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# GO GLIDING

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FLYING TRAINING IN GLIDERS

Also by Gabor Denes

*

PLAIN SAILING
(*Faber and Faber*)

*Gliders are made with great care to be light yet strong. Janet, aged just 3, is holding the rudder of a school two-seater—and it wouldn't really matter if she dropped it.*

# GO GLIDING

To Wally

ANN WELCH & GABOR DENES

Ann Welch


FABER AND FABER

24 Russell Square

London

*First published in mcmlx*
*by Faber and Faber Limited*
*24 Russell Square London W.C.1*
*Printed in Great Britain by*
*Latimer Trend & Co Ltd Plymouth*


*The text is by Ann Welch*
*and the photographs were taken by Gabor Denes*
*with the exception of the following plates*
*which were photographed by Ann Welch:*

22, 24, 25, 34, 37, 38, 40, 41, 82, 83,
84, 102, 103, 106, 108, 111, 113, 114

To

Vivien, Elizabeth and Janet

# CONTENTS

*Chapter One*

# ABOUT GLIDERS

*Summary of what gliding is—Misunderstandings—Sizes and construction—Controls, airbrakes, instruments, equipment etc.—Trailers and retrieving—Cross country gliding—Overhauls*

Whenever a glider lands in a strange field, people arrive to look at it, and they always ask the same questions.

'Why has gliding become so popular?'

'What is the use of gliding?'

'Can you land where you want?'

In recent years gliding has attracted thousands of new followers, because it is the only real air sport that exists. The flying of little aeroplanes is today hedged round with controls, restrictions, and regulations, free ballooning is largely prohibited and is fabulously expensive, and parachuting appeals only to a small number of people. In gliding there is everything the enthusiast wants, from team work on the ground to individual effort in the air, from wandering peacefully around the sky on a summer afternoon to tremendously exciting competitive races. It is not expensive in money, although consuming in time. It has an element of risk but is not, in fact, dangerous. But perhaps most important of all, it is a sport which is only in its infancy—there is a long way to go, and much more to be found out.

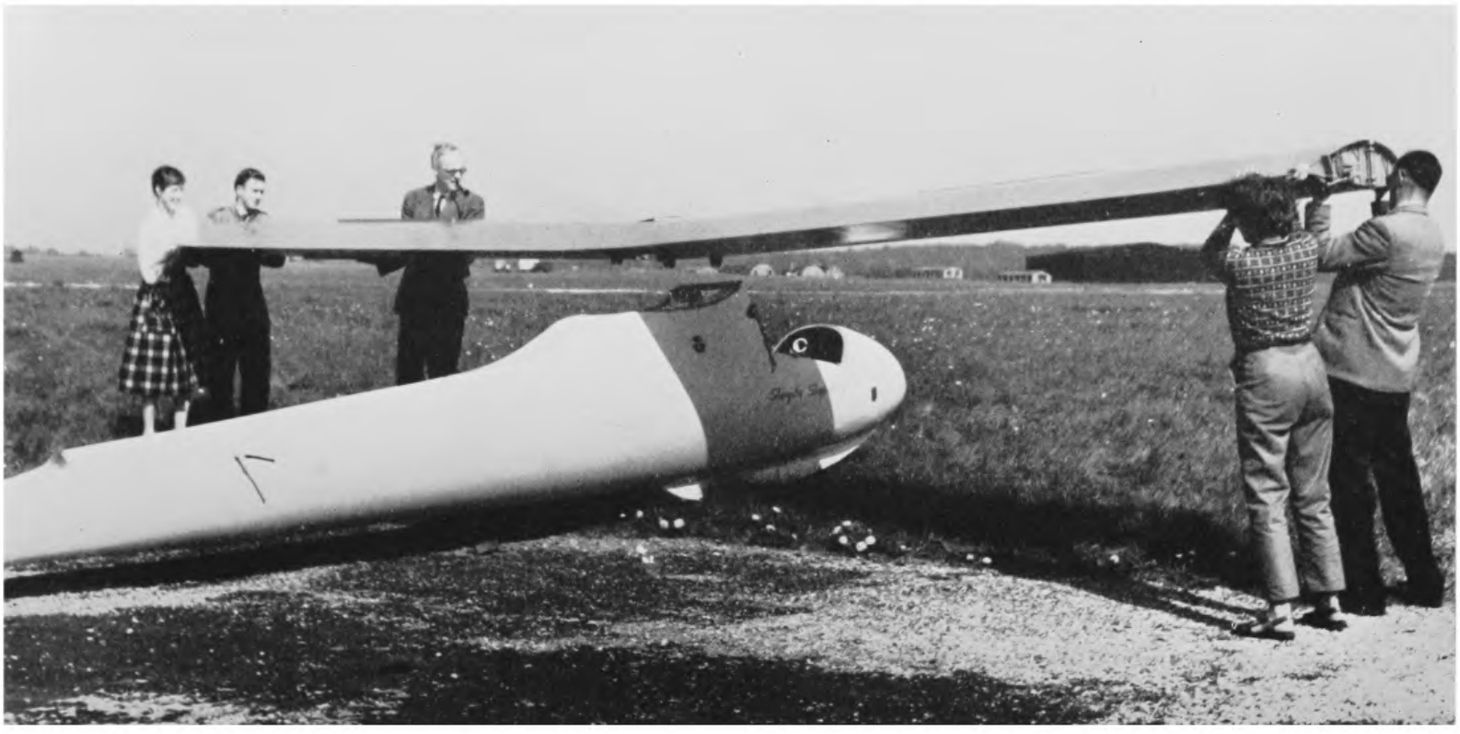
It is not of any commercial value, and no city magnate would dream of setting up a chain of gliding schools to keep him in his old age, but it is not entirely valueless. The glider is a good tool for exploring the air, and meteorologists have used it for finding out about thunderstorms, atmospheric waves, and the turbulence in mountainous areas which have caused airliners to crash. It is also a good test bed for trying out new aerodynamic ideas cheaply; quite a lot of the early development work on dive brakes was carried out using gliders.

There is little real money in gliding, and it supports few professionals, being mostly run by amateurs for others with the same self-help outlook.

The last question which the pilot in his field is asked varies from 'Do you

*1. The family goes gliding. It is a lovely summer day and Philip, with his daughter and friends, get out their glider. Two of Philip's sons are also pilots, and his wife has crewed for him at gliding meetings all over the world. Here they are pushing the Skylark to the launch point so that Philip can take off to fly—where? Perhaps to Cornwall, silent and invisible in the blue haze of the sky. But before the owner of a glider can get airborne he must pull his glider out of its trailer, rig it, and inspect it carefully.*


*2. This is the trailer in which Philip tows his glider to the club, and inside it fits the whole glider. Elizabeth and Bob help Vanessa out with the fuselage, being careful not to damage the top of the rudder on the doorway.*



*3. The fuselage is not standing up on its own. Elizabeth (unseen) is holding it up, but is crouching down while the centre part of the wing is lowered into place. Two long pins will then be put in the fittings to fix the two together. This centre section is the heaviest part.*

crash if you get into an airpocket?' to the remark 'Lucky you didn't land here yesterday, we only cleared the hay bales this morning'. The pilot tries to explain that there are no such things as vacuums, and to make it clear that if the bales of hay had still littered the field he would have selected a different one, but his listeners are not always convinced. They think that in some strange way it is the engine of an aircraft which causes it to be controllable. This is of course a myth, and a glider in the hands of a competent pilot can be landed time after time within a yard of a fixed point. It can do loops and other aerobatics, and be controlled with great precision.

But perhaps this is the time to find out more about the glider itself.

It is simply an aircraft which uses gravity instead of an engine to give it enough speed to fly, and to defeat gravity and soar upwards, it uses upcurrents in the air. This is, obviously, a far less reliable means of flying across country than in an aeroplane but it is much more fun, because the success of the flight depends on the pilot's own skill.

In his wanderings the pilot will find both upcurrents and areas of sinking air. He will want to gain height quickly in the lift, and lose as little as possible in downcurrents. To achieve this the pilot must be cunning, but the glider must also perform well, and be carefully designed to have a very flat

*4. Philip and Elizabeth are attaching the starboard outer panel. This is fixed into place with the steel pin in Philip's hand.*

*5. Now the port outer panel. The span of the Skylark II is 48 ft. and the whole glider can be rigged in less than ten minutes. It has no struts or wire bracing, but is strong enough to be flown safely in the violent turbulence of big thunderstorms.*

angle of glide. It must be light, but strong, and it must be 'clean' so that it produces the minimum drag as it flies along. The pilot must have a good view from his cockpit so that he can search the sky for the best clouds, and finally the glider must be able to be landed without damage in small and rough fields.

Most gliders are made of wood, and covered with thin fabric. Much of the structure is of spruce, which is light but tough. The fuselage and part of the wings are covered with plywood, usually birch or beech, but sometimes gaboon. Fibre glass is sometimes used for the curved nose and cockpit, while the transparent canopy is made of perspex.

Most single-seater gliders are about 25 feet long and have narrow wings of 45–60 feet span. The relationship between wing span, and its width, or chord, is called the aspect ratio. Two-seaters are usually of similar span to the larger single-seaters, but they have broader, lower aspect ratio wings. This is because aircraft of very high aspect ratio, with, say, a span of 80 feet and a mean chord of 3 feet, are expensive to build, and make landing in small fields more complicated.

Single-seater gliders weigh about the same, very generally, as motor-cycles, 300–500 lb. Big fast two-seaters weigh about 800 lb.

Because gliders may often land in fields and have to be taken to pieces, and transported from place to place, this aspect of their design and construction has to be considered carefully. The tailplane attachment and the metal fittings which join the wings to the fuselage, must be easy to reach and not require special tools. The number of detachable parts which can be dropped or lost must be kept to a minimum, and no component must be so heavy that it cannot be carried by 3–4 people. This may sound complicated, but any pilot who, when he starts to rig his glider in Yorkshire, discovers that he must have left a main pin in a field in Cornwall, will know what I mean.

The controls of a glider are the same as those of aeroplanes. There is the stick, which is linked to the elevators on the tail, and the ailerons on the wing. When the stick is moved forward, the nose goes down and the speed increases. When the stick is moved back, the nose comes up and the speed decreases. If the nose is held up the speed will continue to decrease until the wings can no longer continue to support the weight of the glider, and it will stall. If the stick is moved to the left, the left wing goes down, and the glider will start to turn in that direction, or if the stick is moved to the right, this wing will go down.

The glider also has a rudder which is worked by two pedals for the feet. It is

*6. After the main pins have been put in they are secured with special safety pins. The handle on the top of the wing has been used to push the main attachment pin home. It will be removed before flight, and then kept in the glider. In this picture Philip is connecting the aileron control.*

*7. Now for the tailplane. Philip and Bob lower this carefully into place. They will screw down the special holding nut and then connect the elevator control. Before take-off the pilot must always check his controls, as a final safeguard against forgetfulness.*

*8. Finally the canopy, which was removed while the glider was being rigged, is attached, and 8¼ minutes after the trailer doors were opened the glider is ready to fly.*

*9. Many gliders are owned by groups of friends. They take it in turn to fly and crew for each other.*

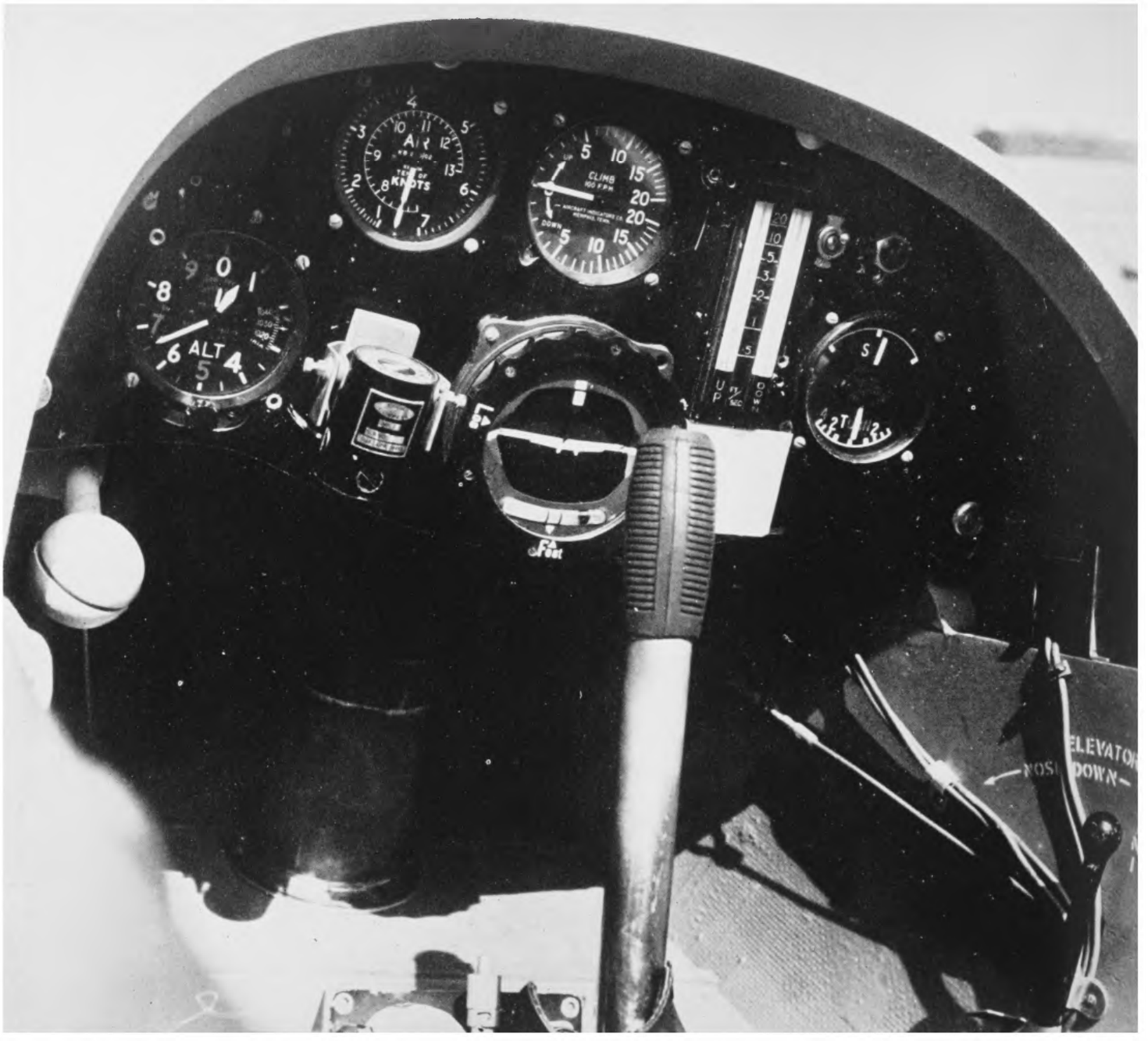
*10. The soaring pilot always wears a parachute, but gliders are so safe and strong today that only one emergency jump has ever been made in this country in peacetime, when two gliders collided in cloud. The two pilots in one jumped safely, and the pilot of the other who had lost part of one wing, landed without further damage. Here, Nick is starting to put on the parachute which he has already adjusted so that it will fit him tightly.*

*11. He clips the four straps into the locking box. This box has a quick-release mechanism in case the pilot is dragged by the wind on landing and wants to get rid of his parachute urgently. All that is necessary is to twist and bang the box, and the parachute harness will fall off. The rip-cord handle for opening the parachute can be seen below the left shoulder.*

*12. How not to wear a parachute. If Elizabeth jumped wearing the harness as loose as this, she would fall out of it as soon as the parachute jerked open. The harness should be adjusted so that it is difficult to stand quite upright.*

*13. Here is Steve getting into the cockpit of his Sky glider with his parachute on and properly adjusted. The hill in the background is the famous 'Bowl' at Dunstable.*

*14. This is the cockpit of a T21b school two-seater. It is open so that the pupil will be able to feel the airflow on her face, and learn quickly how to correct for change of speed, or when she is skidding through air instead of turning accurately. The pupil has a good view, and is taught to keep a proper look out for other aircraft.*




*15. This is the instrument panel of Nick's Skylark III glider. The control stick can be seen in the centre, with the knob for releasing the launching cable on the left. The lever for operating the air brakes is on the left, but hidden. The elevator trimmer lever for adjusting the load on the stick for different weights of pilots can be seen in the right bottom corner.*

not as important a control as the rudder on a boat, being used mainly to help the glider make a smooth turn when the wings are banked. Moving the left foot forward yaws the glider's nose to the left, and moving the right foot forward yaws it to the right. In a turn the stick and rudder are used together and in the same direction.

Nearly all gliders today have airbrakes. These are plates which can be made to stick out of the wing, usually on both top and bottom surfaces, and which greatly increase the drag of the glider. The object of this is twofold. By increasing the drag the performance of the glider will be spoilt and it will glide down much more steeply without increasing speed. This makes it much easier to judge an approach into small fields. The second purpose of airbrakes is to limit the top speed of high-performance gliders so they cannot exceed by mistake the maximum speed for which they were designed. Should the pilot lose control in a thunderstorm which he has tried to explore, he can open his airbrakes and the glider will be prevented from going so fast that it will break. If the airbrakes on a glider are designed both for landing and for limiting the maximum speed they are, strictly speaking, called dive brakes. If they are useful only for aiding the approach, they are usually called 'spoilers'.

In addition to these controls, the pilot has a release knob for letting go of the launching cable or rope, and some gliders have a tail trimmer; this is simply to compensate for different weights in the cockpit, so that a pilot can fly without undue load on the stick.

Gliders are fitted with the usual instruments to be found in aeroplanes; an airspeed indicator which measures the speed through the air, but not the speed over the ground; the altimeter, which indicates the height above sea level, or above its take-off setting, but not the height above the ground over which it may subsequently fly, and a compass. In addition there may be blind-flying instruments so that the glider can be flown in cloud. There may be a turn and slip indicator, or an artificial horizon, or both. The turn and slip indicator needs more practice to use properly than the artificial horizon, but it is both lighter in weight and cheaper. Gliders also carry a special instrument called a variometer. This tells the pilot whether he is in rising or sinking air. The most usual type has red and green balls contained in two tubes separated by a scale. When the glider is rising the green ball mounts up its tube, and the rate of climb can be read off the scale. When the glider is sinking the red ball goes up, and the rate of sink is indicated.

A few gliders are fitted with lightweight oxygen equipment so that if the pilot finds upcurrents which will take him to great heights, he can use them without fear of becoming unconscious in the rarefied air. A pilot should use oxygen over 15,000 feet if he is to remain efficient, and as some gliders have climbed to over 40,000 feet, it will be seen that this is an essential part of such a pilot's equipment.

Another item of equipment which all soaring pilots carry is the parachute. These have been included ever since pilots started exploring the insides of thunderstorms in the weak gliders of the early period. Now gliders are very strong, with speed limiting brakes, and parachutes would not appear to be any longer necessary for this reason. Two lives were, however, saved in 1958 after a collision, because the pilots were able to bale out. The parachute has to be looked after properly if it is to remain of any use. It should be kept dry and away from grease and dirt, and it should be re-packed about every three months. It should also be worn properly in the glider, and not just used as a cushion. If the pilot is ever going to need his parachute, this will not be the moment for putting it on, finding out how to operate it, or wondering whether it needs re-packing. It should also be adjusted to fit the pilot, as it would be most inconvenient, having jumped out of the aircraft, to promptly fall out of the parachute.

Earlier I mentioned that gliders often land in fields and have to be taken to pieces, or de-rigged, so that they can be taken home again. Each privately owned glider has its own trailer for this purpose, while the clubs possess enough of them to deal with such of their gliders as are likely to land away.

These trailers can be either a very simple platform on wheels, or covered in like a slender caravan. Usually painted silver or some light colour, so that they do not get too hot inside, glider trailers may be seen on the roads in the summer months chasing after gliders which can have flown hundreds of miles away.

Trailers can be towed by any 1½-litre car, and a whole family may go for a holiday with their aircraft, finding the many odd corners in the trailer indispensable for carrying tents and all the other miscellaneous equipment camping holidays seem to demand. Glider trailers vary between 20–35 feet long, and weigh 10–18 cwt. Although frighteningly large at first sight they are not difficult to tow.

Going on a retrieve to some strange place to find the glider is great fun, and a good crew will locate the aircraft and pilot with the minimum of delay regardless of the obscurity of the landing place. Not so one rather vague driver who got lost so many times that he did not arrive until the middle of the night, and then, on opening the door of the trailer, was mortified to realize that he had not checked inside before leaving, and that the long empty space was already full of someone else's glider!

When a pilot is launched off to try to fly across country he will take with

*16. If a pilot wants to break a record, or merely to have some permanent information about his flight, he carries a barograph. This is an instrument sensitive to changes of barometric pressure. Whenever the glider climbs high in an upcurrent, or sinks down low when there is no lift this is shown by a line traced by a pointer on a slowly moving smoked drum. Anne and Elizabeth are preparing one of the club barographs by holding the drum over a very sooty flame.*

*18. (above) In case the opportunity for a record flight occurs the barographs are always sealed, and if the pilot is successful may only be opened by an official observer, because the trace on the drum will be needed as evidence that the record flight took place. Sticky paper is put over the join as a seal.*

*17. (below) Anne carefully replaces the drum, being careful not to smudge it. Elizabeth holds the barograph casing.*

*19. An Official Observer then signs the seal. David is wearing the Silver Badge of the Soaring pilot, and he is also a club instructor.*

*20. Afterwards, if the pilot wants to keep the barograph record of his flight, it is fixed by dipping it in a solution of shellac and methylated spirits. This prevents the smoked paper from smudging the traced line.*

him things which he considers essential to the success of the flight. Maps are perhaps the most important of these. Some pilots fly on the Ordnance Survey $\frac{1}{4}$ inch to the mile, Aviation edition, but others prefer the Half Million Edition (about 8 miles to the inch) because much less unnecessary detail is given, and fewer sheets have to be carried, so that folding and unfolding is less complicated.

If the pilot is going to attempt an out-and-return flight, or to fly round a triangular course he will carry a camera with him to take photographs of his turning points, in order to prove that he reached them. It is, of course, possible to send an observer to the turning point, and this is done in competitions when a large number of aircraft are flying on the same course, but this method would be too complicated and expensive for a pilot trying some flight on his own. In order that the pilot's flight, if good enough, can subsequently be claimed as a record, the pilot before he takes off must photograph some person who will vouch for him, or alternatively, photograph a board on which he has chalked his flight

*21. Doug. checks the lightweight oxygen before take-off. If he goes above 15,000 ft. he will need it, as there will not be quite enough for him in the rarefied air high up. The 240-litre bottle is stowed behind his shoulder, and the gauge indicates full.*

*22. This big cumulus goes up to about 15,000 ft. If the glider pilot climbed up inside it, his barograph chart would give him a permanent record of his rates of climb and descent, but it would not tell him about the ice, the cold, and the excitement.*

*23. The Slingsby Sky, a single-seater glider of 59 ft. span. A glider of this type won the World Championships in Spain in 1952 when flown by Philip Wills.*

*24. There are fashions in gliders as well as clothes. This is the Minimoa of twenty years ago with its gulled and curved wings. In its time it held numerous records, but it would not be fast enough today.*

*25. This is the sort of cloud which the glider pilot likes. It looks bright and innocent outside, but inside where it is grey and turbulen there is strong lift to be found.*

declaration. During the flight he photographs his turning points, and on his return, he takes a further picture of some person who will declare that he landed back at his starting point. The film is then developed but the strip of negatives must not be cut; it is forwarded with the record claim, as official evidence that the flight was made.

Cross-country soaring flights may take several hours, and one or two have been done in this country in difficult conditions in which the pilot was still struggling on his way after 8–10 hours, although this is unusual. Most pilots therefore take with them some food and perhaps a bottle of water, to sustain them on the journey. Chocolate, apples, bananas, biscuits and sweets are best as they can be managed with one hand, while the other is used to control the glider. Floppy sandwiches full of crumbly egg, or tough-skinned pippy oranges are more bother than they are worth and usually end up mouldering in the dust under the seat.

Gliders are expensive because so much work and care has to go into both the design and the construction. New, they cost between £600–£1,800, although good second-hand ones can be bought for appreciably less. As a result gliders are rarely owned by a single person. They are bought either by clubs or by syndicates—groups of friends whose flying interests and experience are similar. To remain in good condition the glider has to be carefully maintained. This takes the form of an annual overhaul which can either be done professionally, or by the owners themselves followed by a skilled inspection. Most private owners, like many boat owners, arrange to do their annual overhaul for the Certificate of Airworthiness during the winter, so that they can make the best use of good summer weather. In addition to the C. of A. work, the glider has to be inspected every day before flight, but this check can be done by anybody who is approved by the club, or by the owner himself. This inspection is quite straightforward and takes account of such things as wear on the landing skid and wheel, proper operation of the controls, and possible damage due to bad flying, or someone putting their foot through the wingtip by accident. All sorts of different people fly gliders, boys and girls in their teens, retired people of 50 and 60, engineers, doctors, students, soldiers, test pilots, errand boys and lawyers. Many owners of gliders work in the city all week, and on Saturday morning are to be found getting their aircraft ready for the week-end's flying, wearing old corduroys and brightly coloured sweaters, often accompanied by their wives and families.

I have tried to describe here what a glider is, what it is made of, what

sort of equipment it needs and which sort of people own it and use it. The next thing to do is to see how it works, and then find out why people want to go gliding, and the sort of fun and pleasure they get out of it.

*Chapter Two*

# HOW A GLIDER FLIES

*The gliding angle and sinking speed—Stalling—Airspeed and groundspeed—Ground handling*

Neither aeroplanes nor gliders can fly until they are travelling through the air above a certain minimum speed. The aeroplane obtains this speed from the power of its engine, but the glider can only go fast enough by continually travelling downhill, much as a cyclist can freewheel and continue moving only so long as he is descending a slope.

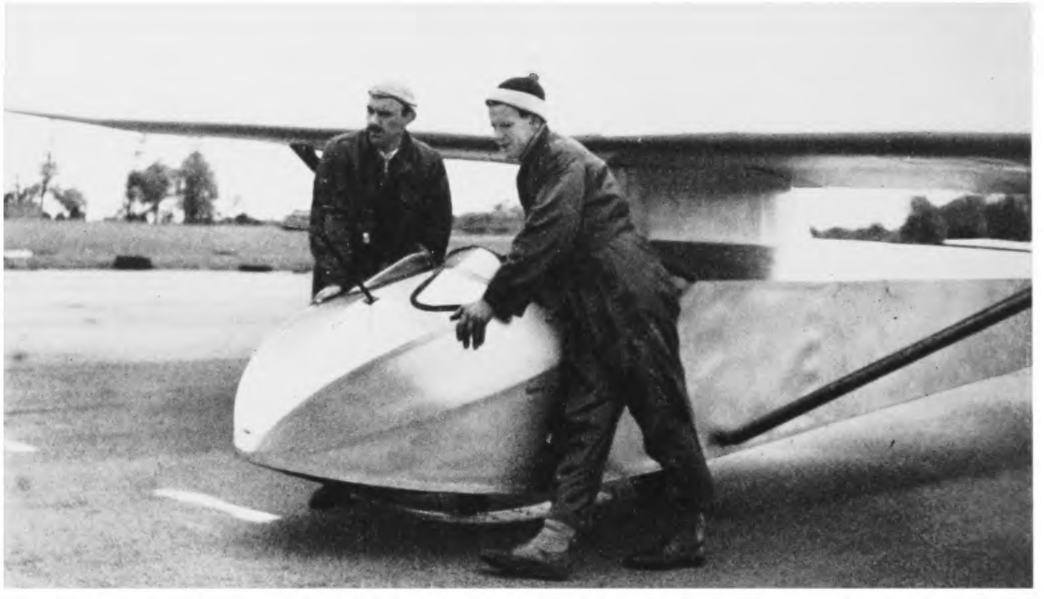
Gliders are designed so that the sloping path needed to maintain flying speed is very flat. The difference between the glide path and the horizontal is called the gliding angle. This is expressed as the glide ratio. It is about 1 : 20 for a school glider, and about 1 : 30 for a high-performance glider. Such gliders could, therefore, fly in calm air 20 and 30 miles respectively from a height of 1 mile, or 5,280 feet. In practice the glider pilot would not be able to go quite as far as this because he would have to spare some height to make his approach and landing at the end.

The rate at which gliders sink back to earth while flying along is called the sinking speed. School gliders have a sinking speed of about 3 feet per second, and high-performance gliders a little under 2 feet per second. When the pilot is searching for upcurrents, or just flying about for pleasure, he will fly his glider at the speed for the lowest sink, which occurs usually at some 40–45 m.p.h.

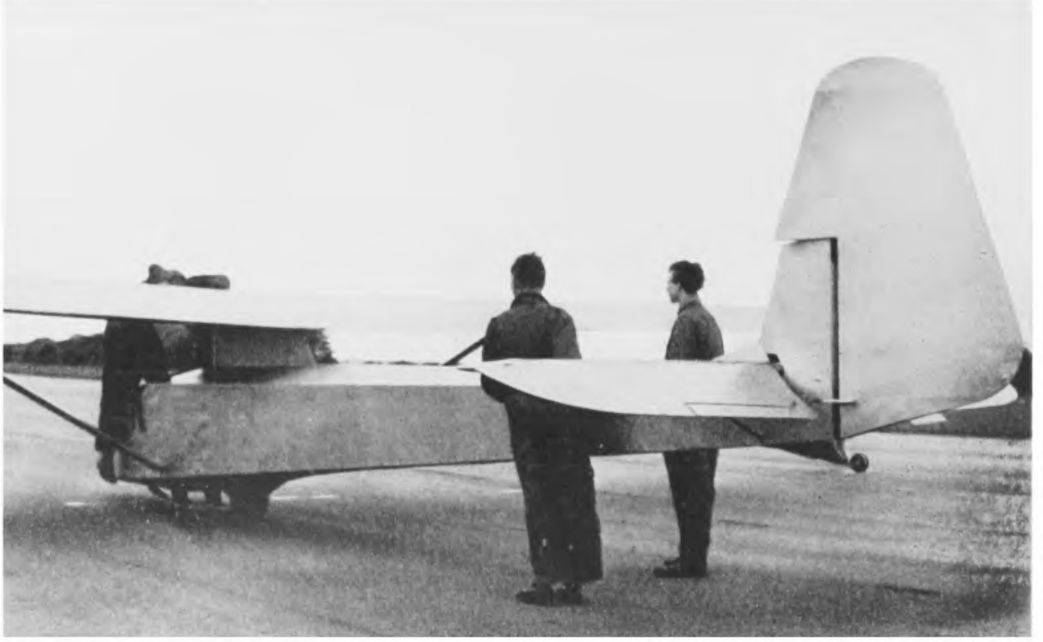
Gliders can be flown quite fast, up to 130–150 m.p.h. but as the drag increases rapidly at the higher speeds and reduces the performance of the glider the pilot would never fly at these speeds when soaring, although he might go as high as 80 m.p.h. to pass rapidly through patches of sinking air.

If the pilot lets the speed of the glider get less and less, the lift of the wings will be unable to continue to support the glider, and it will stall. The nose will drop, but in falling the aircraft will regain speed, and become controllable once more. A school glider stalls gently at about 28 m.p.h. and loses 30–50 feet in the process. Stalling deliberately is perfectly safe provided

*26. The first thing the new member has to learn is how to handle a glider in a wind. Gliders can fly in very strong winds quite safely, but on the ground they will quickly blow over if not treated properly. When the wing is into wind it must be held low, or put on the ground and kept there with a heavy weight such as a tyre.*



*27. When the glider is being moved to the launch point facing the wind, the nose must be held down.*



*28. Before the pilots are in the cockpit, the tail must be held high if the glider is facing the wind. This will prevent it being blown over.*

*29. When a glider is approaching to land it must increase speed. This nose-down attitude can be seen as the Olympia comes in.*

*30. The centre of gravity, or the balance, of the glider is determined by the pilot's weight. If he is very heavy the glider will tend to fly nose down, and if he is light it will tend to fly nose high. If the pilot is too light, and less than the permitted minimum for the particular aircraft, the pilot must put more weight in the nose before taking off. Here Steve is putting ballast into his Sky.*

that there is sufficient height to recover, and pupils are taught stalls so that they will be able to recognize the approach and so avoid flying too slowly and stalling near the ground.

If a glider is stalled in a turn, or with rudder applied, it will probably start to spin. Most gliders do not want to spin, or to stay in a spin, and are very easy to get out. Gliders are easier to spin when flown by very light pilots, and some gliders will not spin at all if the pilot is heavy. If a pilot is less than the minimum weight stated in the cockpit he, or more probably she, must carry extra ballast.

In general the stalling speed of a glider is dependent on the wing loading, that is, the all up weight divided by the wing area. If a glider in flight

*31. Because a glider has only a single landing wheel, it sits on the ground with one wing down. When the glider is about to take off, the wings are held level, until it has got enough speed for the controls to become effective.*

*32. In order to steepen the approach path when coming in to land, the glider is fitted with air brakes, as shown on the Eagle. During flight they are totally enclosed inside the wings, and are extended by the pilot when he wants to land. Many air brakes limit the top speed of the glider, so that should the pilot get out of control in cloud, he can open the brakes, and this will prevent the glider going beyond its maximum permitted speed.*

*33. Philip just about to land in the Skylark II. The air brakes are extended, and the glider is about to touch down on the main wheel and tailskid at the same time—an excellent two-point landing.*

weighs 800 lb. and the wing area is 200 square feet, the wing loading will be 4 lb. per square foot. School gliders have big wings so that they will be able to be flown slowly and give the pupil plenty of time to think things out—although this may not seem to him to be the case when he is learning!

The pilot knows how fast he is flying by looking at his airspeed indicator, although any pilot who is capable of flying solo should be able to land his glider safely and easily without help from any instruments.

The airspeed indicator, however, only indicates the speed at which the glider is *flying through the air*, but not the speed at which it is travelling over the ground. This speed varies with the amount of wind, whereas the airspeed is not affected at all by the wind. The reason for this is that although the glider is flying through the air and this speed is registered on the airspeed indicator, the great mass of air in which the glider is flying is itself moving over the ground, and of course, carrying the glider with it. If, therefore, a glider is flying at an airspeed of 40 m.p.h. against a wind of 40 m.p.h., its speed over the ground will be nil. If it then turns and flies with the wind it will have a ground speed of 80 m.p.h. although the instrument in the cockpit is still only indicating 40 m.p.h. It is rather like rowing a boat against a tide. If the tide is strong enough, the oarsman will remain, in spite of all his hard work, opposite the same bit of land; worse still, the tide may be even stronger than the man with the oars, and the boat will be swept steadily downstream. If the man gets fed up and turns round to row *with* the tide, he will make great headway although working no harder than before.

When a glider pilot makes a cross-country flight and hopes to travel a long distance, he will choose a direction which gives him a following wind, so that he will have it to help him on his way. He will not attempt to fly against the wind if it is so strong that his *ground speed* would be wastefully low. High-performance gliders can, however, make adequate headway against winds of 20 m.p.h. or so, provided good upcurrents exist.

Because gliders can fly at low airspeeds, they must not be left unattended on the ground unless they are properly secured, or unless the air is quite calm, otherwise a sudden gust may cause the wings to start lifting, and the glider may be blown over. When the glider is being manhandled in strong winds great care must be taken to keep the nose weighted down, and to keep hold of the windward wing. One of the first things a pupil is taught when he starts gliding is how to look after gliders on the ground, because damage due to careless handling on the ground is one of the silliest ways to break them.

*Chapter Three*

# HOW A GLIDER SOARS

*Principles—Thermal soaring—Cumulus clouds—Hill soaring—Wave soaring —Problems of the pilot*

In the last chapter it was seen how a glider must always glide down through the air in order to maintain its flying speed. In order to soar, or gain height, the pilot must find upcurrents in the air which are rising faster than his glider is gliding down. If he then flies into the upcurrent and stays within the rising air, he will go up. The rate at which he will ascend will be the speed of the upcurrent less the sinking speed of the glider. For example, if the pilot discovers 'lift' of 8 feet per second and his glider sinks at 3 f.p.s. when maintaining its proper flying speed, then he will gain height at the rate of 5 f.p.s. The pilot does not have to bother with such sums as this, for his variometer in the cockpit tells him the answer: the indicator showing the rate at which his glider is at that moment gaining or losing height.

There are several different varieties of upcurrents, which the pilot is able to use: thermals, the lift which exists in cumulus clouds, hill lift, and wave lift.

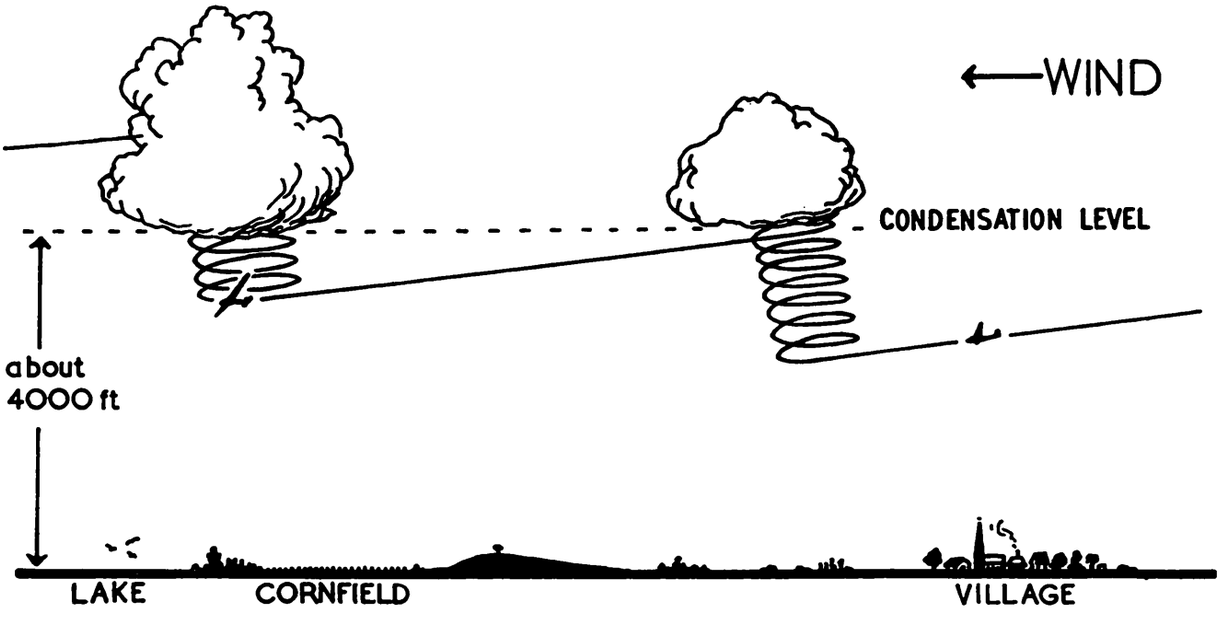
Practically all cross-country flying is done using thermals, so I will describe this method of soaring first.

During warm and sunny weather, the ground and the air in contact with the ground become heated: but this does not happen in a regular manner, as towns and ploughed fields warm the air immediately above them much more quickly than do woods or water. The patches of warm air expand, and grow lighter than the surrounding air, becoming unstable and therefore starting to rise. After having broken away from the ground they continue to go up like invisible balloons continually expanding, but because of this expansion also cooling. When they are no longer warmer than the air surrounding them, they cease to rise any more. Thermals vary tremendously in size, but a glider pilot cannot make much use of them if they are less than 150 yards across, because to stay in the rising air he must circle round and round, and if the thermal is too small, he cannot keep inside it.

The glider pilot flies across country by finding a thermal, circling up in it

using his variometer to show him where the best lift is, or whether he is flying out of the side of the thermal by mistake, and then when he has reached the top, gliding in a straight line towards his destination, at the same time looking for another thermal.

If a pilot finds a good thermal, and there are other glider pilots flying nearby who have not been so lucky, they will all hurry over to join him, and circle quite close together like a flock of birds. There is a convention that the first person to find the thermal sets the direction of circling; everyone joining him must circle the same way, so that collision can be avoided.




*How the glider flies across country. The pilot circles up in the rising air underneath cumulus clouds, and then flies in the direction he wishes to go. If the lift in the cloud is good the pilot will probably continue circling up in it, but if the lift is weak, or the pilot does not want to cloud fly, he will leave the thermal at cloud base.*

Unless the air is extremely dry, and in the British Isles this is not usual, thermals will produce the puffy cumulus clouds that can be seen all over the sky in summer. This happens because the rising air in the thermal is also cooling, and eventually a time comes when the air cools so much that it can no longer hold its moisture in the invisible state, and it is condensed out in the form of water droplets. Cumulus clouds are simply masses of droplets. When this change takes place heat is given off, and this warmth gives a boost to the upcurrent, and so, if he has the proper instruments, the glider pilot will be able to go on climbing inside the cloud.

Because rising air cools at a certain rate, condensation occurs in different thermals at about the same height. This is known as condensation level, or

*34. Three gliders are flying below these clouds. If they are clever or lucky, they will be able to climb up and fly right along the line of clouds for several miles.*

*35. When the wind blows on the hill, gliders can stay up in the rising air above the crest. The pilot flies along to the end of the beat, turns out from the ridge and returns. Hill soaring is not very exciting but is a fine way of staying in the air when there is no other lift about.*

*36. Gliders circle in thermals quite close to each other, and in competitions there may be as many as twenty-five gliders all going round and round like a flock of gulls. This is what the Sky looks like from a school two-seater, circling above the club house of the London Gliding Club.*

more simply, cloud base. Everyone must have seen those summer skies in which rows and rows of clouds have white puffy tops and grey flat bottoms. During the day cloud base tends to rise and so a glider pilot reaching the clouds at 3,000 feet during the morning, may well find that by the afternoon he is circling up in clear air at 4–5,000 feet with the cumulus still above him.

The ordinary small cumulus has a very short life. As the top of the thermal reaches condensation level, little ragged bits of cloud appear, and these soon grow together and form into the cauliflower shaped cloud which is the summer cumulus. By the time this has happened, the bottom of the thermal has risen up into the cloud, and there is then no more rising and condensing air to keep the cloud alive. It therefore starts to collapse and, as it subsides, evaporation takes place, and the cloud disappears. The life of an ordinary cumulus is about 20 minutes, so although the sky seems to be covered with cumulus clouds drifting steadily along, they are all either growing or decaying, and in half an hour's time none of the original ones will be left. The sky will still look much the same, although it is decorated with new and quite different clouds.

To the glider pilot, of course, every cumulus is the signpost to an upcurrent, and on days when they are present he will find soaring easier than on a day of dry thermals, when there is not enough moisture about to form cloud and he has no guide at all as to where to search. But it is no good flying off to any cumulus that appears handy, because if he chooses badly, the cloud will vanish as the pilot approaches, and he will find nothing but sinking air. One of the strange skills that the glider pilot must learn, is to be able to recognize the age of any cloud, from infancy to old age. There is something crisp and fresh about the young cumulus, which has gone from the softer cloud which is developing middle-aged spread, but this is not easily learned from books.

On some days cloud will be prevented from forming or growing because the air, instead of steadily getting cooler with height, suddenly gets warmer. Such patches of layers of air are known as inversions, and they provide an effective lid which prevents further instability and thus any continued rising of thermals or the growth of clouds. Cumulus on such a day, if they form at all, remain very thin and flat, and have a very short life indeed. Sometimes they are not even able to develop properly and appear as faint milky patches in the sky. Such days are often hazy as well, as all the dust and pollen in the lower levels is also imprisoned below the inversion.

On other days the very opposite happens, and the air is very unstable indeed up to great heights. These are the days of towering cumulus and

thunderstorms. Strong thermals leave the ground, form cumulus at condensation level and go on up. The cumulus grow big and fat, and develop a circulation of their own, drawing in more air from below to feed themselves; this warm moist air in turn helps to boost the cumulus which grows and grows like a huge octopus, greedily sucking in more fuel from below. As the top of the cloud reaches up higher and higher, it rises above freezing level, or the height at which the temperature of the air is below 32° F. When this happens the cauliflower-like shape of the cloud changes, and the cloud, now composed of ice crystals, fans out above like a giant's anvil.

These clouds do not die away in 20 minutes, but may last well into the night. Glider pilots have reached 30,000 feet in them in England, and many a cricket match has been hurriedly abandoned due to the hail and tropical rain they fling out to the ground as they pass black and threatening overhead, rumbling with thunder and livid with lightning. The insides of these clouds may be wildly turbulent, and the glider spiralling upwards inside will be covered with ice. Such clouds should not be used by those who merely want a pleasure flight or to look at the view, but they provide an exhilarating ride for pilots who have the skill and the urge to explore.

Hill soaring used to be the standard method of staying up in the air, until thermals were discovered, and it is still widely used by clubs whose site possesses a suitable hill. Very simply, the wind blowing against a ridge or range of hills is forced up over the top. If a glider is flown within this region of rising air, which is above and in front of the crest, it will stay up, and continue to gain height until it is at the top of the lifted air, which may extend to between twice and five times the height of the hill. The usual method of flying in slope lift is to fly along to the end of the ridge, or 'beat', turn outwards from the hill and fly back in the opposite direction while gaining height. Slope soaring is useful in the winter when there are no thermals, or as a stepping off point for a cross-country flight by using the hill lift until a thermal turns up, and then circling up and away in it.

If the pilot allows himself to be drifted behind the ridge, he is likely to fly into a region of turbulence and down-draught, and will soon find himself back on the ground. There are, however, some occasions when the air to the lee of hills and mountains behaves quite differently. Just as a submerged rock in a river will produce a ripple of waves downstream, so will a suitably shaped hill or mountain cause a series of waves in the atmosphere to be set up in its lee. These waves extend to considerable heights, and in some areas many miles downwind. In England wave lift has been found up to

*37. You try and stop a glider pilot taking off when the sky looks like this. There is an upcurrent under each one of these puffy cumulus, and the pilot will climb circling up in these thermals, until he reaches the clouds, and then he will dash off on his way until he needs to find another one.*

*38. If the flight is to be successful, the pilot must avoid mistakes. All the time he must make decisions—which cloud to use, when to leave his thermal, how long before he must find another one—or land—which field—how to get into it safely. Hans did not know this photograph was being taken from the front seat of his Spahlinger S.25 3,000 ft. up, because he was concentrating so hard on soaring.*

*39. Hill soaring can also be used as a way of jumping-off on a cross-country flight on thermals. The pilot gets into the clear fresh air above the ridge and waits until the cloud of his choice comes along.*

15,000 feet and in the Bishop Wave off the Sierra Nevada in California gliders have reached 40,000 feet.

Sometimes the crests of the waves are capped by clouds which show the pilot where to look for the up-going part of the wave, and how to avoid flying into the down-going avalanche of air. These clouds are unusual both in appearance and character. They are called lenticular clouds, and they are frequently almond shaped, or elliptical, with quite sharp smooth edges. In their simplest form they may be isolated, thin, and quite white to look at. But the clouds produced by one of the gigantic wave systems of the world, may be complex and massive, but still maintain the curious smooth curved outline. The odd thing about the character of these clouds is that they stay stationary above the ground regardless of the wind. What happens is that the wind blows through the wave, which is stationary, in relation to the mountains, and the cloud forms at the crests of the wave. Even if the wind is blowing at 60 m.p.h. at the height at which the cloud is forming, it remains in the same place, steadily developing and growing on its windward side where the rising air is feeding it, and decaying away on the lee side where the air is sinking. Under some conditions the existence of a wave can be seen, not by cloud that it is forming, but by slots or holes in a layer of cloud which previously existed. This is not unusual in England, where the sky is frequently covered with a sheet of stratus or layer cloud Increased cloud on the up-going side of the wave may not be seen since it is in or above the cloud sheet, but the air has been pushed down and warmed on the descending side of the wave, resulting in the evaporation of the cloud.

Today, gliding is not merely a rather hopeful activity in which the pilot gets himself launched into the air, hoping that he will find some sort of up-current, and then hoping that he will be able to make a cross-country flight. The technique of using lift is highly developed, and although the pupil on his first cross-country may be filled with little except hope, this is not the case with the experienced pilot. Quite apart from the more obvious things like keeping his glider in superb condition, and understanding to a large extent what makes the weather, and how the weather on any given day will develop, the expert pilot will plan his flight, and particularly his intended destination, before he takes off.

Roughly the problem with which he has to deal is this: there are only so many hours in which thermals will exist in a day. This is extremely unlikely to exceed ten, and, if the weather is likely to change, as it would if a depression were approaching, it may not be more than two or three.

Having decided how many hours soaring he is likely to have, the pilot must then decide what he wants to do, whether to make a distance flight, or an out-and-return flight to a declared turning point, or to see how fast he can fly round a triangular course. In both the last types of flights he will aim to return to his base if possible, and in the first case he will definitely land away, and have to be retrieved. In all these flights he will try to go as fast as possible; on the distance flight so that he can achieve a longer distance in the available time, and on the out-and-return or triangular flight either so that he can try to break the record for the flight or merely to practise going fast. This is not to say that glider pilots merely fly to win trophies and beat records; the problem is the eternal one of trying by skill alone to defeat the obstacles of nature. In this case to try to get more soaring while the sun shines.

The importance of being able to keep up a high average speed is particularly evident if the pilot wishes to fly against the wind. The better the soaring pilot, the stronger the wind against which he can make useful headway.

Earlier I described how a pilot soared across country using thermal lift, by circling up in each thermal he found and then flying straight towards his intended destination turning his height into distance. This is the essence of the problem, but only in its simplest form. To go fast, the pilot must make the best possible use of the thermals that exist at any time. To do this he must first of all teach himself to find the most rapidly rising part of the thermal without delay, and then stay circling within it. If he is satisfied merely with finding the thermal itself and flopping around half in and half out of it, he will find himself left far behind by those prepared to make the extra effort.

Having found the best part of a thermal he must decide how long he intends to stay with it; many thermals get weak near the top and if the pilot goes on circling, he may waste several minutes without any appreciable gain of height. The pilot in a hurry will therefore leave the thermal when the rate of rise gets too small for his liking. He will then fly off on his intended course, making such deviations as he thinks necessary to fly under clouds which he feels should be 'working'. If there is plenty of lift about and the glider is high the pilot will just fly straight through weak lift, without wasting his time on it, using only thermals which are going up fast. If he fails to find really good lift, he will accept progressively weaker lift as he gets lower. To fly in this manner, deliberately throwing away opportunities of staying up by playing for the high stakes of super thermals, takes a great deal of courage to begin with. It is, however, only possible to achieve really good flights by develop-

*40. The inside of big cumulus may be cold and wild, but the view on coming out is so full of beauty, colour, and magnificence that it takes the breath away.*

*41. These clouds will also carry the glider pilot to great height, although they look quite different from cumulus. These are the lenticular clouds, which are caused by great wave movements in the atmosphere in the lee of mountains.*

ing this technique, and it is surprising how clever and cunning a good pilot can get; almost as though he had special instinct for finding the best bits of the best invisible thermals.

By flying accurately in only the strongest lift, the pilot learns to increase his 'through the air' speed. This means that on a good day, and flying a good glider, he would be able to average somewhere between 25 and 35 m.p.h. over the ground in no wind, whereas an indifferent pilot, in the same glider, even if he managed to remain airborne, would only average somewhere between 15 and 25 m.p.h. If both these pilots now attempt to fly *against* a wind of 15 m.p.h. the good pilot would travel over the ground at an average speed of about 20 m.p.h. and would do a 100-mile flight in five hours, whereas the poor pilot would only make good about 5 m.p.h., and even if he started in good time in the morning, would never fly the 100 miles because the sun would have set and night fallen before he had travelled halfway.

When attempting pure distance flights, a pilot would naturally fly in a downwind direction, so that he would have the benefit of its help. The good pilot who could maintain a 'through the air' speed of 35 m.p.h. in the existing thermal conditions would average 60 m.p.h. over the ground if he flew with a following wind of 25 m.p.h. The wind as well as the strength of thermals varies with height, usually getting stronger high up. This too would have to be considered by the pilot when he is working out the best height band in which he will find the strongest lift. If he is going to do an out-and-return flight, it will pay him to stay high when he has the wind behind him even though the thermals are beginning to get weak, and to fly as low as he dare, consistent with having a reasonable chance of finding lift, when he is working against the wind.

In case it is felt that all this is too much like hard work, let me say that on any sunny summer day even the idlest glider pilot can find lift and wander lazily about in the cool air gazing at the countryside spread out below him, without any mental arithmetic or effort at all. Many do just this and have all the fun they want, but for others there is tremendous excitement in trying to go farther, or faster, or higher, overcoming not man-made rules, but much that is still unexplored in nature itself. In gliding, as in few other things today, the man is more important than the machine. An indifferent pilot in the finest glider that money will buy, will get nowhere against a pilot of initiative, skill and determination, flying a much less expensive aircraft.

*Chapter Four*

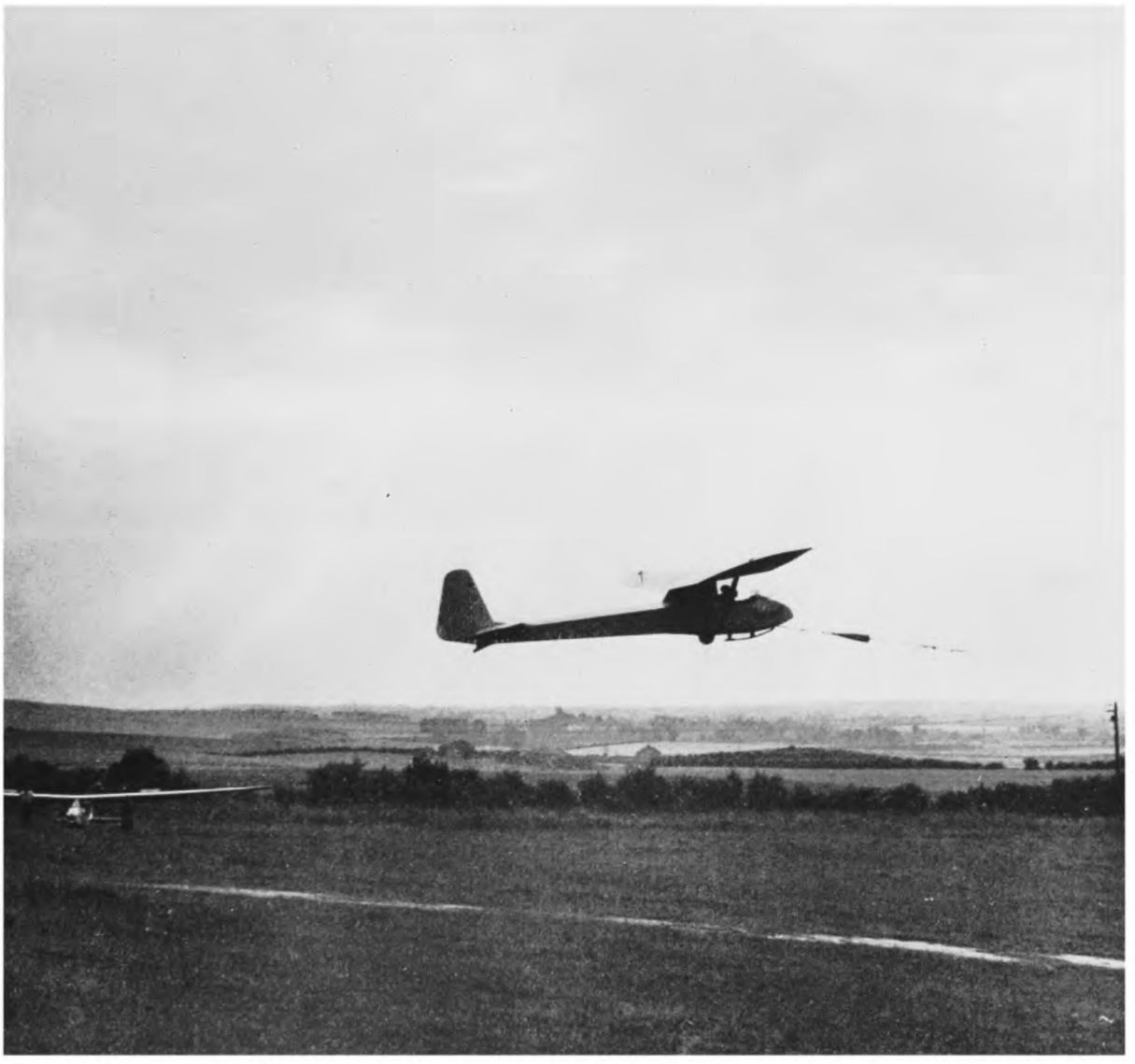
# LAUNCHING

*Aero-towing—Car and winch launching—Signalling—Operating launching equipment—Bungie launching*

A glider in the air is a strong and beautiful thing, but on the ground it is quite useless, delicate and easily blown away. Unfortunately it cannot get off the ground by itself, and so remains useless until sufficient people and equipment are gathered together to launch it. People say that flying gliders is character-building; since most pilots are essentially happy when they are flying, this cannot be wholly true. There is little doubt, however, that character-building takes place in the launching of gliders. Properly organized, with adequate money spent on launching gear, getting gliders into the air can be simple, but unfortunately there is usually not enough money spent on the equipment, because it has already been spent on the gliders. Because most forms of launching require the combined efforts of several people, some of whom are invariably strangers to the ritual or otherwise new or inexperienced, it is difficult to maintain a smooth-running organization. To simplify the problem of launching, gliding is invariably carried out by the clubs.

Probably the simplest way of getting gliders into the air, and certainly the pleasantest, is by aeroplane tow. A light aeroplane such as a Tiger Moth, Auster or Chipmunk is used, and a quick-release hook is built into its tail. The glider has a release hook at its nose, and the two aircraft are joined together by a thin rope some 150 feet long. This is usually made of nylon, slightly thinner than a pencil, which has a breaking strain of about 1,000 lb. The aeroplane pilot takes off normally and the glider pilot flies so that he keeps straight behind the tug, and slightly above its slipstream. Unless the air is turbulent even an inexperienced pilot should have little difficulty in remaining in the correct position. The tug pilot climbs up as rapidly as he can, either looking for thermals so as to give the glider pilot the best chance of finding lift, or taking him to some particular area or place where he wants to go. When the glider pilot wants to terminate the tow, he pulls the

*42. Should the launching cable break, it is soon repaired by the members. If it is a stranded steel cable a Fisherman's Knot is normally used and if it is solid wire then a Reef Knot or Whatnot is quick and satisfactory.* (*see p. 57*)



*43. The two-seater is having a winch launch. The winch which winds the cable in on to a drum at high speed is 800 yards out of the picture to the right. Having been pulled off the ground, the pilot will not start to climb steeply until the glider is at a safe height. If the glider is in a very nose-up attitude near the ground, and the launching cable breaks, the pilot would have difficulty in recovering full control before the glider reaches the ground. Pupils are always taught that failure of the launch is no excuse for breaking the glider.*

(1)

(2)

(3)

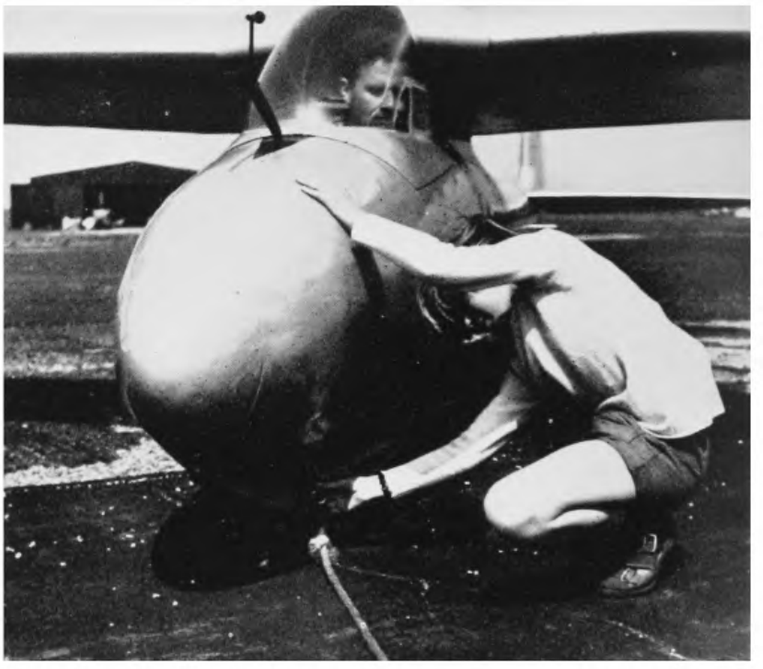
*44, 45, 46. Car towing gives the same sort of launch as a winch, except that the cable or wire is attached directly to a car which drives along at about 40 m.p.h. A smooth-surfaced runway is needed for car towing. In the first illustration the glider is getting to a safe height when it can start climbing more steeply. (2) About halfway up the launch. There is a cross wind which is drifting the glider sideways. (3) Just before release. The glider has nearly reached the maximum height he will be able to get while attached to the 900 ft. long wire.*

*47. Now let us return to the launch point to see how the glider, so remote from the winch or tow car, is got off the ground. Cables from a two-drum winch have been towed out. The driver has followed a straight line to the launch point so that the cables will not be twisted, and care is taken that they are used in a pre-arranged order, so that the winch-driver will not pull in a cable which is not attached to a glider. Spare cables must never be held, or even touched, while launching is in progress.*

*48. Car towing is done with springy piano wire. When a new wire is laid out, care must be taken that it neither gets kinked nor ends up in a sort of bird's nest that no one can ever again unravel.*

*49. The tow car, having given a launch, drops the end of the cable, and then returns up the runway to take the glider end back to the launch point. Here it is being hooked on to the car release, while the parachute, which allows the wire to fall gently and straight after the launch, is inspected.*

*50. The end of the launching cable carries a weak link, intended to break before the glider could be damaged should the launch be too fast or rough, a parachute, and a long length of rope, between it and the special rings which fit into the glider's quick-release hook. This rope is long so that should the glider get a jerky start and begin to run forward on the ground prematurely, there will be little risk of it overrunning the parachute or getting caught up in it. This gives an idea of the precautions which are taken so that gliding is safe.*



*51. When the pilot says he is ready, and not before, the cable is hooked on. At the beginning of each day the release is tested on the ground, both for a hard forward pull, and to see whether the automatic back release is working. This automatic pull-off device works should the pilot forget to release the cable, when the glider starts to overfly the winch or car.*

*52. When the cable is hooked on, and the wings are held level, the glider is ready to be launched. The wing-tip holder is looking round to see that no one is coming in to land before calling to the signaller.*

(1)

(2)

(3)

*53, 54, 55. The signals for take-off are: (1) Take up slack. Elizabeth waves the bat across her knees. (2) All out. The bat waved above the head tells the launch driver that the cable is straight and taut, and he can now speed up the launch to get the glider off the ground. (3) Stop. The vital signal if anything appears to be wrong. Whoever shouts stop during the signalling, Elizabeth must immediately hold the bat stationary above her head, and keep it there until the launch has stopped, and the pilot released the cable from his glider.*

release knob in his cockpit, and the aeroplane returns home with the rope. For ordinary club flying, gliders are usually towed up to 2,000 feet and released just upwind of the field.

Gliders can be towed into the air by powerful, but otherwise quite ordinary cars, if a smooth runway is available. The length of the wire, usually about 1,000 feet, will give launches almost to the same height if the ground run is adequate. The car avoids changing gear if possible, and drives at a speed which varies with the strength of the wind against which the glider is flying; the car's speed is usually about 40 m.p.h.

If a smooth runway does not exist, a similar sort of launch to the car tow is made by using a winch. This is merely a stationary engine which winds the launching cable in on to a drum at high speed. The ground can be quite rough, or undulating between the glider and the winch, provided that the glider has a smooth patch from which to take off, and there are no obstructions in which the cable could get caught. A much longer cable is used for

56. While the glider is gaining speed, the wing must be held level, by someone running fast on the wingtip. Fortunately this is usually only a matter of a few yards.

57. Airborne at last, but climbing a little too steeply too soon.

*58 (left). Winching is one of the most complicated jobs in a gliding club, although liked by those sufficiently mechanically minded. New drivers must be taught carefully, as the lives of the glider pilots are in their hands. Tom, the expert, stands by while the pupil concentrates on taking up the slack in the cable without a jerk.*

*59 (right). He has succeeded, and now the glider is climbing well, while the driver adjusts the launch speed to the changing wind speed as the glider gains height. The wire cage is protection in case the cable snaps.*

winching, as the glider will only climb in height the equivalent of one-third the length of the cable. To obtain 1,000 feet in height, 3,000 feet of cable must be laid out. Most launches in Britain are made by winch.

To do a winch launch, or car tow, the glider is faced into wind, and held level by a person at the wingtip. The cable is hooked on, and a signaller gives 'Take up Slack'. When the cable is tight, the signaller calls for 'All Out', and the winch or car driver accelerates rapidly to get the glider quickly off the ground. When the glider is airborne and the pilot has started to climb, the driver will adjust his speed so that the glider is flying at an airspeed of 45–55 m.p.h. He has no instruments to tell him this, and must use his judgment. If the pilot is being launched too slowly, he will rock his wings laterally, and if he is going too fast, will yaw the aircraft from side to side with the rudder; the driver will then take the appropriate action.

On both car and winch launches the glider must be climbed quite steeply in order to get the maximum height from the launch, but the pilot must only do this when he has gained enough height so that should the cable break, or the launch fail for any reason, he will have a chance to get the nose down and

*60. Should the cable break, the winch-driver must learn to repair it on his own. Tom is chopping off the frayed ends.*

*61. The Fisherman's Knot is tied and the two half-knots pulled tight against each other so that they will not slip. The loose ends are bound with wire.*

regain his normal gliding speed before he reaches the ground. The pilot takes off, therefore, and only climbs very gently until he is sure that not only has he enough speed to climb, but that he would be able to deal safely with any failure of the launch. If the cable breaks, he at once puts the nose down, pulls his release to get rid of any odd length of cable remaining, and then decides whether to land straight ahead, or whether to make a quick circuit. When the pilot first learns to fly, he is taught that failure of the launch is no excuse for breaking the glider.

The signals to the winch or car driver can be made by light or by bat. If lights are used, slow flashes indicate 'Take up Slack', and quick flashes 'All Out'.

*62. Aero towing is a safe and easy way of launching gliders, and one which can take the glider to areas of good upcurrents. After a cross-country flight, the glider can be towed home again if it has been landed on an aerodrome or large field.*

The 'Stop' signal is a continuous light, and the signaller must give this signal regardless of who has called for it. Anyone who thinks that the launch should not take place for any reason—another pilot might spot that the glider's tyre was going flat—is entitled to shout 'Stop', and it must be obeyed.

There are two methods of signalling with bats. If only one bat is used, it is waved to and fro across the knees, to indicate 'Take up Slack', and above the head for 'All Out'. The 'Stop' signal is the bat held stationary above the signaller's head. With two bats, the 'Take up Slack' is given by waving one bat up and down, and the 'All Out' by waving both bats up and down. The 'Stop' is made by holding up both bats.

The single bat method is the more practical unless there is a hump in the flying field which puts the signaller hull down to the winch driver; in this case two bats are more visible.

Winching is not a very rapid method of launching, as after each take-off about 3,000 feet of wire has to be pulled out again. Some winches have two drums of cable, and a few have four, so that the cable retrieve journey only has to be made after every two or four launches. Two drum winches are very practical, but pulling out four cables at once is a very heavy load even for a tractor, and unless the driver goes absolutely straight he may well get his cables crossed. Three-quarters of a mile of badly tangled cables is better than the most ingenious forms of knitting known to man. Ten to twelve launches an hour with a two-drum winch is a good average; with a tow car a slightly

*63. The aeroplane, too, is looked after and refuelled by members. First of all, Anne takes off the filler cap, and then guides the hose . . .*

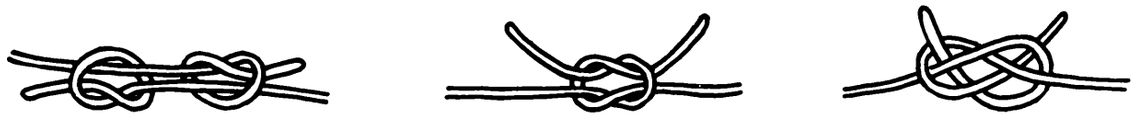

*64. . . . while the fuel is pumped.*

*65. With the tug pilot in the cockpit, and chocks in front of the wheels, the prop is swung, and the Tiger Moth will then be taxied out to tow up the gliders waiting to fly.*

higher launch rate can be obtained if a cable retrieve vehicle is used, and it is possible to get sixteen gliders off in an hour. If a higher rate of launching than this is needed, and the ground is only suitable for winching, two two-drum winches can be used. These are placed at least 200 yards apart at the windward end of the field, and the gliders, starting off from a common launch point, can be pulled up by a cable from either winch independently of the other, even at the same time, without risk of running into each other.

Towing with an aeroplane to 2,000 feet (twice as high as the average winch launch) can provide a launch rate of six or seven per hour. Aero-towing can, of course, be carried out alongside winching or car-towing, provided that there is enough room; pilots can then select the type of launch they want. Someone going on a cross-country flight will probably select the more expensive aero-tow, because it gives him the better chance of contacting lift, but the pilot practising landings will almost certainly choose a winch launch.

A method of getting gliders into the air which used to be very popular in the days when gliding clubs lived on hilltops, and pilots were trained on



(1) Fisherman's knot or Water knot. (2) Reef knot. (3) Whatnot.

*Both 2 and 3 are good knots for joining broken car tow wires. The loose ends should be wound a few times round the wire itself as this protects the knot from wear, and prevents the ends catching in obstructions on the ground. Contrary to common belief neither the Reef or Whatnot are satisfactory for joining pieces of string together: the Fisherman's knot is better and will never slip.*

open 'broomstick' single seaters, is 'bungie launching'. It is mentioned here because it is still used when glider pilots are exploring hilly or mountainous regions in search of new sites, or wave soaring possibilities, although it is not very practical with some of the heavier modern gliders. A bungie launch is great fun; the pilot sits in his glider on the crest of the hill facing out over the valley far below, with the centre of a rubber rope hooked on to the glider's nose, and the two ends pulled out forward in the form of a vee. On each rope there is a crew of three to five, and when the glider is ready to be launched they run down the face of the hill stretching the rope. Meanwhile the wings are held level by a man at the wingtip, and the tail is held back by someone else lying on his tummy, and clinging to the tail-skid as hard as he can. When the wingtip holder sees that the rope is fully stretched he shouts 'let

go', to the tail man and the glider shoots forward out over the valley. Quickly the pilot turns and flies along the hill to keep in the slope lift, to find that he is already rising rapidly, and the hilltop is far below. Sometimes a car is used to stretch the bungie, and in order to avoid the glider running into the back of it, or the car vanishing out of control down the hill, the bungie is attached to a short wire which runs round a pulley, so that the car can drive along the crest at right angles to the direction of launch. Bungie launching is fast disappearing owing to the higher speeds and greater weights of gliders, and a variation on this theme—the shoulder launch—is now virtually unknown. This was quite simple. If the wind was strong enough, the glider with the pilot in it would be picked up on the shoulders of two men standing right on the edge of the hill. The glider would be almost 'flying' in the very strong wind, and it only needed a heave, rather in the manner of a boy launching a model, for the glider to fly out of their hands, and sail upwards into the strong lift. In a slow, old, light glider I have even sat on the edge of a hill in Scotland, without any crew at all holding the glider level, and when a strong gust came along, persuaded the aircraft to lift itself off the ground and fly out over the ridge. I then soared high over the hill for an hour.

Such days are now past, and mechanization has taken over. Less exciting, but necessary in order to launch quickly all the tremendously enthusiastic pilots who today want to fly gliders.

*66. At the end of the day, or when the lift dies out, or when food calls, the pilots come in to land again. Some will have flown many miles away and then returned, others may have been soaring round the district, and a few unlucky ones may have failed to find any lift at all. In the foreground is a signalling lamp which is used sometimes instead of the bat.*

*Chapter Five*

# LEARNING TO FLY

*The first visit—The training glider and how it works—First flights—Sequence of lessons—In the air—How long it takes—First solo—B certificate and C certificate*

Learning to fly a glider so that the pilot can go solo and land safely is quite easy, and the ordinary person can reach this stage after about 40–50 launches, or in two weeks if he goes on a residential course. Becoming a competent soaring pilot takes longer, perhaps two or three years of effort, and reaching international standard may not be achieved in a lifetime. But in this chapter we are only concerned with the first stage—the fun of learning to fly.

On first arriving at a gliding club, the new member probably feels very strange; everyone seems to be so busy doing something which does not seem in the least comprehensible. Often his first introduction is someone shouting in a friendly fashion, 'Hey, you, hold this wingtip a minute, will you?' The new member gingerly clutches the thin plywood tip. Someone backs a car up to the glider and hitches on a short rope, and then without a word drives slowly away. The new member daren't let go, and finds himself being walked miles across to the other side of the field. Eventually they reach a place where gliders are being pushed around by hand—the launching point. The man with the car unhooks the rope, calls 'thanks', and drives away, still leaving the new member clutching the wingtip because no one has told him what to do. After this anything may happen; a pilot may clamber into the cockpit, another may hook on the launching wire, and before he knows what is happening the glider may be suddenly whisked out of the new member's hand and climbed steeply up into the sky. Alternatively, someone may just shout 'Don't just stand there, give us a hand pushing the two-seater'. Anyway, whatever happens, the new member finds himself in the thick of it, and never gets a quiet moment until his turn comes to fly, when he will climb into the two-seater with his instructor for the first time.

This instructor will probably be an ordinary club member like himself, who was once a new green pupil, and who, after gaining enough experience

*67. The Slingsby T21b, or Sedburgh as it is called by the A.T.C., is known all over the world as an excellent school two-seater. Here is 'Fanny' making a good approach to land at Lasham on a routine flight. The height over the fence, and the speed as shown by the nose-down attitude, are about right.*

as a solo pilot, has been trained in the club to teach others. His manner will be friendly and he will go to endless trouble to show the newcomer all about his beloved sport.

The two-seater in which they will fly will probably have an open cockpit, and may have the seats side by side, or one behind the other, in which case the pupil will be put in the front seat where he will get a better view.

The first thing the instructor will do is to explain the controls, the stick which when moved forward depresses the elevator on the tail and causes the glider to dive and gain speed, and when moved back, raises the elevator which causes the glider to climb, and get slower. If the stick is shifted from side to side this will move the aileron control surface at the trailing edge of each wingtip, and cause the glider to bank, and therefore turn, in the direction in which the stick is moved. The rudder, which is only really a secondary control, is operated by pedals for the feet. Move the left foot forward, the vertical rudder surface moves to the left, and this causes the nose of the glider to yaw to the left. Push the right foot and the glider yaws to the right.

On the left-hand side of the pilot are two further controls: a yellow knob which, when pulled, releases the launching cable, and a lever which operates the airbrakes to help the pilot land accurately in small places. Some gliders

*68. The first lesson. Instructor Brian shows 14-year-old Sarah the tail control surfaces, and how they move. The elevator which controls the speed is the horizontal surface which is moved up and down by the control stick. The rudder, which helps you to turn smoothly, is the vertical surface, and is controlled by rudder pedals.*

*69. Sarah sits in the right-hand seat, and Brian checks that she can reach all the controls, and is comfortable, and has her safety harness done up. 'Can you see out well enough, or would you like a cushion?' he asks.*

*70. In the glider and while waiting for the launching cable Brian explains what the first flight will be like. Sarah will not do any of the flying on this trip and so will have a good chance to look around at the countryside and feel the cool air on her face. Brian will point out interesting things and tell her quite simply what he is doing and why.*

are fitted with a trimmer lever, the purpose of which is to equalize the load on the stick for heavy or light pilots.

On the instrument panel in front of the pilot will be the airspeed indicator, altimeter, and variometer. There may be other instruments, but these are all that he will use until he has done quite a lot of solo flying.

For the first flight, the instructor will show the pupil what flying is like, but will not start to give him any serious teaching. To begin with, the feeling of being winched steeply up into the sky, with only the whistling of the wind for company may feel odd to the newcomer, but very soon the instructor will release the cable and then the glider will be floating free 1,000 feet above the earth. He will point out the interesting things to be seen on the ground, and the features of the flying field itself so that the pupil is less likely to get lost or confused. If it is a side by side two-seater he will show the pupil how the glider can be controlled with fingertip touch, and how great strength is not required. He will point out the windsock, so that they can know in which direction to land, and he will encourage the pupil to look out and around for himself to get used to being in the air.

After this pleasure flight, the real work starts.

The pupil will first of all have the simple effects of the controls shown to him—move the stick forward and the nose will go down, and the glider will increase speed—and then he will try out the controls himself, one at a time so that he does not get muddled. After this comes co-ordinating the controls, and trying to fly at the right speed at the same time. This is not a matter of glueing one's eyes to the airspeed indicator, but of trying to judge the attitude of the glider in relation to the horizon, and the sound it makes when flying at the right speed. If the noise gets louder, the glider is picking up too much speed, or if the nose gets higher in relation to the horizon the glider is slowing down. To begin with the pupil concentrates so hard on trying to fly level, and make the proper control movements, that he has little idea where he is in the air, and is quite surprised when he finds the landing ground in front of him, and hears his instructor say, 'All right, I've got her, but keep your hands on the controls and follow through the landing with me.' Then they are back on the ground.

After effect of controls, come turns, straight flying, and the landing, the take-off, and winch climb, practice stalls and spins, practice cable breaks; then when the pupil can handle the glider quite well he goes on to planning how to make the approach so that the glider can be landed in the proper area, and at the same time he learns to use the airbrakes, so that he can

control the approach that he has 'planned'. I put this word in inverted commas because to begin with the pupil will probably find that his planning does not work, and he gets nowhere near the place where he intended to land. Looking imploringly at his instructor for help and guidance usually only extracts from him a broad grin, and 'Go on—see what you can make of it yourself—it's the best way to learn.'

The ordinary training circuit takes about 4–5 minutes, but to the pupil, it seems much longer while the glider is in the air, but like no time at all as soon as it is back on the ground again. Let us try to imagine a lesson with someone we will call Jane, and her instructor. She has done about 20–25 circuits, and can fly the glider reasonably well, and is now learning to plan her approach.

It is one of those fresh spring days that seem almost too bright after the recent gloom of the winter. The wind is now in the west, strong and gusty, but not so wild as to restrict training. The red and silver glider is turned into the wind on the runway, with someone holding the nose down while the two pilots climb in. Jane tucks a cushion in behind her so that she can easily reach the rudder pedals, and does up her harness, pulling the adjusting straps hard so that she feels comfortable and secure in the seat. She glances across to the instructor beside her, his harness is fixed and he is sitting waiting quietly, for his pupil has reached the stage of doing everything for herself—under supervision. Carefully Jane goes through the cockpit check—controls working smoothly and in the right sense, instruments set, and operating correctly. 'Cable on,' she calls, pulling the release knob.

The man by the nose stoops down, and puts the launching cable ring into the release. She looks out at the signaller waiting and calls, 'All clear above and behind?' He checks and declares all clear.

'Take up slack.'

Slowly the wire snaking away 1,000 feet down the runway rustles taut, and the glider rocks gently on its wheel, 'All out'. The signaller waves the bat over his head and the glider starts to move.

Faster and faster the aircraft accelerates while Jane concentrates on balancing it level so that the wingtips do not touch the ground, and keeping it straight along the runway, and preventing it climbing too steeply off the ground. The clean cold air hardens on their faces as the big glider lifts silently into the air, but Jane doesn't notice it in her efforts to get the take-off just right, and please her instructor. At about 100 feet up the glider can be climbed more steeply, and Jane eases gently back on the stick so that the

*71. The instrument panel of the much-used school two-seater. The aircraft has full dual control, and so both the instructor and pupil have their own cable release knob. The central vertical instrument is the Variometer which tells the pilot whether the glider is flying in rising or sinking air. Immediately to its left is the Airspeed Indicator in knots, and left again, the Altimeter. On the right of the Variometer is the Turn-and-Slip Indicator for cloud flying, with its battery switch below. On the extreme right, but barely visible, is the Compass.*

glider is climbing at an angle of almost 45 degrees. There is no longer silence, as the speed is nearly 50 miles an hour, and the turbulence of the gusty air heaves at the glider as it goes up.

The outside world of the glider pilot is now no longer a grey runway flanked by muddy grass, but open fields, villages and woods, widening steadily into the four lovely counties which can be seen from the top of the launch. Jane has not yet done enough gliding to sit back and just watch, so that when the tow car stops with the glider at 1,000 feet and she has released the wire, and carefully settled the glider down to the right speed, the magnificence of the scene startles her. Twenty-five miles to the south is the thin silver line of the sea, and the same distance to the north are the hills on the

*72. Learning to glide is not all flying, for although gliders are extremely strong in the air, they are easily damaged by gusts of wind on the ground, and must be parked properly. The glider has been brought from the hangar and is parked with the air brakes open and one wing pointing into the wind.*

*73. This windward tip is put carefully on smooth ground and a heavy tyre placed on it. Two tyres may be necessary if the wind is strong.*

*74. Even with the wing weighted down, the glider has a tendency to weathercock its nose into wind in gusts, so another tyre is placed on the ground to the lee, or downwind side of the tail skid, so that it will not be able to swing.*

far side of the Thames valley. The sky is brilliantly blue, and the few little torn rags of cloud accentuate its depths. The air is cold, but it is not the cold which makes for shivering, but exhilaration, and excitement. Jane swings the glider round in a flamboyant turn and stares fascinated at the view. This is really flying, this is——

'You didn't look round before that turn to see if the sky was clear and you used far too much rudder. Turn to the right now, and make it a perfect turn. Jane's dreams flee at the stern voice, but the instructor is smiling, and enjoying being in the air as much as she is. Jane tries again—Look round, check speed, put on bank and a little rudder at the same time, maintain the turn by maintaining the bank—don't let it get too steep, and don't let it come off. When you want to come out of the turn, level the wings using a little of the opposite rudder at the same time to help you come smoothly out of the turn. Re-check your speed. She knew it in theory, but it didn't always work, sometimes the air was hazy and her speed wandered all over the place, and today it is the bumps. Suddenly there would be too much bank, and then, equally suddenly not enough, with the glider just yawing sideways, but not turning. It is all very difficult, but as they have plenty of height, the instructor keeps her going on round and round, and after the sun has flashed at least twice on the windscreen, Jane has somehow forced the glider to do what she wants, and the turn is smooth and satisfying.

Now the instructor says that it is time to go and sort out an approach and landing, so Jane stops turning, and looks to see where she will have to land. There are two gliders on the runway at the launch point and the grass area on both sides is clear. She aims to land to the left of the runway, so that if she is higher than she intends to be it will always be possible to pretend she has meant to go in on the right after all.

'Which side of the runway do you intend to land on?' Jane glares, and then grins at her instructor. How did the horrible man know what was in her mind?

'On the left.'

'O.K. Start planning now how you are going to get there.'

Jane looks at the windsock. The wind is quite strong so she must be careful not to get downwind of the airfield and undershoot. At the moment the altimeter says 900 feet so there is obviously plenty of height. Wait a minute! 900!? It isn't possible, that was the height they had before doing all the turns, and there hadn't been any upcurrents.

She feels the instructor grinning at her. He is: the cruel monster had

obviously twiddled the altimeter knob when she wasn't looking, and was going to make her do the approach without the help of the instrument. Fortunately Jane does not have time to tell him what she thinks of him, as they couldn't really be more than about 400 feet up, and they are still over the far side of the airfield. Quickly Jane makes up her mind—straight along just outside the edge of the field, then turn to land on the left side as planned. She increases speed now that she has started the approach, and puts her hand down on the spoiler lever. There still seems quite a long way to go, and somehow, they do not seem to be very high up. Jane lowers the nose even more in her urgency to get back to the landing area in time. 'Watch your speed—Stirling Moss.' 'There's no hurry.' Jane eases the pressure of her hand on the stick, and realizes that somehow they now seem to have more height than before, and that she will have to use the spoilers fully to get in without overshooting up the field. Linked with her thoughts the spoiler lever is tugged, and the glider lurches downwards. Almost at the same time Jane decides to turn into the wind, and let the spoilers shut, so that the aircraft balloons upwards. She knew she was doing this badly, but still everything happened on approaches and landings much too quickly. Grass and fences are careering past underneath now, but sideways. Jane tries to get the glider going straight, and starts opening the spoilers again, as they are almost over the landing area now, but a bit too high. The air is rough and buffeting them about, and Jane feels she will never get this great machine to do what she wants. But suddenly it becomes calm, and the glider has somehow got straight after all—or at any rate it seems like it. The empty grass ahead comes closer—it is time to check the glide—to hold off and to try to land the glider on its main wheel and tail-skid together.

'Look well ahead.' The instructor's reminder seems distant. Colours of gliders and people on the runway flash past, and quickly Jane moves back the stick—too sudden, too soon, the grass falls away and the whistle of the air dies.

'Do nothing'—comes the voice. Jane obeys, but mainly because she cannot think what else to do. Almost at once they are on the ground, gently, and coming to rest in a few yards.

'That was awful,' Jane says. 'I must have nearly stalled it landing up in the air like that.'

'That time you got too slow, and in fact we stalled on to the ground, but your "up in the air" was only about 2 feet, and provided you don't try anything clever at the last moment, these gliders will just settle on to the ground


*75. The goal of every pupil—the first solo. Instructor Nigel is giving Bob a few last reminders before he goes up alone for the first time. To compensate for the instructor ballast weights are fixed in the spare seat.*

like a bird. They are *designed* for people to make mistakes on, because if you never do anything wrong you will never learn very much. That trip wasn't at all bad—it won't be so very long now before you'll be on your own, without me shouting at you—and then you'll have some fun.'

Most pupils take somewhere between 30 and 50 dual flights to go solo, and these flights are usually given in groups of three.

Unless a pupil goes on a residential course, and this is one of the best ways to start learning, he is likely to have quite a number of different instructors, and so by the time he is ready for solo, not only will his aptitude be fairly well understood, but he will have got to know quite a number of club members and feel himself really 'belonging'. By this time, too, he will have found himself involved in all manner of club activities such as driving the tractor to retrieve the winch cable, or launching gliders with the tow car. He will know something about taking gliders to pieces, and parking them so that they do not blow away.

*76. Bob's friends watch with critical interest. 'Good boy, he is turning in to land at just the right place.'*

*77. On the final approach, speed right, all clear to land—look well ahead—but no time to wonder if he might be frightened.*

*78. Back on the ground. The grin is not because he is safely down, but because he has now proved himself as a pilot, and the world is at his feet.*

The first solo is regarded in the club as just another step in the pupil's training, and nothing to get excited about, but to the pupil himself it is a real milestone in his life. Until he actually goes alone, he is not quite sure whether he is progressing or even whether he will be able to fly alone if he has the opportunity. When the moment actually comes everything happens so fast that he hasn't really time to worry before it is all over—he is back on the ground again—feeling very pleased with life indeed.

The instructor will, if possible, send the pupil on two or three consecutive flights when he first goes alone, to prove to him that he can really do it, and that the first flight was not just a fluke. From then on he will have quite a number of check flights on the two-seater in between his solo excursions, to ensure that his flying does not become careless with his growing confidence. By this time the pupil will have obtained his 'B' certificate and be entitled to wear the little blue badge with the two white birds.


Slowly the pupil will progress to gliders with a better performance, and will start to learn to soar. If he flies from a hill site, where he can get some slope lift, he will be able to get his 'C' certificate quite soon. For this he must soar above his launch height for at least five minutes, and pass an exam on the rules of the air. If, however, he flies from a flat site, such as at Lasham, he may have to wait longer before attempting his 'C' as he will have to do it by finding and circling in invisible thermals. As skill in thermal soaring is what the pilot must achieve before he can really spread his wings and fly away across country, a 'C' certificate gained on thermals alone will be well worth the higher standard needed to obtain it.

When the pilot has gained his 'C' he can begin to look around him, for his future in the air is now almost entirely in his own hands. He will hear lectures on soaring and landing in fields, and he may be given dual instruction in both, but great skill in soaring is something which can only be achieved by personal effort, careful observation of the sky and the weather, and diligent practice in accurate flying. But perhaps he will only realize this when he has succeeded in making his first cross-country flight, and after pitting his new-found skill against the elusiveness of thermals and the immensity of the sky, is sitting in a field waiting for the trailer to come and collect him.

*Chapter Six*

# FIRST CROSS-COUNTRY FLIGHT

*Briefing—Choosing a field—Bob's flight—Landing in the field*

For a long time, it seems, the new glider pilot is restricted to flying within reach of the home field—he can go up, and stay up as long as he likes, but he may not leave the locality. Other gliders are launched, and come and join his thermal, and then wheel away and vanish into the distance, calling back later from Cornwall or Belgium, or visiting and photographing some point several counties away and then returning, to dive over the airfield in exulting speed.

The New Pilot circling up in thermals over the familiar ground may feel that he has been forgotten, but this is not so; the instructors have been watching him, to see whether he has learnt to find and use thermals properly, and whether his approaches and landings are getting really accurate. For cross-country flying in gliders is far removed from the same thing in little aeroplanes, with an engine to pull the pilot along, and a large and well ordered airfield to land in at the far end. The New Pilot may well visualize himself sailing silently from cloud to cloud until he arrives in the early evening at the last point of land when he finds a large field conveniently situated beside a telephone and a pub. But this is far from the truth, as the instructor well knows, and so he watches his pupils to see when they are ready for the great adventure, and for the first time it is just this.

Let us go with a pilot on his first cross-country in imagination and see what happens.

First of all he gets briefed, mainly on how to choose a field, and then on how to use the weather on the particular day. What was it the instructor said. . . ?

'For your first few cross-countries you must allow yourself enough height to choose a field and make a safe landing. Whenever you get as low as 2,000 feet above the ground you must ensure that you are flying within reach of good fields, when you are down to 1,500 feet you must choose a field, and when you get down to 1,000 feet you must forget about trying to stay up,

79. *It is a fine sunny day with good thermals and puffy cumulus clouds, so having got out their Eagle glider Ann and Lorne plan their route on a map.*


80. *It is usual practice to pre-declare the hoped-for destination, or turning points, not only in case the flight can be claimed as a record, but because it is more fun trying to get somewhere in a glider, and not just to drift where the wind takes you.*


81. *Parachutes on, and nearly ready to go. The glider will be towed up to 2,000 ft. by the tug aeroplane, and then released to venture on its way alone. The excitement in gliding lies in not knowing where you will land. In some strange field, among strange people . .*

*82. Up into the cumulus, climb through the damp dark depths and up, up, out into the sunshine at 8,000 ft. and then setting course towards the next great mass of cloud.*

and concentrate on landing in the field. Remember that your altimeter will only show height above sea level, so allow for the height of the ground below you, and use your own judgment. Remember when selecting fields that you can fly approximately 4 miles for every 1,000 feet of height you have, with nothing for the last 1,000 feet. Don't forget that you must land into wind, so watch out for indications—smoke is the best, cloud shadows moving over the fields gives an approximate idea only, and washing on the line is unreliable. Before you take off, try and remember where the wind is in relation to the sun, and then if you can find no other indication, you can use this.

'Now for the field. Remember the three "Ss"—Slope, Size and Surface. *Slope*. Do not try to land downhill, you will never reach the ground; streams are the local lowest points so never land towards a stream; approach over it and land in the field on the far side. Fly round the field and try to get an idea of the lie of the countryside, and find a field which is level, or runs slightly uphill into wind.

'*Size*—is it big enough? You really want about 300 yards to begin with,

*83. The glider pilot studies such dull-looking fields as these with great interest and care. Are they of grass or corn? Or do they slope? Are there telephone wires along the boundary? Or electric fences? The big field containing the old chalk quarry is over 300 yards across and would be easy to land in from any direction. The field in the foreground is corn which should be avoided. The glider actually landed in the small centre field with the pen in it, which is 125 yards across from the near corner, because the cameraman was standing there.*

and more if you are coming in over tall trees. Try to get an idea of the size of the field by comparing it with other objects—telegraph poles are usually 60–80 yards apart. Watch out for power wires. Do not make an approach over or under them, although it is all right if they cross the far end of your field, as you will have landed by then.

*Surface*—what is the field made of; fresh plough, potatoes, and heather-covered moorland should be avoided like the plague. Harrowed and stubble fields are smooth and no harm can be done to the crop. Grass fields are the best, but if possible, avoid those with stock in them. Landing in tall corn will damage both the crop and the glider, and watch out for barbed wire and electric fences stretched across grass fields.

'Make an ordinary approach into the field using plenty of airbrake to get you low enough as you cross the boundary, and aim to touch down one-third of the way up the field. After you have landed, park the glider with the parachute in its bag on the wingtip, find out who the farmer is and if cattle are going to be put in the field, and then go and telephone the Club, giving the full postal address of where you are. Remember that cows eat gliders, and to shut the gates after you. The farming community has a heart of gold, and it is up to you to be helpful and polite, and remember that you are—after all—an uninvited visitor.

'Remember, don't forget, remember, remember. . . .

'Now, today you will be going away for the first time, you have learnt about landing in fields, so we will just consider what you are trying to do today. The wind is easterly, but as it is very light I am going to suggest that you try to fly a triangular course so that you can land back here and save a long retrieve. The total distance round is 40 miles, so each leg is roughly 13 miles. Your turning points will be the disused aerodrome at Worthy Down and the little town of West Meon on the South Downs. Cloud base is about 4,000 feet now, but do not set course until you are above 3,000 feet. Remember to set your altimeter at the height here—600 feet, and draw the triangle on your map. You can have Redwing as soon as it lands, and launch by aerotow, and don't forget to tell the tug pilot to drop you off at 2,000 feet over the middle of the field.

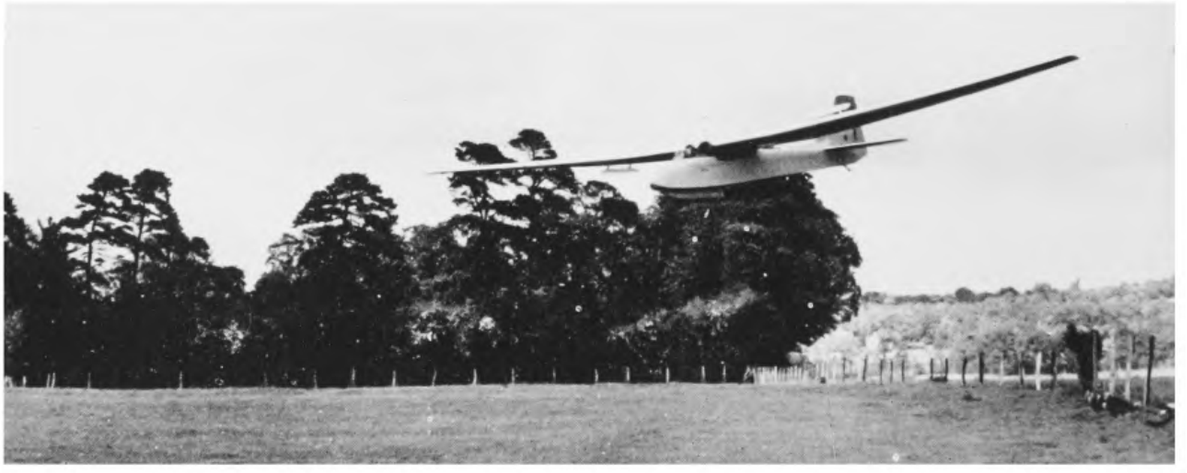
'Don't forget—remember, remember. . . .'

Redwing lands, and the New Pilot climbs in, hardly believing that the moment has come at long last. He tucks the map down beside him, and checks his controls and instruments. The tug taxies up, the thin nylon rope is hooked on and before he has time to think, he is off, climbing slowly away behind the tug. The first few hundred feet of the tow are rather turbulent, but the New Pilot, who is called Bob, doesn't mind as he hopes this is a sign of thermals to come. Above 1,000 feet he has time to look around at the ground—visibility about 15 miles, and at the sky—plenty of puffy cumulus, with patches of deep blue sky, and the sun hot on his face through the perspex. Gently the aeroplane turns, and swings lazily over the field, with the glider formating 200 feet behind, on the end of its rope. At 2,000 feet Bob pulls the yellow release knob, and lets the glider slow down to its normal cruise speed of 40 m.p.h. and looks around. The tug pilot has left him right underneath the dark base of a cloud, and in lift—yes, the variometer is showing 8 feet per second rise. Quick, start circling before the thermal

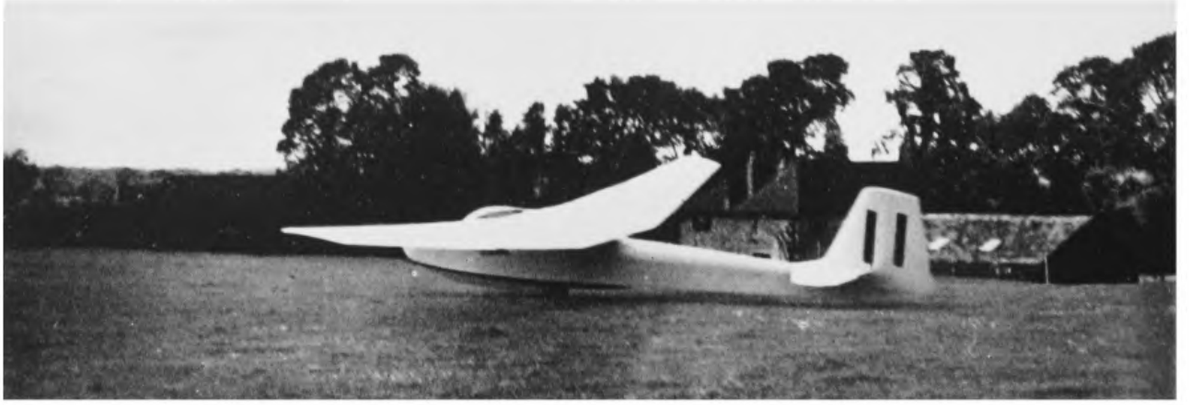
*84. When the glider pilot can find no more invisible thermals to help him silently on his way, he must come down. Below, his approach will not be noticed, but from the air the pilot can see into everyone's fields and gardens, and study the little cultivated islands that people carve out for themselves. Soon he will discover who lives in some of these houses sleeping in the afternoon sun.*

*85. When a glider is as low as this, the pilot will be quite lucky if he can find another thermal to carry him back to the clouds. If an inexperienced pilot were flying, he should now forget all about soaring, and concentrate on achieving a safe landing. An experienced man, whose judgement is good, can afford to continue his search until he is lower. Here the pilot of the Beagle is throwing a last circle over the cornfield, in the hopes of finding lift.*

*86. No luck, so the glider is turned towards the chosen field. As it is so small, the pilot must come low over the fence, at just the right speed. The air brakes are open to steepen the glide and the aircraft is coming straight towards the field, without having to do any further turns.*



*87. It has crossed the fence, with safe margin, and the pilot is getting ready to check the descent, and touch smoothly on the grass. This glider has a wingspan ofnearly 60 ft. and a loaded weight of over half a ton, and yet it can be landed safely in really small places.*



*88. The moment of landing. Main wheel and tail-skid together.*


*89. And after the landing in a far strange field—what then? The glider has to be retrieved, usually by car and trailer driven by friends or partners. Strangely, to those who are unconnected with gliding, retrieves are not the tedious grinds that they may at first seem. There is something exciting, too, in setting off to search for a glider, and a great sense of companionship exists among pilots and crews, who, of course, change places when it is their turn to fly.*

*90. The first thing is to park the glider. There are no spare tyres in strange fields so the parachutes are laid carefully on the into-wind wing instead.*

vanishes. Bob banks the glider over to the left and begins to fly steadily round and round watching the little green ball. It flickers down and sits resolutely at the bottom of the tube taking Bob's spirits with it. He does another circle for luck, and the green ball pops up again and this time stays there. Hardly daring to breathe he circles carefully, flying as accurately as he can, and soon finds the altimeter showing 3,000 feet. He is free to go on his way, but the base of the cloud is still high above him, so he continues to circle, glancing at the ground below, and noticing that the home field is still within reach, and that he has drifted very little. Four thousand feet and nearly at cloud base. Then what, which way has he got to go? Hurriedly Bob looks around and finds the countryside quite unfamiliar. In a panic he looks for the home field and then for a big country house away to the south-west—the pointer to his first turning place. He can see it quite easily now because he has re-orientated himself on the airfield, but this moment gives him his first twinge about the perils of getting lost.

Suddenly the ground disappears, and he is enveloped in a clammy grey fog. Panic! he had forgotten he was getting near cloud base, and has got sucked in. 'Remember, don't go into cloud.' Open the airbrakes and dive gently out. It seemed ages before Bob burst out of the bottom of the cloud into clear air with the ground gyrating round him, but in reality it was only a few seconds. Now he has to look for that old building all over again and decide which way to go. And then he must search for more lift. Fortunately sitting astride his intended line is a beautiful cumulus, dark and flat underneath, with its white top rounded and sparkling in the sun. Underneath it there is lift, just as the book says, and Bob circles round and round and is soon back at cloud base. In the last few circles under the shadow of the mushrooming vapour above him, Bob looks for his home field. It takes him a long time to spot it, because it is far away, absorbed back into the random pattern of the ground, and it is out of reach. The realization that he is now dependent only on himself comes to Bob as a moment of fright, and he hastily surveys all the fields immediately underneath him and is convinced that they are all too small. He is sure he could never land in any of them. Then common sense returns. Remember, the instructor said 4 miles a 1,000 feet, with nothing for the last 1,000. This means he can go at least 12 miles before he has to land, because he is at cloud base 4,000 feet up. Much more to the point to look for the first turning point. Bob looks away into the distance. He knows it is the right direction, because he has remembered that he set off on course with the sun on his left, but in spite of all his searching no air-

field appears out of the haze near the horizon. Suddenly the variometer flickers, and the glider heaves gently upwards. Never waste lift. Bob starts to circle, and as the ground swings round beneath him he sees the airfield he was looking for. He had almost gone past it. In his excitement, and worry to check that it is the right airfield, Bob loses his thermal, and no amount of wandering about gives him any indication of where the elusive wisp has gone to. However, there is little doubt that he has definitely got there, and still has 3,800 feet in hand. So turn on to the next leg. The direction is about 130 degrees, but the compass will not settle down. Don't forget the sun. Oh, yes, Bob turns until the sun is almost in his eyes and then looks ahead for the railway which his map tells him runs to the left of his course. It is quite easy to see, and there is even a train on it leaving a useful trail of white steam across the fields. He only has to fly a bit to the south of the railway line—and find some lift. Three thousand feet, 2,800 feet. Nothing yet, and no good clouds anywhere near. Bob looks hurriedly round. There is a good cloud behind him, but wild horses would not make him turn back now. He glides on, sinking steadily back to earth. The miniature train below is beating him, running silently on its solid reliable rails.

Two thousand feet. Don't forget. You should be in reach of good fields. Yes, there seem to be masses of them.

One thousand eight hundred feet. Calm air and West Meon can be just seen ahead, in a little valley in the Downs.

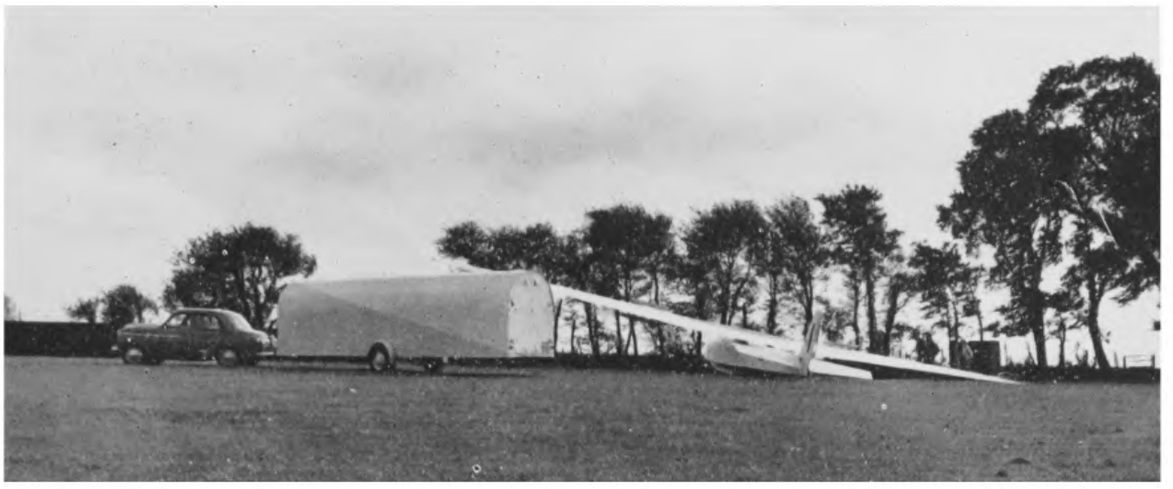
One thousand seven hundred feet. The glider gives a sudden tremor and then flies calmly on; another one, this time accompanied by some turbulence in the air. Bob looks at his variometer. The red ball has dropped down, and the green ball is starting to jump about. Carefully he starts to circle, almost holding his breath, and with his eyes staring at the mesmerizing green ball. Very slowly the glider gains height, creeping away from the ground, but also drifting away on the wind. On this leg the light northerly wind is across his path and irrevocably the glider is moving away with it. Bob does not leave his thermal and just has to put up with the fact that he is losing ground, and getting farther and farther from his destination.

At 3,000 feet Bob decides to leave the weak thermal, even though he has not reached the clouds, and set course back to West Meon, which he can only just see under the shadow of another cumulus. On his way he has a brief moment to look around, at the grey-green earth dappled with dark woods and purple cloud shadows, and at the clear deep sky with its bright clouds, while to the south lies the silver line of the sea, and the grey hump of

*91. Now to telephone back to base, and tell the crew where you have landed. The Beagle carries its own purse of telephone money.*

*92. Sometimes the glider lands in apparently uninhabited country and the pilot spends his time waiting for the trailer and searching the glider and his pocket for scraps of chocolate which may have been mislaid. This time Ann and Lorne were lucky and the delightful people who owned the nearest house produced most welcome tea for their uninvited guests. Those who think that the country has gone to the dogs should fly around in a glider for a while. They would soon discover how many kind, helpful and able people still exist.*

*93. At last the trailer arrives. Malcolm drives through the field gate. The partners designed and built this trailer themselves in nine weekends. It is painted pale blue and cream like the glider.*



*94. Now for the de-rigging. In eight minutes the crew should be ready to leave.*

*95. In one minute the tailplane is off, and on its way to its special rack in the trailer.*

*96. The cockpit cover comes off, aileron and air brake control disconnected. All the partners know the drill, so work proceeds smoothly.*

the Isle of Wight. In the silence of a glider the beauty of the scene goes amost unnoticed, because there is so much of it. The pilot is surrounded by colour, light and shade, and like the birds has the power of almost infinite movement at his fingertips. At this moment, however, Bob merely glances at the magnificence of the summer scene, and tries to make up his mind what is the best thing to do next. Away to the left is a cloud, but to go for it will take him even farther back than he is now. Ahead is his turning point, and straight for this he decides to go.

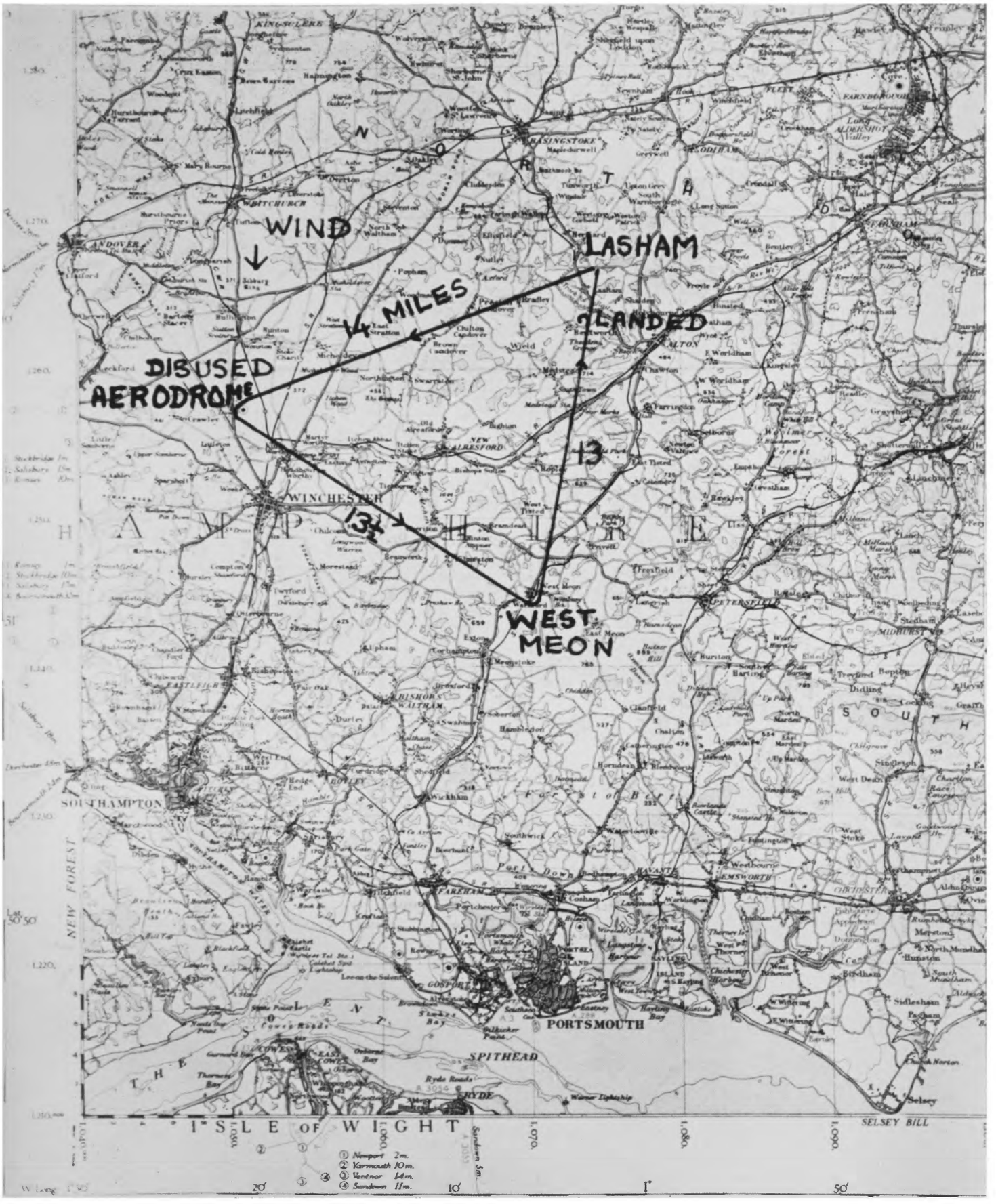
He still has 2,200 feet when he gets there, and makes a quick turn round the little town, peering down into the market place where hundreds of tiny beings throng the shops. Quite a good place to find a thermal. And it is. Once again the live bubbling feeling in the air, and the variometer showing rise. Bob starts to circle, and in the strong lift, scented with a mixture of vegetables and hot streets, the glider climbs once again into the cool sweet air. No one on the ground has seen the glider, or knows that someone has been peering down at their ant-like activities.

The problem now is to get home. Turn so that the sun is behind the tail and try to pick up the valley which curves through the county from Winchester to Alton, some 4 miles south of the Club field. Three thousand six hundred feet and only 12 miles to go. In spite of the slight headwind on this leg 4,000 feet should be enough height to get home even with no more thermals.

Bob sits back, sighs deeply, and wriggles his cramped bottom in the hard seat. His shoulder harness is tight and after an hour and a half beginning to dig into him. He unwraps a barley sugar and puts it in his mouth, pushing the paper through the little window, where it is immediately whisked away.

Three thousand feet, and the gliding club is still invisible in the haze ahead. The glider doesn't seem to be getting ahead very fast, and Bob increases the speed to 50 m.p.h. to cover the ground better.

Two thousand five hundred feet and Bob decides that he has spotted the gliding club site with its big wood on the north side. It seems an awful long way away, and quite impossible to reach. If only a thermal would put in an appearance. Bob searches the sky and sees two magnificent and growing cumulus, one away to the left and the other to the right. Without thought he turns towards one, realizes it is too far away and turns back towards the other, which is also out of reach. As he wavers about on his course, Bob tries to unfold the recalcitrant map to locate his exact position so that he can try to calculate again whether he will get home without further lift or not.




*97. Sketch map of Bob's cross country.*

*98. The wing is in three pieces. Only five minutes have gone by, and most of the glider is inside. Surprisingly, there is still room for the fuselage.*


*99. The tail-skid slides in along tram lines, the vertical support has tracks too. Seven minutes have gone by, and one minute is left to shut the doors, and have a good look round and see that nothing has been left behind.*

*100. Elizabeth, who also came along on the retrieve for fun, makes sure that the gate into the field is left properly shut.*

strange field after all, and the chance of reaching home.

One thousand two hundred feet and the airfield still looks too far to reach, but only just. If only there was some lift. Again Bob searches the sky, but the cumulus have drifted away. He deviates to fly over a sunny hollow on the ground, but no luck.

One thousand feet. 'Forget about staying up and go and land.' But where? Is it possible to get back to base? 'Don't forget,

Bob decides that it is still on, but only just. He is flying very carefully now and can see the airfield quite clearly, but his height is down to 1,700 feet. One thousand seven hundred feet! 'At 2,000 feet be in reach of good fields.' Hastily Bob looks round and then breathes a sigh of relief. The fields are huge.

One thousand five hundred feet. Decide on one of them. But which one. That one over there has power wires across it—no good. This huge one has a stream running into a pond at the end, so it slopes down—no good either. One thousand four hundred feet. Hurry up. What about the big one about a mile this side of the airfield—ought to be able to reach that all right.

Bob flies on, his speed wanders a bit, as his concentration flits between the possibilities of having to land in a

*101. And now to return home, final thanks to their hosts, into the car, and away.*

gliders get broken by pilots leaving their decision to land until too late.' Nine hundred feet. Near panic. Bob studies the big field he has now reached. It is grass, with low hedges all round. No road, or telephone, but don't bother about things like that. It's a good field, just the job. Bob takes another look at the airfield, it is less than two miles away. Surely it is possible to get there. It must be. Bob turns towards it, but doesn't make much headway. He increases speed again, but only seems to come down faster. His eye catches some smoke on the ground, which is streaming along—obviously the wind must have got stronger. Back to the field. Bob turns steeply, but feels happier now he has really decided what he is going to do. He flies down one side of the field looking at it and trying to think of what he has forgotten. Downwind of the boundary hedge he turns across wind, ready to turn in for the final approach. That's funny, he is much higher than he expected to be—airbrakes out—quick. Bob fumbles with the lever, his fingers tripping over the map left carelessly across his knee. Roughly he jams it under his legs, and opens the brakes with a jerk. The glider sinks down, and the point has come where he must turn in, but even with brakes he is still too high. Quickly Bob closes the brakes again, and flies on to the end of the field, turns back again, and beats along the same path, this time with the brakes partly open all the way. Speed? Don't forget to increase speed for the approach. Remember, it is easy to stall on the approach. Watch out for electric fences. Remember. . . .

Now, turn in *now*. Open the brakes fully, keep plenty of speed near the ground—now hold off.

The glider bumps gently to rest, and for a moment Bob sits in the cockpit, looking at his right hand—crooked from gripping the stick, sweaty and rather dirty. He is cursing himself for having failed to complete the flight, but is overwhelmingly relieved that he has now proved to himself that he can land in a strange field. He undoes the canopy catch and swings the cover open. There is a wonderful scent of warm hay and fresh grass. This little flight, insignificant and to some extent a failure, is to Bob the most exciting thing he has ever done. He now knows that this is what he wants to go on doing—if possible for ever.

*Chapter Seven*

# GLIDING CLUBS

*Clubs — Accommodation and food — Costs — Safety — The British Gliding Association — Help by members — Private owners — Numbers of clubs*

In this country gliding is carried out almost entirely in clubs. This is not a result of deliberate organization but because gliders cannot get into the air by themselves. It is just much easier to fly your glider where there are other people who know about gliders and who also want to fly them.

A few gliding clubs fly every day, but the majority operate only at week-ends, except in the summer when there are beginners' courses. Nearly all clubs have bunkhouses and provide meals, although in the little clubs this may well consist of a huge 'fry up' at breakfast time, and another in the evening, with hunks of bread and cheese at midday, all done by the members themselves. Gliding club bunkhouses are not renowned for their comfort or warmth, but as sleeping is of little consequence to the enthusiastic pilot, they are adequate enough. Even if he does not want to get up at six a.m. to fly himself, he will be inevitably woken up by others who do. Anyone wanting greater personal luxury, or longer in bed, can always provide himself with a tent or caravan.

Gliding is a sport which is demanding on time, and dependent on the weather. It is no good arriving at eleven o'clock in the morning and expecting either to get plenty of lessons or to make a record distance flight. There is much to be done before flying can start, and as this is mostly carried out by the members themselves, they must be on the spot.

Gliding clubs have had bunkhouses since gliding began, and members have gone gliding, not for a day, but for the week-end, arriving if possible on Friday night after work.

Accommodation and food is usually cheap, half-a-crown a night, and an average of half-a-crown a meal. Pilots who belong to a club which flies every day often spend their holidays there. It is cheap, they can fly, or help others to fly, and they meet their friends. A big club is almost a little world in itself. There is a tremendous coming and going of people, and since

*102. Some gliding clubs are on large flat aerodromes, but some are sited in beautiful hilly or wooded country, with just a large field to fly from, and quite apart from the silent floating gliders are delightful places.*

*103. Some clubs have fine new club houses, but others have only a wooden hut, but whichever it is, the same friendly spirit exists, and anyone joining a gliding club is sure to make plenty of friends.*

*104. Some members have their own gliders, and owing to the freedom from governmental control can improve their aircraft without getting involved in a lot of paper work. Here John and his partner Steve discuss the best position for fitting radio in the cockpit.*

shaving soap, postcards, and meals can be bought it is not unusual for a holidaying member to find that he hasn't been off the airfield for a week, except perhaps to retrieve a glider which has landed in a field.

The only really difficult thing to do on a gliding field is nothing. Just try lying in the sun for half an hour, and see what happens. 'The winch driver's been "on" since before breakfast, and is hungry, can you relieve him?' 'We're just going to turn out the aircraft workshop—give us a hand.' 'Can

you dig—we simply must drain that bog outside the hangar door,' or simply, 'Don't just lie there, DO something.'

If all this sounds like desperately hard work, or living earnestly, I have given the wrong impression. Gliding requires a great deal of serious competence from the people who are operating the aircraft, but it is also great fun. The fresh air, exercise, and the flying itself, produce a wonderful atmosphere of light-hearted enthusiasm and above all friendliness, and although the candour with which people speak to each other may occasionally alarm a newcomer, he will soon find that he is accepted at his face value and he has made a lot of new friends.

The biggest item of expense on joining a gliding club is the initial entrance fee and the subscription. These amount in the first year to some £10–£12. Having paid out this sum, the pupil will be relieved and often surprised to find that his flights only cost about 4 shillings each. The reason for the high initial charge and the low flying fees is to discourage from joining those people who are not really interested, and to encourage the keen member who wants to get in as much flying as possible once he has started to learn.

Pupils under twenty-one must have their parents' consent before starting to fly, and although they can join the club at any age, they may not go solo until they are sixteen. There are quite a number of pilots who are still at school, and there are flying courses run for scouts and other such groups. One of the first things that many parents ask is 'Is it safe?' Of course nothing in the world is really safe, but gliding is certainly not dangerous. For example, the biggest centre in the country has not hurt a pilot or passenger for ten years, and in this time has done 100,000 flights. Gliders occasionally get broken, but the pilot rarely gets hurt. This safe record is achieved, not by large numbers of rules, regulations and licences, but by the strong sense of self-discipline in the clubs themselves.

There are no licences for pilots, no medicals, and no registration for gliders. The administration of gliding is done by the British Gliding Association whose executive council is composed of representatives of the Clubs. This body, whose members fly regularly at week-ends and sometimes in the week as well, produces recommended practices for safe operation, proficiency examinations for instructors and airworthiness standards for the gliders. It gives full responsibility for safe flying to the Chief Flying Instructor of each Club, because it considers that the man on the spot understands the local problems best, and has every interest in keeping the gliders in his charge un-

damaged. The C.F.I. trains his own assistant instructors, and this group of members teach the newcomers what gliding is all about.

I said earlier that much of the work of the club is done by the members. To begin with the new pupil will spend a great deal of time between flights pushing gliders about on the ground, or signalling or keeping the log sheet, but as he gains experience, and proves himself to be a responsible person he will graduate to driving the winch or tow car, inspecting gliders for air-worthiness before flight, doing repairs and maintenance on the aircraft, and then to carrying passengers himself. By this time he will probably have a silver C which is the international certificate proving that he has made a cross-country flight of 32 miles, climbed 1,000 metres, and made a flight of five hours. At this stage he may do one of two things; become an instructor and take on his share of teaching the beginners as he himself was taught, or going seriously for high-performance soaring, which means he will very probably become a private owner.

At today's prices it is necessary to be very rich indeed to own a glider completely, so most gliders are owned by small groups or syndicates. This has the very real advantage that if one pilot flies away there is a partner to retrieve him. After the rather hectic existence as an ordinary club member, trying at the same time as everyone else to get the best glider on the best day, joining a syndicate seems rather like a rest cure. It is very nice indeed to have a glider with all the instruments in the preferred position, and from which no one has pinched the cushion, and to be able to tow this shiny bird to the launching point and leave it sitting idle and parked until the weather improves and the thermals are popping. There are all sorts of syndicates, varying from the rich man's toy glittering with every device, and towed in its enormous trailer by an even bigger car, to the third-hand glider worked on and loved by a group of students, which travels on the ground enveloped in a cloud of blue smoke behind a wheezy and ancient motor. Perhaps the time when the private owner gets the most fun from his glider is at the National Championships. It is usually his annual holiday as well, and so he is going to enjoy it. The glider is polished until it is like a mirror and when the gang sets forth for the competition site an observer could easily mistake it for a transcontinental expedition, laden with camping equipment, spares, tools, and the pilots, and family or friends, and a vast amount of miscellaneous junk.

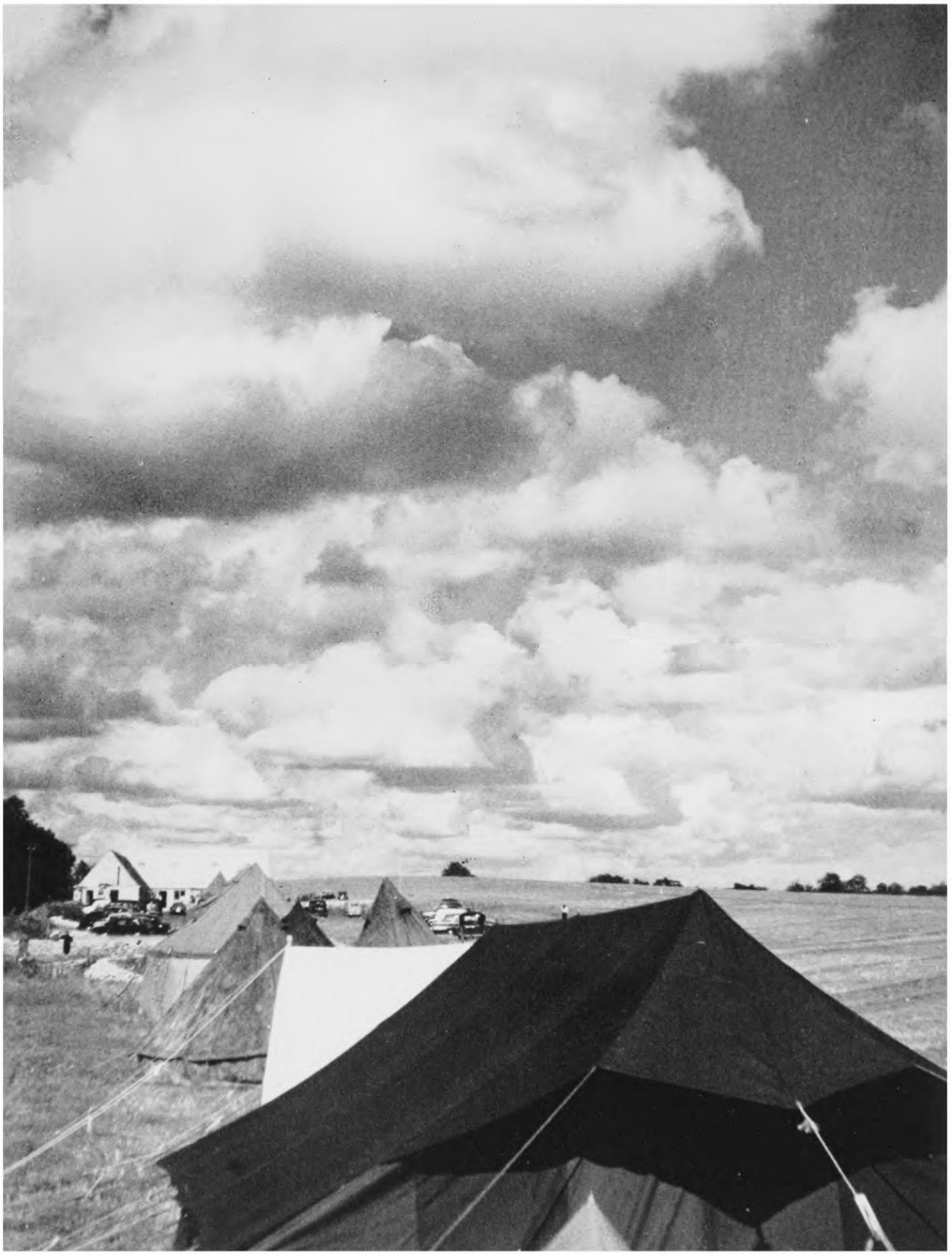
Of course it is sheer nonsense to imagine that flying in the Championships is going to be a holiday; quite apart from the flying there are long-lost

*105. But members work for the club as well as for themselves. Here Tom is fixing stakes into the ground so that the trailers can be moored and will not be blown about in strong winds.*

friends to talk to, and all-night retrieves after good 'distance' days. By the time the pilots return to work they are more in need of a holiday than when they set out—but they would not have missed it for the world.

Back at the club the same routine goes on—new members start flying, the winches break down and are mended, the club's committee has its monthly meeting and deliberates for hours on the state of the hangar roof or what sort of weak links to put in the winch launching cable. While in the bar one of the instructors is trying to find how many would like to get up to fly before breakfast.

There are some thirty-five gliding clubs in the U.K. scattered from Aberdeen to Cornwall. The biggest one—really an agglomeration of clubs—has between six and seven hundred members, and some thirty gliders flying from the site. Others have two gliders and one well-worn winch, but in every one of these is the same idea—to get as much flying as possible, as cheaply as possible. Everywhere there is the same enthusiasm, and the same desire to explore the air, and to find out something new about it, not so that gliders can be turned to commercial use—the thought horrifies—but so that pilots can fly farther, or higher, or faster—just for fun.



*106. The fields are empty of gliders, the tents of people. There are only a few spectators left with nothing to see but the sky. But in those clouds, whose shadows dapple the whole of England, are the gliders, and on the road beneath are the trailers and crews in their cars with maps and sandwiches. The task for the day is Distance to Yarmouth, 180 miles away on the East coast from the Bristol Gliding Club site at Nympsfield.*

*Chapter Eight*

# COMPETITIONS

*Popularity of competitions—Rules—Championship classes—Briefing and meteorology—Take off—Work of the crews—Friendly atmosphere*

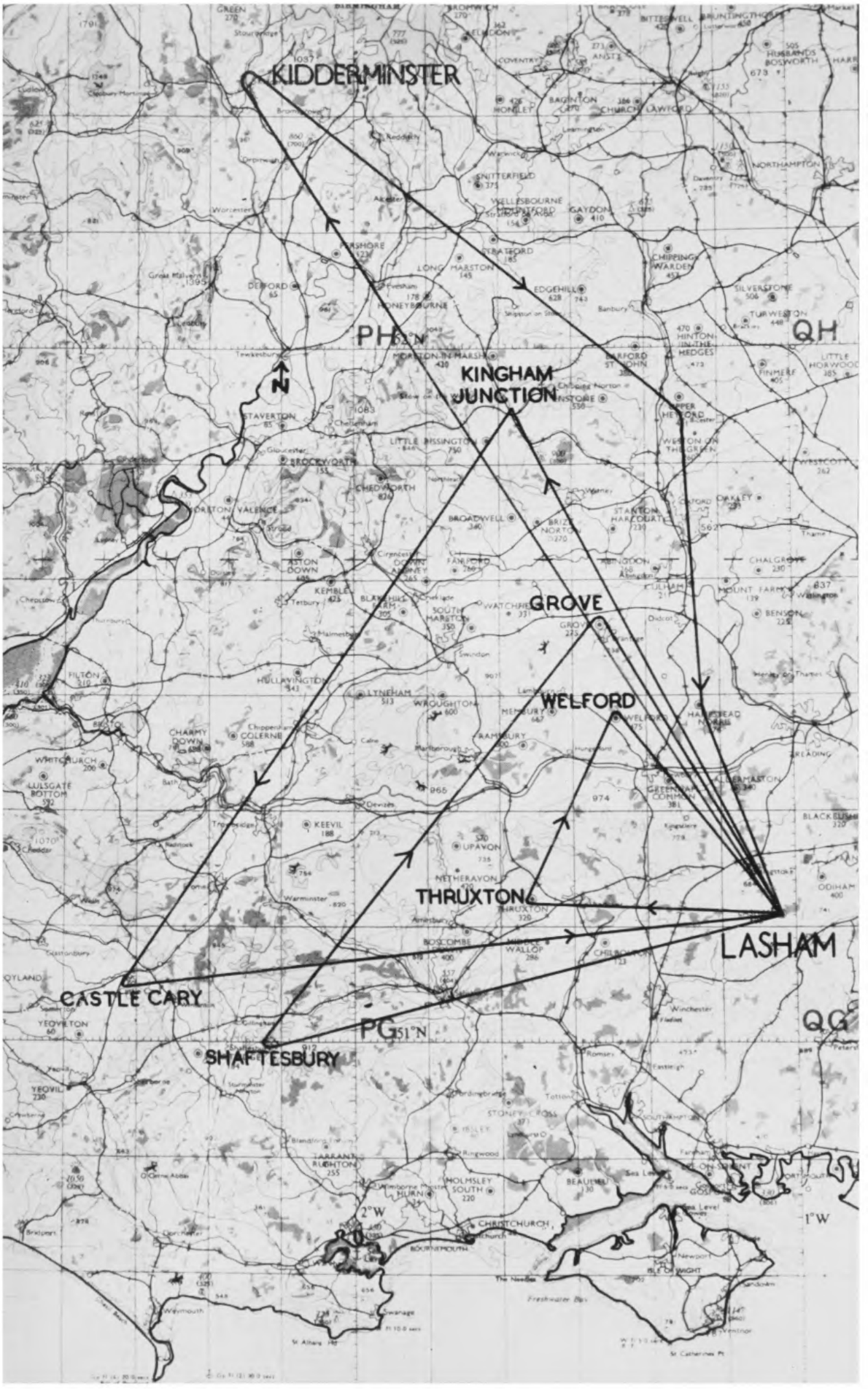
Unlike football or cricket, which are competitive sports in that they cannot be practised without opposition, gliding is essentially individual. Most of the greatest soaring flights have resulted from the planning and flying of a single man, who has set out on his own, whether it be to try to fly the greatest possible distance, or investigate the possibilities of one of the big wave systems.

In spite of this, gliding competitions are increasingly popular, and attract large entries, but not wholly because pilots want to beat each other. Firstly, competitions are fun because of the opportunity they provide for getting together with other glider pilots and comparing experiences and funny stories. Secondly, and much more important, gliding, or rather soaring, unlike most other sports is almost impossible without skill, and even when skill is obtained, it is restricted by the weather to perhaps a few hours on good summer days only. The tyro can have fun falling about in the snow on skis, and the beginner can sail on a lake and have fun with very little ability, but the glider pilot without soaring skill sinks straight back to the ground.

It is therefore essential that the glider pilot develops his skill to the highest possible pitch, if he is to be able to enjoy the soaring weather to the full when it comes.

Competitions today consist of set tasks which the pilots have to attempt. One task is set each day either for distance or speed. There are no tasks, and no marks for height or duration flying.

Competition flying puts a great premium on high cross-country speeds—40 m.p.h. average being quite common—not only when the task is a race to a fixed goal, but equally when the task is Free Distance, since the pilot who can keep up the highest average speed will be able to fly farther in the hours of soaring weather available.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KINGHAM JUNCTION
GROVE
WELFORD
THRUXTON
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CASTLE CARY
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51°N
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## COMPETITIONS

The best possible way for an indifferent soaring pilot to improve his skill is to fly against the experts in competitions. To discover how they manage to find and use thermals, and to see how far short his own performance falls of the winner, and to talk to the pundits afterwards and find out how they managed where he failed.

The general rules of gliding competitions are agreed internationally, but the organizers of National Championships or local rallies can modify them in detail to suit their own requirements and to try out new ideas which may eventually be adopted for World Championships.

One of the best things about gliding contests is that there are no amateur versus professional problems. Each country, or each club, enters its best pilots and they fly against each other equally regardless of their background, and regardless also of their sex, because men compete equally with women.

In the past there have been separate classes for single-seaters and two-seaters, but this has now been eliminated. It may be thought that such variety in the entrants might give an unequal competition, but this is not so. Most results today show very close finishes in spite of the difference in aircraft. This is because the pilot is still more important than his machine, and among the top pilots the standard of soaring skill is uniformly very high, whether they fly for fun, or do it professionally.

If the entry for a competition is very large, it may be necessary to divide the competitors into manageable groups. In World Championships, where the standard of the pilots is very high, an additional class, having its own contest, has been introduced, which restricts the cost and size of the glider. This is intended to encourage the production of good aircraft, the price of which will remain within the reach of private owners, clubs and small nations. In National Championships it is more practical to divide the competitors on a basis not of aircraft but of pilot skill, because in these contests there will be pilots training seriously for the next Internationals, and those who have just gained their silver C's, and who are competing for the first time. With two classes, one for the experts and one for the newcomers, or

*107. Training for Championships. During April, May and June 1957 Tony Deane-Drummond broke four United Kingdom records while practising for championship flying. His flights are shown here, all goal flights, as the turning points and destination were declared beforehand. They are the 100 km. Triangle at an average speed of 32 m.p.h., the 200 km. Triangle at 37·84 m.p.h., and the 300 km. Triangle at 32 m.p.h. The Out and Return record distance was 316 km. As will be seen from the map his return journey was affected by an increasingly strong west wind, against which he had to fight.*

*To give a further indication of what gliders can do today, Nick Goodhart flew a total of 1,000 kms. across country without ever having to land away from base in 1958.*


*108. Waiting for the start. The crews have rigged the gliders and the pilots are at Briefing, where they will be told the task for the day, what weather to expect, and details of take-off, starting lines, etc.*

*109. Training for World Championships takes every spare moment. Not only entering for National Competitions and task flying rallies, but thinking, working out improved techniques, and planning. Nick, placed 2nd in the World Championships, Poland, 1958, studies his route before take-off.*

*110. Each glider has a competition number. These are fixed on the underneath of the wing and on the rudder, so that the glider can be identified from the ground at turning points.*

those whose object is primarily to have a good holiday, it is possible for the task setter to give difficult flights to the top class, and suitable tasks for the second group so that they have the sort of flying they want, and that they can cope with.

National Championships in England are run by one of the clubs, under the authority of the British Gliding Association. The organizers are club members, volunteers who give up all their spare time for months beforehand to make the event a success.

The competitions usually last nine days, and during this time the gliding field becomes unrecognizable, dotted with eighty or more brightly coloured gliders, with their trailers and crews, and ringed with dozens of tents and caravans.

The day starts early, even though for many it is their annual holiday. About 6.30 a.m. most people are in an active state of getting up, walking


*111. In Poland the gliders of twenty-two nations line up for the start, and by evening fifteen of them were 300 miles away near the Russian border. From all over the world pilots had come, some with their own equipment, and some to fly gliders borrowed from their hosts. On rest days pilots and crews would have parties and talk together— Argentinians, Finns, New Zealanders, British, Jugoslavians, and Hungarians.*

*112. On some days the sky is blue and hazy without cloud, and then the pilot will have no guide to where to look for the next thermal. This American Schweizer 1.26 flew* hors concours *in the British National Championships*

*113. Sometimes the sky is full of cumulus, and on a superb day such as this, the gliders will vanish soon after the launch and can average speeds of 40–50 miles an hour to their destination.*

about and talking to their friends in the early morning sunshine, during the process of shaving. The smell of paraffin stoves and fried bacon defeats the scent of the dew. Over at the trailers, crews are already rigging their gliders and laughing and talking.

At 9 a.m. comes briefing in the big tent. The task setter gives the result of the previous day's flying, and then declares the task for the day. There is a rustle of maps as pilots search for the places mentioned. Perhaps the task is 'Distance along a set line'. This means that the pilots have to fly as far as they can along a fixed course, and that they will be penalized for the distance they land away from the Line. This Line may be set at an angle to the wind, or even into wind. Alternatively, the task may be round a 200-kilometre triangle, which means that the pilots have to fly as fast as they can in order to try to achieve the best time, making a note of ground markers seen at each turning point, and then return home. As triangular flights are races, and a few seconds wasted on the way may lose the race, the pilots will start their final glide into the finishing line from as far away as they dare, and fly in as fast as they can. The end of a race is very exciting; the gliders are difficult to

*114. The glider of a British pilot in central Europe. The aircraft is almost invisible, and the pilot completely. This is typical of the end of a flight in World Championships—hundreds of children speaking a strange language—strange smells and strange food, for there is always friendly hospitality for the pilot. But the strangest thing is that when the silent glider lands, the countryside is quite empty of people, but within minutes they arrive, and always the children are first. Gliding is a wonderful way of meeting people and seeing countries. No glider lands in the centre of the city, but in the little out-of-the-way village that the tourist never sees.*

see head on and everyone on the field is waiting and watching the direction from which they are expected. Suddenly there is a shout. Everyone stares, and a few seconds later the first aircraft dives over the line, less than 50 feet up and doing over 100 m.p.h. Then it climbs and turns, with the sun shining on its wings, and opens its airbrakes and lands.

But to return to Briefing. After the task has been declared, the meteorologist gives his assessment of the weather for the route, the strength of the wind, how strong the thermals are, and any changes which are likely. Immediately the met. man is questioned in great detail, so much so that he obviously needs to be a soothsayer as well as a meteorologist.

Finally comes the chief marshal, who explains the launching layout, the location of starting and finishing lines, and anything else necessary to ensure safety on the field.

Instantly this is over there is turmoil. Pilots rush out to put their numbers on the starting board. Crews go off at the double to get the gliders out to the launching point, and the task setter sits back wondering whether he has chosen a flight which will allow competitors to make the best use of the day, or whether he has made an awful mistake, and set the wrong task.

Soon the cumulus appearing in the sky show that thermal activity is beginning, and the first gliders are off—towed up to 2,000 feet by aeroplane, and released over the field. If the conditions are good, spectators will soon be disappointed, as the gliders will soon merge with the depths of the blue sky and rapidly vanish. If, however, the air is fairly stable, there will be the fascinating sight of perhaps twenty or thirty gliders all trying to stay airborne, and circling together in some patch of weak lift, like a host of coloured tropical birds. Although a single glider flying over 200 feet up is virtually silent the cumulative effect of many gliders flying together is considerable. A strange, although faint, moaning sound reaches the ground, which is quite eerie to someone not used to it. Imperceptibly these gliders, too, will vanish, and the race is on. It is difficult to believe, when watching gliders circling lazily about, that the pilots are impatiently trying to save every second, in order to get the greatest possible distance or the fastest time from the flight.

If the task is Distance, the crews will hitch up the trailers on to their cars, wait perhaps for an hour in case their pilot has landed short, and then drive off after him. Every hour they will ring back, and if nothing has been heard drive on. A good crew will somehow contrive to keep within two hours of its pilot, even without radio contact. Sometimes, though, the pilot decides to alter course and keep to the better weather, and the crew continues along the old prearranged route, and may have to back track hurriedly on discovering where the pilot has landed. But a really good crew, used to its pilot, becomes almost telepathic in its ability to follow an invisible glider a mile up in the sky. Retrieving in competition is the next best thing to flying, and there is never any lack of volunteers.

World Championships are, perhaps, the most exciting events in gliding. The National Teams are complete expeditions, driving perhaps 1,000 miles to the country where the Championships are to be held, weighed down by spares, tools, and so much miscellaneous equipment that it seems hardly possible that the cars will pull the trailers.

The flying itself is tremendously exacting, and the crews, usually 3 to each pilot, work at fever pitch, so that he can concentrate entirely on flying. If he breaks the glider landing in a field, no one wastes time asking him what

happened, the machine is rushed off to the workshops where the entire team will work on it all night—except for the pilot who is sent to bed to rest!

In spite of the tremendous but natural desire to win the championship for their own country, there is a wonderfully friendly atmosphere among the pilots and crews of all nationalities and no request for help is ever refused. If someone breaks down on the road with their trailer, any crews passing, whatever their nationality, will stop to assist. In the evenings, or at meals, the teams will mix up, and even though conversation is carried on in several languages at once, it is not in any way stemmed by this limitation. Glider pilots, wearing the little badge of three birds, which is virtually the same all over the world, have friends in every country. Their friendship does not apply only to those who fly in International Competitions, and who know the pilots of other countries personally, counting them as long-standing friends. It applies as well to the young pilot who decides to tour Europe with nothing more than a bicycle and a soaring badge. He will probably not even have pedalled to the nearest gliding club on the other side of the Channel before he is hailed by someone who recognizes his badge, and who is delighted to meet him and talk about gliding.

# APPENDIX

The National organizing body for gliding in Great Britain is The British Gliding Association, and all enquiries should be addressed to 19 Park Lane, London W.1.

## Full Member Clubs of the Association

Air Training Corps. H.Q. Home Command, White Waltham, Maidenhead, Berks.
Army Gliding Club. Lasham Aerodrome, Nr. Alton, Hants.
Bristol Gliding Club. Nympsfield, Stroud, Glos.
Cambridge University Gliding Club. Marshall's Aerodrome, Cambridge.
Cornish Gliding (and Flying) Club. Perranporth Airfield, Cornwall.
Coventry Gliding Club. Baginton Aerodrome, Coventry.
Derbyshire & Lancashire Gliding Club. Camphill, Gt. Hucklow, Derbyshire.
Imperial College Gliding Club. Imperial College, Kensington, London, S.W.7.
Kent Gliding Club. Lympne Aerodrome, Kent.
London Gliding Club. Dunstable, Beds.
Midland Gliding Club. Long Mynd, Church Stretton, Salop.
Newcastle Gliding Club. Usworthy Aerodrome, Newcastle-upon-Tyne.
Oxford Gliding Club. Weston-on-the-Green Aerodrome, Oxford.
R.A.F. Gliding & Soaring Association. R.A.F. Record Office, Innsworth, Glos.
R.N. Gliding & Soaring Association. R.N. Air Station, Arbroath, Angus.
Scottish Gliding Union. Portmoak, Kinross, Fifeshire.
Southdown Gliding Club. Bo-peep Farm, Alciston, Sussex.
Surrey Gliding Club. Lasham Aerodrome, Nr. Alton, Hants.

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Yorkshire Gliding Club. Sutton Bank, Thirsk, Yorks.

## Associate Member Clubs

Aberdeen Gliding Club. Dyce Aerodrome, Aberdeen.
Avro Gliding Club. Woodford Aerodrome, Lancs.
B.E.A. Gliding Club. Booker Aerodrome, Marlow, Bucks.
Blackpool & Fylde Gliding Club. Squires Gate Airport, Blackpool.
College of Aeronautics Gliding Club. Cranfield Aerodrome, Bucks.
Crown Agents Gliding Club. Lasham Aerodrome, Nr. Alton, Hants.
Doncaster & District Gliding Club. Doncaster Aerodrome, Yorks.
Dumfries & District Gliding Club. Townfoot, Thornhill, Dumfries.
Halifax Gliding Club. Ringstone Edge, Yorks.
Handley Page Gliding Club. Radlett Aerodrome, Herts.
Lakes Gliding Club. Tebay Gill, Westmorland.
Norfolk Gliding Club. Tibbenham Aerodrome, Norfolk.
Northampton Gliding Club. Poddington Aerodrome, Northants.
Perkins Gliding Club. Northants. (Changing site.)
Polish Air Force Association. Lasham Aerodrome, Nr. Alton, Hants.
R.A.E. Gliding Club. Farnborough Aerodrome, Hants.
Shorts Gliding Club. Newtownards Airfield, N. Ireland.
Swansea Gliding Club. Fairwood Aerodrome, Glam.
Taunton Vale Gliding Club. Dunkeswell Aerodrome, Devon.

## World Records

### SINGLE-SEATERS

*Distance:* U.S.A., R. H. Johnson (5.8.51). 535 miles.
*Gain of Height:* U.S.A., W. S. Ivens (30.12.50). 29,100 ft.
*Absolute Altitude:* U.S.A., W. S. Ivens (30.12.50). 42,100 ft.
*Goal Flight:* France, R. Foutbiller (13.5.56), 420·6 miles.
*Goal and Return:* Poland, V. Zejda. 322 miles.
100 *km. Triangle:* Jugoslavia, J. Mrak (8.9.58). 60·22 m.p.h.
200 *km. Triangle:* U.S.A., P. F. Bikle (18.8.57). 55 m.p.h.
300 *km. Triangle:* Jugoslavia, K. Bozidar (14.6.58). 49·4 m.p.h.

### MULTI-SEATERS

*Distance:* U.S.S.R., Ilchenko and Petchnikov (26.5.53). 515 miles.

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*Gain of Height:* U.S.A., Edgar and Klieforth (19.3.52). 34,425 ft.
*Absolute Altitude:* U.S.A., Edgar and Klieforth (19.3.52). 44,255 ft.
*Goal Flight:* Poland, Popiel and Siemanskziewicz (20.7.53). 336·3 miles.
*Goal and Return:* South Africa, Dommisse and Barker (9.2.52). 271 miles.
100 *km. Triangle:* U.S.A., Ross and Jensen (14.8.58). 54 m.p.h.
200 *km. Triangle:* U.S.A., Ross and Jensen (12.8.58). 50·3 m.p.h.
300 *km. Triangle:* U.S.A., Ross and Wilson (13.8.58). 50·9 m.p.h.

## National Records

| | *Single-Seaters* | *Multi-Seaters* | *Women's Records* |
|---|---|---|---|
| *Distance* | G. A. J. Goodhart, 384 m. | Welch and Irving, 254 m. | A. Burns, 282 m. |
| *Gain of Height* | P. A. Wills, 28,200 ft. | Piggott and Whateley, 15,240 ft. | A. Burns, 16,750 ft. |
| *Absolute Altitude* | H. C. N. Goodhart, 37,050 ft. | — | A. Burns, 18,400 ft. |
| *Goal Flight* | H. C. N. Goodhart, 360 m. | Kahn and Williamson, 194 m. | A. Welch, 224 m. |
| *Goal and Return* | R. C. Forbes, 217 m. | H. Goodhart and Foster, 141 m. | A. Burns, 94 m. |
| 100 *km. Triangle* | A. J. Deane-Drummond, 47·5 m.p.h. | James and Marshall, 35 m.p.h. | A. Burns, 37·3 m.p.h. |
| 200 *km. Triangle* | A. J. Deane-Drummond, 45·3 m.p.h. | Piggott and Burgess, 22 m.p.h. | A. Burns, 25·6 m.p.h. |
| 300 *km. Triangle* | G. A. J. Goodhart, 48 m.p.h. | — | — |

## British Gold 'C' Pilots with Diamonds

### THREE DIAMONDS

H. C. N. Goodhart, G. A. J. Goodhart.

### TWO DIAMONDS

A. W. Bedford, H. Burditt, Ann Burns, A. J. Deane-Drummond, F. Foster, D. Ince, A. D. Piggott, G. Stephenson, A. Warminger, J. Williamson, P. A. Wills.

### ONE DIAMOND

S. Armstrong, Prince Bira, P. Bisgood, G. Burton, D. Bridson, F. Cretney, J. Croshaw, D. Elrington, R. Forbes, K. Fitzroy, M. Garrod, C. Green, H. Hillditch, J. Holder, G. Hookings, B. James, W. Kahn, D. Kaye, J. Mackenzie. P. Minton, J. Neilan, G. Neumann, R. Prestwich, M. Randle, L. Robertson, P. Scott, B. Sharman, E. Shepherd, B. Thomas, J. Tweedy, L. Welch.

# APPENDIX

## Glider Manufacturers

Elliotts of Newbury Ltd., Newbury, Berks. Tel. Newbury 312.
Slingsby Sailplanes Ltd., Kirbymoorside, Yorks. Tel. Kirbymoorside 312.

## World Championships

1948. Samedan, Switzerland. Winner: Persson, Sweden.
1950. Orebro, Sweden. Winner: Millson, Sweden.
1952. Madrid, Spain. Winner: Wills, Great Britain.
1954, Camphill, England. Winner: Pierre, France. 2-seater class. Rain and Komac, Jugoslavia.
1956, St. Yan, France. Winner: MacCready, U.S.A. 2-seater class, Goodhart and Foster, Great Britain.
1958, Leszno, Poland. Winner: Haase, Germany. Standard class, Witek, Poland.
1960, Butzweiler, Germany.

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