply that it is better to sell a balloon-winch at a reasonable figure to a club than to allow it to moulder in a field with a few hundred others, a start had to be made with auto-towing. A " Beaverette," originally intended as a retrieving car, was turned to this purpose and serves it well, although a few more r.p.m. would be desirable on windless days. Traction is good on grass and, of course, even better on the runways, normally used for launches other than ground-slides. Generally, auto-towing has proved itself to be better than a mere interim measure and it will be continued even when a winch arrives on our scene.

Soaring members of the Club are at present devoting their energies to training the first course of the *an initio* pupils who form the bulk of the membership, and it is hoped that by next Spring sailplanes will have been added to the Club's stable, so making possible use of the soaring site on the south-west face of the Mendips near Wookey, which has not as yet been properly tried. So far, " instructors' flying " is confined to circuits in the " Cadet," although the presentable height of 700 feet has been reached on occasion by auto-tow, a height which with more suitable weather and aircraft might permit a little thermal-seeking.

The great thing is that a start has been made in spite of the difficulty of the times and the complete apathy, or worse, of those in the best position to help the movement. In the course of the next month enough equipment should have arrived to enable us to operate three training lines at Lulsgate and so to give instruction to many of the gliding members at present waiting on the side-lines. By next summer, if the present level of enthusiasm is maintained, things should really be moving.

CROYDON GLIDING CLUB

THE Club's darkest hour occurred last spring when the plough finally took the last green sod off our ground at Noreheads Farm, where we had struggled since 1936. First, snowed under, then ploughed under, the C..GC. reeled back from the fray, followed months of site hunting. In one week two members spent six hours in aerial

search, over the fields of ripening corn. Search parties went out almost every evening in overladen cars. For weeks the hunt went on, spreading further and further afield. There is a true saying about " not seeing the wood for trees." One day, someone on the way home from the old site, spotted what appeared to be an ideal site. He stopped; he looked; he asked. The new site was found!

The Croydon Gliding Club's new soaring site is at Beech Farm, Nore Hill, near Chelsham, Surrey. It is marked plainly on Sheet 115 Ordnance Survey. The site is situated on the main Croydon Tonbridge road, on the bus route (30 mins. from Croydon). The Green Line from Victoria and Aylesbury drops you at the gate after a 60 minute ride.

Eight hundred and four feet above sea level, the site is shaped like the left hand side of a figure 8, and should give " lift " in winds between 360 and 180 degrees. The hangar is on the crest of the site, which is between 305 and 175 feet above the surrounding hills, and is, according to a " local," " always windy."

The moving of hangar, winch retrieving car, and three machines in various stages of construction, was a herculean task, but was accomplished in the good old Croydon spirit, with much sweating and swearing. The hangar was reassembled, twice its former size, but at the time of writing is still too small for comfort. We haven't a club house, but this is an A1 priority on the Committee's list of " action." However, there will definitely be some sort of shack for the winter months.

The Sunbeam winch is now in good shape and should last us for some time. The Committee wishes to purchase another winch, but wisely refuses to pay the government's racketeer price for near junk. The Morris retrieving car has been reshod and generally overhauled, and although working, still presents a problem, as it is likely to become immobile at any time, with the consequential loss of revenue.

We began *ab initio* training last March for a few week-ends before we were forced to pack up. Now, regrouped, at our new site, we have started again. We are using an open " Dagling " primary for ground slides and low hops. Our first group of trainees are doing very well, some being airborne after as little as four slides. High hops and circuits and preparation for " B " and " C " certificates will be done on the two-seater which is rapidly nearing completion. The new nacelle " Dagling " for elementary soaring awaits covering with fabric. It should be ready to take the air at the beginning of November. When the " Cadet " is finished—we hope about February—it will take the place of the nacelle " Dagling " as a " C " getter. There is a third " Dagling " on the way, which should be ready by early Spring.

The Club meets every Saturday afternoon and Sunday from 10 a.m. for gliding. Very little flying is done on Saturdays of late owing to the shortage of daylight. On Tuesday evenings construction work goes on at Streatham. The Club's social evening every Thursday, with table tennis, darts, and " refreshments," etc., laid on, is proving very popular.

Rather sorrowfully the Committee has had to raise the entrance fee, but the subs. and flying fees remain the same.

Enthusiasts proposing to visit the site are asked to contact the secretary beforehand. We get such a crowd of rubberneckers near the site that the " sentries " on the gate have instructions to admit only members and pass holders. We regret that we can let only a limited number of private owners use the site at a time, as winch and retrieving time is almost wholly required for club flying.

SCOTTISH GLIDING UNION

At last we are able to report that flying training is in full swing at Balado Aerodrome, Kinross, and in the period, 6th Oct. to 9th Nov., rapid progress was made by all members.

In the early stages of the reformation of S.G.U. it was decided that, due to the high cost of gliders, we would adopt aeroplane dual instruction for *ab initio* members, in order to reduce crashery, and then pass them on to the " Cadet." We are extremely fortunate in having aeroplane dual instruction facilities available at Kinross Flying Club who are also at Balado, and much of the credit for the successful operation of the scheme must go to the very high standard of instruction set by the Chief Flying Instructor, Mr. Kay.

The wisdom of our plans has been proved this month by the fact that members who have had aeroplane dual have been reaching " B " standard in only 8 launches on the " Cadet," and even then we were " playing for safety " all the time. During the whole month of training we did not see one single example of the sort of flying which makes the onlookers hold their breath. The apparently high cost of training is really a fallacy, which can be exposed by an examination of the cost in relation to the time spent in the air. For success it requires " power " instructors who appreciate gliding problems and gliding instructors who appreciate " power " problems.

A fact worthy of comment is that all members who have started " power " dual are carrying on to the " A " licence standard.

Sunday, 3rd Nov., was notable for the fact that low cloud and poor visibility grounded all " power " aircraft, but conditions were just good enough to carry on gliding training. Pupils had the luxurious experience floating all over the aerodrome and practicing their first turns.

Miss Ritchie, who has had previous gliding experience with the W.A.A.F. in Germany, has joined the club and becomes our first post-war lady member.

We have still some vacancies for members with or without previous flying experience. For information write to the Secretary, whose address appears in the advertisements.

CAMBRIDGE UNIVERSITY GLIDING CLUB

Flying now takes place at both Bourne and Gransden Lodge Aerodromes. At the former aerodrome a Ministry of Supply M.T. dump prohibits the use of all but the W.S. runway, but when possible both aerodromes are used at once.

A certain number of new members have been obtained, but more are required, both *ab-initio* and ex-power pilots being welcomed. A training camp is being held from Dec. 6th—10th.

The Club now possesses 4 " Cadets " and 2 " Tutors." The " Kranich," allocated by the B.G.A. is being repaired, while the repair to the " Cambridge " has been held up by difficulties with the A.R.B.

LETTERS TO THE EDITOR

DEAR SIR,

In order to help your correspondent Amor Borealis (or " windy lover," if my translation is correct) to regain a correct sense of proportion, permit me to commit a few facts to print.

Until August the only glider owned by the L.G.C. was one " Tutor," constructed surreptitiously in a small shed from scrounged material during the last year of the war. Expended on the work was some £145, representing the war-time subscriptions of a faithful few who supported the Club all through the late unpleasantness. During that period any enthusiast was permitted to join and any annual subscription if not less than £1 1s. was acceptable.

Naturally these old contemptibles considered their one and only asset insufficient to share with late comers. To have accepted their proffered subscriptions would have been taking money under false pretences.

Since August, Martin Hearn Ltd. and Slingsby Sailplanes have produced five machines for the Club, and now new members are again welcomed, and a full-time professional instructor is almost always at their service.

It is hoped, however, that the preparedness of Amor Borealis to do " almost anything " does at least include getting to a club early enough to assist in moving the machines and equipment out, and/or staying to help put them away again at the end of the day.

The " Powers That Be " have decided that if you want subsidised gliding you must get it by *working* for the A.T.C., then you participate in approximately £30,000 worth a year.

On the other hand, if you prefer self-reliance and independence there is nothing to stop anyone starting up their own ideal gliding club. No Board of Trade licence, or permit, is required, as there is to start any sort of business.

Finally, do not overlook the fact that some of us have had two wars with which to contend, and the first was even more bloody than the last.

DUDLEY HISCOX,
L.G.C. Committee Chairman.
(over fifty).

DEAR SIR,

I am writing this letter partly to join in the general " grouse " and partly in reply to Mr. J. W. S. Pringle.

I am an undergraduate at Cambridge University, and, in common with quite a number of others here, I have been through an A.T.C. gliding school, and have got my " A " As soon as I got here (just over a year ago) I made enquiries about the University Air Squadron and the University Gliding Club. I discovered that the Air Squadron was virtually restricted to those who intended making a career in the R.A.F. (they actually took about 35 from the whole University), and that the Gliding Club was a financial impossibility to most people in my position.

Mr. Pringle states, quite rightly, that such mass enthusiasm as exists is of the ineffectual type, but there are a number of keen enthusiasts who would do anything in their power to fly. These people according to Mr. Pringle, should be prepared to spend time, trouble and money to gratify their ambitions. Well, so they are, but unfortunately both the time, and more particularly, the money at their disposal are limited.

To join the U.G.C. costs £5; flying charges for the year, I gather, come to at least as much again, and this with no prospect of anything more than winch circuits. If you want any soaring you must go to a Summer Camp, which will cost you, I believe, another £20—£30. How many Undergraduates can afford this, enthusiasm or not ?

If the Government wish to make this Nation " air-minded " one of the best ways for it to work is through the Universities. At the moment such enthusiasm as there is (and there is still some left among those who had once hoped to fly in the R.A.F.) is being stifled from complete lack of action on the part of the authorities.

Finally, may I say that we have no desire to be " spoon-fed."

" GROUNDED UNDERGRAD."

DEAR SIR,

In the matter of Government support it boils down to " no assistance without obligation." We cannot expect it, why should they subsidise it any more than any other sport ? Mr. Pringle's letter hits the mark, but I do not know when that camp was supposed to take place. I am one of a class who must be fairly numerous, the old light aeroplane club, " A " licence members. And I have been watching (and writing) for something like the camp the Yorkshire club did pre-war with power-flying people coming in at half time, as it were. Well, I still don't know how I missed that camp if it was advertised in SAILPLANE. I hope something happens this year.

Yours etc., D. W. O'KELLY.

DEAR SIR,

I was most interested in the letter from Aurora Borealis as I have found the same thing myself. During the entire eighteen months I have been living in England I have been waiting most patiently for a chance to fly. The very few gliding clubs that have reopened are all far too far away—we live in Sussex—and I had hoped by now to have flown both at Devils Dyke and Redhill, but alas, I am still earthbound. My wings are becoming atrophied, and even odd hours in the Straight School Link cannot make up for all the soaring I had hoped to fit in between housework and the inevitable queues. . . . . It is very sad. Yours depressedly,

VERONICA PLATT.

DEAR SIR,

In Mr. Erik T. W. Addyman's letter last month commenting on the Technical Committee's recommendation about fixing seats of gliders and sailplanes securely, I feel he has missed the point of it altogether.

This recommendation was made after the last and somewhat eventful flight of the " Rhonadler " (account in July SAILPLANE AND GLIDER), when the seat shifted forward onto the control column jamming it hard down ; thereafter the " Adler " went through its paces for a T.V. dive test, adding to the complications already encountered.

Mr. Addyman is welcome to try all this out for himself, and I can promise him it is distinctly unpleasant: I should know, as I was piloting the " Rhonadler " at the time ! Yours truly,

P. R. WIJEWARDENE.

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.









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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!

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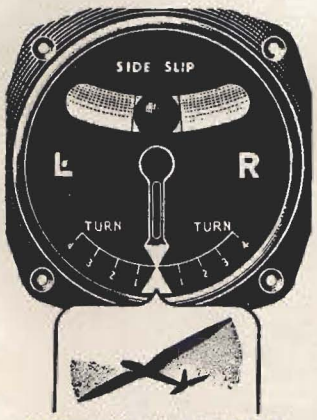
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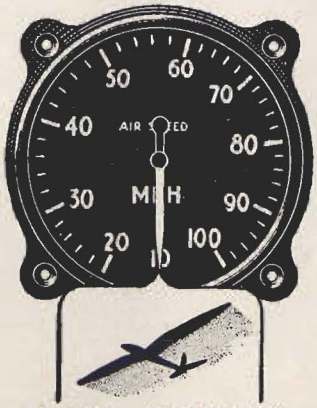
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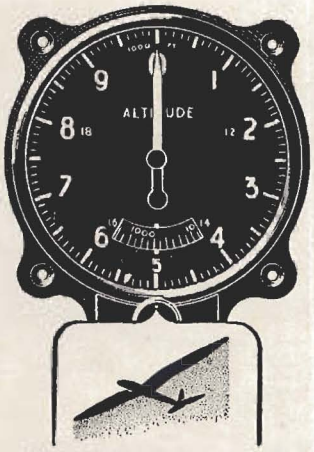
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