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THE FIRST JOURNAL DEVOTED TO SOARING AND GLIDING

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Cover Photo :
Peter Riedel, in 'Slingsby's' pilot's seat and Hermann Winter, two instructors of the South West African Gliding Club. Both have the International Gold "C." Picture taken at Windhoek, in February this year.

Editorial

AS we go to press plans for our grand Gliding Exhibition are well advanced. We have been promised the help of the Science Museum and of the Victoria and Albert, of the Meteorologists, and of the Society of Model Aircraft Engineers, as well as of the B.G.A. We open on the morning of the 17th July and continue till the evening of the 24th July. Of course during this week everybody who can get there will want to be at Camphill, but it would be nice to have the assistance of any glider pilots who find themselves in London between those dates. We hope to see the general public rolling up in their hundreds, all primed with abstruse and most technical questions, and we would welcome your help.

The poster competition is arousing some interest. Entries should be double crown (20 by 30 inches) and vertical, in black, white and one colour. They should advertise the Gliding Exhibition at the Tea Centre, Piccadilly Circus, from the 17th to the 24th July, and be headed 'Sailplane and Glider.' They must be in our hands by the 21st June at the latest to enable us to have time to get them printed and distributed.

We still need models, photographs of all shapes and sizes, and films and colour slides (35 mm.) for the projection room. If these are clearly marked with the owner's name and address they will be returned as soon as the Exhibition is over, but it would be an enormous load off our minds if they could be both delivered and collected at the Tea Centre by their owners in person.

ARGENTINE NEWS—By Jose Cuadrado

During this past season there have been several contests. First of all there were three Regional Contests to decide which of the Silver 'C' pilots should compete at the National Contests this year. One was held in Merlo, one in Cordoba, and the third in Tandil, during the month of December. The pilots selected as a result of these trials went to the National Contests in Cordoba from the 13th to the 23rd of January. In Category 'A' (high performance sailplanes) R. Patallo was first and A. Araoz of the Albatross was second. In Category 'B' ('Grunau Baby IIA') Vastik of Esperanza was first and C. Dori second.

After this the final selection was made between 12 pilots, all flying 'Grunau Babies.' Eight winners of the National Contests were R. Patallo, A. Araoz, J. Wuirschmidt, E. di Salvo, O. Vastik, C. Dori (Instructor), J. Ompre and H. Trellini. With these were the winners of the 1953 National Contest—G. Garcia and W. Sturm, and the first ranking Argentine pilots since 1948, J. Cuadrado and J. Ortner.

These twelve pilots had five tasks : speed to a fixed goal, goal chosen by the pilot, out and return, and triangular flight with speed test. All these tasks were keenly fought out. The 'Babies' did magnificiently—and how they ran ! ! The final order was : 1st Ortner, 2nd Cuadrado, 3rd Ompre, 4th Dori, 5th Garcia, 6th Patallo, 7th Wuirschmidt, 8th Araoz, 9th Di Salvo, 10th Vastik, 11th Sturm, and 12th Trellini.

The three first will represent Argentina at the International Contests ; one in a single-seater and the other two in the two-seater. We will have to see what we can buy—possibly a 'Kranich III' or a 'Condor IV' from Germany or perhaps a 'Canguro' from Italy. Meanwhile we are undergoing a month of intensive training at Tandil, a hilly district near Mar del Plata.

MORE SWEEP

By

B. S. SHENSTONE, M.A.Sc., A.F.I.Ae.S., F.R.Ae.S.

MY article on two-seater sailplanes published in the January 1953 issue of *Aircraft Engineering* and in the issue of *Sailplane* was written early in 1953. Since then there has been considerable two-seater development and it is now my intention to comment on that part of it which has come to my attention.

The most interesting trend has been a wide use of sweepforward to give the aft-seated pilot a better view. At the same time this sweep gives more favourable tip stalling characteristics. It is also likely that for moderate sweep the effective aspect ratio is slightly increased. This is no direct result of sweepforward, but an indirect one. Many unswept wings are washed out toward the tips either geometrically or aerodynamically to improve the stall characteristics. This washout distorts the span loading and reduces the effective aspect ratio. Doing without the washout would improve the effective aspect ratio.

There has been the expected German design activity, for in West Germany at least there is government support for gliding. Seebohm, the Minister for Transport, has publicly stated his interest in gliding. That means money, direct or indirect.

Some of the German types are developments or so-called developments using the names of earlier well-known types. For instance the ' Kranich III ' has a smaller wing and greater span than its earlier namesakes and has also a steel tube fuselage of a different shape. The second man now sits ahead of the spar instead of behind it. The ' Mü 13 E ' series was well known before the war as single-seaters. Now the designation ' Mü 13 E ' has blossomed forth as a two-seater with and without sweepforward.

Slingsby in England is building his ' T-42,' a 58 footer with an unusual solution to the back-seat view problem. The background of this design must be understood to appreciate the reasons for some of the features. This background is essentially the necessity for low cost. With present high and increasing labour costs in U.K. a short-run product such as a two-seat sailplane must be cleverly designed for cheapness. It is easy, as Slingsby says, to design without regard to cost and some very fine designs can emerge from such an approach. But it is a very expert job to design for a poverty-stricken market.

So the ' T-42 ' is a straightforward high wing job with tandem seating, the wing being in three parts, a wide centre-section of about a third of the total span and two outers each also of about a third of the total span. This follows the layout of the ' Skylark ' and although it involves more wing fittings than a two-part wing, such metal fittings are smaller and lighter. The three-part wing also simplifies transport. For the ' T-42 ' there is no part longer than about 25 feet.

The unusual sweep arrangement is worth noting. Over a spanwise distance of 5 feet the sweepforward is 26°, making a wide notch in the planform. This changes to a sweepforward of 3° over the rest of the centre wing. The outer panels have zero sweep on their leading edges (see Figure). This wing with 18% thickness at the root, might be considered too thick by some designers.

The ' T-42 ' fuselage is angular in section, somewhat like the ' Skylark.'

The ' Kaiser Ka-2 ' built by Schleicher in Poppenhausen has the same economical approach as the ' T-42.' It is also a high wing tandem-seated job. Schleicher has built gliders by various designers for more than 25 years, and he has built them for a wide sale, so he does not go in for fancy work. The ' Ka-2 ' has the same span as the ' Olympia ' and the ' Laister-Kauffmann TG-4A,' that is 50 feet (15 metres), which is small for a two-seater. The two-piece wing is swept forward to give both pilots a good view. It is described as a simple and straightforward aircraft for dual training, but also usable for competitive flying. Attention is given to robustness rather than to minimum weight.

The wing section used is a cross between Göttingen 535 and 549, a combination that might be considered rather old fashioned by some designers. It has a large landing wheel which can be omitted if desired for contest flying. The fuselage is ply-covered and oval in section. The cost of the ' Ka-2 ' in Germany is hoped to be about 700 pounds.

The ' HKS-1 ' (Haase, Kensche, Schmetz) is a very different story. It is in the ' Fafnir '/' RJ-5 ' tradition, an all-out job for maximum performance, cost and effort unlimited and not intended for production.

It is a mid-wing machine with sweepforward, tandem seating and a butterfly tail. Every effort is being made to keep the surfaces as smooth and even as possible. Structurally the main interest lies in the use of light aerated or foam plastic as filler and stabilizer. The wing skin consists of an inner skin of wood 0.3 to 0.4 mm. thick, a 6 to 7 mm. layer of the plastic and an outer covering of plywood 1.2 to 2 mm. thick. Ribs and fuselage frames are made of 1.5 to 3 mm. spruce flanges and 20 mm. of the plastic supporting them. The usual rib width of 7 mm. and frame width of 15 mm. were used. The foam material used had a specific weight of 0.03 to 0.05 and has closed cells.

The thin (14%) wing has no slits, slots, cracks or any break in its upper surface. There are no ailerons, flaps or wing brakes. Instead of ailerons and flaps, an ingenious scheme for varying the camber of the aft third of the wing has been devised. This can be symmetrically or asymmetrically applied for use as flaps or lateral control. Dive brakes consist of a tail parachute which can be retracted electrically.

The wheel and skid are retractable and shock-strutted.

The fuselage aft of the wing has the double-arc section as used on the ' Olympia.'

The mid-wing arrangement was chosen so that the designer could have maximum freedom in the design

TABLE

Type	KRANICH III		MÜ 13E		T-42		Ka-2		HKS-1	
Designer	Jacobs		Scheibe		Slingsby		Kaiser		Haase Kensche Schmetz	
Seating	Tandem				Tandem					
Span m ft	18·3	60	17·2	56·5	17·7	58	15	49·3	19	62·5
Length m ft	9·08	29·7	8·2	27	7·93	26	7·95	26·1	8·35	27·3
Wing Area m^2 ft^2	20·2	217	18·6	200	22·3	240	16·8	180	18·3	196
Aspect Ratio	16·5		16		14		13·4		19·7	
Wing Section Root					63_3-618		68 535/549		65 (215) 714	
Tip					4412					
Thick/Chord Root					0·18				0·14	
Tip					0·12					
Washout °					3				2·5	
Sweepford L.E. °			0 or ~3		3 / 26		4		2·5	
" at			5·5 at ·25c				6 at ·25c		5 at 0·3c	
L/D max	27		28		28		24		30+ ?	
at V Kph mph			70	43·5	77	47·7	75	46·5		
Min Sink m/s fps	·65	2·13	·73	2·4	·64	2·1	·85	2·8		
at V Kph mph			55	34	69	42·5	60	37		
at Wt. Kg lb	430	948	410	900	467	1030	430	948		
Wing Load Kg/m^2 lb/ft^2	21·3	4·38	22	4·5	21	4·3	25·6	5·25	28·5	5·8
$Span^2$ Load ditto	1·26	0·26	1·33	0·28	1·43	0·3	1·9	0·39	1·41	0·29
Ultimate Factor					8·6		8			
Wheel Size mm							380×150		400×100	
Weights Kg lb										
Empty	230	508	240	529	286	630	230	508	320	700
Load	200	440	170	371	213	470	200	440	200	440
All-Up	430	948	410	900	500	1100	430	948	520	1140
After Wilkinson :										
Min Sink m/s fps	·73	2·4	·76	2·5	·78	2·45	·84	2·75	·68	2·25
L/D max	25		24·5		23·5		23		28	

of the windshield and cabin top. It was felt that if a high wing position had been chosen, the fuselage nose profile would have to be continuous for the sake of the flow over the top of the wing centre-section.

The designers hope to refine details as required, and not knowing how successful the various ideas will be initially, they are making no performance promises. They suggest that the L/D will lie between 25 and 40. Fair enough. They make no guesses about sink.

In addition to these more refined aircraft, a number of simpler two-seaters have been built in Germany

(continued foot of next page)

News from Salisbury Gliding Club

By Maurice Pike

HERE at Salisbury, where we have a comparatively small membership, our recent A.G.M. produced the decision to play down the ' circuits and bumps ' aspect of our activity and concentrate on soaring both for pupils and trained pilots.

' All work and no play makes Jack a dull boy . . . ' and in our case (where ' Jack ' = ' 1 prospective soaring pilot ') he must have resorted to his beanstalk as a means of getting off the ground because we have on too many occasions during the year, been forced to disappoint newcomers by failing to provide continuous two-seater training, because of small but frustrating incidents involving the ' T-31.' Our main bugbear is the layout of the airfield whose course surface doesn't do the winch cable any good and the elephant grass which grows at an incredible rate in spite of the valiant efforts of a local farmer friend of ours. However, we have given it a ' crew-cut ' this time in readiness for the reappearance of our ' Tiger Moth ' towplane which will be performing again now that the rainy season is over.

Chairman Eric Burditt, D.F.C., has shown that cross-countries, in spite of the potential difficulties, are not by any means impossible, by flying over 60 miles to Sinoia in the little ' H-17,' which is at present undergoing a change of clothing. ' Birdie ' also pushed up our duration record to 3 hours 40 minutes again in the ' H-17 ' which for some time has been easily the most consistent performer in the Club. Cross-country flights will be a little hazardous due to the difficult bush-covered terrain and the small number of roads leading out of Salisbury and although there's no immediate likelihood of trips into Mau Mau territory, pilots cannot ignore the risks of meeting other savage beasts of the field on attempted cross-countries. It's all very fine for you Dunstable types to go sailing gaily around Whipsnade, but they don't fence them in around here. Our moral : stick to the road !

The ' Cadet ' was recently sold to our Umtali friends leaving us with the ' T-31 ' as the only Club-owned aircraft, our policy being to provide training (mainly by soaring from aero-tow) in the two-seater after which the pupil syndicates into a privately-owned sailplane, again concentrating on soaring. There are four privately-owned sailplanes and shares are available in several cases.

We never give up hope of state (or other) assistance, and our claim to such aid has been strengthened by the return of the ' Kirby Kite ' presented by the State Lotteries Trust to Umtali before the war, and now about to take on a new and much improved lease of life in the hands of our C.F.I., Captain Derek Lane, who has spent months of work on the reconstruction and modification of the machine. She now has a long streamlined cockpit canopy, spoilers,

(*continued on page 8*)

MORE SWEEP—(*continued from page 3*)

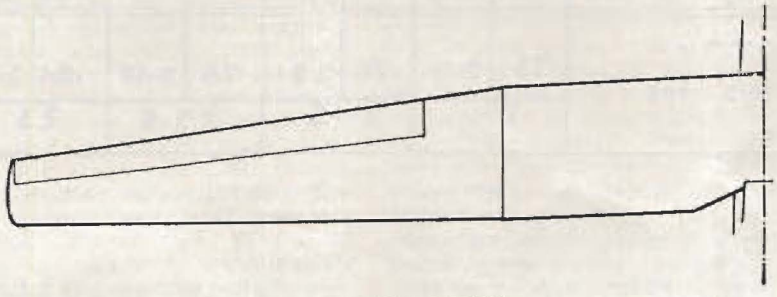
and elsewhere, but these will not be described here as their usefulness is limited, and anyhow they have no sweep.

The Table gives data available on the types described and also the performance from Wilkinson's generalized curves (Fig. 18 and 19 of my January 1953 article). The ' Ka-2 ' is the only one that is not claimed better than Wilkinson's curves, omitting the non-committal Messrs. Haase, Kensche and Schmetz. This simply means that the estimates are either optimistic or the detail cleanliness of the types must be better than average. To achieve that means a great deal of hard work.

Concluding, I may say that for two-seaters sweep-forward is with us. It is not much compared to modern sweepback on powered aircraft, being of the order of $2\frac{1}{2}°$ to 7° on the leading edge for straight or complete sweep, and up to 10° to 16° on partial sweep if one omits the rather special case of the root sweep of the ' T-42.' On many designs the sweep is designated as that at $\frac{1}{3}$ or $\frac{1}{4}$ chord from the leading edge because this has aerodynamic significance. However, when measuring off small drawings, it is easier to measure the leading edge sweep. In general the $\frac{1}{4}$ chord sweep necessary to get the aft pilot on the centre of gravity and still have his eye ahead of the leading edge is 5 or 6° for continuously swept wings.

Here are some examples of leading edge sweep :—

Type.	*Continuous Sweep.*	*Inboard Sweep.*	*Outboard Sweep.*
' Crabpot ' ..	0	—	—
' Mü 13 E ' ..	0 or about 3°	—	—
' Stakhanovitch '	7°	—	—
' Ka-2 '	4°	—	—
' HKS-1 '	2.5°	—	—
' S-25A '	—	11°	0
' T-42 '	—	26° and 3°	0
' Harbinger ' ..	—	16.5°	0



T-42 WING

'SLINGSBY T-42'

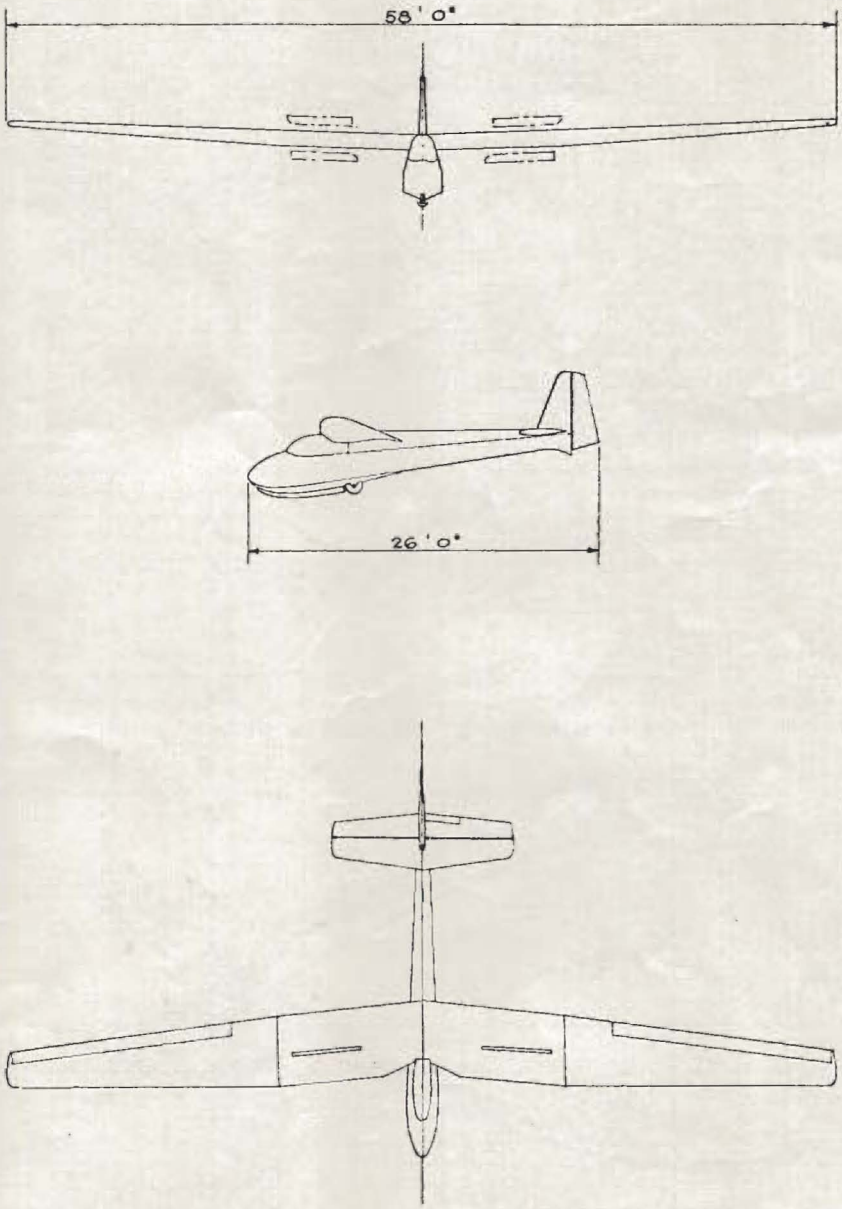
INTRODUCTION

THE 'Slingsby Type 42' has been designed to meet the need for a high performance two-seater training sailplane which can serve as a replacement for the medium or low performance machines at present in use.

The design is intended to incorporate all the features which experience has shown to be desirable in training gliders. The design of the structure is simple and robust and allows for easy servicing and maintenance.

The machine should have a performance which is in advance of any two-seater sailplane at present available. A moderately low wing loading (4.6 lbs. at max. all-up weight) has been chosen to provide a good performance at low speeds and a low landing speed. The machine can be flown solo from the front cockpit by the removal of a ballast weight from the tail end of the fuselage. As a single-seater the performance should be comparable with the present 'Sky' sailplane.

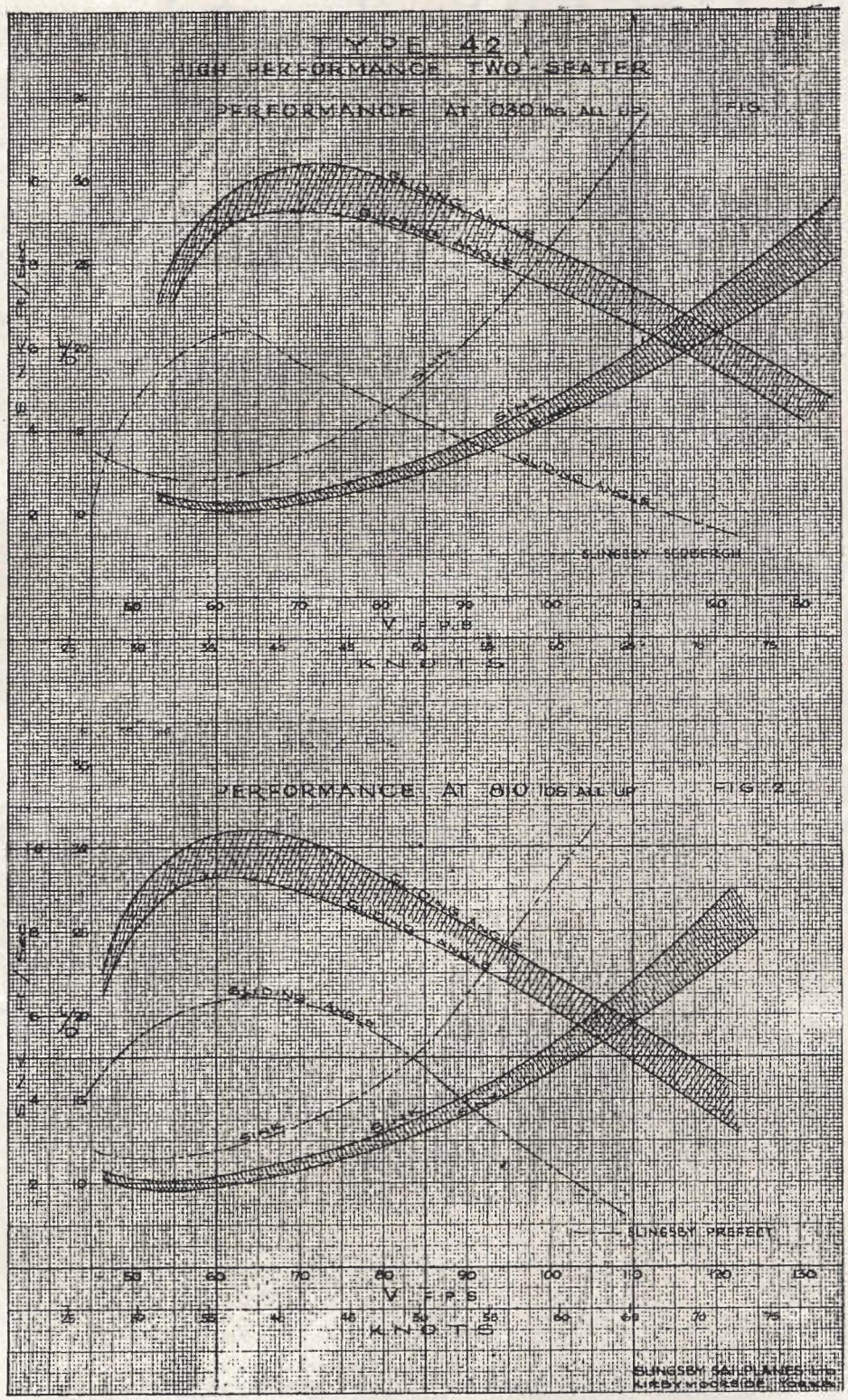
Although designed as a training machine the 'Type 42' should be an excellent all round high performance two-seater and be quite suitable for contest flying.



TYPE 4'2

HIGH PERFORMANCE TWO - SEATER

SLINGSBY SAILPLANES LTD : KIRBYMOORSIDE : YORKS



The stressing weight of 1,100 lbs. should allow ample margin for special installations, such as radio and oxygen to be fitted.

The 'Type 42' can be transported in any trailer which will take a ' Sedbergh.'

TECHNICAL DATA

Span 58 ft., Length 26 ft., Wing Area 240 sq. ft., Aspect Ratio 14, Mean Chord 4.14 ft., Estimated Tare Weight 630 lb., Maximum All Up Weight 1,100 lb., Maximum Permissable Load 470 lb., Tailplane and Elevator Area 37.5 sq. ft., Tailplane and Elevator Span 12 ft., Fin and Rudder Area 19.58 sq. ft. (gross), Fin and Rudder Height 5 ft. 8 in., Positive Stressing Factor 8.6, Negative Stressing Factor 5.6.

Airfoil Sections—

Wing Root NACA 63_3—618, Wing Tip NACA 4,412, Tail Units NACA 64—009, Wing Aerodynamic Twist 3° Wing Root Incidence 5°, Wing Dihedral 2°.

GENERAL DESCRIPTION

All structural components, with the exception of fittings are constructed of wood. Fibre glass laminates are used where suitable for fairings, lightly stressed skins and cockpit fitments.

Fuselage.

The fuselage is built as one component which also incorporates the fin. The forward part of

the fuselage which contains the two cockpits and the wing attachment frames, has a structure consisting of frames, stringers and longerons and is plywood covered. The rear fuselage is a diagonally braced structure which is fabric covered.

Cockpits.

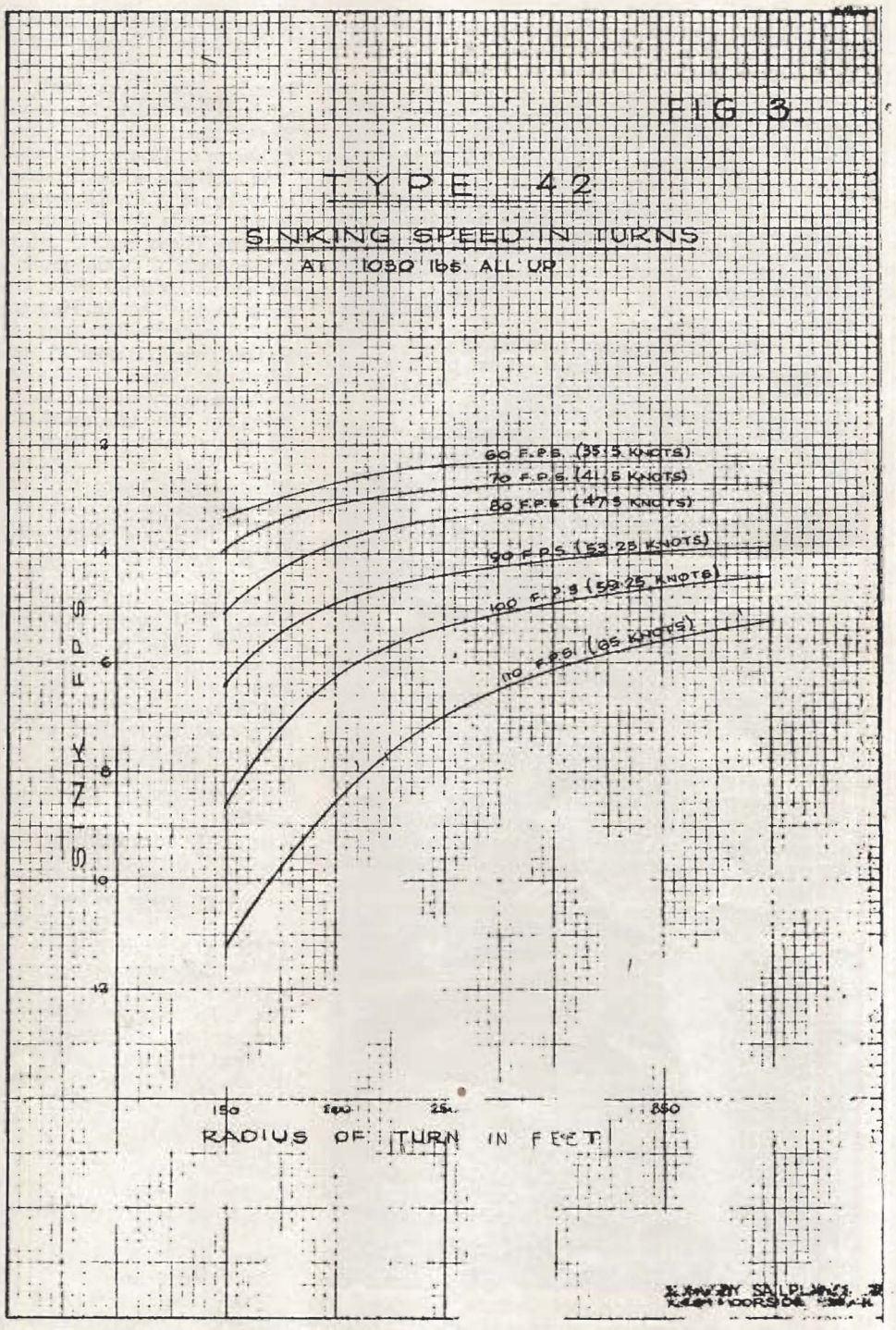
The cockpits are positioned in front of the wing and provide good visibility for both pilots. The rear pilot's rudder pedals are located at the side of the front pilot's seat, this allows the two pilots to be sufficiently close together for normal conversation to be carried on without the need for any system of intercomm.

All controls are fully duplicated and space is available for a full set of instruments in both cockpits.

Access to the cockpits is obtained by opening the coupe, either pilot can enter or leave the machine without disturbing the other. The seats accommodate back type parachutes, if these are not worn seat backs can be fitted.

Undercarriage.

The main undercarriage consists of a skid and a wheel. The skid is mounted on rubber shock absorber blocks, it is made of ash and has a replaceable steel rubbing plate on the underside. The wheel has a diameter of fifteen inches and a tyre size of 6.00 x 4.00; it is located directly under the main frame and is solidly mounted. A tail-skid is fitted at the rear end of the fuselage, this consists of a metal spoon mounted on a leaf spring.



Centre Section Wing.

The wing is divided into three panels, these are centre section, port and starboard outboard wings.

The centre section is twenty foot span and has a constant chord of five foot. To obtain the required C.G. position relative to the wing it has been necessary to sweep the tips of the centre section twelve inches forward. This gives the component an overall width of six foot.

The dive brakes are contained in the centre section of the wing, these are located aft of the spar and are operated by push-rods from the fuselage.

The main spar is positioned at 40% of the chord. Forward of this point the wing is plywood covered to provide an accurate profile, aft of this it is fabric covered.

Outboard Wings.

The outboard wings are nineteen foot span and are attached to the centre section by a special arrangement of fittings, which only require the insertion of one pin.

The ailerons are built in one piece and are operated by a horn one-third out on their spar.

Tail Units.

The fin is built as an integral part of the fuselage and is plywood covered to provide an accurate profile to the airfoil section. The rudder is a diagonally braced structure which is fabric covered, it is mounted on to the fin by means of two hinges.

The tailplane is fully plywood covered and is attached to the fuselage by two rigging pins. The elevator is diagonally braced and fabric covered, it is attached to the tailplane by three hinges. An elevator trim tab is located at the trailing edge on the port side of the elevator.

PERFORMANCE

The estimated performance of the ' Type 42 ' is set out as Figures 1, 2 and 3 on the previous pages. It will be seen that a margin of error has been allowed in the calculations by expressing the performance as falling between two limits, it is considered unlikely that the performance will fall much below the mid-point on these limits.

Figure 1 shows the estimated performance of the ' Type 42 ' when flying with two 180 lb. pilots and parachutes, the performance of the ' Slingsby Sedbergh ' is plotted on the same curve as a comparison. At this weight the ' Type 42 ' should have a stalling speed in the region of 32 knots.

Figure 2 gives the performance of the ' Type 42 ' when flown solo from the front cockpit, the performance of the ' Slingsby Prefect ' is also given as a comparison.

The curves in Figure 3 gives the rate of sink of the ' Type 42 ' when flying in turns of various radii at various speeds. It will be noted that at normal flying speed the rate of sink in turns is low.

When flying at the maximum all up weight of 1,100 lbs. the performance of the ' Type 42 ' should compare favourably with such machines as the existing ' Sky ' sailplane and German ' Weihes,' it should be consistently in advance of any other two-seater which is generally available at the present time.

NEWS FROM SALISBURY—(*continued from page* 4)

blind flying instruments, stick trimmer and cockpit ventilation (an important consideration in this climate). In an all-white colour scheme she'll be the slickest looking sailplane in Central Africa.

The Swiss ' Grunau Baby IIB ' is now shared by Ted Pearson, ex-C.F.I. of the Rand Club, and Maurice Pike (Treasurer). This aircraft is a lovely affair being finished in a yellow and silver scheme. She changed hands in January for, wait for it . . . £200 (we still can't believe it either !).

In addition to Ted Pearson we are also very happy to welcome Wally Menashe from Bulawayo (and the Rand), Sheila Wood, who was trained at Cape Town, Daphne Thompson, also from the Rand, and Lorna McLeod, an ab initio pupil (quite an invasion !). We do hope they'll all either continue to ' be birds ' or learn to do so at Mt. Hampden.

We recently lost our Ground Engineer, Dave Ryland, who has gone to seek his fortune in Northern Rhodesia. Dave was one of our keenest pupils and we were sorry he had to leave before finishing his training, although no doubt the ' bug ' will keep biting and send him back on every possible occasion. Peter Ross (Secretary) has joined the Southern Rhodesia Air Force but judging by the number of attendances by him at Mount Hampden since he joined, he is not being wholly converted to power flying by any means.

So there we are, with three intermediate machines (Jack Wall's ' Kite ' is still for sale) and the old workhorse, ' T-31 ' all raring to go and the 1954 dry season upon us. Maybe even our weather doesn't quite measure up against Texan conditions but we've just seen one of the first ' dust devils ' of our season whip half-a-dozen sheets of corrugated iron (about 6' x 3') off a local factory roof and flip a couple of them over and over up to 500 feet, finally depositing them half a mile downwind. As Peter Reidel from South-West Africa (*Sailplane* March/April) says : ' It doesn't matter if a machine has a sinking speed of one foot a second more or less you go up regardless once you've contacted lift on most days.'

A.T.C. NOW WORLD'S BIGGEST GLIDING ORGANISATION

BRITAIN'S Air Training Corps now has the largest gliding organisation in the world. France comes a close second, with its many civilian gliding clubs. The A.T.C.'s claim to be the largest is based on the number of pupils and instructors continuously engaged throughout the year at its numerous schools, the hours of flying and the number of launches.

Achievements for 1953 (1952 figures in brackets), just compiled, include the following :—

Launches	97,114	(92,584)
Hours of flight	7,346	(not recorded)
Certificates issued	1,478	(1,184)
Cadets qualified proficient—		
' B ' Certificates	1,403	(1,130)
Cadets qualified advanced—		
' C ' Certificates	71	(54)

There are now 44 A.T.C. gliding schools in the country. The outstanding school during 1953 was No. 89 (Christchurch, Hants.) which trained 101 cadets during the year. No. 104 (Martlesham Heath, Ipswich), No. 166 (Hawkinge, Kent), and No. 168 (Detling, Kent) gliding schools have trained over 70 cadets each. At the Instructors' School, also at Detling, 326 students attended 28 weekly courses.

Netherlands Participation in World Championships

The Hague.
May, 1954.

THE Royal Aero Club has entered 2 teams for this great gliding event as was the case in 1950 and 1952. In Sweden the Dutch pilots, P. Malotaux and A. Kleyn (now with the Australian Toowoomba Gliding Club) reached 17th and 26th place among the 29 competitors. Both flew a Fokker-built 'Olympia.' In Spain the Dutch champion, G. J. Ordelman, flew a 'Sky' single-seater into 7th place and the two-seater team consisting of J. Koek and I. de Boer flying a Spanish 'Kranich II' ended as No. 13.

Following are some details of the Netherlands team that will compete at Camphill.

PILOTS

Ilbert de Boer of Amsterdam who will fly a 'Sky,' won last year's Netherlands Gliding Championship flying an 'Olympia.' He started gliding in 1946 on a primary glider and gained number 32 Silver 'C' in 1951.

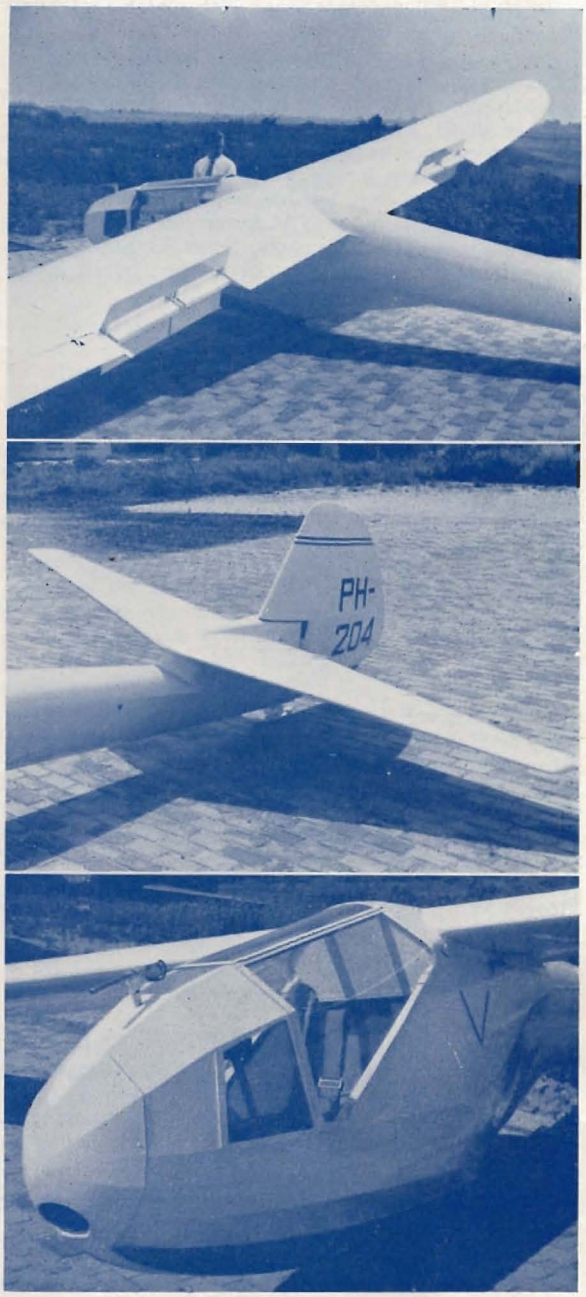
He now has 450 flights and 200 gliding hours in his logbook. After completing his glider training he gained his private pilot licence. De Boer made the first triangle flight and the first Golden 'C' height over Dutch soil. Until last summer he held the Netherlands record for gain of height with 3,135 m. (10,400 ft.).

In the last World Championships he was the navigator in a Spanish 'Kranich' flown by J. Koek, which ended in the 13th place. Koek and De Boer hold all the existing Netherlands two-seater records Distance 201 km. (125 miles); Goal Flight 123 km. (76 miles); Gain of Height 3,670 m. (12,000 ft.); and Absolute Height 4,680 m. (15,400 ft.).

De Boer who is 36 years old is working at the Flight Test section of the National Aeronautic Research Institute. His wife is the only Dutch woman who flies an 'Olympia.' She accompanied the Netherlands teams in Spain and she is an honorary member of the Texas Soaring Association.

The second Dutch pilot Otto Paul Koch lives in Badhoevedorp (The 'KLM village' near Amsterdam's Schiphol Airport). He is a KLM captain, flying 'Süper Constellations' on the Amsterdam-New York route. He started gliding in 1931 as a boy of 16. In 1932 he was the second Dutchman to gain a gliding 'B' licence. In 1937 he obtained his 'C' licence and two years later in August 1939, he made 3 legs for the Silver 'C' in the only Dutch 'Minimoa.' But as he landed 240 km. away from his take-off after a flight of 6 hr. 18 min. this duration was not recognised at the time. Consequently he got his Silver 'C' only when after the war the regulations concerning the duration leg were changed. This 240 km. flight is still the existing Dutch record for a goal flight.

Koch came second in last year's National Gliding Championships, flying that same old 'Minimoa.' On a rest day during the contest he climbed to 4,633 m. (15,250 ft.) after a gain of height 4,190 m. (13,900 ft.) which constituted two new national records. Koch made 406 gliding flights, totalling 105 hours and has done 9,600 hours on powered aircraft. He is chairman



3 views of the 'KNVvl-491'

of the Government Examining Board for glider instructors.

GLIDERS

De Boer will fly the ' Sky ' with which Ordelman gained 7th place in Madrid.

For Koch the prototype ' KNVvL-491 KNVv1-491 ' is being prepared. This laminar-flow glider with 16 m. (48.5 ft.) span is described in OSTIV publication No. 1 page 29-31. When test flown against the ' Sky,' the performance appeared to be equal at all speeds. The 491 fuselage has a welded steel tube forward part and a wooden tail-boom. The wooden wing which has the laminar NACA aerofoil 64 (215)—(7) (16,25)—is built in three parts. Several minor changes are carried out on the prototype now, but it seems that it will be ready in time.

DONATIONS RECEIVED TO 1954 F.A.I. WORLD GLIDING CHAMPIONSHIPS APPEAL UP TO 7th APRIL, 1954

	£	s.	d.
Society of British Aircraft Constructors	2,500	0	0
E. Bradshaw	1	0	0
British Aviation Insurance Co. Ltd.	10	10	0
British Ropes Ltd.	10	0	0
The Bristol Aeroplane Co. Ltd.	100	0	0
Blackburn & General Aircraft Ltd.	52	10	0
Dunlop Rubber Co. Ltd.	100	0	0
The English Electric Co. Ltd.	100	0	0
R. Fender	5	0	0
' Flight '	20	0	0
Folland Aircraft Ltd.	26	5	0
The de Havilland Aircraft Co. Ltd.	100	0	0
Handley Page Ltd.	50	0	0
F. G. Irving	5	0	0
Sir Francis K. McClean, A.F.C.	10	10	0
Patricia Preston		10	0
Colonel R. L. Preston	3	0	0
R. B. Pullin & Co. Ltd.	25	0	0
Royal Aero Club	105	0	0
Shell-Mex & B.P. Ltd.	300	0	0
The Sperry Gyroscope Co. Ltd.	10	0	0
Saunders-Roe Ltd.	100	0	0
United Dominion Trust Ltd.	26	5	0
D. J. Wakeley	1	0	0
M. B. Wild & Co. Ltd.	10	10	0
Westland Aircraft Ltd.	25	0	0
World Championships Appeal Ball (appx.)	90	0	0
	£3,887	0	0

10,000 FEET AT CAMDEN

On Sunday, February 15, Mervyn Waghorn climbed to 10,000 feet in the Sydney Soaring Club's ' Olympia.' The last 4,000 feet of the climb was in cloud.

The flight lasted one-and-a-half hours and was ended voluntarily with 30 consecutive loops and a 120 m.p.h. dive.

Footnote : Other pilots flying on the same day could not get above 2,000 feet.

W.R.A.F. OFFICER JOINS GLIDING CLUB IN GERMANY

THE Women's Royal Air Force of 2nd Allied Tactical Air Force in Germany are out to prove they can fly as well as the jet men—in gliders. At the moment the R.A.F. think their reputation is pretty safe, because a recent examination of the lists of 250 last-year members of the Command's nine gliding clubs revealed not one airwoman.

As this season opened, however, Flight Officer Joy Laing, gave the W.R.A.F. in Germany their first lead by joining the gliding club at R.A.F. Station, Wahn.

Pilots from a number of R.A.F. jet squadrons in Germany are enthusiastic gliders, but most are drawn from ground trades. There are more airmen and N.C.O.'s engaged in the sport than officers.

Many W.R.A.F. who have expressed keenness to take up gliding are waiting to see how their solitary representative makes out over the next few weeks. Flight Officer Laing made several trips in a dual machine to get air experience before starting with Wahn club instructors on ' ground slides.' After half a dozen of these 20 m.p.h. winch-towings along the ground, which accustomed her to the feel of the controls, she was allowed to ease the stick back and lift the primary trainer into the air for short, towed flights.

Flight Officer Laing has been invited by the Wahn club to join their ground crew entered for the 2nd A.T.A.F. Gliding Championships at Scharfoldendorf this May. Before the season ends she hopes to have qualified for her ' A ' and ' B ' certificates so that she can enter as a flying member of the club next year.

2nd T.A.F. GLIDING CHAMPIONSHIPS

SEVENTY officers and airmen—and one member of the Women's Royal Air Force—have obtained passports and entry permits for six European countries in preparation for the 2nd Tactical Air Force Gliding Championships, to take place at Scharfoldendorf, Germany, from May 22nd to June 1st.

The passports are for emergency use only, as the gliders are not encouraged to fly beyond a 30-mile radius from Scharfoldendorf. This limitation is set because retrieving the sailplanes by car and trailer is expensive—one shilling a mile—and the clubs cannot afford long hauls. During last year's competitions it cost more than £10 each to retrieve several of the aircraft, one of them from Holland.

Some 250 members of the R.A.F. will be at Scharfoldendorf representing the following units : H.Q. 2nd T.A.F., R.A.F. Stations Bruggen, Fassberg, Geilenkirchen, Gutersloh, Oldenburg, Sylt and Wahn. The Royal Engineers at Hamelin have also entered. The sole member of the W.R.A.F. will be Flight Officer Joy Laing, of R.A.F. Wahn.

FREE BATTERIES FOR COMPETITORS

WE are pleased to report that a representative of The Ever Ready Co. will be in attendance at the International Gliding Competitions in July.

A full range of dry batteries for radio and flying instruments will be available as *free* replacements to Competitors.

NOTES

By Veronica Platt

Indonesia. An airtrip from Djakarta to Bandoeng in search of gliders yielded four beautiful new yellow ' Schweizer's ' in first class condition, plus a ' Grunau Baby ' in course of construction. It also showed me a new and apparently very good type of hangar floor, both simple and cheap, made from a mosaic of circular slices of tree trunks laid in sand and lightly held together with tar. Being non-dusty and resilient, it seemed to me to be a great improvement on the average concrete or stonechip floor.

They were also using an ingenious storage arrangement whereby extra sailplanes could be suspended from the hangar ceiling. The main weight was taken by a rigid bar from the wall to the release hook; there was a steel cable from the roof fixed to the top of the fuselage and steel piano wires, also from the roof, held the ends of the wings. I would have liked some more information about possible strains, but



Captain Reuneker of the Indonesian Air Force. A convinced Glider enthusiast.

on first inspection it seemed a good answer to cramped hangar space.

The Bandoeng airfield is a very beautiful one, a grassy shelf ringed on three sides by green mountains from which great clouds roll up every afternoon. As the starting point for distance it has its complications. The country is intensely cultivated in a patchwork of tiny padi fields, with clumps of coconut palms marking small villages. The only dry patches are hilly ridges too steep even to terrace, for though rice fields look like light green grass they are usually six or eight inches deep in water. An emergency landing could be made on the road—they mostly have good tarred surfaces—but nowadays there is an immense amount of heavy lorry traffic and it might be difficult to find space between them.

Towards Djakarta the land drops to sea level and opens out into a wide green plain, and the rice fields become larger, so that one could find a reasonably dry one recently harvested and drop into that. Col. Owens made a flight from Djakarta to Kalidjati—a distance of 70 miles—and I was hoping to be able to talk to him about it; but he had left Indonesia a few months earlier.

I was lucky enough to have ten minutes with Captain Reuneker, the present head of the Indonesian Gliding Movement. He told me that the Indonesians are encouraging air-mindedness in a most practical way, by making all flying very cheap indeed and by directing interest first to aero modelling, then to gliding, and finally to flying.

There are three aero clubs—one at Djokjakarta, one at Djakarta, and one at Bandoeng. The gliding administration is civilian and so are the clubs, but they are helped by having military instructors, military gliders, and military maintenance. Gliding is incredibly cheap, costing only 15 rupiah a month. They have altogether 8 ' Schweizers ' (4 two-seater trainers and 4 single-seater high performance), a 'Grunau Baby ' (locally made) and another under construction. By next year they hope to have at least 200 pilots, male and female. They have more entries than they can accept—a new class of 75 pupils was just starting.

Captain Reuneker told me that the accent is firmly on safe flying, and to that end he insists on three months' ground school before a pupil is allowed in the air at all. He then goes straight on to two-seater training, and it is proving very successful.

Australia. From Djakarta we flew to Sydney then on *via* Canberra to Melbourne. Here I was fortunate enough to have a free Saturday, so Bill and Jack Iggulden took me out to Berwick. They and their father flew their ' Gull IV,' rebuilt by Edmund Schneider after its crash, and flying better than ever. The Victorian Motorless Flight Group under Reid and Roberts were flying in the ' Golden Eagle ' and the tandem ' Slingsby ' trainer. Conditions were not good and twenty minutes seemed to be about the maximum obtainable but there was plenty of scattered lift and it was an interesting afternoon. I collected some colour photographs that I hope to be able to use in the July Gliding Exhibition, plus some very fine press pictures from Bob Muller and some souvenirs of Madrid and Elmira from Fred Hoinville. Notes of the V.M.F.G. will be found in Club News.

FLYING IN JET STREAM WINDS

By Captain BERNARD C. FROST

(British Overseas Airways Corporation)



An airline pilot describes his personal experience of jet stream winds accumulated during many routine transatlantic crossings. Absence of topographical effects presenting uninterrupted airflows makes the Atlantic an ideal theatre for investigating such phenomena.

THE discovery of the existence of the jet stream was made comparatively recently and certainly not before the Second World War. The jet stream manifests itself as a narrow core or band of extremely strong winds in the upper atmosphere, moving in the main in an easterly direction, high above those areas of the earth in the middle latitudes known in school geography as the temperate zones, where the prevailing surface winds are westerly. No doubt in the southern hemisphere it is associated with the famous ' roaring forties.'

The jet stream is very definitely associated with the ' polar front ' (the name given by meteorologists to the line of discontinuity between the cold air of the polar regions, and the warm air of the tropics), since it is never very far away from this front, notorious breeding ground of most of our depressions. In fact it may safely be generalized that should the jet stream be overhead, the surface weather at that spot will be variable and unsettled for at least a week.

It is difficult to confirm or otherwise, over the comparatively short period of observations, whether there is any seasonal north and south movement of the jet stream with the sun's changing declination, but there does appear a tendency for stronger winds to blow in the lower northern latitudes during the winter, when presumably the polar front moves southwards too. However, this is not of great importance since the jet stream does not blow just directly west to east, but has frequently been found to meander for great distances both in a southerly and a northerly direction, and often blows from the SSE, particularly when a deep depression is situated over Labrador.

The writer's first realization of the strength of



Fig. 2. Cirrus and cirrocumulus arranged in long bands

Wind direction

Fig. 1. Cirrus in bands

Wind direction

Fig. 3. Altocumulus in parallel bands containing transverse waves







Fig. 5. Jet stream cloud, base about 28,000 feet, photographed from 18,000 feet while approaching from the north-east. Speed of the wind at 18,000 feet reached its maximum while flying below this cloud and measured 138 knots blowing from a north-westerly direction, i.e. from the right of this picture. An abrupt temperature rise was recorded just on the near side of the cloud

these winds was by means of a peculiar observation made from a Stratocruiser when steering eastwards at 25,000 feet over the ocean one morning. On emerging from some high cirro-stratus cloud, conditions became clear at cruising level except for two small isolated cumulo-nimbus tops at different distances ahead, presenting a considerable gap in between. While headed directly for this gap it was seen to narrow very quickly, although the cumulo-nimbus were not changing size or shape, and finally the gap closed. Then the farther cloud passed from right to left behind the nearer, in much the same manner that farther objects pass behind nearer ones when observed from the window of a moving train, although the aircraft, still some distance away, was pointed directly at them. Hence it was obvious that we were moving very rapidly sideways relative to the clouds ahead, and this was confirmed by our wind observation recording SSW at 150 knots. When we finally reached the more distant cloud, the wind had dropped to a mere 60 knots on the beam.

This existence of extremely high winds aloft promised interesting possibilities from a navigational viewpoint. In the past, commercial aircraft had not normally flown high enough to encounter them other than occasionally, but now the Stratocruiser was capable of cruising up to 30,000 feet, and utilizing such winds if beneficial to the flight without any extra charge. No doubt it was such winds that had sometimes caused the then inexplicable navigational errors of some of our war-time bombers on their missions high over Germany, and prior to that could account for the occasional slow westbound Atlantic crossing of the flying boats after a climb to a high altitude over cloud for an hour or so had been made to get star-sights.

So for several years the writer kept a careful look-out on each crossing for any peculiar characteristics these phenomena might possess. Each eastbound flight was planned to intercept a jet stream if one was suspected to exist, and to make use of it should it be going one's way. Loran (long-range radio navigation equipment) proved itself invaluable since frequent fixes could be obtained, thereby giving accurate wind measurements. Whether successful or not one usually benefited anyway by utilizing the high winds associated with, and adjacent to, the main stream on its warm side, and more often than not reduced the forecast flight time by an hour or so when eastbound. Conversely on westbound flights a route or altitude could be selected which avoided the likelihood of encountering strong adverse winds.

The above appears to be about the full extent of the jet stream's economic possibilities on airline operation (i.e. saving of fuel and engine hours) since



Fig. 4. Stratocumulus in long parallel rolls.

Wind direction

Photos: Clarke Collection, Royal Meteorological Society.



Fig. 6. High roll cloud, about 30,000 feet in jet stream; only a mile or so wide, but several thousand miles in length, it can be seen meandering for hundreds of miles ahead. Viewed down wind; wind speed 148 knots.

one does not know exactly where it is until one finds it, and therefore cannot rely on experiencing such strong tail winds as could be forecast in a jet stream if its location could be confidently predicted. In other words, additional payload cannot be substituted for fuel off-loaded in anticipation of intercepting the jet stream. Nevertheless, the reduction in direct operating costs of a flight resulting from the saving of, say, one hour's fuel consumption and four engine-hours, should the jet stream be intercepted and utilized, could easily be in the order of 10%, and is of such appreciable magnitude and significance to the operator that it cannot be ignored.

It has been found, also, that an economic saving may be made by choosing a route following the general wind flow, jet or no jet, even though this may entail travelling over a farther distance. Such a statement is difficult to prove normally since in any given distance it requires two aircraft of the same type and at the same all-up weight, cruising with similar power output at comparable altitudes at the same time, but flying over the two different tracks to the same destination.

Such a unique combination of circumstances occurred on the 7th May, 1952, when leaving Goose Bay for London. Flight plans were compared, cruising power agreed and arrangements made to communicate on VHF R/T once hourly in order to exchange navigational information. The other operator's aircraft departed 15 minutes before ourselves on a constant-heading course for Fastnet, whereas we had selected to go first north-eastwards, then east, then south-east and finally north-eastwards again in order to conform more closely to the air flow expected, rather than having mostly beam winds all the way across. About halfway across the ocean the two tracks crossed one another, and at this point both aircraft were level, and we eventually arrived at London twenty minutes ahead of the first aircraft. Altogether our flight time was 35 minutes less in some nine hours and we had travelled an extra 148 nautical miles into the bargain.

Furthermore, several interesting things were observed over this period of time, amongst them being the fact that in high wind conditions markings on cloud formations at various levels can give valuable indication of the wind direction (within 180 degrees, of course). This is, in a way, analogous to the wind lanes appearing on the surface of the sea, with the wave pattern at right angles across them, so the upper surface of a cloud will have longitudinal streaks in line with the wind direction, and a wave or billow structure athwartships (see Fig. 1).

It is particularly apparent in thin cloud such as cirrus and cirro-cumulus types (see Fig. 2). At the lower level the longitudinal streaks are difficult to discern, but alto-cumulus and strato-cumulus and sometimes stratus tend to form extensively in lines



Fig. 8. Cirrus travelling at 150 knots. London, September, 1952



Wind direction

Fig. 7. Profile of cirrus cloud in long streak formation associated with jet stream.



parallel to the wind direction (see Figs. 3 and 4). A word of warning must be given here, since wrong interpretation is sometimes easy, and once the wind drops below 25 knots it becomes difficult to interpret by this means and could prove misleading.

By expounding at this stage on cloud structures it may be concluded by the reader that much cloud is associated with the jet stream. This is not the case. Indeed, at the jet stream level the air, nine times out of ten, is perfectly clear, but there can be considerable cloud below, usually large cumulus or alto-cumulus, since the jet-stream normally flows over cool polar air. Occasionally it does make itself visible, and two illustrations are given of this in Figs. 5 and 6. The first shows a jet cloud south of Bermuda on 18th March, 1952, at about 28,000 feet, which when passed under at 18,000 feet, gave a wind velocity of 138 knots, exactly in line with the cloud streak. The other was taken looking from the flight-deck, down wind, whilst cruising directly under a thin narrow cloud which was followed for 1,700 miles before it meandered off to a different destination, but which gave a dead tail-wind of a steady 148 knots for over four hours at 23,000 feet on 28th September, 1951. A useful guide whilst searching for such a wind is an occasional thin wisp of cloud or a line of such wisps barely discernible, although sometimes if they do develop any thickness, they appear to have tails below them caused by slight precipitations, as sketched in Fig. 7.

Even when the air is dry, wind directions may still be detected reasonably accurately by observation at aircraft level of dust or haze streaks which always appear most dense when looking at them at right angles. This, with practice, can be done at night also. These indications of wind direction are of considerable value for navigation purposes, since a veering or backing of the wind may be allowed for in course steered as such changes occur, rather than awaiting the next fix to confirm it. They are particularly valuable when endeavouring to keep in the narrow belt of high-winds, having once established oneself there. Also they are useful when one wishes to steer a course obliquely across the wind flow whilst searching for colder or warmer air as appropriate in the initial search for location of the jet stream.

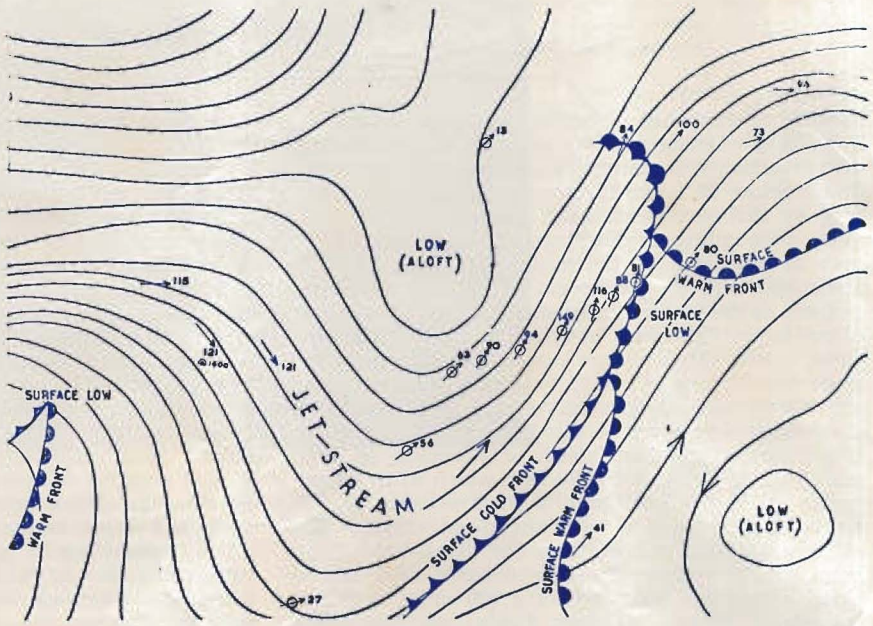
It is interesting to note that windshifts aloft are quite often as marked as they are on the surface, sometimes swinging in an astonishingly abrupt manner. This would appear the appropriate place to express the writer's belief, confirmed by innumerable observations, that the pressure distribution aloft conforms far more exactly to the surface picture (making due allowance for leaning of the systems with altitude) than the forecasters are prone to believe. Hence a truer picture of air flow aloft would ensure



that more emphasis be given to possible north and south meanderings rather than to retaining the tendency of smoothing out the west-east flow as is usually depicted.

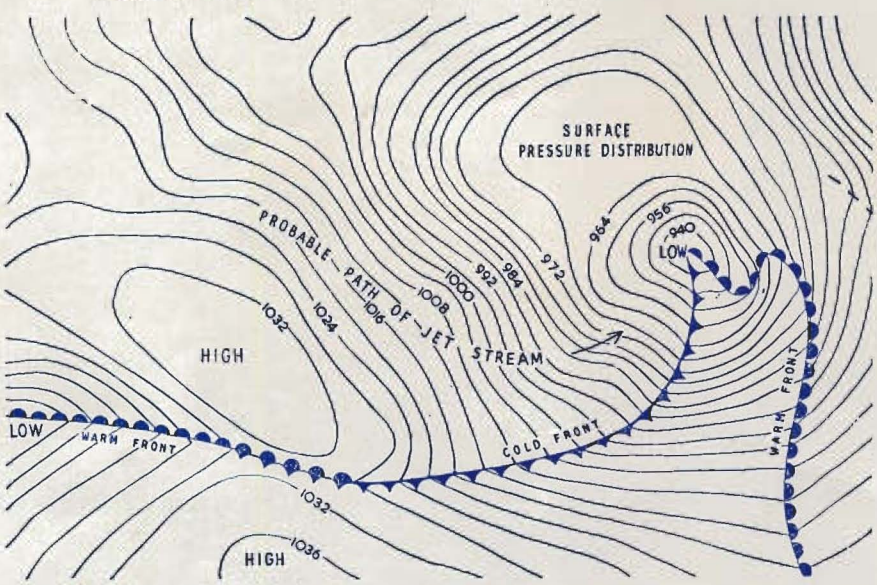
As far as can be ascertained, and taking for the purposes of definition the assumption that jet stream winds are those in excess of 100 knots, it appears that these are not normally experienced below an altitude of 15,000 feet. Hence, if headed into one above that height a quick remedy would be to descend. Aloft, however, *an increase in windspeed approximating* 13 *knots can be expected for every* 1,000 *feet* above this height until the core is reached. It has not been possible due to aircraft ceiling restrictions to obtain any data regarding the average height of this core. It may reasonably be assumed, however, that in ideal conditions, winds of the order of 334 knots could be experienced for instance at 33,000 feet. Isolated cases confirming the existence of extremely high winds can be quoted, viz. : 320 knots pilot balloon observation at Argentia on 16th October, 1952, at 150 millibar level. Also a ' Comet ' holding high over Tokyo encountered a wind exceeding 400 miles per hour.

Fig. 9. *Chart showing jet stream following ' Prontours ' aloft*



The most valuable instrument used in locating the jet stream proved to be the outside air thermometer. Unfortunately its value was not at first realized, but subsequently over the years some useful general guidances from air temperature changes formulated themselves. It was found that once in a strong wind at a certain level by flying exactly down-wind, the temperature remained unaltered and the windspeed remained unchanged. Further, an amazingly accurate guide for calculation of wind strength on either side of the jet stream (within altitude limits normally flown, viz. 15,000-25,000 feet) was that the wind *decreased some* 8 *knots for every degree Centigrade drop in temperature on the Polar (or cold) side ; and it decreased some* 16 *knots for every degree Centigrade rise in temperature on the Equatorial (or warm) side.*

Fig. 10. *Chart showing jet stream in relation to surface weather*



Since, as is well known, the isotherms are more widely separated horizontally on the warm side, it will be appreciated that comparatively high winds are associated with a jet stream on its equatorial side. On the polar side the temperature falls very abruptly and wind strength dwindles correspondingly. From the foregoing it is obvious that if proceeding down-

wind, much faster times will be made by keeping in the warm air which is rushing over and alongside the cold. Should then a sudden temperature drop be experienced, a turn back into the warm air, or a climb up into it, will pay big dividends.

Now, by a combination of the foregoing findings, it can be readily realized how the current wind speed and direction aloft can be estimated merely by reading the outside air temperature and by observation of the cloud forms. This is done simply by using the present wind direction indications, should they exist, in conjunction with the known wind strength ascertained from the preceding navigational fix, but adjusted for any temperature change subsequently experienced. Such estimates have proved extraordinarily accurate when checked subsequently by Loran, being rarely in excess of five degrees and/or five knots in error.

Naturally it is only rarely that an opportunity occurs when a jet stream exists overhead at point of departure, when of course one has only to climb up into it to utilize the strong tail-winds. The writer can recall one instance, on 16th December, 1951, when such a situation prevailed at New York when bound for London, and as far as 10 degrees West longitude an average tail-wind of 140 knots was experienced once the higher altitudes were reached. Since this blew the aircraft along for some 7 hours, it was tantamount to receiving a free lift of practically 1,000 miles ! Another example of this considerable help aloft was demonstrated on 6th October, 1950, when two aircraft of similar types took off from New York half-an-hour apart. The first, being heavily laden and bound for England cruised at 13,000 feet, whereas the second, bound for Gander, was able to cruise at 21,000 feet, at which height it eventually encountered a wind of 260°/180 knots. After a flight of 3¼ hours, it landed at Gander as the first aircraft passed overhead.

On one occasion when the jet stream could be observed from the ground it was recorded by the photograph shown in Fig. 8, taken at London, when wind at cloud level was travelling at 150 knots in the direction indicated.

Usually, instead of being entered from below, the jet stream has to be approached from one side or another and in this case apart from any visual indications that may manifest themselves, the one true guide is the rapid change of temperature on its polar side. When passing through this rapid temperature change a mild, gentle turbulence may be encountered, but in the writer's experience has *never* been of a violent or dangerous nature. Once through this rapid temperature change, if entering from the polar side, it may be safely assumed that the belt of strongest winds has been reached and a turn down-wind made immediately ; but if this rapid temperature change is encountered when entering from the equatorial side it may be safely assumed that the aircraft has gone too far through the jet, and into the polar air, and a pilot wishing to take advantage of the direction of wind flow should change his direction until the temperature rises suddenly again. In a nutshell, the jet stream can be ridden like a beam by using the air thermometer.

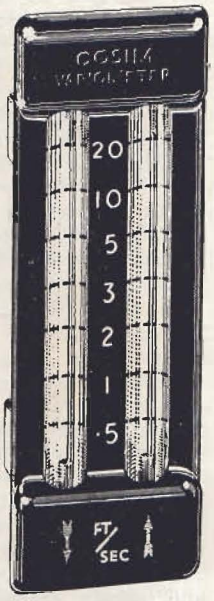
WORLD CHAMPION

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Once in the jet stream, contrary to general belief, flying conditions usually are velvety smooth. In fact it becomes difficult to comprehend that the air itself is moving at all, yet it is doing so at possibly over 2½ miles every minute. The width of this band of very strong winds appears to be about 80 nautical miles, and is possibly less.

In Fig. 9 is shown the forecast pressure distribution at 400 millibar level (approximately 23,000 feet altitude) over the North Atlantic on 14th January, 1950, together with some winds at that level observed by various ships and ground stations, together with the wind strengths in knots, measured whilst passing through a jet stream in an eastbound aircraft piloted by the writer. The position of surface fronts is also shown. Examination will reveal how the jet stream (shaded) follows almost exactly the ' prontours '—or forecast lines of equal altitude on a given pressure surface.

It has also been found by a continuous study of the many situations experienced that the highest velocity upper winds occur in the region some 200-300 miles distant from the most active or central portion of the surface cold-front, this distance being measured normally to the cold-front, and towards the cooler air. They also tend to pass over or near the surface tip of the warm sector. With this knowledge,

and bearing in mind what has been said earlier about the general direction of the ' prontours ' aloft, it is possible to obtain a generally accurate idea of the present shape and location of the jet stream, should it exist, or, failing that, the area of strongest winds from the forecast surface weather map and to plan the best route accordingly. Moreover, such a route, besides being speedier, has the additional advantage of avoiding the worst weather areas, most of its length passing through excellent flying conditions. Fig. 10 shows a typical weather distribution over the North Atlantic and where, under such a set-up the jet stream would approximately lie.

On some occasions as indicated by Mr. P. D. McTaggart-Cowan, a secondary jet stream lies to the north of and adjacent to the primary one. This situation existed on 2nd November, 1950, in the vicinity of weather ship *Dog*, just east of an upper-air trough, where the first strong wind encountered was 200°/95 knots (—35°C.) and later one of 200°/111 knots (—32°C.) whilst in between it dropped to 66 knots (—37°C.). Fig. 11 is a photograph taken whilst in the secondary stream, but looking towards the main jet stream, and is notable in that several cumulo-nimbus cloud tops were sheared off by the high winds. Incidentally, weather ship periodical upper-air observations are an invaluable aid to assessing the whereabouts of these exceptionally strong winds.

The only occasion when the writer experienced severe turbulence was on the same day (2nd November, 1950) whilst 13,500 feet above Birmingham at about 4.30 p.m. The jet stream was overhead blowing from the north-west, and a depression was just forming over the English Channel, giving easterly winds below. Although above all cloud, the strong horizontal wind-shear caused very rough conditions.

Summarizing, it would appear that there is almost always a potential jet stream situation dormant between the cold and warm air masses, its intensity being directly related to the greatness of temperature differences. Witness to this can be made by quoting one's own experience since commencing this ' jet stream hunting ' in as much that on practically every eastbound flight where this technique was used, winds in excess of 100 knots have been measured. From this it can be assumed that the strongest jet streams will be found where, for instance, warm marine air comes into confluence with cold continental air. Consequently, high velocities in the winter could be expected at times both over Nova Scotia and Newfoundland when a south-westerly upper air flow predominates ; or over England and France with a north-westerly flow aloft. Even stronger jet streams can be visualized flowing from the south-west adjacent to the Pacific coast near China and eastwards over the ocean, as greater air-mass temperature contrasts might reasonably be expected there.

It is said that one learns something new every voyage. This is still true, and much research in this matter remains to be done, particularly farther aloft, and much more no doubt remains to be discovered. With the inception of the ' Comets ' Great Britain has the chance to lead in this field of upper air exploration.—*Reprinted by courtesy of ' Shell Aviation News,' December*, 1953.

Southdown Gliding Club

UP until the present time this year has proved to be quite successful. Aircraft certification has been carried out without a hitch, only one ' Tutor,' which is almost completed, outstanding. This has been accomplished by our rarely publicised, and very efficient members who work behind the scenes, namely Messrs. Blaber, Constable and Perelli.

Flying for the first part of the year has been generally good. The total time until the first week in May being 60 hrs. 18 min. for 737 launches. Before Easter two good ' Beachy Head ' days were had.

These days are had when a S.S.W. wind is blowing giving a beat along the Seven Sisters from the Cuckmere valley to the Beachy Head light.

This Easter holiday was decidedly the best that can be remembered by the ancients of the club. Good Friday saw the ' Tutor ' and ' Olympia ' at Firle, our site a few miles inland, where a good Northerly wind gives some very fine hill soaring. Both aircraft had 3 flights each Bill Jordan in the ' Olympia ' gained 3,200 ft., and flew back to Friston much to the disbelief of several members who were seen to be rushing up and down looking in all the bottom fields.

Saturday gave us a fine thermal day. The most notable flights of the day were those of Chris Hughes in the ' Olympia ' to 4,700 ft. a gain of 4,000 ft., and Ron Willbie in the ' Tutor ' to 3,500 ft., a gain of 2,800 ft. All flying on this and subsequent days was at Friston.

Sunday an early start was made to try for 100 launches in the day. That we got 94 and had at times all aircraft in the air and the winch standing idle was a fine effort and only the result of full hearted support from all members. Many fine flights were had, notably Jack Godley and Smith in the ' T21-B ' who were at one time flittering around the cloud base

(*Continued on page* 21)

SOUTHDOWN GLIDING CLUB

★ Southdown Gliding Club are holding a Soaring Course open to non-members, at Friston from 5th to 11th September.

The course will be limited to pilots of " B " standard and above.

Details from Course Secretary :

Miss J. CLOKE, 34, Graemesdyke Avenue, East Sheen, London, S.W.14.

CORRESPONDENCE

Officers' Mess,
10 A.F.T.S.,
Royal Air Force,
Pershore,
Worcs.

DEAR SIR,

I followed with great interest the articles on reducing the cost of gliding by Fred Hoinville (Dec. '52-Jan. '53), more particularly as I am one of those unfortunates who has little opportunity and less money with which to take an active part in the sport.

I am one of the many would-be devotees who first tasted the joys of soaring and gliding with the A.T.C., but who are now reduced to wishing and becoming theoretical penguins, flapping but not flying. Flying is the greatest interest in my life and I get plenty of power flying, but I wish to soar.

The major point which I think Fred missed out of his otherwise good articles is the distance between the extremely localised centres. Even if the cost were not so prohibitive for the actual flying, many would-be pilots would become discouraged by the cost of travelling to the nearest site every week-end. The only way to avoid this is either that every pilot should own his own cheap sailplane or that there should be numerous small clubs and groups throughout the country. These groups could be set up quite cheaply and would expand relatively quickly if the idea was used in conjunction with those that follow later.

The sailplane is the main necessity of soaring so I will explain a few of my ideas to cut down the cost to a reasonable figure.

Firstly, there should be a greater freedom for would-be home constructors. Every effort should be made to help these people—the real enthusiasts. The restrictions and the red tape which give rise to the greatest frustration should be cut to a bare minimum. I believe there are a great number of people about today who would welcome the chance to build their own aircraft. Most of the gliding people I have met (including myself) have very definite ideas on how a sailplane should look and fly; they should have the opportunity to put their ideas into practice.

Secondly, why not have a design contest as is now being held for light aircraft? A sum, for prize money, could be voted from the Kemsley Trust and the new enthusiasm and the results which would almost certainly be attained would make it well worth while. The contest could be split up into various sections—aircraft design, constructional methods, launching systems, etc. The ideas could be distributed around to the various centres and the best designs sold, at a nominal charge, to prospective constructors.

Thirdly, set up a committee to which the gliding club or the modest individual could take his designs and ideas for expert approval and which could give in return, criticism, advice, information and help. There should also be a way of having amateur-built aircraft test-flown at low cost.

These are just a few of the many ideas which I have had for a long time. It would be interesting to find out the views of other readers.

Yours faithfully,
M. J. SUGDEN (Pilot Officer).

SIR,

The main reason I am writing is to find out where the U.S.A. statistics were obtained for Mr. O. W. Neumark's article. It was quite surprising to us to see this for the S.S.A. has been trying to collect accurate information on the number of ships and hours flown with very little success.

I can assure you that there are not 445 active gliders. I would say that 250 would be a maximum. As to the amount of flying, I am sure that the 5,500 hours is very low. We almost had 1,000 hours flying at the Nationals last year. We also note that the U.S.A. is only listed as receiving one Diamond 'C' while France has 30 in 1949, 1 in 1951 and 48 in 1952.

Consequently, we are not too happy with the conclusions drawn by this article for we do not think that it represents the actual conditions. We certainly are to be criticized over here for not keeping better records. We suspect many of the other countries keep good records because the Government subsidy is dependent upon this. Over here we are independent and own our own gliders and hence the difficulty in trying to get these figures. However, we continue to work on it.—**Paul A. Schweizer.**

(*The statistics were reproduced from the official bulletin of the F.A.I., which is sent to all National gliding associations which are members of the F.A.I. The title of the Bulletin is : " Bulletin de Federation Aeronautique International" 27th year, No. 90, published in Oct., 1951, and 28th year, No. 91, published in Oct., 1952.*

Some corrections were made by the author in the cases of Sweden and Switzerland, who published cumulative totals for Silver 'C's'. The author had resource to other official figures which gave new Silver 'C's' gained per year.

The F.A.I., send out a pro-forma requesting yearly statistics to all national gliding movements and it is their responsibility to produce accurate statistics. It

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MIDLAND GLIDING CLUB, LTD., Long Mynd, Church Stretton, Shropshire.

★ Summer Gliding Courses will be held as follows :—

July 3rd—10th, August 7th—14th, August 28th—September 4th.

Inclusive fee for each course of 8 days with accommodation, 4 meals per day and all flying, £15.

Full particulars from :—S. H. JONES, 9 Hagley Road West, Harborne, Birmingham, 17.

would be unfair to blame the author for their shortcomings.

The author wishes to emphasise again that the purpose of the examination of statistics was not to enhance the national prestige of any particular country but by learning what we can from statistics to help individuals and individual clubs in all countries to enjoy more hours soaring and more interesting soaring for a given capital investment.—**O. W. Neumark).**

SIR,

May I make some Australian viewpoint comments on the matters discussed between Peter Fletcher and Hubert Wheatcroft in your Jan./Feb. issue ?

H.W. says that the reason why competition pilots are 40 years old is that ' gliding is a pleasant sedate sport requiring very little energy.' This reminds me of the golfer who watched some champions playing, and said : ' If that's golf, what the hell have I been playing all these years ' ?

P.F. replies that it takes 20 years of amateur weekend activity in gliding to reach competition standard unless you can have advanced two-seater instruction from a first-class soaring instructor.

I support P.F., with two extra points. First, power flying and keen study can take the place of the two-seater soaring tuition to a large extent, and greatly speed up training ; second, no matter how good the pupil becomes, it takes many years to save up enough cash to afford cross-country flights, which mostly imply private ownership expenses.

H.W. says pupils are frustrated by long waits for 5 minute flights, and don't fly often enough to remember how. Very true. A very good argument for sending ab initios to a power school for enough dual 30 minute flights to enable them to solo a training glider with no more than a check out and thorough briefing. This method has been forced on us here at times and has been quite successful to date. I know of no failures.

Where there are not enough two-seaters for all—and that means just about everywhere—I agree with P.F. that the best use of the two-seater on soarable days is for advanced training. A skilled soaring instructor can polish up a promising pupil and hasten his progress greatly.

H.W. says every pilot should plan every flight, and we all agree. P.F. modestly disclaims any success with his plans. This seems to indicate that P.F. is unaware of the advantages of Glidermanship (Ploy 77) which requires that the plan be not revealed until after the flight. This is of the greatest help in becoming a Pundit, unexpected or otherwise.

H.W. advocates more club task flights, and P.F. supports him. So do I. Even short out-and-returns, for example, are excellent training and quite inexpensive. Also, as H.W. states, task flights teach the genuine value of planning. (Pre-flight !).

Once we can agree on a method of getting pupils up to competition standard in a reasonable time, the next step is to make it possible for them to compete at a reasonable cost. Hence my campaign for the recognition of midget glider classes.

For the same reason we should all support the German campaign for the elimination of straight distance flights from contests. Straight-line flying is for record-breaking attempts. Let us keep contests to circuit flying of various types, which would eliminate most retrieves and keep the others short, quick, and cheap, and reduce fatigue for all.—**Fred Hoinville.**

THE ' MINIMIDGET '

I would like to thank J. A. I. Reid, B.Sc., D.C.Ae., for his ' Design Study of a 25 foot Glider,' published in the Jan./Feb. issue of *Sailplane and Glider.*

Mr. Reid's article has particular value because he has obviously set out to evaluate the ' Minimidget ' conception without any bias for or against. Thus his conclusions are the more convincing.

As originator of this project (or reviver of it—Mr. Baynes of ' Scud ' fame seems to be one of those far ahead of me) I am accustomed to coming up against the feeling that I may be over-enthusiastic about the possibilities. Many critics have not bothered to examine the idea seriously because of that.

One highly qualified aerodynamicist set out to persuade me to accept a wing span of over forty feet as the minimum for a fairly good performance, then to clinch his argument, for the first time he sat down and went into figures on the 25 foot span, just to show me. He finished up selling himself on the 25 foot span, without another word from me.

Another stumbling block which I have found is that critics still tend to compare the 25 foot glider with the ' Sky ' and other very high efficiency large gliders. If the ' midget ' had to compete with all sizes, the critics would be right. It wouldn't be in the race. The essential point, which is so often overlooked, is that it would compete only against other midget gliders limited to the same span, while for local pleasure flying, it would be far superior because of its ease of handling both in the air and on the ground, and very emphatically because of the huge reduction in financial investment and risk. Being in charge of ' a fortune on wings ' is a heavy responsibility that takes a lot of the pleasure out of gliding that should be carefree.

Mr. Reid has avoided these mistakes, and has judged the midget class fairly and dispassionately, on its own merits as a separate and independent class.

Mr. Reid has considered the problem of pilot position and mentions several alternative designs. I feel that the prone position could result in an increase in fatal accidents, since some proportion of accidents is inevitable when large numbers of gliders fly.

I should think that the pilot would feel safer with his head under the wing than out in front. Perspex panels in the wing could reduce the blind spot quite a lot. This also applies to the swept back wing with pilot behind the spar. Perhaps the safest and the most efficient is the swept forward wing with the pilot in the conventional position. This design is little more complicated than a straight wing, if any.

Thank you, Mr. Reid.—**Fred Hoinville, 1 Gillard Street, Brighton S-6, Victoria, Australia.**

SIR,

Mr. Hoinville's remarks on the ' Design Study of a 25 foot Glider ' are very interesting and I would

like to comment on some of the points that have been raised.

With regard to performance, a ' Minimidget ' would certainly be unable to compete with a ' Sky ' but if the class is to prove popular it will still have to be good. A competition in which nearly all the entrants were launched only to come straight down again or sat over a hill without being able to climb up and away would be a very dull affair for all concerned. A machine of at least Silver ' C ' capabilities seems to be required.

The pilot position in such a small machine is a difficult problem as the airframe is too light for the pilot to sit out in front in the normal position. The prone position was suggested as not only does it allow a fuselage of minimum cross sectional area but it means that the wing structure can be continuous over the centre section. In the case of a crash landing this position is admittedly dangerous.

Mr. Simon's letter in the March/April issue emphasized the problems of the prone pilot. The method of entry envisaged in the original design was to remove the transparent canopy which extended along the fuselage centre line to the leading edge and for the pilot to slide his legs backwards under the wing. For an emergency exit in the air, the pilot would jettison the canopy and haul himself forward, diving over the nose or one side. This should not be much more difficult than leaving an orthodox cockpit.

Sitting the pilot upright increases the fuselage cross sectional area and this will increase the drag to some extent. The centre of gravity of the machine will be roughly in line with the pilot's forehead and the wing aerodynamic centre will have to be arranged on this line. A swept forward wing layout will give the pilot the best possible view but the difficulty in this case is to build in good stalling behaviour. Normal washout would mean the aft portion of the wing stalling first and this would tend to aggravate matters. Wash in at the tips would mean early loss of aileron control and be asking for a spin. An untwisted wing and differential aileron control might be the answer.

The design study was carried out more with a view to finding out the possible performance and the problems involved rather than with the production of a final design. There are certainly plenty of problems but they do not appear to be insuperable, and I hope that Mr. Hoinville's ' Minimidget ' class will soon become established.—**J. A. I. Reid.**

SOUTHDOWN GLIDING CLUB—(*cont. from page* 18)

about two miles out to sea. A gain of 2,500 ft. was made on this flight. Don Snodgrass in the ' Olympia ' gained 3,300 ft. to 3,800 ft., and Dick (Funny Hat) Vanson in the ' Tutor ' gained 2,100 ft., a fine feat this, being his initiation to thermal flying. Also much admired was his ' Stuka ' demonstration when wishing to return to earth.

Monday was again a good day but only one flight of any note was made. Bill Jordan in the ' Olympia ' gained 3,400 ft. and gave an aerobatic display on the way down; need I say, much to the awe of the onlookers ?

We are now keeping our fingers crossed and hoping for a continuation of this kind of flying throughout the year. The week-end of 15/16 May also has proven to be very good, on both days flying was had at Firle and Friston. Jim Wells obtaining his ' C ' certificate at Firle.

Two ' A ' certificates were obtained at Easter by Ray Marshall and Dawn Reynolds. Four ' B ' certificates have been obtained so far, the above two having since obtained theirs and also Fred Gill and John Hawkins.

On the social side a dance was held at Haywards Heath on 24.4.54, and though not heavily supported a thoroughly good time was had by all present.

The Central Council for Physical Recreation is due to send us a party for first hand knowledge of Gliding, the date set being Saturday, May 22nd.

From September 4th for eight days we are running a course at Friston and further particulars may be obtained from E. R. Jarvis, Esq., 45 Havelock Road, Hastings. If this course proves to be as successful as the last it should greatly enhance our reputation not only for the flying to be had but for the culinary achievements of our cuisine. Extra large belts and chairs stressed to a High Load Factor are supplied to course members.

We always welcome visitors to the field and are to be found at Friston every week-end, wet or fine, throughout the year.

NEWS. Sel Owen, of the Sydney Soaring Club, may represent Australia at the World Contest this year. Bob Krick, another strong possibility for selection, had to withdraw for business reasons. Owen is an airline pilot with many years experience in power and gliding. He holds a Gold ' C ' with one Diamond, also the National Goal record, of 205 miles.

SMALL ADVERTISEMENTS

If you have something to sell or there is something that you need why not advertise with a small advertisement in *Sailplane and Glider* ? The cost is not high and full details will be sent on request.

ROYAL AERO CLUB CERTIFICATES

(Issued under delegation by the B.G.U.) **MARCH, 1954**

' B ' CERTIFICATES

No.	*Name.*	*A.T.C. School or Gliding Club.*	*Date taken.*
17575	D. Leary	No. 2 G.S.	19. 7.53
17576	E. Latham	No. 42 G.S.	14. 2.54
17577	L. J. Ingram	No. 68 G.S.	28. 2.54
17578	G. Battson	No. 125 G.S.	21. 2.54
17579	G. A. Proudfoot	No. 143 G.S.	28. 2.54
17580	B. R. Newman	R.A.F. Halton	6. 9.53
17581	G. R. Dall	No. 143 G.S.	13. 2.53
17582	H. A. M. Townsend	No. 143 G.S.	20. 2.54
17583	M. A. Weatherhead	No. 143 G.S.	17. 1.54
17584	Stella Alexander	Surrey G.C.	4. 9.53
17585	V. Alexander	Surrey G.C.	4. 9.53
17586	D. H. Williams	R.A.F. St. Athan	21. 2.54
17587	S. Nieschnidt	No. 7 G.S.	17. 1.54
17588	R. G. Gilbert	No. 82 G.S.	28. 2.54

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'OLYMPIA EON II' BGA 568. Makers No. 065 (Nov. 1947). Wheel. Full instrument panel. C. of A. annually since new. No major repairs. Current C. of A. to April, 1955. All ply fabric-covered and repainted 1954. Trailer reconditioned and repainted 1953. Complete, £600. Can be seen at Dunstable or Kidlington. Might sell one third share. "Cadex," 16 Carlisle St., W.1. (GERrard 1253).

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N.B.—One or more friends may be introduced and readers who do not wish to cut their copy may send addresses on plain paper. Please quote M.J.54.

'B' CERTIFICATES—*continued*

No.	*Name.*	*A.T.C. School or Gliding Club.*	*Date taken*
17589	M. W. Gard	No. 89 G.S.	24. 1.54
17590	T. B. Hill	No. 7 Area G.C.	27. 2.54
17591	P. S. Jaffray	Handley Page G.C.	27. 3.54
17592	D. J. Brown	No. 92 G.S.	14. 2.54
17593	B. B. C. Watson	London G.C.	10.10.53
17594	Valerie Whitney	R.A.F. St. Athan	27. 2.54
17596	C. F. White	No. 143 G.S.	21. 2.54
17596	J. L. Butt	No. 89 G.S.	6. 2.54
17597	A. E. W. Jones	No. 68 G.S.	31. 1.54
17598	N. H. Wood	No. 89 G.S.	14. 2.54
17600	K. L. Kenney	No. 126 G.S.	7. 3.54
17601	D. E. Church	Oxford G.C.	28. 2.54
17602	N. H. Skinner	No. 146 G.S.	28. 2.54
17603	T. J. Patrick	No. 146 G.S.	28. 2.54
17604	D. N. Spencer	No. 146 G.S.	7. 3.54
17605	P. J. Joyce	No. 92 G.S.	14. 2.54
17606	D. A. Walsham	No. 22 G.S.	27. 9.53
17607	R. B. Pownall	No. 82 G.S.	14. 2.54
17608	J. N. Walker	No. 188 G.S.	27.12.53
17609	H. L. Cailes	No. 22 G.S.	11.10.53
17611	A. G. Waite	No. 89 G.S.	14. 2.54
17612	A. D. Wescott	No. 89 G.S.	14. 2.54
17613	W. T. Tomlinson	No. 22 G.S.	6. 4.53
17614	J. H. Kelly	No. 188 G.S.	3. 1.54
17615	A. W. Newton	No. 92 G.S.	7. 2.54
17616	R. L. Watts	Surrey G.C.	17. 3.54
17617	C. L. Barnfather	No. 125 G.S.	24. 1.54
17618	J. R. J. Dovey	No. 166 G.S.	30. 8.53
17619	K. A. H. Gordon	No. 104 G.S.	7. 3.54
17620	J. A. Linnitt	No. 130 G.S.	27. 9.53
17621	A. W. Strong	No. 87 G.S.	15.11.53
17622	J. D. Tweedie	Scottish G.U.	14. 3.54
17623	J. P. Welsh	Bruggen G.C.	7. 2.54
17624	E. C. Williamson	Newcastle G.C.	26. 4.53
17625	J. A. C. Carr	No. 31 G.S.	14. 3.54
17626	T. A. Nunn	No. 105 G.S.	23. 1.54
17627	B. D. F. Wheeler	No. 143 G.S.	21. 2.54
17628	I. B. Wright	Avro G.C.	28.11.53
17629	P. L. Rivett	No. 143 G.S.	28. 2.54
17630	J. A. Davey	No. 89 G.S.	20.12.53
17631	S. Hunt	No. 22 G.S.	21. 3.54
17632	I. S. F. Hunter	No. 125 G.S.	21. 3.54
17633	W. D. Lomas	No. 31. G.S.	20. 3.54
17634	G. D. McKeeken	No. 2 G.S.	31. 1.54
17635	C. T. Kirk-Smith	Oldenburg G.C.	9. 9.53
17636	S. Garrad	No. 143 G.S.	21. 3.54
17637	H. S. Chilvers	No. 104 G.S.	21.3.54
17638	R. T. Gladwin	No. 104 G.S.	7. 3.54
17639	R. W. Prizeman	Coll. of Aeronautics	10. 2.52
17640	W. A. Graham	No. 22 G.S.	21. 3.54
17641	S. D. Glenholmes	No. 22 G.S.	28. 3.54
17645	D. H. Stretton	No. 143 G.S.	21. 3.54
17646	G. A. Wapling	London G.C.	25.10.53
17647	J. Wilson	No. 1 G.S.	21. 2.54
17648	W. W. Bennett	No. 22 G.S.	21. 3.54
17649	J. S. C. Harrison	No. 168 G.S.	21. 3.54
17650	R. N. Luce	No. 123 G.S.	28. 3.54
17651	D. J. Lane	No. 87 G.S.	22.11.53
17652	J. Wipperman	No. 142 G.S.	21. 3.54
17653	M. J. Whitcher	No. 122 G.S.	21. 3.54
17654	J. A. W. Crozier	No. 203 G.S.	14. 3.54
17655	D. J. Fuller	No. 122 G.S.	21. 3.54
9629	I. M. Ross	No. 7 G.S.	17. 1.54
10560	D. O. Davidson	No. 7 G.S.	17. 1.54
13821	D. R. Nunn	No. 104 G.S.	21. 2.54
14051	S. C. Spikins	No. 89 G.S.	18. 8.53
17592	D. Stinton	No. 7 Area G.C.	28. 2.54

'C' CERTIFICATES

13121	P. D. Thomas	No. 64 G.S.	28. 8.51
14731	M. Clubb	No. 64 G.S.	10. 8.53
15062	L. Bellamy	No. 64 G.S.	10. 8.53
16076	C. Carmichael	No. 188 G.S.	10. 1.54
17238	H. C. G. Cartwright-Taylor	R.E. G.C.	24. 2.54
17356	P. C. Pirow	Oxford G.C.	7. 3.54
17593	B. B. C. Watson	London G.C.	14.11.53
17635	C. T. Kirk-Smith	Oldenburg G.C.	4.12.53
17646	C. A. Wapling	London G.C.	7. 3.54

SILVER 'C'

444	Hugh S. S. Trotter	Surrey G.C.	19. 7.53

'B' CERTIFICATES — APRIL, 1954

No.	*Name.*	*A.T.C. School or Gliding Club.*	*Date taken*
17656	M. E. Brown	No. 125 G.S.	28. 3.54
17657	D. D. Bonham	No. 122 G.S.	14. 3.54
17658	S. H. Bell	No. 44 G.S.	28. 3.54
17659	T. Green	R.A.F. Halton	1. 4.54
17660	B. J. F. Able	No. 84 G.S.	1. 7.51
17661	R. L. Mansfield	No. 142 G.S.	21. 3.54
17662	D. A. Kendall	No. 142 G.S.	28. 3.54
17663	D. A. Twiss	No. 123 G.S.	28. 3.54
17664	J. C. T. Comins	No. 42 G.S.	21. 3.54
17665	J. R. S. Gilbert	No. 168 G.S.	28. 3.54
17666	J. S. Thom	Scottish G.U.	28. 2.54
17667	P. Jacques	No. 1 G.S.	21. 2.54
17668	B. Harris	No. 42 G.S.	21. 3.54
17669	M. J. E. Rumsey	No. 104 G.S.	30. 5.53

'B' CERTIFICATES—*continued*

No.	Name.	A.T.C. School or Gliding Club	Date taken.
17670	D. C. Saunders	No. 125 G.S.	4. 4.54
17671	S. D. Rayner	No. 104 G.S.	27. 3.54
17672	C. J. Bailey	No. 125 G.S.	4. 4.54
17673	R. E. Mountford	No. 142 G.S.	28. 3.54
17674	D. L. Page	No. 142 G.S.	28. 3.54
17675	B. M. Shadbolt	No. 105 G.S.	21. 3.54
17676	G. Williamson	No. 42 G.S.	28. 3.54
17677	G. J. McCafferty	No. 183 G.S.	4. 4.54
17678	D. G. Taylor	No. 102 G.S.	4. 4.54
17679	R. Cave	No. 31 G.S.	28. 3.54
17680	B. E. Woodham	No. 143 G.S.	28. 2.54
17681	B. E. Harwood	No. 5 G.S.	28. 3.54
17682	N. G. Russell	No. 146 G.S.	4. 4.54
17683	T. A. Trigg	No. 24 G.S.	22. 7.36
17684	A. H. Geary	No. 142 G.S.	21. 3.54
17685	B. M. Allen	No. 166 G.S.	21. 2.54
17686	T. G. Harries	No. 126 G.S.	21. 3.54
17687	R. M. Kearin	No. 166 G.S.	21. 2.54
17688	D. G. Tidbury	No. 123 G.S.	10. 4.54
17689	D. M. Wright (Miss)	Army G.C.	13. 4.53
17690	M. J. A. Mells	Surrey G.C.	13. 4.54
17691	P. L. Folkes	Coventry G.C.	4. 4.54
17692	D. A. Heden	No. 161 G.S.	19. 8.53
17694	B. A. Brett	No. 126 G.S.	11. 4.54
17695	J. H. Nunneley	London G.C.	30. 3.54
17696	M. N. Whiteman	No. 104 G.S.	13. 8.53
17697	R. A. Agar	No. 31 G.S.	10. 4.54
17698	D. Carlton	Moonrakers G.C.	28. 7.53
17699	D. M. Holgate	No. 146 G.S.	19.10.36
17700	R. Seller	R.A.F. Detling	28. 2.54
17701	P. R. J. York	No. 125 G.S.	11. 4.54
17702	G. D. Cook	No. 92 G.S.	28. 3.54
17703	A. Welburn	No. 22 G.S.	11. 4.54
17704	E. J. Pearson	R.A.F. Detling	19. 8.53
17705	E. M. Horne	No. 122 G.S.	28. 3.54
17706	M. J. Jennings	Old Sarum G. & S.C.	23. 6.52
17707	W. Grewar	No. 5 G.S.	28. 3.54
17708	C. H. Smith	No. 26 G.S.	11. 4.54
17709	H. M. Lockhart	No. 26 G.S.	11. 4.54
17711	R. J. Wingrove	No. 130 G.S.	4.10.53
17712	B. W. Cooper	No. 146 G.S.	17. 4.54
17713	P. L. Harris	No. 105 G.S.	28. 3.54
17714	C. Moffatt	No. 31 G.S.	10. 4.54
17715	B. M. Swan	No. 123 G.S.	2. 8.53
17716	I. Y. Wattam	No. 22 G.S.	11. 4.54
17718	W. E. Morely	No. 22 G.S.	21. 3.54
17719	C. E. Chamberlain	No. 22 G.S.	21. 3.54
17720	D. Wright	No. 92 G.S.	22.11.53
17721	L. W. Redding	London G.C.	9.10.53
17722	W. Atkinson	No. 31 G.S.	28. 3.54
17723	M. Knowles	No. 5 G.S.	28. 3.54
17724	R. Griffiths	No. 142 G.S.	26. 8.53
17725	Mrs. M. N. A. Aitken	Scottish G.U.	19. 4.54
17726	R. E. Baker	No. 168 G.S.	11. 4.54
17727	J. U. Watson	No. 104 G.S.	19. 4.54
17728	T. Stothers	No. 141 G.S.	17. 4.54
17729	R. Sowerby	No. 141 G.S.	17. 4.54
17730	R. G. Wyper	No. 141 G.S.	18. 4.54
17731	J. C. H. Harvey	No. 126 G.S.	18. 4.54
17733	D. McDonell Hartas	No. 168 G.S.	18. 4.54
17734	A. MacDonald	No. 141 G.S.	17. 4.54
17735	J. E. J. Partridge	No. 104 G.S.	18. 4.54
17736	F. A. Rouson	No. 143 G.S.	19. 4.54
17737	D. J. Snell	No. 142 G.S.	28. 3.54
17738	G. Soper	No. 143 G.S.	19. 4.54
17739	R. J. H. Woolgar	No. 186 G.S.	18. 4.54
17740	J. D. York	No. 141 G.S.	17. 4.54
17742	R. J. L. Bolton	No. 102 G.S.	20. 4.54
17743	R. T. Whittle	No. 102 G.S.	20. 4.54
17744	G. F. Clack	No. 102 G.S.	20. 4.54
17745	J. Page	No. 102 G.S.	20. 4.54
17746	D. P. Pearson	A. V. Roe G.C.	17. 4.54
17747	D. A. Benton	No. 48 G.S.	30. 4.54
17748	J. L. Vanderpost	Derby & Lancs. G.C.	11.10.53
17749	M. J. Fenton	Avro G.C.	13. 8.53
17750	D. A. Clifton	No. 130 G.S.	24. 1.54
17751	G. Allison	No. 22 G.S.	22. 4.54
17752	A. T. D. Booth	No. 141 G.S.	17. 4.54
17753	M. A. Bell	No. 105 G.S.	28. 3.54
17754	M. A. Clark	No. 146 G.S.	17. 4.54
17755	P. M. E. Clarke	No. 89 G.S.	8. 4.52
17756	R. L. Kunkle	No. 143 G.S.	19. 4.54
17757	R. I. Lloyd	No. 84 G.S.	11. 4.54
17758	D. M. Potts	No. 22 G.S.	22. 4.54
17759	A. C. Remfrew	No. 126 G.S.	19. 4.54
17760	R. M. Spall	No. 102 G.S.	6. 2.54
17761	M. J. Ward	No. 186 G.S.	17. 4.54
17763	R. Brown	No. 2 G.S.	28. 3.54
17764	R. J. Brown	No. 105 G.S.	17. 4.54
17765	D. R. Harding	No. 31 G.S.	19. 4.54
17766	L. D. Kyd	No. 186 G.S.	17. 4.54
17767	W. G. Mycock	Avro G.C.	16. 4.54
17768	D. Mary G. Poole	Surrey G.C.	9. 1.54
17769	R. J. Bickford	Wessex G.C.	14. 8.53
17770	J. R. Fisher	No. 166 G.S.	22. 4.54
17772	M. Murden	No. 23 G.S.	24. 4.54
17773	A. E. Nash	No. 105 G.S.	19. 4.54

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'B' CERTIFICATES—*continued*

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17774	M. G. Savage	No. 23 G.S.	23. 4.54
17775	L. Stewart	No. 126 G.S.	25. 4.54
17776	P. G. Bamforth	No. 22 G.S.	21. 4.54
17777	D. G. Barber	No. 166 G.S.	22. 4.54
17778	I. D. Bell	Kimbolton (141)	23. 4.54
17779	D. M. Etherington	No. 126 G.S.	19. 4.54
17780	M. H. Cullup	No. 141 G.S.	23. 4.54
17781	P. J. C. Edmunds	No. 141 G.S.	23. 4.54
17782	W. J. Elder	No. 122 G.S.	23. 4.54
17783	R. H. Gammon	No. 122 G.S.	19. 4.54
17784	M. A. Hughes	No. 186 G.S.	11. 4.54
17785	A. Page	No. 122 G.S.	21. 4.54
17786	A. V. Seymour	No. 122 G.S.	21. 4.54
17787	G. P. Spray	No. 23 G.S.	24. 4.54
17788	D. A. Stevenson	No. 23 G.S.	24. 4.54
17789	J. C. Taggart	No. 122 G.S.	24. 4.54
17790	I. Woodruff	No. 84 G.S.	9. 4.54
17791	D. M. Wilson	No. 1 G.S.	31. 8.52
17792	G. K. Stephenson	No. 26 G.S.	18. 4.54
17793	D. J. Westaway	No. 183 G.S.	21. 4.54
17794	P. E. Burling	No. 105 G.S.	24. 4.54
17795	C. J. Robinson	No. 23 G.S.	11. 4.54
17796	J. W. Bowman	No. 123 G.S.	24. 4.54
17797	A. A. B. Davies	No. 22 G.S.	18. 4.54
17798	P. O. D. Marshall	No. 166 G.S.	22. 4.54
17799	J. Millward	No. 122 G.S.	22. 4.54
17800	F. W. Parkinson	No. 31 G.S.	4. 4.53
17801	B. D. Sparks	No. 126 G.S.	25. 4.54
17802	J. E. Houghton	Bristol G.C.	13. 9.53
17803	J. C. Dilworth	No. 122 G.S.	22. 4.54
17804	M. Burr	No. 130 G.S.	21. 3.54
17805	D. W. Rutter	No. 183 G.S.	18. 4.54
17806	A. H. Lomas	London G.C.	10. 5.53
17807	D. B. Thompson	No. 89 G.S.	23. 4.54
17808	B. K. Knivett	No. 89 G.S.	22. 4.54
17809	B. Davitt	No. 89 G.S.	18. 4.54
17810	R. D. Cotton	No. 89 G.S.	24. 4.54
17811	J. H. Hitchcock	No. 89 G.S.	18. 4.54
17812	P. D. Brown	No. 22 G.S.	25. 4.54
17813	G. J. Stevens	Cambridge G.C.	4.10.53
17814	F. Tinlin	No. 31 G.S.	18. 4.54
17815	E. B. Burgoyne	No. 106 G.S.	28. 3.54
17816	R. A. Evans	No. 141 G.S.	23. 4.54
17817	B. Davis	No. 84 G.S.	25. 4.54
17818	A. J. Lynch	St. Athan G.C.	7. 4.54
17819	J. A. Fletcher	No. 166 G.C.	22. 4.54
17820	P. A. Allworthy	No. 23 G.S.	24. 4.54
17821	J. P. Armstrong	Derby & Lancs. G.C.	6. 2.54
17822	M. Baynes	No. 122 G.S.	19. 4.54
17823	R. J. Brady	No. 123 G.S.	24. 4.54
17824	H. W. Cuckow	No. 22 G.S.	19. 4.54
17825	D. M. Cullup	No. 105 G.S.	19. 4.54
17826	P. C. Cummings	No. 166 G.S.	21. 4.54
17827	A. Gilbey	Army G.C.	8. 4.54
17828	J. McArthur Reid	Scottish G.U.	25. 4.54
11385	F. E. Ord	Moonrakers G.C.	25. 4.54
13730	J. Cook	No. 1 G.S.	24. 8.52
14813	P. J. Thomas	No. 143 G.S.	19. 4.54
	'C' CERTIFICATES		
3582	G. J. R. Saunders	No. 44 G.S.	19. 4.54
10583	P. G. Plows	No. 122 G.S.	16. 4.54
11695	P. G. H. Mann	Army G.C.	9. 4.54
13144	D. C. Wilson	Hereford G.C.	15. 4.54
13232	D. H. J. Lake	Midland G.C.	27. 7.53
14519	D. M. Clewer	R.A.F. Bruggen	28. 3.54
14903	D. A. Smith	No. 141 G.C.	11. 4.54
15058	J. N. King	Cambridge G.C.	5. 7.53
15087	C. Ellam	Coll. of Aeronautics	1. 4.54
15112	P. J. Sullivan	Oxford G.C.	11. 4.54
15130	J. Goddard	Coll. of Aeronautics	31. 3.54
15147	T. Coldwell	Coll. of Aeronautics	31. 3.54
15349	J. K. Lumsdon-Taylor	No. 31 G.S.	16. 4.54
15496	A. H. Burnage	No. 142 G.S.	19. 4.54
15738	J. M. G. Bennett	No. 203 G.S.	17. 4.54
15756	C. Yarker	No. 64 G.S.	16. 8.53
16389	S. Chenna Keshu	Coll. of Aeronautics	1. 4.54
16548	J. A. Wignall	Avro G.C.	25. 4.54
17272	J. L. Weatherley	Moonrakers G.C.	25. 4.54
17389	D. Collings	Avro G.C.	4. 4.54
17481	D. Bailey	No. 89 G.S.	23. 4.54
17617	C. L. Barnfather	No. 125 G.S.	18. 4.54
17660	B. J. F. Able	No. 84 G.S.	1. 7.51
17721	L. W. Redding	London G.C.	4.11.53
17724	R. Griffiths	No. 142 G.S.	19. 4.54
17748	J. L. Vanderpost	Derby & Lancs. G.C.	28. 3.54
17768	Mary G. Poole	Surrey G.C.	10. 4.54
17769	R. J. Bickford	Wessex G.C.	11. 4.54
17806	A. H. Lomas	London G.C.	10. 6.53
17813	G. J. Stevens	Cambridge G.C.	19. 4.54
17821	J. P. Armstrong	Derby & Lancs. G.C.	4. 4.54
	SILVER 'C'		
445	P. A. E. Jeffrey	Coll. of Aeronautics	9. 4.54
446	D. Hendry	Scottish G.U.	2. 4.54
447	W. N. Tonkyn	Imperial Coll. G.C.	18. 4.54
448	W. Verling	No. 166 G.S.	20. 4.54
449	A. Stagg	London G.C.	19. 4.54

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