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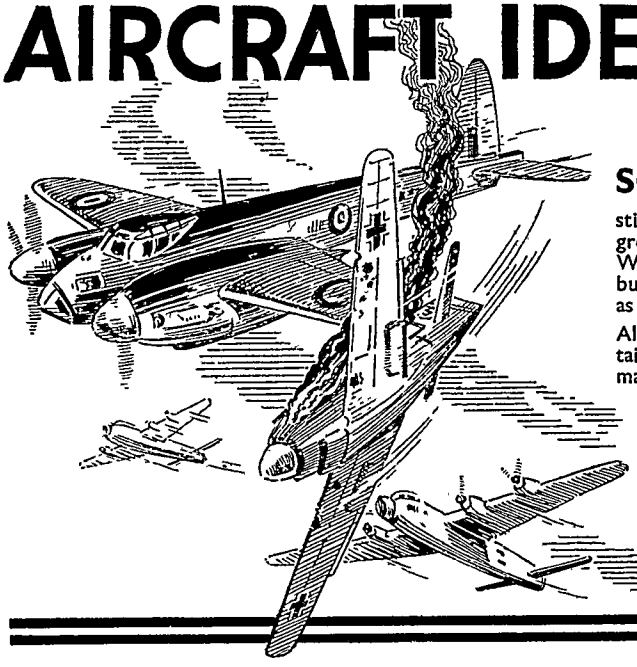

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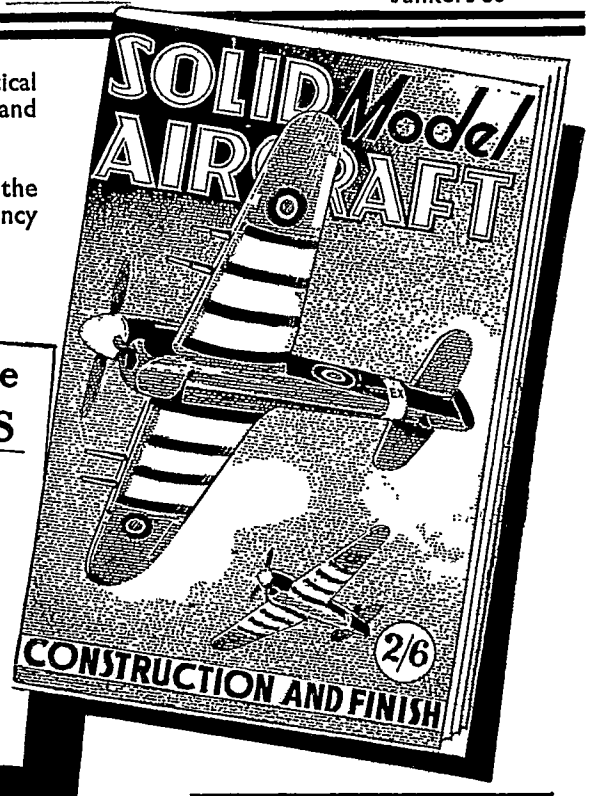

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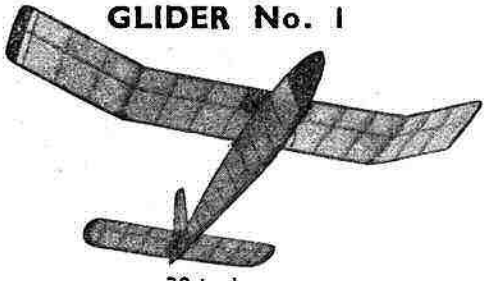

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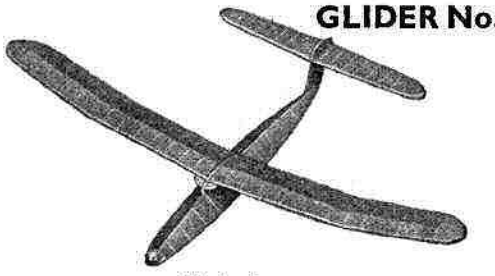

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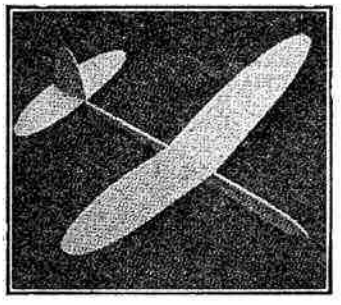

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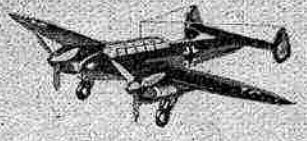

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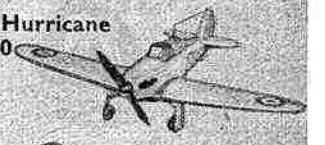

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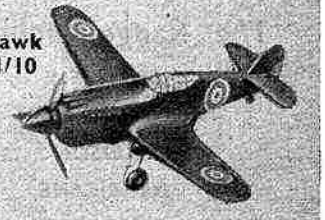

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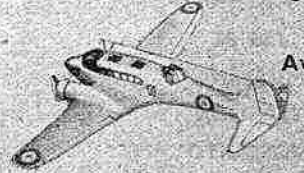

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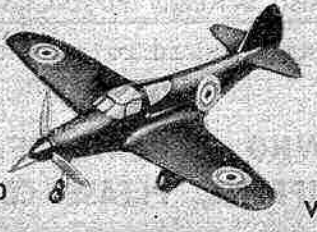

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The Model Aeronautical Journal of the British Empire

Established 1936

VOL. IX' No. 102 MAY 25th, 1944

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EDITORIAL

WE have pleasure in announcing that we have secured the copyright in the design of Mr. George Temple's "Celestial Horseman," which won the "Wings for Victory" Competition organised by the S.M.A.E. last year. A number of photographs of this beautifully-made model are published in the centre-spread of this issue, together with an announcement in regard to the large plan which is now available showing all parts fully detailed and drawn full-size.

It is interesting to note that in the "Wings for Victory" Competition, sixth place was taken by a flying scale model of the "Albacore," two twelfth places by flying scale models of the "Hotspur" and "Lysander," and fourteenth place, also by a "Lysander," all built from AEROMODELLER Plans Service plans.

We are pleased to announce that, consequent on the steadily increasing demands for our series of blue prints of flying models of all types in this service, we can, despite war-time conditions, make considerable price reductions. For instance, the "Lysander" plan, which has sold at 5s. post free, is now reduced to 4s. post free. 10s. 6d. plans are reduced to 9/6, and many other plans *pro rata*.

There is, however, one price *increase;* that of the "Horsa" glider, which has been advertised at 6s. against the true price of 9s. This is now *re*duced to 8/3 . . . or as-you-like-it, *in*creased from 6s.! Anyway, we have borne the loss on selling a considerable number of these plans owing to a mistake in the first announcement!

Aviation in Miniature.

We also announce in this issue particulars of a 48-page booklet, with a striking three-colour cover, price 1s., descriptive of the whole Aeromodelling Movement, and containing, in its later pages, a full list of the Harborough publications and Plans Service blue-prints and 1/72 scale three-view drawings of the world's aircraft.

Under war-time conditions it is not possible to issue, as is usually done in the form of circulars, particulars of publications; and we have therefore arranged for these particulars to be included at the end of this very interesting booklet—"Aviation in Miniature"—a copy of which should be in the possession of every aeromodeller. This little booklet serves also as an excellent means of introducing a "stranger" to the hobby of aeromodelling, and it is hoped that "for the good of the cause" a wide distribution will be made, and that readers will bring copies before the notice of friends who may be interested in joining the ranks of aeromodellers.

We would emphasise that "Aviation in Miniature" includes the most up-to-date list of publications, blue-prints (with all the new *reduced* prices) and the many hundreds of 1/72 scale plans and photographs which are now available. Copies may be ordered from any Model Shop, W. H. Smith or Wyman's bookstalls, or direct from our Leicester Offices, price 1s. (post free).

"Aircraft of the Fighting Powers." Vol. I.

As was advertised some months ago, a small reprint of Vol. I of "Aircraft of the Fighting Powers" was recently run off, and a limited number of copies are now available. The whole of the three-view drawings have been re-drawn to the "finer line," and higher standard of accuracy which has obtained in Vols. II, III and IV of this series, and many additional photographs added. Copies may be obtained from any bookstall or Model Shop, price 21s. each, or direct from our Leicester Offices, price 22s. post free. We would emphasise that there are less than 2,000 copies available, after meeting firm orders placed when the reprint was announced; therefore it is essential that readers requiring copies should order immediately, to avoid disappointment.

Our stocks of Vol. III are also diminishing fast. Readers are advised to obtain their copies at an early date, as we shall not be able to run a reprint of this volume until after the war. The rate of despatch of Vol. IV is steadily increasing, and it is hoped, within the next month or so, to have completed all orders in hand. Readers who have not yet ordered their copies should do so immediately; orders are of course always dealt with in strict rotation.

D. A. R.

CONTENTS OF THIS ISSUE

With apologies to Guinness.

Recently a small consignment of rubber strip was made available to the Model Aircraft Trade—here is some of it in the arms of two of the Aeromodeller staff. (No, they did not take a few ounces out of one of the bundles!)

Lest it be thought that model planes made with feathers—a model of which was published in a recent issue of the AEROMODELLER—are new, we feel that readers might be interested to know that in the August, 1924, *Flight* described with illustrations, four different models—three of which were biplanes made entirely of feathers. They had been built by Mr. R. N. Bullock of "Wakefield Cup" fame. There was a slow flying biplane with a speed of 3·2 miles per hour and a duration of five seconds; a monoplane and biplane with speeds of about 8 m.p.h. and durations of 20/25 seconds; and a speed monoplane with a maximum of over 18 m.p.h. and a duration of eight seconds. One of these models clocked a duration of nearly ninety seconds when competing in the "Gamage" Challenge Cup of that year.

★ ★ ★ ★ ★

Some rather good "journalese" has appeared in the popular press recently descriptive of youthful plane spotters, and we hear of a boy, only four years of age, of whom it is claimed—"show him a book of pictures of hundred or more aircraft, and he will tell you after a moment whether it is English, American or Japanese, and just what kind." Whilst this child prodigy cannot read, words such as Savoia-Marchetti, Messerschmitt, Focke-Wulf, slip easily from his tongue! A wag on our staff suggests that if this boy can co-ordinate shadowy forms flitting between trees about two miles apart, with the muted whine of an aero engine, and identify them whether Mustang or Spitfire, he should be made Hon. Vice Marshal of the Royal Observer Corps!

NEWS ITEMS

IN the February 9th, 1944, issue of the *Daily Sketch*, appears a description of a "paddle plane" which is described as the Nazi's latest. A drawing of this paddle plane is quoted as having been taken from a Nazi aeronautical paper, but we feel sure readers will be interested to know that, on page 194 of the May, 1942, issue of the AEROMODELLER we published the same illustration (giving due acknowledgment to the *Illustrated London News*) and offering a prize for any modeller who could construct a small scale model of this paddle plane which would fly. Wonderful how the daily press keeps abreast of the latest aeronautical news!

★ ★ ★ ★ ★

It is interesting to note that two Bristol born boys now in Toronto, Canada, have cleaned up in the Canadian Nationals. The youngest of the two, Brian Hockin, aged 12, took second place in the towline gliders, fourth in the outdoor fuselage, and second in the junior petrol class. His brother Gordon, aged 19, and training in the R.A.F., won the Toronto Globe and Mail Trophy for the best time record in all the petrol model events. His time was 15 mins. 34 secs., for six flights.

★ ★ ★ ★ ★

For the interest of our readers, we quote the following paragraph from the August 1st issue of *The Graphic*, 1874:—

THE FLYING MAN.—The inquest on the body of Vincent de Groof, who was killed on the 9th ult., has resulted in a verdict of accidental death, the jury adding a rider to the effect that the increasing frequency of dangerous exhibitions should claim the attention of the Legislature, though in the case in question they thought no blame should be attached to the proprietors of Cremorne. It came out in evidence that the statement as to the previous trip being successful was false: the machine, instead of racing with the balloon for some distance, was never disconnected from it, and was a complete failure. According to the *Lancet*, the mechanical difficulties are not the only ones which have to be surmounted before man can "ride upon the wind," for "the rapidity of the movement, the exertion of controlling the apparatus, and doubtless the anxiety, would produce an acceleration of the heart, which, in an atmosphere becoming every moment more rarefied, would cause syncope, insensibility, and finally death. From Icarus downwards, this flying literally in the face of nature has proved abortive, and will continue to do so until the experimenter can essay the task of a bird with the organism of a bird, and without the impediments of the 'featherless biped,' man. Physiologically, we repeat, the human respiratory and vascular apparatus forbids the attempt."

★ ★ ★ ★ ★

Sir Frederick Handley Page presented scale models of a Hampden and a Halifax II to Mr. S. M. Bruce, High Commissioner for Australia at the Boomerang Club recently. The models are destined for the National War Museum in Australia. "These models will be of great interest to coming generations of Australians", said Mr. Bruce. "They will help to record Australia's war effort in what we hope will be the last World War."

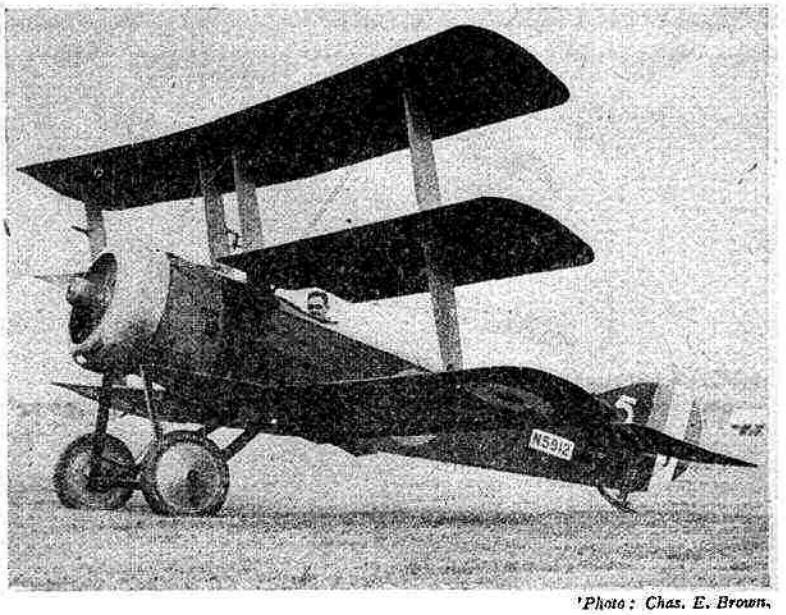
Sir Frederick, in making the presentation, recalled an amusing comment made some time ago by Lord Brabazon during a discussion on how flies manage to alight upside-down on the ceiling.

"Yes, it's a wonderful bit of flying," observed Lt.-Col. Moore Brabazon, as he then was, "but Australian airmen down under are doing it all the time."

OPINIONS OF THE ACES

SOME "NEW" MACHINES OF THAT OTHER WAR

BY W · BODDY



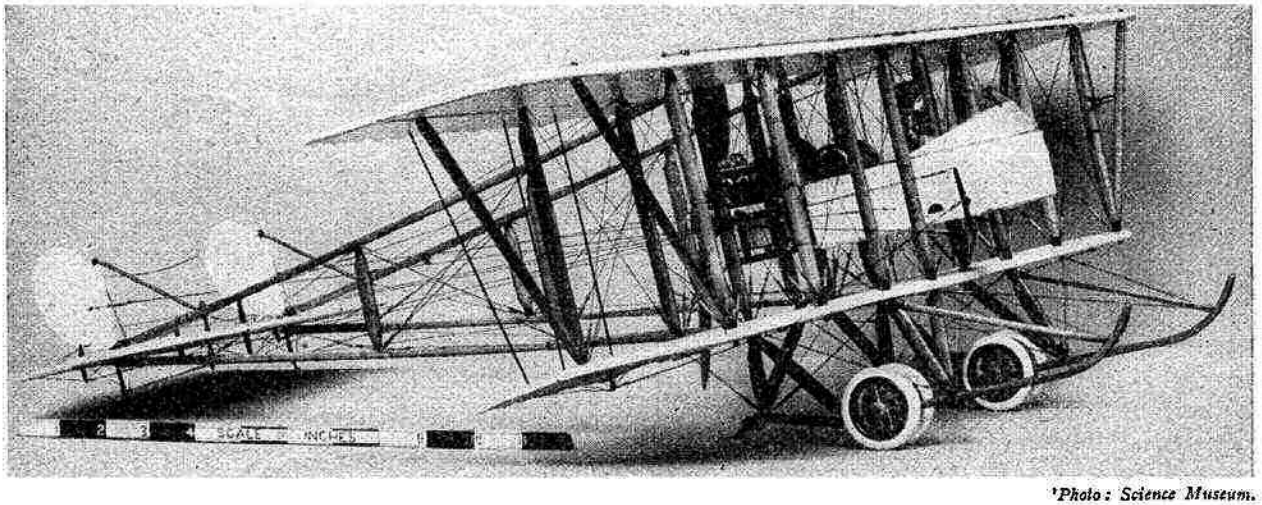
'Photo: Chas. E. Brown.

The well-known "Tripe," or to quote its official title, "The Sopwith Triplane."

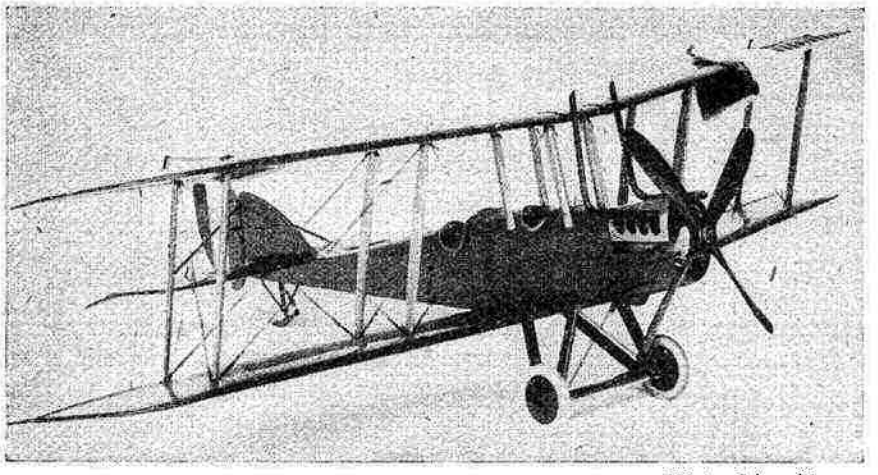
AS a brief respite from the rigours of the present it is pleasing to delve into the past, which, aeronautically, takes us from Spitfires, Hurricanes and Typhoons, to B.E.2s, Camels and S.E.5s. Aircraft of the 1914–1918 war will never cease to fascinate the present and the rising generation and it is a proud fact that the study of the exploits of the air "aces" of "that Other War" indicates plainly that the grand spirit found in the R.A.F. today had its origin in the Royal Flying Corps of 1914. As with the personnel, so with the aircraft. The outstanding fighters of the first Great War had personality, and endeared themselves to their pilots, just as much as is the case with the fighters of our time. If only to forget our present anxieties, let us study the opinions of the different types held by pilots whose fame, achieved in encounters with German airmen over a quarter of a century ago, have never ebbed.

In the early stages of the 1914–1918 war we find Maurice Farmans—Shorthorn and Longhorn—still in evidence. In his delightful book "Wind in the Wires," Duncan Grinnel-Milne reports finding a queue of novices waiting to fly the only training Longhorn, when he was posted to Gosport. "The trouble," he tells us, "with a Shorthorn was that it had no nice tea-tray elevator in front with which to judge the correct flying angle, and thus the first impression to a Longhorn pilot was rather perilous, as if he were hanging head down over a balcony." Cecil Lewis, too, learned to fly on a Farman "Longhorn," of which, in "Sagittarius Rising," he says: "If you crashed it, there was such a lot between you and the ground that you were unlucky to get hurt. Also it had no vices. It was docile and well behaved. It climbed at forty-five, flew level at sixty and settled down like a kite when landing." The great James McCudden, also had reason to remember the Farman, for, prop.-swinging an Anzani-Caudron, that aircraft started up pilotless and proceeded to eat up a Farman which obstructed its path. Lt.-Col. L. A. Strange, D.S.O., M.C., D.F.C., in "Recollections of an Airman," reminds us that he learned to fly on a 35 h.p. Anzani-Caudron biplane, later going on to Graham White Box Kites at Hendon, and it was on Caudrons that Capt. Albert Ball put in some of his early training. Strange found, incidentally, that when war came he was obliged to learn all over again, at Upavon, on Farmans

"The wind in the wires" with a vengeance! An excellent model of the Maurice Farman "Shorthorn."



'Photo: Science Museum.



Left is a model of the B.E. 2D type biplane. Below is one of the many different types flown by Captain Albert Ball, V.C. The Bristol "D" Scout.

'Photo: Science Museum.

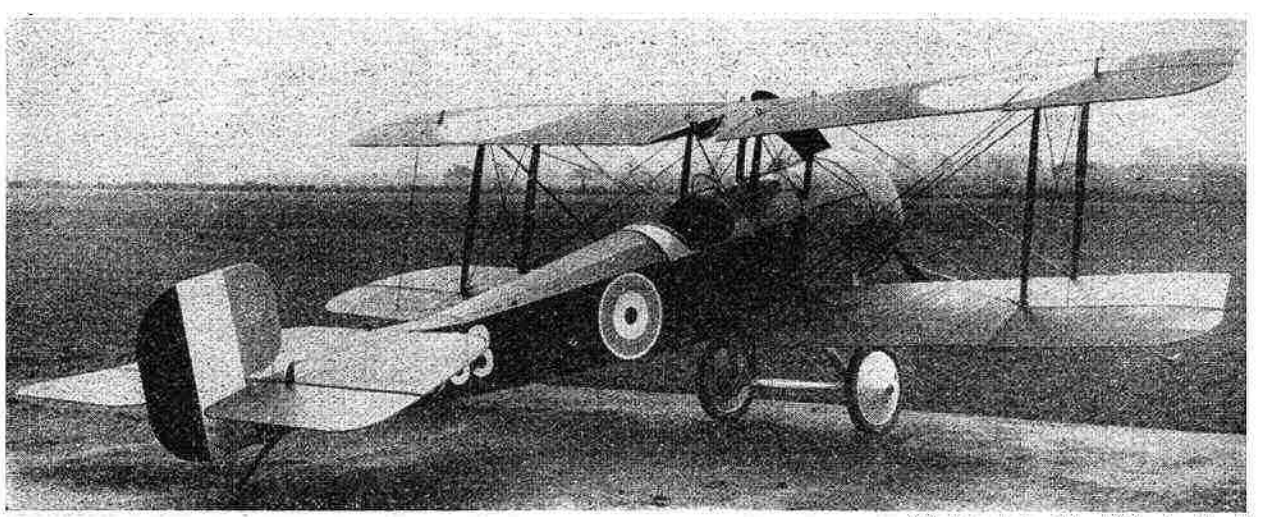
and B.E.s. Of the Caudron, Grinnel-Milne wrote " . . . perfectly safe; she has never been known to spin. Providing one did not stall her, she would give no trouble. She was strong, had a low landing speed, required a comparatively short run for taking off and was more or less foolproof in the air. Her one weakness was that whirling incinerator of an engine."

Some interesting aircraft come in for mention in "Flying Fury," which McCudden saw while waiting his chance to go for the Hun. At Eastchurch, where Lt. Samson was flying a type S38 Short in early 1914, was a German D.F.W. which Britain had bought for experimental purposes. McCudden was a mechanic with No. 3 Squadron, R.F.C., at this time and when war broke out their 80 h.p. Bleriots were flown over the Channel to Amiens. These machines were fitted up with little wooden racks to carry small hand grenades and steel darts—the aircraft were fired on from the ground by all and sundry on these first observation flights and suffered badly from rifle bullets!

The B.E.s, which, with the Vickers Fighter, bore the brunt of the Fokker scourge, caused nearly as much confusion in the early part of the last war as the Spitfire, in its many marks, can do in this. Grinnel-Milne remarks of the trainer he had at Gosport: "As a matter of fact I am not quite sure whether it was a 2C or some earlier category. It had a less powerful engine—80 h.p. Renault—cables instead of streamline wires and wooden skids on the undercarriage."

But later, at the front, he got a B.E., "nominally of 90 h.p., but upon the boss of the four-bladed airscrew was stamped '100 h.p. R.A.F.,' which gave it in my eyes an added importance." Of this type this author says: "In the air it was very easy to handle, stable, and, once used to her ways, I found her very manœuvrable. She was capable of making vertically-banked turns and, I recalled, was strong enough to be looped—inspiring thought! Another, less pleasant thought, was that she might spin at any moment." The fear of spinning the B.E. was mostly unfounded and, after gaining experience of his B.E. 2C, Cecil Lewis wrote: "Actually she was as docile and dull as a motor 'bus—and about as heavy to handle—and it was very difficult to get her to spin at all."

What was the trickiest aircraft of the 1914–1918 war? If we believe Cecil Lewis, the Morane "Parasol." Of this 80 h.p. le Rhone-engined craft he tells us: " . . . the elevator was as sensitive as a gold balance; the least movement stood you on your head or on your tail. You couldn't leave the machine to its own devices for a moment; you had to fly it every second you were in the air. The other controls were practically non-existent. There was a rudder too small to get you round quickly and ailerons which were so inefficient that sometimes, if you got a bump under one wing taking off, it was literally seconds before you could get on an even keel again. The stick did not come above the knees and had a grip on the top, like half a shooting stick. If you were foolish enough to let go of this in the air the stick fell forward with a crack against the tank and the aircraft went straight into a nose dive. Never, even when you knew it inside out, could you relax for a second." McCudden's Squadron received its first Morane in December, 1914, but within a month it was crashed and completely wrecked, and McCudden describes them as



'Photo: reproduced from "The Aeroplane."

Photo: Imperial War Museum.

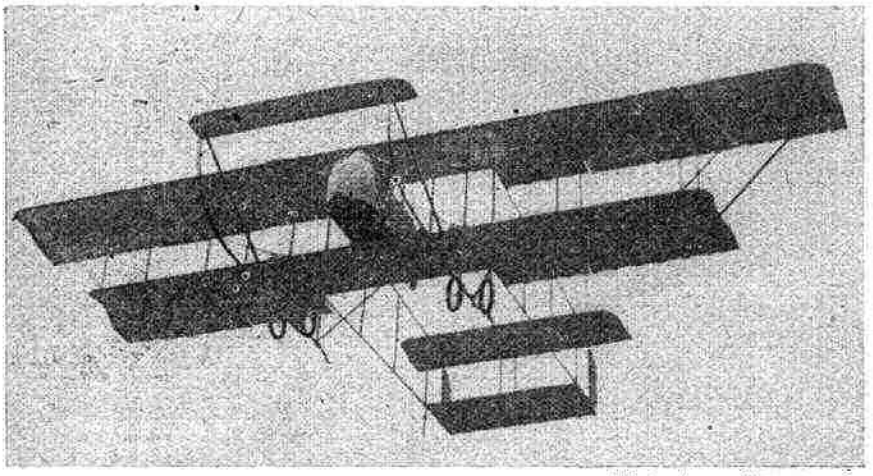
having "many nasty tricks, being an absolutely unstable aeroplane," although twice in "Flying Fury," he refers to the excellent climb of "The wing-warping Morane," mentioning 6,000 ft. in 12 mins., observer up. Ball, desperately anxious to get away from B.E. 2C.s, was put on to Morane Bullets at St. Omer for single-seater training, and survived without damaging an aircraft. Coming back to his Squadron he temporarily flew their Bristol Scout, and then went over to the greatest single-seater of that time, the Nieuport Scout, which began to arrive in March, 1915, and could do 105 to 110 m.p.h., reach 10,000 ft. in 10½ mins. and provided its pilot with an excellent view. Later Ball was put back on to B.E. 2C.s for a rest, and it is reported that when General Trenchard asked him his opinion of them he replied: "It's a b——— awful machine!" Back on Nieuports, Ball made a speciality of attacking Roland two-seaters and he considered these the best German machines on the Western Front in the Summer of 1916, although it was known that they were nose-heavy and hard to fly and the Germans themselves preferred the two-seater L.V.G.

So the single-seater scouts came into the picture, equivalent to the Hurricane, Spitfire and Typhoon of today. Cecil Lewis crashed a Bristol Scout on his first attempt to land it, but said of it: ". . . she was as light as a feather on all controls." He, too, had long days on B.E. 2C.s in France, as did Grinnel-Milne and Lt.-Col. Strange; Strange, however, first flew 80 h.p. Gnome-Avros, and, later, F.E. 2Bs, while Grinnel-Milne finally went over to S.E.5s. Of the F.E. 2B Strange said: ". . . it is a fine machine and would be ideal if it were only a little faster. As it is, the Hun always seems to see us in time and avoids us like the plague, so that we seldom catch him. It is, however, a splendid reconnaissance and photographic machine." Cecil Lewis was destined for test flying. He flew the Sopwith Triplane and says that for actual pleasure of flying it was one of the best aircraft he ever took up. "It was so beautifully balanced, so well-mannered, so feather-light on the stick, and so comfortable and warm. . . . for its docility, the lack of all effort needed to fly it, and yet its instantaneous response to the lightest touch, it remains my favourite." Lewis went back to active service flying with 140 h.p. Hispano-engined S.E.5s and tells us: "The machine (for 1917) was quite fast. It would do about 120 on the level and climb 10,000 ft. in 12 mins. It could be looped, rolled, and dived vertically without breaking up. Altogether it was a first-class fighting-scout (probably the most successful designed during the war), and was relied on to re-establish the Allied air supremacy lost during the winter." As it turned out, the German machines still had a considerable superiority in performance in dog-fights at 1,500 to 18,000 ft. and not until the S.E. 5 got its 200 h.p. motor could it prove its real merit. Lewis recalls a friendly duel with a Sopwith "Dolphin" while flying a 200 h.p. S.E.5 and confesses that in the hands of a real expert the "Dolphin" could out-match the S.E.5. Later he had a mock battle against Guynemeyer flying a Spad and admits that in the first minute the S.E.5 would have been shot down a dozen times. The Spad and the Dolphin were both more manœuvrable, while apparently the German Pfalz could also beat up an S.E.

Above is the Morane Parasol considered to be one of the trickiest machines of the 1914-18 War. This particular aircraft is the 1916 version.

Right, is the well-known S.E.5 flown by most of the "Aces."

Photo: Imperial War Museum.



The Maurice Farman "Longhorn," note the "tea-tray" elevator which distinguisher this machine from the "Shorthorn" version.

Photo: Imperial War Museum.

So to the Sopwith "Camel," of which Lewis wrote: "The machine was not particularly fast on the level, but it climbed well and could beat any other scout in a fight. Like all Sopwith productions it was a bit on the light side; but for actual flying, next to the Triplane, it took first place with me."

Reverting to McCudden, he flew across the Channel, after "taking his ticket," in a B.E. 2D with a passenger, losing an engine bearer on the way over and just getting into St. Omer. Incidentally, the only other tractor machine he had flown up to that time was an Avro! He seems to have passed in quick succession from D.H. Scouts and S.E.5s to the D.H. 2, "a very cold little machine, as the pilot had to sit in a small nacelle with the engine a long way back, so he got no warmth from it." He also observes: ". . . these machines, even then, were not very popular with the average pilot. I found it very nice and light after the heavy S.E." McCudden seems to have got on well with the types which were light to handle. He later tried a Le Rhone Bristol Bullet and "liked it so much I plucked up enough courage to do six loops in it on my first flight." He also wrote: ". . . the little Bristol was a most excellent flying machine, and quite easy to land and fly though it was generally said that if a pilot could fly a Bristol well he could fly anything." After going up in a Martinsyde "Elephant," McCudden said: ". . . it was very comfortable and warm, which made it popular for cross-country flying." Just for fun, in a training Martinsyde which he took up from Dover, McCudden established a personal height record of 18,500 ft.—which will leave the pilots of today cold! Of the Sopwith "Pup" this ace said, after crashing an F.E. 2B by trying to land it as he would a "Pup": "I think that one can blame the "Pup" a little for various accidents on other machines, because it has such a large speed variation, is so controllable, and nice; that when a pilot gets on to another type he is apt to forget these little things and flying on the whole is not so easy as the "Pup" would have one believe." McCudden tried the Vickers F.B. 16D (200 Wolseley Hispano) and said: ". . . this was a fine little machine and was tremendously fast. I climbed to 10,000 ft. in 8 mins. and at that height the machine did 136 m.p.h. It had some very excellent points and one or two bad ones." Engine inaccessibility was the Service snag, but Harold Barnwell liked it, even though it cost him a pair of trousers every time he flew it, as the cockpit became oil-soaked. McCudden finally flew exclusively on S.E.5s, of which he said: "The S.E.5 which I was now flying was a most efficient fighting machine, far and away superior to the enemy machines of that period . . . good points were its great strength, its diving and zooming powers and its splendid view. Apart from this, it was a most warm, comfortable and easy machine to fly." His own aircraft had smaller elevators and fin than standard, and was an R.A.F. built job, where previously he had used Vickers and Martinsyde S.E.5s. The streamline spinner gave it an extra 3 m.p.h. (120 m.p.h. at 10,000 ft.) and it could reach 20,000 ft. whereas the ceiling of most 200 h.p. S.E.5s was 17,000 ft. When McCudden found Rumplers with the new Maybach engines were beating him up above 16,000 ft. he was quick to order that h.c. pistons be used in his V8 Hispano motor.

In the Spring of 1917 Ball had designed the Austin-Ball Scout. He expressed his opinion that the S.E.5 was a failure, having only the Nieuport's speed, but not its climb. He thought the Spad the only machine capable of meeting the German machines, such as the 120 m.p.h. Albatros DIII and the 135–140 m.p.h. D.V. When he was posted to 56 Squadron his opinion of the S.E.5, armed with Vickers and Lewis guns, seems to have improved somewhat, but he still implored to be put on to Nieuport or Spad machines. Later still he decided that the S.E.5, with its speed and its double volume of fire, was preferable to his Nieuport, which he used only once more behind the lines, and he conveyed this view to General Trenchard. Actually, he gained his last victory in the Nieuport, and was lost while flying an S.E.5.

At what sort of height did they fly in the days of the fighting aircraft we have been discussing? 20,000 ft. would seem to be the very maximum for dog-fighting in general, up to 1917, and Zeppelin patrols were up 15,000 or 16,000 ft. Strange, referring to the first enemy aircraft he saw over the British lines, describes it as a Taube or Albatros at 5,000 ft. and says that two B.E. 2s that chased it could not climb above 3,500 ft. He also recalls that in those early days, the 80 m.p.h. his 80 h.p. Gnome Avro gave seemed ample to combat any Hun aircraft, so he had no compunction in obtaining permission to fit a Lewis gun, which restricted the ceiling to about 7,000 ft., however.

Lt.-Col. Strange, in his book, gives some interesting information about standardised heights used on bombing raids in 1918. The D.H.9s flew at 6,000 ft. and S.E.5s. preceded them at 5,000 ft., while behind came the escort Bristol Fighters, with cameras, at 6,500 ft., and behind them an escort of S.E.5s. at 7,000 ft. to 8,000 ft. Later the procedure changed and D.H.9s went in at 2,000 ft., protected by S.E.5s at 3,000 ft., Sopwith Camels at 4,000 ft., Bristol Fighters at 6,000 ft. and Sopwith Snipe at 7,000–8,000 ft. and higher. Before this the D.H.9s had wasted much time in climbing to 12,000 ft. They carried 230 lb. bombs and dived to about 2,000 ft. before releasing them.

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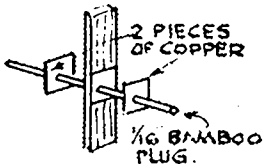
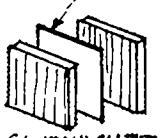
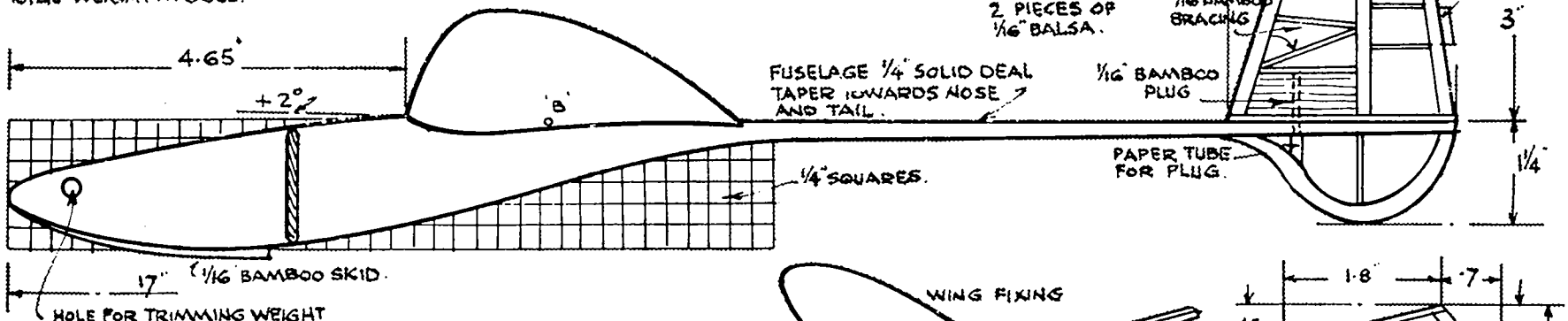
TAILPLANE FIXING

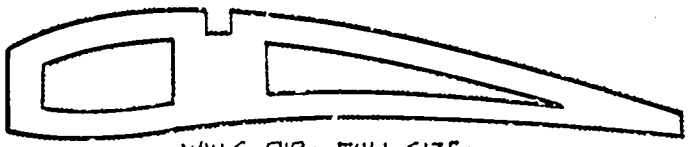


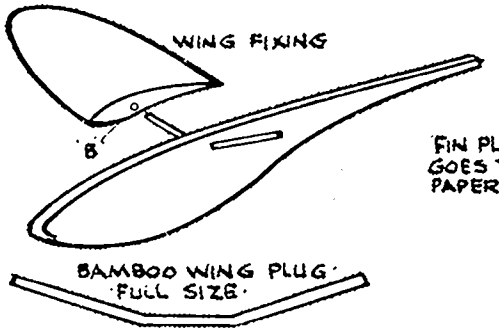
ALUM.M TRIM TAB

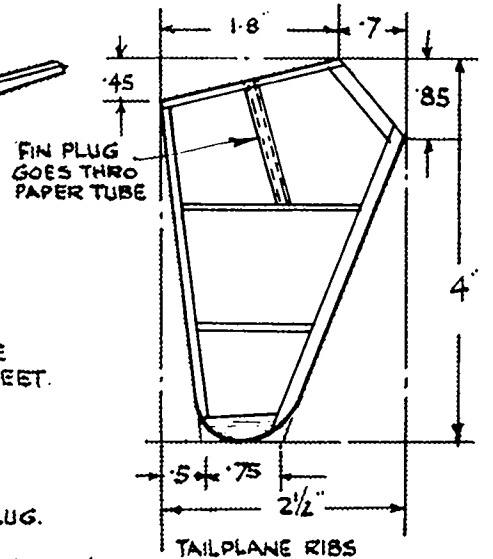


SANDWICH TRIM TAB BETWEEN 2 PIECES OF 1/16" BALSA.







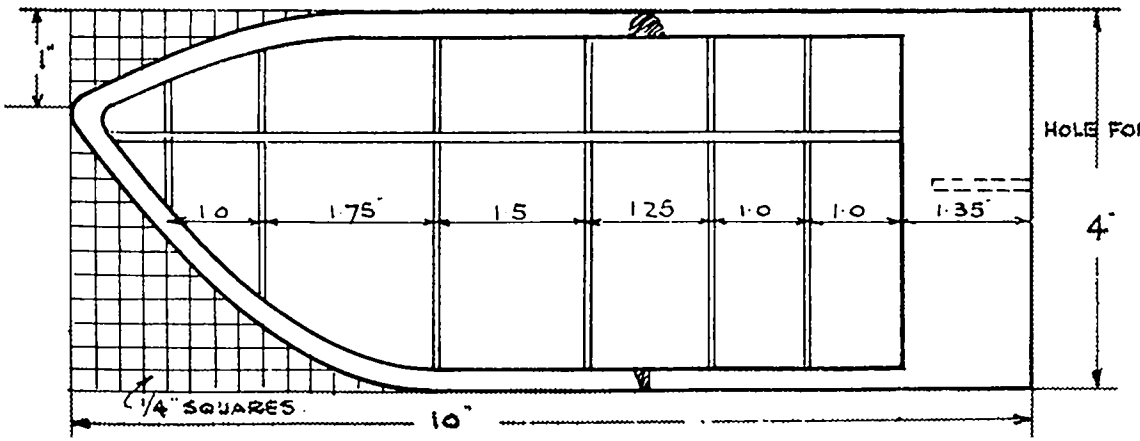


TAILPLANE RIBS SYMETRICAL.
FIN & TAILPLANE PARTS OF BALSA.

DIHEDRAL 3° AT EACH TIP.

WING CUT OUT OF BLOCK 3/8" THICK DEAL - TAPER & CARVE TO SECTION.

FILLET WING TO FUSELAGE WITH CEMENT & BALSA SHEET.



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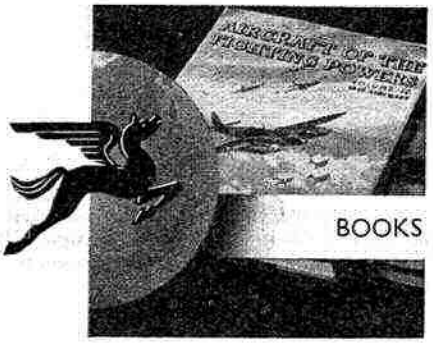

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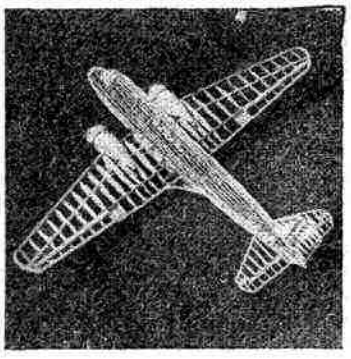

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LOADS ON MODEL AEROPLANE STRUCTURES

BY D · G · CROUDSON

WHEN you had built and flown your first few models, what did you learn from them? You most probably learnt that it is the smaller details of a machine that give the most trouble, and in subsequent models watched out for them.

When we design a model, we design it primarily from flight considerations, using flying loads. These loads are usually on the small side, and it is very rare for a model to break up in flight because it has been badly designed. The causes of the smaller breakages are what are known as "external loads," and can be divided into two classes: (*a*) landing forces, and (*b*) handling forces. Under the heading of landing forces comes "crash forces," which explains itself, and handling forces include such things as wing fixing bands, etc.

Now, the essential point in detail design is to ensure that suddenly applied forces on an individual member of the structure are easily distributed amongst the other members of the structure. For instance, suppose we have a fuselage joint such as in Fig. 1a. The horizontal member is supported at the ends, and there is a compressive load in the vertical strut. There are two forces acting on the horizontal member, a direct shear force P tending to tear the shaded portion away from the rest of the member, and a bending moment which is at a maximum just at each side of the vertical strut; this bending moment is of far greater importance than the shear force. If the joint is filleted, as in Fig. 1b, the shear force remains the same, but the bending moment is decreased, since the point of maximum bending moment is now at section X-X, there being no bending moment in the shaded part of the member. A good-sized fillet is required, a small one will certainly make the joint more rigid, but will not increase its breaking strength very much. The fillet should also be fairly thick, preferably not less than 1/16 in. for ⅛ in. square members, in order to prevent buckling under load. This filleting of joints is normally required only where external forces are likely, such as the nose and parts where the model is held for launching and winding, etc.

Let us now consider a fairly common type of undercart, such as is shown in Fig. 2a. The best places to anchor the cross-members of this type are, naturally, next to the bulkheads as these are the strongest part of a fuselage. If we consider the forces imposed on the undercart due to the model gliding into the ground, they will be approximately as shown in Fig. 2b. The leg AB will be forced upwards and back, and the leg AC, in the position shown, be in direct compression. Taking the joint B, it is obvious that the fillets holding the cross-members will have to be substantial, but what is not so obvious is that a fillet is required on the other side of the bulkhead. The reason is that the forces in the cross-member tend to turn the fillet about its apex (see inset), thus bending the longeron to which it is cemented. The fillet on the other side of the bulkhead transfers part of this bending effect to the longeron on that side and loads due to a bad landing would not be concentrated in just one part of the structure.

Actually, cemented joints should be put in compression wherever possible; if they are in tension, a really good job of cementing must be done. In the case considered, the fillet has been placed on top of the longeron because there is more room for it there.

A point to watch for is, that if the bearings are made too long (Fig. 2c), an upward force on the wheels will cause the cross-members to bend, and the bearings will tend to turn with them. The forces produced in such a case might be quite considerable.

A sideways or one-wheel landing will put a strain on the longerons to which the cross-members are attached, but if the cross-members are built close up to the bulkheads, this effect will be minimised. If it is impossible to do so, the best method of strengthening is to crossbrace the bay or bays affected.

If you are unsure of a certain type of undercart, try drawing the side view out in some nose-down position (the attitude which it is likely to assume when making a bad landing), and apply the force vertically at the wheels. You should then be able to visualise, or work out, the proportion of load coming on to each member, and that will give you some idea of what sort of joint is required for that member.

Other parts of the structure may be treated in the same sort of way. Taking the tail-end of the fuselage, the greatest strain is of course caused by the twisting effect of the rubber motor. A circular or elliptical cross-section takes this strain better than a square section. Also, the larger the section is, the less the load at the ends of the motor peg will be. See Fig. 3, a cross-section of a fuselage at the motor peg. The right-hand end of the peg will be forced down and the left-hand end up, thus causing a twisting couple of magnitude $F \times 1$ to be applied to the fuselage. Suppose now the fuselage diameter to be increased to 1. The twisting couple will still be the same, but $F \times 1$. Therefore, since 1 is greater than 1, F must be less than F, and there will be less tendency for the peg to tear through its mountings.

It must be remembered that, on circular and unbraced square fuselages, the covering takes practically all the torsional loads, and therefore special care must be taken with it. This part must be carefully watched when flying in damp weather.

To sum up, follow these points when designing a new model or constructing one that is not already an old and well-tried favourite:—

(1) Mentally stand back and view the model in different attitudes, i.e., flying in rough weather, landing, being man-handled, etc., and visualise where the greatest loads will occur and what sort of path through the structure they will take.

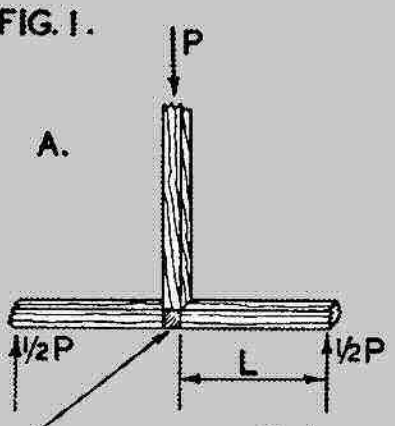
(2) Take each separate detail and, using methods such as I have described, figure out the most economical and strongest way of constructing that detail.

(3) If you are not sure of what will happen at a particular weak spot, make a rough model of it, using the same dimensions of wood, etc., and test it by putting different loads on it from different angles.

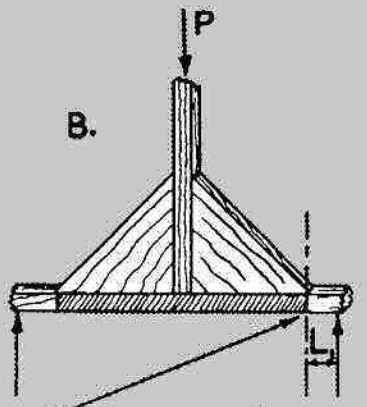
(4) Do not rely on the covering too much to hold things together. The covering will often make up for a weak spot when new, but when it slackens off through wear and tear, you will soon be aware of that weak spot.

If you watch all these points and work accordingly during construction, your model will be free from most of the irritating pinpricks often met with on the flying field.

FIG. 1.

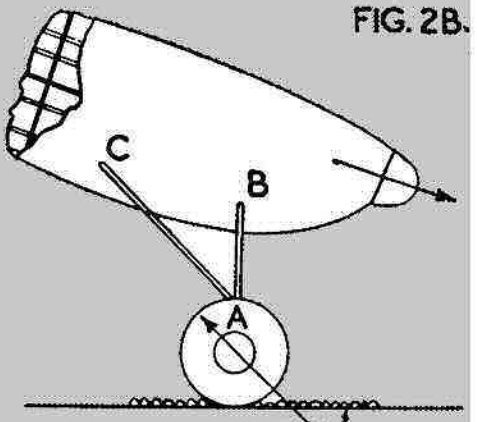


PT. OF MAX. B.M. = P x L



PT. OF MAX. B.M. = P x L,

FIG. 2B.



THIS ANGLE DEPENDS UPON SURFACE., 90° FOR SMOOTH DECREASING TO 45° FOR ROUGH.

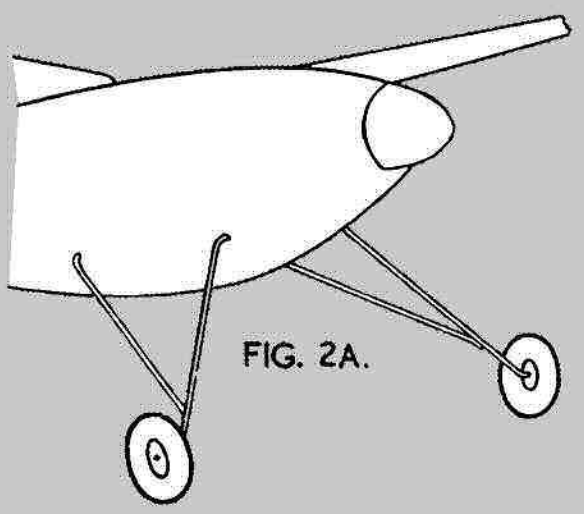
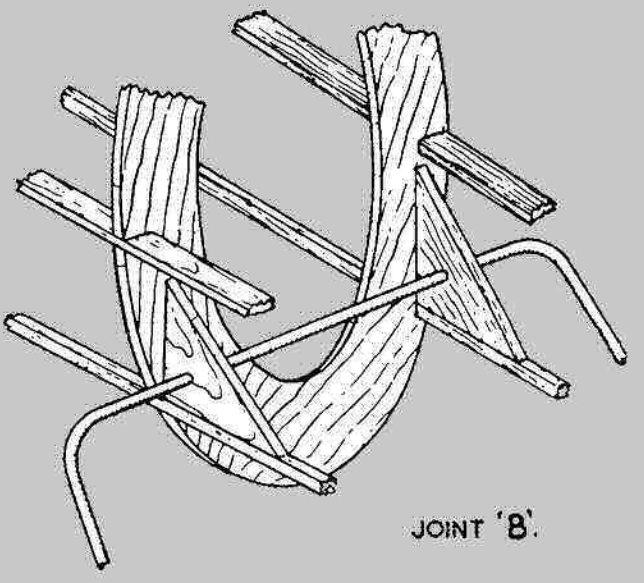
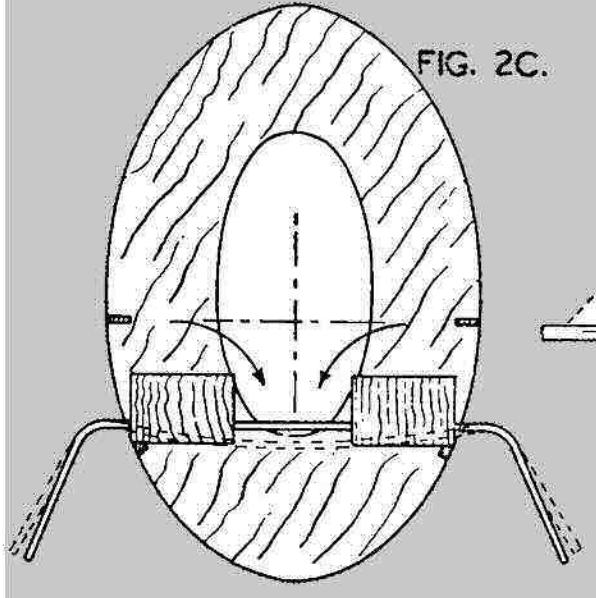


FIG. 2A.

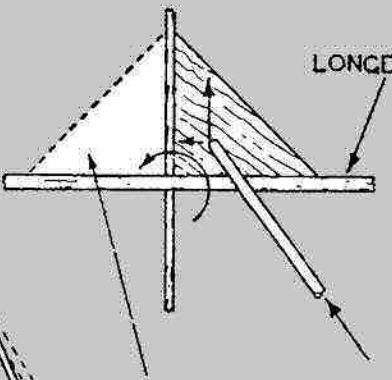


JOINT 'B'.

FIG. 2C.



LONG BEARINGS TEND TO TO TURN WITH CROSS MEMBER.



FILLET HERE, DISTRIBUTES BENDING EFFECT TO THIS SIDE.

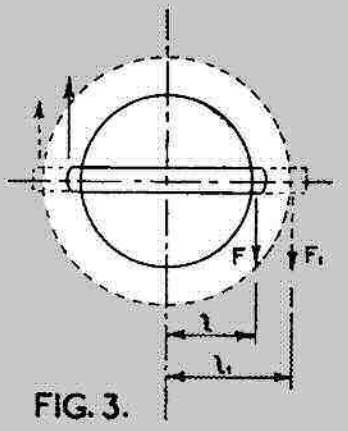
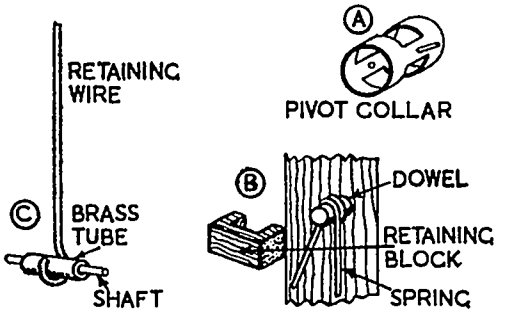


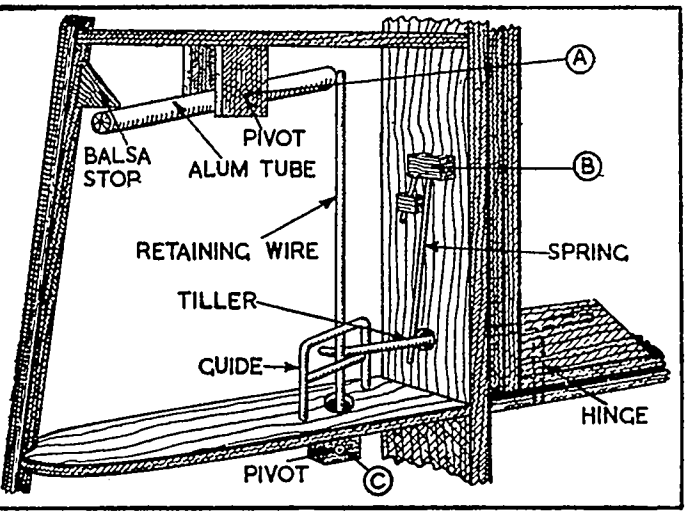
FIG. 3.

A NEW FORM OF

AUTOMATIC RUDDER CONTROL

BY C. R. NEWING





MY experiences with the form of rubber control for model gliders which depends upon movement of the towing hook have shown that the method is not altogether reliable, while mechanically it is not very neat, involving as it does external wires, stops and springs. I set out to tackle the subject from an entirely new angle and have evolved a mechanism which is completely housed in the fin without there being any external evidence of its presence. It is so designed that while the glider is at a climbing angle the rudder remains aligned with the fin, but is released as soon as the glider attains level flight.

The diagram shows how it is constructed but to simplify it the blocks of balsa used to fit the guide and the spring have been omitted.

A balsa block is fitted to the lower part of the rudder, near the hinge and a piece of 18 gauge wire is pushed into it to form the tiller. A hole is cut in the upright fin strut to allow for movement of the tiller which projects through into the fin. The retaining wire which holds the tiller straight during launching is wound round a small piece of copper tube at its lower end and soldered in position together with a small shaft on which the wire is pivoted. Two small pieces of balsa are bushed with brass tubing and used to pivot the retaining wire below the fin rib as shown in the diagram. If the fin is held straight and the retaining wire is allowed to fall to the rear it will engage with the tiller and prevent the rudder from turning. A wire guide is made as shown in the diagram and is fitted at an angle so that when the end of the tiller has been bent at a similar angle in the opposite direction they form a V in which the retaining wire can lie. A spring must be fitted to put sideways pressure on the tiller and one of the type shown in the diagram gives good results. It is fitted by means of a small piece of $\frac{1}{8}$ in. dowel which is fixed to the fin spar. The loop of the spring is placed over the dowel and a piece of balsa placed over the top to retain it. The outside part of the spring is anchored to the fin spar by gluing a piece of balsa over it and it was found necessary to fit a piece of balsa over the moving part of the spring to keep it close to the fin spar while operating the tiller. If construction is carried to this stage it will be found that if the rudder is held aligned with the fin and the retaining wire is held in its rearward position the rudder will remain straight until the retaining wire is released, when the sideways pressure of the spring on the tiller will create a scissors effect on the tiller and guide and will force the retaining wire forward until the tiller is clear of it and the rudder flicks over. The tiller should be no longer than necessary to engage the retaining wire.

To operate the retaining wire an aluminium tube is made by rolling a small sheet of aluminium round a piece of metal rod of suitable size to allow a 3/16 in. diameter ball bearing free movement in the tube. The ball bearing is placed in the tube and the serrated ends of the tube turned over to keep the ball in. A small steel collar which is a tight fit over the tube is made and lightened as much as possible and a small shaft is soldered on each side to act as a pivot. The collar is fitted nearer to one end of the tube than the other, in such a position that with the ball at the short end of the tube that part is slightly heavier than the longer end of the tube. The tube is pivoted in an aluminium stirrup attached to a fin rib. Great care must be taken in its fitting so that with the nose of the machine tilted upwards the retaining wire falls back and the ball rolls to the rear, tilting the tube so that its rear end falls in front of the retaining wire, preventing it from going forward until the machine is tilted level, when the ball rolls to the forward end of the tube and tilts it so that the rear end of the tube clears the retaining wire. A stop is fitted to the L.E. of the fin so that with the machine level the tube is tilted downwards and when covering the fin with 1/64 in. sheet another stop is fitted to prevent the retaining wire from falling too far forward. The rear end of the tube and the retaining wire must be filed very smooth or the weight of the ball may not be enough to trip the mechanism and all pivots should work in a metal bearing of some sort.

On the model recently completed the whole mechanism has been fitted between two fin ribs $1\frac{1}{2}$ in. apart and the distance between the inside of the L.E. to the fin spar is $2\frac{1}{4}$ in. and the width of the fin ribs is $\frac{1}{2}$ in. in the widest part of the R.A.F. 30 section. Some patience may be needed to get the mechanism to work as it has to be rather delicately adjusted.

To set the mechanism the glider is held with the nose inclined downwards, the rudder is aligned with the fin and the glider is then inclined nose upwards until the ball rolls to the rear of the tube thus locking the rudder in position. The towline is then attached and the glider is launched still slightly nose up. The rudder will come into operation when the glider reaches the peak of its climb and is ready to leave the towline.

THE AIRSPEED "FERRY"

BY E · J · RIDING

Photo by E. J. Riding.

THE Airspeed Company was formed by Messrs. N. S. Norway and A. H. Tiltman at York in 1931. Although their previous activities had been confined to the construction of sailplanes, they undertook the design and construction of a ten-seat passenger-carrying aeroplane to a specification laid down by Sir Alan Cobham, who was about to begin his series of National Aviation Day Campaign tours, the object of which was to bring aviation to the public in a manner in which it had never been brought before—to their own doorsteps.

To do this meant employing machines that could be landed and flown away from any sort of field throughout the country. People who would in the ordinary way refuse to take the air in a single-engined open machine, were to be enticed to fly in a " three-engined air-liner "—almost akin to the types used on the Continental air lines, as the programmes pointed out, and to hundreds of thousands of enthusiasts the name Airspeed " Ferry " conjures up visions of their first flight—a brief five minutes, or maybe a longer formation " cruise," with Capns. J. R. King or J. D. Parkinson.

The " Ferry " was designed to carry ten passengers from the average British field in comfort, free from noise and the elements, at 5s. per head. To do this, the designers employed three engines together with a biplane wing arrangement. The two outboard engines were D.H. " Gipsy " IIs and the third, mounted on top of the centre-section, was a D.H. " Gipsy " III, the total output being 360 h.p., or 36 h.p. per paying passenger.

The machine was of all wooden construction, the fuselage being of the familiar spruce and plywood design, the wings and tail surfaces being fabric covered. Subsidiary airfoil surfaces were incorporated in the undercarriage and radius rod assembly, no doubt contributing a small amount of extra lift. The time taken for the machine to progress from drawing board to test flight was ten months and the prototype was delivered in June, 1932.

Four machines were built, two for Sir Alan Cobham—G-ABSI and G-ABSJ—and two for Midland & Scottish Air Ferries, Ltd., bearing the registration letters G-ACBT and G-ACFB.

G-ABSI and G-ABSJ went through the 1932 and 1933 tours with great success. They were both painted silver all over with blue and green struts and letters. In 1934 'SI was painted a delicate shade of pink (!) and 'SJ was taken on a similar tour to India, where she suffered rather an unusual fate in that she was devoured by ants ! 1935 saw 'SI still going strong, newly painted in a silver and blue colour scheme. She survived this, the last of Sir Alan's tours, and after a brief rest and a process of rejuvenation involving the installation of three D.H. " Gipsy-Major " engines instead of the previous arrangement, she sallied forth resplendent in a coat of bright red paint with white letters ; this time with C. W. A. Scott's Display, the successor to the N.A.D. tours. 'SI was accompanied on this tour by G-ACFB, re-painted dark blue with white letters after being brought down from Renfrew during the winter by Capn. King.

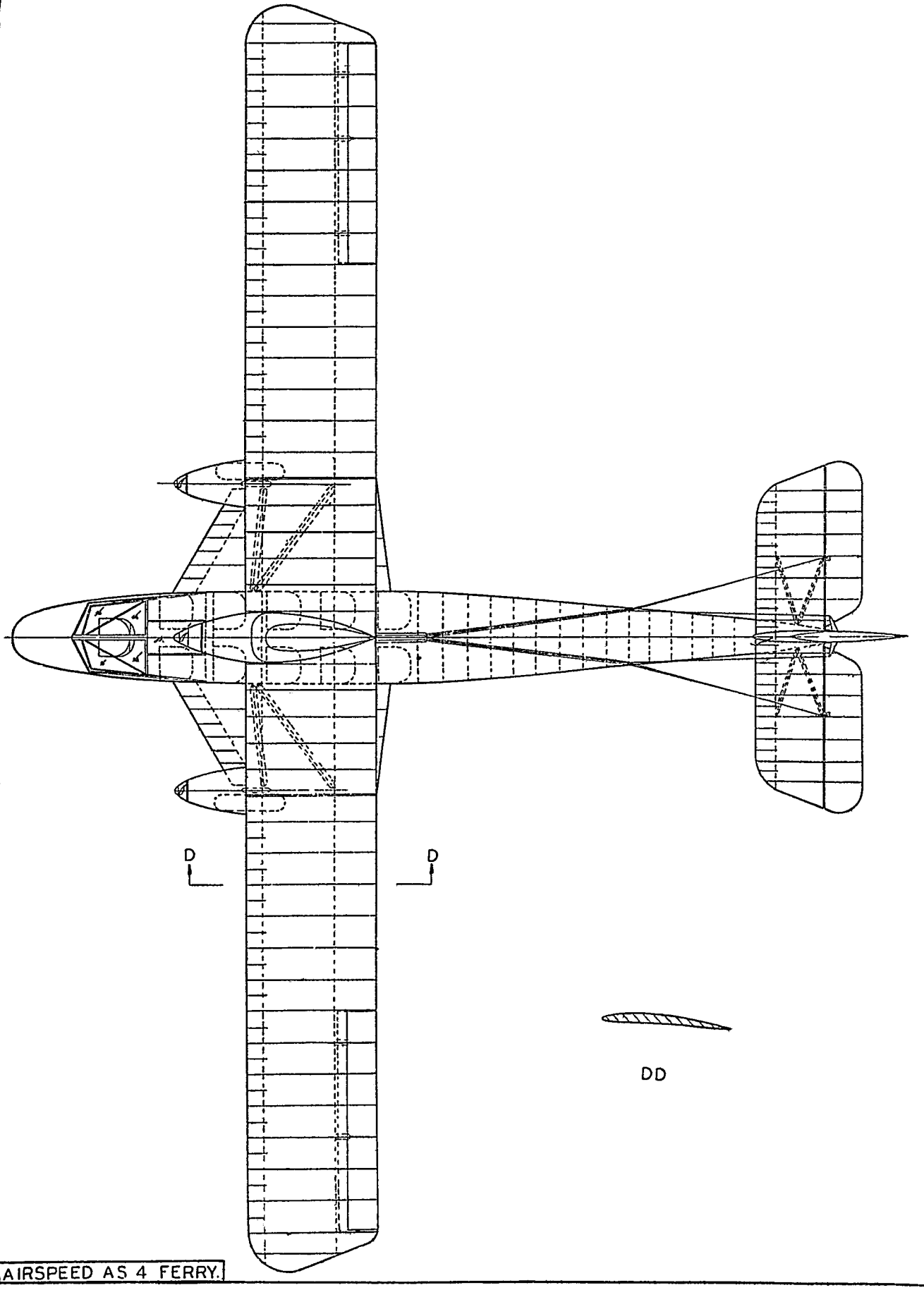
Midland & Scottish Air Ferries, Ltd., who owned G-ACBT and G-ACFB, was a concern organised by a very large motor-bus combine, with headquarters at Renfrew, Speke and Belfast, connecting with Hillman's Airways in the South. When they closed down in 1934, the two " Ferries," together with an Avro Ten, were stored at Renfrew, pending purchase by anybody who could find use for them, but although 'FB was put into service again, 'BT and the Avro Ten were still lying up at Renfrew at the outbreak of war.

M. & S.A.F. " Ferries " were painted white with red letters and silver wings. In latter years, old 'SI passed into the hands of Portsmouth, Southsea & Isle of Wight Aviation, Ltd., who used her on their services to the island and elsewhere until September, 1939. 'FB became the property of Air Publicity, who used to extol the virtues of various prophylactics in yard-long letters towed behind Avro 504Ns, but it is doubtful if 'FB ever indulged in this sport. As late as 1941, 'FB was a familiar sight at Heston, being part of the aerodrome camouflage, so to speak, until ultimately she was destroyed by the elements.

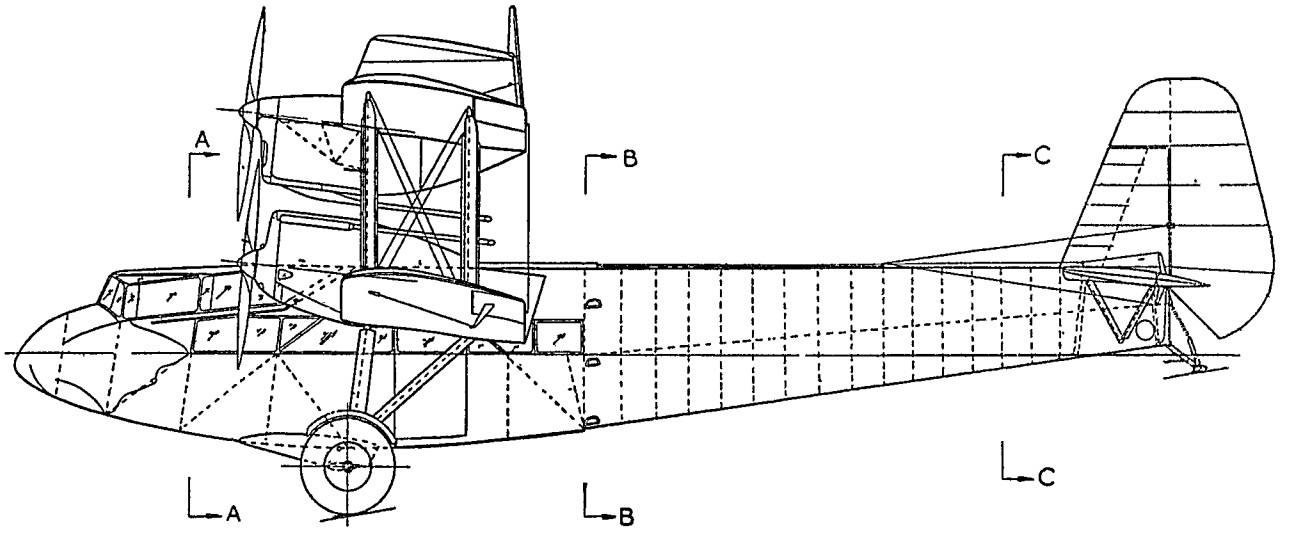
A good—if not the best—machine of its type in those days, the " Ferry," or at least a more refined version of it, would find a place in the post-war market, for joy-riding, like the poor, will be always with us, and present-day types have not the same capabilities for getting in and out of small fields as had the old biplane designs.

Specification.

Ten-seat, short-range passenger machine. Span, 55 ft.; length, 39 ft. 8 in.; height, 14 ft. 3 in.; wing area, 641 sq. ft.; weight loaded, 5,400 lb.; maximum speed, 120 m.p.h.; stalling speed, 50 m.p.h.; ceiling, 15,000 ft.



AIRSPEED AS 4 FERRY.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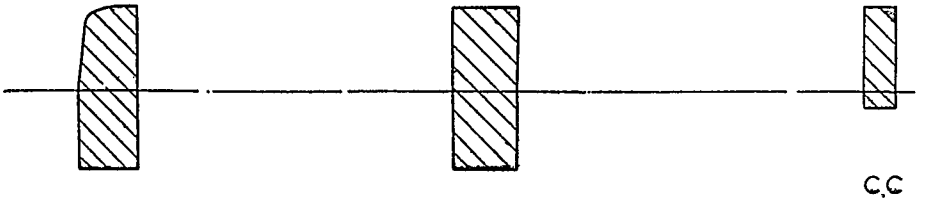
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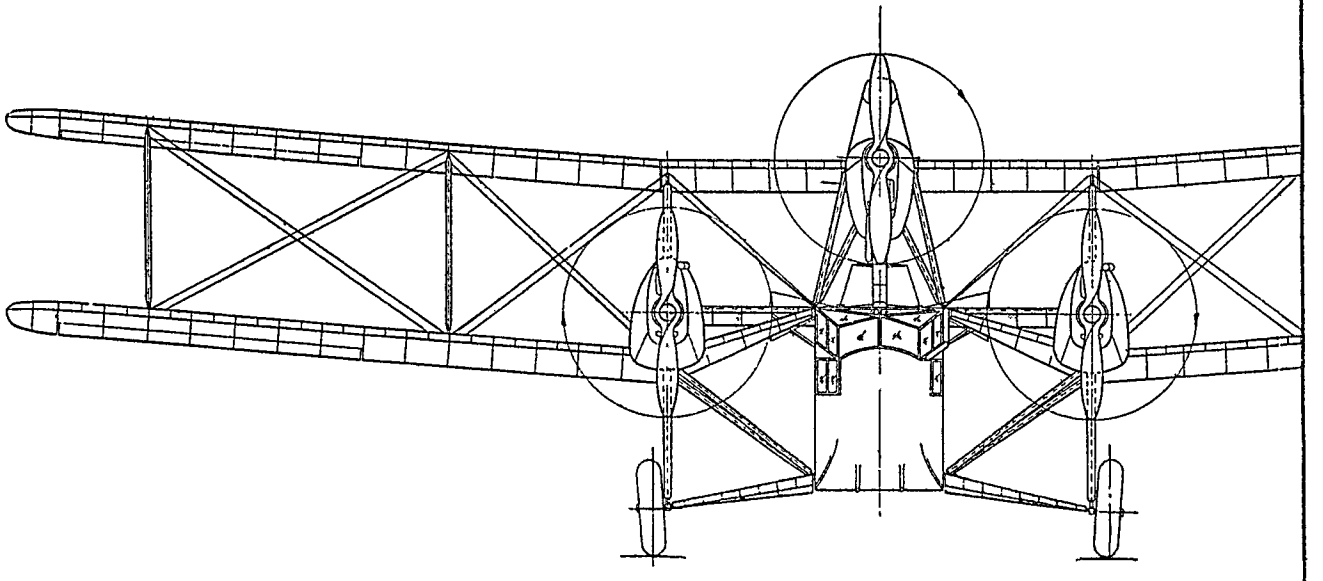
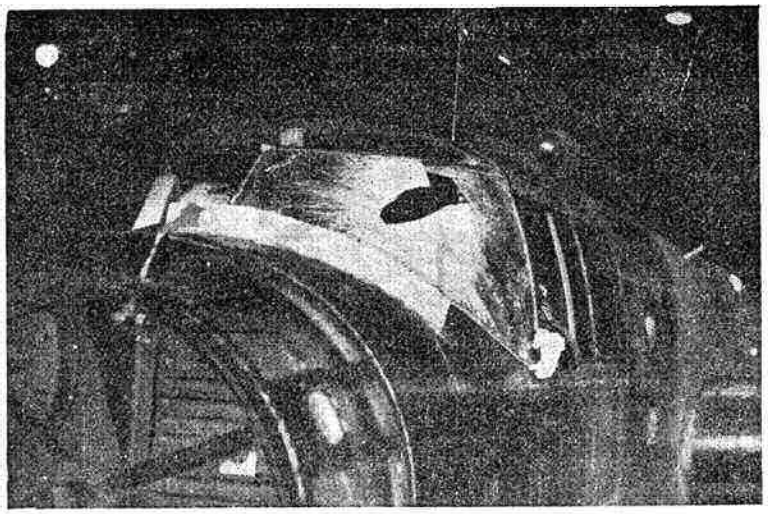


(UN) NATURAL HAZARDS

BY FRANK W · LANE



" By far the biggest danger was from birds. We ran into flocks of lapwings, swallows, geese and even herons. One of the fellows came back with a goose foot still on the trailing edge ; another shocked his ground crew by climbing out of the cockpit covered in blood. It was from a slaughtered seagull."—Pilot after the raid on the Philips Radio works, Eindhoven, December, 1942.

THE records of aeronautics contain many unusual incidents—yet few can be more remarkable than the case of the aeroplane which was nearly brought down by a lion. Yet this " believe it or not " incident actually happened in a flight of Udet's, the famous German air ace of the last war.

He and a companion were flying low over the Serengetti Plains in Africa making a film. They dropped towards a pride of lions basking in the sun. As the machines flew low over the group one of the lions made a great leap upwards, claws pawing the air. It just missed Udet's aircraft but, quickly recovering, made another great leap as the second 'plane flew over.

This time the lion's claws caught the aileron of the aeroplane and tore a large hole in the fabric. The force of the impact was so great that the lion turned a complete somersault before crashing back on the ground. A few more inches in the lion's leap or a split-second difference in its timing and that 'plane might have been brought to earth.

Beryl Markham, who used to " spot " elephant herds for hunters in Africa, says that she has had big bull elephants charge at her machine and challenge the " great bird " to do battle. If she had flown low enough maybe an elephantine trunk might have dragged her from the sky !

Udet's lion is the only case I have met where a non-flying mammal damaged an aeroplane in the air, but in Australia a flock of bats once got mixed up with a machine and damaged it so severely that the pilot had to make a forced landing.

Before dealing with the most prolific cause of those " natural hazards "—birds—two other strange accidents from non-flying animals may be mentioned. During a wave-hopping flight a pilot swore a fish struck his airscrew. He was lucky it wasn't wrecked because a flying-boat has had its airscrew taken right away when it hit a wave during take-off.

The other casualty was caused by—an earwig ! It got into the bomb-releasing mechanism of a bomber with the result that when the bomb-release was operated over Germany nothing happened. The pilot had to bring all the cookies back home again.

But to-day by far the most serious of these " natural hazards," excepting the weather of course, is from birds. The position has been aggravated of late owing to the technique of " hedge-hopping " raids. Such flying not only means that the aircraft are largely operating at the heights, but it also scares birds on the ground and sometimes makes them rise in clouds—right in the path of following aircraft. The exact number of accidents to 'planes caused by birds in this country is a secret, but some idea can be gathered from a recent American statement that in the United States, where birds are likely to be encountered, such accidents occur at the rate of about two a week.

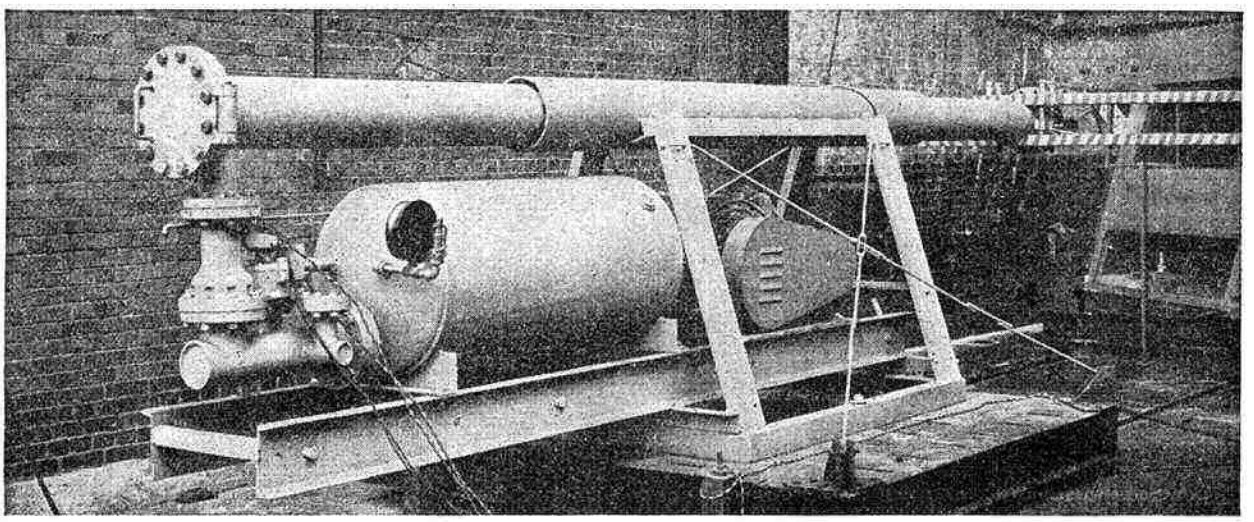
M. G. Beard, chief engineering pilot for American Airlines, has been collecting records of some of these accidents. He finds that over half of them occur at night and about 40 per cent. of 'plane-crashing birds collide with the wind-shield.

It might be thought that the wind-shield would provide adequate protection against all but the largest birds. Such has not proved to be the case. A sparrow hit the wind-shield of a big Army observation machine, crashed right through and caused the pilot to make an emergency landing on a highway. Another bird went through the wind-shield of another aircraft, travelled the whole length of the fuselage, and ended up in the baggage compartment !

If birds the size of sparrows can't be kept out by the ordinary wind-shield it can be imagined that larger birds can cause considerable damage. A wild duck which crashed into the cockpit of a R.C.A.F. flying-boat, hit the pilot in the face, stunned him and caused the machine to crash-dive into the sea.

Of course, many other points besides the wind-shield are hit by colliding birds. I have records of engines which have been struck and severely damaged, wings in which great holes have been torn, rudders which have been rendered useless and numerous airscrews which have been " chipped " and severely damaged. In one instance some of our outward-bound bombers collided with a large flock of wildfowl. The damage was so severe and widespread that a number of machines had to return to base.

It has been said that during the last War some of the French pilots used to go aloft with a bag of bricks in the cockpit. The idea was to try and heave one of the bricks into your opponent's airscrew. Two German machines were stated to have been brought down by accurately-heaved bricks The casualties among ground



Compressed Air Catapult developed by Westinghouse Electric Manufacturing Co

personnel from bricks which missed their objective is not stated.

It was from France that the suggestion emanated that eagles should be trained to attack enemy aeroplanes! In fact it has been stated that six eagles were specially trained for the purpose. Tempting baits were hung out from model balloons and an attempt was made to get the eagles to rush furiously at them.

In an article published in Paris it was said: "There is no airplane, and above all, no dirigible, which could withstand such an attack. Given the rapidity of an eagle's flight, and the strength of its beak and claws, there can be no doubt that a company of properly trained eagles could annihilate, in a few seconds, the most powerfully equipped aerial fleet." (Now *you* tell one!)

Eagles are probably the most dangerous of all birds to aircraft. So much is this so that some ten years ago the Air Ministry issued a warning to all pilots in the Near and Middle East in which they said:—

> "Only one rule can be given for the general guidance of pilots. Since the birds referred to invariably dive when alarmed, attempts to avoid them should be made not by endeavouring to pass beneath them, but by changing course."

Some years ago an R.A.F. officer from India carried out some experiments at the London Zoo with a view to finding an efficient "eagle scarer." Various whistles and other noises were made in front of the eagles' cages to see which produced the most violent reactions!

As a family, sea-birds are probably the worst avian offenders. On Midway Island there are thousands of them and they sometimes suddenly take off in dense masses. In one case they jammed a machine's wheels and the pilot was forced to make a belly landing.

Some of our own aircraft have returned from cross-Channel sweeps with portions of gulls wedged in various parts of their machines. One 'plane returned with two seagulls in its radiator. The gag at the local station was: "The Dutch will say to-morrow, 'Two of our seagulls failed to return.'"

Sea-birds constitute a special danger to the aeroplanes of carriers. They perch on these ready-made islands and to while away their time peck at the fabric on some of the 'planes' wings. Thus holes are made and airworthiness seriously affected.

From what has been said it will be readily appreciated that bird *versus* aeroplane has become a serious issue. I don't know what steps are being taken to combat it in this country, but in America much experimental work has already been done, primarily to construct a wind-shield capable of giving the pilot a high degree of protection.

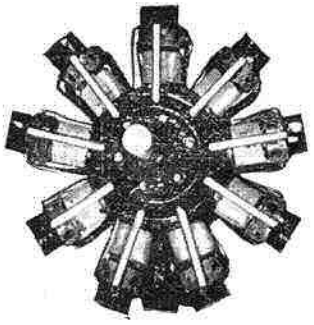
It can be imagined that it was not easy to simulate the exact conditions of these bird-aeroplane collisions. At first various synthetic "birds" were constructed. They consisted of tennis balls partially filled with lead shot; a heavy dart with a rubber ball at the striking end; sponge rubber wrapped round a hard core of rubber and lead shot; and, to simulate the smaller birds, tomatoes and paper bags filled with water.

But it appears that recently all the experiments have been carried out with real birds, chiefly 4–6 lb. chickens and 15-lb. turkeys. They have been painlessly electrocuted and then stuffed into linen bags and fired from large-bore air-cannon, capable of propelling the projectile at 400 m.p.h., at various test wind-shields. The dynamics of the impact were studied through the use of a 35-mm. high-speed camera taking 1,500 pictures per second. Various electrically operated gauges and oscillographs gave additional data on the tests.

It was found that a typical ¼-in. wind-shield was penetrated by a 4-lb. carcase travelling at only 75 m.p.h. But a wind-shield of laminated glass-vinyl construction with extended plastic edges and other strengthening devices, having a total thickness of about ¾ in., was found to resist the impact of a 4-lb. carcase fired at about 300 m.p.h. and a 15-lb. carcase at 200 m.p.h.

These tests revealed two important features. Even when no penetration of the wind-shield occurred vision through the shield was destroyed, and large quantities of extremely dangerous glass splinters were thrown off the rear face of the panel at high velocity.

[For a full discussion of these tests the reader is referred to a paper by A. L. Morse in the *S.A.E. Journal* (*Transactions*), August, 1943, to which I am indebted for the facts of the most recent tests and for the photograph of them illustrating this article.]



1/48th SOLID SCALE MODEL MOTORS

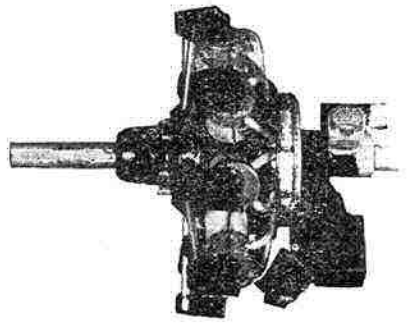
ARTICLE IV

BY "S.B.S."

THE BRISTOL PEGASUS

INCLUDING

THE BRISTOL MERCURY



COMPLETING the Bristols in this series, our model this month is of the Pegasus: a poppet-valved 9-cylinder air-cooled radial. The construction is very similar to Perseus, described in December, 1943, but should be found a little easier as we have no ports to drill in the cylinders with the attendant wire threading. Three general views are shown in the drawings: on the left is the front view; in the centre, the side view; and to the right, the rear view. As before, these three views have been purposely left incomplete to avoid complication: all essentials are shown.

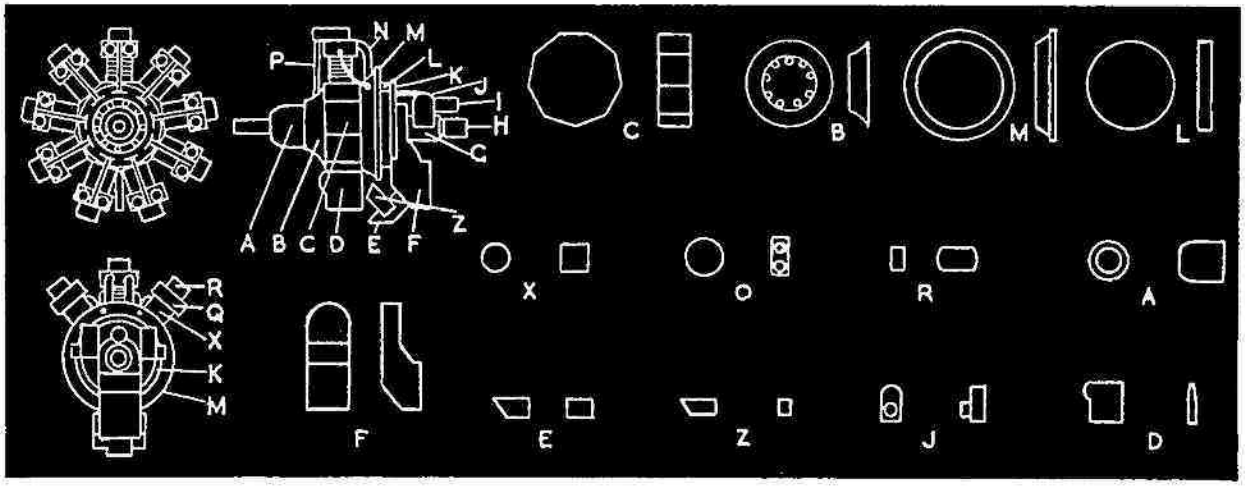
Two views of each part are also depicted, with the exception of G, H, I, and the push rod and induction tubes, P and N. The cylinders, X, are made from 9 gauge bakelite knitting needle, wound round with 36 s.w.g. wire: this to simulate the fins. Start and finish the wire at the back of the cylinder so that the ends will not show when it's finished. The cylinder heads are of 6 gauge needle, and have 4 tiny holes drilled at diagonal points: North-East, South-East, South-West, and North-West, when viewed in plan. The holes to be about 3/32 in. diameter. They need not be drilled deep, 1/16 in. being ample. These represent the inlet and exhaust ports, and in the case of the former have small pieces of 19 or 20 gauge wire fitted into them to form the induction pipes, N; two to each cylinder. P, the push rod tubes are of 21 or 22 gauge wire, and a shallow hole should be drilled in the rocker boxes, R, to receive them. Similar holes will be required in the timing gear case, B. This latter, by the way, has 9 very small pins fitted at the front to represent the fixing bolts. They should not protrude more than about 1/32 in., and the method of fitting is as described for Perseus.

G, H, and I, are best made from knitting needle. G being 8 gauge; H and I from gauge 10 or 11. K, the magneto conduit, is of 20 gauge wire: short pieces of the same wire should branch back to the magnetos, J, and fine leads of 36 gauge wire should be run in pairs to each cylinder. These are the plug leads and should join the cylinder at the sides half-way up the cylinder head, Q Strictly speaking they should be fed through tiny holes drilled in the engine mounting ring, M; one hole between each cylinder would do nicely. If you wish to mount your model on a fuselage or bulkhead, a similar frame to that shown for Perseus can be used, M being the part to secure the frame to.

A, the prop. boss can best be made from 4 gauge needle, and it requires a hole drilling through the centre for the prop. shaft: a short piece of bright nail supplying this latter. A small bright washer slipped over the nail and secured to the nose of the prop. boss will finish it off

As to colouring, A, B, and C, are jet black. The cylinders are grey with P and R again black. The top curve of N is black whilst the straight portion is either grey or aluminium. Strictly speaking, most of the rear parts should also be black, picked out here and there with aluminium, but I prefer to take a little license with the original scheme and do L, G, and the tips of H and I in aluminium: they show up better. The magneto conduit, K, and the plug leads can be left the bright natural colour of the wire. That's all; good luck.

P.S.—Pegasus and Mercury are identical in appearance. At 1/48 scale Pegasus scales out at 1·25 in. dia., Mercury being slightly smaller scales at 1·07 in. If you try your hand at taking a shade off cylinders and crankcase, you can make these drawings cover the two engines.



"Wings for Victory" Winner!

This model, of over ten feet span, was built by L. G. Temple to the same design as a high performance full scale sailplane and is possibly the nearest approach to true scale ever attempted in a flying model. The construction follows that of the original very closely, as the builder uses models as "flying test beds" for the larger machines. In spite of this, Celestial Horseman is not difficult to construct, although there is a great deal of detail work in it—the original model represents approximately 1,460 working hours.

Some of the interesting features incorporated in the model include a fully equipped cockpit with dashboard, glazed instruments, joystick andr udder pedals, metal backed seat with safety belt, brake lever, towing cable release, wiring, and complete upholstery. Scale type fuselage construction with built-up frames and hoops made of birch and plywood: wing ribs with the cross-bracing the same type as on the full scale machine, and tail surfaces true to scale. All the aerodynamic calculations, and many of the stressing problems of the real sailplane were used when designing the model. In so large a design it is possible to approach full size performance very closely indeed, and although under the present ban it is not permissible to fly replicas of Celestial Horseman, it is in all respects designed to fly, though naturally not as an everyday model. And under favourable conditions it has a really astonishing performance.

A fine finish has been obtained on this model by using methods commonly employed in the car body trade and it was necessary for the builder to learn the intricacies of celllouse chemistry before embarking on the job. It is interesting to learn that it took more than 300 hours of patient rubbing down before a satisfactory finish was achieved on the fuselage. Moulded cockpit covers made in exactly the same way as the full-sized article are used, they are beautifully clear and reveal the interior details very well.

FULL SIZE PLANS 70ins. x 40ins. PRICE 8/3 POST FREE, MAY BE OBTAINED FROM THE

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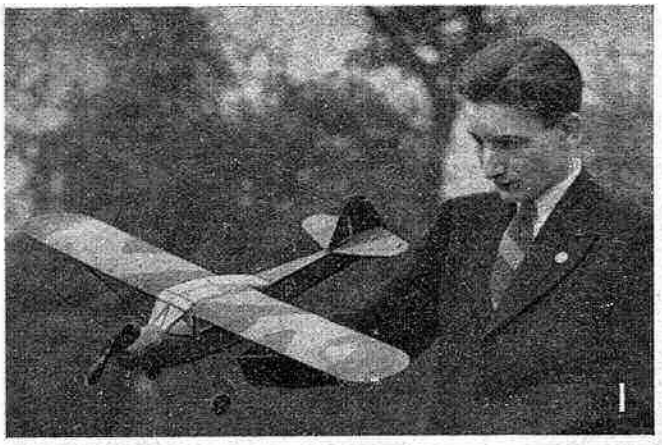
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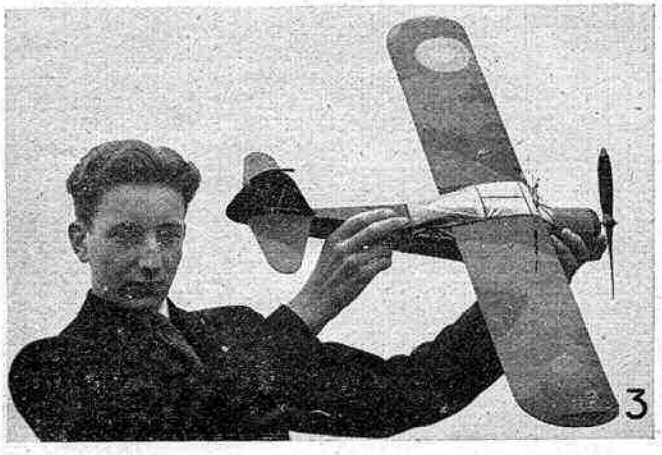
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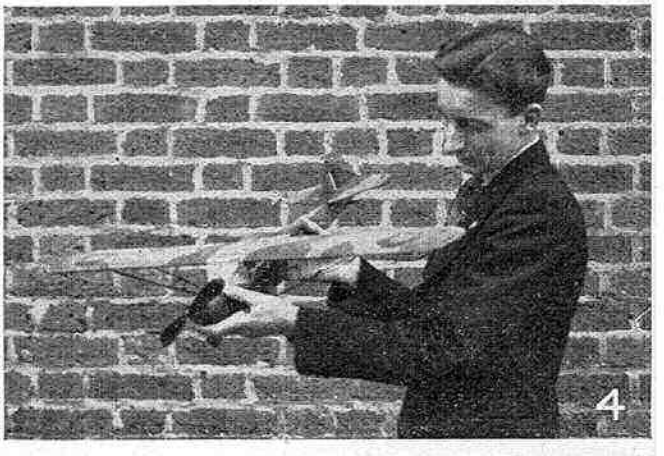
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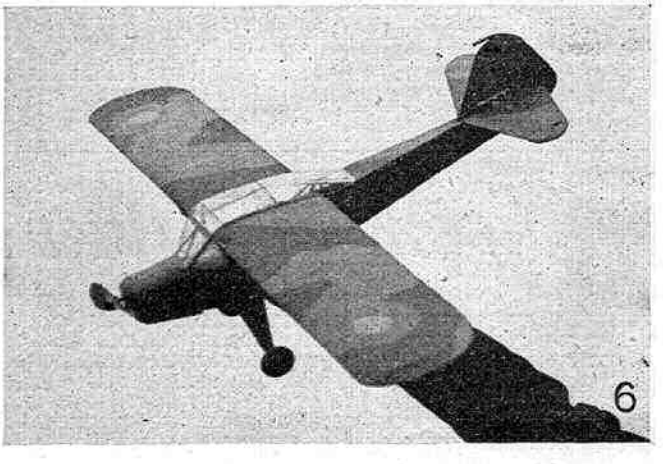
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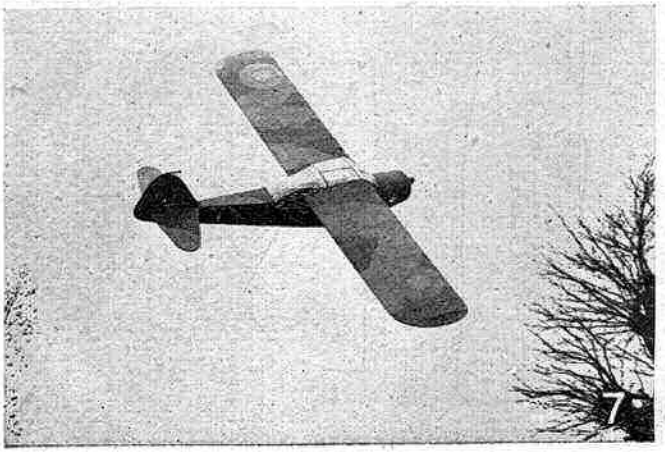
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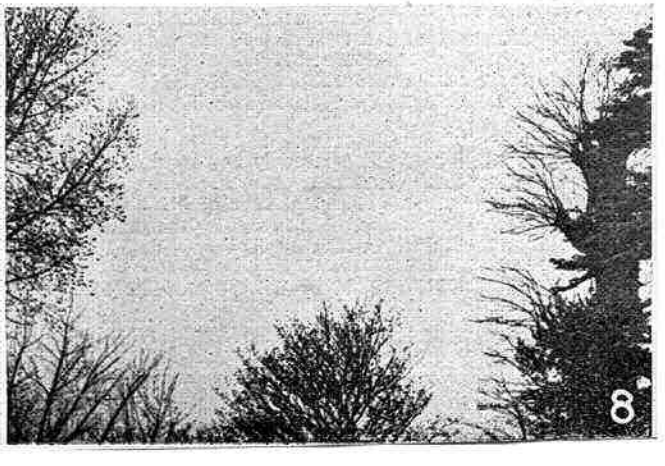
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PHOTOGRAPHIC SECTION

BY J. A HODGSON

FILMS other than 35 mm. are very scarce indeed. A reader has suggested that aeromodellers lucky enough to secure a film may prefer to save it until the weather permits outdoor photographs to be taken. This reader says that he for one is rather wary of wasting precious material experimenting with lamps and time exposures indoors, when on the first good spring day he can easily take a table into the garden and feel sure of what he is doing.

Natural lighting is more suitable for the amateur photographer, and the same methods of setting up and checking focus as was described in the March AEROMODELLER can be adhered to. Just one point, a large sheet of white card or paper serves as a good reflector and helps to even up the light on the shadow side—try it!

The "good" days, speaking "photographically," should be here very soon now, so we might as well go further into the important question of backgrounds. Illustrations convey far more than long involved explanations, we will therefore just refer to our April article where we speak of backgrounds—brick walls—heads in the way and so on—and carry on from there. Read that section over again then study the illustrations in this article. Take a walk with your camera and model to the nearest park if you have no room in your own garden. There is no need to waste one single shot. Really good pictures are worth that extra time and trouble even if it does mean checking up on a ground glass screen to see that the background does not spoil the picture.

The illustrations appearing with this article were taken on a dull and overcast day. An exposure of 1/25 sec. was used for them all. The iris diaphragm or stop was set at f.8 for pictures 1, 2 and 4 and f.11 for the others.

Figs. 1, 5 and 6 illustrate good angles and the correct way to hold a model for photography. Figs. 1, 2, 3, 4 and 5 illustrate faults. 1 and 2 show the model correctly held, but the backgrounds are poor. Figs. 3 and 4 show suitable and unsuitable backgrounds, in each case the model is held carelessly.

Over 50 per cent. of the pictures submitted to the Editor have fingers or hands, and even heads in the way of the subject! The percentage of pictures with brick walls, etc., as backgrounds, is incredible. The Editorial Staff have come to the conclusion that readers simply do not trouble about such things. We in the Photographic Section, knowing the colourful little image that appears in the camera viewfinder, venture to suggest that this is the root of the trouble. Remember! photographic prints are only monochromes. An object that stands out well in colour from the background may be lost in the final print.

In fig. 6 the near wing is a little muzzy. This is the result of approaching too close to the model for the aperture used. Figures 5, 6, 7 and 8 illustrate a simple method of obtaining flying shots by double printing. It will be noticed that the portions of the figures showing in figures 5 and 6 can easily be "painted" out on the negatives. Figure 6 has a fault as explained, and it will be seen that fig. 5 has been selected for use in the final composite picture. Fig. 8 is a print of the background used in making up picture No. 7. The airscrew has been taken out to make the final effect more authentic.

The pictures at the top and bottom of this page have been taken purposely to show how long grass spoils the photographs when the camera is used low down. Such things as this are easy to avoid if a little common sense is used!

MY ENGINE

BY LAWRENCE H SPAREY

THE great interest which seems to have been aroused by my proposed engine design, and especially that it should have merited the attention of such expert "petroleers" as Dr. Forster and Col. Bowden, has been very gratifying to me. I am sure that when I rather timidly published my design I had no idea that I should hit so many nails on the head, and, seemingly, hit my own thumb once or twice. Well, an honest workman must expect to acquire a bruise or two in the course of his occupation.

Be this as it may, I do not think that I have been too badly battered, and on reading Col. Bowden's article I suddenly realised that the controversial element which has crept into the articles of Dr. Forster and Col. Bowden on the one side, and of myself on the other, is largely due to the fact that we are, to some extent, talking at cross purposes. In its way, this has greatly added to the interest and, I hope, the usefulness of these articles, in so far as the discussion seems to be between two expert *users* of model petrol engines, and one who, if not an expert, has valiantly struggled along as a *designer* and *maker* of these engines, for a good number of years. Both Col. Bowden and Dr. Forster are concerned only with the capabilities and facilities of the engine *in the field*, while my own not inconsiderable field experience has been tempered by the limitations of a small lathe and amateur workshop in which my small engines must be *produced*. These differences must indeed produce a divergent outlook.

In this respect it is interesting to remark that I have successfully flown a model biplane of my entirely own make and design; that is to say, I have made and designed not only the aeroplane, but the engine, flight-timer, coil, condenser, airwheels, and, in fact, almost everything except the battery! I say "almost everything" because the home-made plug failed after about 60 seconds run, owing to my inability to obtain any suitable type of machinable insulator, and I was reluctantly forced to fit a small A.C. plug. Now, I quite understand that this kind of foolishness is not everyones' meat, yet, for my own part, I do get a "kick" out of the thought that I have really *made* a model aeroplane.

To return to Col. Bowden's article. This article, besides containing criticism of my engine, deals with many other things in a general manner; thus, his reference to the hot-stuff engines of Gems Suzor would convey the impression that my own design is one of that racing class for which this gifted Frenchman was famous. Now, in my first engine article in the AEROMODELLER of April, 1943, I explicitly state that I do not want a "hot-stuff" engine under any circumstances; in fact, my insistence upon *reliability* as opposed to hot-stuff efficiency is one of the main planks of my platform. I, too, remember Mons. Suzor's racing two-strokes, and have read his book, "Petits Moteurs," published in 1938 (which, curiously enough, does not deal extensively with the multi-carburettored, hotted-up types), and my only reason for introducing the name of Suzor into my article was in connection with the underfitting in the piston which anchors the connecting rod.

Mention of this underfitting may serve to remind readers of my great reluctance to drill holes in my small pistons and cylinders; which drilling I believe to be a contributory cause of bad starting through leakage caused by wear. It was mainly for this reason that I incorporated the rotary disc type of inlet valve, and while the benefits of this point are acknowledged by Dr. Forster, Col. Bowden makes no reference, either condemnatory or otherwise, to this reason for its use. Both gentlemen seem to have a preference for the hollow crankshaft type of rotary valve, such as is fitted to the Baby Cyclone engine, and I am in full agreement as to its merits, but—it is not so simple for the amateur to produce as the equally efficient rotary disc; nor does it possess the advantages of timing and overlap which is a virtue of the disc valve. Also, the ideal lubrication of the disc type valve makes for long and trouble-free service.

Of the dozen or so engines which I have at various times possessed, all but two have had the detachable type of cylinder head, and I cannot say that I have experienced trouble of any kind with them due to this cause. I have never had a detachable, alloy head crack and Col. Bowden's experience with his 15 c.c. engine was probably caused by faults other than an inherent badness in the arrangement. The head may have been of unsuitable design, or, more probably, was not tightened with due care. Detachable heads must be tightened down by a systematic tightening of all the nuts or screws in special sequence; that is, one nut is first gently tightened, then its opposite number on the opposing side of the head; then an intermediate nut is tightened together with its opposite number, and so on until all the nuts have equal tension. The engine should then be run, and a final shade of a turn given, in the same sequence, to all the nuts or screws. Furthermore, a correct spanner for the nut-size should be used, as the length of the spanner will automatically control the leverage applied. So important is this method of tightening head-retaining bolts or screws that many car manufacturers supply a chart showing the sequence in which the many holding-down nuts must be tightened in repair shops. Col. Bowden's reason for condemning the detachable head will come as an awful blow to many thousands of owners of small engines, either of pro prietory make or otherwise.

It is evident that Col. Bowden's article was written before my answer to Dr. Forster's criticism was published, otherwise he cannot have failed to appreciate the necessity for a detachable head on engines of home manufacture. Furthermore, he makes no reference to the facilities which only a detachable head can give, both in the home manufacture of the cylinder or the machining of a desirable contour in the head itself.

As the criticisms of both Col. Bowden and Dr. Forster were written on my first tentative design, their criticism of the contact breaker is deserved. The fact that I did, quite unawaredly, spike the guns by subsequently altering the design of this component in no way detracts from the justness of their comments. As they and readers are aware, this component was redesigned by me before I was even aware of their interest in the matter, and was, strangely enough, cast into the type which they advocated later. This overlapping is inevitable because of the delay which is unavoidable in publication of a monthly periodical, yet I wish to thank them for pointing out the weakness of the design, and to assure them that I should have altered the component to conform to their suggestions, had I not discovered its infirmities for myself.

Col Bowden shares my aversion to controls which endanger the fingers by being too near to the spinning propeller. In fact, my right index finger always "tingles" when this matter is mentioned, as it was the victim of a particularly vicious attack by a 9 c.c. engine of my own make. My final design of engine places all controls at the rear of the crankcase, so that in this instance Col. Bowden and myself are in accord. Dr. Forster's invariable habit of running his engines in an inverted position has the advantage that a reasonably remote control may be obtained even when the contact breaker is on the front of the engine, and the illustrations which accompany Col. Bowden's article show this arrangement excellently. I have always been at a loss, however, to understand why the complications of a curved rack and bevel pinion should be introduced to perform so simple an operation. The running of the engine in the inverted position would allow of ample control of the contact breaker by simply extending the ignition lever and bending it backwards, away from the airscrew. The bevel pinion and rack as shown by Dr. Forster would be complicated to make, besides involving some awkward fitting problems. It does not seem to fit in well with Col. Bowden's plea for simplicity.

This constant plea for simplicity is one which we often hear, and arises from the mistaken idea that simplicity in itself is a synonym for reliability. Most of my life is spent among machinery of one sort or another, and I can state that this is definitely not the case. Machines of all types are becoming more complicated and yet more complicated, but the reliability is steadily increasing. One has only to instance the cases of the modern aeroplane and motor car to realise this.

The idea behind this simplicity cliché is, of course, that the fewer the number of parts the less there is to go wrong; yet this apparently obvious truth is really not so obvious as it would seem. Barring accidents and misuse, the causes of failure in machinery may be summarised as follows: bad design, bad workmanship, bad or unsuitable materials, fatigue, neglect. If, therefore, in a machine having, say, twelve parts, none of these faults is present, there is no more reason for failure than there is in another machine having but two parts of the same integrity. Nobody would suggest, of course, that machines have become more reliable *because* they have become more complicated; it is because design, materials and the other essentials have become better that a complicated machine is not necessarily an unreliable one.

An apparent complication may, however, even contribute to a machine's life and reliability over a prolonged period. Such a case may be cited in the rotary-disc inlet valve on model petrol engines. This arrangement is certainly much more complicated than the simple opening and shutting of a port by the passage of a piston across it. Yet the disc valve, for reasons which I have stated before, is much more efficient, long-lived and, therefore, more reliable in the long run, than the port valve.

Complication, *per se*, has never prevented me from incorporating any item of design which I thought might be beneficial, and I have had remarkably good results (not necessarily with model engines) from ideas which have first presented themselves as very queer phantoms of the mind. On the other hand, I never introduce a complicated arrangement if a simple one will do the job *equally well*. Most simple things in machinery, however, don't.

Pursuing Col. Bowden's remarks, we come to the question of the petrol tank. His observations about variation in fuel level with alteration of the machine's flying angle, are too well known to dispute. The excellent illustrations of Dr. Forster make the matter obvious. Fortunately, my own engine does not suffer from these defects, but, nevertheless, the matter holds great interest for me. This is an interest purely from the designer's point of view, and is intimately bound up with another vexed question. This question is whether model aero engines should be run *upright* or *inverted*. I do wish aeromodellers would make up their minds about this point. It would give the designer a so much better chance of turning out a complete and efficient unit. As it is, one is faced with the problem—almost unique in engineering, I should say—of having to design a complicated component which is capable of functioning under two opposite, *permanent* conditions. This catering for a reversal of the petrol tank is a headache, and means that the tank must be hung, like an afterthought, as a separate and flimsy component entirely detached from the main body and design of the engine.

After Dr. Forster's strong expression of views about this matter, I did, at last, think that we were going to get somewhere, when, behold! along comes Col. Bowden with his demand for a reversible tank. After due consideration I am entirely in agreement with the Doctor that a reversed engine can be fitted into any type of model aeroplane more easily than the upright type. But what would aeromodellers say to an engine, put upon the market, which could be used only in an inverted position? Would they buy it? I do not know.

I wonder if Mr. D. A. Russell would help in this matter. Would he organise a sort of Gallop Poll, similar to that which he organised to discover which contents of the AEROMODELLER readers liked best? I am aware that this entails a great amount of work, yet I am sure the results would benefit the power-'plane movement to an enormous extent.

Could we be sure that model flyers really wanted their engines one way up only, what beautiful little designs we should see upon the market! What neat little die-cast tanks, streamlined, and forming, probably, a cone of support around the main-bearing housing. The idea intrigues me.

As most small engine designs are limited, from the outset, by this need to reverse the petrol tank, I have given the matter some consideration, and have evolved a layout which will suit both the "uprights" and the "inverteds." The urge for reversing an engine arises from the need to place the thrust line (i.e., the propeller shaft), high up, midway, or low down in the layout, to suit the particular type of model aeroplane under construction. My new design may be placed in any reasonable position without the need to reverse the engine or turn it in any manner. All the desirable features which it has been the object of these articles to discover have been incorporated.

It has never been a hobby of mine to throw cats among pigeons, yet I would be prepared—with the Editor's consent, of course—to present the design to readers of the AEROMODELLER in a further article. After all, I can take it if he can!

(Mr. Sparey's design is now being drawn out, and together with a full description, will be published at an early date. In a following issue Mr. D. A. Russell will attempt to collate the views put forward by Dr. Forster, Lt.-Col. Bowden, and Mr. Sparey, in a comprehensive article on petrol engine design.—Ed.)

GADGET REVIEW By "Bonus"

PAST "Gadget Reviews" have proved so popular that it has been decided to present future Reviews in a rather different manner. Older readers of the AEROMODELLER will remember how the subject was featured some years ago. Unfortunately, with the coming of war and the absorption of so many readers into the Forces, there was a serious lack of material and the Review had to be dropped. During recent months, however, our Editorial offices have been stacked ceiling high with MSS., proving without doubt that our readers are more than capable of keeping future "Gadget Reviews" well stocked with brilliant ideas. I should like to say now, that the success of the feature does depend entirely upon you modellers. However simple your gadget may be, send it in. Keep the descriptive matter as short as possible and make the sketches good and big. Finally, of course, all ideas published will be paid for in the usual way and at the usual rates.

Well, here goes. The New "Gadget Review."

P. E. Finney has designed an excellent tool for making wheels for solid scale models. Old toothbrush handles and other unwanted plastics provide the raw materials. Wheels of any shape may be made by varying the cutting edges of the tool which is made of mild steel and is driven by an ordinary hand drill.

Naturally a tool made from mild steel could not be expected to cope with metal work. If the modeller wishes to fashion metal wheels of steel or iron (which might happen in the case of all-metal show models), then the tool should be made of high speed steel. Wooden wheels are not easily shaped owing to the comparatively slow speed at which the tool may be turned.

Most modellers, however, will use plastic material and the mild steel tool is excellent for this work.

Diagram 1 shows a tool made from a piece of 5/16 in. diameter mild steel rod. It is hammered, after being heated, to a width of the diameter of the wheel required and filed at right angles to its axis so that the top is perfectly square and flat. A template is made of the desired section of the wheel with which the cutting edge of the tool is checked from time to time, during its construction. A hole is then drilled downwards, vertically, through the centre of the tool to receive a centre shank the size of the axle. This method will be found more satisfactory than making the tool and the shank all in one piece. The shaping of the tool is done with small flat and round files.

The diagram shows the cutting edge which must be filed with some considerable care. The angle of the cutting faces must be kept constant throughout and any traces of turning over or burr, filed away. Tempering is not necessary when working soft material such as old toothbrushes.

To make a wheel take a piece of plastic material, which should be a little thicker than the desired finished wheel, and drill a hole to take the centre shank of tool. The latter is then fixed in the drill and one half of the wheel turned. The material is then turned over and the other side carved. The wheel should then drop off the tool.

During the whole process of turning the material should be thoroughly soaked in oil as this will ensure a smooth finish. The method may be used to turn out wheels from ¼ in. to 1 in. diameter quite successfully.

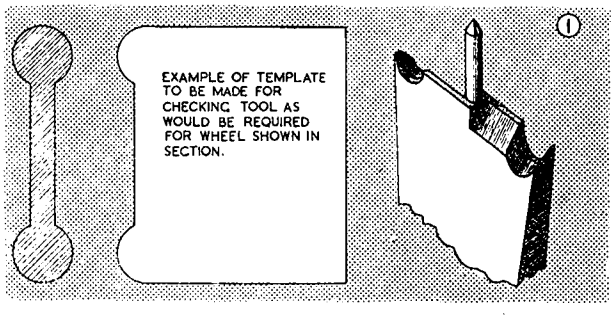
And now to turn to flying models. Here are three devices for releasing towed gliders from the tug. The first comes from D. Biggins. He says any general purpose machine will be suitable for the tug, the only modification necessary being the addition of guides for the towline and a rather longer tailskid than is usual.

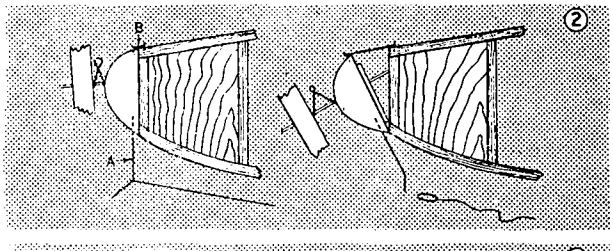
The release gear is very simple, consisting of a wire A, see diagram 2, fixed into the nose block of the tug and a rubber band B used to pull the nose block back into place after the release has taken place.

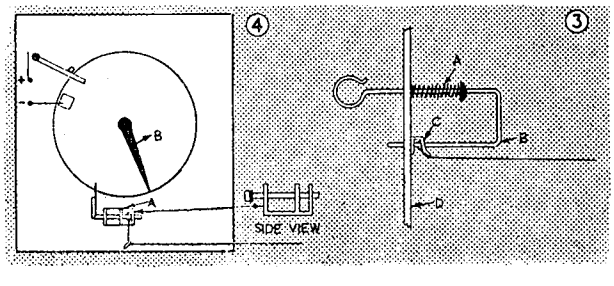
The action is as follows:—The tension of the tug's motor keeps the nose block and the towline in position until the end of the power run. The drag of the glider then pulls the pin A back and the towline slips off. The nose block is returned to position by the band B. When the glider is clear the towline falls right away, leaving both models free.

The second and third methods come from P. de Burgh Daly, one being for rubber driven and the other for petrol models.

In the rubber-driven method the towline is released by the action of the rear hook. As will be seen from diagram 3 the rear hook will move backwards under the action of the spring A, when the motor has unwound







The bar B will move backwards through the frame C and release the towline. D is a solid former of three-ply.

The other method intended for petrol models has not yet, of course, been tried out in the air, owing to the ban on the flying of power-driven model aircraft. I can see no reason, however, why the device should not prove quite satisfactory

From diagram 4 it will be seen that the release is worked by the timer. As the arm B travels towards the switch it will move the release gear A and free the towline. The point of release may be set to occur whenever required during the motor run by suitably positioning the release gear.

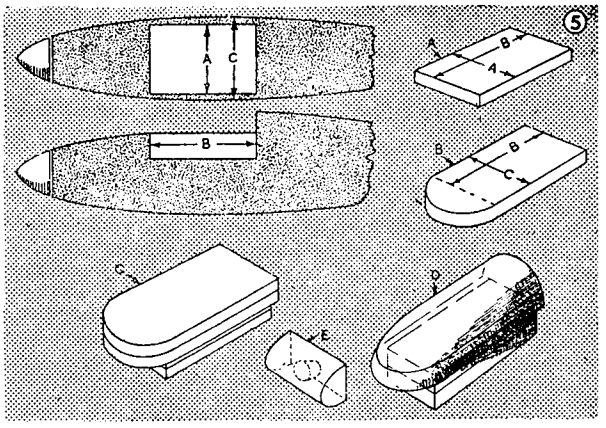
Judging from the number of photographs we receive of well made solid models marred by poorly finished cockpit covers and gun turrets, it seems that this particular problem is indeed a real one. A good deal has already been written on this subject but as different modellers methods vary so greatly, no harm will be done by detailing the procedure adopted by K. W. Goodall. The finish obtained is quite professional and in the case of a cockpit cover, includes a dummy pilot.

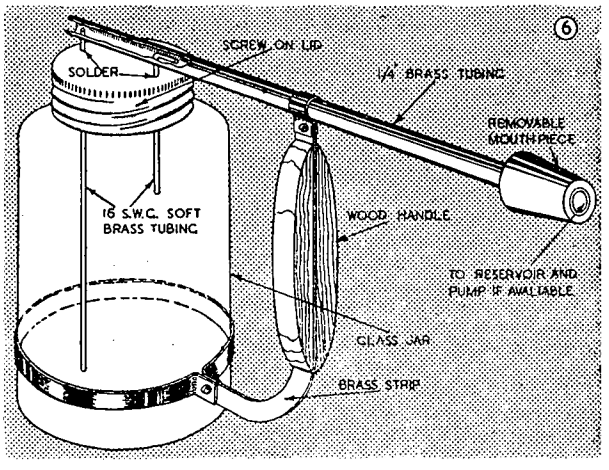
Mr. Goodall uses small pieces of perspex but if the reader cannot lay his hands on any of this rather precious commodity, cuttings from an old set square will do just as well if built up to the right thickness. The cockpit is hollowed out to the required length and breadth. The depth should be about one third of the height of the fuselage. Diagram 5 will make this clear. Mark out on the perspex or celluloid several rectangles to the inside dimensions of the cockpit, see diagram A.

Next mark out several rectangular shapes having a curve at one end and equal to dimension C across the width (i.e., overall width of fuselage). Diagram B. Cut out all the shapes with a fret saw and sandwich them one above the other, using Balsa cement to glue them; dry *under pressure*. It is important to use cement or a similar adhesive of acetate origin, which has an affinity for celluloid and which will become invisible when dried under pressure. This provides a good foundation for carving and appears as in diagram C. Shaping is done with a $\frac{1}{8}$ in. wood chisel, followed by a fairly fine file and finally smoothed off with very fine sandpaper. The cockpit cover is, of course, opaque and must be polished to make it transparent. This is accomplished by fixing a piece of cloth to the bench with drawing pins, damping with metal polish and rubbing the block to and fro on the cloth. This gives an immediate polish and the block then appears as in diagram D.

The fashioning of the "pilot" is accomplished by turning the block over and drilling a $\frac{1}{8}$ in. diameter hole where the pilot would normally appear to sit. The shoulders and then the head may be fashioned with the aid of a small sharpened screwdriver. The depth of this hollow pilot must be almost the same as the depth of the block, since this has similar properties to a prism and consequently will make the pilot appear slightly smaller than he really is. A dab of pink dope or paint inside the head where the face would be and the rest of the hole touched up with drab or brown and the result will be most realistic.

The cover is lightly filed around the bottom edges of the rectangles to make it a push fit into the cockpit, where it is fixed with a little cement. It will be found that the wider top pieces come flush with the outside edges of the fuselage





The faint lines of the laminations represent the longitudinal framework of a real cockpit cover and the lateral framework is represented by fine lines cut with a file. Fine dark lines each side of the cockpit, just below the glazing, can represent the channels for the sliding portion of the hood. This completes the ensemble.

Finally a word about landing lights. These, positioned in the leading edges of the wings, may be made in exactly the same manner as the cockpit covers. The actual lamp may be hollowed out of a solid block shaped to the required section. See diagram E.

Since the recent publication of various types of spray guns, many readers have written in asking if it is possible for the AEROMODELLER staff to make guns for them. This, I am afraid, is quite impossible, even though adequate payment is offered. Most of the requests come from modellers who, for one reason or another state that it is not possible for them to devote the time or find the materials necessary for making their own gun. I fully sympathise with them, knowing only too well how difficult things can be these days. Unfortunately, the AEROMODELLER also suffers from time, labour and material shortage.

In view of the above I feel that the very simple spray gun sent in by J. M. M. Powell may be of considerable interest to quite a number of readers. Diagram 6 shows the gun and no explanation should be necessary. Air may be blown through either by mouth or by pump.

Readers' ..... Letters

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

DEAR SIR,

Readers of the AEROMODELLER have grown to expect something new and interesting in Mr. N. K. Walker's articles, and this is fully justified by his latest—"A Six-Minute Motor Run"—in the September issue. Here we find him making what is, in effect, the suggestion that outdoor duration models should be designed on the indoor principles of light weight and long motor run.

I must say I applaud this as an attempt to improve duration times heedless of references to "paper bags full of rubber and other gibes from the semi-scale fans, but, at the same time, a hard-headed sceptic such as I is bound to point out that the reason for the truly remarkable results claimed by the author is by no means apparent from the data supplied.

Adopting a procedure similar to that described by Bob Burns in "A Method for Calculating the Performance of Rubber Motors" (January, 1942, AEROMODELLER), it may be shown that, with the 36 in. motor and allowing as much as 70 per cent. airscrew efficiency, the energy available is approximately 450 ft./oz., whereas the energy required for a 5 minute motor run and a climb of 600 ft. is about 1,200 ft./oz. Indeed, 450 ft./oz. is not nearly sufficient to maintain even level flight for 5 minutes. Similar discrepancies are found when the problem is tackled from the "thrust" and "torque" points of view. (Fuller details of my calculations may be had on request.)

Without going so far as to doubt Mr. Walker's times, I should like to invite him to give some explanation as to how he does it, or, as to where the theoretical results break down.

Yours faithfully,

J. H. MAXWELL.

DEAR SIR,

In reply to Mr. Maxwell's letter :—

I am glad to see that LD2W3 has created—as I had hoped—some interest among the serious aeromodelling community, but I must protest that Mr. Maxwell has gone beyond my intention in saying "Here we find him making what is in effect, the suggestion that indoor duration models should be designed on the outdoor principles of light weight and long motor run." I wished to point out that if certain qualities such as realism, impressive appearance, durability and heavy wing loading were sacrificed, a very high duration could be attained, also that the present Wakefield model is not necessarily the last word from the point of view of pure duration.

The reason for the superlative performance attained is, as Mr. Maxwell has pointed out, by no means apparent. His figures are substantially correct; I estimate 1,270 ft./oz. required for a 6 minute motor run and climb to 600 ft., also that the available energy in the motor specified is 815 ft./oz. at 1,800 turns, or allowing the measured efficiency of 60 per cent. 490 ft./oz.

On the other hand there are the definite results obtained on LD2W3 (published) and on LD2W2, an earlier and lighter model, which were not published owing to lack of space.

(*a*) With a motor 30 in. long (two strands of 3/16 in. by 1/30 in.) and 1,800 turns, LD2W2 put up a flight of 3 mins. 39 secs. rising to approx. 600 ft., motor run exceeding 3 mins.

(*b*) On the next flight and 2,000 turns it caught a thermal and climbed out of sight in less than 2 mins. Foolishly trusting in my fixed airscrew as a dethermaliser I had omitted to put on my name and address so I never saw it again. Both the above flights were made in the presence of two other witnesses.

(*c*) LD2W3 will climb and fly for 110 secs. consistently on a 17 in. motor wound to 600 turns.

On the same motor indoors the 'plane appears overpowered as it takes off and climbs at 1 : 2 on 400 turns.

(*e*) LD2W3 on a 36 in. motor with 1,800 turns has climbed to 600 ft. and flown for 5 mins. 35 secs.

The above times were all measured with a stopwatch and are very accurate but the heights were estimated by finding the apparent wing span on a scale held at arm's length. This was 2 mm., the true wingspan is 22 in. and my arm is 26 in. long so the height is $\frac{22 \times 26 \times 25{\cdot}4}{12 \times 2}$ or 600 ft. approx.

I found early this year that this discrepancy between practice and theory existed, unfortunately after the article was written and as a theorist without a theory is very much a fish out of water I have spent much time in trying to explain the difference.

The answer is "thermals"! In absolutely still air the model's flight will conform to the theoretical predictions, so it will climb for 50 secs. to approx. 150 ft. It then commences to cruise and will sink at a gradually increasing speed until the motor runs out. At this moment its sinking speed will be 2 ft./sec. and it will be 100 ft. *below* the point of launch. However, its sinking speed will be less than 0.5 ft./sec. for 70 secs. of cruise and less than 1·0 ft./sec. for another 100 secs., so the performance would be that of a glider launched at 150 ft., credited with a bonus of 50 secs. and a sinking speed of less than 1·0 ft./sec. for 170 secs. of glide, and slowly increasing to 2 ft./sec.

Observations made during this summer in all kinds of weather, subject to the sole proviso that it must be suitable for flying, have convinced me that once the turbulent region extending up to about 100 ft. has been surmounted, the air during the day is slowly ascending. The rate of ascent appears to be about 0·5 ft./sec. which increases with height until at about 400 ft. the speed is over 4 ft./sec. The rising air also tends to concentrate in "chimneys" and any model of light construction which reaches this height is liable to be drawn into them and will then almost certainly pass out of sight.

You may say "What happens to this rising air, where does it come from?" My answer is that for a considerable part of the day the air is heating up and expanding, also that there are known to be strong downdraughts over cold regions such as rivers and lakes.

The hypothesis is confirmed by observations made on flights (*a*) and (*e*). On both occasions the 'plane climbed very quickly to 150 ft. or so, then very slowly up, to about 300 ft. and then much faster. In fact at the end of flight (*a*) for a few seconds it seemed as if the model would continue its upward journey with its prop. dangling below on the end of 18 in. of rubber.

For soaring flights LD2W3 possesses the following advantages over the normal types. It climbs very quickly up to 150 ft. and so dodges the turbulent air, it can then gain height in any rising current, it is very light and stable and is not liable to lose height through gusts and is readily drawn into the ascending chimneys of warm air or the rising bubbles of hot air—the true thermals, the normal 'plane reaches 150–200 ft. then sinks at 3 ft./sec.; LD2W3 climbs to 150 ft. but for another 170 secs. its sinking speed is less than 1 ft./sec. The superior performance is not really surprising. This view of the process by which the model maintains height is confirmed by two flights I witnessed at Prestatyn.

On one occasion I was privileged to see the Secretary's model, a "20 minute glider," make a flight of nearly a minute from a hand launch from 15 ft. above the surface of a field, the height reached being about 45 ft. Now the sinking speed of this model was accurately measured to be 1·68 ft./sec., forward speed 17.6 ft./sec., so even at this low altitude there must have been a rising current of more than 1·7 ft./sec. with an average value of over 1 ft./sec.

Again, I was testing LD2W6 (LD2W3 with two wheel undercarriage and two spar wing) and had experienced difficulty owing to the flexibility of the wings, but finally put 400 turns on a 24 in. six-strand motor at sunset. There was little wind and the 'plane drifted slowly downwind out of the field and over some houses. By this time the motor had practically run out and the model, a little nose-heavy, had begun to descend, but as soon as it reached the houses it commenced to ascend again and even soared for several seconds with the propeller freewheeling. It could only have been soaring on the warm air rising from those houses, and if the model is sustained by so weak a thermal who can doubt its ability to soar on the much stronger currents met with at higher altitudes, and in daylight.

In conclusion, I would suggest that Mr. Maxwell should build a copy of LD2W3 and try it out for himself. The time required is not excessive nor is the amount of material and I would be glad to give any assistance. Indeed, I will go further, I have just heard that my model has been recovered and if Mr. Maxwell will give me a day or two to make repairs I will send it to him for him to test.

Yours faithfully,
N. K. WALKER.

DEAR SIR,

In the editorial comment on my article on Cardboard Modelling in the January AEROMODELLER, you mentioned the loose application in scale modelling of the term "solid." While agreeing with you on this point, I feel that some definite steps are needed to clarify and fix the terms to be used in scale modelling, especially in view of the varieties of built-up construction now in use.

While rather uncertain myself as to the best terms to apply, I put forward some suggestions in the hope that they may provoke other modellers to produce better ones.

Confirming the discussion to non-flying scale models—an accurate, but clumsy name for the class as a whole—why not "static scale" or "statics"?—there are three groups clearly defined, with a few borderline cases. The first, and by far the largest group, contains models carved from wood or other materials—the true "solids," and for these no better name could be found. The second is composed of models built up from cardboard or other thin sheet materials, usually with little internal structure; possibly these could be named "shell-scale" or "monocoque" models.

The third is made up of models, generally to a larger scale, having a complete built-up structure, the best examples being the series Dart, Avro Cadet, Tiger Moth and others described by E. J. Riding in various past issues of the AEROMODELLER; these might be described as "structural scale."

Huntingdon. P. R. DOUDNEY.

DEAR SIR,

A paragraph of interest to all aeromodellers is to be found in a recent copy of "The Aeroplane." I quote it here in full:—

"A competition of petrol-driven model aircraft will take place in Germany (in the summer). The National Socialist Flying Corps will be in charge of it and has provided the equivalent of £1,150 for prizes. The conditions foresee long distance and point flights in which petrol-driven ornithopters may take part. A special prize of £500 will be awarded to the competitor who solves best the problem of controlling the flight of a model aeroplane by short waves. In this country flying of petrol-driven models or of radio-controlled designs is still not permitted."

It would be interesting to know the nature of facilities provided for aeromodellers in Germany at present.

*I honestly fail to see that such competitions can promote any real technical advances in countries having many hundreds of experts working in their laboratories, but I should imagine that the object is to use the competitions as a medium for spreading air-mindedness, so important in war and peace, as well as the value to the competitors and those directly concerned—a small minority!

Trusting the letter has some information value.

Kent. D. BROWN.

* *Any comments?*—[ED.]

DEAR SIR,

Towards the end of his intriguing article, "A Problem of Power," Mr. Warren assumes M to be constant. Surely this is not so.

With d a junction of two variables, its only true maximum value is when $\omega = 2\,M = o$, the duration then being infinite, the model being lighter than air.

If we put the optimum amount of rubber in an airframe of weight M, the duration $= K\frac{2\,M}{(3\,M)\,3/2} = \frac{2\,K}{\sqrt{27}} \times \frac{1}{\sqrt{M}}$ which increases for smaller M. This seems to indicate lightweight design.

But if W has a minimum value, say 8 ozs., as in a Wakefield design, then $d = \frac{K}{8\frac{2}{3}} \times W$ which increases with W, reaching a maximum value for a 'plane consisting of 8 ozs. of rubber.

Below is a table of figures showing relative duration for different combinations of MK and ω has been taken as 1,000.

M ozs.	W ozs.	W=M+ω ozs.	d	
5	3	8	135	
5	8	13	170	(approaching maximum
4	4	8	177	efficiency for 5 ozs.
4	6	10	189	airframe.)
4	8	12	192	
3½	4½	8	199	(maximum efficiency for
3	5	8	221	4 ozs. airframe.)
0	8	8	354	

Mr. Warren would have us add 2 ozs. of rubber to his Wakefield and increase the performance from 177 to 189, but by saving only ½ oz. of weight in the airframe and adding it to the rubber, the duration is increased to 199.

This indicates how efficient a model such as A. D Piggot's Wakefield must be, and in my opinion, suggests that a Wakefield ought to be built simple and strong and light, made up to 8 ozs. with rubber.

To those critics raising the howl of "Paper bags full of rubber" let them try controlling the power, and to the streamliners, well, they have my congratulations when they can produce an airframe of equal weight to a slabsider.

N. GREGORY.

Middlesex.

DEAR SIR,

I have followed, with interest, the articles on miniature engine design by Dr. Forster and Mr. Sparey and on reading Mr. Sparey's latest article and the letter by Mr. F. Gray in the February AEROMODELLER, it would appear to me that these two gentlemen, in all good spirit, have misunderstood Dr. Forster's intentions.

Dr. Forster, to my knowledge, does not pretend to be an expert practical engineer and is not attempting to direct amateurs in their individual engine designing. He is, however, a man with considerable very practical experience in the building, flying and servicing of aircraft powered with existing commercial miniature engines and, as such, is interested in the development, not of the occasional amateur engine, but of the future commercially produced engine which will affect him and many thousands of others far more than the former. In this direction he has been good enough to record for the interested public his extensive experiments with commercial engines, to point out where they fail, and to put forward his ideas for improvement.

Direct contact with Dr. Forster has shown me that under certain circumstances, he can be far more helpful than he has been in his published articles, and I believe that the successful post-war commercial British engine will owe a measure of its success to his work. In fact, if any prospective manufacturer ignores Dr. Forster's experiences and advice, he will at once, in my opinion, be jeopardising his chances of producing a good engine of wide acclaim.

On one point, however, I must support Mr. Sparey—I also draw engines in the upright position!

R. V. BENTLEY.

Blackpool.

"THE SHAPE OF WINGS TO COME"

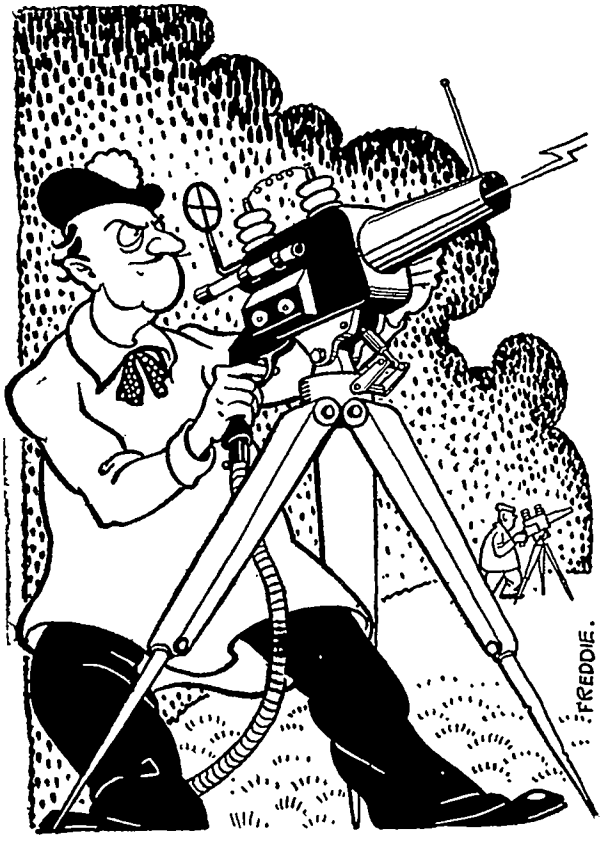
BY ROBERT JAMIESON

TRYING to write down my experience—just as I remember it—I realise how incredible it seems, written thus in cold print. The scientifically-minded will, no doubt, talk airily of a curve in time, or the fourth dimension. The cynical will say I was drunk or dreaming. Probably you won't believe it anyway—still, here it is; just as it happened; near as I remember.

We'd certainly been lucky with the weather. The afternoon was drenched in sunshine, and the breeze so light that the fleecy white clouds had halted their slow procession to watch what we were doing. Away to the south rose the low hills that heralded the beginning of the Downs. On my left was the long line of tall poplar trees at the edge of the flying field. A grand day for the rally! If only my one—and only—decent model had not seen fit to commit suicide on the telegraph wires last night. Well, there it was; and here was I, playing policeman. Shepherding the crowd and asking the too curious just to keep a *little* further back from the take-off board.

Not that the crowd gave any trouble once the flying got under way. Funny how so many people seem to get a kick out of watching model 'planes do their stuff, and yet never seem to find the energy to build one themselves. There's young "Last-minute" Jackson coming up now. Bet the dope isn't dry yet—but his 'planes always fly well. Yes—there she goes—what a climb!

Now what does Ferrars think he's up to?—messing around with that speed model of his. Must be nearly a pound of rubber in it. I believe he's winding it up—and if that thing gets loose among the crowd . . . Why must that chap always try to show off? He ought to get further back, out of the way—LOOK OUT!



* * * *

Funny—it seemed to hit me, yet I never felt anything. No one was taking any notice—but the crowd seemed to have grown suddenly. There must be thousands here—just a minute; this isn't the field at home—those tall buildings over there look like—Why, it's Hyde Park! Now how the Dickens did I get here?

The crowd's beginning to applaud. Something must be happening over at the flagpole by the marquee, there's the windsock slowly going up. What does it say?

"It says R.S.M.A.E., Cockie," said a cheerful cockney voice at my side. I must have been speaking aloud.

"I'm a member of the Society—" I was beginning when he cut me short. "Where's yer badge?"

My fingers strayed to my lapel. "Must have left it in my other jacket."

"Sure, Cockie, sure. But don't try to kid me. You'd never pass the entrance exam., you wouldn't. Besides—what yer doin' 'ere if yer a member. Why don't yer nip down to the enclosure?" And with that he turned and left me in disgust.

Membership of the Society evidently carried some prestige. And the size of the crowd! What a mob. And even a grandstand over there in the trees. Then it began to dawn on me that I was out of my own era; that I must have skipped half a century or so to get here. Hyde Park looked different, and there were subtle differences in the dress of the people around me. Looking round in search of enlightenment I discovered the man on my left. He looked promising—with his close clipped moustache and greying hair.

"Third day of the International Rally," he said in answer to my enquiry. "Controlled flying—Cock-fighting they call it."

I was no wiser, but hated to admit it. So I bided my time until I could risk further questions. Now four small balloons were going up, attached to cables, one at each corner of the field. At about three hundred feet they stopped, and I noticed there was a windsock on each cable about a hundred feet from the ground. I looked at my neighbour expectantly.

"That's the actual combat area," he said. "Got to keep above the windsock and underneath the balloons."

I tried to look wise; not very successfully. Seeing that I was looking quite lost my new friend got chatty.

"They're flying on the power beam—" he was beginning, when my blank stare must have told him I knew nothing about power beams. He explained.

"When Martin invented his system for broadcasting power, it was regarded as an interesting toy, of no commercial value—since it was effective only over short distances—and very little power at that. But it revolutionized the aero-modelling game; 'specially when the apparatus was so simple to make."

"Is that what these chaps are working at?"

Away over beside the grandstand were two affairs that looked like cameras, with a long cylindrical hood over the lens. They were mounted on tripods, capable of being swivelled through both the horizontal and vertical planes. A power cable dangled from the pistol

grip at the back.

"These are the beam emitters. Most clubs build them for themselves; and the models are fitted with small high output electro-turbines."

"But how do they control them. I mean if the power—?"

"That's where the skill comes in. They've got to be flown on the throttle—there's a resistance worked by the grip at the back of the emitter. I really don't know a great deal about it. They've all got their pet systems and ideas. You ought to hear my boy and his pals arguing about it. The general thing is to trim for maximum climb on full throttle, and get the model to cruise level on about one third power—"

"But steering—?"

"Aye. That's the rub. As I said, they've all got their pet theories. Some set their 'planes to circle on the rudder when the power is full on, others use a combination of side thrust and a weak spring on the rudder, so that the job flies straight on full throttle, and the rudder only acts when the power is reduced."

"Sounds a pretty chancy business. Aren't there many crashes?"

"No. You'd be surprised how few there are. The Society is pretty strict, of course. An aero-modeller has to pass a really stiff test before he gets a permit to fly in these contests. After all, it's not so very remarkable; much the same as any other sport. Look at the way an expert tennis player can control the ball with his racket."

The sound of a gong drew our attention back to the field. The first round was getting under way. Two figures walked out and placed their models on the tarmac about a dozen yards apart. Then they approached each other, shook hands, and took up their stations behind the beam emitters.

"Blue and silver dice, black and orange stripes, Czechoslovakia and France," said my friend. "Now watch this."

"But what's the big idea—I mean how do they decide?" I asked.

"Each model has a small hollow rubber pylon mounted on top of the fuselage with a little parachute inside it. The 'stick' as they call it, is attached to the 'plane by a sucker—a vacuum disc. The idea is to get above your opponent and sufficiently close to knock off the 'stick,' and at the same time prevent him doing it to you. Soon as your 'chute opens—you're beat."

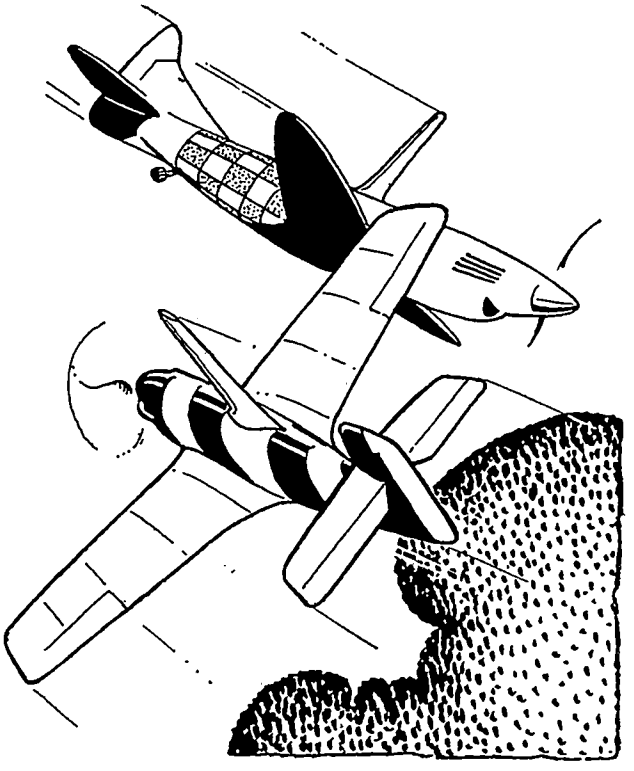
At a second gong stroke the competitors pointed their "guns" at the 'planes. The engines broke into humming life. They raced along the tarmac and took off, climbing steeply. At about two hundred feet the gong sounded again—and the battle was on! Both 'planes turned and twisted, zoomed and dived as each tried to "draw a bead" on the other. The crowd were quick to cheer each clever manœuvre; but to me the most fascinating thing to watch was the pilots at the emitters. The way these chaps swivelled the apparatus round and up and down to keep their models in the "juice" was terrific.

Suddenly a roar from the crowd and another gong stroke brought my attention back to the 'planes. Both were gliding in with the power off, and floating down between them was a small orange and black parachute.

"France, one down," remarked my friend. "Pretty quick kill too. Seventeen and a half seconds."

"Is there a time limit?" I asked.

"Yes. They're only allowed one minute. If no decision is reached in that time, then another thirty



seconds. After that it's a draw."

The organisation was good. Hardly had the last two 'planes touched down before another two were out on the tarmac. All black and all red this time. The gong clanged again and we were off!

"Belgium and Holland—a local derby," said my friend. "A really International field this year. Wonder how they're getting on out at Crixton?"

"What's happening there?"

"That's the Society's own flying field. Rubber and petrol-driven jobs—free flying, radio-controlled formation and glider towing."

"Glider towing—how do they release—?"

"Petrol jobs mostly; time switch—but we're missing the fun."

Black and red were having a real dog-fight. The pilots knew their stuff. Both models twisted and turned like eels, but neither could gain any advantage. Each move by one was promptly checkmated by the other; and the seconds flew by. Soon the gong clanged to indicate the minute was up, and both men re-doubled their efforts to reach a verdict in the remaining thirty seconds. No go. The final gong went and both cut and went gliding in without a decision. The crowd's applause was generous.

"Belgium and Holland are always mustard. Next pair should be just as good. England and Scotland Blue and white, yellow and red."

As the 'planes rose and circled, one of them passed quite near. The "close-up" prompted me to ask: "What are they made of."

"Plastics—"

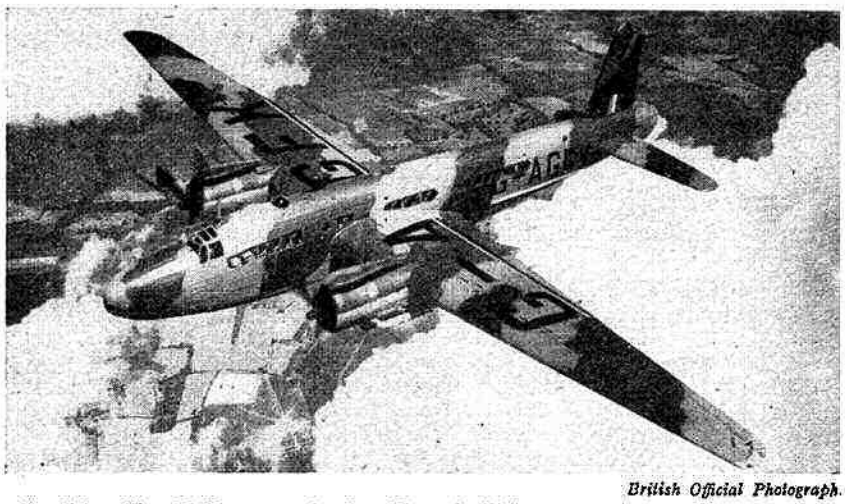
"But—don't the modellers build them?"

"Of course they do. That's one of the rules. Most clubs make their own moulds—but some build a Taigun frame and cover it with a thermalite skin, all a matter of taste."

Continued on page 319.

MONTHLY MEMORANDA

BY O · G · THETFORD



British Official Photograph.

The Vickers Warwick Transport. Developed from the Wellington, the Warwick is powered by two Pratt & Whitney Double Wasp Engines, and has a wing span of 96 ft. 8¼ ins.

Battle Scars on Models.

I heartily endorse the views expressed on the finish of solid model aeroplanes in the editorial of the March issue of the AERO-MODELLER. Far too little attention has been paid by solid modellers to signs of age and hard usage on the aeroplanes they claim to reproduce faithfully. An aeroplane fresh from the production line presents a very different appearance from a veteran with several months, or even weeks, of service with an operational unit. Code letters are, of course, always painted on the airframe after the machine has reached a squadron, often by the " erks," and it is common for these letters to be painted over the serial number on the rear of the fuselage. Yet modellers rarely seem to notice this point and few, if any, models have been exhibited with overlapping code letters and serial numbers. The introduction of the duck-egg-blue 18-in. rear fuselage band on fighters caused many alterations to the positioning of serial numbers in 1940. Nearly all the Mohawk fighters, as received from the U.S.A., for instance, had the serial number painted further aft and lower down on the fuselage than it subsequently appeared against the duck-egg band, and in most instances the old number could be easily discerned beneath the thin coat of paint.

Night fighters are considerably prone to present a " patchy " appearance after any length of service owing to the tendency of the black paint to peel off (not in the aerobatic sense !) revealing the primer paint, usually a bright yellow, underneath. The writer has personally noticed many Beaufighters and Havocs with large patches of yellow along the leading edges of the wing and tail surfaces standing out vividly against the general black finish of the aeroplane as a whole.

Another point which modellers fail to appreciate is that a large amount of mud and dirt is thrown up beneath the belly of machines operating from muddy aerodromes. Machines with a patched, fabric-covered tail control surface or aileron frequently have it hastily doped the initial red and then go into service again before the standard camouflage can. be applied. The fabric patches placed over the gun-ports on night fighters and other fixed-gun types are invariably doped red. These are to decrease drag and are shot away when the machine makes an engagement.

Wing walk-ways should always be dented, scratched and worn, as a reader points out in the March issue, and the light-painted nacelles just aft of the exhaust outlets on some day bombers are naturally stained very quickly, in addition to the cartridge shoots. A detail consistently ignored by modellers was the yellow anti-gas patch painted on the majority of British aeroplanes in 1940 and 1941. They were small, pale yellow squares painted on the upper centre-section of the wing within the pilot's range of vision and on the rear fuselage decking or top surface of the tailplane, where they could be readily spotted by the dorsal gunner.

Good-bye to Camouflage !

Modellers with a taste for an elaborate camouflage scheme on their models will doubtless be disappointed to learn that certain machines operating with the U.S.A.A.F. no longer carry warpaint and that there is a tendency, it seems, for this system to become more general. American aeroplanes already on operations with a dazzling aluminium finish so early as February, 1944, include the Lockheed P38J Lightning and the Boeing B-17G. The star insignia remains as before. The inner surfaces of the motor nacelles and the top surface of the fuselage ahead of the cockpit are painted dull black to obviate dazzle and glare for the pilot. The technical reasons given for this change in policy are that the increase in speed resulting from the decrease in weight and smoother surface more than compensate for the loss of slight advantages derived from camouflage schemes.

Beaufighters at " Gib."

It can now be revealed that many Beaufighter IIs, with Merlin motors, are serving with Coastal Command as long-range day fighters. Little has been heard of the Merlin version of the " Beau " for some considerable time and they were at first reserved as night fighters. The Coastal Beaufighter IIs are camouflaged in the standard day scheme for Coastal Command and some of them are stationed at Gibraltar.

In Brief . . .

A Messerschmitt Me 109G fighter captured intact by the R.A.F. is serving at an experimental station in this country painted in the latest standard day fighter scheme with R.A.F. roundels and the serial number RN 228 in black on the rear fuselage.

Tropical Spitfire IXs of a R.A.A.F. Squadron serving in Italy carry the code letters " BQ."

A Mosquito fighter-bomber squadron of Bomber Command operating by day carries the codification " SY " aft of the fuselage roundel. Bombs are carried beneath the outer wing panels in addition to the bomb-bay load.

White-painted Martin Mariner flying-boats of the U.S. Navy Patrol Squadron 211 carry the markings " 211-P-1," " 211-P-2," " 211-P-3," etc., on the bows, just above the national star insignia.

AEROPLANES DESCRIBED XVI

The

WESTLAND WIZARD

BY H · J · COOPER

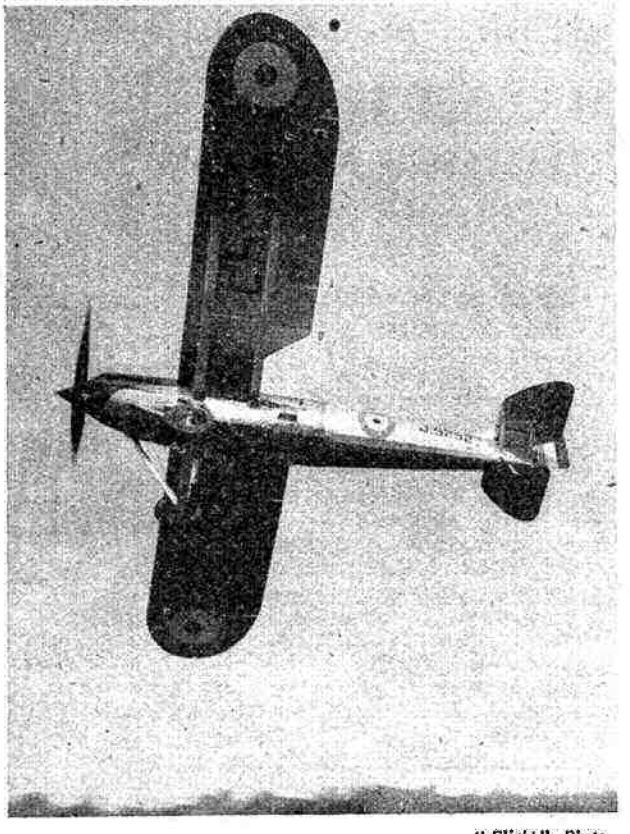
Next Month: Martin-Baker MB-2

IN 1928 was produced a monoplane of outstanding ability and appearance named the Wizard. It was designed and constructed by the Westland Aircraft Works, of Yeovil, Somerset, and was an example of that firm's enterprise when other manufacturers were sticking implicitly to the biplane formula calculated to satisfy Air Ministry requirements. The Wizard was a private venture, and although at this period the Fighter Monoplane as a type was something of a white elephant to the Service, it attracted considerable attention on account of its clean lines and obvious capabilities.

The prototype had appeared in the previous year, but was not quite so good-looking as the Mk. I, the earlier machine having a rounded nose with the cylinder heads visible. The Mk. I was equipped with a Rolls-Royce F.XI motor faired splendidly into the oval-section fuselage, which in itself was something of a departure from the orthodox rectangular construction of contemporary types.

The Mk. I was built after a nose-over landing at a test flight of the prototype. The new machine had an all-metal fuselage in place of the wooden fuselage of the original, but the wooden wing construction was retained. This version was shown to the public in the New Types Park at Hendon in June, 1928, and, piloted by Flt. Lt. J. Summers, caused considerable excitement by its sensational rate of climb.

After this demonstration the Air Ministry became awake as to its possibilities, but were not satisfied with the view from the cockpit, so important in a fighter. Actually the parasol-wing arrangement resulted in a very good view, but Westland modified the Wizard by fitting a thinner centre-section, which slightly increased the span. The wing-tips were altered and smaller ailerons were incorporated. Unhappily these modifications resulted in a slightly decreased performance, and the Wizard was not accepted for production.



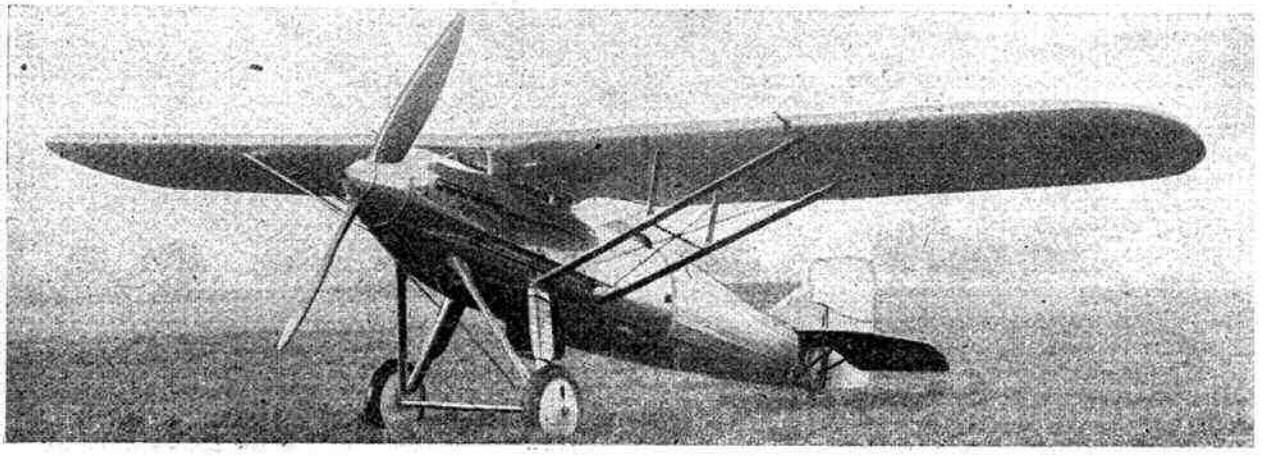
Westland Wizard II *"Flight" Photo.*

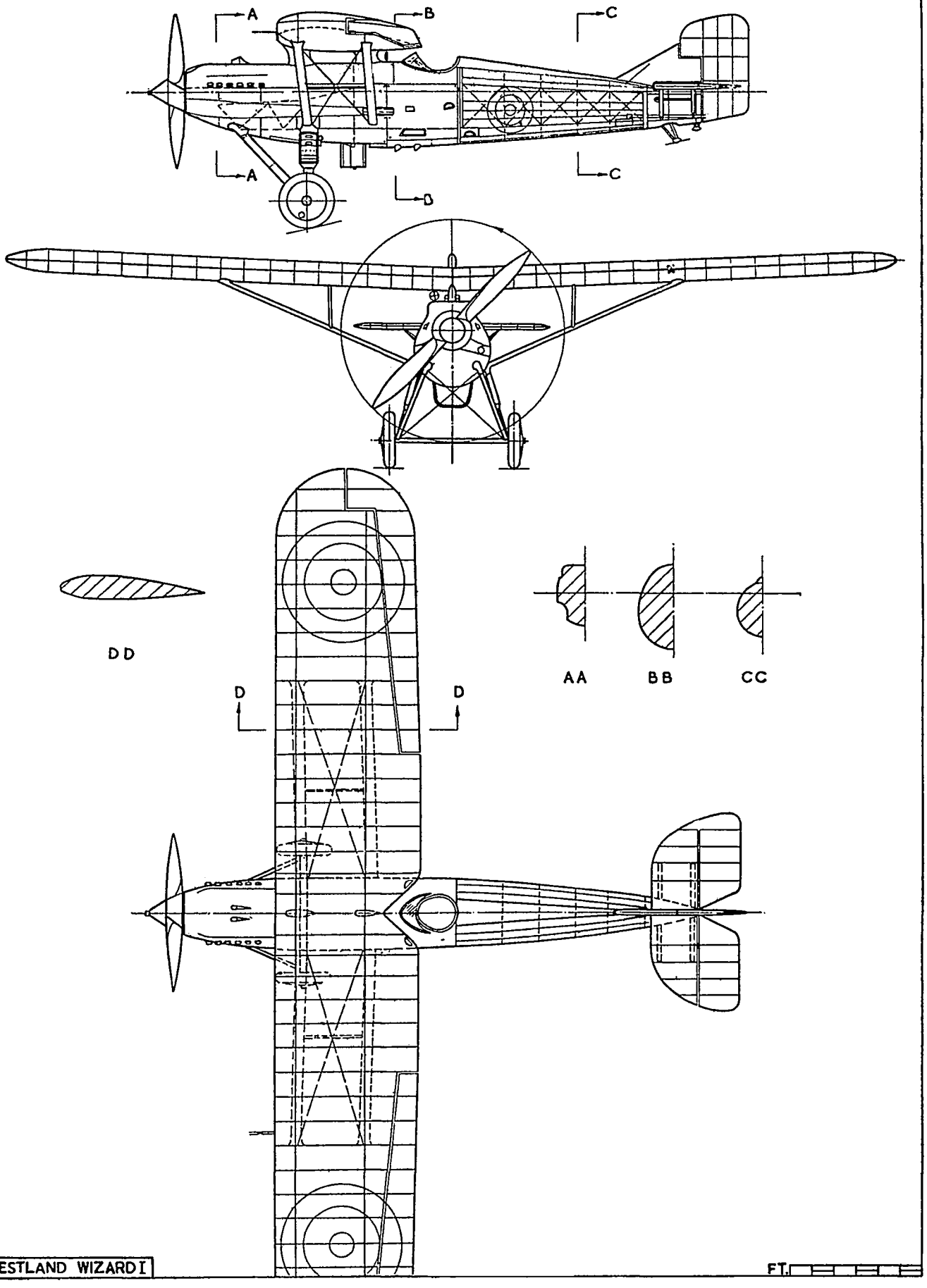
Both the Mk. I and the Mk. II, as the third machine was known, were coloured all silver, with a brilliant polish to the metal parts, and the deck and nose were painted dark blue, outlined thinly in red. The serial number J 9252 was painted in black on each side of the fuselage, and below the wings; in the latter place the tops of the figures were towards the leading edge on the starboard wing and towards the trailing edge on the port wing

Main dimensions for the Mk. I are: span, 39 ft. 6 in.; length, 26 ft. 10 in.; chord, 6 ft. 5 in.; track, 5 ft. 6 in.

The Mk. I had a maximum speed of 188 m.p.h. at 10,000 ft. and a climb of 2,000 ft./min.

Westland Wizard





WESTLAND WIZARD I

FT.

CLUB NEWS

BY CLUBMAN

HELICOPTER MODEL *(Air bus of the future)*

This model of a 14-passenger helicopter Air Bus, conceived by the Greyhound Corporation, the famous American transport company, and designed by Raymond Loewy in collaboration with Igor Sikorsky, helicopter inventor, was exhibited recently before the U.S. Civil Aeronautics Board. The Greyhound Bus Lines have applied for permission to operate helicopter buses in local air service over 49,130 miles of routes.

I AM sorry to note from varying sources that all does not seem well with the S.M.A.E. The current Publicity Bulletin mentions the fact that our old friend and founder member, Mr. C. A. Rippon, no longer sees eye to eye with the Society, and has resigned his position on the Council—a duty he has fulfilled for many years.

Apparently a number of people are not satisfied with the efforts made so far by the Society to cater for the rapidly growing body of aeromodellers in this country. The inference is that the only section of the aeromodelling fraternity catered for are the out and out competition fans—who are, after all, a very small portion of the modelling public. Certainly competition matters play a big part in the activities of the S.M.A.E., and I personally subscribe to the view that there are other very important considerations that are being overlooked. However, I hope to hear more of all this at a later date, and will, of course, pass on the " gen " in due course.

One of the biggest snags has been the more or less blunt refusal to take advantage of various offers and employ a full-time secretary. The time has passed when the business of the Society can be handled in an individual's spare time, and I do think that the time has come for other means to be considered. I do commend, however, the present view that such a step cannot be undertaken until a continuity of income is found.

A move is again to be made to secure the lifting of the present ban of the flying of petrol models, and I for one hope it is successful. I am definitely of the opinion that the reasons for the imposition of the ban no longer obtain, and the resumption of such flying would be a welcome addition to our present somewhat restricted activities. A strict watch will have to be kept on the conduct of such flying, and correct time-switching, insurance cover, etc., must be compulsory. Any ideas from readers on this subject will be welcomed.

An interesting letter has been forwarded by a member of the Widnes club, the writer being Gunner P. Gillowey now serving in Italy. He says :—" *I am in Italy, and don't get much time for modelling. However, I tried my hand at designing a model, but having no large sheets of paper had to make the best of it by fixing sheets of writing paper to a large flat board ! I have also built a solid scale ' Spitfire.' Had quite a time getting materials for this, the chief difficulty being glue, but managed to get some after a lot of arm waving in one of the small town shops. I'm afraid my Italian is not so hot ! ! Then, just as it was finished, our lorry ran over it—so that was that. My only contact with the hobby is through the* AEROMODELLER, *which is sent to me regularly.*"

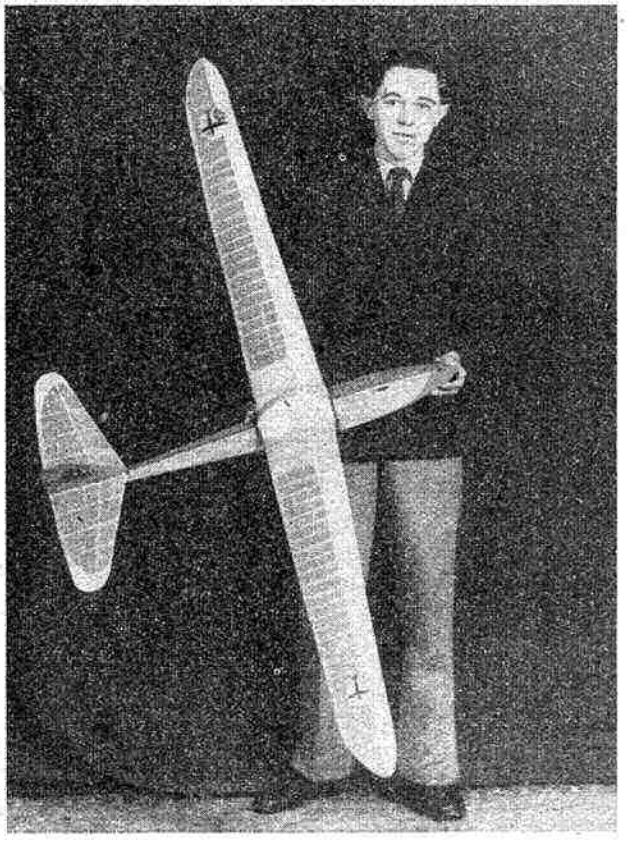
The SURBITON & D.M.F.C. have started the season well by holding two glider meetings, at which times were consistently good. Records were well and truly smashed, the previous figure of 2 : 10 held by K. Mee being beaten first by J. Cheetham with a flight of 6 : 05, and later by D. Butler, whose " Vagabond " flew o.o.s. in 17 : 15. The owner chased the model for over 30 minutes before finally recovering it.

The AYLESTONE M.F.C., after placing second in the S.M.A.E. r.t.p. contests have had to discontinue indoor flying owing to lack of rubber! Fifteen " Mick Farthing " gliders have now been built by club members, and some very good times are being logged. F. Ivory clocked 4 : 46·5 for three flights in a strong wind recently.

The TETBURY & D.M.A.C. is now affiliated to the S.M.A.E., and all members are busy preparing their models for an exhibition to be held in a local showroom

Above, the opening gathering of the Bishops Stortford and District Model Aero Club in the summer of 1943.

Below we have N. K. Cast of Dorset, proud owner of a slightly modified "K.L. Stothers Glider," built from Aeromodeller plans.



to boost membership. Club records to date are: Duration, 1 : 32 o.g.s., Gliders, 1 : 45, both records being held by R. Bristow.

Another meeting at the Clwyd Hills is planned by the MERSEYSIDE M.A.S., when the present glider record will be attacked. Anyone interested should keep the date, May 28th, on their appointment list.

The TUNBRIDGE WELLS M.A.C. is being restarted, and modellers in that area are asked to get in touch with the secretary, P. Teeman, of 27, Madeira Park, Tunbridge Wells, Kent.

Of special interest to Welsh clubs is the announcement that the " War-Time Cup " will again be organised this year by the CARDIFF M.A.C. Date is July 16th, and full particulars can be obtained from T. A. Lewis, " The Bungalow," Alps Quarry, Wenvoe, Cardiff.

The NORTHERN HEIGHTS M.F.C. have been having plenty of lectures during the winter months, recent talks being on such handy subjects as " Planking of a Model Fuselage " (J. Davall), " Airscrews " (C. A. Rippon and R. Copland) and " Doping and Covering "

Saturday, May 13th.

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at

Tewkesbury, Gloucester.

In aid of the " Salute the Soldier " campaign.

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TEN GUINEAS

as prizes.

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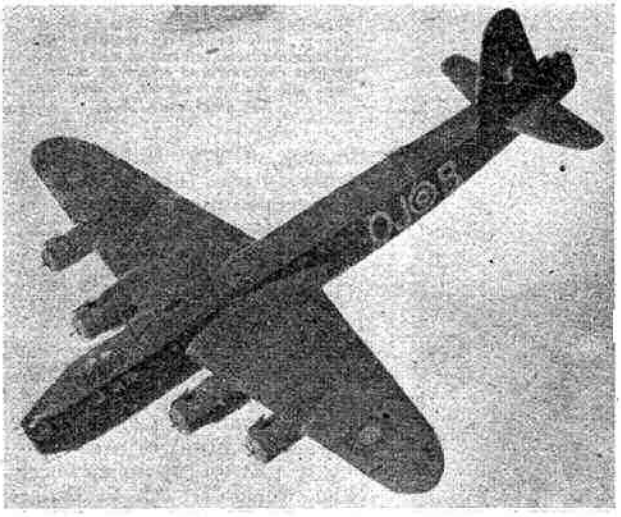
Open Glider (pulley launch).

For further particulars apply to :

S. Guy, 101, Church Street, Tewkesbury, Glos.

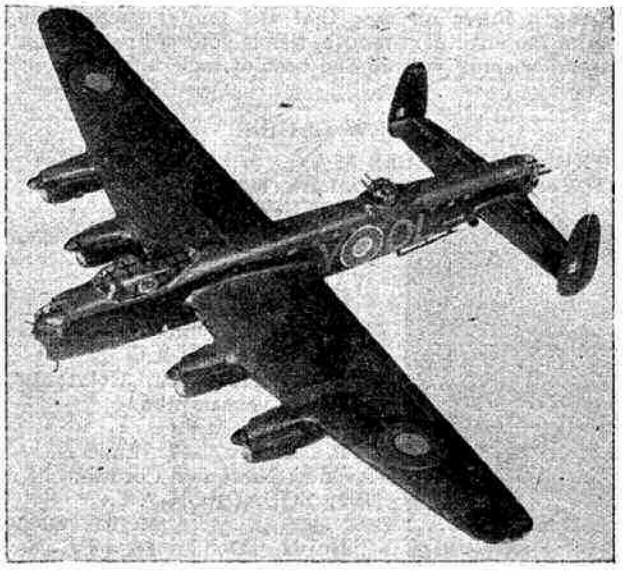


A Short Stirling by K. Wright of Edgware. He complains, quite rightly too, of the unnecessary damage the model sustained during the "Wings for Victory" exhibitions.

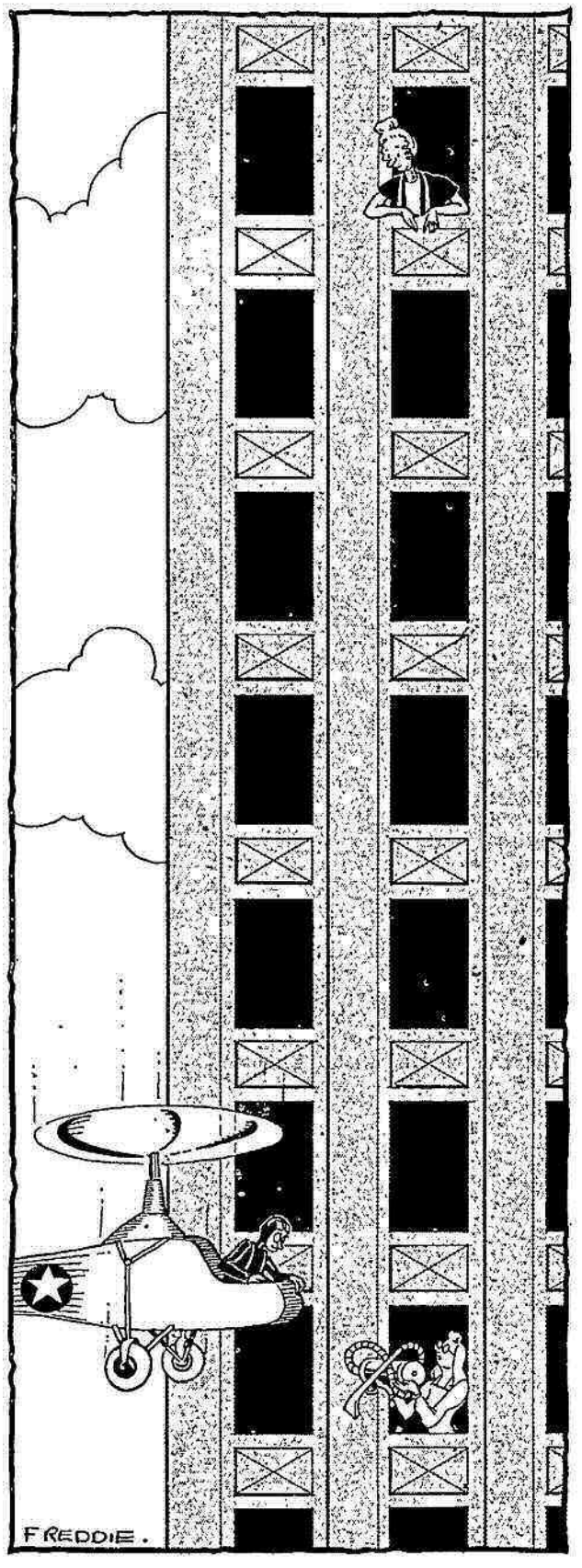
(A. G. Bell). Mr. Davall had a 54 in. fuselage for a glider, all nicely planked as an illustration of his subject, while Bob Copland carried out practical demonstrations by carving a finished airscrew. I can recommend this type of activity to other clubs—it's always better to see a practical demonstration than listen solely to talks.

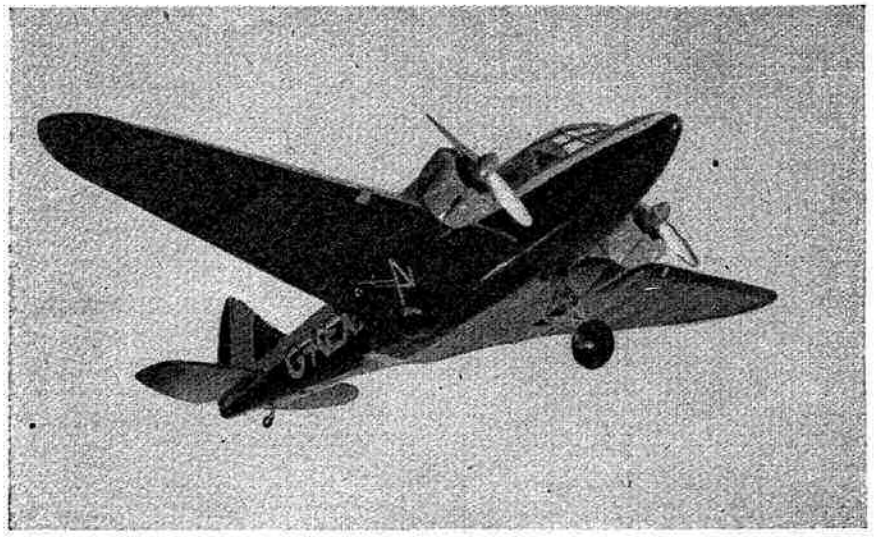
Complaints from the LEEDS M.F.C. regarding lack of membership! However, it is hoped that more enthusiasts will put in an appearance this year, and non-members are asked to go along to the Stonegate Road flying ground and swell the numbers. At present a

An excellent 1/72nd scale Avro Lancaster, built from plans in "Aircraft of the Fighting Powers," by H. Bramwell of Worcester. This model includes details such as hinged rudders, elevators, etc., movable guns and rotating gun turrets.



"WOULD YOU MIND TAKING MRS. STRATOSFAYER'S VACUUM CLEANER UP TO HER?"





A really first-class flying scale Airspeed Envoy, built to 1/12th scale by M. A. Simmons, who informs us that it was his first concentrated effort at modelling. All we can say is, "keep up the good work"!

number of models are being built, mostly fitted with folding props. and undercarts. The writer states:—"*We have not however solved the dethermaliser problem (and perhaps never shall). The amount of fruitless thought and work wasted on dethermalisers makes me wonder if it is possible to obtain six minutes continuous motion weighing less than an ounce. Unless of course an escapement is used, which is too difficult for the average modeller.*"

An individual championship has been arranged by the AGRICOLA M.A.C., points being awarded for entries in both club and S.M.A.E. contests. New gliders are putting in an appearance recently, one, a 5 ft. streamliner with planked fuselage and pylon wing mounting clocking 45 seconds on its first trip from a 75 ft. line.

D. M. Booth and R. M. Shepherd, of 100, Brookhill Street, Stapleford, Nottingham, wish to form a club in that district and want others to get in touch with them at the earliest opportunity.

A number of Home Guards in the Great Yarmouth area are desirous of either joining or forming a model aero club—if rooms and a flying field can be found! Anyone interested can communicate with W. W. Grimmin, 90, St. George's Road, Great Yarmouth.

Yet another who wishes to get a club going is A. E. Bradley, of 279, Halley Road, Manor Park, London, E.12. Prospective members will be welcomed if they call any Saturday afternoon.

And now for this month's "Agony Column"!! Mr. E. C. Thomasson, of 113, York Road, Denton, Manchester, is in "desperate" need of a compressed air engine; J. A. F. Halls, Memorial Court, Clare College, Cambridge, wishes to buy a pair of 2½ in. airwheels (who wouldn't); C. S. Drake, A/F (L) FX82714, Mess C. 2, H.M.S. "Kestrel," c/o G.P.O., London, wants to get hold of a copy of "Aircraft of the Fighting Powers," Vol. II; and R. C. D. Short, of 7, Countess Place, Penarth, Glam., wishes to purchase a complete petrol 'plane and engine in good condition.

Reader 2328050 Signalman F. Gardner, "B" Block, 45th General Hospital (U.K.), M.E.F., wishes to know if any reader has a 3–4 ft. span glider they wish to dispose of, also any old copies of "Air Trails," "Flying Aces" and "Model Airplane News." Can anyone help here?

T. A. Lewis, of "The Bungalow," Alps Quarry, Wenvoe, Cardiff, has an all balsa constructed Spencer Larsen for disposal, while H. Bradbury, of 138, Stockport Road, Mossley, Manchester, has a 7·5 c.c. Gwyn Aero engine, complete with coil, condenser and prop. for disposal, highest offer over 6 guineas.

Well, that's all for this month, and I hope to hear more news of some of the other clubs. Things should be getting a move on now that the fine (!) weather is coming, so until next month, this is your old pal signing off and wishing you all the best of luck, weather and flying.

THE CLUBMAN.

NEW CLUBS.

TUNBRIDGE WELLS M.A.C.
P. Teeman, 27, Madeira Park, Tunbridge Wells, Kent

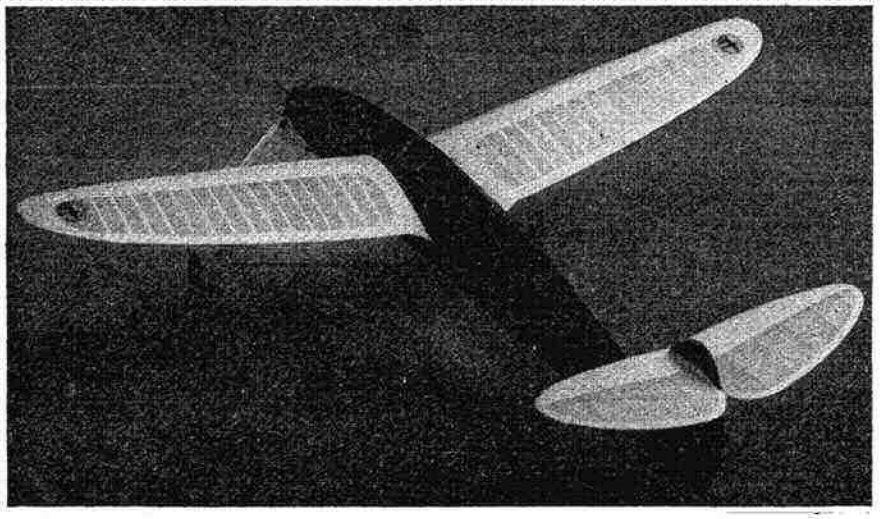
GREENFIELD M.A.C.
C. Jones, Nook Cottage, Greenfield, Oldham.

WALLASEY M.A.C.
R. E. Price, 339, Upton Road, Noctorum, Cheshire.

GOLDTHORN M.A.C.
A. A. Shore, 34, Goldthorn Hill, Wolverhampton.

NEWQUAY M.F.C.
P. Bussey, 47, Edgecombe Avenue, Newquay, Cornwall.

1929 SQUADRON A.T.C. (MORETON).
B. H. Dodd, 26, Briscoe Drive, Moreton, Wirral, Cheshire.



A "Wakefield" model by S. W. Spackman. We are informed that the airscrew folds underneath the nose so as not to disturb the airflow over the top of the lifting fuselage. Is there any point in making a streamlined fuselage to an aerofoil shape?

THE SHAPE OF WINGS TO COME

Continued from page 309.

Things had certainly progressed. My mind was beginning to accept the fact that I had skipped half a century or so, and a maze of questions were clamouring to be answered.

" And you say there's never a crack-up ? "

" I'd hardly say that—you'll always get an occasional smash, but not often."

My eyes went back to the 'planes. They were at ceiling ; almost level with the balloons. From the aerobatics they were performing you could have sworn they were the real thing, complete with pilots. Suddenly one of them went into a power dive.

" Hullo—what's wrong with that one ? "

I had a hazy impression of the crowd around us beginning to scatter. The chap at the emitter was frantically trying to bring his model out of the dive. My friend pulled suddenly at my arm—LOOK OUT !

* * * *

" He's coming round now." Ferrars was standing over me, looking anxious and guilty. " Funny, no cuts or bruises, yet he's been out for nearly twenty minutes."

Yes. I was back on the home flying field. Again the low line of hills and the long fringe of poplar trees. Thousands of people in Hyde Park watching an International Rally. The thing was nonsense, I must have been delirious. Someone shouted, " Here's the Doctor." And I got a flash of horn-rimmed specs. and a little case.

" Now, what's the trouble ? "

Well, that's it. Near as I can remember. I've tried to tell them about it, but they only smile and talk about concussion. Yes, yes. I know what I ought to have done. It's easy to say that afterwards. I ought to have gone round to the enclosure and explained that I was a chap from fifty or sixty years back, and would they please give me a little information to take back across the years—and then what would have happened ? They'd have had me certified.

What were the models like ? I'm rather hazy on that point. So many things were happening at once. Some of the 'planes were rather " Spitfirish " only more so, if you follow me. I seem to remember a pusher with the prop. blades revolving on a ring round the fuselage ; and I'm certain there were some tailless and flying wing jobs. If only I could have brought back some photographs or a programme or something. But what's the use ? They wouldn't believe me in any case.

The " mystery " Beaufighter published on page 266 *in last month's issue was built to* 1/72*nd scale by G. D. Barnes. This machine raised £*20 *for a Civil Defence Fund draw which is not surprising considering the high standard of workmanship. It was photographed by B. Holmes who also assisted in the construction.*

This photograph together with that of the " Wakefield " model on the left were taken by O. J. Lee who built this slab-sided, lifting fuselage job of conventional design. We would recommend readers to study the lighting, background and the way the model is posed as we would like to see more photographs of this standard submitted.

THE SOCIETY OF MODEL AERONAUTICAL ENGINEERS

POINTS FROM THE ANNUAL GENERAL MEETING

POINTS FROM COUNCIL MEETING, 19th MARCH, 1944.

Withdrawal of M.A.T.A. Offer.

Mr. Bell read a letter from the Model Aircraft Trade Association withdrawing their offer of £200 to the Society. In the same way Mr. Russell has withdrawn his offer of £100, which has been at the disposal of the Society for the past twelve months. These offers were made for the specific purpose of assisting in the initial expenses of a London Headquarters and a paid secretary, which projects were, as decided at the A.G.M., not possible at the present time. The Council expressed their regret that it had not been considered practicable to take up these offers, and were deeply appreciative of the spirit which had prompted them. Their real concern, however, was bound up more with the question of regular income than with capital expenditure and, during the next few months, they would consider ways and means to this desirable end.

New Affiliations.

The publicity campaign continues to bear fruit, and a regular stream of new country members are coming into the Society. It should be pointed out to these new members that they will receive Journals and News for twelve issues from their initial subscription: should they require back numbers application must be made, and where possible their needs supplied.

Another eight clubs applied for and were granted affiliation as under:—

Ayr Y.M.C.A. M.A.C.
Hatfield M.A.C.
No. 1927 (Petersfield) A.T.C. M.A.C.
No. 358 Squadron (Welling) M.A.C.
Tewkesbury M.A.C.
Warwick & District M.A.C.
Ashover M.A.C.
Pym's Lane (Crewe) M.A.C.

Competition Rules.

For the benefit of the many new clubs a handbook is to be prepared containing details of the Constitution and Competition Rules of the Society, together with illustrations of the principal trophies and information for the benefit of competitors. An initial free distribution will be made to all clubs. Additional copies will be available at a price not exceeding 1s. 0d.

Technical Publications.

It has long been felt that the Technical Secretary should compile, from time to time, technical leaflets on matters of interest to members. The first of these on "Dethermalisers" is in course of preparation, and will contain a symposium of views on the subject from all over the world, together with the unbiased criticism of an expert on the issue. Price of this publication, which will be available to members only, will be between 6d. and 1s. 0d.

Delegate Meeting.

The next Delegate Meeting, scheduled for early in May will take place at Leicester. This venue has been chosen after careful consideration as offering reasonable travel facilities from all parts. From the experience gained it will be possible to extend the field at the next meeting: already an invitation has been received from Birmingham club to meet there.

In order to make the meeting as all embracing as possible, it has been decided to invite members of the Council to give a short talk on some matter of interest, following the business of the Delegate Meeting. Clubs will be notified in good time of the address, date and time of the meeting, together with details of train service.

Area Scheme.

Friends in the Provinces are going ahead with the development of Area Schemes as suggested in the News. Northern Clubs have got together and are holding an inaugural meeting in May, while Midlanders are also developing contacts and will soon be under way. As soon as schemes have consolidated, they will be invited to send special Area Delegates to meetings, in addition to normal Club Delegates.

Goodbye Mr. Rippon.

A letter was read by Mr. Bell, which announced the resignation of Mr. C. A. Rippon from the Council, who wrote saying that he no longer felt that he could see eye to eye with the Society. The Council expressed their regret, and in accepting his resignation instructed the Secretary to write thanking him for his past services and reminding him that, should he have a change of heart, there was an ever ready welcome for him.

As the next on the list of candidates, as voted at the A.G.M., Mrs. Buckeridge will be invited to join the Council.

MERSEYSIDE OUTING.

Merseyside M.A.C. are holding a Hand-launch Glider Meeting on Whit-Monday, at Clwyd Hills, between Molo and Ruthven, Denbighshire. Last season several successful meetings were held here, and all modellers in that district are cordially invited.

BLACKPOOL INVITATION.

Blackpool and Fylde M.A.C. are staging a series of competitions for holiday visitors, and making a special drive to welcome them. It is hoped to have a special "Visitors Cup" for competition. All intending visitors should write to Mr. H. V. Bentley, 8, Compton Avenue, Hawes Side Lane, Blackpool, for details.

S.M.A.E. CONTESTS.

All contests during the 1944 season will be governed by the following emergency rules unless otherwise stated. All contests will be held on the recognised grounds of affiliated clubs. These clubs should co-operate and endeavour to arrange for contests to be held on the most suitable ground within their areas. All clubs are requested to encourage visitors from other affiliated clubs.

Affiliated clubs shall provide their members with subscription cards or other evidence of having paid their subs., and these shall be presented to the officials in charge of a decentralised event.

Contests must be held on the dates arranged, unless a change is authorised by the S.M.A.E. Council. Results must be forwarded to the Hon. Comp. Sec., giving fullest possible details, including weather conditions, and must arrive not later than FIRST POST THURSDAY MORNING following a contest, together with the entry fees. Official result sheets should be used if available and entries made thereon in ink or indelible pencil. They must be certified correct by two club officials. Entry fees (except where otherwise stated): Affiliated club members, 1s. 0d.; Juniors (up to, but not including, their sixteenth birthday), 3d.

No competition flight will be recognised by the Society unless officially observed by two officially appointed timekeepers. Timekeepers must be senior members whose names have been lodged with the Society. The S.M.A.E. should be notified of any change during the season. No trial flights may be made during the five minutes preceding the time appointed for the contest to start, or during contests. Minor repairs and test flights will, however, be allowed during the contest at the discretion of the judges. Individual flights (R.O.G. or R.O.W.) of five seconds or under not to count as contest flights: but only three such attempts shall be allowed. Each contestant must be ready within two minutes from the time he is called. If not then ready he renders himself liable to disqualification from that round. When flights have been obtained, the duration will be taken from the time the model is released (at the commencement of each flight).

Rubber driven models must take off R.O.G. without any push or assistance whatever, although the entrant may steady the machine by holding one tip of the propeller and one wing tip only.

The timing of any flight shall terminate when the machine touches some solid object, passes out of sight (although it may subsequently be seen), or up to the time some part of the aircraft may drop off.

Two timekeepers must be employed, but only one stop-watch is necessary. Where two are available the mean value of the two readings should be taken as the correct figure, the timekeepers remaining at the point from which the machine is released. Where no stop-watch is available an ordinary watch can be used with a seconds hand, but five seconds must be deducted from the observed time. Competitors are not allowed to time their own models.

When three flights are necessary the judges will, at their discretion, fix a time limit by which each flight must be made.

Full rules, together with Pluggo points system, will be in an early *Journal*. A special booklet on Comps., Trophies and Constitution in preparation.

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