This Gliding!

THIS GLIDING

Ever since the earliest days of the human race the problem of flight has been one of absorbing interest. In every age great thinkers have dreamed of the conquest of the air and have attempted to discover its secret just as hopefully as they sought to transmute base metals into gold with the aid of the Philosophers' stone.

History records many attempts at the solution of flight, and such great technicians as Leonardo da Vinci, Lilienthal, and the Wright Brothers, all took progress a stage further. It is, however, within the last 30 years that the whole advancement of aviation has been successfully based upon the experiences and technical knowledge gained by the early pioneering efforts of the Wright Brothers who first learned the secret of controlling an aircraft by constructing a series of gliders. They, of course, were more concerned with the evolution of a power-driven aeroplane, but the machines with which they first created their world records in the early part of this century, were nothing more or less than gliders into which a somewhat clumsy engine and propellers had been fitted.

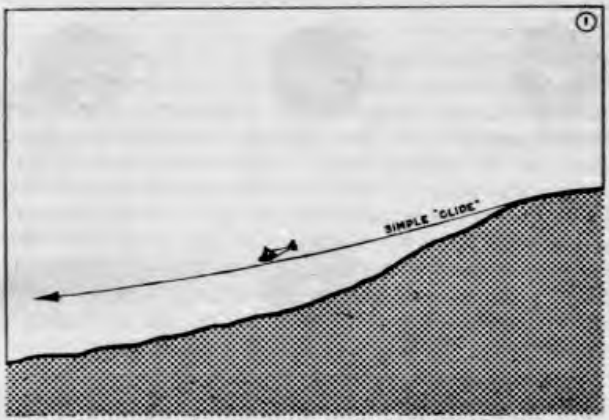
The advent of the power driven aeroplane, for many years pushed the study of gliding flight into the background, but some 10 years ago, an enthusiastic body of technicians and sportsmen in Germany recommended the study of motorless flight.

It was apparent as soon as gliding began to gain popularity that something must be done to stimulate and to control its International development. The technical and competitive aspect of any sport which can be enjoyed by the youth of a large number of nations can only progress on the right lines if there is some International controlling body. An International Congress was held at Darmstadt in Germany in March, 1930, and the first instruction centre for the art of motorless flight was established at the Wasserkuppe in the Rhon Mountains in Germany. Each country represented at the Congress had its own national controlling body and thus the British Gliding Association was formed in 1931.

WHAT IS ITS OBJECT.

The spectator will at once ask "What is the object of gliding?" The answer is very simple. It is to be found in the fact that here is a sport not only with a thrill in it, but a sport which has a technique entirely its own, and one which still holds a good many secrets. Modern youth naturally wants to find out just what these secrets are, and there are plenty of enthusiasts busily probing into these mysteries.

Since this little book makes no attempt to deal technically with the subject of gliding, but is distributed for the benefit of those spectators who have actually arrived at one of the many gliding clubs to see a glider in the air for the first time, it is necessary to outline the whole procedure.



" Sport with a Thrill in It."

THIS IS " GLIDING."

Gliding, which is only the popular term for "motorless flight" embraces four main divisions of the art. First, there is "Gliding," a procedure in which the machine is launched from the top of a hill and proceeds to glide down to a landing place at the bottom. Secondly, there is " Soaring," in which a more efficient machine is maintained by the upcurrent of air which rushes up the side of the hill. Thirdly, there is " Thermal Soaring," by which the machine is sustained by invisible, but nevertheless strong upcurrents, which are caused by the rising of warm air towards the clouds. Fourthly, there is the very advanced practice of " Thunder Storm " or " Cold-front Soaring," a procedure which often demands " Blind Flying " inside the clouds.

"A" BADGE

"B" BADGE

"C" BADGE

SILVER "C" BADGE

The British Gliding Association issue three certificates, A, B and C, for tests which mark the proficiency of gliding pilots.

For the A certificate a pilot has been trained sufficiently to be launched in free flight for a period of 30 seconds. At first this short space of time may sound to be truly ludicrous, but before reaching this test the pupil has undergone a very considerable amount of primary training, and 30 seconds at this stage is very definitely to him something of an achievement.

For the B certificate the pupil progresses until such a time as he has mastered the art of turning to the right and to the left, and the test consists of a flight of one minute with a definite right and left hand turn included. In addition to this he has to have made at least two flights of 45 seconds each.

The final C certificate is altogether a more ambitious test. Gliding is now finished and the pupil has to make a free flight of not less than 5 minutes over his starting point, sustained by the upcurrent over the 'edge' or top rim of the hill. To do this he is launched at the top into the narrow belt of up-wind, and must travel backwards and forwards over the edge and parallel to it, turning at either end out into the wind and thus back to the edge, forming in other words a series of very much elongated figures of eight. In this test every evolution that he has learned to date is brought into practice, and he has truly gained the extraordinary exhilaration which free soaring flight alone can give.

Incidentally, a heavy landing during any of the tests disqualifies the aspirant in that particular examination.

THE SILVER "C".

So much for the ordinary proficiency certificates but beyond these there is an International Gliding Certificate, the much coveted "Silver C." To gain this the pilot must have flown at least five hours at one stretch; have reached a height of 1,000 metres, which is about 3,284 feet, and have flown a distance of at least 50 kilometres, which is about 32 miles.

With the great advance in Soaring technique this latter test, which looked almost unattainable five or six years ago, has been successfully passed by over 100 British Pilots.

For this reason a new International test known as the Golden "C" has been devised requiring 300 kilometres distance and minimum height of 3,000 metres, an achievement of which only the worlds most accomplished glider pilots are capable.

THE RIGHT SITE.

It is at once obvious that gliding calls for the right sort of hills, and throughout Great Britain, sites have been found where just the right formation of country is available. The discovery of these sites is not easy, for whilst a long gentle grass slope without obstructions of any kind, such as trees and fences, may be ideal for the early stages of gliding, long ranges of hillside facing the prevailing winds (which are mostly South-West) and which are necessary to deflect the wind upward for soaring flight, are much more difficult to find.

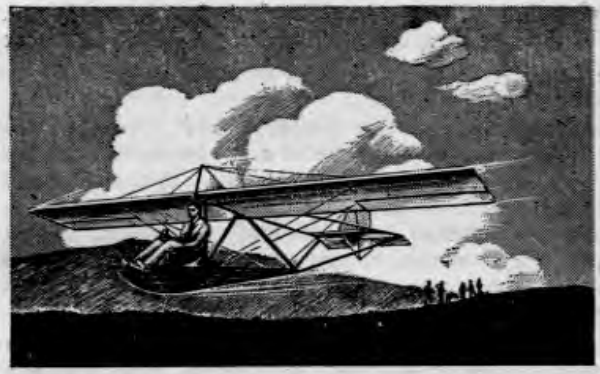
How are these beautifully made, though flimsy looking machines controlled, and why are there so many different types? For simplicity let us take the machines in order, from that on which a pupil first commences to learn, to the most advanced types which are used by the "Aces" in their high altitude cross-country flights of hundreds of miles.

The most elementary machine is known as a primary trainer and is of the " Dagling " type. Here is a glider reduced to its very simplest terms. A wide spreading main plane, a tail unit complete with rudder, and elevators and an open seat at the front.

THE " BUNJY " SCHOOL.

Here is the work in progress on a typical Saturday afternoon.

It is a bright breezy day, with a fairly strong wind from the west. It is soon apparent that at least three groups of members are at work at different phases of the art.



A PRIMARY MACHINE (Dagling Type).

Here is a group of fifteen or more towing a somewhat elementary looking machine behind a car, from the hangar to the top of one of the slopes on the training field. Arrived at the top of a slope an instructor takes charge and the machine is placed into the wind. The first pupil on the rota takes his seat in the machine and the instructor commences to give him the instructions for what is perhaps his first attempt at motorless flight.

HOW DOES IT WORK ?

" How do the controls work ? " Let us watch this pupil. His feet are resting on the " rudder bar." He's moving it to and fro—look at that vertical plane or " rudder " at the tail. It too, is swinging from side to side. Right foot forward . . . rudder swings to the right, the wind strikes it and tends to push the tail to the left, the nose

therefore turns to the right. Left foot forward . . . rudder swings left, tail end swings right, nose turn left . . . and so he gets directional control—just like a boat.

Now the pilot is pushing the " joy-stick " or control lever backwards and forwards—what's that for ? Look again at the tail. That horizontal plane or " elevator " is moving up and down Stick forward . . . elevator down . . . wind strikes the elevator and raises the tail . . . nose dips down . . . and vice versa. There then, is the up and down control.

But the joy-stick can also swing sideways as well—what does that do ? This time observe those little flaps or " ailerons " at each tip of the big main planes. Stick to the left . . . right aileron down, left aileron up. Again the wind catches the depressed aileron and pushes the right wing up at the same time as the left aileron is tending to push the left wing down . . . that's how the pilot controls the side to side motion of his machine. And that's all about the controls, except how to use them at the right time, separately or all together—and that's what he's now going to learn.

Two long elastic ropes are now hooked on to the front of the machine and spread out fanwise in front of it at an angle of 30 degrees. On each of these ropes four members stand ready to pull. Our budding pilot has received his final instructions and the instructor gives the word " Walk ". The two teams on the tow ropes commence to walk, and then comes the command " Run." The machine commences to slide forward faster and faster down

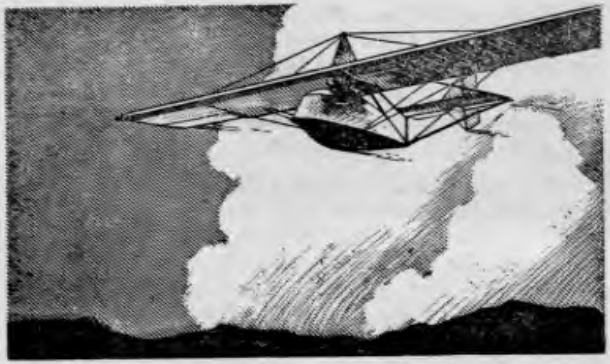
the slope until it has reached flying speed, and then perhaps it leaves the ground for a hop of five or six yards, never more than eighteen inches from the surface. It lands heavily or smoothly according to the degree of accuracy to which the pupil has obeyed his instructions.

The machine is returned laboriously to the top of the slope and over and over again with this pupil and with others in turn, the same process continues throughout the day, but it is noticeable towards the end of the evening that these hops have become longer and that the machine stays more or less steadily in the air 20, 50 and often 100 yards at a time, though, of course, there is always the pupil who violently over-controls his machine and provides both amusement and consternation by reason of his apparent clumsiness in control.

Danger? It certainly looks somewhat hazardous but in actual fact mishaps are few and far between, and even in later stages of training, crashes, if any, very rarely result in more injury to the pilot than is sustained by a rugby football player in the course of an ordinary hard match. And so the work in what is known as the primary squad or "Bunjy" school goes on.

MORE ADVANCED TRAINING.

On another side of the site, however, rather more serious attempts at flight are being carried on by a separate squad. Here, in a more advanced type of training machine, the pilot is receiving instructions for carrying out a fairly long flight in which he has to make a left or right hand turn.



A " NACELLED " DAGLING TRAINER.

The controls on this machine are precisely the same, except that pedals take the place of the rudder bar. The machine has of course, a slightly bigger wing span and the pilot is more comfortably seated in a " Nacelle " or streamlined cockpit, which cuts down the air resistance of his body and legs.

Attached to the front of his machine is a steel wire stretching away plumb into the eye of the wind to a high speed winch on a converted car chassis, at least 2,000 feet away. Standing by the side of the machine is a telephone operator and at the winch end is another operator on the other end of the telephone.

Figure 2 shows a typical example of this operation. The winch is placed close to the edge of the " soaring " slope of the hillside. Close by it at point A is the telephone instrument which runs

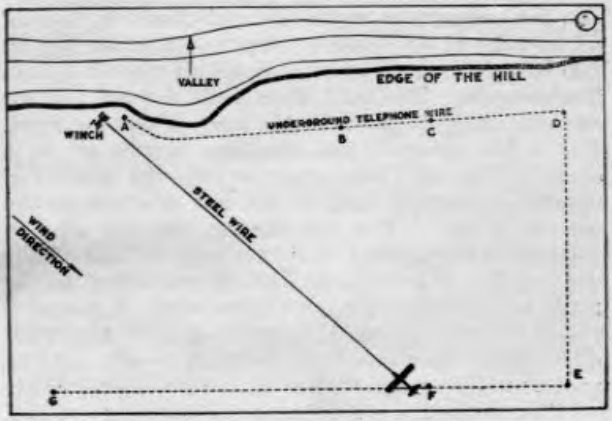


FIG. 2.—ARRANGEMENT FOR WINCH LAUNCHING.

round the field passing through various "plug-in" points, B, C, D, etc., to point F where, in this case, the instrument is placed near the glider. Notice particularly that the line A to F is exactly facing the wind, so that the pilot may get the maximum "lift" when the winch starts to draw him towards it.

The pilot has got his final instructions and the telephone operator gives the word "Tighten up." The winch slowly takes up the slack in the cable—"Stop." A final word with the pilot . . . "All set, go," and the winch speeds up and in a 5-yards

run the machine is in the air and climbing rapidly like a kite at 30 degrees. Up, up to some 150 or 200 feet, and then the pilot eases off the climb and flattens out. The pilot then pulls a quick release and the cable drops from the nose of the machine. For a few seconds the machine carries on in a straight line and then comes perhaps the somewhat clumsily executed turn to the left or right as the case may be. The machine is steadily gliding towards the ground and perhaps a half-a-mile away it lands heavily or lightly, according to the proficiency of the pilot, on a given spot. A powerful car is waiting to tow the machine back and pilot after pilot receives this training, each getting probably five such flights in a long day's work.

That is the day's routine of the secondary squad. These have learned, at least, to fly.

THE " C " PILOTS.

And now we come to a more leisured group of enthusiasts awaiting their turn to take their very beautifully finished high efficiency " Sailplanes " into the air for " Soaring " along the " Edge," as the top rim of the hill is called, or to fly still further afield if "Thermal" upcurrents will permit.

These are the " C " pilots, men whose experience ranges from 2 to 500 hours experience in gliders and some of them may have travelled across country 25, 50 or even 100 miles in motorless flight.

Again the winch is brought into service and away goes a graceful sailplane up to 300 feet on the wire. At 300 feet he casts off and makes straight towards the 600 feet edge or hill on the top of which the training field is situated.

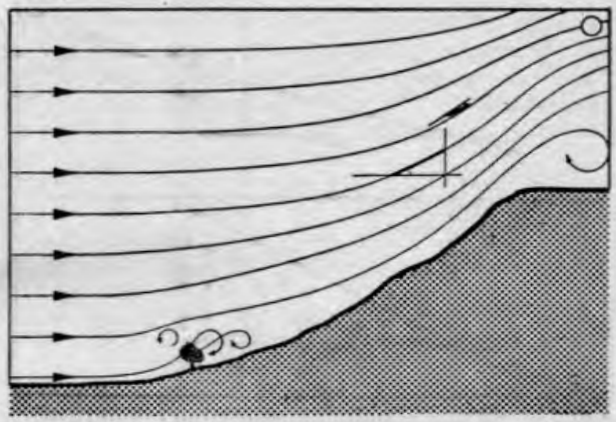


FIG. 3.—THE HILL SLANTS THE WIND *upwards*.

Leaving the edge he turns, but here is the difference; he is not losing height at all. As he beats along the edge it is immediately obvious that he is gaining height, and backwards and forwards he goes until finally he is riding on the strong upcurrent of wind, 1,000 feet above the edge, almost forgotten by the perspiring squads on the ground.

WHAT KEEPS IT UP?

All very well you may say—we can see him up there apparently going where he likes—but there's no engine! How? Why? Its all really very simple. You see, the wind is blowing across the valley at about 15 or 20 miles per hour. When it meets the hillface (*Fig.* 3) it naturally is slanted upwards, but once going upwards it doesn't immediately turn down again over the top of the

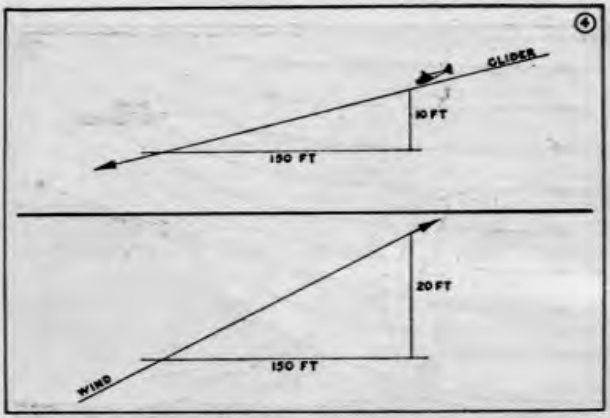


FIG. 4.—GLIDING ANGLE AND WIND ANGLE COMPARED.

hill. Often its upward influence is felt for well over 1,000 feet above the hilltop.

Now in Figure 3 one of the thin lines representing the wind has been thickened. This more clearly shows the average inclination of the wind at this point.

HOW DOES IT RISE?

Reference to Figure 4 shows the downward path of a gilder under normal no-wind conditions. PARTICULARLY NOTE THAT A GLIDER OR SAILPLANE WHEN FLYING PROPERLY MUST ALWAYS BE "NOSEING" DOWNWARDS AT AN ANGLE TO THE EARTH. How does it go upwards then? Well! The diagram shows that for every 150 feet the glider travels forward it sinks 10 feet towards the ground—a "gliding angle" of 1 in 15, but the bottom diagram shows the wind's upward inclination (see also thick line in *Fig.* 3) which for every 150 feet forwards is RISING 20 feet.

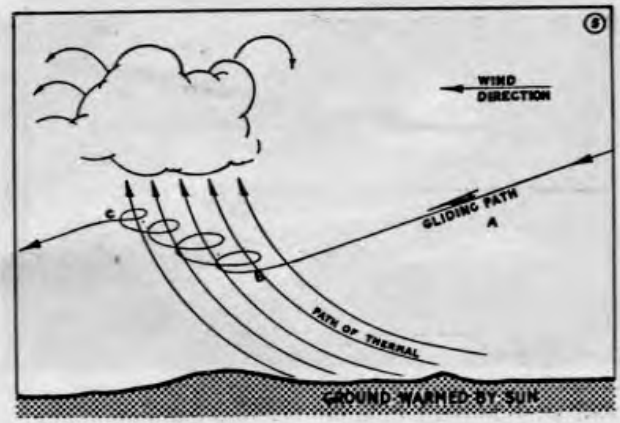
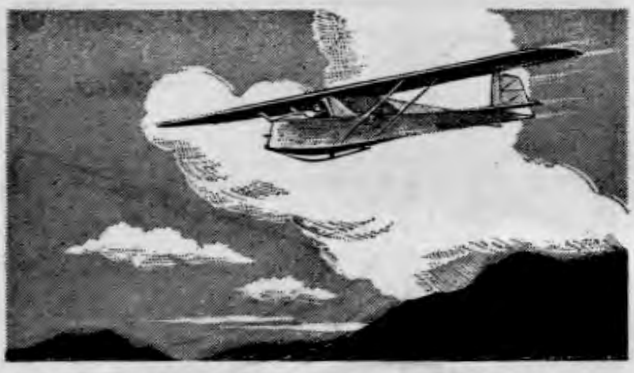


FIG. 5.—THE PRINCIPLE OF " CLOUD SOARING."

The glider is gliding down at 10 feet per second, and, the whole wind stream in which it is flying is going up 20 feet per second, therefore the glider must RISE under these conditions.

Indeed, there is the pilot we have been watching, at 1,000 feet to prove it. Let us watch him a bit longer.

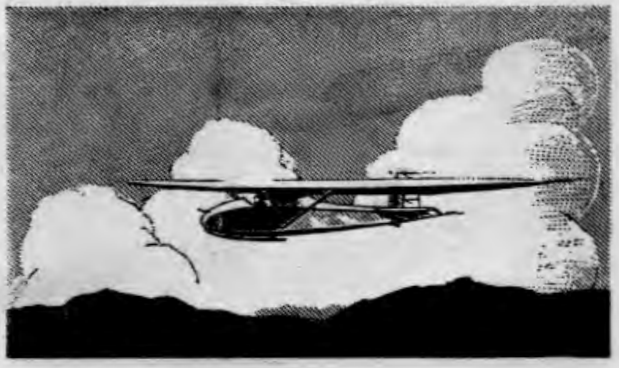
At 1,000 feet he has decided to go away across country but he is now out of the friendly upcurrent on the edge and LOSING height (A *Fig.* 5). He is cutting off for a large white woolly cloud under which, he knows, will be a strong upward current of warmer air (B, *Fig.* 5), and now he has reached it and is circling high up under the cloud.



A KIRBY "CADET"—SECONDARY TRAINING MACHINE.

Figure 5 shows approximately what is happening. The large white woolly clouds which you see are called "cumulus" and are nothing more or less than moisture condensing on the top of a rising column of warm air. Now you may think that air rising from the warmed earth (incidentally pilots call these "thermal currents" or "thermals") does so in a somewhat leisurely way, but it may surprise you to know that quite frequently, near the clouds, these currents are rising at 15 to 20 feet a second, which is equivalent to a good strong wind, and that just inside clouds of this nature such terrific air currents are working that even the strong construction of a glider might be torn asunder easily.

Up and up goes our pilot and now perhaps he has reached 3,000 feet (C, *Fig.* 5). Ten miles away he sees another cloud and off across the



A " GRUNAU " SAILPLANE.

intervening space he flies, now LOSING height again until he reaches the friendly influence of the uplift under the second cloud. And so he passes from our sight. Later in the day, a telephone message will come through to say that he has reached a point 40, 80 or even 100 miles away by means of his skill in flying from cloud sky hook to cloud sky hook.

Upon his return we may hear of his adventures when flying up through a friendly cloud, through the hail and sleet it contains, and up again through its snow area ; of the very rough passage and his enforced use of blind-flying instruments when inside the cloud—compass, artificial horizon, altimeter, turn and bank indicator. Surely that is adventure !

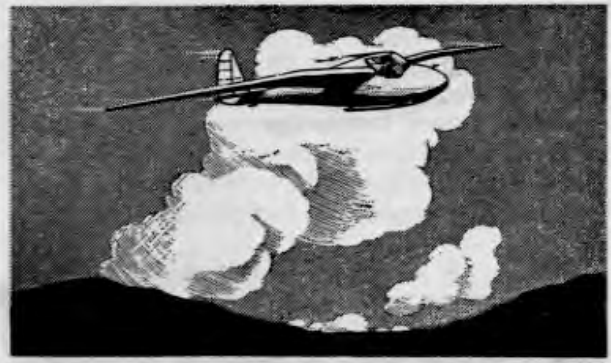
During the past few years a new method of launching known as aero-towing, has been evolved. In this method the glider is attached by about 200

THE KIRBY " KITE "—HIGH EFFICIENCY SAILPLANE.

feet of wire rope to an aeroplane. As the aeroplane taxis forward the towed sailplane rises from the ground some five or six feet, until the aeroplane " takes off."

The sailplane pilot keeps his machine in station exactly behind and slightly above the aeroplane, until at some 2,000 feet under a likely cloud, the aeroplane pilot gives a pre-arranged signal and the glider pilot releases his end of the wire by means of the usual quick release.

Aero towing experience is now an essential for all entrants in the National Competitions. It is useful in flat country for putting sailplanes in touch with the influence of likely lifting currents under clouds and at all times useful in eliminating the time wasted in climbing off the edge up to those higher levels where the sailplane pilot can revel on the wings of the wind.



THE KIRBY "KING KITE"— HIGH EFFICIENCY SAILPLANE.

Now you have had some explanation of this "gliding" business you may ask yourselves what does one do to take up gliding and how much does it cost and do I have to have a machine of my own, and how long will it take me to learn to fly like these other fellows?

If you don't know the name of a Gliding Club drop a line to the Editor of "The Sailplane" (which, incidentally, is the monthly magazine which deals exclusively with the sport, and which can be obtained from any book-stall) asking for the name of the Secretary and the address of the nearest club. The subscription of all the clubs in Great Britain includes free tuition on club-owned machines, which means that you will be able to learn to soar without having to buy a machine.

As to how long it will take you to learn, that depends very largely on the organisation of the club you join, and the weather conditions during any given season, but on the average it should not take you longer than six months to learn the art of sailplaning sufficient to be able to stay in the air for periods of upwards of half-an-hour.

There are few sports which have so many clearly defined sides as sailplaning. There is constructional work for the fellow who is keen on making things, there is metal work, there is mathematics, science, and a huge field of technology for the studious, and there is enjoyable outdoor exercise for all, whilst in the evenings, when flying has finished, all the lessons of the day come back afresh to the group by the fireside in the club house.

In concluding this little book it may be interesting to mention the various existing International gliding records as well as the corresponding British records.

INTERNATIONAL RECORDS

SINGLE SEATERS.

DISTANCE
Victor Rastorgoueff (Russia) ... ... 405.3 miles

DISTANCE, OUT AND HOME
Bernhard Flinsch (Germany) ... ... 189.9 miles

DURATION
Kurt Schmidt (Germany) ... ... 36 hrs. 35 mins.

HEIGHT
Erwin Ziller (Germany) ... ... 22,434 feet

TWO SEATERS

DISTANCE
L. Kartacheve (Russia) ... ... 385 miles

DISTANCE, OUT AND HOME
Heinrich Huth (Germany) .. .. 160.8 miles

DURATION
August Bodecker (Germany) ... ... 50 hrs. 26 mins.

HEIGHT
E. Ziller (Germany) . ... . 10,839 feet

BRITISH

SINGLE SEATERS

DISTANCE
P. A. Wills, in Minimoa, Heston (Middlesex) to St. Austell, Cornwall .. .. 209 miles

DISTANCE, OUT AND HOME
Sq-Ldr. W. B. Murray, Ratcliffe to Castle Bromwich and back . ... 68 miles

DURATION
Sub-Lieut. A. N. Young in Falcon II at Long Mynd (Salop) ... ... 15 hrs. 47 mins.

HEIGHT
P. A. Wills, in Minimoa, Dunstable (Beds) ... 10,080 feet

TWO SEATERS

DURATION
Lieut. W. B. Murray and J. S. Sproule in Falcon III at Dunstable (Beds) ... 22 hrs. 13 mins. 35 secs.