THE SILENT WING

A SIMPLE EXPLANATION
OF THE SPORT OF GLIDING
AND SOARING FLIGHT

"Majestic and serene, high on silent wing he soared,
A master of his noble craft, and of the air, a Lord."

BY CHARLES ESPIN.

1/-

The proceeds from the sale of "The Silent Wing" go to assist the funds of this Gliding Club and help to finance machines and maintenance.

THANK YOU !

DORSET GLIDING CLUB.

The Silent Wing.

BY

CHARLES ESPIN

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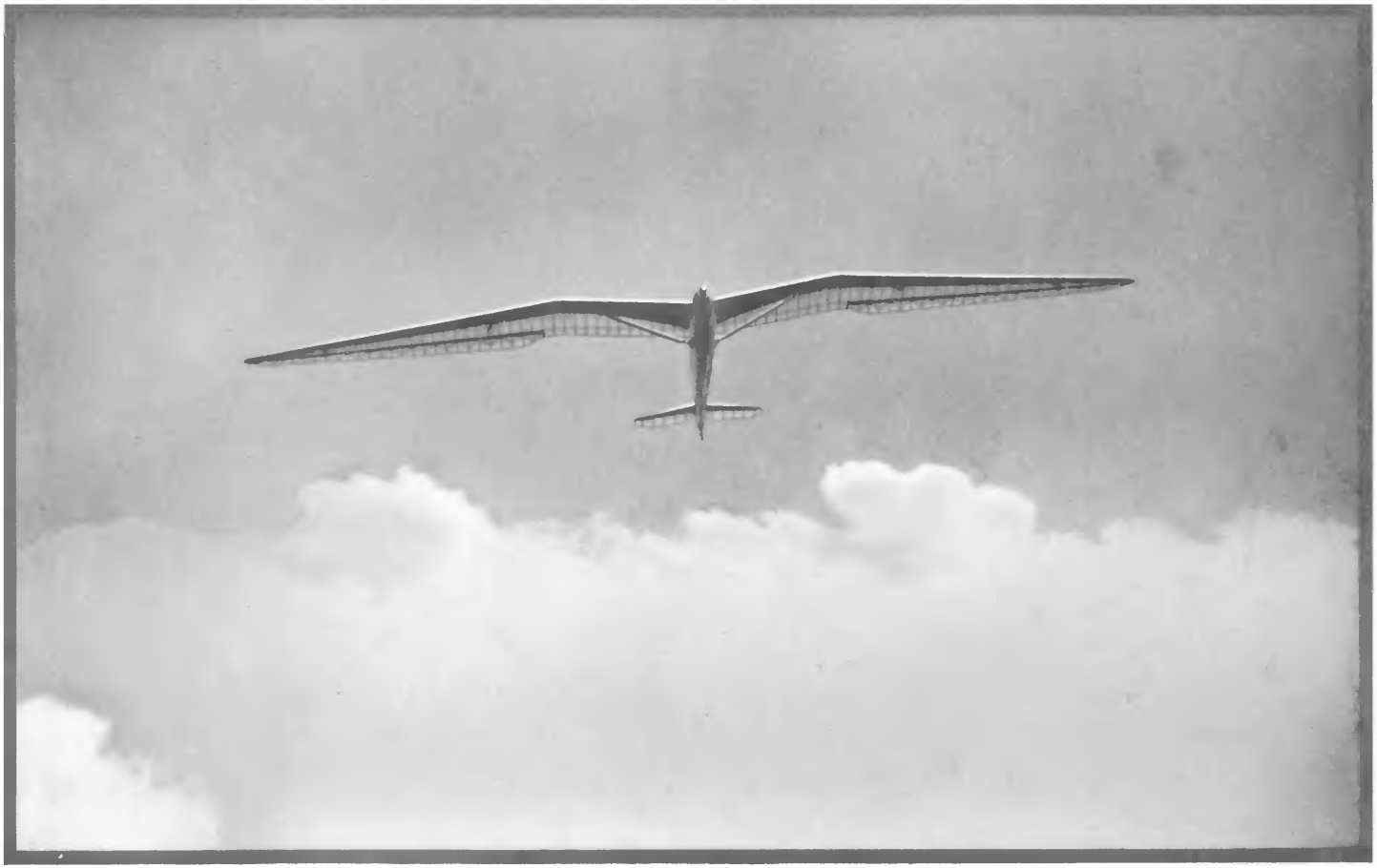


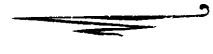
The last word in Sailplane Design—"The Moazagotl."

Introduction

NEARLY four years have elapsed since the first serious attempt was made in this country to introduce the Sport of Gliding and Soaring Flight. Previous to this, several individual enthusiasts had toyed with the idea, but no serious attempt had been made to create and equip an organisation capable of initiating newcomers into this delightful sport. Since those early days of 1930 361 " A " Cerificates, 164 " B " Certificates and 92 " C " Certificates have been issued in this country. It cannot be denied however, that amongst the general public, little is known about this fascinating sport, and it is the object of this book to explain, as clearly as possible, the simple principles that govern Soaring Flight; it must be admitted with regret that to many to-day, it savours of black magic.

As you read these pages, you should constantly bear in mind that the air, unlike objects on the earth's surface, can, and does move, in three dimensions; not only does it move parallel to the earth's surface from all points of the compass, but it also moves in an upward or downward direction, at various angles of steepness. It is upon this simple fact that the whole of the art of Soaring Flight hangs.

A considerable knowledge of the laws governing this upward and downward movement of the air has been obtained during recent years, and it is now possible to estimate with considerable accuracy, just where to find the areas of strongest lift. These are the spots which the Sailplane Pilot hunts out and exploits. He has no mechanical driving power other than the force of gravity, neither does he wish for any; it is those great natural " lifts " which it is his delight to find. How he finds and uses them this book will explain to you, also how you may find and use them, if you really wish to.



An excellent example of Slope Soaring at the Seaside.

DEFINITIONS.

A GLIDER is a machine used for free engineless flight with continual loss of height. In other words an Aerial Toboggan.

A SAILPLANE is a machine used for free engineless flight without loss of height. In other words, a machine capable of Continuous Flight.

CHAPTER I.

AIR AND AIR FLOW. HOW HILLS ARE USED. THE EFFECTS OF SUN HEAT.

IF bricks were invisible, it would be necessary to describe them accurately when writing on house construction. Similarly, to describe and explain gliding and soaring flight it is desirable to start by first showing how the air-flow over the earth's surface is able to maintain a heavier-than-air craft in flight without artificial motive power.

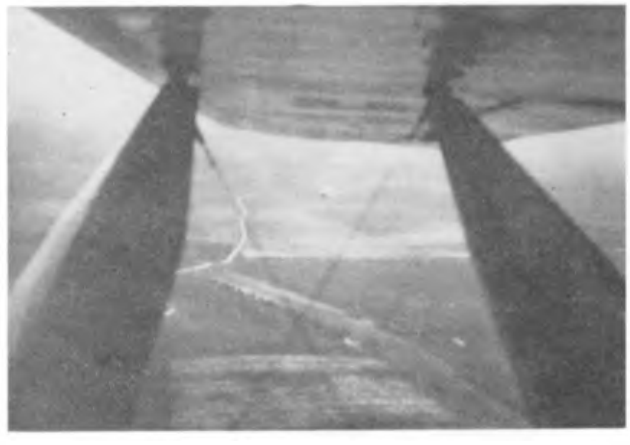
You have no doubt noticed that air is seldom stationary, and that only on rare occasions is there a perfectly still day. In the normal way, owing to the varying barometic pressures experienced in different localities, the air moves more or less continuously in directions which are controlled by the varying pressures. The common term for such moving air is " wind," and, as far as earth-bound man is concerned, wind appears to be horizontal only. Actually, however, this is not the case, no matter in what direction the wind may be. Lines of hills standing across the natural wind-flow deflect all air passing over them in an upward direction. Trees and houses have the same effect to a lesser extent. This is one of the conditions which makes soaring flight possible. The second condition is as easily explained.

On any day, whether still or windy, when the sun is shining brightly, large areas of the earth's surface are heated up by its rays. In particular, these areas include dry sand, rocks, dry moorland and cornfields, and even large quantities of common house-tops. As soon as they are sufficiently warm they impart a portion of their heat to the surrounding air. This heat gradually but invisibly accumulates in the same way that fog gathers in a low area at night. As the volume of heated air grows over these particular spots, it tends to rise, and in due course, when enough has collected, it breaks away from the earth and goes soaring aloft like an invisible balloon. These hot-air bubbles may measure anything from a few yards in width to as much as a quarter of a mile, and it is a common sight to see birds such as seagulls or rooks circling round in them and going up to great heights without effort.

For the want of a better name, this heated air-bubble is called a " thermal," and is to the soaring pilot what gold is to the prospector. The existence of these phenomena has been but partially understood until recent years, and it is only during the last five years that they have been utilised by sailplane pilots in soaring flights. The first man to exploit them, and to show the full use to which they could be put, was the famous German soaring pilot, Wolf Hirth.

"Falcon II" soaring at Dunstable

A well banked turn by the "Rhonadler"



A view from the passenger seat of a "Kassel" two-seater

In practice, the normal procedure when starting on a soaring flight is to use the up-currents caused by hills to commence the flight, and to obtain initial height, and then on sunny days to utilise thermal currents and cloud lift for continued flight.

You may ask, " What amount of air-lift is necessary for a machine to soar ? " The answer is this : When the upward component in the air's movement is equal to the sinking speed of a sailplane, then sustained horizontal flight becomes possible. When it exceeds this amount, the sailplane will climb. As far as the novice is concerned, it is usual for his first flights to use the wind that is forced to rise over hills, and for a period his activities are restricted to this region of air. It is equivalent to our first walking exploits in the nursery.

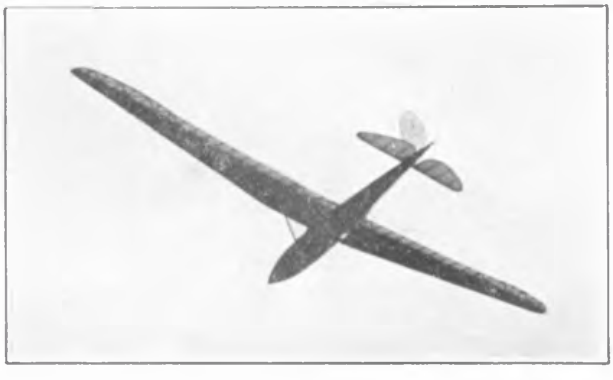
One of the best examples in England of an ideal soaring site for beginners is the Dunstable Downs on the Chiltern Hills. These are used by the London Gliding Club, and although they are not more than 250 feet in height, and only about three miles in length, flights of upwards of 50 miles have been made from them, and altitudes of approximately 5,000 feet have been reached from this 250 feet start. In Germany, which is the home of gliding, the mountains used are much higher, many of them being 3,000 feet in height.

In actual practice one can use any line of hills of a mile or more in length which are clear of trees and face the prevailing wind of the district, provided they are over 150 feet in height, and have an average slope of not less than 1 in 7. It is very important that there shall be no large trees or buildings, or other small hills, at the bottom of the slope, not only for ease of landing, but because the existence of such obstacles break up the even air-flow, and makes flying exceedingly unpleasant, which conditions may put off a beginner. There are several other kinds of air lift, such as the rather violent up-currents occasioned by thunder-storms ; also masses of cold air sometimes sweep over the country, forcing the warm air upwards in front of it. But these are not of fundamental importance in the early stages of Gliding and their description can be left to the gliding text book accordingly.

The "Wren" soaring.

"Prüfling" soaring just after taking off.

"British Falcon II" soaring at Dunstable.



"Scud II" soaring at Sutton Bank

CHAPTER II.

MACHINES AND THEIR CONSTRUCTION. HOW THEY ARE CONTROLLED.

MANY people imagine that gliders are blown about the sky like toy balloons, while the pilot sits there helplessly, hoping for the best, without control of either direction, ascent, or descent. This is completely erroneous. A glider or sailplane is an aeroplane in all respects, except for the absence of an engine. The structural features are similar, as also are the control systems, and a sailplane can therefore fly freely in all directions at the will of the pilot. Out and return flights are a usual feature of gliding to-day, but they are, for obvious reasons, not so spectacular as distance flights in a straight line.

One of the most striking differences between the modern sailplane and a power aeroplane is the former's greater aero-dynamic efficiency, coupled with a superiority of finish and a greater beauty of line. In fact, few will deny that a modern sailplane in flight is one of the most graceful of human achievements, both in its actual design and in the stately manner in which it moves through its element, the air. Aero-dynamic efficiency means reduced head resistence, while the high finish of the surface minimises skin friction due to air viscosity. The effect is that whereas an engined aircraft can glide about seven miles from a height of one mile, a good sailplane would in calm air cover as much as 25 miles from the same height.

A glider may well be described as a light aeroplane without an engine; having no motive power, it is only capable of gliding downwards relative to the air. By efficiency of design it is possible to obtain the fine gliding angle mentioned above, thus allowing long distances across country to be traversed with little loss of height. How this loss of height is continually made good by the skill of the pilot you have read in the preceding chapter.

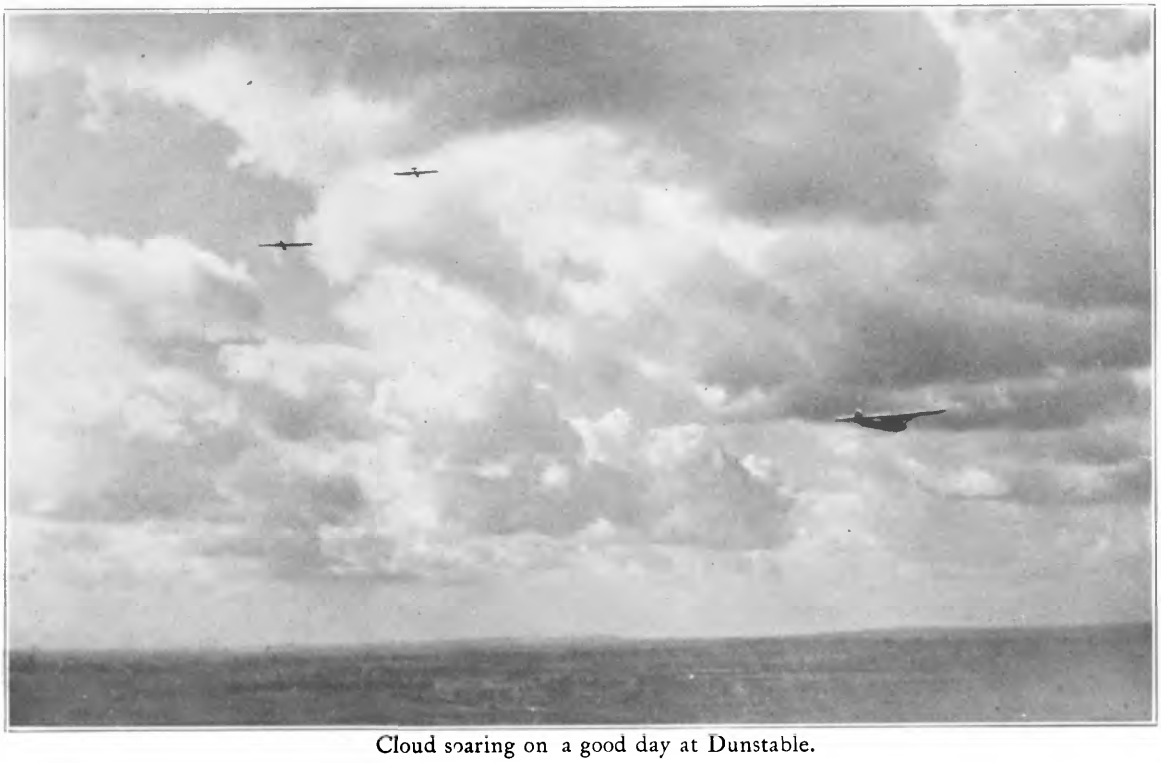
Gliders can be divided into three classes:

(1) Primary or training machines, which cost about £50, and which are exceedingly strong and light, yet very simply made. The usual wing span is 32 ft.; the over-all length 18 ft.; depth of the wing 5ft. 3 ins. The pilot sits well forward, without any protection, in order that

(a) He may become accustomed to the feel of the air-flow past him, and thus be taught to estimate his air-speed; and

(b) In case of a bad landing in the early stages, there may be no superstructure to damage.

The best type of machine in this class is either a "Dagling" or a "Zögling." Both can be bought new in England for the above-mentioned sum. It is possible to put a ply-wood or fabric fairing round the pilot if desired, in which case a skilful pilot can soar under favourable conditions. In the



Cloud soaring on a good day at Dunstable.

Peter Riedel soaring the Fafnir over Berlin.

ordinary way, however, it is better to use these machines solely for " ground-hops," which are short straight flights on the flat. These teach the beginner to " take off," hold the machine level, and land. Normally twenty or thirty of such flights are necessary before a beginner is competent to fly off a hill. When he has satisfied his instructor that he is capable of flying such a machine at its correct speed with a normal take-off and landing, it is then usual to transfer one's activity to the second type of machine, which, as its name suggests, is called

(2) A SECONDARY : The most usual machines in this type are either a " Prüfling," a " Falcon," or in cases where economy is a consideration, a " Nacelled Dagling." On a good site it is relatively simple to soar these machines in suitable conditions, and after two or three hours' flying a novice will begin to feel quite at home in the air. When this stage has been reached, it is desirable to use

(3) A SAILPLANE : This is a high efficiency machine with a gliding angle of about 1 in 20. The most popular Sailplanes in this country are :

(a) The British Scud II., which costs about £135 and has a wing span of 42 feet, and weighs 150 lbs ;
(b) The improved British Falcon which costs about £125, has a wing span of 45 feet and weight 260 lb ;
(c) The British Wren machine, costing about £100, with a wing span of 40 feet and weight about 200 lb.

All these types can be seen flying when there is a soaring wind, either at Dunstable Downs or Sutton Bank in Yorkshire, and all are well built, well designed, and excellently finished. Silver spruce is generally used in their construction.

The control movements of all types of machines are identical, except that, for obvious reasons, in primary machines the effect of the control is not so great. All types land on a broad central sprung ash skid. It is not usual on primary or secondary machines to have instruments, but on sailplanes they become essential for high performance work. They are also exceedingly interesting, and it is from one's instruments, coupled with careful observation, that good results are obtained. On the dashboard of a soaring machine, it is usual to have an air-speed indicator, to give the pilot his exact air speed ; an adjustable altimeter, which can be set at zero on the commencement of a flight ; and lastly, the most important of all, a variometer, which shows the pilot in feet per second whether he is ascending or descending.

To you, sitting in your chair reading these notes, it may appear strange that a considerable upward or downward tendency needs to be recorded by an instrument, but it is a fact that once a height of a few hundred feet have been gained, it is exceedingly difficult to tell quickly whether one is gaining height or losing it. One of the chief uses of the variometer is the detection of thermal currents. One may be flying to the limit of a hill up-

The "Condor" Sailplane flying in Germany. This machine holds the World's Altitude Record of over 13,000 feet.

The London Club's original "Zögling"; and below, The Club House and Hangars at Dunstable.

"B.A.C." two-seater soaring under a cloud at Huish.

Ground hopping on a "Dagnall."

current, and just holding height accordingly. On entering a thermal current the variometer will show an immediate rise, thus warning the pilot that he has " struck oil." In order to ascertain if the particular thermal entered is big enough to circle in, a pilot must immediately begin to count, watching his variometer the while. If the rate of climb shows about 4 feet per second, and if this rate of ascent is maintained for at least five or six seconds, he knows that the thermal entered is large enough to circle in, which action he at once begins, adjusting his course in accordance with the reading of this instrument. A variometer is also useful when flying in clouds, a common lot of the sailplane pilot. A cumulus cloud is an optical indication that a mass of hot air has risen and may be still rising. The cloud itself is formed by surplus moisture condensing as the air rises and cools. It is thus that cumulus clouds are formed and they can therefore be taken to indicate good up-currents and a happy hunting ground for the soaring pilot.

A close-up of "Kassel" two-seater at Dunstable.

Kassel 20 soaring at Dunstable. This Machine can be bought for about £80.

A splendid illustration of a cloud street taken by the passenger in the Kassel two-seater on its record flight of 46 miles.

A "Hols der Teufel" soaring.

CHAPTER III.

HOW TO GLIDE AND SOAR AND WHERE.

FROM the preceding chapters you will by now have gained a rudimentary idea of the principles underlying this fascinating sport, and at this point it becomes necessary to observe that of all sports, gliding is one of the safest. To some this may sound surprising, but practice has proved it to be a fact. The last four years of gliding activity in this country have been practically free from serious accidents, and while no one would deny that it is possible to commit suicide in a glider as well as by any other method, it is a fact that its slow speed, light weight, and strong construction, make it one of the safest forms of locomotion. In addition, there is no danger of fire or explosions, no vibration, racket or noise ; nothing but the song of the wind passing over and around the wings and fuselage of your machine, and sustaining you on your way. In emergency, tree-top landings can and have been made without damage to the pilot or plane. There is no heavy engine to drag the machine to earth and dash it into the ground. Experience has proved that even in a severe crash the machine takes the shock, and the pilot being placed well back behind the strong but light structure, climbs out and wonders how he did it. After such an episode the victim is not at all popular for several weeks with his gliding colleagues, if the accident was his own fault. This also makes for safety.

If you have read this far, I am tempted to believe that you are really interested in this, the most delightful of sports. I therefore invite you to come with me in imagination on two flights :

(1) A primary 'ground hop" of 100 yards or so, of which you must make many if you wish to fly, and then

(2) A short soaring flight.

Before we start, however, I must warn you that great patience and perseverance are necessary before you obtain the much-coveted " C " certificate, which means that you can soar. It may be noted at this point that there are four gliding and soaring certificates to be obtained. They are as follows :

1. The " A " Certificate—This consists of a straight flight of 30 seconds duration with a normal " take off " and landing. Its value is to show that the pupil can " take off," fly the machine in a normal and straight course, and bring it to earth in the proper manner.

2. The " B " Certificate—For this test it is necessary to remain in the air for one minute, during which time a satisfactory right and left turn must be accomplished with a normal landing. Its value is to show that the Pupil can now control the direction of flight, as well as land and " take off " correctly.

Launching " Falcon II" The elastic rope can be seen falling ; note the running crews.

Another view of the falling rope and running crew as "Falcon II" takes off at Prestatyn.

3. The " C " Certificate—To gain this Certificate the pupil must remain in the air ABOVE HIS STARTING POINT for five minutes, bringing the machine to earth normally. This test denotes that the soaring stage has been reached, and the pupil now knows sufficient to commence his soaring career.

4. The Silver " C " Certificate is the coveted prize of soaring men; there are not yet thirty in existence. The conditions are a flight of not less than 31 miles, an altitude of not less than 3,280 feet, and a duration of five hours. The first and last condition must be made in different flights but the altitude can be obtained in either flight. Mr. Eric Collins of the London Gliding Club is the first holder in this country.

But to come back to our flight:

The machine is a " Dagnall," facing into the wind on level ground, with 200 yards clear ahead of it. The instructor holds the wing-tip, and you take your seat, while a strong and comfortable supporting belt is placed round your waist; in case you disgrace yourself and make a bad landing, it will prevent you from being thrown out. You then take the " joy stick " or controlling lever in your right hand, taking care to hold it lightly. A forward movement of this lever causes the machine to glide down; a backward movement causes it to glide up (but only for a few feet); while a movement to the right causes the right wing to drop, and a movement to the left, the left wing to drop. One then puts one's feet on the rudder bar, which for want of a better description can be said to work direct; that is, if you wish to go to the right you press the right foot forward, and if you wish to go to the left, the left foot. The rudder bar is used in conjunction with the sideways movement of the joy-stick; that is, left rudder with left joy-stick, right rudder with right joy-stick.

The elastic launching rope, which is 60 yards long and has a metal ring fastened in the middle, is then hooked on to the nose of the machine by an open hook, and each arm, which unexpanded is 30 yards long, stands in a narrow V straight into the wind. The extreme end of each arm of the rope is manned by three or four people. Two stalwarts, preferably heavyweights, are detailed to hold back the tail; the instructor then gives the command of " all set "; the team fix their eyes on a point straight ahead of them into wind, and at the word " walk " begin to walk slowly towards it. When 5 or 10 steps have been taken, the instructor gives the word to " run," and the team proceeds to run, and keep on running until they feel the machine become detached from the rope. At the machine end, when the team have run about 10 or 15 paces, the Instructor gives the word to " release." When this takes place, each arm of the rope has been stretched about 20 yards, and the team are still running; so with the stored energy in the rope and in the running team, the machine is shot gently into the air. Before this takes

"Kassel" two-seater soaring at Dunstable. It has a wing span of 50 feet and weighs 350 lbs.

Shewing the instruments on "Kassel 25."

place, however, the joy-stick is put by the Instructor into normal flying position for your weight, and you are told to hold it as still as possible ; under no pretext must it be pulled back, for as you have no power but force of gravity, to pull back the stick would cause the glider to rise only a few feet. The stored energy would then be used up, and a " stall " would follow. It is only by passing through the air at about 25 miles an hour or more that a glider can maintain itself in flight in the air. The first thing to be learned after the actual lateral controls have been mastered is to keep one's flying speed at a uniform figure, which is about three or four miles an hour faster than the stalling speed of the machine.

The word " release " has been given, and you feel yourself bump along the ground for two or three yards. Then all bumps cease, and the earth seems to be sliding away from beneath you. Do not be alarmed ; this is the moment you have been waiting for. Press the stick slightly forward, not more than half-an-inch or so, and, if the day is a calm one, you will experience your first effortless glide. It will soon be over, and the earth will appear to be coming up towards you again. Just before you touch, ease the stick back ever so slightly, and a graceful landing is made. After 20 or 30 of such like hops and five or ten more from the top of the hill, you will, provided you persevere, be standing at the top of the hill, one fine morning, with a light wind blowing up the slope, ready to go for your first soaring flight.

Instead of stepping into the open " Dagling," you now creep into a tight and cosy cockpit, with just your head raised above the fuselage level, and a shining array of wings and instruments around you. Let us imagine there is a light wind of some 15 miles per hour blowing. The launch is the same as the one already described, but now if you are adventurous you will give the running crew a few extra yards run. On the word " release," you are away, but this time the ground does not begin to come up towards you after a few seconds' flight. On a good launch, you should climb 50 to 80 feet or more, and when the energy of the rope has been expended you turn along the hills, keeping just over the steepest portion. You glance at the air-speed indicator, and find you are flying at two or three miles an hour more than you need be, so you ease back your stick a fraction, until the requisite speed of about 28 m.p.h. is reached. You then cruise along, gradually gaining height as you tack along the hills. The wind is a light one, and you may have to do three or four tacks before you get up to 200 or 300 feet. At each turn, you may possibly lose a little precious height, but at last your altimeter registers 400 feet.

By this time the sun will be well up and shining brightly, so you keep a weather eye on your variometer for thermals, large or small. You may have done two or three tacks without gaining further height, and are stuck at 400 feet above your start. You turn out to run up a small promontory jutting out from the hills, and, as you reach the apex of this, you note with delight that your variometer is showing " climb," and that

The new "Rhonadler" at the bottom of the Downs at Dunstable.

The "Falcon II" landing at Prestatyn.

Another view of "Falcon II."

you are now gaining height at 6 feet a second. It is so smooth that you cannot tell you are climbing, but you hold steadily on your course. In five or six seconds you notice that your rate of climb has vanished, so you at once turn back and begin to circle; you have found a thermal. You will have to do a little manipulation to get yourself right into it, but this is soon done, and up and up you soar. In a few minutes you reach a height of 3,000 feet, and the line of hills you started from look hills no longer, but a mere doorstep; houses have become dolls' houses, and human beings practically invisible. Now the fun starts. There are two things which engage your close attention:

a. Your variometer to look for further thermals; and

b. A cumulus cloud approaching with dark base.

Both lead to more lift, and plenty of it. Half a mile out from the hill is your nice fat woolly cumulus floating along about 1,500 feet above you. If you go out to meet it and do not get sufficient lift from it, you will lose much of your valuable height. If, however, the lift under it is good, you will be up 1,000 to 1,500 feet in no time. To-day is your day out. As you approach the base of this cloud, the variometer suddenly shows "climb" again. Gradually you see the air around you filled with wisps of cloud, and in another minute you are inside this white beauty. This is really not unpleasant. It is like motoring over the Welsh mountains in a mist. After the large vista of sunlit earth beneath, the shade of the cloud is quite pleasant, provided it is not a dense one, and in a few minutes you will be out, either on the other side, or, if you are lucky, above it. Only one dark thought crosses your mind when you enter the cloud, and that is the hope that no one else has just gone in on the other side. However, there is no fear, for if a man has learned to soar sufficiently well to reach the clouds, he has also learned caution and has had a good look round for other human birds before stepping inside.

I could prolong this flight for you all day if you so wished it. A modern sailplane can stay up as long as desired in favourable conditions, but in practice two or three hours is plenty. The inner man must needs be refreshed, and although one cannot see it, that advertisement several thousand feet beneath you that "Guinness is good for you," comes to your mind and calls you back to earth. So, after a happy morning you work your way out of the uplift, and glide gracefully back. It may take you 15 to 20 minutes to get down to land at the spot where you took off from two hours before.

Now a word to you, who may be the prospective pilot of to-morrow. If you wish to learn to soar, it is essential for you to join a well established club. When you become a member of that Club you become a member of a co-operative movement, where your help, in the form in which you are best able to give it, will be needed, whether you fly or not. It is only on certain week-ends that the wind will blow in the right direction at your gliding site. If you are lucky it will be every other week-end at the most, but this is

"Professor" Sailplane, soaring at Dunstable.
It has a wing span of 52 feet,

The "Kassel" two-seater and "Rhonadler"
soaring together at Dunstable.

Mr. Collins' "Rhonadler" circling in a thermal.

Five machines at Dunstable waiting to be pulled to the top.

not important during your early stages of ground-hopping. When you reach the soaring stage, however, it needs patience and tenacity of purpose. I do not wish to convey that there is anything difficult about motorless flying, for I am convinced any average car driver or sailor with good sight and distance-judging ability, can learn to soar during the favourable week-ends which occur in eighteen months. What I wish to convey,however, is that you cannot learn to glide without joining a club which has machines and the instructors to teach you. At the end of this book is a list of such clubs and the Secretaries' names and addresses. Subscriptions vary, but none are more than £5 a year. If you are in a district where there is no Club within 100 miles, and you wish to start one, the British Gliding Association will give you all the help in its power. A letter to the HON. SECRETARY, 19 Berkeley Street, LONDON, W.1, will bring you particulars of the best way to form a club in your area. But it is not practicable to do this unless you have the help of one or two experienced pilots. In fact, optimism, without caution and wisdom, dealt a severe blow to gliding in 1929. However, the aforesaid optimists are now defunct, and the surviving organisations can be relied upon to deliver the goods.

If, however, like the writer of these notes, you have dreamed of soaring (note: one never dreams of noisy engines, but always of silent natural flight), if, I say, you have dreamed of soaring, then you will not mind hard work, delays and disappointments, all of which are part of your gliding training. Any man who endeavours to harness natural forces, must wait on tide and time, as these wait for no man.

Don't forget also that the monthly gliding paper, " The Sailplane and Glider," contains much useful advice as well as up-to-date reports of all that is doing in the soaring world. You can order it from any bookstall.

One last word to you, patient reader: Do I hear you asking with one eye on your car, " What is the use of Gliding ? " No, it is not a means of transport, but like ski-ing, tobogganing, or just golf, it is firstly a healthy and invigorating means of enjoying yourself in the open air, in the most beautiful spots of this old world—to wit, the hill-tops with green valleys beneath; and secondly, it is the only means whereby you can emulate the natural flight of birds in their leisurely meanderings.

There is no doubt that during the next ten years, this sport of gliding and soaring is destined to become one of the most popular pastimes to people with imagination, who have in their youth watched the gulls at the seaside with a secret envy. The art of soaring can be likened to graceful figure-skating, and even those who have no desire to take the air, have admitted themselves charmed by its grace. But only those who have actually soared can realise the exhilaration and true beauty of the sport.

An improved "Prüfling" soaring at Pewsey.

Soaring a nacelled "Dagling" at Dunstable,

The "Wren" soaring at Dunstable.

The "Wren" taking off.

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W. W. BRISCOE

Tel. MAYFAIR 3497

The Secretary will supply you with any information or advice you may need with regard to Gliding and Soaring.

LIST OF BRITISH GLIDING CLUBS.

Clubs providing Soaring facilities :

YORKSHIRE : Arthur Cox, " Overdale," Boston Avenue, Kirkstall, Leeds.
DORSET : J. Laver, 9 Commercial Road, Weymouth.
FURNESS : H. S. Gross, 106 Greengate Street, Barrow-in-Furness.
LONDON : H. O. Davies, 13 Victoria Street, London, S.W.1.
MANCHESTER : F. S. Coleman, 62 Edgerton Road, Chorlton-cum-Hardy.
SOUTHDOWN : A. York Bramble, 3 First Avenue, Hove, Sussex.
ULSTER : Sydney Hanna, 17 Royal Avenue, Belfast.

Primary Clubs :

ACCRINGTON : J. Nolan, 67 Eagle Street.
CHANNEL : C. M. C. Turner, " Charlton," Hawkinge, Kent.
ILKLEY : J. K. Watson, " Craigielea," Ben Rhydding, Ilkley.
IMPERIAL COLLEGE : G. P. Hebden, Imperial College of Science, S. Kensington.
KENT : Miss R. H. Sinclair, Lady Place, Sutton Courtenay, Berks.
NEWCASTLE : A. P. Miller, 25 Holme Avenue, Walkerville, Newcastle-on-Tyne.
OXFORD : A. F. Houlberg, " Midway," 160 Oxford Road, Cowley, Oxon.
PORTSMOUTH : R. Robinson, 72 Copnor Road, Copnor, Portsmouth.
PRESTON : L. E. Falla, " Lendor," Lawrence Road, Penworth Hill, Preston.
WILTS : C. T. Cuss, 2 Church Place, Swindon.
WORTHING : N. T. Whiteman, 101 Rowlands Road, Worthing.
THAMES VALLEY : E. F. Camps, " Pensilva," Bolton Lane, Harlington.
ESSEX : W. Webster, 113 Coombes Road, Dagenham, Essex.
RUGBY : A. C. T. Isaacs, " Killingholme," Hillmorton Road, Rugby.
LEICESTERSHIRE : W. Adcock, 79 Gartree Street, Leicester.
STOCKTON-ON-TEES : H. P. Dean, Redwing Lane, Norton-on-Tees, Co. Durham.

Note.—*The foregoing notes are for the information of those who have no previous knowledge of soaring flight. They are a simple and non-technical description of the principles involved in this new sport, and experiences pertaining thereto.*

This is not, and does not claim to be, a text-book on gliding.

C.E.

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