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EDITORIAL

IN our March issue we announced particulars of a "Wings for Victory" competition for the best flight by a replica of Mr. C. Rupert Moore's "Jackdaw II," built from Aero Modeller Plans Service plans. The large number of orders received for copies of the plan indicated a wide interest in the competition, and, at the request of a number of entrants, who have had limited time in which to build up and fly their models, we are extending the closing date from July 31st last, as first announced, to September 30th. This will give those whose holidays are taken in August and September the opportunity of putting the finishing touches to their models and a better choice of weather conditions for their timed flights.

The full rules for this competition were published in our March issue. Six prizes were offered of 10, 7, 5, 3 and 1 National Savings Certificates.

We repeat the closing date—September 30th next.

Agony Column.

From an ex-R.A.F. reader on the South Coast we have recently received a letter, part of which reads as follows:—

"I was approached to enter some models at the local Holidays at Home and Hobbies Exhibition, as there was no flying club or any other modellists around here willing to exhibit any models. I offered the only four models I have at present, namely, (a) a 20-in. span flying scale 'Spitfire'; (b) a 30-in. scale Blenheim; (c) a tricycle undercart push model of my own design; (d) a 5-ft. 0-in. span 'Quaker Flash' petrol-plane, complete with engine.

The Exhibition finished yesterday, and, after completing a 12-hour spell at a factory 4 miles from my home, I went to collect my models, and found only the pieces! Even the holding-down screws from the cylinder head of the motor, also the coil and condenser had gone!! Two small boys were busily throwing my pusher model between each other. The only person 'in charge' to look after the exhibits was a lad of 12, who had taken the ticket money!"

Now, presumably this Holidays at Home and Hobbies Exhibition was organised under the auspices of some local organisation, and if so it does seem a shame that a craftsman willing enough to lend his models for display should have them mishandled in such an unreasonable manner.

Unfortunately, this is not an isolated case. During the past few months we have received a number of complaints from various parts of the country from aero modellers who had loaned their models for "Wings for Victory" competitions and had them returned in a quite "unflyable" condition.

It might be argued that exhibition organisers, not being aero modellers, do not understand the models put into their charge, or realise the many hours involved in their construction. In our opinion that does not relieve them of the responsibility of looking after another person's property. An important principle is involved, and we deprecate any outlook which seems so lacking in responsibility as not to take precautions so as to enable the return to its owner of a model in the same pristine condition in which undoubtedly it was loaned for purposes of exhibition. Our advice to owners of valuable models is that they should, before loaning them, obtain in writing from a responsible organising official an acknowledgment that proper care will be taken of any model loaned. In fact, it would not be at all a bad idea to obtain in advance a deposit returnable in full *only* if the model is returned in good condition!

The "Moore" Drive.

We have received a number of enquiries from readers asking whether it is permissible for them to manufacture for their own use units of the "Moore" drive, in view of its having been patented. The answer is in the affirmative. What it is not permissible to do, when an article is patented, is to manufacture it in quantity for sale, except under licence from the patentee. Thus, any aero modeller may build up a unit for his own personal use without getting into trouble.

CONTENTS OF THIS ISSUE

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MODEL RECOVERY SERVICE

REGISTERED OFFICE
AUCHENGARGLE. N.B.

MANAGING DIRECTOR. H.B. McGILLICUDDY

HON. SEC. and TRES.
R. (MUGSI) JAMIESON

Dear Aeromodeller,

The highspot of our hobby is a fine sunny day, a well trimmed model and a good flying field.

But no pleasure is perfect, there is always a wrinkle in the tissue, a warp in the tail or a knot in the rubber. How often have we balsa butchers suffered the galling and humiliating experience of watching our model - proud product of our hands and minds - soar gaily into the sky on a thermal, to be carried far beyond hope of recovery. How often have we torn across country in a vain pursuit? How often suffered hairbreadth escapes from angry bulls, the cursings of furious farmers, and the threats of gamekeepers? Who has not endured the scratching of thorn hedges, the mud of streams and the panting sweat of steep hills - all to field that wayward model? Then, after the chase has carried us into the next county - Triumph! We recover the plane and start the weary trek back to the flying field, only to find that the sun is sinking in the west, the competition is all over, and the only persons on the field are a crowd of small boys, waging, as is their custom, the usual furious battle of the pieces of broken tails and wings, the scraps of tissue and rubber that mark the scene of the days flying.

This need happen no longer. Let MODEL RECOVERY SERVICE take this weight from your mind. Insist that your club secretary engage us for your next meeting, gala day or rally. The only apparatus required (which we supply free of charge) is a small loop of reed cane, which is fixed to your model at the C.G, by rubber bands. Its weight is negligible. Then leave the rest to us. Should your model get into a thermal the ready signal is gonged, immediately your model is on the point of passing O.O.S., one of our flock of specially trained Retriever Gulls is released, in a few moments your model is returned safely.

The organizing Club pays a modest cover fee, for our attendance at the flying field.. There is a small individual charge for each model recovered.

Send for further details to our Head Office. Invite us to your next gala day. No more lost models or regrets, we look after that. And Remember!

Look for the Van with the SIGN OF THE SEAGULL.

Yours fraternally,
For M. R. S. Ltd.
H.B.McGillicuddy
(H.B.McGillicuddy)

THE above circular was sent to all Northern and Scottish clubs. To say that it caused a sensation was to put it mildly. Official news of unlimited supplies of balsa and rubber at pre-war prices could scarcely have been more joyfully acclaimed. Everywhere this latest manifestation of the Maestro's genius was greeted with cheers and hailed as a real advance. Practically the only dissentient note was the remark of a certain Mr. R. H. Borring, "There's a catch in it somewhere, that old crock's got something up his sleeve; he's as twisted as a pre-wound motor."

* * * *

Meanwhile at Auchengargle, McGillicuddy was addressing a meeting of the directors.

"Lads," said the Maestro, "there's a fortune in it. Every aero-modeller is a potential customer. I can visualise the day when, *springing from this head office*, branches of M.R.S. Ltd. will be opened all over the country, when every rubber stretcher will bless our name and when our vans bearing the sign of the seagull will be greeted with cheers on every flying field." (Loud and prolonged applause.)

"But, mind you," the Maestro continued, "the preparatory work that had to be done before this great enterprise could be successfully launched has not been easy. There were times, indeed, when we almost despaired. But patience and kindness triumphed over all difficulties. Once Drambuie understood that every time he brought back a model he was rewarded with a sardine—the rest was easy."

Here one of the directors asked where the flock of trained retriever gulls were if we only had Drambuie, and what would happen if we were asked to provide our services at two different meetings on the same day.

(A voice, " hear, hear.")

The Maestro's reply was straight to the point.

" Never patch your fuselage before the motor breaks," he told his critic severely. " Small beginnings, but we shall, I am confident, expand rapidly. Immediately it is necessary, Drambuie will be placed in charge of squadrons of young gulls, to train them in our methods. Tact, kindness and sardines will do the rest."

" And finally," the Maestro concluded, " to-day I have received a request that M.R.S. Ltd. attend the flying field of Muckle Mire M.A.C. on the occasion of their inter-club match with our old rivals, the Teuchle Toorie Club. I have already accepted, and therefore, gentlemen, on Sunday first, M.R.S. will have their first try-out. I have no fear or doubts in my mind as to the result. So let our slogan be :—

" Put on full-turns and let her rise,
A record ! You'll achieve it.
Don't worry where your model flies,
Let M.R.S. retrieve it."

A unanimous vote of confidence was passed, and the meeting was closed amid scenes of tremendous enthusiasm.

* * * *

The day broke wet, but a hot sun soon came through to dry up the ground and give promise of a good crop of " risers." The Maestro was optimistic. " A good day for trade," he remarked happily, as the M.R.S. van (loaned for the day by special arrangement with R. McSwindle & Son, Wine and Spirit Merchants) drove on to the flying field of the Muckle Mire M.A.C. When the news leaked out that McGillicuddy himself was present, all competitors and officials gathered round and called for a speech. Nothing loth, the Maestro mounted the top of the van and delivered a short address.

" Well, lads," said the Maestro, " we are not here to-day to take part in your competitions, so you have a much better chance of winning." (Cries of " Oh, yeah " and " Izzat so?") " We are here," he continued, " to give you all the assistance in our power. M.R.S. is the aero-modeller's fairy godmother. What good is the sportsman on the moor without his gun-dog ? What good is the fisherman without his landing net ? Or a cricket team without good fielders ? What good is an aero-modeller without M.R.S. ? Go to it, lads—good flying—and remember !

Don't worry should the thermal ketchit,
Just ring—and let Drambuie fetchit."

This was greeted with cheers. The Teuchle Toorieites shouted their battle cry of " Tops for Teuchle Toorie," the Muckle Mire men replied with " Yumph for Muckle Mire," the wind sock was hoisted and the field was declared open.

Most of those present queued up at the van to have their models fitted with the necessary apparatus. While this was proceeding, the Muckle Mire secretary advanced and greeted the Maestro. They were old friends, their meeting was on most cordial terms, and they remained for some time in close and earnest confabulation.

The waiting period was short. In the first round of the general duration one of the Muckle Mire models—a replica of the famous " Cutty Sark "—hooked a " riser." The ready signal was gonged and at the right moment Drambuie was released. He shot off like a Spitfire in pursuit, climbing in steep spirals, he reached the now fast disappearing model, gripped the loop in his beak, and turned back to the flying field, guiding the model safely down, and only releasing it some twenty feet from the ground, where it landed gently, practically at its owner's feet.

This fine display aroused a storm of applause, even the cynical were enthusiastic and generous in their praise. Drambuie immediately returned to the van, where he was rewarded with a sardine, of which he stood greatly in need, having been kept fasting for the previous twelve hours in order, as the Maestro put it, " to keep him frisky."

This set the ball rolling. Several other models were fielded with equal success before the main event of the day began, the inter-club match between Muckle Mire and Teuchle Toorie. Here, alas ! the first snag was encountered.

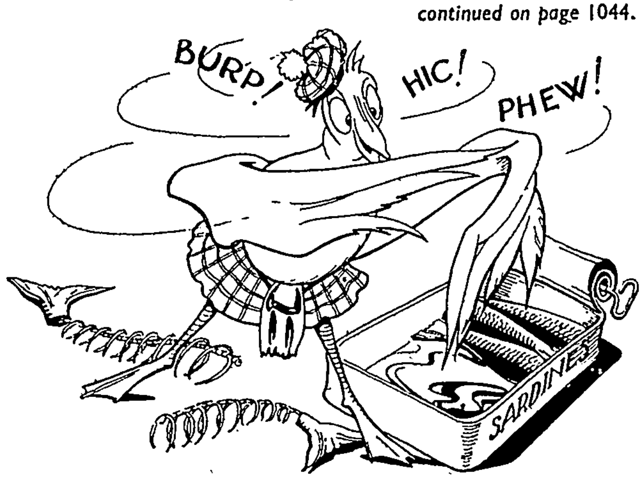
Several models required fielding during the first half-hour, and just before the interval a deputation of the Teuchle Toorie Club approached the van flying a protest flag. They alleged that M.R.S. was guilty of bias against their club. That we had recovered their models long before they were in danger of passing O.O.S., thus shortening their times, while on the other hand, Muckle Mire models were allowed every advantage, and Drambuie had, on one occasion, flown above a Muckle Mire model because it had turned back toward the field and had convoyed and escorted same before guiding it down, thus lengthening its time by one and a half minutes, all this to the detriment of the Teuchle Toorie Club.

McGillicuddy indignantly repudiated these insinuations, M.R.S. were quite impartial, he assured the deputation ; and any competitor who did not want to make use of our service was quite at liberty to refrain from doing so. The deputation then withdrew, two of its more belligerent members were seen to mount their cycles and pedal off in the direction of Teuchle Toorie.

From then on thermals seemed absent, Drambuie's services were not required, so he sat in a corner of the van and sulked because no more sardines were being dished out.

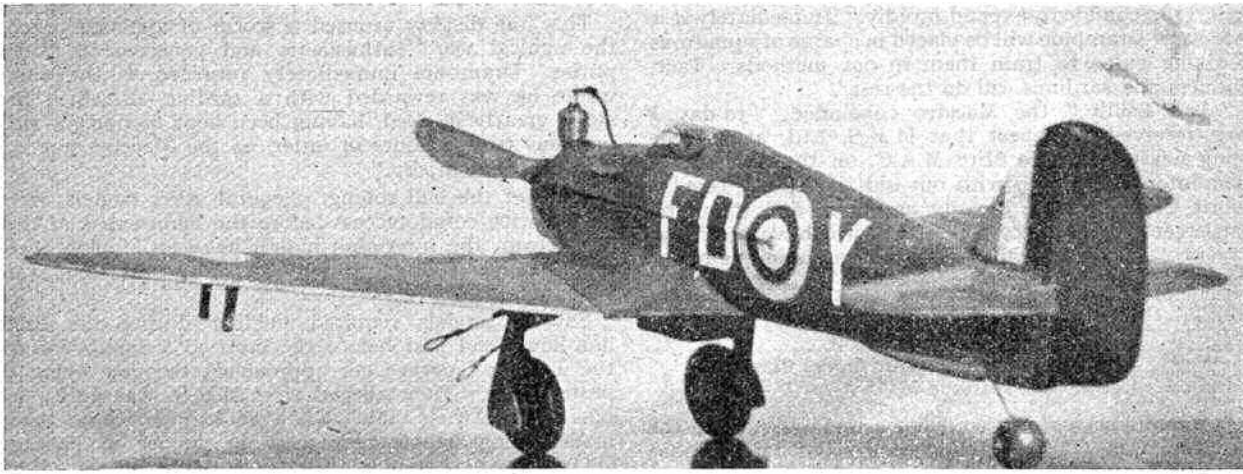
During the lunch interval an argument started amongst the competitors on some obscure point of aerodynamics and, while the battle was still in its earliest stages, two of the Teuchle Toorie boys approached the Maestro and asked him to come and give his views on the point in question and let the assembly have the benefit of his opinion. McGillicuddy was delighted. The Teuchle Toorie boys were holding out the olive

continued on page 1044.



CONTROL LINE FLYING MODELS

By R · C · JUDE



Above is the Author's ¾ inch to the foot Hawker Hurricane. Note the control line spreader, attachment points for control lines and off-set rudder. The engine is an American "Super Atom" 1/10 h.p. ½ inch bore and stroke. The airscrew is 8 ins. in diameter.

SOME time ago I was sent to the United States of America on War duties, and for two years I moved about to different parts of that country. Now, as a keen model airplane enthusiast, I took every available opportunity to study the why's and wherefore's of the American movement, only to find that with their free flying models they had nothing on us except perhaps a little more balsa wood, and not so much of that. But they did have a new form of model petrol-engined airplane flying that I found most interesting and which I believe will interest many enthusiasts in this country. It is known as "Control Line Flying." In this article I will try to give you some idea of the principles of operation and later some designs and suggestions for the construction of suitable models.

If you look at diagram No. 1 you will see the principles of a typical layout. The model, which is controlled by yourself at all times during flight, operates in a manner very similar to that of a full size aeroplane. It flies around you in a circle, which is in most cases about one hundred feet in diameter. You hold the control lever, from which two strong but thin fishing lines run. These connect the pilot to the control unit, which is located inside the model airplane. As you will see from the diagram, when the top of the control lever is moved backwards the elevators move up, or in other words, it would cause the model if it were running along the ground to take-off, or climb if it were already in the air. If you move the top of the control lever forward then the model would dive. I will warn you now that the controls are quite fierce and until you are well used to your model great care should be taken to make all control moves as slight as possible.

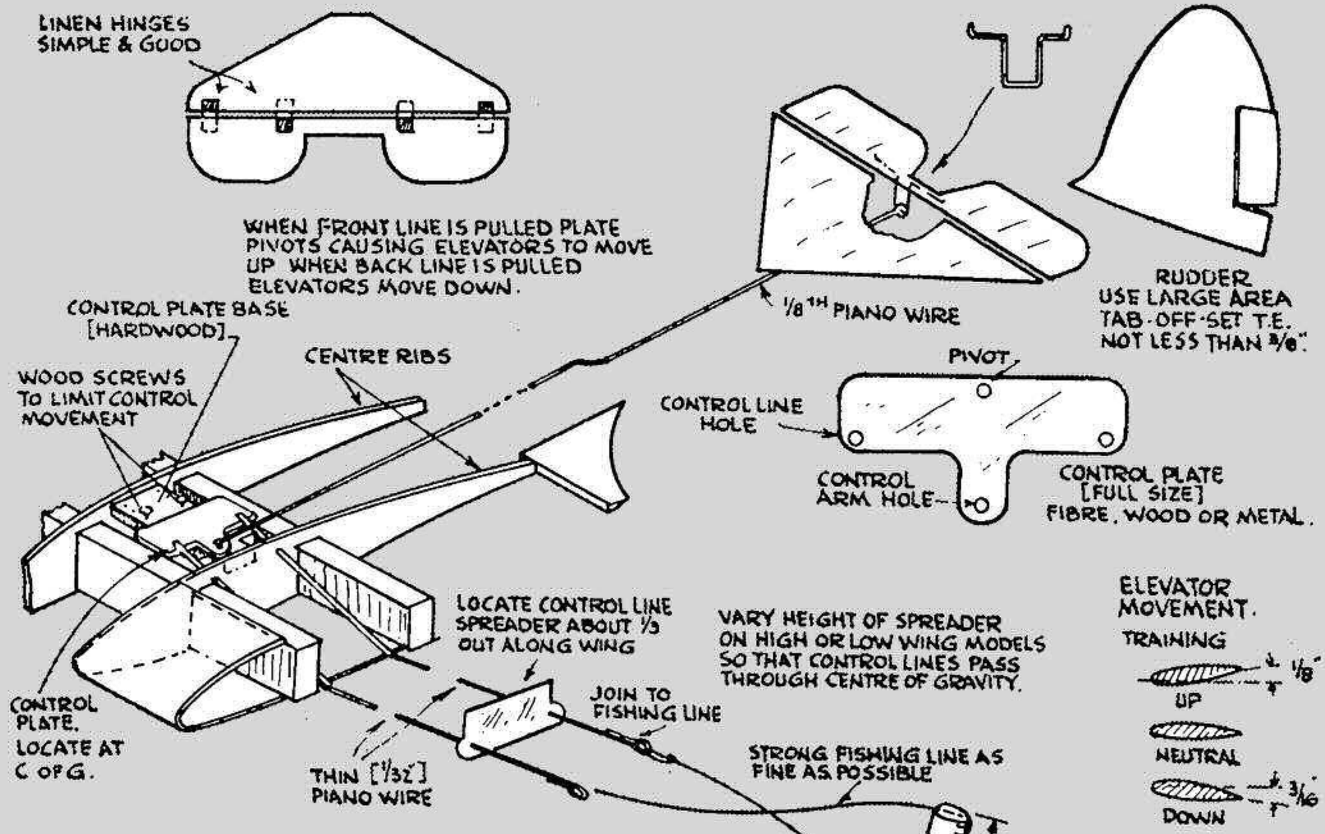
The models that are built in the United States range from the usual freaks to very fine scale jobs. Whilst over there I built two Control Line models, the first was a scale of the "Gee Bee" racer. It was only 18 in. span and was powered by a 1/10 h.p. Super Atom engine. This little model weighed nearly two pounds, yet would take-off after a run of some ten feet. It had a speed of more than forty-five miles per hour. The main construction was of balsa, yet almost any other type of wood could have been used. The second model (a photograph of which is shown with this article) was a 3/4 in. to the foot scale of the "Hawker Hurricane." This model is a very good flyer, and is much faster than the "Gee Bee." It has a span of some thirty inches and is just about ideal in size for a good fast Control Line model. It has been flown with a 1/10 h.p. engine and with a 1/5 h.p. The only difference was the top speed of the model, by which you will see that the size of the engine does not make a great deal of difference to the performance. I will add as a matter of interest that speeds of over one hundred miles per hour have been officially recorded. These were done with racing freaks of course. If you construct a model do not try to keep the weight of the model too low, for centrifugal force has quite a lot to do with this form of flying.

If you wish to try out Control Line flying with your present petrol model, then study diagram No. 2. This shows the necessary modifications for converting a free flight model. When you have carried out the alteration be sure to apply sufficient rudder to keep the model turning against the circle; trial and error will tell just how much rudder offset you will need. I would suggest that the model be made to fly in a clockwise direction, the torque of the engine then also helps to keep the model taut at the end of the control lines. Do not forget you can fly just as well indoors as out, in fact, it is better to start off indoors until you become well used to this method of flying.

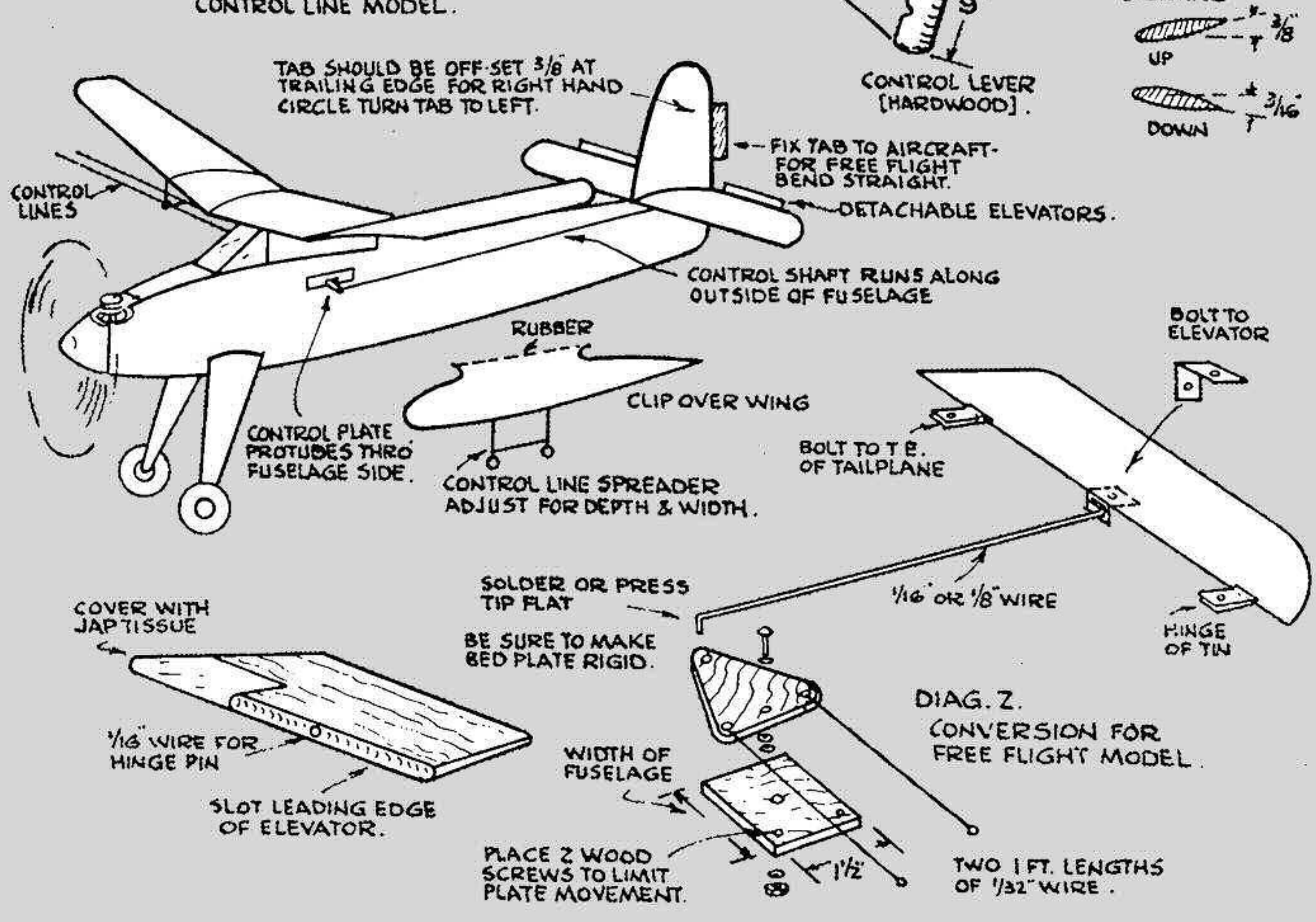
And now a few flight instructions. Understand these thoroughly before you attempt to make a flight.

Prior to starting the engine lay out the control lines on the ground. Have a good trusty friend with you to hold the model once the engine is running and to release the model on a given signal. Be sure to simply release the airplane and not to push it, as it may swerve towards the pilot. Move the top of the control lever forward so that the elevators will cause the model to run along the

Continued on page 1045.



DIAG. 1. TYPICAL LAYOUT FOR LOW-WING CONTROL LINE MODEL.



DIAG. 2. CONVERSION FOR FREE FLIGHT MODEL.

FINDING the CORRECT FIN AREA of a GLIDER

By BRIAN CRAWFORD

FINDING the correct fin area of a model glider seems to depend on experience more than on any exact formula. Some method of calculating the required area without laborious experimenting should be welcomed by the aeromodeller. Accordingly it was decided to study the relation of the centre of side pressure (CSP) to the centre of gravity (CG) of a number of well-known gliders.

Reasonably large cardboard outlines, about one-third full size, of the elevations of the Elmira I, Condor, Aeolus I, Temples Tribute, Ivory Gull II and Stothers were made. The elevation included the projected side area of the dehedraled wings.

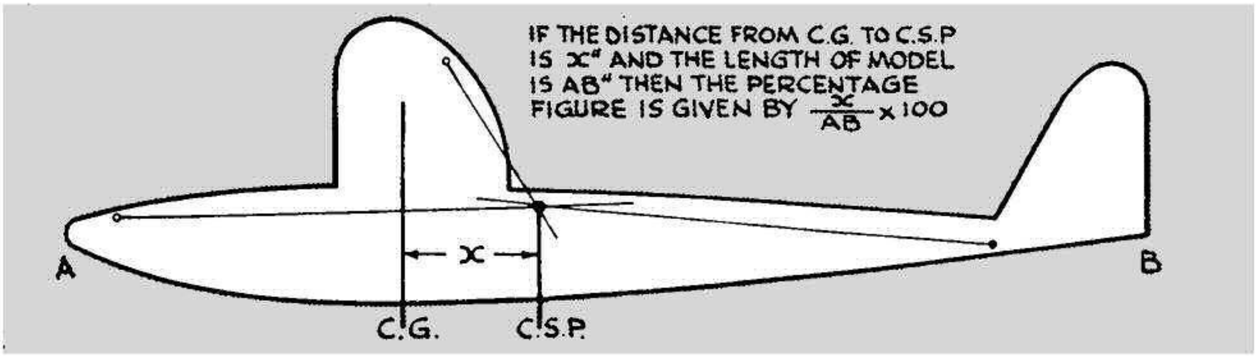
The CG of each of these was found by the suspension method giving their CSP. That the CG corresponds with the CSP is shown in a very forceful manner if a pin, with a piece of thread and a weight attached, is pushed through the CG and the model allowed to fall releasing it in a horizontal plane in which it continues; if the pin is pushed through any other point the model will not remain horizontal.

To obtain a result which could be applied to any glider it was decided to measure the distance of the CG from the CSP as a percentage of the total length of plans which have been given from time to time in THE AERO MODELLER. This system worked well for the Tribute and Ivory Gull II but the other plans had no CG marked. The Aeolus I, Stothers and Elmira I have non-lifting tails at 0° and the CP of wing for their incidence works out at about 40 per cent. of the chord, so this point was taken as the CG, but for the latter two it is suspected to be further forward, due to the downwash of the wing affecting the tail. The Condor was a problem but, all points considered, 40 per cent. of the wing chord was again taken as CG position.

The results are as follows (the CG to CSP distances are expressed as percentages of the total length of the model) :—

Elmira I ..	.. 22	Tribute ..	.. 17
Condor ..	.. 18	Ivory Gull II	.. 19
Aeolus I ..	.. 15	Stothers ..	.. 16

The percentages of these models vary a little but not a great deal, so when you are designing your next glider if you draw the elevation out on cardboard with an oversize fin and cut it down until the CSP is, say, 18 per cent. of the total length behind the CG, you will have the correct fin area.



continued from page 1041

branch and the Maestro is always at his happiest when holding the jackets in an argument. He left his post at the van and joined the meeting. Soon the well-known voice was booming away.

When flying was resumed thermals were still scarce, for the first half-hour or so the gong remained silent and the M.R.S. organisers merely stood by. The Maestro, confident in Drambuie's ability to work without coaxing, had deserted his post at the van, and was standing by the take-off board. Then suddenly, the Muckle Mire secretary's model got into a thermal. The gong was rung, no response! Again the ready signal boomed over the field, still no response. At the third stroke the Maestro realised something was wrong and hurried over to the van, but before he reached it, however, Drambuie ambled out, the bird blinked once or twice, hiccoughed loudly and then broke into a little staggering run, flapping his wings in a futile attempt to take off. But it was useless and he climbed back into the van with an effort and immediately went to sleep.

The Maestro raced toward the van. Was Drambuie ill? Swift as the Maestro was, the Muckle Mire secretary arrived at the same time, with the whole gathering close at his back. The secretary's face was livid with rage, he shook his fist at the Maestro. "You auld twister," he shouted, "so this is how you fix things so's we'll win. My model's lost. How can we win now?"

There were tears of rage in the Maestro's eyes as he silently mounted to the recumbent Drambuie. Nearby was a large empty sardine tin. This bore the address of a firm in Teuchle Toorie. So that was why they had decoyed the Maestro from his post to take part in the argument. Thus they avenged their defeat at Ben McSplurge. Drambuie was not ill, merely surfeited with sardines.

The crowd became threatening on this disclosure of the Maestro's duplicity. There were angry shouts of "Screw that blank seagull's neck," "Throw the old twister in the horse pond," "Chuck him off the field," "Report him to Lord Woolton," etc., etc.

Our departure could hardly be called an orderly retreat to prepared positions. It was more like a Rommel rout. The Maestro suffered no bodily injury—but his dignity was badly dented.

M.R.S. has gone into voluntary liquidation.

Control Line Flying—continued from page 1042

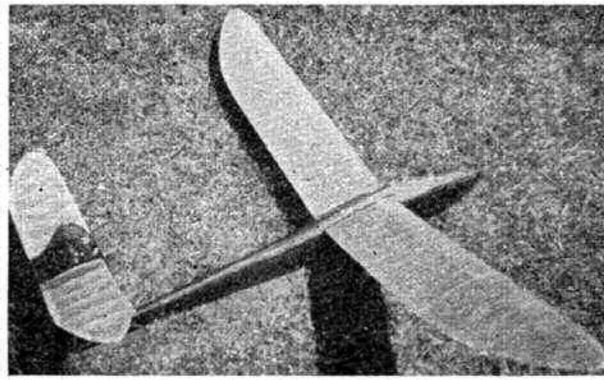
ground until sufficient speed has been reached for the take-off. As you gently ease back on the control lever the model will leave the ground and start to climb. Do not climb too sharply or else the little craft will stall. There is one point to remember and that is to make the take-off down wind. Until you are well used to flying the model it is best to make any alterations of height down wind, this being done because both down wind and across wind (with wind on pilot's back) the model will have plenty of speed and will be taut on the control cables. On the first flight be content to keep the model straight and at an altitude of some ten feet; you will find this hard enough for a start. When the engine stops hold the controls in the neutral position, as the model loses speed it will gradually descend to the ground. After a few landings like this you can start to make three point touch-downs. Do not be too hasty. If you take things easy at first you will find that your model will last for many hundreds of flights with little or no damage. If you should find that the control lines are getting slack, then take a pace backwards to counteract the resultant loss of control.

And now for a loop. When you are certain that you are fully able to handle your model, by that I mean when the machine gets into a difficult spot you are able to keep control and bring the roaring projectile back to its allotted course, then and only then you should be able to make your model carry out a loop, or if it is fitted with a special fuel tank to fly inverted. But let us deal with the former. Firstly, because of the great pressure or force that is put on the airplane, when it loops it is necessary to enrich the mixture until the unit is on the point of four stroking. This is done because the force referred to above pushes the petrol down into the tank and causes the engine to receive a very weak mixture which will in most cases bring the works to a stop, or at its very best cause a most serious loss of revs. You will see then that the very rich mixture is automatically leaned off just at the point of the loop where you require good even running from your engine. Start the loop with the wind on your back and the airplane high in the air. Ease the control lever back until the model is vertical in the air, then move the lever back very sharply and step back one pace to keep the control lines taut. Once the model is over the top of the loop move the control lever back to the neutral position so that the airplane continues on a level course.

Now just a few points about a suitable flying ground. If you are lucky enough to have an indoor site then your only worry will be the height clearance. But do not forget to have several windows open so that the exhaust fumes can clear away. For an outdoor site it is best to be able to use a close-cut lawn or some other flat surface. I have on several occasions used lengths of old linoleum for take-offs. Try also to find a well-sheltered spot, then you will have a higher average of flying days. And lastly, steer clear of windy days until you have found out what it is all about.

Lastly, why not try this type of control on a rubber driven model? It should give the high speed enthusiasts a chance to fly models with very high wing loading in comparative safety.

GANYMEDE MK. 3



By A · & F · YOUNG

THE fuselage is immensely strong and the construction is not difficult. The $\frac{1}{8}$ in. medium balsa formers are threaded on to the $\frac{1}{2}$ in. square balsa main member and cemented in their correct positions. These are followed by the wing root tongues and strengthening blocks. The fin and elevator stub assembly is now made and fitted into the main boom. The small under fin is cemented to the underside of the boom. The fuselage is covered with medium balsa sheet in approximately four pieces comprising top, bottom and sides steamed to shape. The fin is covered up to the tailplane stubs with 1/32 in. balsa sheet. If this is not done the tailplane will develop flutter. The fin should be "filleted" to the fuselage covering with 1/32 in. sheet or very soft block. Wing root fillets are done in the same manner.

The nose block is made in two halves which are cemented together leaving a space for the balancing weight. It is then cemented to the front former, and sanded to contour.

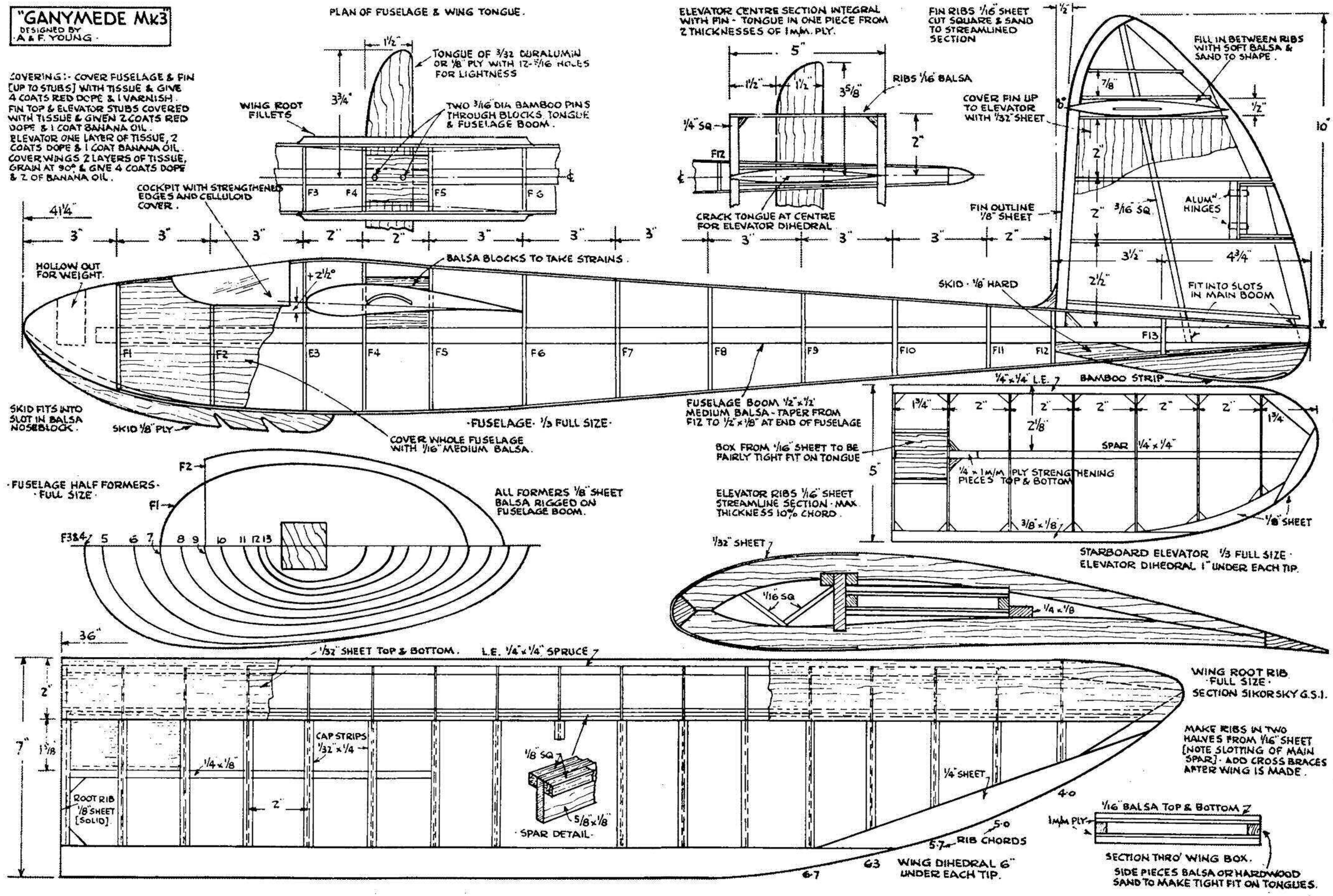
The skid, cut from $\frac{1}{8}$ in. three-ply, is cemented to a slot in the nose block and to the bottom of the fuselage. The cockpit is cut out and strengthened internally, finally being covered with celluloid.

Cover the fuselage (up to the stubs) with tissue and give four coats of red dope and one coat of varnish. The fin top and tailplane stubs are covered with tissue and given two coats of red dope and one coat of varnish.

The tailplane outer sections are of orthodox design except for the knock-off fixing. (It was found by experience that if a wing was knocked off the tailplane generally hit the ground so it was decided to allow for this.) Cover with one layer of tissue and give two coats of dope and one of banana oil.

The wing ribs are cut in two halves as shown on the plan and the cross braces added. This method keeps the wing light and also conserves balsa. The main spar is $\frac{1}{8}$ in. by $\frac{5}{8}$ in. hard balsa formed to T-section with two strips of square $\frac{1}{8}$ in. balsa. The leading edge is covered with 1/32 in. sheet balsa and the ribs are capped with 1/32 in. by $\frac{1}{4}$ in. balsa. The wing tongue boxes are built up from 1 mm. three-ply backed with balsa and well cemented. The box is then cemented to the main spar, ribs, and auxiliary spar and strengthened with $\frac{1}{8}$ in. square strips.

The covering is two layers of tissue having the grain at 90 degrees, and given two–four coats of dope and two of banana oil. A plan of this model is to be fonnd overleaf.



"GANYMEDE Mk3"
DESIGNED BY A & F. YOUNG
COVERING:- COVER FUSELAGE & FIN [UP TO STUBS] WITH TISSUE & GIVE 4 COATS RED DOPE & 1 VARNISH. FIN TOP & ELEVATOR STUBS COVERED WITH TISSUE & GIVEN 2 COATS RED DOPE & 1 COAT BANANA OIL. ELEVATOR ONE LAYER OF TISSUE, 2 COATS DOPE & 1 COAT BANANA OIL. COVER WINGS 2 LAYERS OF TISSUE, GRAIN AT 90° & GIVE 4 COATS DOPE & 2 OF BANANA OIL.
PLAN OF FUSELAGE & WING TONGUE.
TONGUE OF 3/32 DURALUMIN OR 1/8" PLY WITH 12-5/16 HOLES FOR LIGHTNESS
WING ROOT FILLETS
TWO 3/16 DIA BAMBOO PINS THROUGH BLOCKS, TONGUE & FUSELAGE BOOM.
ELEVATOR CENTRE SECTION INTEGRAL WITH FIN - TONGUE IN ONE PIECE FROM 2 THICKNESSES OF 1 M/M. PLY.
RIBS 1/16 BALSA
CRACK TONGUE AT CENTRE FOR ELEVATOR DIHEDRAL
FIN RIBS 1/16 SHEET CUT SQUARE & SAND TO STREAMLINED SECTION
FILL IN BETWEEN RIBS WITH SOFT BALSA & SAND TO SHAPE.
COVER FIN UP TO ELEVATOR WITH 1/32" SHEET
FIN OUTLINE 1/8" SHEET
ALUM^N HINGES
COCKPIT WITH STRENGTHENED EDGES AND CELLULOID COVER.
HOLLOW OUT FOR WEIGHT.
BALSA BLOCKS TO TAKE STRAINS.
SKID · 1/8" HARD
FIT INTO SLOTS IN MAIN BOOM
SKID FITS INTO SLOT IN BALSA NOSEBLOCK.
SKID 1/8" PLY
·FUSELAGE· 1/3 FULL SIZE·
COVER WHOLE FUSELAGE WITH 1/16" MEDIUM BALSA.
FUSELAGE BOOM 1/2"x1/2" MEDIUM BALSA - TAPER FROM F12 TO 1/2"x1/8" AT END OF FUSELAGE
BAMBOO STRIP
1/4"x1/4" L.E.
BOX FROM 1/16" SHEET TO BE FAIRLY TIGHT FIT ON TONGUE
1/4 x 1 M/M. PLY STRENGTHENING PIECES TOP & BOTTOM
SPAR 1/4"x1/4"
ELEVATOR RIBS 1/16" SHEET STREAMLINE SECTION · MAX. THICKNESS 10% CHORD.
1/8" SHEET
STARBOARD ELEVATOR 1/3 FULL SIZE · ELEVATOR DIHEDRAL 1" UNDER EACH TIP.
·FUSELAGE HALF FORMERS· ·FULL SIZE·
ALL FORMERS 1/8" SHEET BALSA RIGGED ON FUSELAGE BOOM.
1/32" SHEET
1/16 SQ
1/4 x 1/8
WING ROOT RIB ·FULL SIZE· SECTION SIKORSKY G.S.1.
MAKE RIBS IN TWO HALVES FROM 1/16" SHEET [NOTE SLOTTING OF MAIN SPAR] · ADD CROSS BRACES AFTER WING IS MADE.
1/32" SHEET TOP & BOTTOM.
L.E. 1/4"x1/4" SPRUCE
CAP STRIPS 1/32"x1/4
ROOT RIB 1/8" SHEET [SOLID].
1/8" SQ
5/8"x1/8"
·SPAR DETAIL·
1/4" SHEET
RIB CHORDS
WING DIHEDRAL 6" UNDER EACH TIP.
1/16" BALSA TOP & BOTTOM
1 M/M PLY
SECTION THRO' WING BOX.
SIDE PIECES BALSA OR HARDWOOD SAND TO MAKE TIGHT FIT ON TONGUES.

A $\frac{1}{72}$nd Scale MANCHESTER III

A NEW METHOD OF "SOLID" CONSTRUCTION BY D·M·HALD

THE chief material used in the method of construction is Bristol board. This is easy to work and, having no grain, will take an excellent finish.

A guide to the method of construction of the Manchester III is given below.

Fuselage.

The formers A, B and C are marked 1/32 in. undersize on $\frac{1}{8}$ in. sheet balsa and cut out. Holes are cut in these formers to enable them to be slid on to a temporary jig. A good push fit should be obtained.

A piece of Bristol board should now be cut to the shape shown in diagram (1) and a datum line drawn down the centre. The former positions are drawn on and the lines A, B and C represent the circumference of the formers. The Bristol board may now be cemented to the fuselage jig with the datum line running down the top centre of each former. When dry, wrap round the formers and cement the join underneath. Finally, trim both ends of the tube now formed and remove the jig.

The nose and tail of the fuselage are carved from the solid and cemented into place.

The cabin and mid-upper turret are carved from the solid 1/32 in. undersize and thinly coated with wax. These are used for moulds. To produce transparencies, celluloid sheet is soaked in acetone until soft, and wrapped round the moulds. When dry the transparencies will be easily removed if placed in hot water. Should they be milky white in colour, they may be soaked in amylacetate until clear.

To finish the fuselage, windows should be cut out and covered with cellophane, and interior fittings for cabin and turrets inserted and painted black.

Wing.

The wing is made in four sections, two inboard and two outboard.

Four ribs are cut from $\frac{1}{8}$ in. sheet (diagram 4), care being taken to ensure that these are 1/32 in. smaller than the finished size.

The inboard sections are drawn on Bristol board as shown in diagram 3, and, starting at point H on diagram 4, trailing edges are cemented together and held with paper clips until dry, when any excess should be sanded off.

The outboard sections are constructed in exactly the same manner, the only variation being that the inner rib is carved to give the correct dihedral angle.

Tailplane.

In this case a spar is used instead of ribs (diagram 6); otherwise construction is the same as for the wing. The two fins are cut from 1/16 in. sheet and cemented to the tailplane tips.

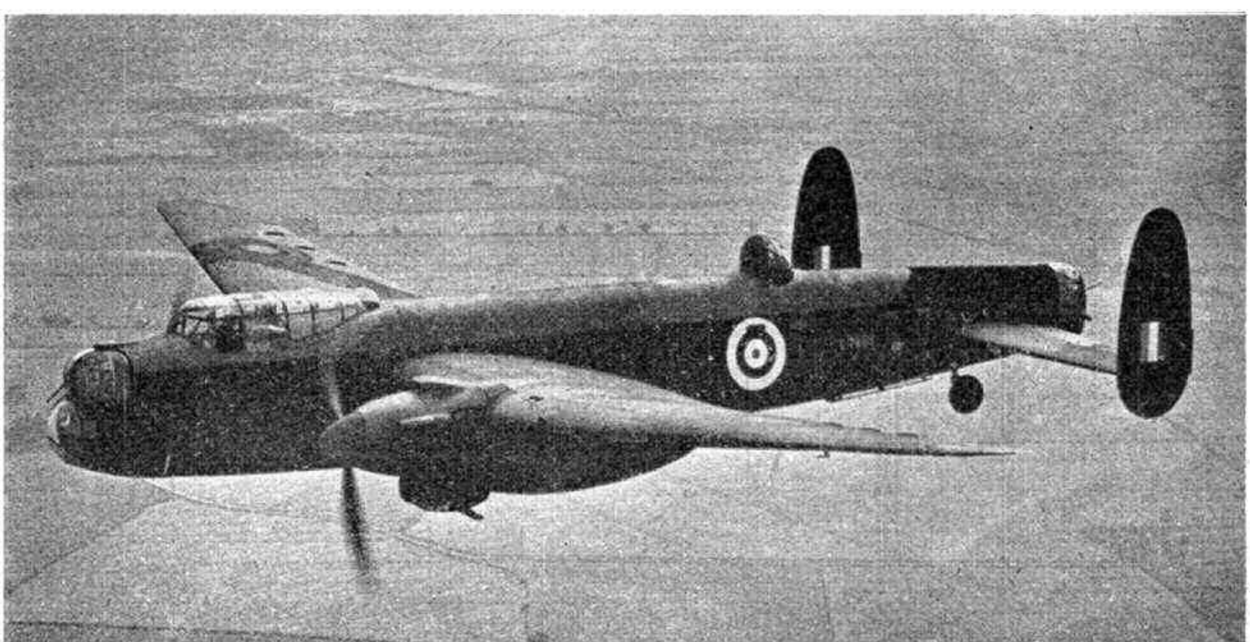
Undercarriage.

The retractable undercarriage is made from paper clips around which paper has been rolled to give the required thickness. The pivots in the nacelles are made from plastic wood (diagram 7) and the rear members are formed from aluminium foil. Hinges are made from pins, clipped off near the head, pushed through the foil, and flattened with pliers. The doors are made from Bristol board and hinged with tracing paper.

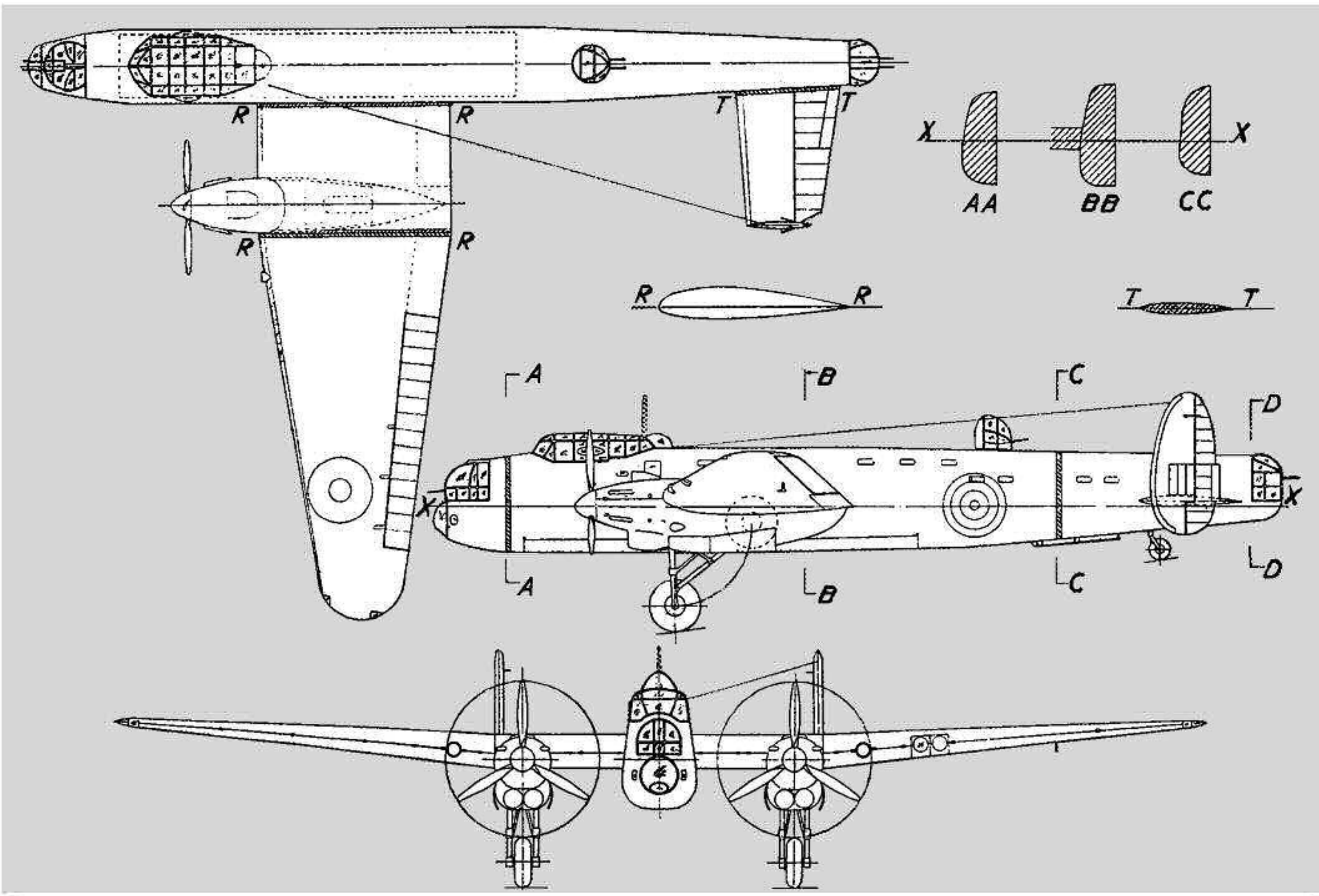
The air intakes are made from thin aluminium and cemented in place.

Painting.

The model is given two or three thin coats of dope and then painted in the Royal Air Force night bomber colours. Green and brown camouflage on the upper surfaces of wings, tail, and fuselage, and soot black on under surfaces and sides.



Air Ministry Photograph


R
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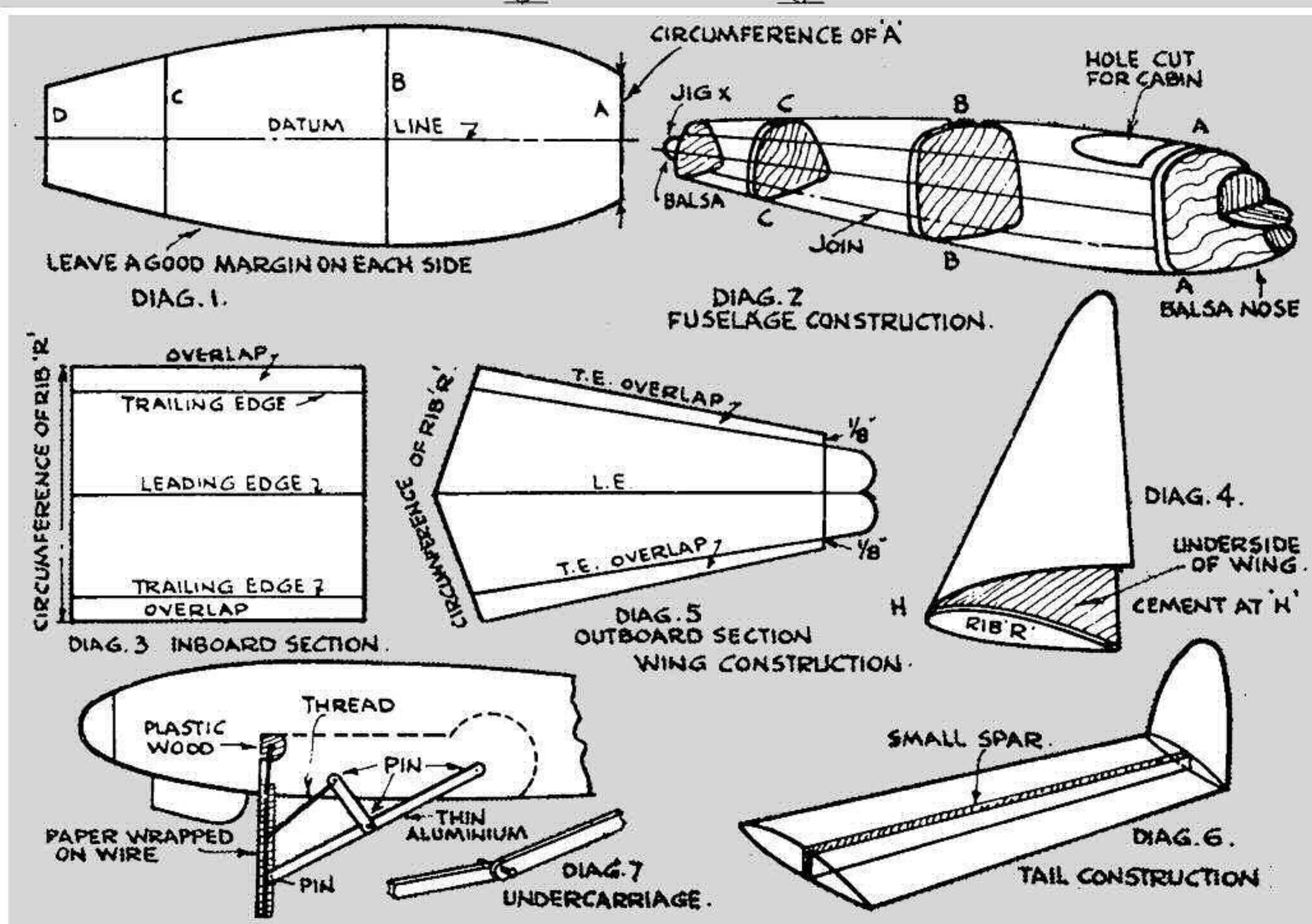
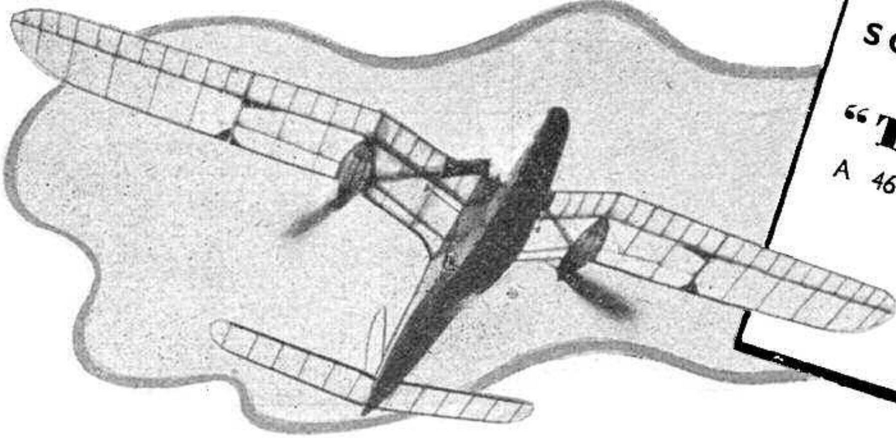

CIRCUMFERENCE OF 'A'
D
C
B
A
DATUM LINE
LEAVE A GOOD MARGIN ON EACH SIDE
DIAG. 1.
JIG X
BALSA
HOLE CUT FOR CABIN
JOIN
BALSA NOSE
DIAG. 2
FUSELAGE CONSTRUCTION.
CIRCUMFERENCE OF RIB 'R'
OVERLAP
TRAILING EDGE
LEADING EDGE
TRAILING EDGE
OVERLAP
DIAG. 3 INBOARD SECTION.
CIRCUMFERENCE OF RIB 'R'
T.E. OVERLAP
L.E.
1/8"
T.E. OVERLAP
1/8"
DIAG. 5
OUTBOARD SECTION
WING CONSTRUCTION.
DIAG. 4.
UNDERSIDE OF WING.
H
RIB 'R'
CEMENT AT 'H'
THREAD
PLASTIC WOOD
PIN
THIN ALUMINIUM
PAPER WRAPPED ON WIRE
PIN
DIAG. 7
UNDERCARRIAGE.
SMALL SPAR.
DIAG. 6.
TAIL CONSTRUCTION



SOME NOTES ON THE "TWIN GULL"

A 46" SPAN "WAKEFIELD" TWIN PUSHER

DESIGNED BY C. RUPERT MOORE, A.R.C.A.

AS FEATURED ON FRONT COVER.

BEFORE starting, I refer you to the following articles in previous AERO MODELLERS :—" Flying Scale Blenheim," December, 1942, page 557 ; " Short Popjoy Scion," February, 1943, page 697 ; a " Wakefield Twin Gull " and " Soldering Simplified," both July, 1943, pages 945 and 974.

The fuselage sides, spars, centre section halves, wings and tail are all built on boards. The fuselage is assembled minus the top stringers. The two separate centre section halves are built flat, *omitting all riblets and ribs R2 and R3* until the shafts D2 and box spars are in place when the sections are completed.

The stirrups on shafts D2 are made from untempered steel and being soft with no spring in it, it is very easy to work. Shafts D1 and D2 can also be made of silver steel (mine are), but piano wire is better. The " Fork " prongs *must* be piano wire. Three tools are essential to make this drive : *small* round-nosed pliers, *small* square pointed-nosed ones, and a small steel cutting file.

The stirrups are bent to shape on the plan and cut to length. The necks are opened slightly to enable the flats to be filed and then closed again. Bind necks of stirrup with fuse wire and solder solid. There are four hardwood bearings made by making a bit of scrap shaft red hot and burning half away into the wood. The four bottom halves are cemented in. The brass bearing plates should be bent into square U's to fit the spar and the spar cut long enough to force the bearings against the stirrup necks and prevent end slap. The box spar ends should be well cemented and the shaft lowered into the box when the lid with the other half of the wood bearings is cemented in place. Bind over bearing plates with cotton and cement.

The distance between shafts D1 and D1 is determined by the distance between the centres of the stirrup bars as are the bushes in the gear box (regardless of the plan !).

In order that the nose block can be " broken " for stretch winding, the two top gears are soldered to shafts D1 and D1, leaving $\frac{3}{8}$ in. projecting to locate the two top bushes of the gear box. The other two gears are fixed to the nose block and the tension of the rubber holds them in mesh.

The front bearings for the shafts D1 should be made, the shafts put in the gear box and the bearing slotted on. The shafts should be threaded up the fuselage and the gear box pinned in place. Mark exactly length of shafts to central marks on stirrups, cut bearing spar from hard balsa and mark position for holes for shafts. The brass " fork plates " should be made in pairs by folding brass strip and drilling. Put a pair on each shaft end and bind between with fuse wire. Line up " prong " holes with match sticks and solder. Re-assemble gear box and shafts in fuselage and pin in place. Push " closed fork prongs " into " fork plates " over stirrup bars and solder lightly. Cement all bearings and bearing spar and while wet revolve the shafts, moving bearing plates for cutting or packing bearing spar until *" fork prongs " engage " sitrrup bar." during the complete revolution.* The propeller shafts and forks are built but the prongs are soldered and cut off to form " open forks." The joint is aligned as before.

The Starter.

In place of the box tube and brass square, which are not easy to get, use a screwed bush for the square and file to a square after soldering on the shaft. For the box tube bend tin round this bush and bind with fuse wire till it fits the starter spindle plug with wood and solder, then heat the spindle and push it right inside.

Rigging.

The model should balance on, or in front of, the marked C.G., *but not behind.* Unless very far forward or behind don't use ballast, trim by tail.

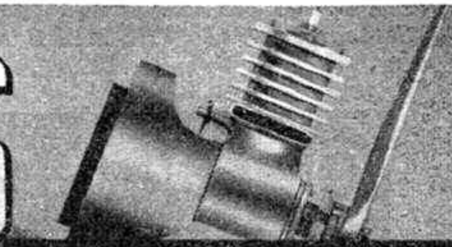
When gliding, properly learn to use the starter, NEVER WIND BY OR HOLD THE AIRSCREWS.

To wind, push the starter into the nose and locate the " Winder bar." Pull out the nose and wind as with airscrew. Replace nose, grip bobbin in the right hand and remove " Winder bar." Thread left wrist through the string loop and grasp bobbin in the left hand, remove the right hand and hold model with it as usual for launching. *Gently* release grip on bobbin and pull the revolving bobbin from the nose *by the string loop.* Downthrust is added by packing the top of the nacelle ends. If she turns look to the thrust lines and give side in one or both if necessary.

Before winding always make sure the open fork prongs are on opposite sides of the stirrup bars—it pays !


OF COURSE—
ITS BIG
LOOK
WHAT IT IS!
MODEL AIRCRAFT
MANFD BY THE BRITISH MODEL AIRCRAFT MANFG CO. MITCHAM

PETROL TOPICS



DR. J. F. P. FORSTER.

NOW that Rupert Moore's patent drive has been published and the practical solution of the twin or multi-engined rubber-driven model has given yet another fillip to the Scale Model "rubber-ears," these gentlemen have stolen a march on us poor grounded "petroleers" and it is high time we brought some grey matter (and as soon as possible some practical experiment) to bear on this twin-engine problem. From time to time in "Petrol Topics" I have touched on the subject, dealing mostly with its snags, and my own failure when tried out in practice on the bench, to get satisfactory results from any of the suggested methods of engine synchronisation.

Perhaps I have overdone this stressing of snags, and if "Topics" has any serious influence on its readers, this may have tended to discourage others; at all events, there seems little evidence of serious practical experiment by correspondents, and any other petroleers who have made serious attempts at its solution have kept very quiet about their failures or successes. Naturally the flying ban has put "paid" to the proving of ideas hatched shortly before its imposition, and has further discouraged the building of experimental twins based on ideas (radio-control excepted) which have smitten petroleers during this period of marking time

"Petrol Topics" was started as an essentially *practical* feature, but now that the ban has been on for three years, readers will, I hope, forgive a temporary lapse into the realms of theory, in which I have to confess to being rather like a duck out of water. Apart from letters of derision (let 'em all come!) maybe this will produce some hot and fiery correspondence from which we shall all benefit in the long run!

Indeed, all this arose in the first place from an argument between two Scotsmen (the national industry, they assure me!) resulting in a letter from Robert Burns of Stewarton by Kilmarnock, who feels that the solution of twin-engine operation lies not in synchronisation at all, *but in twin fins.* He suggests that, contrary to C.E.B.'s "toed-out" twin fins fitted to his Blue Goose Flying Boat (which he *claims* to act as a "drogue") the twin fins should have their L.E.'s "toed *in*," so that each fin, being set in the slipstream from its respective prop, will tend to correct the turning moment due to the outboard position of each engine. Mr. Burns hopes that as the thrust varies from either prop, so will the speed of the slipstream and its effect on the toed-in fin.

Unfortunately, as I see this problem, it is not quite so simple, and as usual there are snags. The effects of torque seem largely unpredictable until tried out by practical experiment. Apart from variations in torque using different props of *apparently* identical form, pitch and diam., the question of how this force varies in relation to the speed of the slipstream and thrust, needs to be determined. I believe the theorists with a lot of hieroglyphics can write a formula showing that it is either directly proportional to, or to the square (or is it the inverse square?) of the thrust. Unfortunately most of these formulæ contain a large letter K, which stands for some Constant (why not C I can't imagine!) which probably depends on just how much sandpaper one used to finish the surface of one's prop. Having broken several during initial tests, one's carving becomes progressively more slapdash; the air becomes thicker with blasphemy, and with each new prop, K, of all things, becomes the most inconstant of all symbols!

Let us then, for a moment, be like the ostrich: let us ignore torque altogether, and consider our twin engined flying machine as ejecting two streams of air (slipstreams to you, Sonny!) shooting backwards a little distance outboard of either side of the fuselage, each tending to "push" its respective half of the main plane forward. On the tailplane are fins set in the path of these slipstreams (see Fig. 1). Provided both are inclined the same amount, but in opposite directions apart from some extra drag (equal on both), the directional stability will be maintained.

If, now, one of these "ejections of air" diminishes or ceases, the other will win the contest of "main-plane-pushing." That wing moves relatively faster and gains more lift, and the whole machine both banks and turns towards the weaker side. We now need hard rudder against the stronger side to maintain straight flight.

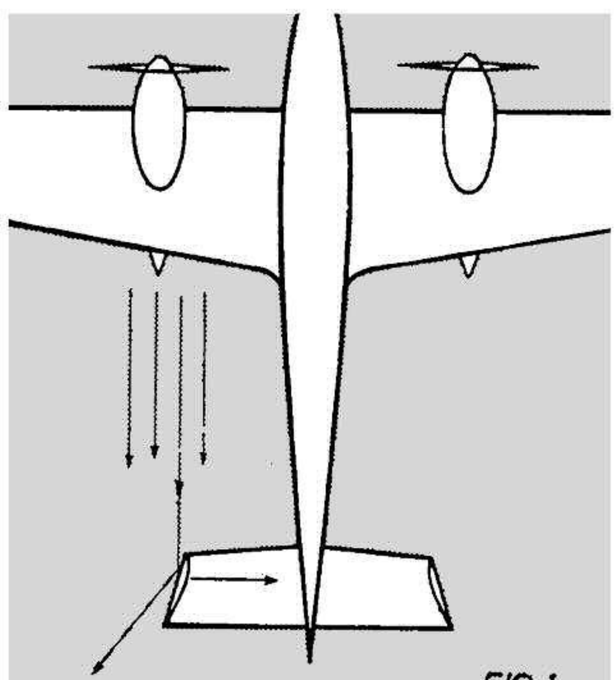


FIG. 1

If the fins are already toed in on both sides, the effect of the fin on the weaker side will diminish with the falling off or loss of slipstream, so that the total turning moment of both fins instead of, for example, being M—M=Zero, becomes M—½M, which gives us for the first time a definite moment of +½M in favour of the weaker side.

The idea looks all right so far. The question is, can the fin be made powerful (i.e. large) enough to balance the turning moment due to the outboard position of the thrust line? Also, can its moment remain in constant ratio to the thrust, and therefore the speed of the slipstream on its side? The drag increases with the *square* of the velocity. Does the turning moment also increase in this ratio? Probably less than 10 per cent. of the slipstream can be expected to impinge on the fin.

These are questions which I hope may produce some interesting correspondence. I cannot answer them until practical experiment is possible, but what are the prospects of success or failure? Perhaps some of the theorists can supply the answers. I began to consider carrying out tests, as soon as the ban is lifted, on a robustly built experimental crate equipped with independently adjustable twin fins with a dummy engine, in one wing first of all (why smash two?) The fin on this side would be set as accurately as possible parallel with the c/l of the fuselage. With a small engine in the other wing, the fin on that side would be toed in and gliding or "rumbling" tests carried out under low power to see if it was possible to lose height slowly on a straight course (apart from a bit of "crabbing"). With any luck, after getting this state of affairs by fin adjustment, the ignition setting would then have to be advanced, and observation made of its effect on direction. The thrust will increase, and so also will the correcting tendency of the fin. Will the latter be exaggerated and outdo the former (as seems possible if the drag varies with the *square* of the velocity, though most improbable?) or vice versa?

Assuming the correcting tendency *can* be got to balance the variation in thrust, the whole process would then have to be repeated with the second engine installed, and if and when the correct fin setting has been determined, the great day when both engines were run simultaneously might be expected to convert the rumbling glide into a gentle climb.

Most readers will object to this adventure in the realms of fantasy, since the effect of torque has been ignored throughout. This was done deliberately to simplify the issue, and to consider first of all the effect of, and the means of countering the outboard thrustline and its moment about the C.G. of the model as a whole. Assuming there is something in Mr. Burns' suggestion, and that variations in *thrust*, at any rate, can be made to cancel themselves out, we are surely halfway to a solution. What about Torque?

Although torque has been described as a complex of forces, most of these are surely consequences of torque, i.e. "torque reactions." As I see it, torque is primarily a twisting force applied about the thrust line of a prop. ("about" meaning, "around," but these mathematicians *will* use such strong language!) in the opposite direction to that in which the said prop. revolves. In short, the tendency in a single engined model for the *machine* to turn round instead of the prop. Note that such turn occurs *around* the prop. shaft.

Now with twin engines, placed outboard in the wings, the effect of torque along the c/l of the centrally placed fuselage must surely be diminished—progressively so—the further the engine is placed outboard. The diagram (Fig. 2) illustrates this:

P and P' are two engines of equal power, one set at twice the distance outboard of the c/l of the fuselage of the other. T represents the torque of each and F the force applied through the lever (or centre section). It will be seen that the prop placed at 2D distance from the c/l of the fuselage exerts only half the force F at the fuselage. Since the fuselage must be considered as a relatively immovable object the net result is a very slight tendency for the wing to drop as a whole (engine and all) pivoting about the c/l of the fuselage.

Thus, strange as it may sound, from the point of view of torque alone, the further the engine is from the fuselage, the less we need to counter torque; so that if, as Mr. Burns suggests, we can overcome variations in *thrust* within reasonable limits, torque should not trouble us as much as is commonly experienced in single engine machines. By having oppositely rotating engines, this in any case is equalised if (and when) both engines are behaving well at equal revs, and if the effect of each is small in any case, the sudden loss or diminution of torque of one engine due to failure beyond our control, is not likely to affect matters as much as has been commonly supposed.

To reduce the effect of torque still further, I therefore suggest that oppositely rotating props be used, and arranged so that the port prop revolves clockwise (i.e. the conventional way) so that any turning tendency to port (as is usually experienced) is opposed by the starboard yawing tendency of the outboard position to port of its thrustline, and *vice versa* with the starboard engine.

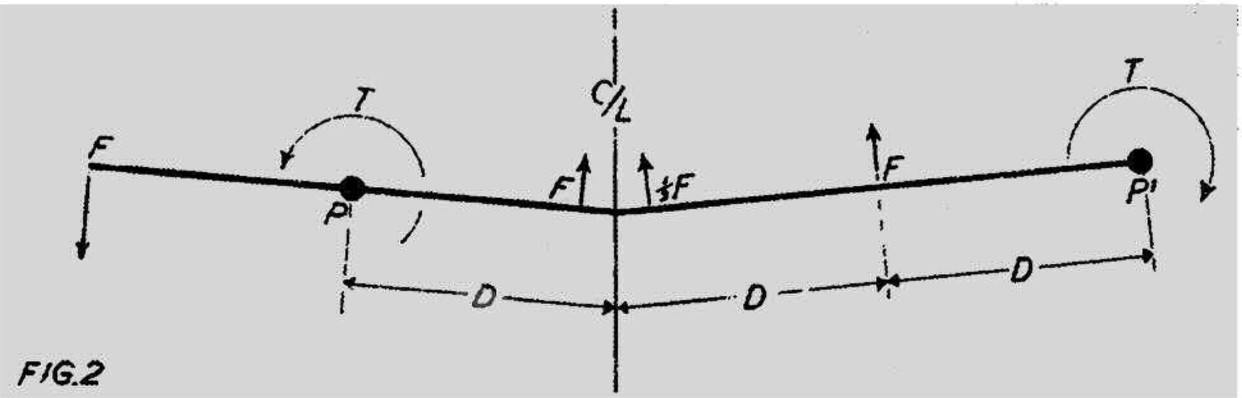


FIG. 2

This then was the process of optimistic reasoning which seemed to hold out possibilities worth investigating. At this point I began to get that uncomfortable feeling that it was all too simple and some practical experiment was called for. It seems to me that the flying speed of the model has no bearing on our problem, since the increase in airspeed of the twin fins is equal on both. A wind tunnel therefore seems quite unnecessary to prove or disprove the theory.

I therefore rigged up a fuselage and centre section from planks of hardwood, with a locating square for a detachable mounting fixed to one side of the centre section and a large tailplane from one of my models attached with rubber bands towards what represented the tail. The whole affair was suspended at a point about 3 in. behind the L.E. of the centre section by a string from the roof of my workshop. An Ohlsson 23 on a detachable mounting was plugged into the port side locating square and a counterbalance weight placed on the starboard centre section. An odd coil and wiring were installed connected up to a pair of sockets for my booster connections, and finally another hook was screwed into the bottom of the fuselage under the C.G., from which another length of string was stretched vertically downwards to another hook in the floor, so preventing the contraption hurtling through the wall of my workshop! Fins were placed on the tailplane one being directly behind the engine, and the latter was started up.

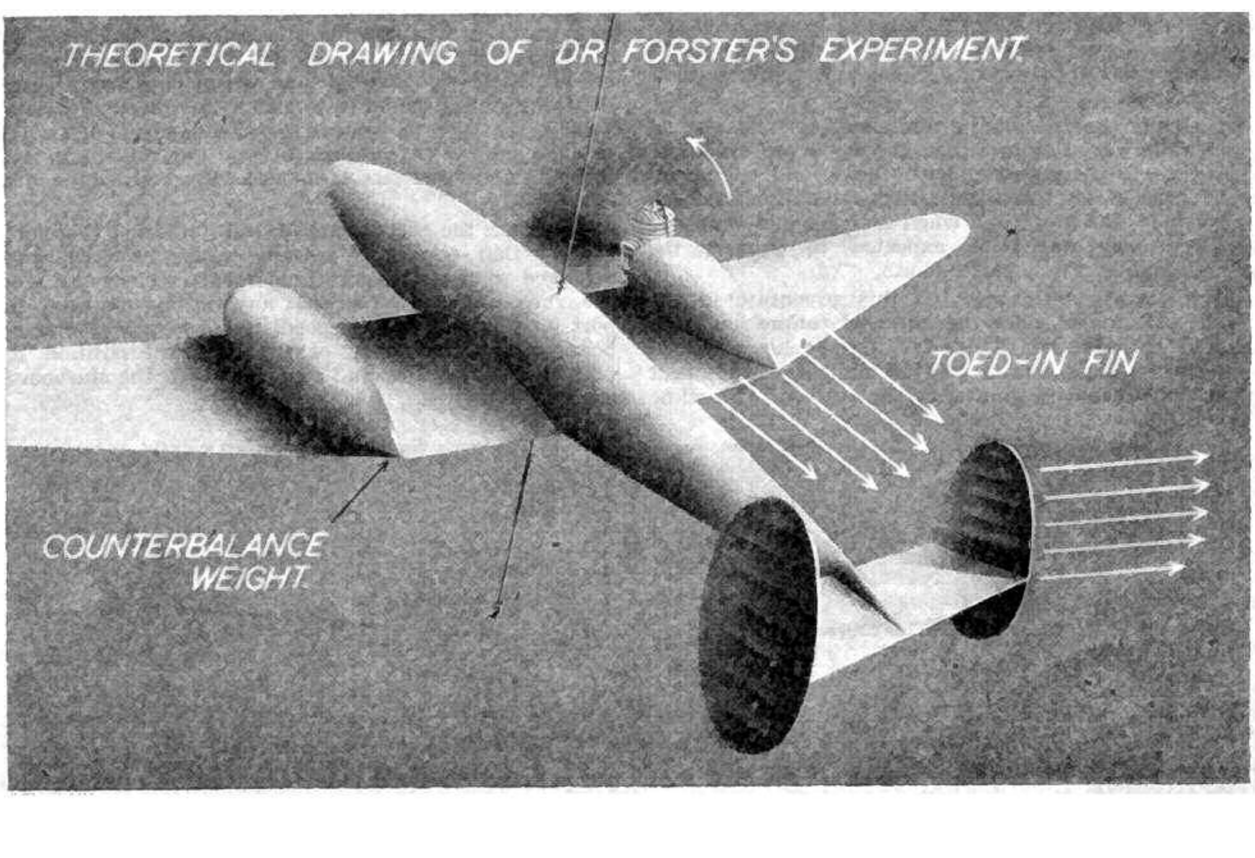
I held on to the tail and increased the "toe-in" of the whole fin until it was inclined a full 45 degrees to the c/l of the fuselage, but still the whole affair strained at the leash to spin round on the string, though noticeably less as the angle was increased.

At this point I decided that I wasn't "capturing" nearly enough of the slipstream, so I added a second fin below the tailplane, nearly doubling the area. The spinning moment was then very considerably reduced but so far I have not succeeded in neutralising it altogether. I also found that advancing revs and increasing the thrust increased the rate of spin slightly, but *only* slightly, so that it begins to look as if Mr. Burns' theory does after all hold *some* water. The question is, can it be made watertight by using a still larger fin, or a "sideways lifting" fin, instead of one with the normal streamlined section?

As I anticipated, altering the length of the tail moment arm about the C.G. does not affect matters greatly, as the longer the moment arm, the weaker is the slipstream, so far behind the prop.

I ought to add that Mr. Burns did not claim that his idea could be expected to work over the full range of variation in revs (as would occur in the event of complete engine failure) and he proposed the use of governor operated cut out switches on both engines, which would cut out *both* engines if one dropped more than 20 per cent. in revs. The idea is, of course, delightful, but I fear somewhat impractical on existing engines, though not impossible if extension shafts were used.

Well, here are my rather disappointing results of a practical experiment to prove or disprove what looked at first sight rather an attractive idea. Any comments, however derisive (!) and any suggestions for improving on it (apart from the obvious one of using spring balances actually to *measure* the turning moment in ounces) may even yet help us to lay the bogey of the twin engined model.

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SCALE MODEL AIRCRAFT
FROG
TRADE MARK REGD.
MADE IN ENGLAND BY
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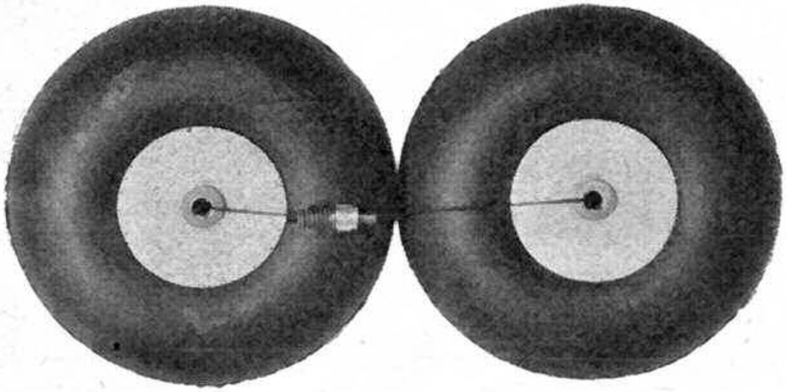
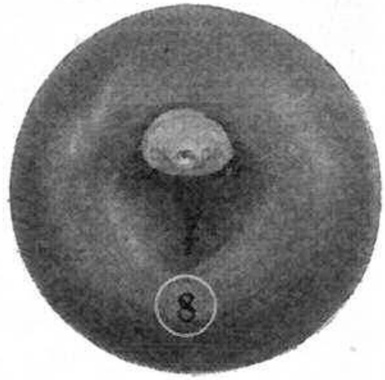
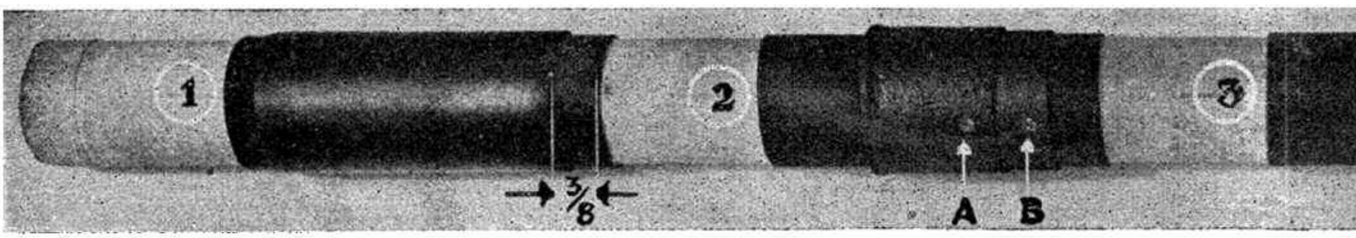


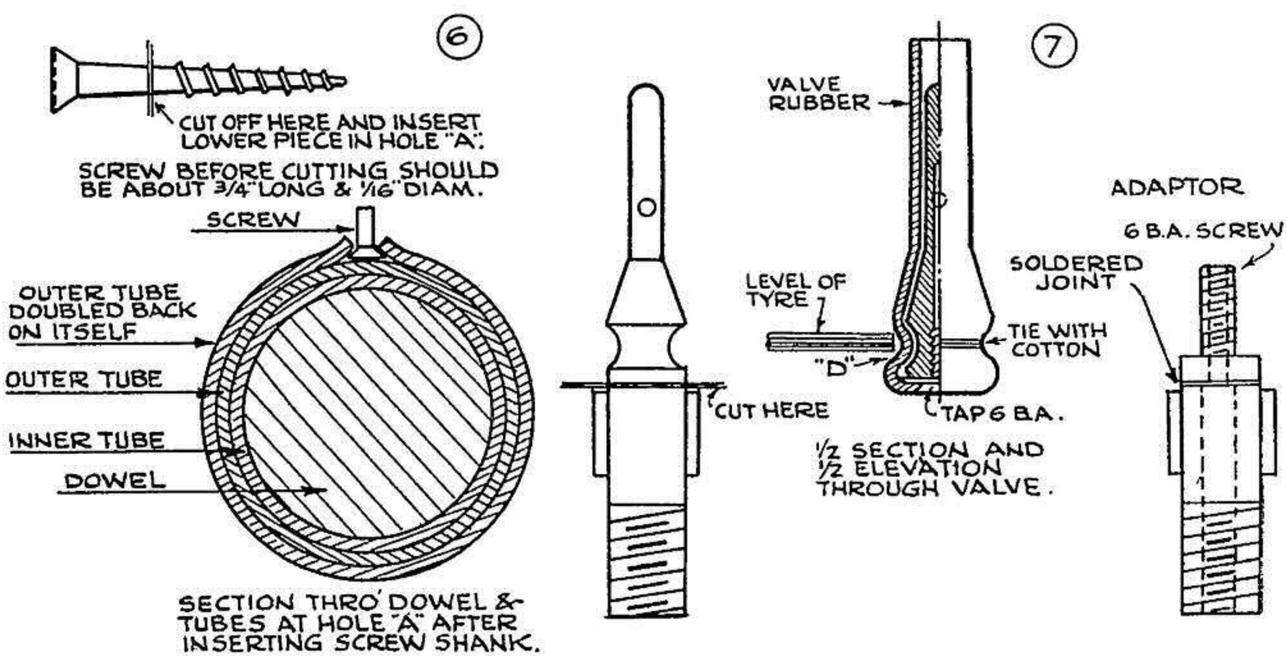


This method of making inflatable air wheels is easily the best known as yet. There must be many enthusiasts with odd lengths of inner tube in the cycle shed or workshop, not yet commandeered for salvage . . . . . well ! Here is your chance to make some really efficient and attractive air wheels.
Between the two wheels above is shown Mr. Cox's ingenious adapter made to fit an ordinary cycle pump.
There is no reason why this method should not be tried with even larger inner tubes . . . now then you chaps who have motor bikes or cars stored for duration !

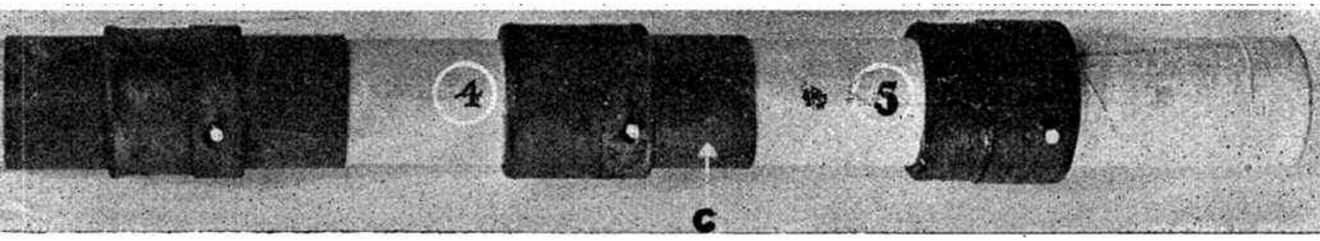
This is how the air wheel should appear when inflated before the plywood discs and axle have been fixed—note the regular shape in the centre and the position of the valve.

A NEW METHOD OF MAKING





INFLATABLE AIR WHEELS



INTRODUCED BY G · H · COX

BY this method inflatable airwheels 3, 3½, or 4 in. in diameter may be made with very few tools and easily obtainable materials.

All the tyre portions of these wheels are made the same size and the final diameter of the wheels is governed by the size of the hub and the degree of inflation.

Making the Tyre.

1. Cut two pieces each 3 in. long, from a 1½ in. bicycle inner tube.

2. Push one piece of tube inside the other so that the inner projects ⅜ in., and then pull both on to a piece of dowel 1⅛ in. in diameter. If you have no dowel this diameter wrap thick paper round a thinner piece until it is the required size. (See diagram 1.)

3. Turn back the outer tube until the edge is ½ in. from its other end. Cut the holes shown in diagram 2 about 1/16 in. in diameter in the positions shown. This is most easily accomplished by means of leather belt punch pliers.

4. Cut a small wood screw as shown and place in hole A. This is to keep the holes in alignment. (See diagram 2.)

5. Smear rubber solution in the appropriate places and turn the ½ in. flap taking care that the hole B also goes over the projecting shank of the screw. (See diagram 3.)

6. Turn up bottom flap and manipulate until its edge just touches the edge of the stuck down ½ in. flap. When touching all the way round turn back, smear with solution and stick down. It should now be as diagram 4.

7. Punch hole C. (See diagram 4.) Stick down final flap so that this hole also goes over the screw shank.

It should now be as diagram 5.

Leave to dry and set for at least two days, otherwise when you attempt to blow it up one of the joints may open.

N.B.—Use plenty of rubber solution throughout.

Making the Valve.

1. Cut cycle valve as shown and smooth off cut with a fine file.

2. Cut a thread in the hole in the freshly cut face with a 6 B.A. tap. If you have no tap your local watchmaker will probably do it for you.

3. Push a piece of valve rubber (the thick red sort) right over the valve and tie round where shown with thin cotton.

Inserting the Valve.

1. Remove the screw from the tyre.

Take the tyre from off the dowel.

2. Screw adapter (see later) into the valve and moisten the valve rubber.

3. Push the valve through the hole in the tyre where the screw has been right up to point D on the valve.

4. Screw bicycle pump on to the adapter and give one stroke. Remove the pump leaving adapter screwed into the valve.

5. Squeeze solution round valve. Holding the adapter pull the valve a little way out and then push in again. Continue doing this until solution has entered sides of the hole. Then pull slightly out again, use more solution and push the valve home again up to point D.

6. Cut an ⅛ in. hole in an ½ in. diameter cycle patch and stick on to the tyre over the valve, so that the threaded hole in the valve can be seen through the hole in the patch.

7. Take the tyre and hold it with the valve furthest away from you. With your finger push at the centre of the tyre nearest to you, so that the valve gradually moves over the top of tyre. Do this until it is slightly inside the centre at the opposite end to where it was whilst the tyre was being made. (See diagram 8.)

8. Manipulate the tyre until its centre is as in diagram 8. *If the triangle seen in the centre of the tyre is left for any length of time an irregular shape, the wheel when complete will not be truly round.*

Making the Adapter.

Take the unused portion of the cycle valve and smooth off the cut. Drill a 6 B.A. screw down the centre and file its head until the saw-gate is removed. Solder this screw on to the top of the piece of cycle valve. (See diagram 7.)

Final inflation of Tyre.

When the valve has been put in for at least a day the tyre may be blown up to within ½ in. of the intended final size. After being left for another half hour it should then be blown up to ⅛ in. diameter less than the size required when finished. The action of the wheel discs pressing against the tyre will make up the remaining ⅛ in.

Completing the Wheel.

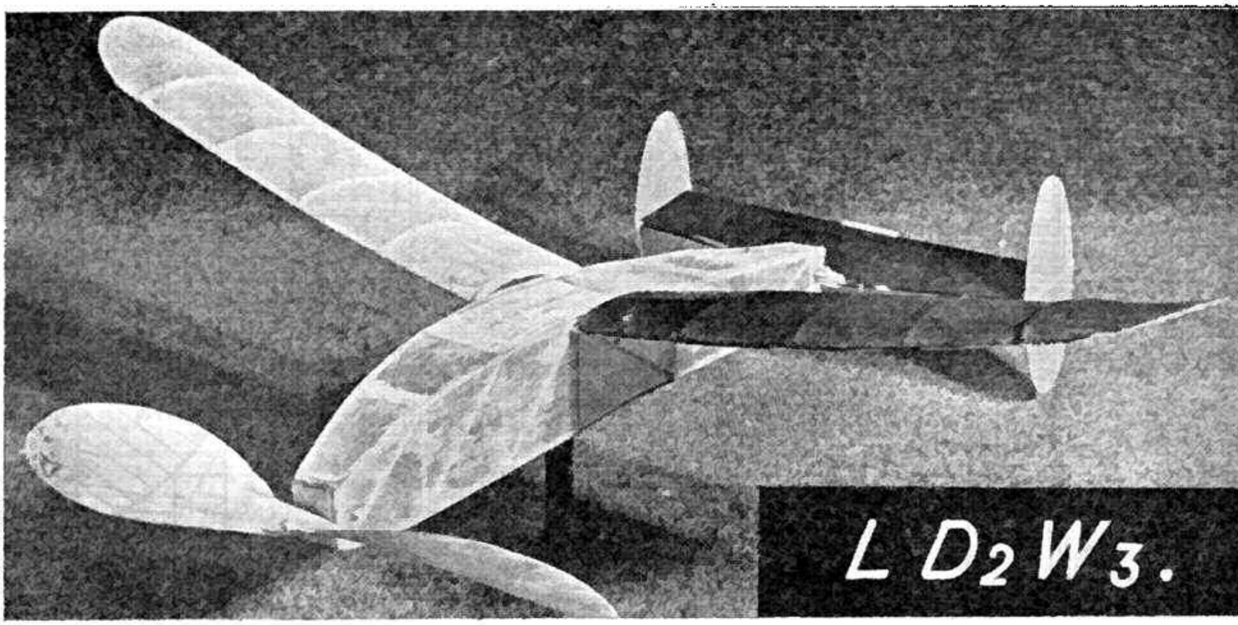
A thread is cut on to one end of a piece of brass tube and a suitable nut obtained. On to the other end of the tube a washer is soldered. The length of the tube between the washer and nut when in position should be 1¼ in. for 3 in., 1½ in. for 3½ in. and 1¾ in. for 4 in. wheels.

A plywood disc 1½ in. in diameter is now passed on to the tube which is then pushed through the wheel. The tyre is compressed and another plywood disc put on followed by the nut. The wheel is then complete.

To reinflate the nut is simply removed together with the disc, when the valve should be visible.

If you cannot get a thread cut on the brass tube a washer should be soldered on each end. In this case, however, a hole must be left in one of the discs, in the correct position, so that the valve is visible through it for reinflation.


We're sorry, but we're proud . . .



A SIX-MINUTE MOTOR RUN By N · K · WALKER

ABOUT a year ago I began to study the subject of duration seriously with a view to designing a model that would consistently average five minutes under any conditions, and which would preferably be difficult to lose. The present day Wakefield model has a duration of not more than 3 minutes in cold, still air, but has such a good glide that in air which is at all "lively" it is liable to get lost out of sight after only one flight, and under present contest ruling its average will be then quite low.

The ideal duration 'plane will have a terrific motor run, a poor glide (adjustable if possible) and will be stable in most winds. This seems a difficult specification to fill, indeed I had almost shelved the problem and begun concentrating on canard Wakefields when quite by accident the solution dawned on me.

I had built Warring's 1940 pole-flyer, and had got duration of about 2 minutes with 12 in. prop., when I noticed that the weather was hot and dead calm, and decided that the chance was too good to miss. I cut down the prop. to 10 in., braced the wings with tissue, and heaved the model into the ozone. The motor ran for 2½ minutes, climbing all the time to about 200 ft., and I had just decided it was gone for good when out dropped the airscrew assembly on the end of two feet of rubber, and inside 10 seconds the model was again on terra firma.

Here was a clear indication of the type of design required.

The present model, LD3W2, was 2 in. longer, and deeper, space being allowed for the largest possible knotting, while to economise in balsa and to increase strength the fuselage was built of 1/16 in. square hardwood sanded round to guard against cutting the rubber. A single leg undercarriage was fitted, and the wing span increased to 22½ in., and the chord to 3½ in. As the weight was much increased the motor was thickened slightly to four strands of ⅛ in. by 1/24 in. and a length of 36 in. installed. It was now the evening before Northern Heights Open Day, so at eleven at night two pieces of 1/16 in. sheet were hurriedly cemented into a hub and twisted to a guesstimated pitch.

Well, if you attended you'll know what the conditions were like, with gusty and fairly strong wind, quite cold. The "Flying Banana," as it was called, disgraced its maiden flight by refusing to climb on 800 turns, and cruised about only 3 ft. off the ground. Later on, however, I cut off 1 in. from each tip, put on 1,600 turns, and got 2 minutes, and the next two flights with 1,800 turns were 2·29 and 2·32 respectively. For comparison, the winner of the Open Competition flying a Wakefield type put up about a 2½ minute average, so these last flights were quite good.

I noticed, however, that it came down with the prop. still running, while the height reached was only 100 ft., so something was badly wrong, and that something must be the propeller. A check gave diameter 14 in., blade width 1¼ in., pitch 14 in., while the average speed was 1800/150=12 revs. per second. But the flying speed, timed round the pole, was 10 ft./sec., so that at 12 revs. per second the effective pitch should be 10 in.

But if the revs. fall to 8½ r.p.s., as they would after about 70 per cent. duration, the effective pitch would be 14 in. and as this equals geometric pitch there would be no thrust.

A new airscrew was designed for a speed of 6 revs. per second and 20 per cent. slip, using the same motor, which meant a pitch of 23 in.

Now revs. are proportional to $\frac{1}{\sqrt{PDB^3}}$, and it is obvious that to cut the speed down so far would require D to be increased to about 12 in.

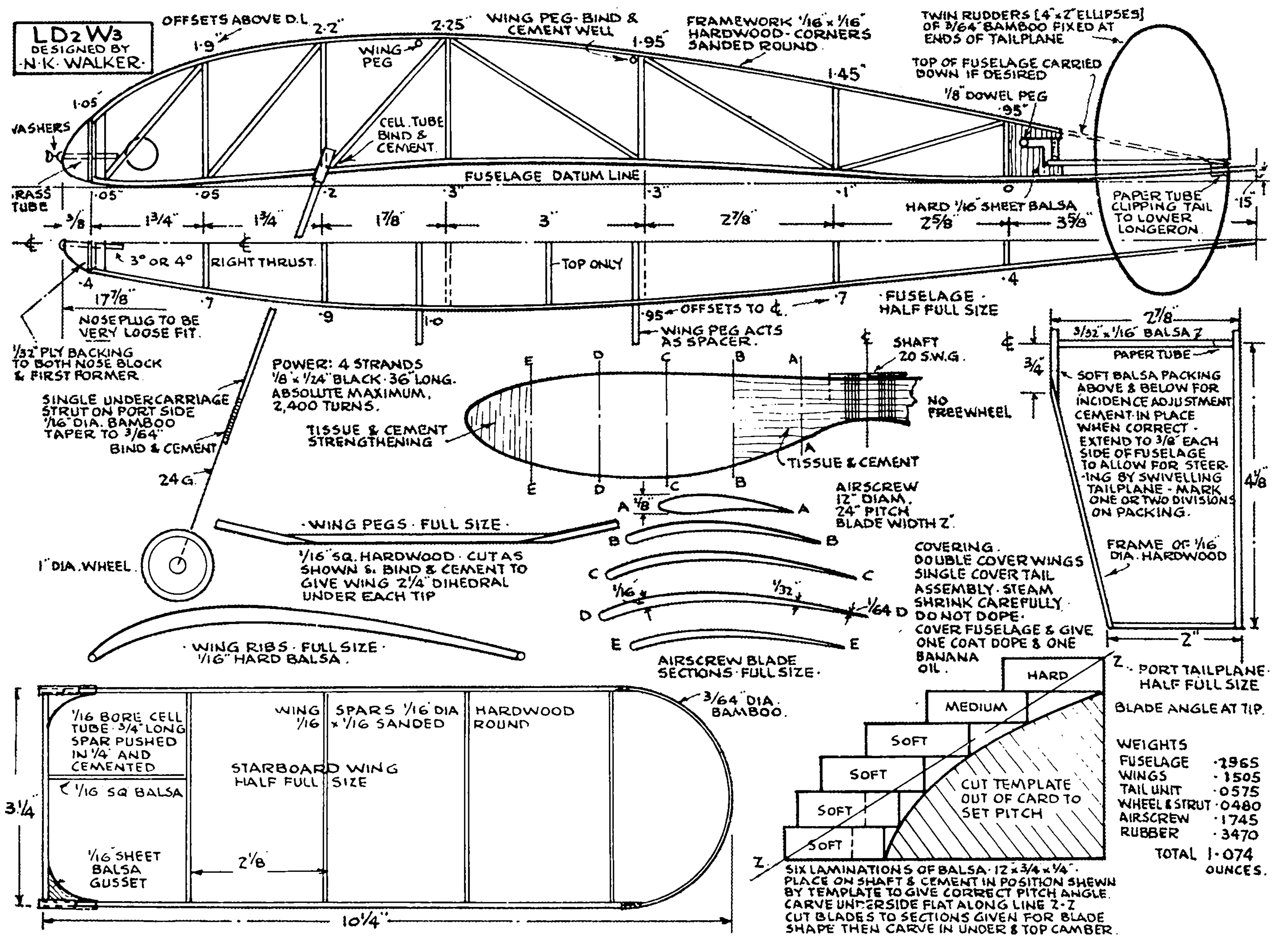
We now have

$$(RPM)_1 = \frac{K}{\sqrt{P_1B_1D^3}} \qquad (RPM)_2 = \frac{1}{2}(RPM)_1$$

$$= \frac{K}{\sqrt{P_2B_2D_2^3}}$$

$$12 \times \sqrt{P_1B_1D^3} = 6\sqrt{P_2B_2D^3}$$

Or $$P_1B_1D_1^5 = \frac{1}{4}P_2B_2D_2$$


LD2 W3
DESIGNED BY
N·K·WALKER
OFFSETS ABOVE D.L.
WING PEG-BIND & CEMENT WELL
FRAMEWORK 1/16" x 1/16" HARDWOOD-CORNERS SANDED ROUND
TWIN RUDDERS [4" x 2" ELLIPSES] OF 3/64" BAMBOO FIXED AT ENDS OF TAILPLANE
TOP OF FUSELAGE CARRIED DOWN IF DESIRED
1/8" DOWEL PEG
WASHERS
WING PEG
CELL. TUBE BIND & CEMENT.
FUSELAGE DATUM LINE
BRASS TUBE
HARD 1/16" SHEET BALSA
PAPER TUBE CLIPPING TAIL TO LOWER LONGERON
3° OR 4° RIGHT THRUST.
TOP ONLY
FUSELAGE · HALF FULL SIZE
OFFSETS TO ℄
NOSEPLUG TO BE VERY LOOSE FIT.
WING PEG ACTS AS SPACER.
1/32" PLY BACKING TO BOTH NOSE BLOCK & FIRST FORMER
SINGLE UNDERCARRIAGE STRUT ON PORT SIDE 1/16" DIA. BAMBOO TAPER TO 3/64"
BIND & CEMENT
24 G.
1" DIA. WHEEL
POWER: 4 STRANDS 1/8" x 1/24" BLACK 36" LONG. ABSOLUTE MAXIMUM, 2,400 TURNS.
TISSUE & CEMENT STRENGTHENING
SHAFT 20 S.W.G.
NO FREEWHEEL
TISSUE & CEMENT
AIRSCREW 12" DIAM. 24" PITCH BLADE WIDTH 2".
WING PEGS · FULL SIZE ·
1/16" SQ. HARDWOOD · CUT AS SHOWN & BIND & CEMENT TO GIVE WING 2 1/4" DIHEDRAL UNDER EACH TIP
WING RIBS · FULL SIZE · 1/16" HARD BALSA.
AIRSCREW BLADE SECTIONS · FULL SIZE ·
3/32" x 1/16" BALSA
PAPER TUBE
SOFT BALSA PACKING ABOVE & BELOW FOR INCIDENCE ADJUSTMENT CEMENT IN PLACE WHEN CORRECT · EXTEND TO 3/8" EACH SIDE OF FUSELAGE TO ALLOW FOR STEERING BY SWIVELLING TAILPLANE - MARK ONE OR TWO DIVISIONS ON PACKING.
FRAME OF 1/16" DIA. HARDWOOD
COVERING. DOUBLE COVER WINGS SINGLE COVER TAIL ASSEMBLY · STEAM SHRINK CAREFULLY. DO NOT DOPE · COVER FUSELAGE & GIVE ONE COAT DOPE & ONE BANANA OIL.
PORT TAILPLANE · HALF FULL SIZE
BLADE ANGLE AT TIP.
1/16 BORE CELL TUBE 3/4" LONG SPAR PUSHED IN 1/4" AND CEMENTED
1/16" SQ BALSA
1/16" SHEET BALSA GUSSET
WING 1/16" x 1/16"
SPARS 1/16" DIA SANDED
HARDWOOD ROUND
STARBOARD WING HALF FULL SIZE
3/64" DIA. BAMBOO.
HARD
MEDIUM
SOFT
CUT TEMPLATE OUT OF CARD TO SET PITCH
SIX LAMINATIONS OF BALSA · 12" x 3/4" x 1/4" · PLACE ON SHAFT & CEMENT IN POSITION SHEWN BY TEMPLATE TO GIVE CORRECT PITCH ANGLE. CARVE UNDERSIDE FLAT ALONG LINE Z-Z CUT BLADES TO SECTIONS GIVEN FOR BLADE SHAPE THEN CARVE IN UNDER & TOP CAMBER.
WEIGHTS
FUSELAGE ·2565
WINGS ·1505
TAIL UNIT ·0575
WHEEL & STRUT ·0480
AIRSCREW ·1745
RUBBER ·3470
TOTAL 1·074 OUNCES.

$P_1 = 14$ in., $B_1 = 1\frac{1}{4}$ in. $D_1 = 10$ in.

$P_2 = 23$ in., $D_2 = 12$ in.

Therefore

$B_2 = 1\frac{1}{4} \times 14/23 \times (10/12)' \times 4$

$= 1\frac{3}{4}$ in.

As the new prop. should be more efficient the revs. will be increased slightly, and to counteract this effect the blade width actually chosen was 2 in.

Tests with a 17 in. motor of two strands, ¼ in. by 1/24 in., were carried out. Six flights in succession were obtained within 5 seconds each of the mean—110 seconds, using 600 turns on the rubber each time (60 per cent. full power). The height attained was only about 60 ft., but the flight was readily controllable, and no height was lost even on the last turns. The mean speed is 5½ revs. per second, showing the accuracy of the calculations. Subsequently a 36 in. motor was installed, and on 1,800 turns the power run duration was over 5 minutes and a continuous climb up to about 600 ft. obtained. Full power for the 36 in. motor is 2,400 turns, but tests have shown that a 48 in. motor will knot excessively, so this motor is now going in and the duration should go up by another 100 seconds, though owing to the extra weight the ceiling will probably be only slightly increased.

The fuselage must be constructed of smooth round wood, and sharp cement edges should be sanded off to prevent the rubber from being cut. Wings are of standard construction with leading and trailing edge of 1/16 in. diam. hardwood and the covering tissue must not be doped. The undercarriage leg is plugged into a tube on the port side of the fuselage, and the wheel is fixed on the port side of the leg, thus being 1½ in. off set to port. On full power the torque of the motor will be about 1½–2 in. ounces, and the weight of the model (just about an ounce) will produce an approximately equal opposing torque, making for easy take-off. The tail plane is a tight sliding fit in the slot behind the motor pegs and is located at the rear by a paper tube which slips over the two longerons (cemented together). Adjustments for circling are made by swivelling the whole tail in the slot.

Airscrew.

The airscrew is the most important part of the whole model, and must be carved well and be very light. Its pitch has been increased to 24 in. to allow for the slightly higher flying speed with the longer motor. A modification now being built has the two blades hinged similarly to those on the Baby Duration (January, 1942, AERO MODELLER), with motor tensioner and a removable locking piece, the idea being to make two flights of approximately 6½ minutes duration with the airscrew locked and loose nose block, thus allowing it to drop out of the model and prevent a thermal carrying it out of sight. On the third flight the locking piece is removed, the nose block being held in position by a rubber band, and so after a 6 minute motor run the airscrew folds and the model sinks slowly at about 3 ft./sec, (Note.—This is only allowing 3 : 1 glide) from 600 ft. The duration should be increased by about 200 seconds and of course any stray thermal should be easily utilised.

Trimming.

The airscrew is given a little side thrust but no down thrust while the tail plane incidence is adjusted for rough trim, subsequent adjustment being by tightening or loosening the turn which should be *against* the torque. (Tightening the turn holds the nose down.) If the plane stalls on full power increase the side thrust. As the model cruises with its nose up about 5° to utilise the fuselage lift the thrust line actually has upthrust and materially contributes to the total lift. Hand launches should always be made with the 'plane level fore and aft but banked at 45° to starboard to ensure that the 'plane starts in a nice tight spiral.

Flying Weather.

This model will fly in any weather that will allow a Wakefield off the ground. In fact the present model was tested one day in a wind so strong that I had to shield the model behind my body to prevent the wings folding up. The launch was made by running hard downwind and launching in a 45° bank as described (on 800 turns 17 in. motor), with high power (at least 80 per cent. maximum). This resulted in a 60 seconds out of sight flight and the height attained was just as good as in a calm.

Further developments of the type are the installation of a folding airscrew and the strengthening of the wings to take the weight of a 60 in. motor. A consistent performance of 10 minutes is within reach.

As regards the stability, the one trouble is that common to most lightly loaded models—stalling. The speed is so low that there is little margin, but in this case, for some reason, the tail stalls first and the model loses about 10 ft. of height, flying backwards and vertically downwards. The rudders, however, are usually set well over, and steer it to one side. The model then rolls over and recovers normal climb after a loss of about 20 ft. of height. Stalling is therefore unimportant higher up, but must be avoided close to the ground. Hence the 45° bank.

Winding Stick.

On one flight the rubber broke at 1,400 turns (instead of 2,400) and examination showed it had been cut by the L.E. of the tail plane. Rubber is precious now, so a winding stick of 16 g. wire was made. It consists of a large loop grip at one end and two claws covered with valve tubing at the other. The whole is of 16 S.W.G. and is about 24 in. long overall. To use it, remove tail and prop., pass stick through fuselage from the rear and attach motor to claws. Wind with the prop. and when fully wound pull fuselage over rubber and lock by pushing dowel peg through claws of loop held and claws of winding hook. Then replace tail.

Gliding Angle and Flying Speed.

Since writing the foregoing I have accurately measured the gliding angle of the model without prop., and with folded two-blade airscrew. The results are :—

(*a*) No airscrew, 5·2 : 1.
(*b*) Folded airscrew, 4·85 : 1.

Tests round the pole on a long line give a speed of 9·2 ft./sec., when all up weight is 0·877 oz. Hence $C_L = +28$ and $C_D = \frac{C_L}{L/D} = 0{\cdot}246$ without airscrew, or 0·274 with folded.

The increase of drag due to the folded airscrew is therefore ....$C_D = 0{\cdot}028$ or 12 per cent.

(Prop. blade area = 16 sq. in. Diam. = 12 in.)

The Design of Miniature Petrol Engines

By A · S · ROSENFELD

DURING these troubled times, when petrol model flying is necessarily curtailed (except for the irresponsible few), what could be better than to use the lull in the activities by endeavouring to improve the breed ?

The writer feels that, as manufacturers have to produce down to a price and that demand is ever for lighter and lighter power units, much valuable scope for development is being lost. Existing designs are simple in order to lower casting and machining costs, but are there not many who would willingly pay for " the little something the others haven't got"?

With this in mind the writer has designed and built an engine of ⅝ in. bore and stroke incorporating those points which his experience of full-size racing engines makes him feel are necessary to obtain the utmost ounce of power for the weight incorporated.

The engine must clearly have the following requirements :—

1. It must be capable of extracting the energy from the particular fuel used to the full. I say " particular fuel " advisedly. Commercial petrol is not in my mind. It would be advantageous to explore the possibilities of higher octane fuel using higher compression ratios.

2. It must be rugged to withstand hard usage, accidents and, regrettably, neglect.

3. It must be practical. By this I mean that it must be easy to manipulate in the 'plane, under trying circumstances (such as those met with during competitions). In this no doubt I have the support of those persistently practical men, Messrs. Russell and Forster.

4. It must start at a touch, *hot or cold.*

Only one thing can be left to fate. The designer, while to some extent being able to cater for the man who neglects, cannot provide for him who, without knowledge, dismantles a new engine " to see what's inside."

I do not regard lightness in itself as a virtue. If by adding an ounce design may be improved to produce a thrust which, when converted to lift, may raise an extra two or three ounces, then surely this step is justified.

If this increase in weight results in longer life of the wearing parts then it is doubly justified.

A case which comes instantly to mind relates to main bearing length. An increase in overall dimensions would result in better crankcase compression, greater rigidity and therefore higher power output, longer life due to greater bearing area and a shape of engine which fits in more easily with the modern, tapering nose. An argument which I recently heard put forward against longer bearings was that the increased area would cause higher friction losses ! Old ideas die hard.

Then again many engines are marketed to serve both in model 'planes and power boats, with little or no modification to suit individual requirements. This results in high peak R.P.M.—unnecessary for airscrews—with, consequently, greater wear of moving parts—difficult balancing problems and thus a greater risk of vibration at some period in the higher speed range.

It would now be an advantage to summarise the various points which would contribute to the above requirements as they apply to the various parts of the engine.

Cylinder.

Of light alloy with an extremely thin cast iron liner. Unless facilities are available for machining the combustion chamber to an efficient form in one piece with the barrel, then the head will have to be detachable. Where the combustion chamber can either be die cast or machined to the form shown in Fig. 1, then the non-detachable head will prove an advantageous one for the following reasons :—

1. More even cooling owing to even distribution of metal.

2. Possible source of leakage eliminated.

3. Reduction in weight by obviating the use of fixing studs, nuts and the extra metal for accommodating same.

The liner should be lapped out to a perfect fit with the piston when in the cylinder.

The three ports could be positioned in the cylinder in suitable flanges cast integrally for the purpose or the inlet port could be placed in the crankcase and operated via the crankshaft. I prefer the latter arrangement as the cylinder wall area is therefore increased with consequent longer life. If the inlet port is incorporated in the cylinder the usual rectangular shape should be modified to that shown in Fig. 2, thereby making opening and closing more gradual—this obviating to an appreciable extent gas shock and consequent condensation of fuel. Finning must be the minimum for running the required time without pre-ignition. Overcooling is wasteful from the power point of view in what after all is purely and simply a heat engine.

Crankcase.

Of light alloy, well ribbed round the main bearing housing for rigidity. The space inside should be filled as far as possible by the casting where moving parts do not sweep in order that the crankcase compression may be kept high.

The main bearing should be large and of a material suited to high speed and loading requirements. Chilled phosphor bronze has given excellent results in practice. It may be mentioned in this connection that I am at present making a main bearing lined with white metal 1·25 in. in length and ·4 in. in diameter. If a rotary inlet valve is employed the carburettor mixing chamber will be incorporated in the crankcase casting, and the bearing will receive ample lubrication from the incoming petroil mixture. If not, then provision will have to be made in the form of oil grooves in the bearing.

Crankshaft.

Should be machined from the solid. An admirable material is nickel-chrome steel. Whether the shaft is used for admitting the mixture or not it should be drilled out to as large a diameter as possible consistent with strength and plugged with aluminium to retain crankcase compression. The crankpin should be of ample diameter and drilled for lightness. A ballrace should be incorporated to take care of airscrew thrust. If the above points are watched there should never be reason for that old bogey—bent crankshafts due to crashes, nosing over, etc.

Connecting Rod.

Either dural or nickel-chrome steel will serve, milled out to I section and highly polished to reduce drag, and failure due to cracking. When of steel it should be bushed at the big end if not at both ends, phosphor-bronze once again being called for. If of dural then no bearing other than the metal of the rod is necessary. The steel rod may be machined down to a thickness of about one half that of the light alloy rod. A cross-section area 1/60th of that of the piston top will suffice for all normal requirements if the rod is of steel. In either case the length of the rod between bearing centres should be approximately twice the stroke, to give a reasonable connecting rod angle at the mid position of the crank.

Piston

Turned from high-grade cast iron. Its low coefficient of expansion and moderate specific gravity make it admirable for the purpose. It should be lapped to a push fit in the cylinder to give good compression without the use of rings. If carefully run in will take on a subtle finish unobtainable with other metals and will have a high resistance to " drying up " due to under lubrication. The deflector should be well faired into the piston top both on the transfer and exhaust port sides, and its height should be 5 to 10 per cent. greater than the depth of the transfer port. All sharp corners should be removed, preventing pre-ignition caused by hot spots, and the whole surface highly polished to ensure easy gas flow and prevent early forming of carbon deposit.

Carburation.

A carburettor of simple mixing chamber type will suffice provided that a shallow petrol tank is used. A deep tank will cause too great a variation in petrol level and necessitate the use of a float chamber. If carried on the cylinder a packing should be inserted before fitting the carburettor to minimize the flow of heat from the hot cylinder on stopping the engine—a frequent cause of bad starting when warm due to gassing of the fuel in the jet and fuel pipe. An intake of venturi form should always be used, though, regrettably many commercial engines are not so fitted.

While on the subject of carburettors I would like to point out a fallacy which exists regarding " super-charging." Placing the air intake in the airscrew blast will not cause an immediate increase in power but will result in overheating and possibly seizure for the following reason.

The carburettor depends for its action on a reduction in pressure in the region of the jet. Increasing the pressure on the inlet side will simply cause—at high speeds—the fuel to be forced back down the jet with a consequent falling off in power and overheating.

Only by coupling the source of fuel supply to the air blast by a pipe of approximately the same diameter as the induction pipe may this be mitigated.

A number of years ago I carried out several experiments on full-size two and four cycle racing engines. Without balance pipe the speed was reduced some 15 per cent., while with a cumbersome arrangement of balance pipes and careful adjustment of the carburettor the speed was restored to that originally obtained. The increase in induction pressure—even using a scoop of quite alarming proportions—was practically negligible, compensating barely for the extra weight of equipment carried. All this at speeds in excess of model speeds, varying between 40 and 100 m.p.h. Even if an appreciable increase in induction pressure could be obtained a host of troubles would follow in single cylinder engines due to pulsating caused by opening and shutting of the single inlet port.

Ignition.

Undoubtedly made easier by recent researches with small accumulators. Once again we are indebted to Mr. Russell and Dr. Forster. The contact breaker should be of rocker arm type. One point is particularly worthy of note. The distance from cam to point should be roughly 50 per cent. of the distance from cam to pivot. Careful adjustment of spring tension will ensure reliable action at high R.P.M. and avoid " cutting out."

So much research has been carried out by sparking plug manufacturers that the amateur would be lucky indeed to hit on a combination which would result in an increase in plug performance. I do not wish to discourage, indeed several discoveries have been made with the most meagre equipment, but merely wish to point out the difficulties. A reduction in size would certainly be an advantage, not only reducing the weight of the plug but also the mass of metal in the head to accommodate it. Insulation problems, with materials available, immediately present themselves.

One avenue for experiment exists. The power and smooth running of an engine are dependent largely on sparking plug position and the conventional central position is not the best in this respect. Using the form of combustion chamber mentioned previously the plug will, with advantage, be placed in the position shown in Fig. 1.

While realising that the above summary is necessarily abbreviated the writer trusts and indeed hopes that it may cause many enthusiasts to experiment for the ultimate betterment of this most fascinating of hobbies.

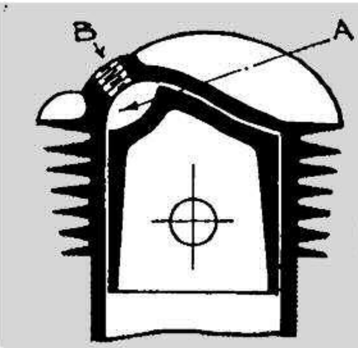


FIG. 1. SKETCH OF PROPOSED COMBUSTION CHAMBER.

A... SPACE AS NEAR SPHERICAL AS POSSIBLE.

B... SPARK PLUG HOLE OFFSET IN RELATION TO C/L OF CYLINDER.

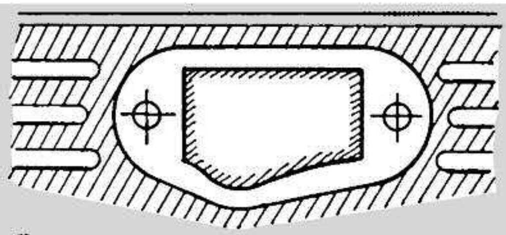
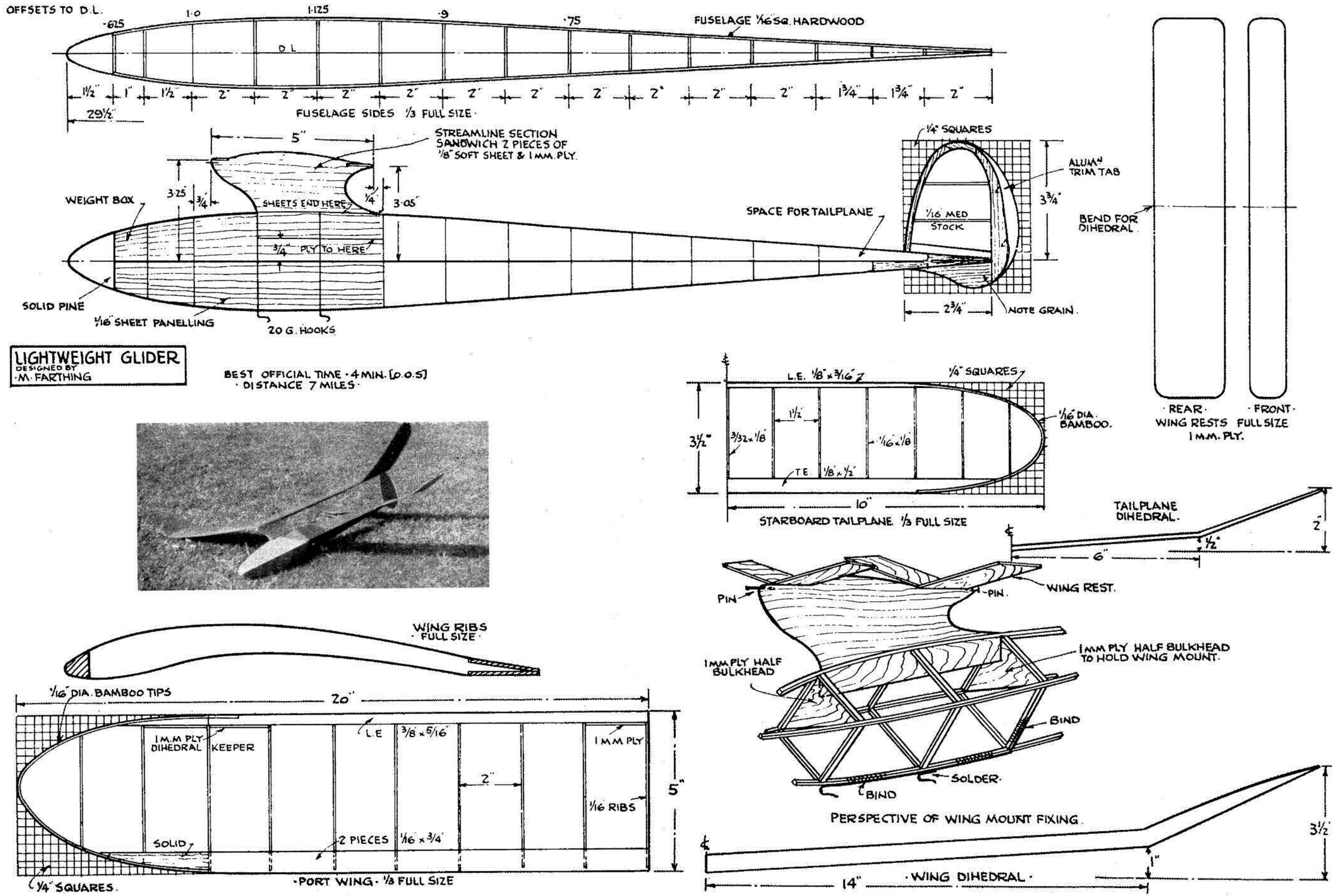


FIG. 2. SUGGESTED FORM FOR INLET PORT. EXISTING RECTANGULAR PORTS MAY OFTEN BE ALTERED AS SHEWN WITH IMPROVEMENT IN ALL ROUND PERFORMANCE.

LIGHTWEIGHT GLIDER
DESIGNED BY
M. FARTHING

BEST OFFICIAL TIME 4 MIN. [O.O.S]
DISTANCE 7 MILES



MIDGET MOTORS for $\frac{1}{72}$ Scale Models

H · A · HAMLYN & E · N · BRADLEY

THERE must be many solid scale-modellers who, having finished their latest bomber down to the last detail, have sat back and regarded it with pride mixed with a little dissatisfaction. If only the motors could tick over! So at least thought the authors, confronted with a really, well-made and finished, yet lifeless, short-nosed Blenheim. Could the propellers be made to run without flicking them? Could the model really come to life? To be brief, it could. It has, and already several spectators have been amazed at the sight of a perfectly normal 1/72 scale model, made from an ordinary kit, standing as though on the runway, twin motors slowly revving up from a tick-over to full throttle. No accessories are to be seen for they are all inside the engine nacelles and the only clues to the solution of the mystery are completely hidden by the tail-wheel—a pair of very thin lead-in wires, easily concealed.

The secret? Two tiny electric motors, one in each nacelle; tiny, but simple to make with ordinary care and patience and requiring little in the way of tools and materials. Each motor fits into a space roughly $1\frac{1}{8}$ in. by $\frac{1}{2}$ in. and can thus be fitted into many types of 'plane. The parts consist of a horseshoe magnet, electrically energised, together with an armature and contact maker on a spindle.

Details of construction are as follows:

The Magnet (Fig. 1).

An oval nail is bent into a horseshoe so that the sides are parallel with a $\frac{1}{4}$ in. gap between them with an overall length of $\frac{7}{8}$ in. This horseshoe is softened by bringing it to a bright red heat, preferably in a fire, and allowing it to cool as slowly as possible in the ashes, this ensuring that there will be no residual energy in the magnet when the current is switched off. After softening, the ends, or poles, are ground perfectly flat and smooth and any scale is removed. In the dead centre of the bend a small hole is drilled to a depth of 1/32 in. with a sharp drill a little larger than the diameter of the spindle, which is an ordinary sewing needle. This hole forms the back bearing, and must be cup-shaped to take the needle point.

Two small paper formers are made, one to fit snugly on each pole, and these are wound with No. 36 D.C.C. copper wire in 8 or 9 layers, each layer being of 40 turns, so that there is a gap between the two windings sufficiently wide to allow the needle to rotate. The windings are connected with a "cross-over," that is, one former is wound clockwise and the other anti-clockwise, while the wire which connects them must be left slack to clear the spindle. To test the magnet connect the two leads to a small battery and present the poles in turn to a small pocket compass. They must attract different ends of the compass pointer, one pole being North and the other South.

The Armature (Fig. 1).

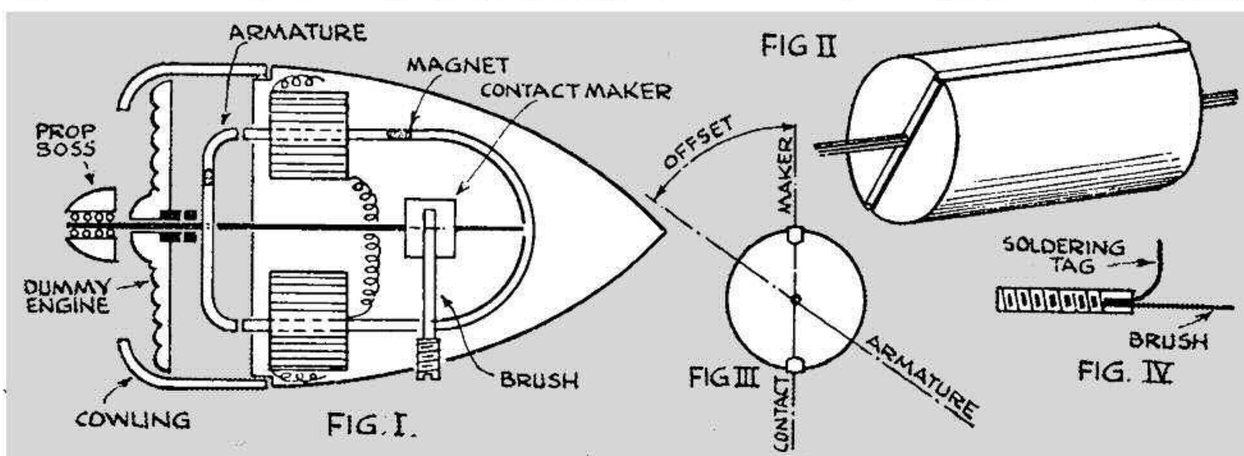
The armature is made from an oval nail cut and bent to the shape shown and softened in the same way as the magnet. It is drilled at dead centre with a hole to make it a push fit on the needle and must be so adjusted on the spindle that it just clears the magnet poles with the spindle right home in the back bearing. As soon as this position is determined the armature is soldered to the spindle and finally balanced for true rotation.

The Contact Maker (Figs. 1 and 2).

This must be well made and true running. In the original it was of ebonite rod, $\frac{1}{4}$ in. long by $\frac{1}{8}$ in. in diameter, drilled to a push fit on the spindle, but it has so little wear that hard balsa rod, sanded and doped, could be used. The surface of the rod is slotted in two diametrically opposite places, fitted on the spindle to clear the magnet windings and held in place by two bare copper wires which run along the slots and have their ends soldered to the spindle. These wires are then ground to a flat surface, almost, but not quite flush with the surface of the rod. The wires make contact with the brush as they revolve, and to ensure correct rotation their axis must be offset by about 60 degrees from the armature (Fig. 3).

The Brush (Figs. 1 and 4).

The brush is best made from a strip of $\frac{3}{8}$ in. phosphor bronze, 2/1000 in. thick by 1/16 in. wide, but springy copper or brass may be used. The brush is mounted in a slot at the end of a grubscrew and soldered firmly, a shorter length of the strip being mounted with it to act as a soldering tag for a lead. To avoid awkward insulation the brush assembly is not mounted on the motor itself but in the nacelle, and details come under "Assembly."



The Front Bearing (Fig. 1).

This consists of the original dummy motor, its rear side filed smooth and clean, and the bearing is made by forcing a small glass bead into the hole and then pressing the lead up to it to hold it tight. The dummy motor is then fitted into its cowling and held in place with four dabs of solder.

Assembly (Fig. 1).

The nacelles in the original model were already painted and hollowed, at the rear, for the retracting undercarriages. The wheels were removed, the cowlings and dummy engines taken off and the work done with the nacelles in place on the wings. To provide a cylinder of clearance for the spindle group they were drilled with a $\frac{1}{4}$ in. bit dead centrally till the hole broke through into the undercart hollow, and this $\frac{1}{4}$ in. hole was then enlarged by slotting down its sides till the whole magnet with its windings was a firm fit in the nacelle, the poles left protruding by 1/16 in. When the armature and spindle were dropped into their back bearing the contact maker was found to be visible in the under-carriage well, so that fitting the brush was a simple matter. The side of the nacelle was drilled with a hole slightly smaller than the grub screw so that it should cut its own thread, this hole being positioned by eye to bring the brush directly over the contact maker. The screw was then driven home, the brush adjusted by tweezers to ride smoothly over the contacts and the soldering tag bent upwards and clear of the brush. The brush must touch no metal part other than the contact maker or a short-circuit will occur.

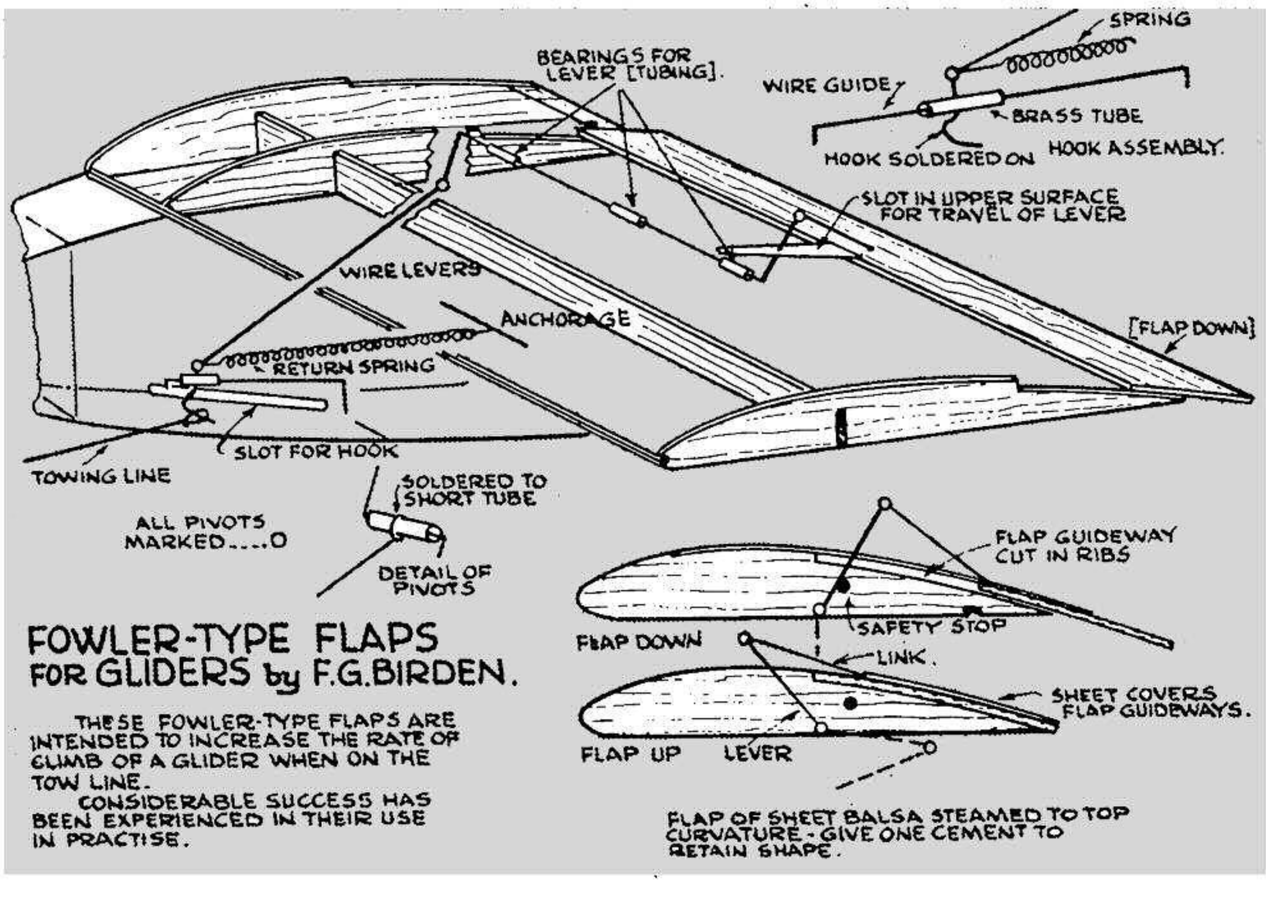
A bead was then slipped over the end of the needle, the front bearing in its cowling refitted and cemented into place and the end of the spindle was wound with fine wire and soldered till the original lead propeller was a tight fit. Finally the undercarts were replaced, and still had room in their wells for retracting!

The Circuit

The connections must be made before final assembly, but they are given last for simplicity. The magnets when wound have two leads. Of these one is soldered to the tag on the brush, the other being a main lead-in while the second lead-in is a wire soldered to the magnet itself. It is simple to trace the theory of the circuit; whenever the brush touches a wire in the contact maker a current flows through the coils of the magnet, energising them, so that the poles attract the armature. This rotates, breaking the contact at the brush until the second wire remakes it, giving a new impulse, the lead propeller helping with a good "flywheel" effect.

The motors are not self-starting, but they require only a touch of the finger to set them off. Remember they revolve anti-clockwise.

When two motors are used they must be connected in parallel; that is the leads from one are each connected to a lead from the other, the two joins thus obtained being fed by two further leads. In the Blenheim the motor leads run through slots in the leading edges, the main leads through a slot under the fuselage and the joins are in the cabin. All the leads are of No. 36 wire. The motors will run on a $4\frac{1}{2}$ volt battery, but 8 or 12 volts and a variable resistance give a range of speeds that is surprising.



FOWLER-TYPE FLAPS FOR GLIDERS by F.G.BIRDEN.

THESE FOWLER-TYPE FLAPS ARE INTENDED TO INCREASE THE RATE OF CLIMB OF A GLIDER WHEN ON THE TOW LINE.

CONSIDERABLE SUCCESS HAS BEEN EXPERIENCED IN THEIR USE IN PRACTISE.

THREE TROUBLE SAVING DEVICES

By H · SPEIGHT

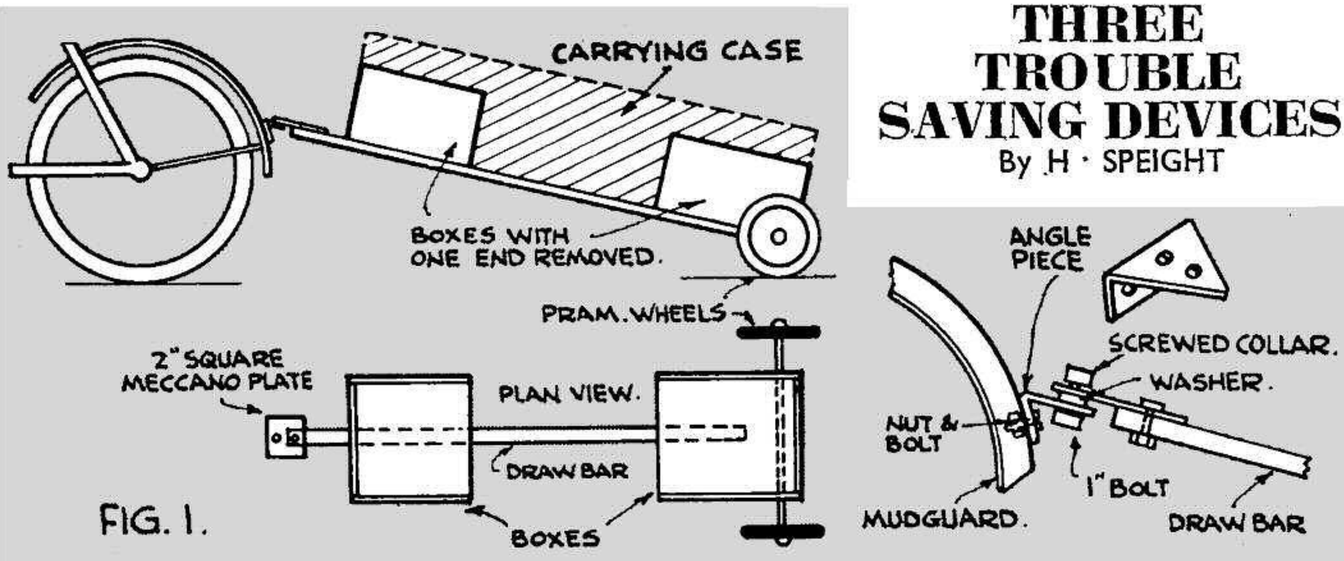


FIG. 1.

1. A Simple Trailer.

Materials: Two wooden boxes or materials for making same, 1 pair of pram wheels with axle long enough to take rear box, 1 length of broomstick or whitewood about length of carrying case plus 6 in. and 1 in. square, "Meccano" angle piece and flat plate 2½ in. square, 1 in. bolt, screwed collar and one plain collar, screws, nails, etc., as required.

The boxes should be just about the width of the carrying case and each should have one end knocked out.

The box that is to go at the rear should then be fitted on to the drawbar and the wheels fitted on the rear end of this box.

The other box is then fitted at the front end of the drawbar and the end of the drawbar securely fixed to the 2½ in. square plate.

Through a hole in the mudguard the nut and bolt which will hold the angle piece are fitted.

To connect up the trailer the 1 in. bolt is passed through the angle piece, the plain collar slipped on, the bolt passed through the square plate and finally the screwed collar is placed in position and secured to leave about ⅛ in. play.

2. A De-treeing Cane.

Materials: ⅛ in. ply about 6 in. square, lengths of bamboo cane or thick birch dowel, tubing as used for encasing electric wires in houses.

Cut the plywood to the shape shown in order to prevent damage to the model and also to get a good grip on the model.

The ply is fixed to one of the lengths of cane and the cane should be a tight fit into the tubing forming joints about 3 in. long.

A substitute for the electric light tubing is the fitments sold for joining lengths of garden hose.

3. A "One-Man" Winder.

Materials: One piece of ⅛ in. ply to make box, 2 eyelets screws, glue and string.

Build up the box from ply taking care to cut the small slot for the rubber peg in the front side pieces.

The false bottom is fitted to the box to give added strength.

The box is fastened by string to the most convenient tree or fence and the model slipped into the front slot and wound in the usual manner.

Take care that the string is strong enough to withstand the tension of the rubber motor.

When the motor is wound engage the freewheel, hold the prop. and the nose of the model with one hand, the other hand holds the box and the model is slipped out backwards, and the box can be dropped to the ground ready for the next winding.

If no trees or fences are available two pegs can be driven into the ground and the string from the eyelets secured to them.

If you are taking more than one model to the flying field make sure that the front slot in the winding box is large enough to accommodate your widest fuselage and that the rubber motor pegs are long enough to engage in the box slots.

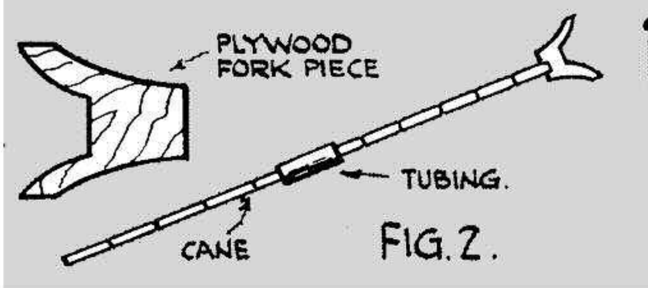


FIG. 2.

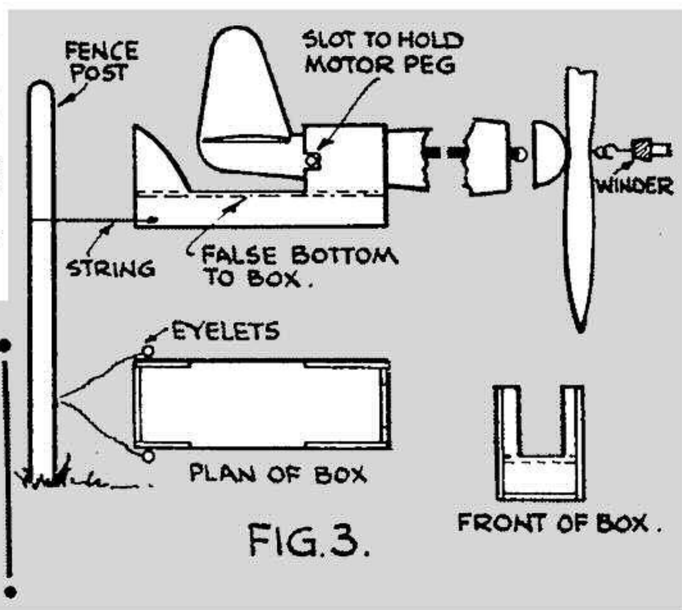
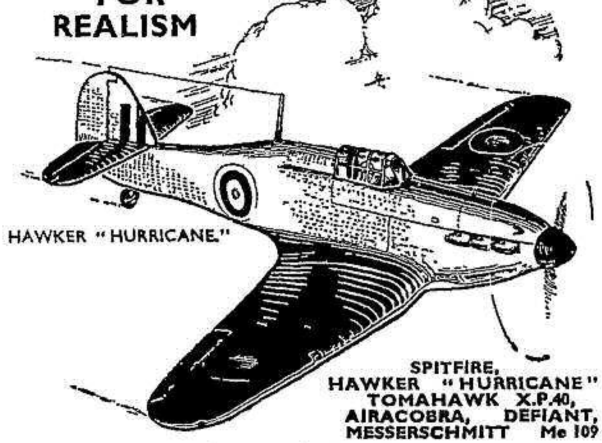


FIG. 3.

UNBEATABLE FOR REALISM



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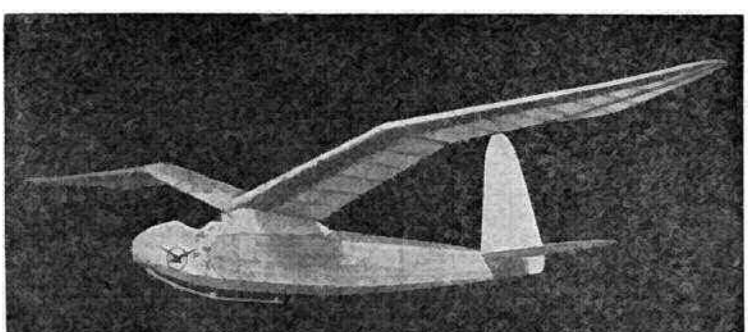

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PLANES THAT PLEASE

MONTHLY MEMORANDA

By O · G · THETFORD.

Halifax in New Guise.

Two improved versions of the Handley-Page Halifax II night bomber have gone into service with Bomber Command since the beginning of 1943. A much increased performance is obtained as a result of fitting more powerful Merlin motors of a later series and a general " cleaning-up " of the airframe. A modification in the armament, however, provides the readiest clue for the spotter as to the difference between the later Halifaxes and the old types, some of which are retained in service whilst awaiting modification. Operational experience has shown the nose turret to be largely superfluous on night attacks and this has resulted in re-designed noses, the Mk. II Series I having a " blacked-in " nose of the original type, and the Mk. II Series IA a completely new nose of transparent Perspex rather on the lines of the Baltimore nose. A single hand-operated Vickers " K " gun is installed here. The Mk. II Series I had no front gun and often operated without a dorsal turret. On the Series IA the large Boulton-Paul (" Hudson ") turret of the old Mk. IIs is replaced by a neater and smaller " Defiant " type turret. Rolls-Royce Merlin XXII motors replace the Merlin XX motors, and the old-type radiators and asbestos exhaust shrouds are abandoned. Minor airframe refinements include the removal of the aerial mast; smaller astro turret; semi-retractable tailwheel; shortened jettison pipes; blister in the belly for observing attacks from below; improved bomb-doors in the fuselage and centre-section and a new sort of night camouflage.

The new " night black " on the sides and under-surfaces is similar in appearance to the old " RDM 2," but the chief drawback of the latter, namely the rough finish, has been eliminated, resulting in less drag. This new paint is, of course, now used generally on all the night bombers and not restricted to the Halifaxes. A Halifax Series IA of the well-known " ZA " squadron, actually machine " X," is serially numbered BB 924. Another Series IA is numbered HR 674.

Operational Mods on " Spits."

Operational Spitfires have now been broadly classified into two categories: " low-level fighters " and " high-level fighters." The low-level fighters can also function as fighter-bombers with bombs slung beneath the wings for low-level " strafing " attacks on troop formations and centres of resistance. Both types are capable of carrying long-range fuel tanks beneath the centre-section.

Mk. V Spitfires are used for the low-level work, and to increase their performance at such low altitudes the wings have been clipped in a manner similar to that tried tentatively on the experimental Mk. IIIs. The Mk. VB Spitfires differ from the Mk. VCs in having only two shell-guns instead of four. Both types are in service with the 32 ft. 2 in. span wings. Squadrons flying Mk. VB Spitfires with clipped wings are " UF " " IR" and " FN."

Mk. IX Spitfires have the old-type wings but a modified form of tail assembly providing a readily-observable spotting difference. The fin and rudder are more pointed and of higher aspect ratio in order to improve directional stability and control in rarefied air. These are flown by " FY " squadron in this country, amongst others, and by many units in the Tunisian area, these machines having tropical radiators in addition.

The Avro Lancaster I—appears to be very popular with solid modellers these days. The example above is by A.T.C. Cadet D.S. Robinson of Keresley, Coventry.

Thunderbolts and Typhoons.

Amongst the many rapidly-forming squadrons of Thunderbolts and Typhoons in this country are squadrons " LM " with the American type and " PR " with the Typhoon. The new Typhoon squadron formerly flew Spitfires from a station in Scotland. Squadron " LM " has the letters painted ahead of the fuselage star in yellow and an individual recognition letter is painted aft. Thunderbolt LM-R has the U.S.A.A.F. number 27970 painted in yellow on the fin. Another squadron of Thunderbolts have a different system of marking employing a three-figure numeral in white beneath the cockpit differing on each machine. The identification numbers run from 250 to 276. Thunderbolt 264 from this unit has the service number 16209 on the fin. Since it is a flight leader, white bands are painted across the horizontal and vertical tail surfaces.

Hospital Bombays.

Hospital versions of the Bristol Bombay I bomber-transports built by Short and Harland for Middle East service have a rather interesting marking above the wings. It consists of a large red cross with a white border covering the entire centre section, i.e. the span-wise components spreading from one nacelle to the other. Apart from this, normal service roundels and desert camouflage are carried.

U.S. Markings Altered.

Yet another change has been made in the official United States Army Air Forces insignia. It has been found as a result of operational experience that the existing type of U.S. marking is readily confused both with German and Japanese markings in the heat of battle and the new marking is to obviate this difficulty. As yet only a tentative description has been issued and it is hoped that more complete details can be given in a future issue. The official U.S.A.A.F. description of the new marking, as announced in July, 1943, is as follows: " A five-pointed star on a circular field of blue, with a white rectangle attached right and left of the circle, the whole surrounded by a red border."

AEROPLANES DESCRIBED VIII

by H · J · COOPER

THE FAIREY FANTÔME

NEXT MONTH:
The Focke Wulf Fw 56 Stösser.

"FLIGHT" Photograph.

THE Fairey Fantôme (or Phantom), single-seat fighter biplane was built to compete in the International Fighter Competition organised by the Belgian Government in 1935, and at that time was considered to be the fastest multi-gun aeroplane in existence.

The Fantôme was evidently a development of the Firefly fighter, a number of which were supplied to the Belgian Army Air Service. The new machine had a generally cleaner appearance, with faired and spatted cantilever undercarriage, and was considerably faster, its maximum speed being then estimated at something over 250 m.p.h. Unfortunately the British Air Ministry did not entertain the acceptance of the design, otherwise the Fantôme might have been a regular R.A.F. fighter. As it was, the Gladiator, which was typically similar, was accepted for issue to the squadrons, and although perhaps not quite so nice looking from an aerodynamic point of view, has taken some heavy knocks in this War.

The Fantôme put up a splendid performance at Evère Aerodrome, Brussels, during the Competition, but a low dive at maximum velocity resulted in the machine crashing into the ground and the death of the pilot, Mr. S. H. G. Trower.

The "Avions Fairey" Company of Gosselies, the Belgian branch of the Fairey Aviation Company, produced large numbers of Firefly and Fox biplanes between the time of its formation in 1931 and May, 1940, and further development of the Fantôme was carried out by them. A new machine, known as the Féroce (Ferocious), was built and externally was identical with the earlier machine. One machine was supplied to the British Air Ministry for experimental purposes, and two others were supplied to the Soviet Union.

The Fantôme was of all-metal construction, the wings and rear portion of the fuselage being covered with fabric, and the forward portion of the fuselage with metal plates. A Hispano-Suiza 12Ycrs liquid-cooled motor of 925 h.p. was fitted.

Armament consisted of a 20 mm. Oerlikon *canon* mounted between the cylinder banks of the motor and firing through the airscrew boss, and four ·303 Browning machine guns, mounted two above the motor cowling and one in each lower plane. The two inner machine guns were synchronised to fire through the airscrew disc and the others were outside the arc. Four 10 kg. (22 lb.) bombs could be carried beneath the lower wings.

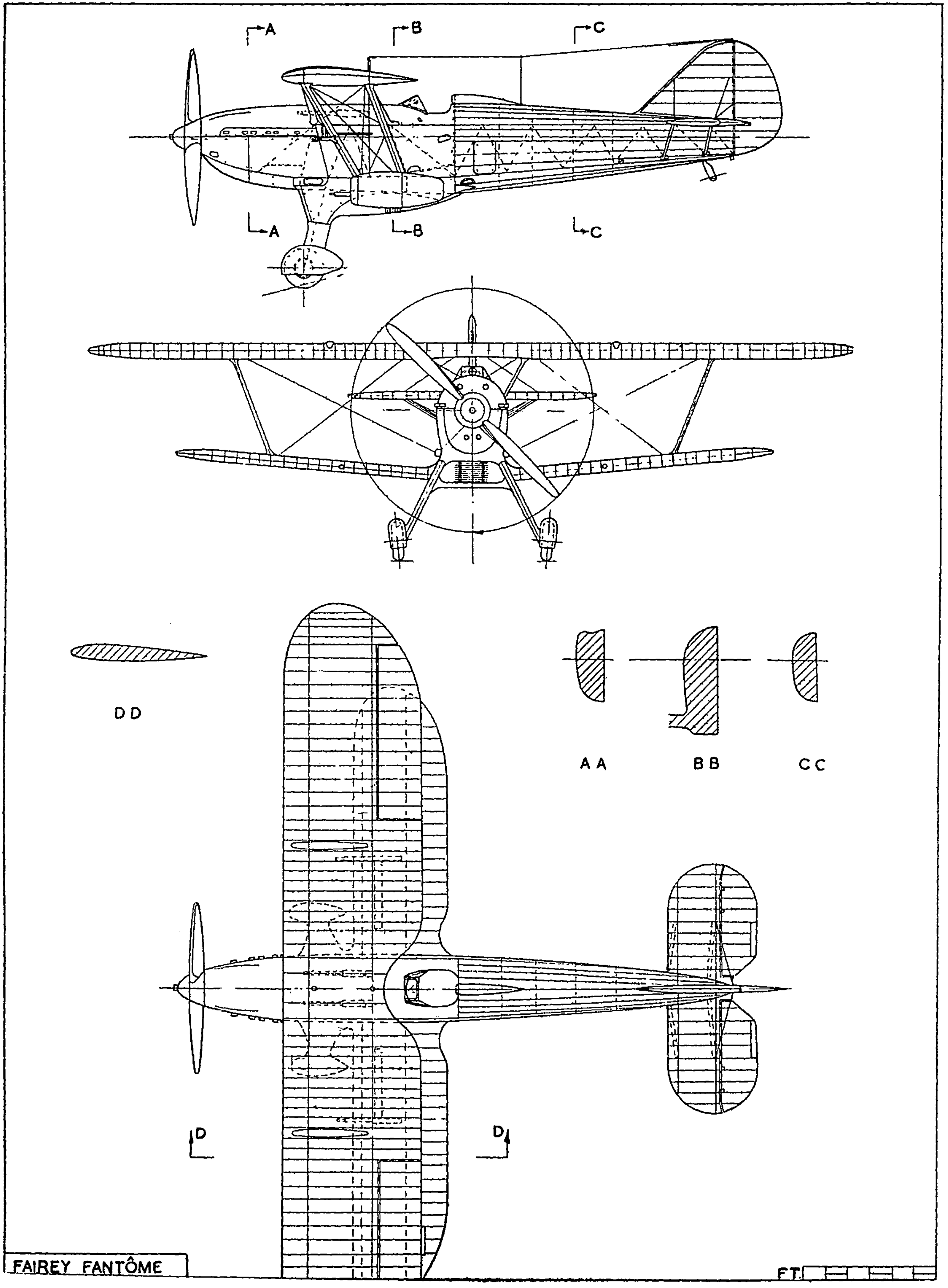
The Féroce had a maximum speed of 270 m.p.h. at 13,000 ft.; at ground level the speed was 223·5 m.p.h., and the landing speed was 60 m.p.h. The climb to 13,000 ft. occupied 4½ minutes, and the ceiling was 36,000 ft. At its operating speed of 217 m.p.h., the Féroce had a duration of 2 hours (435 miles).

The all-up weight was 4,120 lb.

The following dimensions apply to both machines: Span (upper), 34 ft. 6 in.; (lower), 27 ft.; chord (upper), 7 ft. 3 in.; (lower), 4 ft. 2 in.; length, 27 ft. 6 in.; track, 6 ft. 6 in.; tailplane span, 11 ft. 2 in.; chord, 3 ft. 11 in.; gap at centre-section, 4 ft. 10½ in.; gap at interplane strut, 4 ft. 2 in.; airscrew diameter, 11 ft.

The prototype Fantôme was coloured silvery grey all over and carried the civilian registration letters G-ADIF in black outline letters. The Féroce supplied to the R.A.F. in 1938 was similarly coloured and carried red, white and blue roundels on the wings and fuselage.

"FLIGHT" Photograph.



FAIREY FANTÔME

Club News

BY . . . CLUBMAN

WING COMMANDER PELLY-FRY, D.S.O.
Born Kings Langley, 1911. Home in Colombo, Ceylon. Educated Douai School, Berks. Commissioned in R.A.F. Reserve of Officers in 1933. Appointed Wing Commander in 1942. Mentioned in despatches, March, 1941.

"On the 6th December, 1942, a force of bombers was detailed to make an attack in daylight on the Phillips factory at Eindhoven. The operation, which was executed faultlessly, demanded a high degree of skill and accurate timing. Bombs were dropped at varying heights down to roof-top level. Many hits were obtained, some in the centre of the target area. Two gun posts were silenced. Intense and heavy opposition was encountered and both on the outward and return flights attacks were made by enemy fighters. The great success achieved reflects greatest credit on the following personnel, who participated as leaders and members of aircraft crews : " (thirteen awards, including Pelly-Fry).

WELL, well, what do you think of Pilcher Cup day ? A peach, wasn't it. From all accounts, fine weather was experienced everywhere, and some remarkable times were put up. I was able to get the results into last month's issue at the last moment, but unable to comment, so here goes.

A record entry of sixty-one was received from thirty clubs (still too small a percentage from over one hundred affiliated clubs !), and Mr. J. Marshall, of Hayes, is to be congratulated on his fine win. To aggregate over sixteen minutes for three flights is jolly good going at any time, and for gliders exceptionally good.

However, that is not all, as a number of extremely good flights were put up by other than the winner. W. Weight, of Harrow, flying an "Aeolus," set up a time of 13 : 49·2, and A. Impey, of Luton, made 10 : 26·4. Marshall's best time was 12 : 32, and many more tip-top flights must have been made as can be seen from the total times put up by the first twelve placemen. It remains to be seen what records claims are made, as it is certain that some models do not line up to record standards.

It is still not possible to state the position of clubs in the Plugge Cup contest, as the whole system of points allocation must come before the Council. However, I think I am right in saying that Merseyside still lead, with Bushy Park following behind. I shall be pleased to see the position clarified, as it is no joke for clubs to be in the dark on such an important matter.

What about that new list of clubs mentioned in the July issue ! ! In spite of my earnest plea, I doubt if 50 per cent. clubs have troubled to notify their existence. This is your last warning—and don't grouse when your name is not included in the final register.

I have received an interesting letter from the secretary of the Auckland (New Zealand) M.A.C. Apparently they are much better off for materials over there, and apart from a large number of their best members being with the R.A.F., they still seem to be able to get along well. Gliders are coming in for more attention, and from all accounts much attention is devoted to the more unusual type of model, as from the report I see that 17 records were broken in the past season, mainly in the R.O.G. and *R.O.W.* classes. We don't hear much about R.O.W. work over here nowadays, but the new book shortly to be published should do much to stimulate interest in seaplanes and flying boat models.

I hear there is some agitation for a lifting of the ban on the flying of petrol models, and whilst I personally would like to see such restrictions taken off, I would warn readers that it is definitely against regulations to fly a petrol model at the moment. Whatever arrangements can be made by the S.M.A.E. will require careful consideration, and I do appeal to all readers not to jeopardise the chances of future flying by breaking the rules now. It won't hurt to wait a further period, and can only do the whole movement harm if inconsiderate modellers will not wait for the word to go. So, a bit more patience, and let's hope the present ban will be eased if not entirely lifted. Boy, am I waiting to get my fingers on a nice hot plug again !

The BLACKHEATH M.F.C. Open Day was a great success. The day opened with strong wind and heavy cloud, while the early proceedings were enlivened by a display of low flying by the R.A.F.—not for the club's benefit but to amuse the Home Guards. Officials however took due credit ! ! The wind blowing into the hillside took heavy toll of models, as results testify. Only one competitor—the winner—managed to trim his glider to soar over the valley—others bowled out of sight over the hilltop in well under the minute.

The most notable glider was not entered in the contest—being a beautiful 43 oz. heavyweight by G. Dunmore, of Leicester. The builder explained that this "limit span" job was built in 255 working hours, and that wings had been designed to stress formulæ as article in THE AERO MODELLER of a few months back. There was automatic aileron and fin control worked from the tow hook, and micrometer elevator adjustments. Built up wings in best George Temple manner comprised 1,500 units.

After lunch the venue was shifted to the other side of the slope and better times recorded for the rubber models. It was not a day for lightweights, and though Mick Farthing got away to one good flight, he could not repeat the performance. Mr. Bell's masterly handling of a Baby Gnome (he placed 11th) showed, however, what could be done with a lightweight in the hands of an expert. (It should be added that he expressed fears for his reputation for turning up with such a "babe"—but it was the opinion of onlookers that its performance showed rather the contrary.)

H. Austwick's winning model was a streamlined shoulder-wing Wakefield—that bore all the hallmarks of the Lees-Stott-Halifax school of design. It had only been finished a day or two before and sailed off into the blue on its maiden flight—unfortunately not as yet recovered. Buxton, of Luton (the second prize-winner), was the only lightweight in the winners' list. (Is that same Buxton formerly "mechanic" to Mick Farthing, of Croydon ?)

The finish of the Team Contest was marred by rain, and some flights were not flown off in consequence—though whether they would have altered the first two placings is open to doubt. D. Lofts, who had flown very consistently in the previous event, achieved a well-merited victory for the Northern Heights team with his one flight, as well as the prize for best rubber flight of the day. He was flying his well-known "Lofty" shoulder-wing Wakefield, with all the confidence of an old campaigner.

Many old friends of Faireys days and way back were present. Notable amongst them were Messrs. C. Burchell, Edgar Westbury, L. J. Hawkins, Bob Copland, A. G. Bell, H. J. Towner, and many more besides, not to forget "Rip," without whom no function would be complete. It was very welcome to receive such support from distant clubs—Birmingham, Halifax, Darlington, Leicester, Slough, and the solid support of most of the active London clubs.

As to the results, the organisers were very pleased to see a fair share of the prizes go to the men who had travelled farthest to get them, while, unlike so many contests where luck decides the winners, it gave great satisfaction that what were undoubtedly the best designed and flown models secured the leading positions. Results were :—

Gliders.	
A. H. Taylor (Bushy Park)	219·6 secs.
G. Richards (Northern Heights)	96·5 ,,
G. Dunmore (Leicester)	75·7 ,,
Duration.	
H. Austwick (Northern Heights)	336·1 ,,
— Buxton (Luton)	230·9 ,,
— Bushell (Birmingham)	230·7 ,,
Team.	
Northern Heights	344·0 points
Bushy Park	287·7 ,,
Harrow	242·5 ,,
Best Flight of Day.	
(Glider) A. H. Taylor	114·4 secs.
(Rubber) D. Lofts	344·0 ,,

The WHITEFIELD M.F.C. have apparently come out of their winter hibernation, as I hear of some varied activities recently. Weather of course has not helped a lot, though some good flying was seen on the one day of summer enjoyed to date. R. Duncan put up some very good times with his biplane, clocking 41·9 secs. This club suggests the following compulsory rules for all flying grounds :—

(a) No females or dogs allowed on the field.
(b) No little boys allowed to ask "Does it fly, Mister ?"
(c) All winders to be tied to a peg in the ground.
(d) All downthrust to be cemented in.
(e) A special trophy for all those terrific flights made when no official timekeeper is on the job !

A member of the PLYMOUTH AERO-MODELLERS has lost his model glider that won him second place in the Bristol Wings for Victory Exhibition. Over six feet span, the model was silver doped, with the word "Gremlin" in red on the nose. Any information will be gratefully received.

After many Sundays of high winds, the CARDIFF M.A.C. were lucky on Pilcher Cup day, the weather being ideal. In spite of lack of experience with gliders, the following times were set up :—

T. A. Lewis	222·1 aggregate.
P. Linsel	200·8 ,,
G. Ferrier	189·0 ,,
A. Sheen	162·3 ,,

As there is no club within easy distance, W. G. Marney, of 47, Days Lane, Sidcup, Kent, wishes to form a club in that area, and would appreciate anyone interested getting in touch with him right away.

Roy Gallagher, of the BRADFORD M.A.C., pulled off a hat trick by winning the "Zenith Cup" recently, his time being 3 : 09. Brother F. M. placed second with 2 : 38, and J. London third with 1 : 49·2. The winner's feat is all the more outstanding when we find that he flew a super-lightweight on a windy day on the Yorkshire moors !

Another bunch to use said moors was the ILKLEY M.A.C. on the occasion of their Open Rally on the 18th July. A dull morning turned into a bright but breezy afternoon, and the twenty competitors were hard put to it what with wind and spectators. The open duration event attracted the greatest entry, in spite of rubber shortage, and H. Tubbs, of Leeds, made the best flight of the day with 2 : 46 o.o.s. C. Furse, of Leeds, put in three steady flights to gain second place to J. Townsend's Wakefield model. H. Hayes made a fine flight of 119 seconds with his

Members of the Worcester M.A.C. at their recent rally.

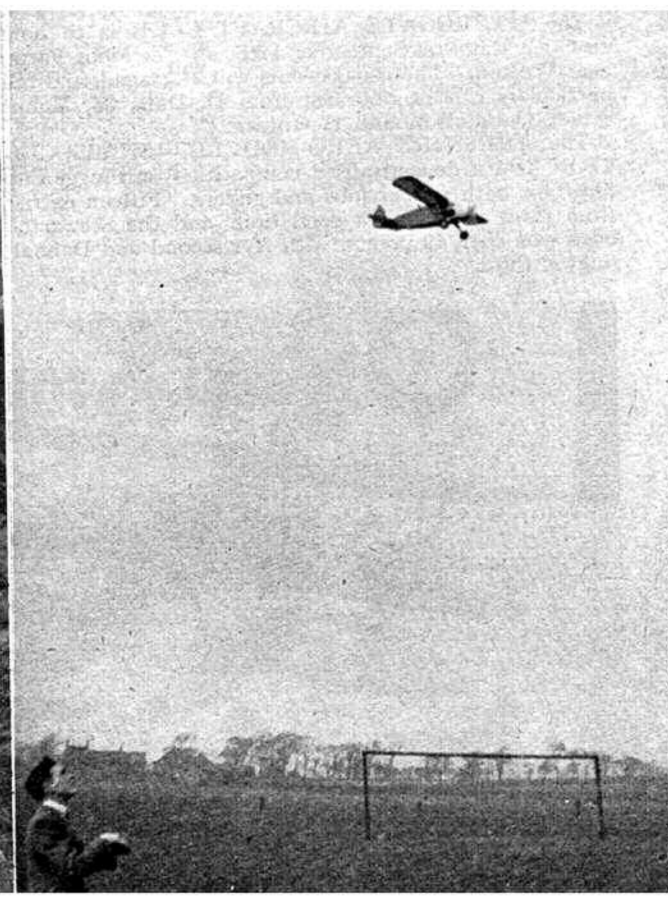
"King Falcon" in the gliding event. Full results were :—

Gliders.		
H. Hayes (Unattached)	168·7	aggregate.
J. Townsend (Ilkley)	76·2	,,
H. Tubbs (Leeds)	23·1	,,
Duration.		
J. Townsend (Ilkley)	182·8	,,
C. Furse (Leeds)	167·4	,,
H. Tubbs (Leeds)	166·0	,,
Nomination.		
P. G. Bell (Ilkley)	43·0	,,

H. Tubbs, of the LEEDS M.F.C., had bad luck when his model "Puffin" flew o.o.s. after 23 : 13·6, after the contest for the Pilcher Cup! Not content with this, he lost another model three weeks later with a time of 6 : 46, unfortunately unofficially timed, so it cannot stand as a club record.

July 18th seems to have been a regular field day for all clubs, and the LANCASTER & MORECAMBE M.A.C. had three "King Falcons," two "Atalantas," two "Ivory Gulls," and six "Aegeous" on show !! Flying from their ground at Bolton le Sands (really down to sea level), J. P. Swindlehurst lost his "King Falcon"

Geoff Dunmore of the Leicester M.A.C. at the Blackheath Rally. He placed third in the glider event, but kept his best model for a later date!



J. D. Arden of the Ashton & D.M.A.C. anxiously watches his scale model Fairchild Ranger coming in to land.

How's this for tip-top modelling plus photography? The model, a Typhoon Ib built from "Aeromodeller" plans, was constructed by A. F. Woollett of Yalding and photographed by his brother.

after 4 : 15, the model making its way over Morecambe Bay, never to be seen again.

The HAYES & D.M.A.C. is still going strong, and one of the old sweats, J. Marshall, has won both the Weston and Pilcher Cups with the same model. Among the newer members, J. Wassall, flying in the M.E. No. 2 Cup, flew his model o.o.s. in 5 : 30, the model being recovered from Swanscombe, Kent, over thirty miles away.

The Gala Day staged by the WEST YORKS. M.A.S. was held in fair weather, and H. Austwick, of Halifax, had a real birthday, winning both the H.L. and R.O.G. competitions with his streamlined Wakefield job. Full results were :—

H.L. Duration.

H. Austwick (Halifax)	4 : 59 aggregate.
J. Townsend (Ilkley)	3 : 12 ,,
D. Blatch (West Yorks.)	2 : 04 ,,

R.O.G. Duration.

H. Austwick (Halifax)	3 : 24 ,,
J. Townsend (Ilkley)	2 : 30 ,,

The HARROGATE AIRCRAFT CLUB is to hold an Open Rally on September 12th, at Low Moor Farm, near Weeton. The usual events will be staged, and full particulars can be obtained from D. Dale, 35, Mount Street, Oatlands Mount, Harrogate.

The AYRSHIRE AERO-MODELLERS' ASSOCIATION held a de-centralised competition on Plugge Cup lines, for both rubber jobs and gliders. Fifteen entries from three clubs had a good time, and the Stewarton boys won with 49 points, with Ayr second and Dalmallington third.

STREATHAM AERO-MODELLERS are to hold an Open Day at Epsom in September, exact date to be noted later. Club secretaries will be notified by post.

Members of the HARROW M.A.C. went to Chobham Common to fly with the Hayes chaps for the Pilcher Cup, and I am told that the thermals were really ripe. As noted earlier, W. Weight flew his model away for 13 : 19·2, while S. Bradshaw had the bad luck to clock 17 : 55 *after* making three normal flights in the competition. However, he had his chance at the Croydon meeting, when he came second in the glider event with two flights of 4 and 6 minutes o.o.s.

J. Webb, of the ANDOVER M.A.C., raised the club record from 2 mins. to 3 : 40 with a "Zenith" model.

During the past six months, the UXBRIDGE M.A.C., meeting at Swakeleys School, Ickenham, has maintained an interesting programme for the benefit of members.

Apart from regular practice indoor flying in the hall of the School, the second part of the indoor programme, from January to May, included the following items :—

A talk on microfilm models.

Two "Question Nights" (on model and general aeronautical subjects).

An R.T.P. indoor flying contest.

A drawing contest.

A talk on the design of full-sized aircraft.

A competition for non-flying scale models.

A design competition (members' designs for a full-sized single-seat fighter).

Scale general arrangement drawings showing also the internal layout of the proposed aircraft were required for the design contest, which attracted some unusual, yet sound, designs. A snappy biplane and a neat monoplane with shaft-drive tied for first place.

The STEWARTON M.A.C. had an inter-club meeting with the Ayr and Edinburgh groups, the winner being H. Wardell, whose "Percy" clocked an aggregate for three flights of 3 : 47·4. R. Burns came second, flying a glider to aggregate 3 : 22.

Three nice solids by B. Malkinson of West Bridgeford and exhibited in a local show

Another inter-club affair was that staged by the YNYSYBWL M.A.C. with the Mountain Ash M.A.C., the latter winning by 268 to 256 points. Best flights were made by D. Bartlett (Mountain Ash) with 98 secs., and T. G. Leek (Ynysybwl), 67 secs.

K. G. Griffiths, of 10, Willow Road, St. Helens, Lancs., would like to correspond with a fellow aero-modeller about his own age—13 years.

A newly formed club is the RUNCORN A.F.C., secretary being S. Green, of 11, Halebank Road, Halebank, Widnes. Any modeller in that area is welcomed to the club.

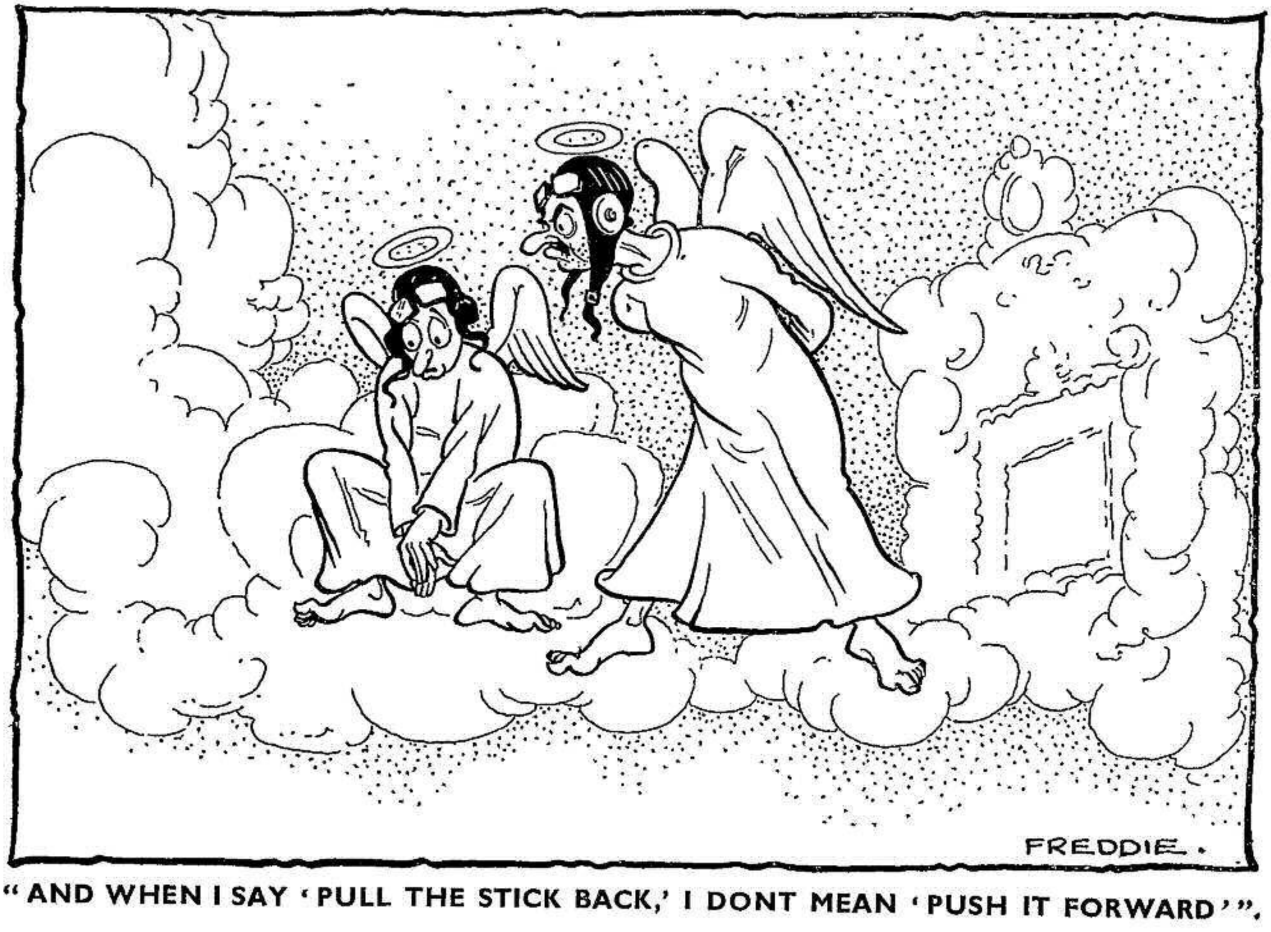
WANTED: Compressed air motor and tank—also any oddments of rubber!! F. H. Donn, The New Palace, Tetbury, Glos.; 1 pair 2½ in. or 3 in. air wheels, and one pair 2 in. or 2½ in. celluloid wheels. C. Chaplin, Beckthorns, Keswick, Cumb.

DISPOSALS: Technical library. M. G. Page, 107, Stonor Road, Hall Green, Birmingham, 28; New Elite "Airbourne" glider, G. Riches, 43, Shalimer Gardens, Horn Lane, Acton, W.3; New "Miles Kestrel" (not flown), 1 in. scale, D. Rodger, 224, Lancaster Road, N. Kensington, W.11; 9 c.c. Hallam engine (minus plug), 1235248 L.A.C. Fowler, Block H, Room 2, R.A.F., Waterbeach, Cambridge; 7 c.c. engine and 6 ft. span model Wasp, S. W. Elliott, 38, Prairie Road, Addlestone, Surrey.

And that, my little chickadees, is that for another month. Let's hope the weather keeps as good as the news, and keep 'em flying. As Frank Zaic would say—"If all the aero-modellers in the world were laid end to end . . . boy, would a steam roller be handy!"

The CLUBMAN.

"They're off." Boys of the Blackheath Club find a new use for the starters box on Epsom Downs.



"AND WHEN I SAY 'PULL THE STICK BACK,' I DONT MEAN 'PUSH IT FORWARD'".

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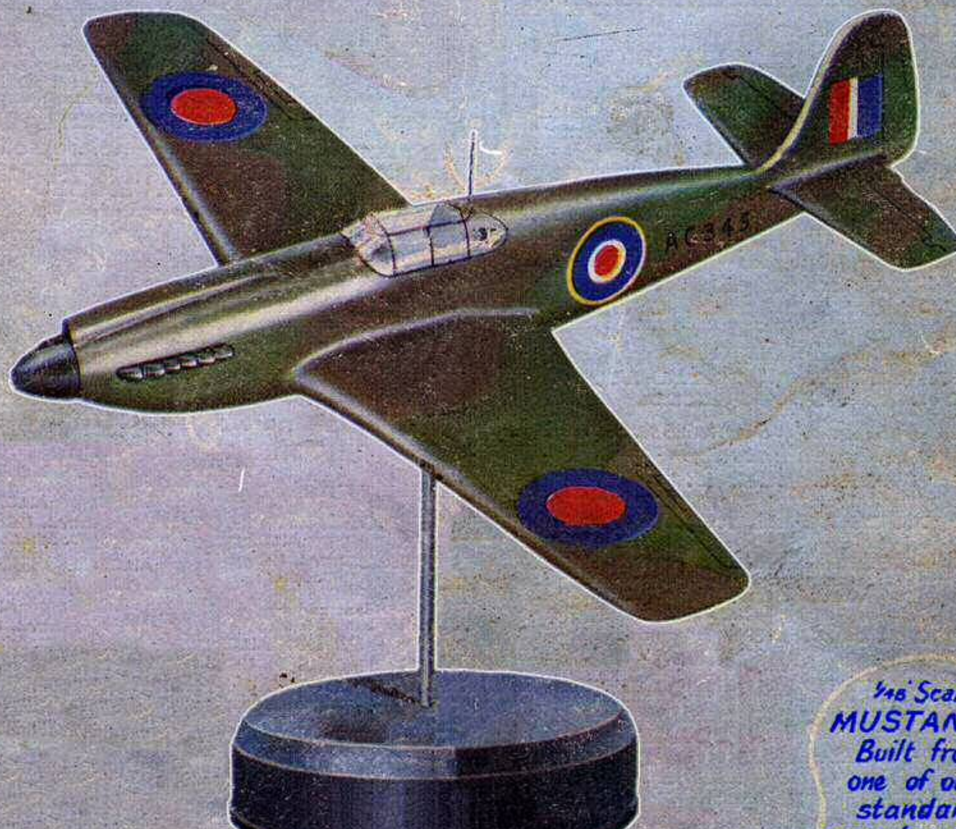

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