Sailplane and Glider

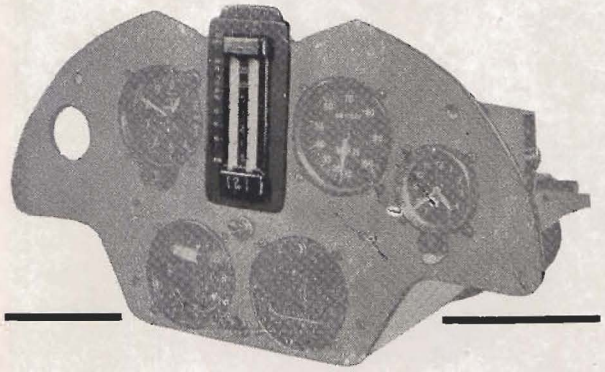
The First Journal devoted to Soaring and Gliding



MAY 1951

1'6

The
COSIM
VARIOMETER



TAKES
PRIDE OF PLACE ON ALL
SAILPLANE INSTRUMENT PANELS

COBB-SLATER INSTRUMENT CO. LTD
RUTLAND STREET - - - MATLOCK

Have you read . . .

THE TERENCE HORSLEY BOOKS

'Soaring Flight'
(EYRE & SPOTTISWOODE)
The classic English book on the subject.
16/- - *postage* 6d.

'The Long Flight'
18/- (COUNTRY LIFE)
"A Grand Book"—*Sailplane.*

•

'Gliding and Power Flying'
by 'Stringbag."
(OXFORD UNIVERSITY PRESS)
Drawings by Stanley Sproule.
A delightful little handbook.
6/- - *postage* 4d.

'Weather Forecasting'
(LONGMANS)
S.W.C. Pack.
"Invaluable"—*Royal Aero Society.*
25/- - *postage* 9d.
From "Sailplane" Office: *Cash with order.*
139 STRAND, W.C.2

SCOTTISH GLIDING UNION

BISHOPHILL AND BALADO AIRFIELD

Entrance Fee £1. 1s. : Subscription £3. 3s.

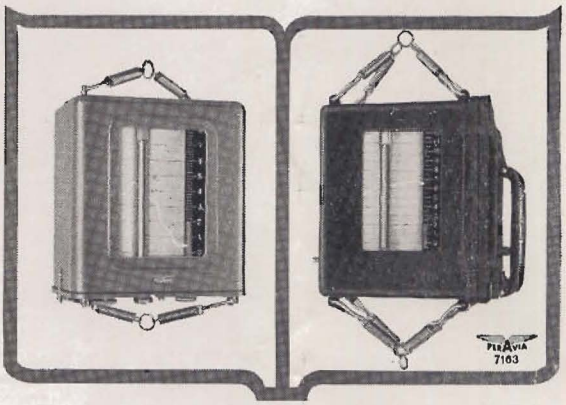
Write to Hon. Secretary:
D. HENDRY
THE SCOTTISH GLIDING UNION
BALADO AIRFIELD
MILNATHORT
KINROSS-SHIRE

Want to Fly Cheaply?

Then you should investigate U.L.A.A.

Group-operated home or factory built ultra light aircraft offer the very cheapest form of non-subsidised private flying. This is what U.L.A.A. is sponsoring, so why not find out more about this rapidly expanding national organisation?

Full details on request from: HON. SECRETARY,
ULTRA LIGHT AIRCRAFT ASSOCIATION
ROYAL AE. CLUB AVIATION CENTRE
LONDONDERRY HOUSE, PARK LANE, W.1



The famous and reliable barograph PERAVIA. *Types for sailplanes (left) and for aeroplanes (right). For details write to:*

PERAVIA Ltd.
BERNE/SWITZERLAND

Sailplane and Glider

Sailflying Sailflyer

and ULTRA LIGHT AIRCRAFT

THE FIRST JOURNAL DEVOTED TO SOARING AND GLIDING

MAY 1951 ★ Vol XIX No 5

EDITOR:
VERNON BLUNT

ASST. EDITOR:
VERONICA PLATT

PRODUCTION MANAGER:
RONALD BISHOP

EDITORIAL and ADVERTISEMENT OFFICES:
139 STRAND, W.C.2
PHONE: TEMPLE BAR 6451/2

The *Sailplane and Glider* is published on the 5th of every month. Price One Shilling and Sixpence per copy: 19/- per year posted Advertising Rates on application.

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

CONTENTS

Editorial 97

8 Miles High (Two World Records—Bill Ivans' own story) . . 98

Twenty-One Thousand Three Hundred Feet, by Martin Warner . 106

Soaring in France—' Arsenal 4.111 ' 108

Report on a Flight Investigation of Lee Wave Disturbances near Melbourne 110

Keep Gliding Safe . . . 113

Brevities 115

News from the Clubs . . . 115

Ultra Light Aircraft . . . 119

COVER PHOTO:

A Young French Pilot by Guy Borgè

Editorial

IN 1950 the A.T.C. trained 1,474 pilots to the ' A ' standard, gained 252 ' B 's and 3 ' C 's. They also carried out 105,614 launches. In the same period of time the B.G.A. Clubs made 42,232 launches, soared for 7,025 hours and gained 130 ' A 's, 392 ' B 's, 239 ' C 's, 47 Silver ' C 's and 2 Gold ' C's.

The figures for France, as given in Guy Borge's article last month were 400,975 launches, 1,640 ' B 's, 993 ' C 's, 251 Silver ' C 's and 11 Gold ' C 's besides 1,362 legs of Silver ' C 's and 62 legs of Gold ' C 's.

The above figures give rise to some startling comparisons. Whatever the reasons, there is no doubt that France is among the leading nations in the Soaring world today. The reasons are chiefly economic. After all, if our Government had chosen to use some of the funds given so generously by the U.S.A. with which to re-arm in building up the new ' Armee de l'Air ' by the gliding method, we might have expected figures of the same order in this country. Where gliding is ' laid on ' at negligible cost to the participant as the above figures show, there is no lack of interested students and pilots. Where it has to be fought for and earned, often literally by the sweat of the brow of the aspirant after soaring flight, it is not so universal. This is the case in the U.S.A., Gt. Britain, except the A.T.C., and in all the British Dominions. The subsidy in Australia and New Zealand has not yet taken effect and would have to be made much greater to be effective, or significant.

Point is lent to this statement when it is realised that about one-third of the unofficially sponsored gliding in Gt. Britain is done at the well established and get-at-able London Club.

Do we make as much use of our facilities as we might ? We are a small country, which, if it makes the distances flyable on good days, small also indicates that there cannot be very great distances between the Clubs. Last year your Editor met in Elmira, a pilot who motored 300 miles on a Friday night to Elmira, flew as much as he could until Sunday evening, and then motored back again. It is true the straight, well cambered high speed roads of New York and Pennsylvania make this less of an ordeal than it would be in Gt. Britain. No doubt there are such enthusiasts in Gt. Britain today, we know there are in the Dominions, but we do not hear so much of them now.

Still it is our opinion, for what it is worth, that the next few years, especially if there is continued mounting war preparation, will see again some such scheme as was operated before the last war, when the Air Defence Cadets were trained by the Gliding Clubs. This did the Clubs a lot of good and cost the country very little. To do as much good as was done then would require at least three times the £5,000 then spent, but with the spectacle of the £2,500,000 wasted on the Battersea Fun Fair, that is perhaps not so formidable a figure to contemplate. The figure of .01 per cent of the money wasted on the Groundnuts Scheme, would have put the British Gliding Movement on its feet.

We have done our part in bringing these arguments forward where there is most chance of success, and the news, published in Gt. Britain first in *Sailplane* of the new French power cum gliding training scheme for military pilots, we have placed before the person most able to influence its adoption here. We shall continue to press this point of view in public and in private, and in time, we are sure that some such scheme will be adopted here, to the benefit of all concerned, as the advantages of such a scheme come to be realised.

This means, of course, a remodelling of the A.T.C., but with the shortage of man power this is inevitable. The Clubs therefore can hope to play again the part they played in 1938-9, or so it seems today. Speed the day.

8 MILES HIGH

By William S. Ivans, Jr.

PHOTOS BY WARREN WATSON

On December 30, 1950, the author reported reaching an indicated altitude of 42,000 feet above sea level in his ' Schweizer 1-23 ' sailplane, after an altitude gain of approximately 30,000 feet. The flight was made in the vicinity of Bishop, California, in strong standing wave updrafts formed in the lee of the Sierra Nevada range. This flight has been homologated by the F.A.I., and has established two new International soaring records in both Absolute Altitude and Altitude Gain categories.



Bill Ivans in his ' Schweizer 1-23 ' all metal sailplane, ready for high altitude soaring. Note warm clothing, oxygen mask, ' bail-out ' oxygen bottle, emergency oxygen supply (gauge visible in rear of cockpit), double-thickness ' clear-vision ' ports in canopy

A GROUP of us had arrived at Bishop nearly a week beforehand with the intention of spending the Christmas holidays in altitude soaring attempts. Until December 30th, however, the weather proved unfavourable for soaring, though otherwise very pleasant. Marion Duiker, Irving Gere and I had

(*Continued on page* 100)

Looking south from Bishop Airport, Bishop, California, on December 30, 1950. Photo taken shortly before International Altitude soaring record was broken.

Sierra Nevada range on right, partially obscured by snow squalls. Dark clouds in centre are ' roll clouds ', 18,000 ft.-23,000ft.

Stratus above and to right of roll clouds is approx. 33,000 ft. High lenticular (with well-defined leading edge) parallels the Owens Valley; its height can only be estimated as ' over 50,000 ft." Mountain tops are somewhere over 14,000 ft.



8 MILES HIGH—continued.

driven up from San Diego, trailing my ' 1-23 ' behind Dean Morehead's powerful ' Hudson.'

GREAT EXCITEMENT

Great excitement marked the morning of December 30th ; a high white lenticular cloud and lower altocumulus roll cloud were visible at daybreak, sure signs of the long awaited standing wave. As we were hurriedly dressing, a pounding on the door announced Bob Symons, impatient for us to be off. Five minutes later, Allan Langenheim pounded at the door, with the same message. Skipping breakfast, we hastened to the airport for a check on the winds aloft. The morning pibal (single theodolite) gave the following information :

Height	Direction	Velocity
4,118 ft.	280	03 knots
5,000	220	02
6,000	170	08
7,000	160	17
8,000	170	18
9,000	180	15
10,000	180	11
12,000	220	11
14,000	350	17
16,000	350	35
18,000	340	61
20,000	340	78
25,000	350	80
30,000	260	65



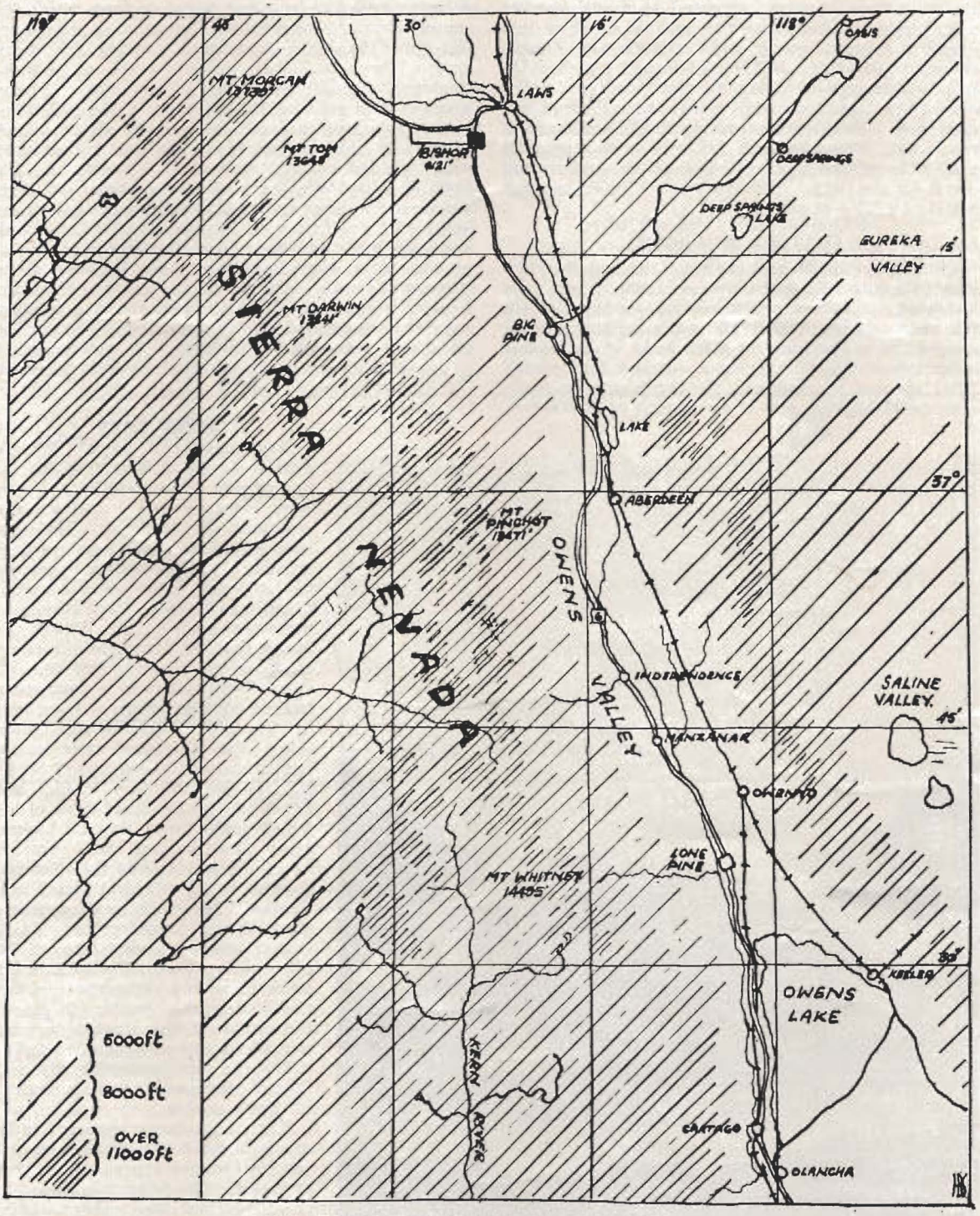
Bill Ivans' ' Schweizer **1-23** *' sailplane. Note static ' bomb '*

Certainly an odd wind behaviour with respect to direction, though the velocities were high enough.

Dave Boone, of San Diego, was the first to take off. By the time Bob Symons had returned in the big red ' BT-13 ' towplane I was sealed in the cockpit of my ' 1-23,' barographs ticking, ready to go. Bob landed, taxied to the end of the towline, then jumped out of the ' BT ' and hurried over to my ship for a last minute briefing. He reported leaving Dave in ' better than 1,500 ft./min. up,' and said that turbulence was not excessive. I shouted back through the canopy that I would call him from Salt Lake City. Bob laughed and wished me luck, then went back to the ' BT.'

THE TAKE-OFF

Take-off was at 0945, PST. The tow progressed in a southerly direction from Bishop, along the eastern border of the Owens Valley. As altitude was gained, turbulence of increasing intensity was noted, although at no time did it reach a dangerous level. When approximately 12 miles south-east of Bishop, the towplane turned into the wind, in order to pass under the largest of the altocumulus clouds, which were continuously forming and dissipating in a line along the centre of the valley.



Section of an aeronautical chart showing the Bishop area

Increasing turbulence, along with more sustained updrafts and downdrafts, was encountered during the final phase of the tow. I noted accelerometer readings of maximum positive 3½ g and maximum negative 2 g. This was a peculiar turbulence, rather like driving over a very rough road at high speed;

the individual ' bumps ' occurred so rapidly and in such random fashion that the controls could at best establish only an average flight attitude, and I began to worry about the 300 feet of frayed ¼ inch nylon which connected my ship to the towplane. The average rate of climb while under the roll cloud was quite low. Shortly after passing to the windward of the cloud, strong smooth lift was encountered. I pulled the release knob, and Bob at the same instant dived for the deck. Release was at 1005, approximately 12,000 feet above sea level.

COATING OF FROST

Climb was smooth and rapid for the first few minutes following release ; a steady 2,400 ft./min. was indicated. I maintained a position in front of the roll cloud during the climb, while putting on my oxygen mask, checking for mask leaks, and checking operation of the blinker type oxygen flow meter. After the first few minutes, the climb rate gradually decreased, reaching zero at an altitude of 30,000 feet. A light coating of frost had begun to form inside the canopy shortly after release ; this coating grew more dense as the flight progressed, cutting off vision except through ' clear vision ' ports of double-thickness plexiglass (an Irv Prue idea). Flying southward above and to windward of the roll cloud (which extended in depth from 18,000 feet to about 23,000 feet ASL), an area of weak lift was encountered which yielded a top altitude of 33,500 feet. At this time, a fairly thin layer of stratus began to drift across the valley, and finally drifted into the area in which I was flying. I turned on the electric bank and-turn gyro and flew blind for several minutes, peering out at the wings occasionally for signs of ice (there was none). After breaking out into clear air, I found that wind drift had carried me to a position somewhat downwind of the roll cloud, although the cloud tops were still far below me. It was necessary to dive at high speed into the wind, in order to regain the lift area ; some 8,000 ft. of altitude was lost in the process.



Looking south from Bishop Airport. Wind from west. Roll cloud and Lenticular

30,000 FEET

Regaining this lost altitude proved to be a slow process, as no updrafts of noteworthy intensity were encountered during the remainder of the flight. The next hour and 20 minutes were spent in cruising along the western boundary of the Owens Valley, over a stretch of perhaps 70 miles, from Bishop to somewhat south of Mt. Whitney. I found that the strongest lift could be found to windward of the roll clouds which showed a very steep leading edge, seemingly independent of the actual size of the cloud. After the altimeter once again indicated over 30,000 feet, I began to feel hopeful once more, and began to look for other signs of lift which might boost me still higher, after first turning the pressure breathing regulator to the ' Safety ' position to guard against mask leak dilution. The inside air temperature gauge showed a comfortable plus 15 deg. C. at waist level, although the frost was growing very thick inside the canopy and along the edges of the instrument panel. I placed the gauge in the shaded forward part of the cockpit, at ankle height ; it dropped rapidly to minus 10 deg. C. and remained at that reading for quite a while.

The stratus layer appeared to be much thinner to the south. I noted too, that in several areas the stratus appeared to be deflected upward as it approached the valley, whereupon it feathered out and disappeared! The upward disappearance could only mean lift, so I flew into these areas and was rewarded by welcome clockwise rotation of

the altimeter hands. I found that once in the lift areas, I could maintain position by heading into the wind with an indicated airspeed of about 50 miles per hour.

A CHANCE

After passing the 35,000 ft. mark on the altimeter, I found a new problem, that of navigation. It became increasingly difficult to maintain a fixed position in the wave, since I was far above the roll cloud reference. The Sierras were completely blanketed by snow squall clouds, and the stratus layer had continued to advance, threatening to obscure the entire valley below, particularly toward the north. By this time, even the double windows had begun to frost over, though it was possible to scrape off the frost with the edge of a chart. The search for updrafts became a matter of chance under these conditions.

At 38,000 ft indicated, I was surprised to encounter a layer of mild, choppy turbulence. I immediately turned upwind, and was again rewarded by finding fair lift. Previous to this time, the flight subsequent to release had been characterised by the exceedingly smooth air which is usually associated with wave soaring at high levels. I should mention another phenomenon, perhaps akin to turbulence, which I noted several times during the climb. This was a long period (several seconds) pitching oscillation of the ship, observed while heading into the wind. The oscillation was very smooth, and did not produce a noticeable change in airspeed. It was as though I were in a small boat, being gently raised and lowered by a single swell in an otherwise calm sea. Such things are very noticeable when wave soaring; the air is usually so smooth that one can fly for ten minutes or longer without touching a control. The airspeed indicator and rate-of-climb meter will not fluctuate so much as a needle's-width, and the only distractions from complete serenity are the hissing of the oxygen regulator, the sharp blink of the oxygen flow meter, and an occasional sluggish movement of the altimeter hand.

Once past 38,000 ft., I turned the regulator dial to a higher index, thereby applying more pressure inside the mask. At intervals, I examined my fingernails for the tell-tale blue warning of anoxia. Everything O.K. Despite the intense cold outside, it was possible to leave a glove off for long periods without discomfort, although my feet were beginning to feel somewhat cold. An occasional gas bubble would rise from my 'innards,' and I was thankful that I had kept this potential discomfort to a minimum by skiping breakfast.

FROST BECOMES NUISANCE

Shortly afterwards, at perhaps 38,200 ft. indicated, I was chagrined to find the rate of climb slowly dropping to zero, then dropping still more, to a steady sink. This was an awkward altitude at which to terminate the climb, since it was just barely over 5 per cent past the 36,100 ft. mark set by Harland Ross and George Deibert earlier in the year. By flying into the wind at fairly high speed, I again found lift, and watched the altimeter hands creep slowly past 38,000, 39,000, then past 40,000, while I watched them as though hypnotised. The frost inside the canopy had by this time become a real nuisance, even on the clear 'vision' ports; I would rub vigorously with the map edge every few minutes in order to see outside. Unfortunately there was little to see. The horizon was obscured by cloud and haze, and even the ground below was covered by the stratus and snow squall layers, except for the eastern boundary of the Owens Valley. A jet was making a vapour trail some 20 miles to the south of me; I wished that he would come closer so that he could look up and see me there, with no visible means of support. His trail extended for a considerable distance upwind and downwind of the valley. I watched it closely for signs of lift; there was none, the trail remaining fairly straight until it had dissipated.

I was somewhat dismayed earlier in the flight to find that my oxygen consumption rate appeared high; at 40,000 ft., still climbing, this posed a question: should I use my remaining oxygen to make a dash

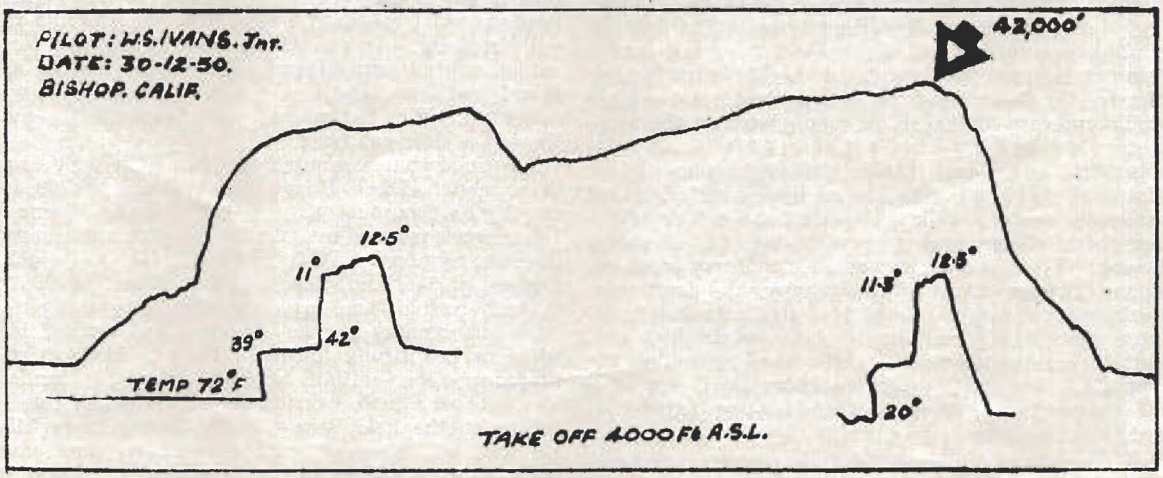


CHART TRACES WORLD-RECORD SOARING FLIGHT

Barograph traces path of Bill Ivans' world-record-breaking altitude flight

toward Salt Lake City, or should I continue to climb ? I decided to abandon the goal flight attempt for the present, and try to better my altitude while the oxygen supply lasted. I settled back to a routine of scraping frost, peering out, watching my fingernails, blinker and oxygen pressure gauge, and occasionally beating on the altimeter with my fist (it was becoming very sluggish). At intervals I turned on the bank-and-turn gyro, to keep it warm and free for possible use during the descent. Past 41,000 ft., I turned the pressure dial another notch.

At this time, I listened very carefully for the ' voices ' which one is supposed to hear when flying over 40,000 ft., I heard none.

I had expected that some sloppiness would develop in the control system, but an occasional waggle of the wings and dipping of the nose showed good response to stick movements. The stick became slightly stiff, owing to hardening of grease in bearings and slides, but never objectionally so. The rate of climb began to drop off slowly, and it seemed many minutes between movements of the altimeter hands. Slowly, the large hand rotated toward zero, which would indicate 42,000 ft. I again beat on the altimeter, and in a final lurch it read 42,000 even. It was 1210, and I had reached the high point of the flight. I held altitude for a few minutes, then gradually began to sink. I took a final look around ; the thermometer read minus 12 deg. C., at ankle height. There was almost an inch of fuzzy frost on single thickness areas of the canopy, and frost was forming on the faces of most of the instruments (I later found that radiosonde data established the outside air temperature at this level as minus 69 deg. C.). The great white lenticular cloud was still far overhead. I again noted a mild choppy turbulence but this time I could find no lift.

30 MINUTES' OXYGEN

With a half hour's supply of oxygen remaining in the main tank, I decided to return to Bishop and land, if possible. The Owens River was visible along the eastern edge of the valley, but I was not certain of my north-south position. Flying rapidly downwind and to the north, I could see more of the valley exposed, and soon recognised the town of Independence below the edge of the stratus layer. I believe that my best altitude was reached somewhat east of Mt. Whitney. Heading north along the eastern boundary of the valley, I soon had Bishop airport in view, and indulged in a series of high speed spirals as a relief from the straight-and-level monotony of the preceding few hours. I stayed in the region of the wave downdraft, and was soon able to maintain a fine 3,000 ft./min. rate of sink by flying level in the ' down ' I reached 30,000 ft. quite rapidly, and headed straight for Bishop Airport at 115 m.p.h. indicated. To my amazement and disgust I soon found that I would fall far short of the airport on that particular heading, even though it was in plain sight, less than 20 miles ahead of me and almost 5 miles below. I was forced to again fly into the wind, in order to escape the downdraft area, before I could resume flight toward the field.

Below 20,000 ft., my ears hurt rather badly from the rapid descent ; I was tempted to slow down, but instead, I dropped down to 18,000, removed the oxygen mask and attempted to clear them by yawning, shouting, etc. Finally, the pain suddenly diminished.

BACK TO AIRPORT

I arrived over the Airport with several thousand feet to spare, and killed off the altitude with a series of turns and chandelles. The frost had melted abruptly below 10,000 ft., and water had streamed all over the cockpit. This didn't matter—I was thinking only of the two barographs, wondering if they had remained in operation. I flew quite fast along the runway, then made a wide turn in preparation for a nice conservative final approach. I settled in toward the runway, and when ready to touch down I was startled by a loud scraping noise—I had forgotten to retract my VHF antenna ! It was too late then, however, so I rolled to a stop with the antenna rod still dragging. It was 1255; I sat in the ship for a while, excited and happy. Bob came over to ask how I had done, and I gave him the news. He was delighted. We looked at the barographs—each showed a clear-cut trace.

I learned that a number of other high flights had been made. Dave Boone had reached 28,000 ft., earning his Diamond ' C ' altitude. Tom Osborne of Los Angeles reached over 30,000 ft., with a passenger, in Bob Symons' ' TG-3 '. Flt./Lt. R. C. ' Jock ' Forbes, of Scotland, flew a ' Pratt-Read ' to 26,500 ft. with Irving Gene, my crew chief, as passenger.

Milton Kuntz, of Los Angeles, had arrived late with his beautifully finished ' TG-3 '. He was still preparing for initial take-off when I landed. We were all a little worried about his being able to return to the field, since it was closing in rapidly. He took off, however, with a passenger, and came back shortly afterwards after reaching 19,000 ft. Apparently the wave was dissipating. Warren Watson, who was in Milt's party, stayed on the ground that afternoon, recording the goings on with his excellent camera equipment. I am indebted to Warren for the fine illustrations to this article.

I repeated the story of my flight many times in the next hour ; the Irv Prue's, George Lockett's, George Deibert and Al Langenheim appeared, and it was a pleasure to give them a first-hand account.

The noon pilot balloon run had been reduced at the airport weather station. It showed the following (double theodolite) :

Height	Direction	Velocity
4,118 ft.	310	09 knots
5,000	280	07
6,000	270	19
7,000	230	27
8,000	220	35
9,000	230	43
10,000	240	37
12,000	230	37
14,000	240	53
16,000	240	73
18,000	240	57
20,000	240	80
(balloon went into clouds)		

By this time it was mid-afternoon, and I drove into town for a belated breakfast at Jack's Waffle Shop. It tasted wonderful.

That evening, John Graves knocked at the door of my hotel room. He had just driven up from Los Angeles,and was anxious for news of the day's happenings. I mentioned in an off-hand manner that I had gone to 42,000 indicated, then let John talk me into giving the details. John took the barographs to Los Angeles for calibration several days later, and since then he has been extremely helpful (under the expert guidance of Dr. W. B. Klemperer) in preparing the mass of quadruplicate data which must accompany altitude record claims.

Harland Ross called the next evening. He had seen an article in a Los Angeles paper, and wanted to offer congratulations. It was good to hear from him.

I had spent many hours in preparation for this flight. To begin with, I have a very sturdy high-performance sailplane, a ' Schweizer 1-23 '. The cockpit interior is lined with Fiberglass blanket insulating material, in order to reduce the heat loss. The large canopy is fitted with the aforementioned ' clear vision ' panels of plexiglass, taped to the inside of the canopy with air space between. Two-way VHF radio was installed, dry battery powered. Cockpit instruments include air speed indicator, altimeter, compass, two rate of climb indicators, electric bank-and-turn indicator, accelerometer, clock, thermometer (inside air), oxygen flow indicator, oxygen pressure gauge, and oxygen regulator. The main oxygen system is of the pressure breathing type, with A-14 regulator and A-13 mask. An entirely independent emergency oxygen system is installed, with separate mask. In addition, I carry a small ' bail-out ' reservoir for use if a parachute descent is indicated.

PERSONAL EQUIPMENT

My personal equipment was chosen with some care. Heavy underwear, wool shirt, wool sweater, a full length double thickness wool flying suit, wool socks (2 pair), felt boots, overshoes, wool gloves and fleece lined helmet were worn to insure warmth. I wore a pair of large goggles, which fit closely over the oxygen mask, in order to protect eyes and face from exposure to the frigid air in the event of canopy rupture or parachute descent. I had made a number of other high-altitude soaring flights, the highest to somewhat over 30,000 ft., and had further prepared for this flight by experiencing a simulated altitude of 45,000 ft. in an altitude chamber.

I mention these preparations for a purpose. Wave updrafts can quickly and smoothly carry a sailplane pilot to great altitudes. Unless he is well trained and well equipped, he will be carried quickly and smoothly to certain death by anoxia, with no more warning than a feeling of drowsy comfort. Advance preparation is all the more necessary because the standing waves have been known to develop and to intensify with great rapidity ; vast areas of strong lift may suddenly surround the pilot, lift so strong that neither spinning nor diving with full spoilers will keep him from being carried upward. In a case of this kind, it is vital that the ship and pilot be well equipped, in order to allow time for a downwind run in search of neutral air or downdrafts, which may be some miles away.

I am thus a strong advocate of thorough advance preparation. The Southern California Soaring Association has conducted an excellent educational programme relative to preparation for high altitude soaring flight, through informal talks by experienced pilots and through its publication *The Thermal*. A particularly good paper on this subject was presented by Paul MacCready at the 1949 SCSA-AGCSC Glider Operations Forum ; copies of this paper are still available from the SCSA, at nominal cost.

I wish to acknowledge the generous assistance and the warm hospitality accorded all soaring people during their stay at Bishop. George Deibert, the Airport Manager (and passenger on the flight in which Harland Ross set a new International 2 Place Altitude record), places glider operation in a position of high priority on his field. Bob Symons, who has a truly remarkable background of experience with the standing wave, operates a flying service at Bishop Airport which is headquarters for sailplanes and pilots. Bob spends many hours carefully explaining the techniques and dangers of wave soaring to those (such as I) who ask his help, and many an otherwise quiet evening at Bishop has been enlivened by ' open house ' at the Symons' and a showing of his justly famous collection of slides and motion pictures.

There is ample evidence which indicates that the Sierra wave was in a not extraordinary state of development on December 30. Much higher climb rates have been recorded by powered aircraft flying in the Owens Valley region, with engines throttled or even entirely shut down. No sailplane has yet been launched during a period of intense standing wave activity. It appears certain that a sailplane launched into a high intensity wave will be rapidly carried to altitudes at which even the most modern pressure breathing oxygen apparatus will not sustain life. The full exploitation of this remarkable phenomenon for soaring purposes awaits the development and use of a pressurized cabin sailplane or a satisfactory pressurized suit.

Auxiliary data : Temperature vs. Altitude, per U.S. Weather Bureau at Los Angeles, Dec. 3, 1950, for neighbourhood of Bishop, Calif.

4,850 ft.	9.4 deg. C.
9,990	0.2
18,600	-15
23,940	-26
31,030	-40
39,400	-62

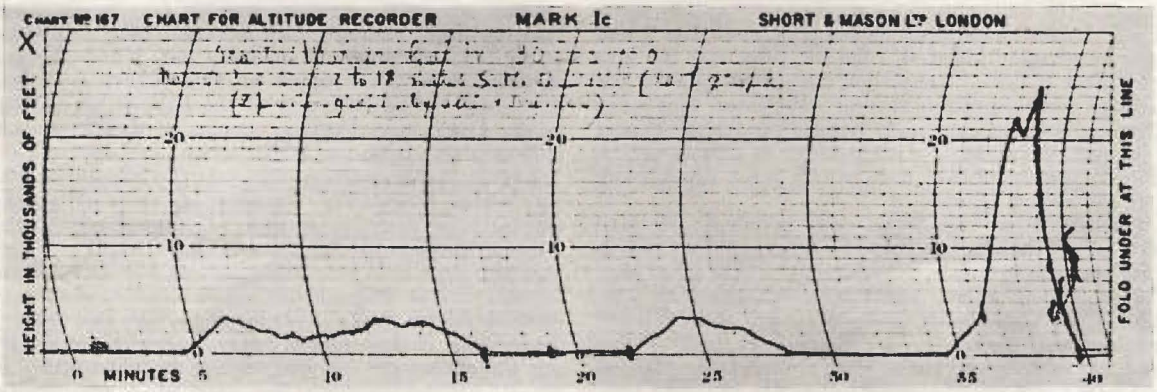
(from this, I estimated -69 deg. C. at 42,000 ft.)

Personal data :

William S. Ivans, Jr., 30, single, 6 ft. 2 ins., 185 lb., electronics engineer. A member of the Soaring Society of America and Associated Glider Clubs of Southern California, Bill has been gliding for about three years and has also flown light powered aircraft. He has a Gold ' C ' and Goal flight and Altitude Gain Diamonds.

Twenty-One Thousand Three Hundred Feet

By MARTIN WARNER *(Exclusive)*



ON Sunday, December 30th, last year, the Sydney Soaring Club's ' Gull IV ' was flown in a cumulus nimbus cloud and reached a height of approximately 23,500 ft. above the ground, having gained 21,300 ft. in soaring flight.

The morning did not appear to be a good soaring day, and it was not till 11 a.m. that the ' Olympia ' was launched. M. Waghorn who was flying the machine that day, stayed airborne but not with ease, later going to Bathurst 112 miles away. Dr. Heydon was not launched in the ' Gull IV ' until about 11.30 by which time clouds were appearing over the hills east of Dubbo and gradually forming closer to Duboo 18 miles away.

One hour and a quarter later the ' Gull IV ' landed as the prospects were not good and lunch was waiting.

In the afternoon Dr. Heydon did not want to fly, so as I was next in turn, I was offered the rest of the day.

By 1.30 p.m. the clouds had built up to the west of Narromine and a cumulus which appeared active looked worth investigating.

At 1.55 p.m. a take-off behind the ' Tiger ' was made and we climbed steadily until 3,000 ft. was reached, still under cloud. At this height the tow was released and some six minutes were spent without losing height below the cloud but without finding any usable lift.

After the loss of about 1,000 ft. on the western side of the cloud a decision was made to return to Narromine aerodrome, and having flown below the cloud for about 9 minutes again without loss of height a straight glide was made to the aerodrome.

A storm still appeared to be imminent and though the ' Gull ' and pilot remained on the aerodrome the ' Tiger ' returned to the hangar. This disturbance passed over and about half an hour later a further build up to the south west looked very active and another take-off was organised.

We were airborne at 3.15 p.m., the cloud by this time having grown to a cumulus nimbus of quite large proportions.

To save confusion all heights quoted in the next paragraphs will be as indicated by the altitude recorder which at the higher levels has a quite large error.

A release was made at 2,200 ft. above the ground S.S.W. of Narromine and a thousand feet was gained at 5 to 6 feet per second. At this point the real strength of the lift began to be felt, and the next thousand feet was gained at 10 to 15 feet a second.

This lift was smooth, without any disturbances and a normal easy circle was being flown, the electric turn and bank was on and everything was comfortably settled down.

Cloud was entered at about 6,000 ft., fairly close to the northern side of the leading edge of the formation.

From 4,000 ft. above the ground to 10,000 ft. the rate of climb was 28 ft. per second and apart from rain, and some light hail nothing disturbed the smooth easy circle.

At 3 p.m. a schedule call on the radio was attempted but because of electrical noise and lightning, which was encountered at this height, 11,000 to 12,000 ft., the call was abandoned, particularly as my spare attention was occupied with the sensitive altimeter winding itself up. From 10,000 ft. to 20,000 ft. indicated, the rate of climb was 37 ft. per second, 2,220 ft. per minute, and lift was still steady and undisturbable.

Approaching this height I began to straighten out on a northerly course, but did not get on course and dive brakes out till 22,000 ft. indicated, when still in smooth air, a rate of descent of approximately 15 ft. per second was made—about the normal sinking speed of the ' Gull IV ' with dive brake fully extended.

However, after only two minutes of this, excessively turbulent air was struck and the altimeter again started to show climb.

5,700 ft. was gained in this state at a rate of 26 ft. per second and considering the rate of descent of the ' Gull ' with dive brakes out, this air would be rising at least 41 ft. per second, in fact the last 3,000 ft. appeared to have taken little more than 1 minute so the air in this region would have been rising at 46 ft./per second, or 31 miles per hour vertically.

During this period my recollections are hazy due to lack of oxygen, but the relief of seeing the altimeter suddenly descend is still remembered and it was not till 18,000 ft. that I felt up to doing something about the odd attitudes the ' Gull ' was assuming in the very turbulent down, and another 4,000 to 6,000 ft. were used in straightening out the worst of the knots.

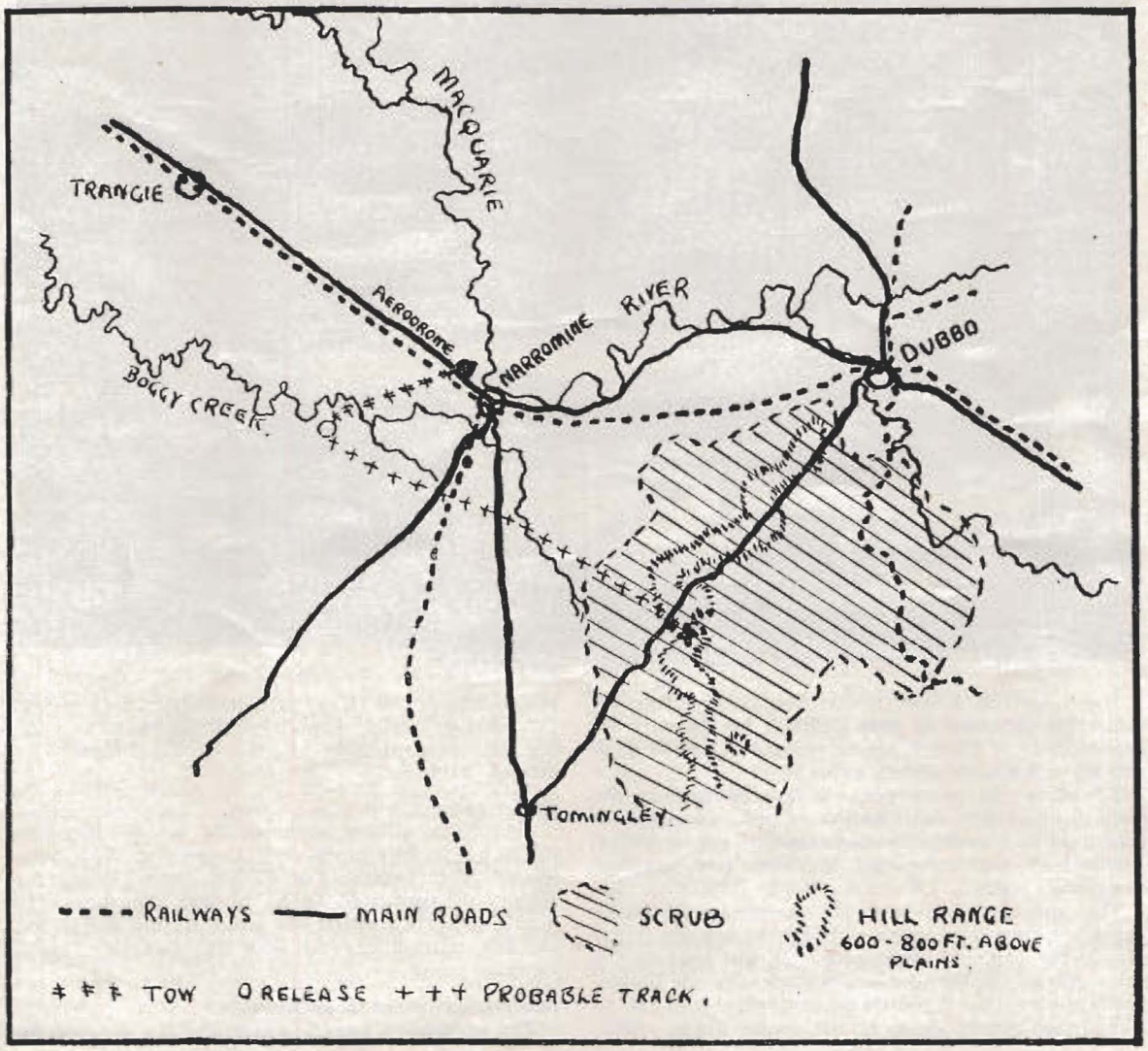
Now down at 12,000 ft., some 13,000 ft. had been lost in 3½ minutes, that is a rate of descent of 61 ft. per second, representing a down current of 31 miles per hour.

Still in this turbulent stream amidst hail and rain, due to poor piloting, I was unable to hold a steady northerly course, which I believed to be my best route out of the cloud, and when at 4,000 still descending like a brick, I was getting worried about breaking clear.

As is usual there was a certain amount of misting of the canopy and what with wiping this off, peering out and still being in a dark grey atmosphere composed almost entirely of water, the next few minutes were most unpleasant, particularly when trees suddenly appeared ahead, below, and very close, leaving no alternative to a landing in scrub at very short notice.

The ' arriving place ' proved to be in the timbered range country some 600 ft. above the take-off south east of Narromine, and this pointed to a major error on my part for I should not have tried to make a northerly course because of the drift over the ranges.

Had west been chosen for the course there is a possibility that cloud would have been broken over clear country, also the cloud was entered in a rather late stage of development resulting in extreme turbulence as the particular cloud had joined up with others resulting in a storm of tropical intensity, branches of trees being torn off and the local creeks ran full.



SOARING IN FRANCE

The high performance Sailplane

By GUY BORGÉ

'ARSENAL 4.111'

THE 'Arsenal 4.111,' studied by M. Jarlaud, is the most advanced French high performance sailplane in use to-day.

Built by the Arsenal de l'Aéronautique, it has the same general appearance as the old 'Air 100,' but the 'Air 100' is a very simple designed sailplane, having an aspect ratio 'limited' to 18, and is easy to fly by a good Silver 'C' pilot.

The 'Arsenal 4.111' seems completely different from this side and is very difficult to fly with an aspect ratio of 24.5, a big wing loading, some flaps and a considerable gliding ratio of 34.

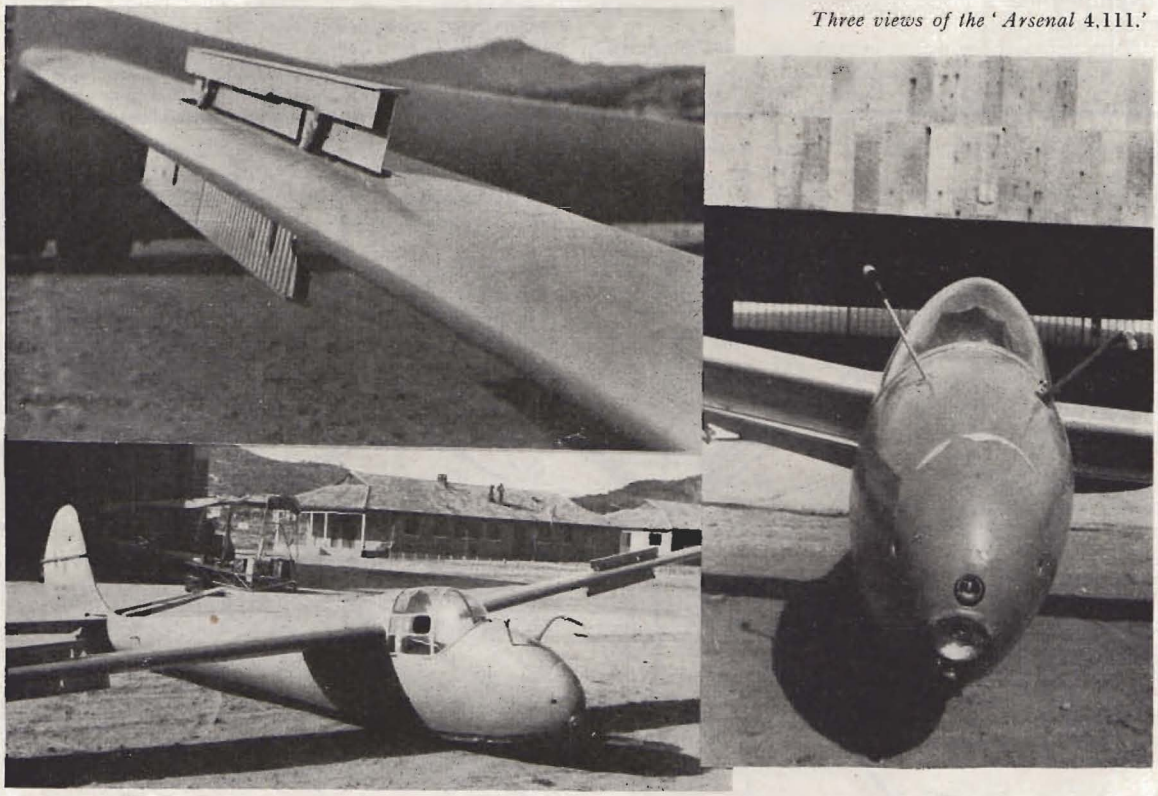
Therefore the prototype was not entered at the Swedish International Contest as not one pilot at this time had sufficient experience of the machine, which had just completed its tests but was not completely ready.

This machine has been demonstrated at many flying meetings and when put into aerobatics it has proved its immense strongness. It was sent to the Saint Auban Centre to execute some altitude flights, and Gaudry, the Chief-Pilot, recently took it to 28,200 feet above sea-level. It seems likely, therefore, that the prototype will also be used for some attempts against the distance records because it is very fast and efficient at great speeds.

Characteristics of the 'Arsenal 4.111.

Wingspan, 19.20 metres (63 feet); Wing Area, 15 m2 (161.40 square feet); as the 'Olympia.'; Aspect ratio, 24.5; Empty weight (without oxygen and heating), 280 Kgs. (616 pounds); Full weight, 375 Kilogs. (825 pounds); Wing loading, 25.2 Kg./m2 (5 pounds/sq. foot); Total length, 7.48 metres (24.5 feet).

Three views of the 'Arsenal 4.111.'



Performance.

Maximum gliding ratio of 34 at 85 Km./hour (53 m.p.h.); Minimum vertical speed of 0.62 metre/second (2 feet/second) at 57 Km./hour (35 m.p.h.); Maximum permitted speed of 250 Km./hour (155 m.p.h.). Vertical speed of 1 metre/second (3.3 ft./sec.) at 100 Km./hour (62 m.p.h.); Security factor, superior to 12.

Description of the main features.

The wing has a biconvex airfoil. The construction

(*Continued on page* 112)

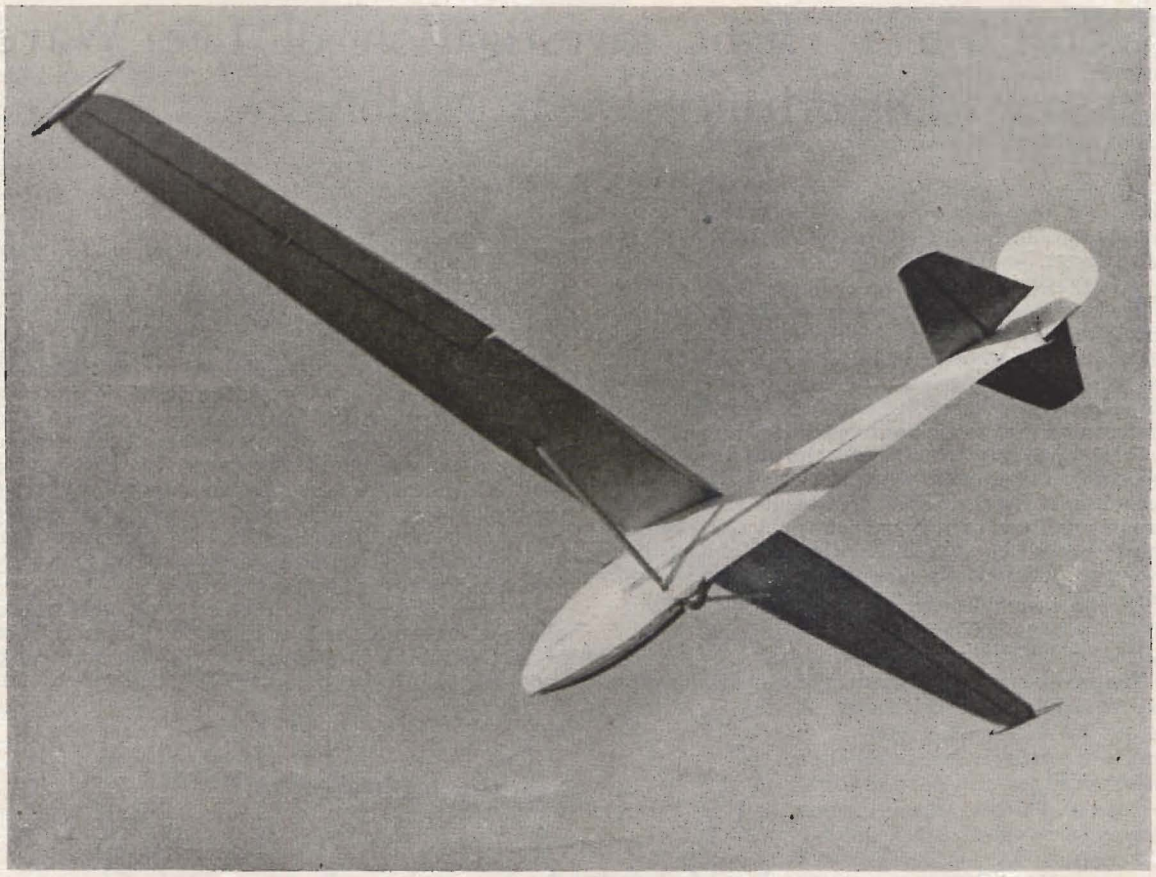


Photo by J. C. Reussner

' Kite II ' used by Slingsby Sailplanes Limited for experimental purposes. Note wing tip blobs. Pilot, A. Pratt

THE FLYING SNAKE

THE Sunday before last I took the Club's old and much repaired ' Grunau 9 ' up for a Test Flight. On landing I felt something smooth and cold pass across the back of my neck. Turning my head I was just in time to see a snake disappear into a hole at the wing-root end of the right wing. This charming stowaway must have had a free flip in the left wing, got a trifle windy at my landing and, spotting a ' better 'ole ' right opposite, used my neck to bridge the gap.

I have never seen such unselfish fellows as our club members when I said ' Your turn next.' One after the other they offered to stand down in favour of their fellow pilots—the brave bods. Gliding was temporarily suspended and after much N'daba (nattering) as to how to get rid of the non-flying member, a tube was connected to a car exhaust and led into the wing in an attempt to gas or drive out the snake. Although we could see it at times it just refused to come out, so all holes were sealed with dope and cloth and gliding was resumed, true to the old saying that ' Flying must go on.'

The standard of flying was rather poor—even our Mabel Glass, who has flown literally everything on wings and is ex-war Shuttle-Service Pilot, wouldn't take sufficient height, came down far too fast and nearly landed in a ploughed field. On closing down for the day we opened up the holes and last Sunday, as there was no odour a la Gorgonzola, we assumed our unwanted guest made a ' flying ' departure during the week.

Our motto in regard to snakes is kill 'em if you can, if not, treat them with great respect.

E. B. V. TOLLIS
(Durban Gliding Club)

Report on a Flight Investigation of Lee Wave Disturbances near Melbourne

by U. RADOK

Summary

HORIZONTAL flights in a ' Tiger Moth ' aircraft at altitudes from 3,000 ft. to 10,000 ft. during strong easterly winds across the Dandenong ranges showed evidence of wave-like disturbances in their lee, with a particularly marked region of descending air directly over the ridge. In one case this region coincided with a strong positive temperature anomaly.

Except at fairly low altitudes the observed vertical velocities do not agree well with those to be expected according to the theoretical treatments of the phenomenon by Lyra and by Queney; in the case of a third theory the verification remained inconclusive owing to difficulties in adapting the available upper wind observations.

(1) *Introduction.*

The investigation reported in the following represents part of a programme of research on lee wave disturbances which was adopted jointly by the Department of Civil Aviation, the Commonwealth Meteorological Bureau, and the Department of Meteorology, following the observation of such disturbances on the Tasmanian air route (Desmond and Radok, 1949). While that programme provided in the first place for the study of a wave cloud frequently observed over the Upper Yarra region, some 40 miles East of Melbourne, by means of a ' DC 3 ' aircraft, an unexpected opportunity arose for preliminary tests in light aircraft, when during the period from February 2nd to February 8th, 1950, Southern Victoria was dominated by unusually strong and persistent easterly winds.

On the morning of February 3rd, the writer observed from his home at Ringwood (15 miles East of Melbourne) a stationery roll of cumulus cloud running parallel to the range of hills from Mt.

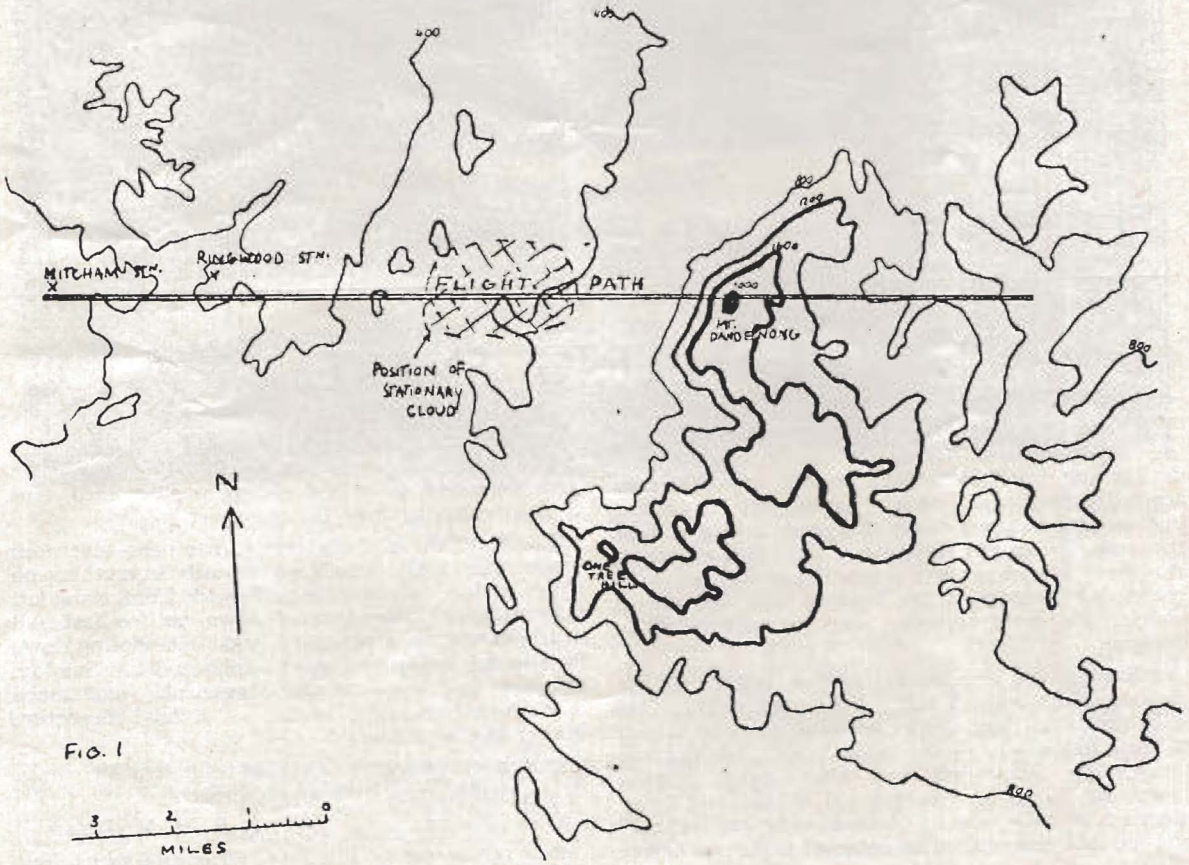


FIG. 1

Dandenong to One Tree Hill near Ferntree Gully (cf. map, fig. 1). Arrangements were made immediately to investigate the flow in the lee region West of the ranges by means of a 'Tiger Moth' aircraft supplied by the Royal Victorian Aero Club. While this type of aircraft is not usually suitable for this work owing to its slow speed and low ceiling, the special conditions of the present case allowed it to reach the disturbed area quickly in a flight across wind from Moorabbin airport; the heights of the disturbances being at the same time comparatively small (behind an obstacle of only 2,000 ft. altitude).

Owing to low cloud near the coast the start of the flight was delayed until 14.40 hrs., E.S.T. After reaching the area of interest the aircraft was taken four times along a line from Ringwood across Mt. Dandenong to the reservoir at Silvan, at altitudes from 3,000 ft. to 8,000 ft. During these traverses the setting of the throttle was kept constant so as to ensure as nearly as possible a steady horizontal flight in undisturbed air. Details of the flight are shown in fig. 2.

The following day was unsuitable for flying owing to low cloud and drizzle. However, on February 5th good conditions returned, and another similar flight was made, starting at 12.45 p.m. (fig. 3, to be published next month).

After that, similar conditions prevailed for another 3 days. During the last two of them the typical lenticular wave clouds appeared for the first time. Finally during the morning of February 8th the wind went around to the South and brought the end of the special conditions. No further flights were made during this final period.

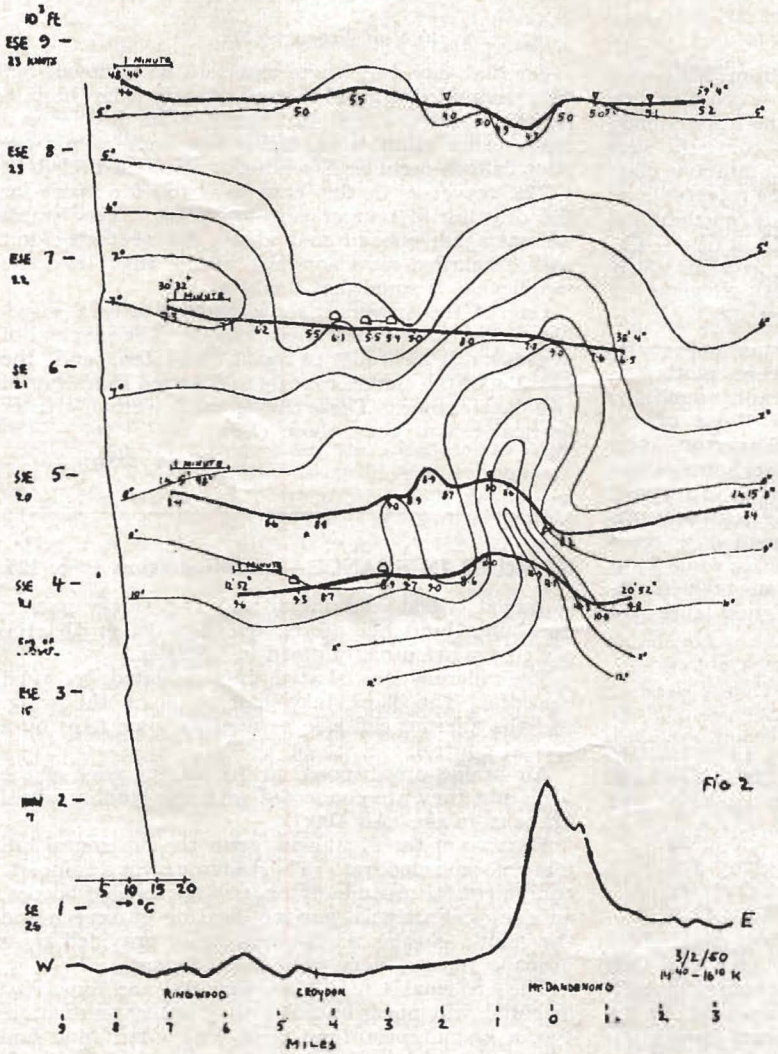


Fig 2.

(2) *Analysis of flights and its accuracy.*

The flights were recorded by a Friez meteorograph attached to the starboard wing strut of the aircraft. This instrument has a time scale of 40 seconds to one millimetre and a pressure scale of 5.9 mb to one millimetre, approximately. Thus times and heights could be determined, in the altitude range explored, at the best to the nearest 4 seconds and 40 feet, respectively. The former interval would correspond, for the average speed of the traverses, to a distance of some 150 feet: but much larger inaccuracies were doubtlessly introduced by the necessity of fixing visually the starting point of each traverse and, to a somewhat smaller extent, also the moments of passage over Mt. Dandenong. These were entered on the meteorograph record by means of an electrically operated time marker; in most cases the corresponding time was also noted down from a stop watch.

The aircraft's location along the vertical and the horizontal can thus be considered accurate at the best to the nearest 100 ft. and 1,000 ft., respectively; the latter figure being optimistic if anything.

The above demonstrates the need for additional instruments if accurate results are to be obtained from flights of this type, especially at greater altitudes. A barograph with an open time scale used in conjunction with an aerial camera

LEE WAVE DISTURBANCES—continued.

operating vertically downwards would appear to be the minimum requirements. A further useful addition would be an artificial horizon; in the present case the traverses were not always level on the average, owing to the horizon being obscured by clouds.

The last represents no serious defect, however, since the average vertical velocity of the aircraft was less than 2 ft./sec. in each case. These average velocities, computed from the height differences between start and finish of each traverse and the time elapsed, were deducted to arrive at the actual vertical velocities, shown for both flights in fig. 4. As most of these velocities are small and were computed from the slopes of the barograph traces (cf. Radok, 1949) they are probably quite accurate (± .2 ft./sec.).

(3) *The flight of February 3rd.*

Fig. 2 shows the four traverses from Ringwood across Mt. Dandenong together with a cross section through the surface contours along the approximate flight path, marked in fig. 1. The contours were taken from the one inch to the mile military map, sheet Ringwood; the height scale thus represents an enlargement factor of 10.56. Clouds encountered are marked along the traverses by ⌂ or ⌂——⌂, the latter implying a cloud extending over the entire distance between the two symbols. Regions of strong turbulence are represented by ▽.

All available meteorological information is also shown in the diagram. The temperatures plotted on the left are those of the meteorograph sounding; these agreed almost precisely with those of the radiosonde flight of 7.30 hrs., Z at Laverton, some 30 miles to the West (after the latter's correction for an error in the base line temperature). The upper winds given next to the height scale represent the 4.30 hrs. Z pilot balloon flight at Essendon (20 miles to the West) up to 3,000 ft., and a radar wind flight at the same station (3.56 hrs. Z) from 4,000 ft., to 9,000 ft. Some of the winds at higher levels are given in the following table :—

Table 1 : *Upper winds, 3/2/50, 400 Z, at Essendon, Victoria.*

Alt. 10^3 ft.	10	11	12	13	14	15	16
Direct o.	120	200	280	330	360	300	280
Velocity kts.	23	23	22	18	2	4	12
Alt. 10^3 ft.	18	20	22	25	30	35	
Direct o.	270	270	270	290	270	310	
Velocity kts.	22	32	42	56	70	66	

During the flight the coastal plain was covered by 5/10 of cumulus with bases at 2,400 ft., and tops reaching to about 5,000 ft. In the region investigated a group of these clouds appeared to be constantly forming upwind and dissolving downwind, without the group changing its position as a whole. Some of these clouds extended above 7,000 ft. at times.

All traverses in fig. 2 except that at 6,500 ft. show clear evidence of vertical currents. During the last traverse especially these, appear to have produced a wave of approximately 5 miles length. The stationary character of the clouds in the region is confirmed. At roughly twice the height of the obstacle almost directly above it strong vertical currents were found. Higher up there was little or no vertical motion, and still higher it appeared to recur with inverted phase. Strong turbulence was encountered especially in the clear air just upwind of the clouds.

The temperatures recorded during the traverses by the meteorograph have also been entered in the figure. Tentative isopleths of temperature show in the region of the strongest descending currents a core of air which is up to 5° C. warmer than the air elsewhere at that level. This would suggest a descent of at least 1,500 ft. By comparison the cooling in the ascending currents is insignificant.

(4) *The flight of February 5th.*

On that day only three traverses were flown, but these extended somewhat further away from the hills (to the water tower at Mitcham). The day being a Sunday, no radar wind flight was made, while the pilot balloon flight at Essendon only reached 5,000 ft.

The traverses in this case were too far apart for the drawing of temperature isopleths. Very warm air was again encountered above the obstacle; but with a marked inversion just above that level, its significance is somewhat doubtful.

One of the traverses shows very clearly a wave-like motion of 4 miles' wave length. The reversal of phases with altitude is again indicated, and the position of the clouds appears unchanged from that of two days earlier. These clouds again were of greater vertical extent than those elsewhere.

(to be continued)

SOARING IN FRANCE—continued from Page 108.

is mixed, wood and metal and the single spar is duralumin built like a box, and the wooden ribs, the ply covers are directly glued by ' Redux.'

The ailerons are slotted and actuated by rigid controls. The flaps take half span of the wing, and the ailerons can also be used as some flaps by a special control.

Air brakes are disposed in the leading edge of the wing and they are connected with the landing wheel brake as in the ' Air 100.'

Because of the great wing span the horizontal tail is given some diedhral. The machine owns a complete equipment for altitude flying, two big oxygen bottles, an electrical artificial horizon, heating of oxygen and the pilot's gloves. Cabin heating is provided by a propane burner, very light and efficient.

The ' Arsenal 4.111,' a very special and expensive machine, will never be put into quantity production. But a second prototype is under construction and will complete new extensive tests, and perhaps break some distance or altitude records.

GUY BORGÉ.

KEEP GLIDING SAFE

By NEVILLE WYNNE

REMEMBER this—Safety first should be the keynote of every gliding operation.

It may take only one accident, caused by a moment of forgetfulness, panic or unnecessary haste to cause a tragedy; and at the same time deal a blow that might cripple or even terminate the club's activities.

Even the experienced pilot can make a mistake; unfortunately throughout the world many have. It is important that the fundamental rules of safety should be in everyone's mind all the time; therefore this article is aimed to reach all pilots, from the 'Ground Skidders' to the 'Cross Country Types' and where applicable to the 'Ground Crews.'

The Daily Inspection

Every pilot should be completely satisfied that the machine they are about to fly *has* received its usual daily inspection, by an approved person. The obligation then falls on the pilot to make a pre-flight inspection.

Before you get into a glider, you should make sure that every safety pin and assembly pin is in place. NEVER be too proud to stoop down and check any pin that could be sprung open or bent by stray timber, low scrub or tufts of grass, on the previous take-off or landing. Once seated adjust your safety harness or belt and then (not before), check the controls for free and correct movement. DON'T forget to check that RELEASE—make sure it does open. Always keep your wing-tip on the ground until you are ready to take-off.

A point often neglected is the failure of a pilot to notice the amount of cross in the wind at the time of take-off. Unnecessary or daredevil prophesying to onlookers as the tow commences, is rarely, if ever, called for. Such phrases as 'Now watch me zoom' may make famous 'last words' but will always be a poor second to 'Two bats please.'

During the tow always be on the alert for line breaks and fouled lines. If other aircraft are trespassing the take-off area, be ready to release in a split second. Powered aircraft have been known to use adjoining strips, making low approaches and take-offs sometimes unnoticed by the pilot or the launching crew. Never climb steeply from the deck, take it easy for the first 100 ft. of altitude. If the line does break, get your nose down immediately to maintain flying speed, THEN drop your free end of line. NEVER turn back for a short circuit or a downwind landing unless you have plenty of altitude or enough 'strip' to effect a safe landing.

Launching Crew and Pilot

If you reach your maximum permissable tow altitude; *don't forget* to release. If the machine you use for flying is not equipped with an automatic over-run release, always pull the release handle or cable several times to make sure. If the day ever dawns when your release mechanism fails to operate, remember, as soon as the tow-car crew disengage their end of the wire, to complete your flight with as few turns as possible, and with ample excess of airspeed to clear or snap the line if it fouls while dragging in the ground.

THE LAUNCHING CREW SHOULD ALWAYS COMPRISE at least one person who would be immediately aware of the pilot's difficulties in such a case. All members should realise that the quick-release on the tow car is for the *pilot's safety* and not for the ground crew's convenience.

If you are still in the 'Ab-initio' stage of instruction don't start TRYING to put up a better show than the other pilots—if you are good, you don't need to overtax your ability or stretch your luck—if you are not 'So Hot' you can still learn to fly safe and finish on top.

Safe flying *can* be cultivated by *constant practice*. Always maintain flying speed, and when flying low always allow a good reserve of air speed to lessen the effects of any down currents or sudden gusts. Never fly on the altimeter under 200 ft., estimate your altitude visually. If you are flying a sailplane not equipped with blind flying instruments, or a parachute, give all overdeveloped cumuli and cumulo-nimbi a wide berth.

Ab-initio and Aerobatics

DON'T make a practice of steep low turns or 'shoot ups' on a landing approach; strip control officers and instructors generally frown upon such. If you are qualified to do aerobatics, do them at safe altitudes, 1,000 ft. or more.

DON'T commence your career of spectacular aerobatics in primary type gliders—it mightn't be worthwhile.

A standard set approach, with a landing fifty yards up the strip is always favoured against a tree top escapade or a successful attempt to flatten the boundary fence.

After you have landed, *never* leave a sailplane or glider unattended unless it is securely weighted down, wing into wind. Motorless aircraft are comparatively easy to turn back on to an even keel after being blown over, the only difficulty being that they are very hard to repair.

WHILE YOU ARE ACTING AS GROUND CREW NEVER connect a launching wire to an empty aircraft. If a *line chute* is used, it should be clear of the nose of the glider by no more than two or three feet. If a chute-tube is fitted to the aircraft make sure that the chute is an easy slide-in fit.

When signal bats are called for, always take up a position clear of the glider and in clear view of the pilot. NEVER give take-off signals on your own assumption (unless authorised by the instructor in

charge) always wait for the pilot's request of 'one bat' and 'two bats.' Signal bats should never be waved without some reason, in the air, as unintentional signals may cause confusion with pilots already flying and with the tow-car crew.

Gliding and Soaring are safe, but like all forms of flying, it leaves no room for carelessness. The risk of injury in a glider accident is very small when compared with the same risk in a powered aircraft. Even so, the obligation is on the Gliding Fraternity to take all possible precautions and to make sure that that risk is eliminated altogether.

Let's enjoy our sport, but always remember this—KEEP GLIDING SAFE—'*Glidabout.*'

COULD 'GLIDER' HAVE SAVED "AFFRAY"?

SOME four thousand descents have been made by a Submarine 'Glider' in the Mediterranean for the purposes of deep sea exploration.

This news came to light during the recent search for the submarine *Affray* which was lost in the English Channel.

This type of machine is completely air-tight and carries searchlights, batteries, and instruments. It is towed over the water at minimum speed and is operated exactly like a glider.

Whilst the machine is being towed at 1 to 2 knots the pilot dives to whatever depth is required, when the speed is put up to three or four knots. With this machine it is possible to explore depths of two hundred feet or more.

The suggestion was made that the British Admiralty should use such a machine in the search for the *Affray*, but so far we have not heard whether or not the offer was accepted.



The 'Venture' two-seater at the Mynd

NEXT MONTH

'Look Before You Leap'—by F/O. G. Melville-Jones, M.B., B.Ch., is the title of an article to be published in the next issue of *Sailplane*.

The author is a specialist on pressure breathing at the R.A.F. Institute of Aviation Medicine, and has also much experience as a glider pilot.

His article is inspired by the flight of Bill Ivans, world record breaker, and he offers sound advice on the intrinsic hazards of dicing in the stratosphere.

THE FESTIVAL and AVIATION—

LONDON, MAY, 1951

A FEW days ago the Festival of Britain was officially opened by their Majesties the King and Queen at a Service at St. Paul's Cathedral and a visit to the South Bank Exhibition.

Since the eyes of the world have been upon this country from the moment that the Festival was first suggested, and subsequently caused one of the biggest internal political disputes in modern times, it is surely fitting that whether or not we approve this whole idea, which has cost so much, we should traditionally, as British people, wish it the success which it so rightly deserves.

Sailplane therefore is devoting some space this month to show readers what the aviation and gliding people are putting on show to the world.

THE HANGING 'SKY'

As we reported earlier this year a 'Sky' (Slingsby's new high performance sailplane, until recently known as the 'T/34') is to be seen in the Transport and Communications Pavilion which adjoins the Dome of Discovery. Other exhibits to be seen suspended from the roof include an Eon 'Olympia', about which a question was to be asked in the House of Commons on April 3.

Mr. Turton (Con., Thirsk and Malton) was to ask the Minister of Works why the Eon 'Olympia,' 'a sailplane of German design,. is to be shown in the Festival Exhibition; and whether he would confine the Exhibition to 'products of British design and manufacture.'

MARCONI'S PART

A replica of the cockpit of the 'Comet'—the world's first jet airliner—showing its complete Marconi wireless communication and navigational aid equipment, is another of the interesting exhibits in the Transport Pavilion.

The 'Comet' equipment consists of two high power High Frequency transmitters, two High and Medium Frequency high-discrimination receivers, and two Automatic Direction Finders. Voltage Regulators for this installation are also of Marconi manufacture.

There are many other Marconi exhibits to be seen at the South Bank Exhibition, the Festival Ship 'Campania' and at the Exhibition of Industrial Power, Kelvin Hall, Glasgow.

BREVITIES

U.S. SOARING CHAMPION TO ATTACK WORLD'S DISTANCE RECORD

DICK Johnson, U.S. National Soaring Champion, is planning to devote considerable time this summer in an attempt to better the world's soaring distance record.

This record is at present claimed by a Russian woman, Olga Klepikova, for an alleged soaring flight covering 465.532 miles.

Dick has made considerable improvement in the performance of his ' RJ-5 ' sailplane, since he flew it in the American Nationals last year. His plans are to set up operations at a site in West Texas, probably Odessa, Texas. He would expect to spend upward of a month's time in the area, studying conditions and being prepared to take advantage of the right conditions. He thinks some twenty high thermals will do the job if he has the L/D of the ' RJ-5 ' up to 40.

He is a great distance flyer and has accomplished two of the longest flights on record.

His goal flight last year went 320 miles and previously he flew a Schweizer ' TG-2 ' two-place, 312 miles. The barograph trace of his long flight last year is a beauty to behold, it is a perfect picture of efficient cross-country soaring. On this flight, Dick took 21 thermals and was working against a quartering head wind. Given the same conditions, and West Texas has many days better, going fully down wind, Dick is sure to better the Russian ' record.'

STATE CONTROLS LANDING CHARGES

DETAILS of the Royal Aero Club's annual landing card scheme for State-controlled aerodromes has been modified with effect from 1st April, 1951. In place of the existing arrangements whereby landing cards costing £5 each and valid for twelve months can be issued in respect of private and club-owned aircraft not exceeding 6,000 lbs. all-up weight, the following scale of annual charges will be introduced :

Club aircraft :

Aircraft not exceeding 4,000 lbs. all-up weight, £5.

Private aircraft :

Aircraft not exceeding 2,600 lbs. all-up weight, £7. 10s. Aircraft not exceeding 4,600 lbs. all-up weight, £10.

Landing cards in force on 31st March, 1951, will not be affected by the new arrangements, but the new charges will apply to all cards issued after that date.

BIG BUSINESS FOR SCHWEIZER'S—COUNTRY SEAT FOR PAUL

THE Schweizer Aircraft Corporation is bustin' at the seams with business. They are building various aircraft components for military machines, tow target gliders for the Navy, etc. They hope it may be possible to fabricate one more batch of ' 1-23 ' sailplanes, but unless orders are in soon, this may be all for the duration of the present emergency.

Paul Schweizer has purchased a farm with a 14-room house near Harris Hill, and overlooking the valley, the County Airport and Schweizer's plant. A country squire—no less, but girls please note—he is still a bachelor.

TWO MEETINGS

Here is news of two Gliding Meetings as follows :

Kufstein. 12th—27th May, 1951. Organising body :—Osterreichischer Aero Club, Landssverband Tirol, Innsbruck, Tirol, Austria.

Types of aircraft available :—' Grunau Baby II,' ' Kranich.'

Zell am See. 19th August—2nd September, 1951. Organising body :—Osterreichischer Aero Club, Landesverband Salzburg, Salzburg, Nonnbergstiege 2, Salzburg, Austria.

As there are very few sailplanes, but very many sailplane pilots in Austria, and only at Innsbruck have Austrians had any appreciable amount of soaring with the French Military Gliding Club since the war, it would be advisable for visitors to bring their own sailplane or sailplanes. Otherwise no visitor will have time to acclimatize himself to alpine soaring.

O. W. NEUMARK.

38,000 AT BISHOP

JIM Spurgeon brought news that Bob Symons and Dr. Joachim Kuettner soared to 38,000 feet, over Bishop, exceeding the height of 36,100 feet made by Ross and Deibert. This is subject to homologation, however.

NEWS FROM THE CLUBS—

JOHANNESBURG SOARING CENTRE

FORMATION of this club—despite the existence of a well-established and active club in the district—was brought about by the need for a gliding centre which could provide hangarage for several privately owned high performance sailplanes and also cater for a large number of aero-tows. Baragwanath Aerodrome, home and birth-place of the Johannesburg Light Plane Club, served this purpose adequately.

The field was first used by private owners in a small way in 1949. Late that year Hans Würth arrived from Switzerland with his ' Kranich ' and several half-built machines to start an advanced training school. By the end of 1950 the number of machines operating from Baragwanath had risen to six : ' Air 100 ' (Heli Lasch) ; ' Kranich ' and ' Spalinger S. 15 ' (Hans Würth) ; ' Spalinger S. 18 ' (' Sparky ' Davidson) ; ' Hutter H. 17 ' (P. Leppan and R. Lilienfield) ; ' Grunau Baby ' (P. Beatty and A.

NEWS FROM THE CLUBS—continued

Farquharson) plus a ' Minimoa ' owned and occasionally flown by members of the Pioneer Gliding Club.

Inevitably the hours flown from Baragwanath increased with the number of machines. Glider pilots from all over the Union came to Hans Würth for advanced dual instruction, and an increasing number of power pilots and onlookers asked for conversion or training in the ' Kranich.' It seemed desirable therefore, in the face of all this increased activity, to form some sort of club at Baragwanath in order to keep a proper record of the hours flown, to regulate the flying, and to undertake the training of new blood.

At the beginning of 1951, the Johannesburg Soaring Centre was formed. Fortunately it was possible to become a part of the Johannesburg Light Plane Club and to accept their constitution, though by mutual arrangement the finances of the gliding section are kept separate from the parent club.

With the subscriptions of the founder members, which gave them life membership, we have purchased a ' Grunau Baby ' from the now extinct Lourenco Marques Gliding Club in Portuguese East Africa. All new members will eventually solo on this machine after dual training in the ' Kranich .' The ' S. 15 ' is also available for use by members. Launching is by aero-tow only, for which the J.L.P.C. have two ' Tiger Moths ' with towing attachments, and a third is owned privately.

The amenities at Baragwanath must be comparable to any Gliding Club in the world. Over and above the flying facilities there is an excellent club-room with all meals available, a bar, a swimming pool, and tennis and squash courts for those tired of gliding (if any).

The Transvaal, being very flat on the whole, cannot boast many suitable soaring ridges (the only good one near a populated area being at Pretoria, and this is used for soaring at certain times of the year) and so of course there are no standing waves or other short cuts to stardom for those flying here. The only type of soaring is by means of thermals, and luckily there is no shortage of them. They can be found throughout the year.

As far as can be ascertained from the incomplete records kept before the centre was formed, the flying hours for 1950 were somewhere in the region of 330. In comparison with this figure the 1951 total looks like being greater, as for the first twelve weeks of the year the hours flown are already on the 200 mark, including two 5-hour durations completing Silver ' C ' certificates.

This 5-hour duration business is the biggest headache here, so many have to fight for the last hour. Though to watch Heli Lasch or ' Spark-' Davidson on a suitable day one would think there was no difficulty in the duration flight ; they both repeatedly go away for 5 and sometimes 6 hours at a time. One quite good day was on the 11th February when the six sailplanes flew 27 hours between them. February's hours exceeded 80. It would be interesting to know how this compared with the thermal hours of other clubs in the world.

K.B.N.

BRISTOL GLIDING CLUB

Successful full scale camps were held over Easter at both Roundway and Lulsgate.

At Roundway, soaring was possible on the first four days in spite of rain and snowstorms, and a total of 17 hours was flown. The best day was Easter Sunday when the ' Tutor ,' ' Grunau,' Club 'Olympia ' and a syndicate-owned ' Olympia ' were soaring together.

B. M. Brown obtained this season's first ' C ' with a flight of 35 minutes in the ' Tutor.'

On the Saturday, flights of up to halt an hour were made over the North slope in a N.W. wind. This slope was soared for the first time recently and appears to have considerable possibilities. We have now shown that slope soaring is possible at Roundway in all wind directions except from N.E. to S.E.

At Lulsgate training was hampered by the high winds but several members were checked out for Roundway and 140 launches were made.

The good soaring weather continued after Easter and on April 8, J. H. Parry-Jones found lift extending out from the ridge as far as Devizes. On the 15th ten hours were flown by three aircraft.

The Annual Meeting was held on March 30. President, Air Commodore E. Cadbury, presided.

The Chairman, T. R. Young mentioned some of the highlights in the Club's five years post-war operations.

Since the war, he pointed out that we have made 17,722 launches, flown 10,002 hours and obtained 449 certificates.

Turning to last year he gave an account of our activities and said that thanks largely to the success of our weekly training courses we had managed to make both ends meet with a small margin. On the subject of sites he said that in Roundway we had a fine soaring site with great future possibilities, and in Lulsgate an ideal training airfield. Both sites were essential to our future development.

After the Treasurer's report the following officers and committee were elected. Chairman, T. R. Young ; Vice-Chairman, J. N. Cochrane ; Secretary, J. H. Parry-Jones ; Treasurer, C. H. D. Michell ; Committee, M. R. Chantrill, A. F. Gotch, J. M. Hahn, D. J. Jones, C. Staffurth and A. G. Winter.

The meeting closed with the presentation of the Uwin's Cross-Country Trophy. This was presented by Capt. Uwins himself to C. Staffurth for a 79-mile flight from Bradwell Edge to Witternsea. J.N.C.

LONDON GLIDING CLUB

This year the London Gliding Club, Dunstable, is organizing Courses confined to Members. These Meetings are scheduled for 12th to 27th May ; 16th June to July 1st ; 4th to 19th August.

They will provide continuous instruction, opportunities for Gold and Silver ' C ' tests, and the B.G.A. task flights.

Readers living too far distant to regularly use the Club should still find it worth while to join and spend 16 days' holiday there. The cost is as follows : Entrance fee and country sub. £9. 9s. 0d., Dormy accommodation (and 4 meals a day) £9. 6s. 6d., Flying money, say 24 flights, aggregating 8 hours £4. 16s. 0d., a total of £23. 11s. 6d.

SCOTTISH CLUBS

HOLIDAY GLIDING COURSES

The Holiday Courses provide a week's gliding training for beginners and power pilots converting to Gliders.

The Courses are held at the Club's training site, Balado Airfield, Kinross, which lies one mile west of the town of Kinross on the edge of Lochleven. The Airfield is 400 feet above sea level and bounded by the Ochill Hills on the North, Bishophill on the East, and Benarty and Cleish Hills on the South. The towns of Perth, Dunfermline, Stirling and St. Andrews are within easy reach for evening visits.

Facilities available include dual and solo training gliders, launching winches and retrieving cars, and fees cover Flying Membership of the Union for the period of the course, accommodation and all meals at the Kirklands Hotel, Kinross, use of aircraft, glider insurance and expert instruction.

The average beginner can qualify for the Royal Aero Club 'A' Gliding Certificate in the week and trainees with power-flying experience can add the 'B' Certificate. With this in view, two passport-size portraits should be brought to the Course.

The all-in fee for the seven-day Course is £12. 12s. 0d. and every application to join the Course must be accompanied by the necessary fee or deposit of £3. 3s. 0d. (not returnable), *Dates of Courses*: *Course* 1, 23rd to 30th June; *Course* 2: 7th to 14th July; *Course* 3, 21st to 28th July; *Course* 4, 4th to 11th August; *Course* 5, 18th to 25th August; *Course* 6, 1st to 8th September; *Course* 7, 15th to 22nd September.

ULSTER GLIDING CLUB

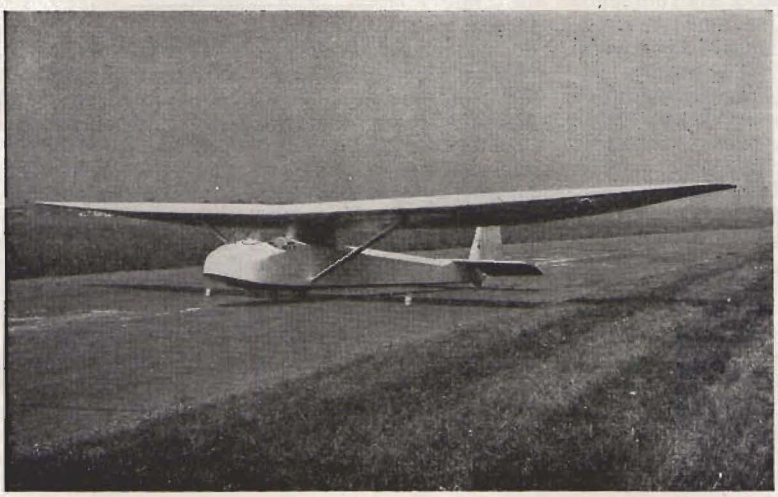
For the first time since the war we have been able to have Gliders ready in time for Easter and enough petrol to make the 60 miles' journey to Magilligan Strand. With a blessing by telegram from our friends at the R.N.A.S., Eglington, we launched on Easter Sunday, March 25th, accompanied by the A.T.C. who were on a course at Ballykelly.

Civilian instructors Robert Curry and John Wilson flew a half hour and a hour respectively, and P/O Robin Gibson flew for 20 minutes. William Liddell in the 'Gull' flew for over an hour.

Conditions were peculiar. There was a 200 ft. thick cloud layer at 1,200 ft.—this layer covered the land but did not extend over Magilligan point or a mile from shore. However, as the sun went lower, clouds began to form everywhere and it was necessary to come downstairs from 2,200 ft. or get lost. In our pre-war *Sailplane* accounts we used to write about the Raven who lived on the mountain and attacked the Gliders, so much so that he dug a hole in the tailplane of the old 'Cassel 20' (see account of 'Sailplane vs. Raven' in the May, 1936 issue of *Sailplane and Glider*.). Now, whether it is the same 'papa' Raven defending his nest we do not know, but Liddell had a most entertaining view of the Raven flapping along over the top of John Wilson in the 'Tutor.' To be attacked by this Raven is quite embarrassing and we are glad to know that John Wilson on his second soaring flight did not see the menace flapping along so close over his head every time he invaded the Raven's Parking Lot. It was truly a very amusing sight for the spectator.

Easter Tuesday, March 27. There was nobody there but us chickens, i.e., Liddell and the Raven.

On Service—for The Service



The T21B, 2 seater is now in quantity production for the Reserve Command Royal Air Force as well as for export to foreign governments.

Slingsby Sailplanes Ltd., Kirbymoorside, Yorks.

NEWS FROM THE CLUBS—continued

Hail storms came in from the sea every half-hour. The tow car was driven by William Douglas, still the Ulster Glider Duration holder. As the heavy rain of Monday had cut deepish rivers across the sand, the ' Gull ' had to be held stationary into the cross wind while the tow car crawled through each river and then picked up speed, and Glider height, before the next river was reached. The hail storms were a half-mile wide, with enormous draperies hanging in layers and tunnels through which the Glider could be flown. Lift was up to 2,200 ft., and a mile out to sea, and then came the Raven, first as a small black speck, then rising rapidly to 2,200 ft. The ' Gull ' and the Raven had a battle royal, with the Raven a points winner with two resounding bumps on the ' Gull ' tail, but the ' Gull ' fought back manfully, turning and chasing the Raven who at times seemed a little flustered.

All this caused immense amusement to Willie Douglas and Albert and Jackie Leathem in the tow car, who had followed to the West Face road and who swear that at one time the Raven was actually sitting on the empennage. We doubt this, but at times the ' Gull ' did shudder in a peculiar way. However, the boys took movies of the show and maybe they will prove something.

To get a thrill out of Gliding, come to N. Ireland, ride a motor bike 60 miles, fly for two hours and ride home again, and if your meat ration is low there is always the Raven.

W.L.

THE ARMY GLIDING CLUB

Since our last contribution we are happy to report that our conversion to auto-towing as the main system of launching seems most successful.

We hope that the economics of the method will be equally satisfactory.

Lasham seems to be a most fruitful source of thermals, and on Sunday, 15th April, in particular, conditions were very good. A total of above 6 hours was put in by the ' T 21B ', ' Olympia,' and ' Grunau,' and many flights were only terminated because of the queue at the launch point.

Lift was still noticeable as late as five-thirty in the evening, a most encouraging discovery in mid-April.

R.L.P.

CAMBRIDGE UNIVERSITY CLUB

The now traditional Easter Camp at the Long Mynd started on 10th March. We took three aircraft up—the ' Kranich,' the ' Cambridge,' and the ' Prefect,'—arriving very late with a light South wind blowing and snow falling gently. For the first week we had indifferent weather with only one good West wind day. This gave us an opportunity to prove our new mobile two-drum winch. The ' Brute ' as it has been affectionately christened, after towing the ' Kranich ' trailer from Cambridge and up the face of the Mynd was nothing daunted and gave excellent launches.

The winch is mounted on a Ford 3-ton chassis and was designed and built in the Engineering Laboratories at Cambridge by David Marthew and David Clayton.

The weather improved in our second week and we had some fine West winds. Several members had their first taste of hill soaring and two or three flights were made in standing waves.

Five ' C ' certificates were gained and six qualifying flights for the Silver ' C ' duration leg were made. R. H. Prestwich completed his Silver ' C ' with a 45-mile cross-country towards Gloucester in the ' Prefect ' and A. R. I. Austin's five hour flight won him his.

We should like to thank the Midland Gliding Club for their kind hospitality. We had a grand fortnight. Such endearing intricacies as the whiffling machine and water pump are fun for two weeks.

J.K.W.

DURBAN GLIDING CLUB

Our membership is approximately 40—about 20 active members and the usual two or three overworked ones.

We operate at Harrison Flats, a small plateau bordering the Valley of a Thousand Hills, some 30 miles from Durban, the only available flat spot in a radius of fifty miles of Durban. Except for one direction we can never go too far from home as the surrounding countryside is far too broken and uninviting from a landing point of view.

At times we have operated from Maritzburg Aerodrome for aerotows (56 miles from Durban); Authorities have recently made it U/S.

We have two ' Grunau 9's ' one very much u/s, one very much repaired. Our ' Grunau Baby ' was damaged at Standerton last November—needs half a new fuselage.

We have just completed a new fuselage to a pre-war Bourlus ' Baby Albatross ' which was test flown this Easter.

(Wish my log book showed as many minutes' flying as hours spent in building and repairing).

E.B.V.

GATINEAU GLIDING CLUB

Shorty Boudreault spent an hour and a half above the still snow-bound Gatineau hills on Sunday, March 6, in the ' Olympia.' Shorty's lift was partly due to thermal activity and partly ridge lift. The glider was fitted with a new ski, seven feet long by ten inches wide, and performed well on and off the snow. There was plenty of room for aero-towing off Lake of the Mountains, which formed a good winter runway 4,000 feet long by two or three hundred feet wide.

It is planned to fly at Beamish Hill as long as the ice is safe.

The scheme originated with the idea of impressing the skiers with the fact that the season is waning and that we would like them all to join the G.G.C. and learn to fly this summer. A number of members were on hand on Sunday to explain what it was all about, and a good bit of interest was shown.

Johnny Dure showed up last week for a few days and made himself very useful over the week-end. All being well, he and Leo will be with us again this summer.

ULTRA LIGHT AIRCRAFT

Extract from March Bulletin

FLIGHT ASSESSMENTS OF U.L.A.

By John Fricker, Public Relations and Test Pilot, U.L.A.A.

No. 2 The 'Fairey Junior'

IN many ways, Fairey's 'Junior' comes near to being the 'ideal' ultra-light. This is hardly surprising, as it conforms to a specification which was drawn up by the Association soon after its inception, and it was designed by Mr. E. O. Tips, who has produced some of the most efficient ultra-light types in the world.

Two prototypes of the 'Junior' have been produced, the first, '00-ULA' (a graceful tribute to the Association) originally appearing with a 36 b.h.p. JAP engine. This was later replaced by the 60 b.h.p. 'Walter Mikron,' so that it conformed with the second prototype, '00-TIT', the subject of this flight report. Take-off power of the 'Mikron 2' is actually given as 55 b.h.p. at 2,350 r.p.m., maximum permissible revs., being 2,800.

Construction of the 'Junior' is characteristic of the general simplicity of the design. The semi-monocoque fuselage has four longitudinal spruce members, and is fabric-covered. Wings are of the conventional two-spar type, with birch ply leading-edges and fabric covering. The whole airframe, in fact, is pleasantly orthodox, and the 'Junior' has the 'real aeroplane' touch which is a common feature of Mr. Tips' designs.

Perhaps the only novel feature is in the wheel-brakes, which comprise Ferodo cubes threaded on a piece of piano wire encircling the drum. These brakes are cheap and simple, and are reasonably effective. They are not necessary for taxy-ing, as a steerable tailwheel takes care of directional control with very little fuss.

Accommodation in the 'Junior' is good, the cockpit giving the pilot the impression of sitting on the aeroplane, rather than in it. View is naturally very good, and a large windscreen makes goggles unnecessary. Primary instruments are fitted, including an A.S.I., graduated in kilo-metres; tachometer; oil pressure gauge; turn and slip indicator; and a singularly ineffective altimeter about the size of a wristwatch, graduated, if I remember rightly, in 2,000's of kilometres.

Forward of the cockpit is a shaped 11-gallon fuel tank, suggesting an endurance of more than three hours. Fuel level indication is by the normal float-stick. With full tanks, gross weight of the aircraft is about 730 lb., and the C.G. about 15½ inches aft of the wing leading-edge. C.G. limits are from 15.2 to 17.4 inches aft of the leading-edge, and the aft limit is reached when all the fuel is used.

Take-off in the 'Junior' is simple, but gives a foretaste of the general liveliness of the machine. As the throttle is opened, the 'Junior' tends to swing to starboard, but the tendency is no more than a suggestion, and a little rudder holds it smoothly straight. The elevator becomes effective at full throttle, and with the stick back, the 'Junior' will fly off at about 40 km./hr. (25 m.p.h., IAS). Normal take-off procedure gives an unstick speed of about 50 km./hr. (31 m.p.h. IAS). Rudder is held on during the climb away, at 90 km./hr. (56 m.p.h.), when the 'Junior' shows positive longitudinal stability, less marked laterally and directionally. Rate of climb is about 1,000 ft./min.

The 'Mikron' is a smooth and fast-running little engine, and the 'Junior' cruises at 2,600 r.p.m., giving an airspeed of about 98 m.p.h., TAS. Maximum speed has been reported at 108 m.p.h. A bungee trimmer provided in the cockpit for the fore-and-aft trim terminates simply in a leather loop which may be slid up and down the control column. It might relieve the load on long flights, but the stick forces are so small and the changes of trim scarcely noticeable, that it is seldom brought into action. Despite its simplicity, however, it is effective.

Limit speed of the 'Junior' is about 140 m.p.h., IAS, which can be reached with only light stick forces even with the most adverse trim. Stick-free however, at that speed, the 'Junior' will pull out abruptly, and Boscombe Down, who had the 'Junior' for extensive tests, report an accelerometer reading of over 3½ G. Even with the trim fully forward, longitudinal stability is very positive, a 2 G acceleration being recorded.

With its clean airframe and wing-root fillets, the 'Junior' may be expected to stall without much warning, and with either power on or off, such is the case. With a wing loading of about 5.9 lb./sq. ft., however, the stall is gentle, and little height is lost, although the port wing is prone to drop fairly abruptly. Power-on, the 'Junior' stalls at about 40 km./hr., IAS (25 m.p.h.), which is low enough, even adding quite a lot for P.E.C., for anyone. Without power, the stall comes at some indeterminate point around 50 km./hr. IAS, (31 m.p.h.). Trying these stalls in 30° banked turns produced similar results, and there was no tendency to spin.

Indeed, to make the 'Junior' spin, aileron and elevator have to be applied in addition to full rudder, and a slight relaxation of rudder produced an immediate recovery. Its reluctance is also shown by the nose-up pitching moment that makes itself felt very strongly during recovery.

Although no flaps are fitted to the 'Junior', the glide, at a recommended 70 km./hr. (44 m.p.h.) IAS, gives a satisfactory angle of approach. No trim is possible below speeds of about 75 m.p.h. in the glide, but a light pull force is merely required. The aircraft sits low on the ground, and during the gentle flare-out, one can almost feel the ground cushion. The 'Junior' settles nicely at about 50 km./hr. (31 m.p.h.) IAS, as one would expect, and rolls straight with very little help.

The 'Junior' is such a thoroughly satisfactory aeroplane that the only fault that one can find with it is that it is not in production and available to our Groups. It seems to be the answer for Student Pilots to put in hours on an aeroplane representative of larger mounts, while more experienced pilots can exercise their skill most economically on either long cross-country flights or aerobatics. Given a suitable engine, we may yet see the 'Junior' in wide scale service.

ROYAL AERO CLUB CERTIFICATES

(Issued under delegation, by the B.G.A.) MARCH, 1951

CERTIFICATES - "A" .. 56 (12972 and 13027 inc.)
"B" .. 23
"C" .. 10
Silver "C" 5

"B" CERTIFICATES

No.	Name	A.T.C. School or G.C.	Date taken
5668	Peter Westmorcland	No. 82 G.S.	4. 3.51
8968	John J. Bowman	Scottish G.U.	12. 8.50
11627	Ivan C. Hitchman	No. 130 G.S.	4. 3.51
12591	Robin Chambers	No. 126 G.S.	3. 3.51
12655	John S. Skipp	Hereford G.C.	3.12.50
12972	Mark Scott	No. 31 G.S.	2. 2.51
12974	Alan A. Croxford	Oerlinghausen	12. 8.50
12977	Robert W. Avery	Bristol	17.2. 51
12980	Mary Martyr	Bristol	4. 3.51
12995	Robin I. L. Rose	R.A.F. Coll.	3. 3.51
12996	Michael Edwards	R.A.F. Coll.	4. 3.51
12997	Albert A. Fenn	No. 83 G.S.	3. 3.51
13000	Ronald Hickson	Fulmar	13. 5.50
13001	John R. Powell	No. 89 G.S.	4. 3.51
13011	David J. Walker	No. 89 G.S.	4. 3.51
13014	Janet E. Toler	H.Q., B.A.F.O.	12. 8.50
13016	James P. MacGregor	Celle	11. 5.50
13020	Samuel J. Barker	Salisbury S.A.	14. 1.51
13021	Douglas G. Elliot	Salisbury S.A.	20. 8.50
13022	Harold F. Burditt	Salisbury S.A.	3. 9.50
13025	Giuseppe A. Luciani	Scottish G.U.	25. 3.51
13026	Erwin S. Jedynak	London	7. 9.50
13023	John R. Bell	B.A.F.O.,	4. 5.50

"C" CERTIFICATES

9898	Major Awdry	Army Flying	19. 3.50
10707	Edwin E. Tooke	R.A.F. Coll.	15. 8.50
10885	George E. Crosse	No. 48 G.S.	29. 8.50
12300	Arthur Calderbank	Derby & Lancs.	25. 3.51
12951	William S. Askey	Derby & Lancs.	25. 3.51
12974	Alan A. Croxford	Oerlinghausen	17. 9.50
12997	Albert A. Fenn	No. 83 G.S.	3. 3.51
13014	Janet E. Toler	H.Q., B.A.F.O.	16.12.50
13026	Erwin S. Jedynak	London	1.10.50
13023	John R. Bell	B.A.F.O.	27. 5.50

SILVER "C's"

297	Jean Bird	Surrey	19. 9.50
298	A. R. I. Austin	C.U.G.S.	24. 3.51
299	J. A. Currie	London	25. 3.51
300	C. O. Vernon	Handley Page	26. 3.51
301	R. H. Prestwich	C.U.G.C.	24. 3.51

FOR SALE

KIRBY KITE—BGA 394. Complete with Trailer. New 1939 and last C. of A.–9.9.47. Total flying hours since new, less than 100. A.S.I. Slater-Cobb and recording Barograph.—WALKER, LONDON GLIDING CLUB. Dunstable 419.

Glider Photographs

REQUIRED FOR

FRONT COVER

OF

SAILPLANE

AND COLOUR PRINTS

ONE GUINEA for copyright if used.
Glossy prints or negatives only.

When submitting please state : Photographer, type of camera, film used, stop, exposure and locality.

Please reply to ART EDITOR, *Sailplane & Glider*, 139 Strand, W.C.2.

GLIDING IN GERMANY

As we go to press we hear that permission has been given by the Allied High Commander in Western Germany for gliding to begin again in the Allied Zone so soon as they have agreed the rules with him.

We may now look for the emergence into public view of several new types of sailplanes about which we have heard in the past year. They have been under construction, but so far only as models, although some of the 'models' appear to have a fifty-foot span.

MIDLAND GLIDING CLUB, LTD.
Long Mynd, Shropshire

Summer Camps will be held as follows : May 12th—20th. June 30th—July 8th. August 4th—12th. September 1st—9th. Inclusive fee for each Camp of 9 days with board and lodging and all flying, £14. 0s. 0d. Full particulars from J. W. HORRELL, 92, Knightlow Road, Harborne, Birmingham, 17.

THE MIDLAND GLIDING CLUB LIMITED

The Long Mynd, Church Stretton, Shropshire. Telephone : Linley 206.

Full particulars may be obtained from the Secretary, F. G. Batty, F.C.A., 2, Lombard Street West, West Bromwich, Staffs.

THE DERBYSHIRE AND LANCASHIRE GLIDING CLUB

Camphill, Great Hucklow, Derbyshire.

2 seater ab initio training a speciality.

Fully licensed Club House.

Resident Steward and Stewardess.

For further details apply to the Secretary.

THE LONDON GLIDING CLUB LTD.

Dunstable Downs, Beds.

Tel. : Dunstable 419.

Flying Membership :

Entrance Fee £5. 5s. 0d.
Annual Sub. £6. 6s. 0d.
(*or* 11/6 *monthly*)

Non-Flying Membership :

Entrance Fee Nil
Annual Sub. £2. 2s. 0d.

Resident instructor, two resident engineers, dormy houses, licensed bar, full catering at week-ends. Flying instruction every day except Tuesdays.

Twelve club aircraft.

Link Trainer Instruction Available.

Club Meetings : 12th to 27th May, 16th June to 1st July, 4th to 19th August.

THE YORKSHIRE GLIDING CLUB,
SUTTON BANK, YORKSHIRE.

Flying facilities are offered to all *Private Owners, Soaring and Power Pilots.*

For full particulars apply to : L. A. ALDERSON, "Lyndhurst," Sinnington, York. Hon. Secretary, Yorkshire Gliding Club.

COUNTRY LIFE CARAVANS

have Models to meet all pockets and needs.

Country Life Caravan Co., Romsey.

THE .
HAWKRIDGE AIRCRAFT CO. LTD.
for

- Crash repairs and C. of A. overhauls to Light Aircraft, Gliders and Sailplanes.
- Modifications and experimental work.
- Used Gliders and Sailplanes.
- Reconditioned and special components.
- Plans Service and Constructional Kits.
- Trailers.

Write :
HAWKRIDGE AIRCRAFT COMPANY LTD.
KNIGHTON WAY LANE, NEW DENHAM
Nr. UXBRIDGE, MIDDX.

We build,
You construct,
They fly . . the Dart Kitten

DART AIRCRAFT LTD.
25, Kings Way, DUNSTABLE, Beds.
Dunstable 938
Barnet 0621

Soaring ★

One of the few magazines in the world devoted exclusively to motorless flight.

Send 10/- for three sample copies and the booklet—

Soaring in America

Increase your knowledge of soaring. You are invited to send £1 for membership in the Soaring Society of America, which includes a year's subscription to *Soaring*.

SOARING SOCIETY OF AMERICA, INC.,
3778, Marion-Ave., Memphis, Tenn., U.S.A.

SPECIAL OFFER TO READERS

A few ONLY !

Well bound volumes of "SAILPLANE AND GLIDER" for 1948, 1949 and 1950—Price Two GUINEAS each.

Send your cheque **NOW** *to the address below.*

AND—

BACK NUMBERS

We now possess a large selection of back numbers dating from 1934 onwards. If readers desirous of obtaining copies will state their precise requirements we shall endeavour to accommodate them. There is a wealth of interesting and instructive detail in the matter of these numbers and, glancing through them, one cannot fail to be impressed at the rate of progress made in the movement which was in its infancy in the early 1930's. Price : 2/- per copy, January, 1948 onwards ; 2/6d. for all preceding issues. Both prices include free postage to any part of the world.

"Sailplane" Office, 139 Strand, W.C.2

Will YOU help our drive for Circulation?

Sailplane and Glider

THE ONLY BRITISH JOURNAL CATERING EXCLUSIVELY FOR THE INTERESTS OF GLIDING AND ULTRA LIGHT AIRCRAFT ENTHUSIASTS

SUBSCRIPTION FORM

To ROLLS HOUSE PUBLISHING CO. LTD.,
BREAMS BUILDINGS, FETTER LANE, EC.4

Please enter my subscription for 12 *months. Remittance for* 19/- *herewith.* (9/6 *for* 6 *months*).

NAME .....

ADDRESS .....

.....

.....

Cheques, P/O's, etc., payable to Rolls House

Do you know your airfields?



10

Recognise this airfield? It's No. 10 in this series of puzzle photographs. You'll find the answer below on the right. ★

The Aircraft Servicing Vehicles of the Shell and BP Aviation Serviceare a familiar sight at twenty-five aerodromes throughout the country. On duty all year round, their crews service the aircraft of numerous charter companies, flying clubs, private and business owners and twenty-three international airlines.

Shell and BP Aviation Service

Shell-Mex and B.P. Ltd., Shell-Mex House, Strand, W.C.2.
Distributors in the U.K. for the Shell
and Anglo-Iranian Oil Groups.

★ Turnhouse, Edinburgh