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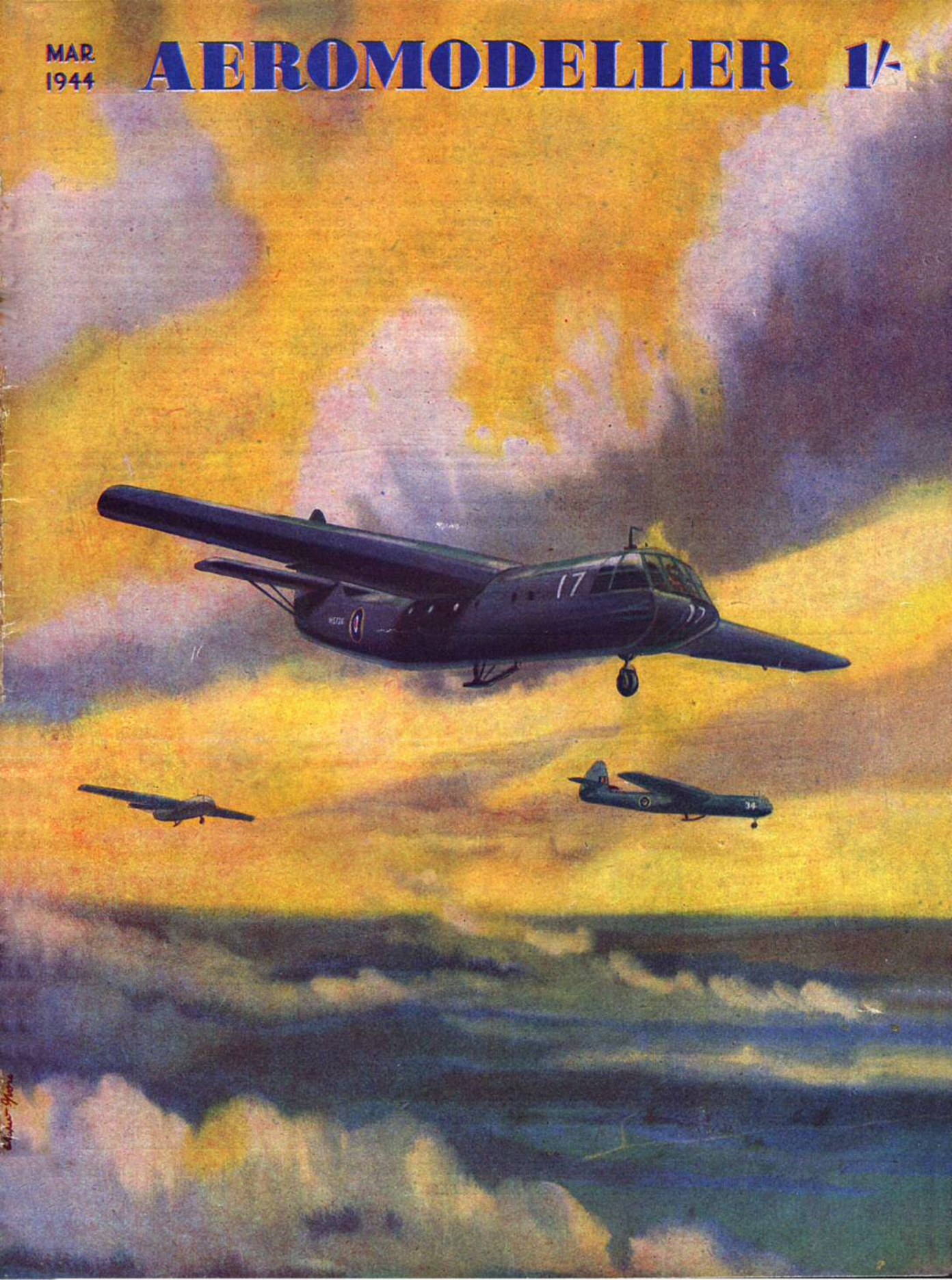
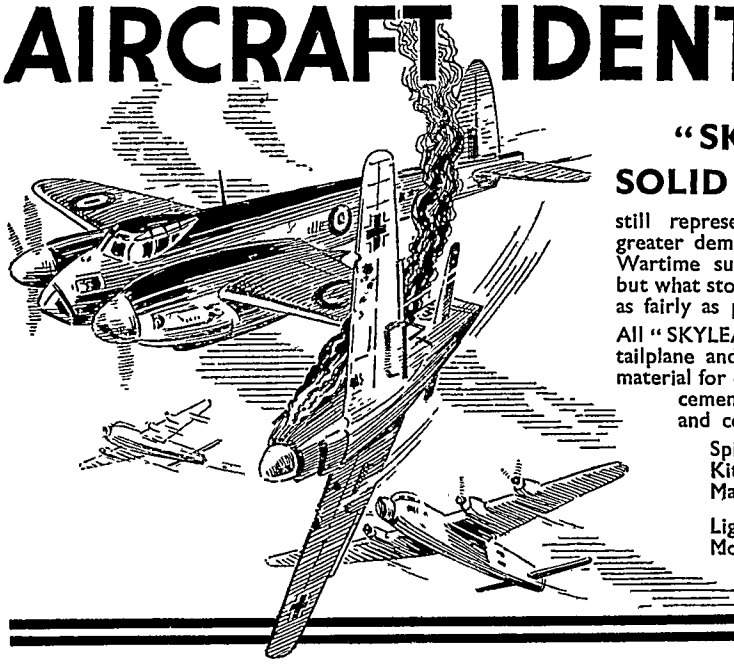


AIRCRAFT IDENTIFICATION



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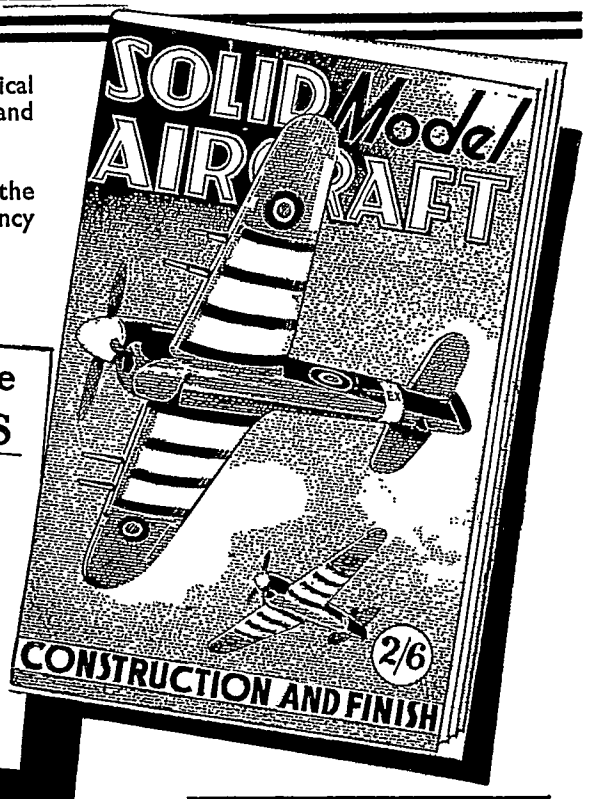

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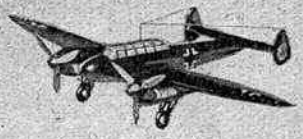

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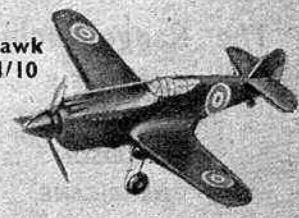

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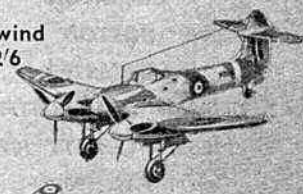

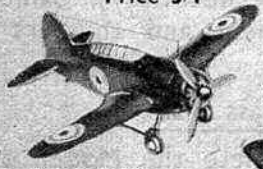

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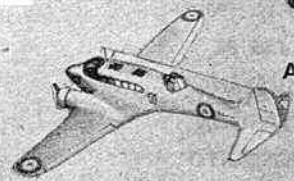

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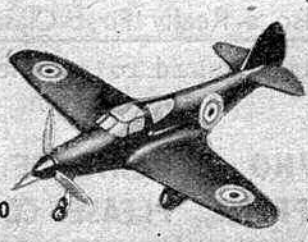

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The Model Aeronautical Journal of the British Empire

Established 1936

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EDITORIAL

AS promised, we have reinstated the feature "Readers' Letters," which we trust will be of interest. We would remind readers that letters should be of general interest to other readers . . . also that we do not publish anonymous communications. We mention this because there exists a very small minority of readers who think it clever to write in curiously worded letters, generally ending up with "I dare you to print this letter," and giving no name and address! These odd letters, of course, offer criticisms—why it should be supposed that we do not welcome criticisms is difficult to understand. A magazine thrives on criticism, advice and suggestions, but there is no need for such to be offered anonymously or rudely. When considering any matter for publication, an Editor has always to endeavour to satisfy the greatest number of readers, and these odd folk who send us such curiously worded letters should realise that they can have little interest to the vast majority of our readers. Constructive criticism and suggestions are always welcome and carefully studied.

MSS. Plans and Photographs submitted by Readers.

Readers are earnestly requested to take note of the following points when submitting MSS. etc., with a view to publication in the AERO MODELLER:—

Articles and descriptive literature should be typewritten if possible. Double spacing should always be employed. If MS. cannot be typed it should be clearly written in ink. The title and name and address of the contributor *must* be clearly printed in Block Capitals on page one. All pages should be numbered and titled. The number of words should not normally exceed 1,500. Any diagrams for inclusion in the text should be clearly marked and have the contributor's name and address on the back.

Plans, drawings and sketches must be clearly drawn as large as possible. Every detail appertaining to the subject should be included.

Negatives should always be sent in with any prints submitted. These will be returned to the sender when finished with.

Prints should always be glossy. Grained art paper of any kind should never be used. Negatives should have a paper attached with the name and address of the contributor, and the title of the article to which the photographs apply.

Prints should have this information written on the back.

The Editor and his staff are pleased to endeavour to answer readers' queries, provided they are accompanied by a stamped addressed envelope. Queries or letters requiring an answer not accompanied by an S.A.E. cannot be dealt with.

Balsa! O My Balsa!!

We continue to receive letters from readers revealing hidden sources of supply of balsa!

From Mr. Curry, of London, we hear that he has come across cigar boxes made of balsa, one such was constructed of ⅛ in. thick material, from which he obtained two lengths 9 in. by 4 in. and four pieces 9 in. by 1½ in.—enough to build quite a substantial "solid"!

From Mr. Walford, of Eire, we hear that he has seen 12 in. rulers made of medium grade balsa; whilst from a reader who signs himself "R. M." we recently received a sample of excellent grade balsa, which he had cut from a piece 2 ft. by 5 in. by ⅛ in. thick (Golly)! He took this from a tea chest which had come from India. "R. M." says that he has omitted his address lest he is besieged with enquiries for the name and address of his employer!!!

Finish of Solid Model Aircraft.

An interesting point with regard to the finish of solid models has been raised by a reader, who points out that types of military aircraft in service are not the immaculately turned out jobs that model builders would seem to think. It is argued that for models to be true replicas, squadron letters should be painted over, walk ways on wings should be shown worn, cartridge shoots should be smoke stained, and there should be a number of dents, scratches, repair patches, etc., indicated on the model. Admittedly these details would be hard to indicate on 1/72 scale models of the smaller aircraft, but certainly they could be shown on models of twin and four-engine bombers. We, personally, feel that this is a sound point, and wait with interest to see the results

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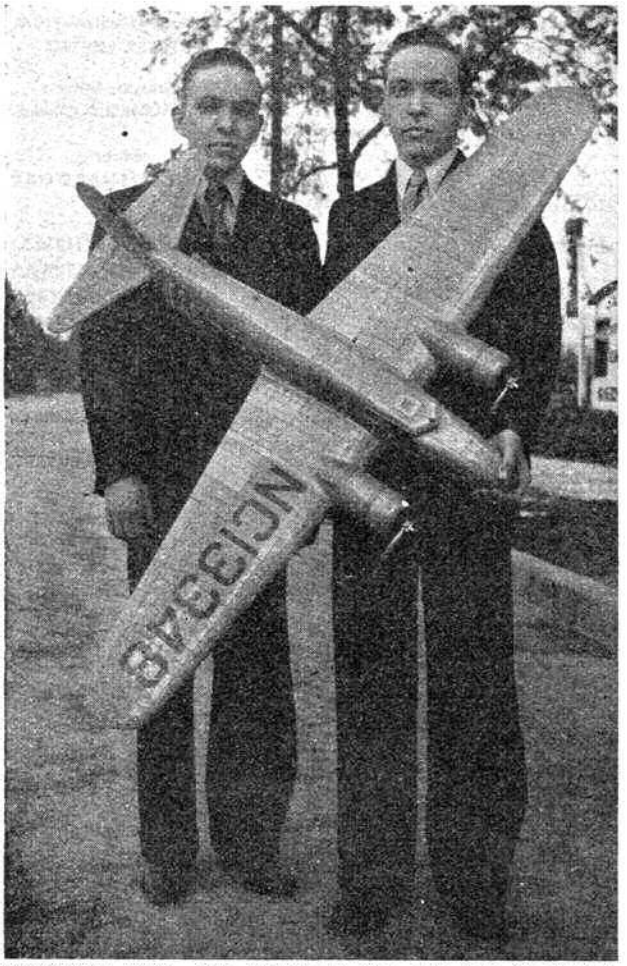


The Doering Twins. Two Canadian brothers who have turned their Aeromodelling into a profitable industry, producing some of the finest models yet seen, as a result. Their full story will be found in next month's AEROMODELLER entitled " Aeromodelling as an Industry."

of the S.M.A.E. contest to see whether the winning models are shown as representative aircraft as delivered from the factory or as after.

Vacancies on the Staff.

Vacancies exist in the Photographic and Editorial Departments of the AERO MODELLER, at Head Office, North London. Applications should be addressed to the Managing Director, AERO MODELLER Offices at Leicester, and marked " personal " in the top left hand corner. Applicants should be 16 to 18 years of age. The positions are permanent and offer good prospects, and a commencing salary of £2 to £2. 10s. 0d. per week will be paid. Applicants should be of good education and of Matriculation standard, with a sound interest in model aeronautics.

N.G.A. Third-Party Insurance.

We make no apology for once again referring to the fact that all members of the N.G.A. should have made use of the membership form printed at the foot of the back inside cover of last month's issue of the AERO MODELLER. Even if they have been members for some years, they must renew each year.

All those readers who are not yet members are asked to consider seriously availing themselves of the third-party insurance cover at the very nominal subscription. A pamphlet, setting out the terms of the policy, which is on Lloyd's and gives full particulars, will be sent on receipt of a stamped and addressed envelope sent to our Leicester Offices.

Albemarle.

In this issue we publish a number of photographs of the Albemarle, particulars of which were released on the 27th January.

These photographs were taken by Mr. J. A. Hodgson, Staff Photographer of Aircraft (Technical) Publications, Ltd., which Company is responsible for the technical preparation of the *Aircraft of the Fighting Powers* series, the "Harborough" range of books on model aircraft, the wide range of 1/72 three-view scale drawings, and the full-size blue-prints of model aircraft put out by the AERO MODELLER Plans Service, Ltd.

Aircraft Technical) Publications, Ltd., is also responsible for the technical preparation of the AERO MODELLER, and the addition of Mr. Hodgson to its staff is a further indication of our endeavours to provide the fullest and most up-to-date service to our readers.

D. A. R.

News Items.

We quote without comment the following story recorded by A. J. Cummings in a recent issue of the *News Chronicle*.

" A German, who had his home bombed by the R.A.F. in Berlin heard that an office had been established where such as himself could go to receive advice and help. When he arrived he found two doors. On one was written ' For total bomb damage ' ; on the other ' For minor bomb damage.'

As he felt that he belonged to the latter category, he opened the second door as the more appropriate to his case, and found himself in the next room with two more doors bearing the words ' For Party members' and ' For Non-Party members.' Belonging to the latter category he opened the door—and found himself out in the street again."

What the moral to this is—in a free country—we do not quite know. . . .

★ ★ ★ ★ ★

We see that Vernon Blunt, discussing rocket bombs in the *Sunday Pictorial* recently, writes of a Model Aeroplane anchored by wire to a concrete block, which with an 8 lb. charge of gunpowder reached the phenomenal speed of 2,000 m.p.h. It is claimed that the model made a number of circuits, covering 14 miles in 25 seconds ; some model ! and, by gad, sir, some wire ! ! !

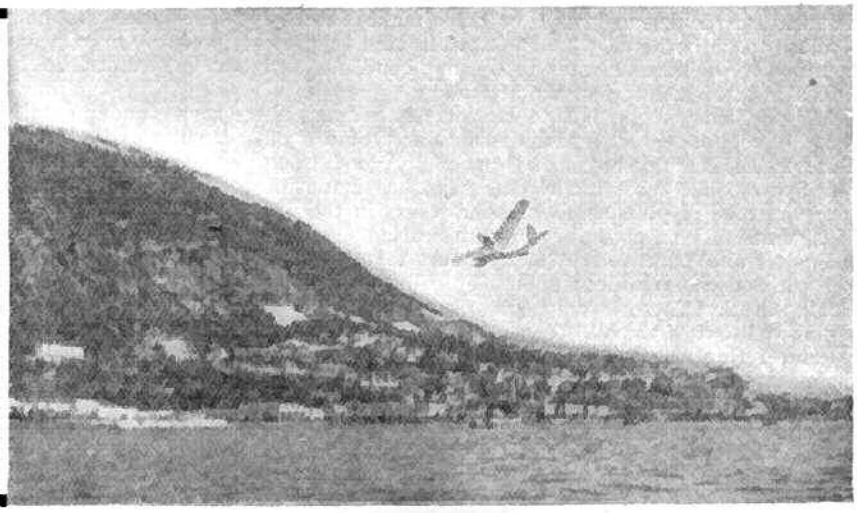
★ ★ ★ ★ ★

From time to time we receive enquiries for the address of the Royal Aeronautical Society, and if there is an Aeronautical College in this country. The Royal Aeronautical Society has offices at 4, Hamilton Place, N.W.1, and there is an Aeronautical College at College House, Princes Way, N.W.19, the Principal being Mr. C. H. Roberts.

PETROL VAPOUR

BY

COL. C · E · BOWDEN



OWING to circumstances beyond my control, it is some time since I have been able to write anything on Model Matters. Nevertheless, I have followed all the war-time model aero correspondence and articles in the AERO MODELLER and at last I can contain myself no longer. Mr. Sparey's article on engine design has got me like it did Dr. Forster. I have a great respect for Mr. Sparey's model making abilities, but like Dr. Forster, I believe he has slipped up over several points in his engine design. Hard practical model flying experience does not agree with a number of the points in the design of his engine. Mr. Sparey will forgive a dual attack, I know, because he has asked for criticism.

Dr. Forster has really covered all the main points, but I am going to come in and bark at his heels. On the second record-breaking petrol model aeroplane after the last war, I fitted a detachable-headed 15 c.c. engine—I used a similar engine in a model hydroplane that held the British C. class record for a time. The engine in its day was excellent, but one of its nuisances was a detachable electron head. However carefully fitted, detachable heads are inclined to break. They are quite unnecessary in a model engine, in my opinion, and as Dr. Forster says, only put up manufacturing costs and the owner's bothers.

I am sure both he and I have run model engines for periods at least as long as most people, and we both agree that decarbonising action is hardly ever necessary. In fact, little two-strokes usually run better when slightly carboned up as gas seals are better.

We aeromodellers want to keep our engines *as simple as possible*. In fact, we do not want to seek after excessive "racing power," like the hydroplane, many engines with that last ounce are tricky things and not suited to the average man—we do not require unusual high power output. I do not wish to convey the impression that we require inefficient engines.

Dr. Forster makes mention of Mons. Suzor, the French model hydroplane enthusiast, who incidentally has made model aero engines and written a book on the subject. During the happy days of peace I knew him well—also Mr. Rankin. I suppose both these men have got more power out of model two-strokes than anyone else. I am sure, however, that the ordinary man would not like the task of starting and adjusting those engines for model aeroplanes. Neither would he like to have to use special fuels and plugs. Such engines cannot be called easy to operate and reliable everyday performers. To hear them racing with a noise like ripping calico is a thrill, but to get them to do it is a very highly specialised job.

I have one of the Rankin engines in a model hydroplane. It is a little beauty, but likes its own way on occasions. This is true of most racing engines where the last ounce of power is the aim. Suzor used to have several carburetters. It was a joy to watch him start up and "tune each one in" until his engine was screaming.

No, we want reasonably high power and complete simplicity and ease of control, We aeromodellers want to start up easily every time and get going without all the fuss and bother that the racing man must put up with; we want a number of easily-obtained and reliable flights during the day; we can, therefore, have a simple and robust engine with plain cast iron or steel pistons without rings. Good large port areas, but not excessive. Many of the early engines spoilt their performance through restricted transfer ports, which could not be altered due to design.

We require ample and rigid bearings with a rigid crankcase and as few joints as possible. Two strokes are very touchy on compression leaks.

Ignition.

I very much doubt if dual ignition is worth while. It certainly steps up the power, but the dual ignition Baby Cyclone produces all the power necessary for any ordinary large-sized model on a single plug. The performance is quite exciting!

It is actually possible to have too much power for the size models we want to produce, i.e., anything up to about 10-ft. span.

Perhaps, when wireless control is used after the war, a little more power will be required, but I personally cannot quite visualise masses of wireless-controlled models flying. I think their use will be rather limited, at any rate, for some time to come.

Anyway, I should require a slightly slower revving 15 c.c. engine to do the job. It should be more reliable than a hotted-up smaller engine.

You see, I am all for this reliability business. I have spent so much time in my life playing with "hot" and also unreliable engines. I suppose I have about 30 engines of all makes stored away, and after the war

I shall discard all except two or three makes, because I refuse to be bothered with bad starters and temperamental little fiends. I want to fly, not bend my back into a knot for the rest of the afternoon.

My post-war engine has to be severely simple and must have its contact breaker points out of the oil. Here I feel Dr. Forster is on to a really good thing. Mr. Sparey, like most model designers, has made the same mistake of putting his breaker points in the way of oil that will be flung from the main bearing.

Forster and I have spent many hours together playing with special platinum points, etc., but to no particular avail. There is only one solution—place your points well out of the oil. The Forster design has done it, and I think has several other good points that he claims for it. I like his remote control, too. I have seen it in operation on one of his models and it works well. I hate getting my fingers too near a revving propeller.

I do not think we can make too much song about this *Ease of Control.* It makes for a less harassed mind so that we can give full attention to landing and flying adjustment of the model.

Petrol Tank Position.

One great difficulty experienced in petrol model flying is alteration of mixture strength due to change of petrol level at the jet, or shall we call it " fine adjustment nozzle," for it is rather like the old rotary engine carburation of the last war as fitted to Avros, Sopwith Pups, etc. When the model changes altitude in a climb or dive, if the tank is not situated in the correct spot, the engine will invariably be starved or choked just at a critical moment. The poor aeroplane's vices are at once intensified, whereas a steady thrust will often save the situation.

Anyway, it is very important to give the aeroplane every chance, *and any engine that allows for alternate starving or choking is bad, in fact, very bad!* Actually, there are a great number of designs that have not considered this point. The matter of tank design and position in relation to the fine adjustment nozzle is clearly described in Dr. Forster's book and has been dealt with in a previous issue of the AERO MODELLER. It is a fundamental point for obtaining sound flying results *and yet I suppose people will continue to design and produce engines that will let one down on this score.*

I do not want to condemn the disc. There have been some good speed-boat engines produced with it. I have had two engines that have operated well with it. But I am not in love with it for the reasons clearly stated by Dr. Forster, and I can back him up here from practical experience. I think back on all my model aero engines on the score of reliability and ease of starting. The Brown is an excellent example of the " direct " induction system, whilst the Baby Cyclone and the little Ohlsson have given great satisfaction with the hollow crackshaft type of valve.

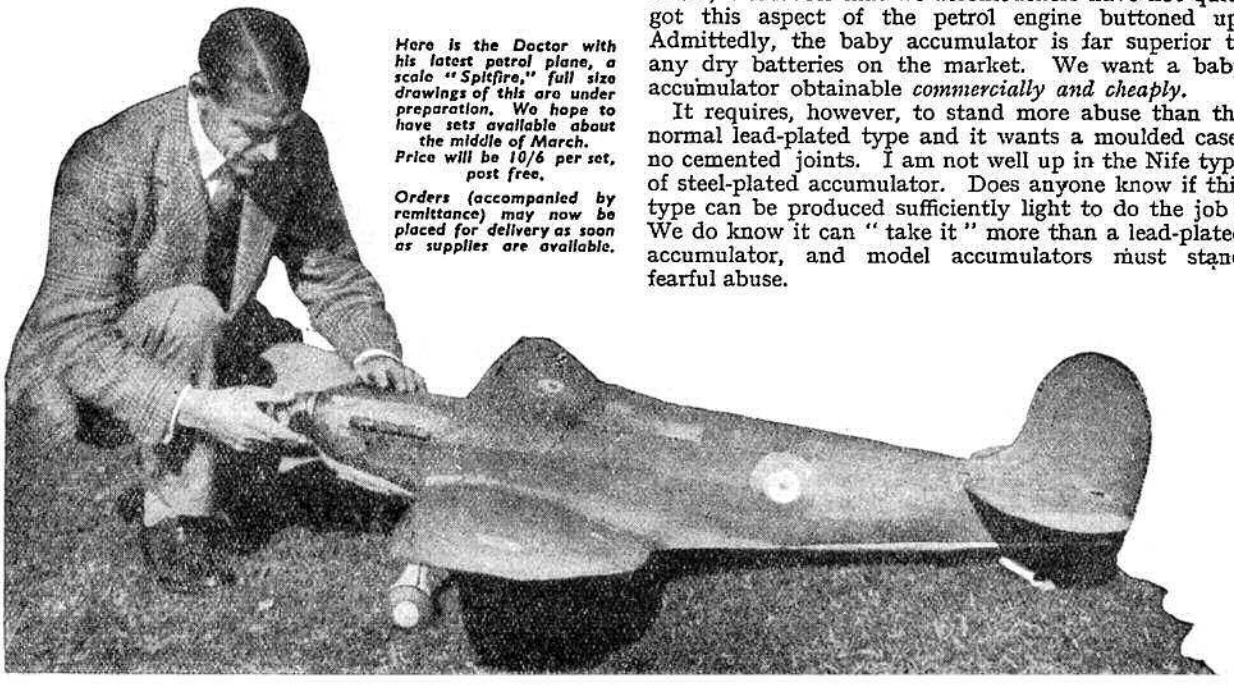
Sparking Plugs.

I, too, like an inverted engine because of thrust line position and cowling, but it is the only point I am not quite so vehement about as Dr. Forster. I consider there are occasions when one wants to mount an engine upright, and it has certain advantages. Plugs are less inclined to be saturated and oil-ups and ignition is, after all, one of the real troubles of model engines.

Let us put it this way. If one does not require a cooled engine and one is producing low type wing model with thrust line low, then I prefer the cylinder looking at me. I can keep my plugs cleaner and get at them more easily. Actually I have almost always used inverted engines, but on principle I cannot agree with all Dr. Forster says. It is bad for his morale. By the way, a useful tip for cleaning model plugs is to fill them with metal polish and scrub the points and electrode with a nail brush. Be careful to wash all polish out afterwards with petrol.

In spite of all the time and effort that both Forster and I have put in on dry battery tests and baby accumulators, I still feel that we aeromodellers have not quite got this aspect of the petrol engine buttoned up. Admittedly, the baby accumulator is far superior to any dry batteries on the market. We want a baby accumulator obtainable *commercially and cheaply.*

It requires, however, to stand more abuse than the normal lead-plated type and it wants a moulded case, no cemented joints. I am not well up in the Nife type of steel-plated accumulator. Does anyone know if this type can be produced sufficiently light to do the job? We do know it can " take it " more than a lead-plated accumulator, and model accumulators must stand fearful abuse.



Here is the Doctor with his latest petrol plane, a scale "Spitfire," full size drawings of this are under preparation. We hope to have sets available about the middle of March. Price will be 10/6 per set, post free.

Orders (accompanied by remittance) may now be placed for delivery as soon as supplies are available.

The Simple Model.

There is going to be some fun after this war with petrol models. There will be so many newcomers to the game. So do not let the old hands scorn the simple slab-sided petrol model. A simple model, like a simple engine, will give good results, if well designed, in the hands of the novice.

Highly streamlined models like the real thing are a delight to look at and can fly well, but a lot of good fun and certain flying is obtained from the simple stuff. *The main thing is the pleasant performance in the air.*

Taking it all round, one gets a far greater sense of satisfaction if one keeps one's model in sight! A fly-away is not much fun. There is no more flying for the day. Just anxious chasing. Once one has attained a few colossal height flyaways one gets bored with it.

A number of steady take-offs, pretty controlled flying around master, followed by delightful glides and landings give a sense of satisfaction at the end of the day.

Model Personalities.

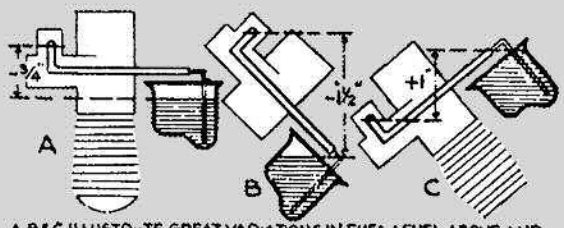
By the way, I expect a number of aeromodellists have seen in the paper that Wing Commander J. E. Pelly Fry has been appointed by the King to be an extra equerry and has taken up his duties at Buckingham Palace. He was termed an ace bomber pilot in one paper I read. You will also have seen his photograph in a fairly recent issue of the AERO MODELLER.

I wonder how many remember his model doings on Wimbledon Common and elsewhere, around the 1930's.

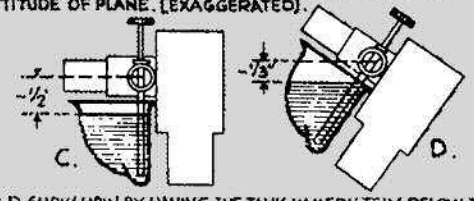
He used to produce the most delightful little low-wing models and won many a competition. He was a most beautiful workman and had infinite patience over the testing of his models. He used to collaborate a lot with that well-known and charming Dutchman, Van Hattum, particularly over speed models.

" Pelly," as we called him, produced a lovely white and green compressed-air super-streamlined racing model. The engine rather let him down, but the model was a centre of attraction at the Model Engineers Exhibition. He and " Van " used to fly the latter's all-black speed model " ghost " on Wimbledon Common. He produced a low-wing duration machine one year with all uprights and cross-pieces of the fuselage made from drinking straws. An excellent idea for the days of wood shortage!

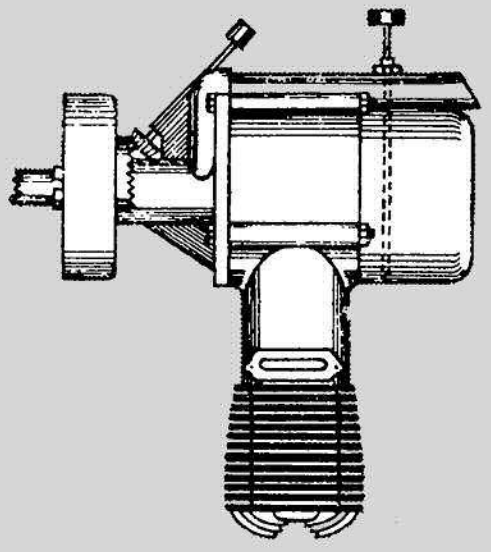
" Pelly " had a great flair and love for super repair work, a virtue not often found in aeromodellers, and often I used to induce him to come home with me after I had a nasty crash with one of my early petrol models. After tea I would just show him the crashed machine expectantly. It always worked. He would call for material, and intricate repairs commenced! He did a lot for model aviation around the 1930's at the S.M.A.E. meetings and in the field of design and flying. He was one of those people who always got there. Very quietly and efficiently. I am not surprised at his success.

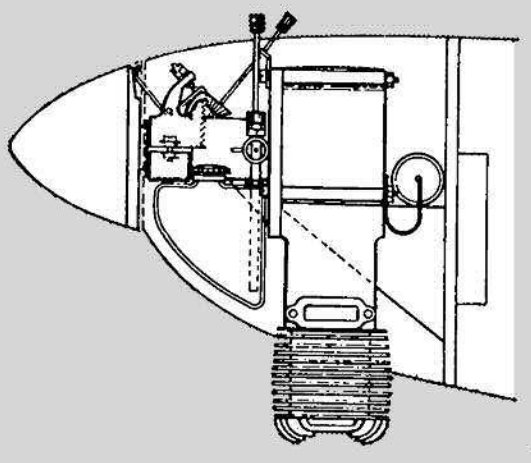


A, B & C ILLUSTRATE GREAT VARIATIONS IN FUEL LEVEL ABOVE AND BELOW NEEDLE VALVE CONSEQUENT ON VARIATIONS IN ATTITUDE OF PLANE. (EXAGGERATED).



C & D SHOW HOW, BY HAVING THE TANK IMMEDIATELY BELOW THE NEEDLE VALVE THE ABOVE VARIATION IS PRACTICALLY NEGLIGIBLE.





At right are illustrations taken from Dr. Forster's book, " Petrol Engines for Model Aircraft." A, B and C show the great variation in fuel level above and below the needle valve which may occur with changing attitudes of the model when the tank is fitted some distance away from the throttle needle. Sketches (C) and (D) show how the level of petrol below the jet may be maintained practically constant by mounting the tank directly underneath the needle.

The centre illustration shows his idea for a positive method of arranging the advance and retard, and also a tank mounting directly behind the crank case with the throttle needle literally descending into the tank.

The lower illustration shows the set-up as arranged in a " Spitfire " type of engine cowling. A novel form of contact breaker advocated by the Doctor is also shown.

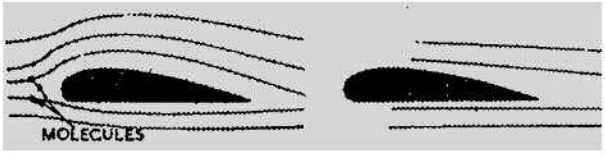
ELEMENTARY AIRSCREW THEORY AND DESIGN METHOD

BY G · GARWOOD (S.R. Ae.S.)

IT is impossible to deal fully with the theory and design procedure of airscrew aerodynamics in the course of a short article. However, I will go into the theory sufficiently for me to describe the design procedure accurately enough for our purpose. Unfortunately, some of the things I will say must be taken without question, as the proving of these points is far too complicated for the scope of this discourse.

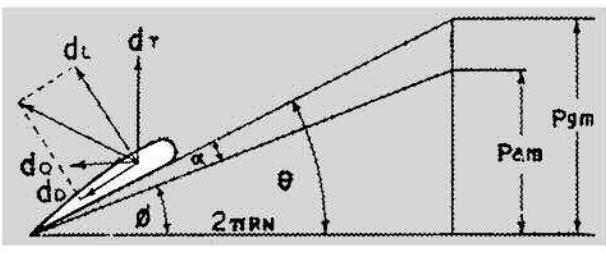
Before airscrew theory can be understood it is essential that one comprehends the underlying theory of the airfoil. Everyone is aware of the general shape of an airfoil section; this has been evolved after years of extensive research both in the air and in the wind tunnel, and I will deal briefly with the basic theory.

When an airfoil is moved through the air, the air flows past it, and under normal conditions it moves around the airfoil by bending; now the upper surface of an airfoil is longer than the lower surface and if two molecules of air are adjacent at the leading edge they will be adjacent at the trailing edge, therefore, the molecules that pass over the top must travel at a greater speed than the molecules passing below the section. Increases in air speed cause a decrease in pressure, therefore the pressure above the section is negative and tends to " suck " the airfoil upwards. The air below the section is slowed down, consequently the pressure is increased and this tends to push the section up. These two pressure differences are very small and never exceed the figure of 0·25 lbs. per sq. inch above or below the atmospheric conditions.



In airscrew work the section becomes progressively thinner as the tip is approached, despite the fact that the chord increases.

There are many theories explaining airscrew phenomena, the most common being that which I propose dealing with. This is known as the Blade Element theory. The theory was developed by Lanchester and Drzweiki and considers the blades of an airscrew as twisted wings. For the purpose of investigation, a small section of the blade, which is known as an element, is considered, whilst disregarding the surrounding elements and their effects on the element under consideration. In this sketch is shown a blade element with forces and angles of flight acting upon it.



The letter " d " before the forces means delta, or a minute portion of the force, as the element is only a small part of the blade itself. If all these small forces are calculated and added up, the resulting figures would be the values of the forces acting on the blade. I shall only deal with the two forces, lift, and drag, as these are the only ones we require to know to design our blade.

The angle gamma shown in the sketch must be calculated; this is easily found and equals the tangent of drag/lift, i.e.,

$$\tan \text{ gamma} = \frac{D}{L} = \frac{C_D p/2 \text{ crv} R^2}{C_L p/2 \text{ crv} R^2}$$

Therefore, from the above, C_D/C_L is equal to gamma. Efficiency is equal to the power output/power input, this equals :—

$$\frac{VdT}{2\pi nDr}$$

which is equal to

$$\frac{VdF \cos(\phi + \gamma)}{2\pi noFr \sin(\phi/\gamma)}$$

Now, $2\pi nr$ is equal to omega and velocity on omega is the same as tan ϕ.

Therefore, efficiency equals :— $\dfrac{\tan \phi}{\tan(\phi, \gamma)}$

Also by differentiating the efficiency and equating the result to zero, we find that :—

$$\phi = 45° - \frac{\gamma}{2}$$

It is also equal to $\dfrac{v \times R''}{nD \times r''}$

Up till now we have only considered a small element of the blade. If L and D, where found for a number of elements and plotted against radius, then the area under the curve would be equal to the L and D for the whole blade. The efficiency would remain the same and is always less than unity, eta or efficiency depends on tan ϕ and tan $\phi = V/w = v/nD$, thus tan ϕ is proportional to V/nd. This quantity is known as J, and is the most important term in the whole of airscrew theory. It is a non-dimensional term of velocity with regard to diameter and revs., thus, two airscrews can have the same J and yet be entirely different in all other respects.

No airscrew can operate at its maximum efficiency if the nose of the machine is not faired to the spinner, even if the machine is of the slab-sided variety.

There are no further theoretical considerations and I will now go through the design procedure, using definite set of conditions. Our known conditions are as follows :—

Weight of complete model	9 ozs.
Section	Eiffel 400.
Wing area	200 sq. ins.
C_L	1·00.
Airscrew diameter	18 ins.
Section	Clark Y.
Revs. per sec.	14.
Max. efficiency	at climb.

Knowing the above we can calculate the optimum pitch.

$$\text{Aircraft velocity} = v^2 = \frac{L}{C_L p/2 \, S}$$

Where L is weight in lbs.

C_L lift coefficient of wing.

Where p/2 is ·0017

S is wing area in sq. ft.

$$v^2 = \frac{9 \times 144}{1 \times \cdot 0017 \times 200 \times 16}$$

v = 24·8 ft./sec.

J can now be calculated from the formula v/nD.

Where v is the velocity in ft. sec.

n is the revs. per sec.

D is the diameter in feet.

$$\frac{24 \cdot 8}{14 \times 1 \cdot 5} \qquad 1 \cdot 18.$$

Now as we know J, it is a simple matter to evaluate the P/D ratio from the formula :—

$$\frac{-\cdot 275 + J}{\cdot 95} \qquad \frac{\cdot 905}{\cdot 95} = \cdot 105.$$

From this Pitch is found, i.e., P = P/D × D

·105 × 18 = 18·9.

Having found our actual mean pitch we must find the efficiency so that we can find the geometric mean pitch and hence the angle θ we require. Efficiency is found from the formula :—

$$\frac{\tan \phi}{\tan (\phi + \gamma)} \qquad = C_D/C_L.$$

The angle of attack of an airscrew should be the angle that gives the maximum L/D ratio for the section used. Max. L/D for Clark Y is at 2·5° when C_D is ·03 and C_L ·6.

Therefore, efficiency is always less than unity.

For efficiency we take a representative station which is usually the three-quarter radius, tan ϕ is P/2πr.

$$\frac{18 \cdot 9}{2\pi \times 6\frac{1}{2}} = \cdot 462$$

tan gamma is equal to ·03/·6. Therefore, gamma is equal to ·4°.

Efficiency equals :—

$$\frac{\tan \phi}{\tan (\phi + \gamma)} = \frac{\cdot 462}{\cdot 47056} = 98\%$$

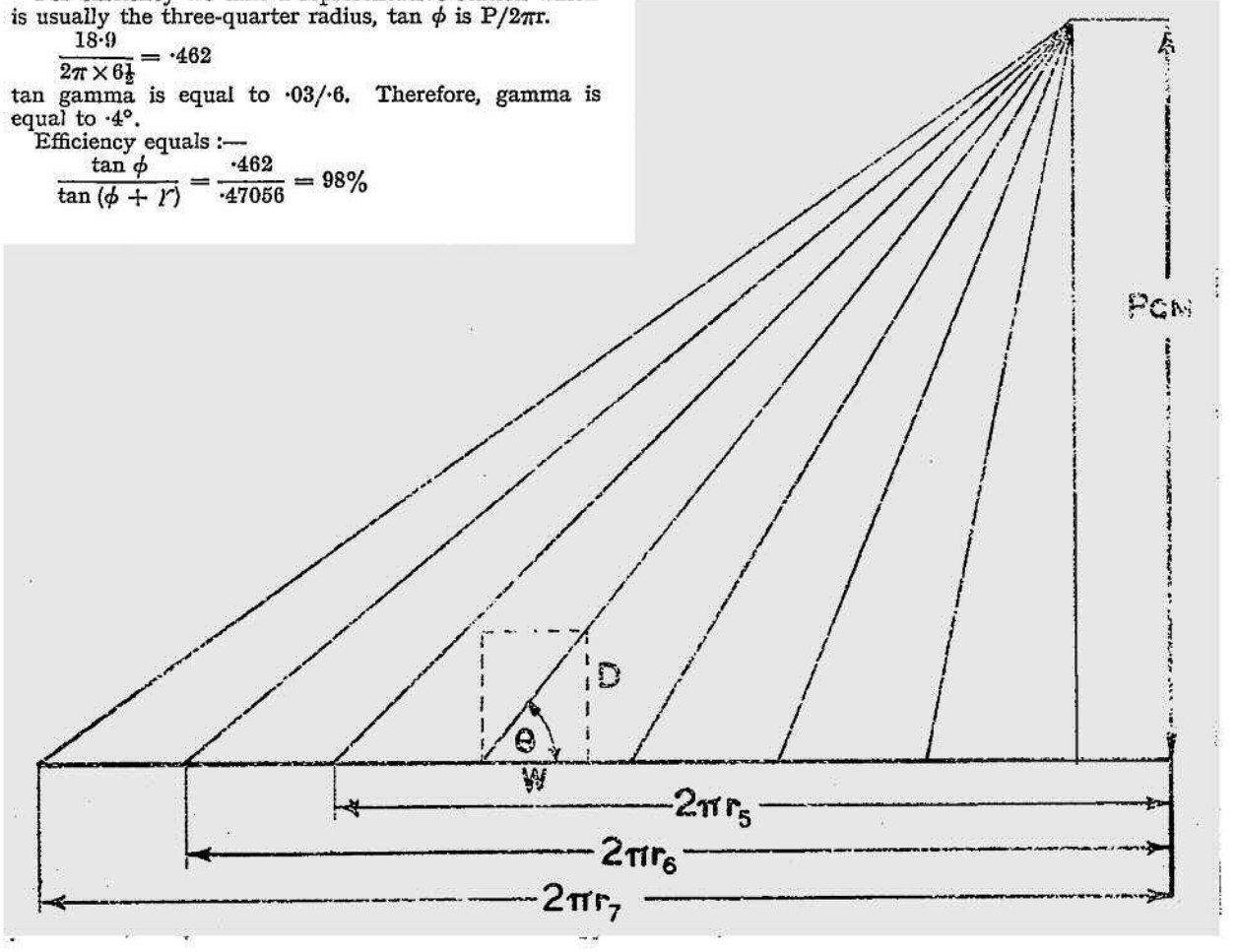
Actual mean pitch has been calculated and found to be 18·9 ins. Now as the propulsive efficiency is 98%, the Pam is 98% of the Pgm, therefore the Pgm is equal to :—

$$\frac{18 \cdot 9}{98} \times 100 = 19 \cdot 3 \text{ ins.}$$

Now the calculations are finished and it only remains to find the angle theta at all stations of the blade. This is easily done if the following method is strictly adhered to.

Draw a vertical line to any scale representing the geometric mean pitch and at right angles to it, at the base draw a line to the same scale representing the radius times 2π. Now divide this line into a number of parts where each space is equal to one inch of radius. If the resulting points are connected to the top of the pitch line the angle resulting will equal the angle theta for maximum efficiency at the given conditions.

From this it is a simple matter to find the width and depth of the block. Measure the chord at each one inch station along the blade drawing and then transfer these measurements to the respective angle line on the angle drawing. Then by dropping vertical and horizontal lines from the point so obtained, the width and depth can be found and measured. (For diagrammatical explanation see below.)



THE AIRSPEED A.S.5 COURIER

BY E · J · RIDING

Photo courtesy E. J. Jackson.

NOTABLE for the fact that it was the first aeroplane with a retractable undercarriage to be put into production in this country, the Airspeed " Courier " was designed by A. H. Tiltman, late of the De Havilland Aircraft Co., Ltd., who, together with N. S. Norway, formed the Airspeed Company at York in 1931. Their previous design had been the highly successful A.S.4 or " Ferry," a three-engined passenger-carrying biplane built to the requirements of Sir Alan Cobham, who used it on all his National Aviation Day Campaign tours.

The fuselage was built up from a framework of spruce longerons and cross members by a plywood skin. Centre line stringers, together with a curved top and bottom decking, gave it a slightly oval cross-section. The wooden wing was of full cantilever form, the centre-section being integral with the fuselage. Two deep section box spars with spruce top and bottom booms and plywood walls supported spruce girder pattern ribs. The tailplane was of similar construction.

Fuel for a flight of 700 miles was carried in two tanks situated at the root ends of the outer wing panels. The undercarriage was retracted backwards into the centre section by means of two jacks actuated by a hand-operated hydraulic pump. In the up position, the tips of the wheels protruded from the underside of the wing—an added advantage in that the machine could be landed in emergency with the undercarriage retracted, considerably reducing the risk of overturning with consequent serious damage. The wings, rudder and fin were fabric covered, that on the fin forming a pleasing fillet on the fuselage top decking.

Various engines have been fitted to the " Courier "—the Armstrong-Siddeley 7-cylinder radial aircooled 215 h.p. " Lynx IVc " and 275 h.p. " Cheetah " being the most familiar. A Napier " Rapier " engined version was flown in the King's Cup race of 1934. In latter years the retractable undercarriage has been deleted in favour of a fixed one.

The " Courier " prototype, G-ABXN, was specially built for a proposed long distance flight to India by Sir Alan Cobham and Squadron Leader Helmore, who planned to have the "Courier" refuelled in the air at three stages of the flight The machine was fitted with extra fuel tanks in the cabin and facilities for receiving the hose pipe from the " tanker "—in this case a Handley-Page W.10. After several weeks of preparation and practice over Southampton Water the start was made from Portsmouth on September 22nd, 1934. Unfortunately the attempt ended in disaster, for soon after passing Malta the throttle lever on the " Courier " jammed, and since the machine was overloaded, Sir Alan decided to make a wheel-up landing at Halfar aerodrome. A few hours after refuelling operations for the initial part of the journey had been successfully completed, the Handley-Page W.10, G-EBMM, crashed at Aston Clinton, near Halton, with the loss of four lives, and the project was abandoned.

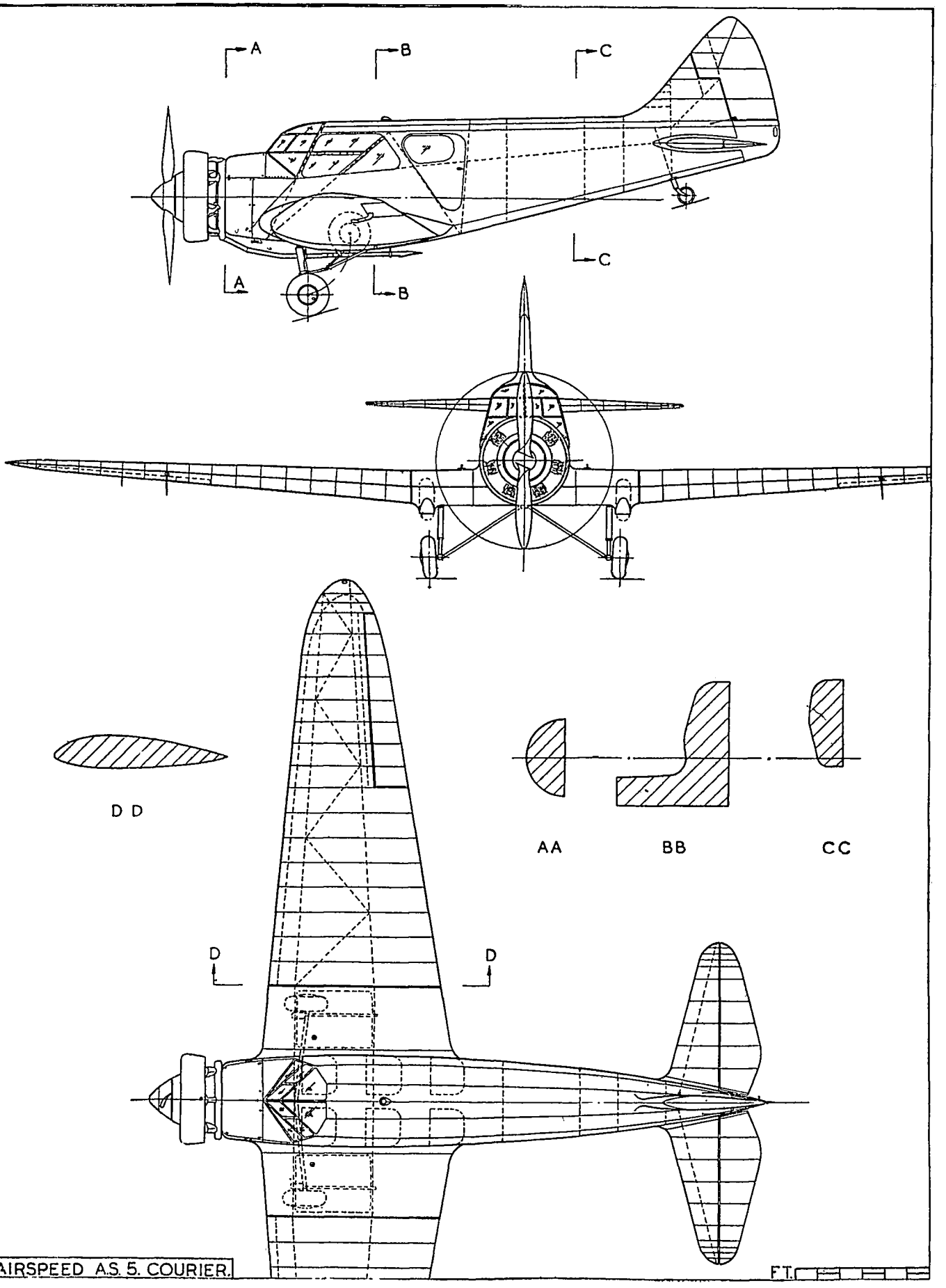
" Courier " production commenced at the firm's new factory at Portsmouth and fifteen machines were registered in this country. The first production model appeared in October, 1933, and was registered G-ACJL.

Other " Couriers " were registered G-ACLF, G-ACLR-T, G-ACSY-Z and G-ACVE-G. One or two machines were privately owned, but the majority did useful work on various internal and feeder line services in this country. Portsmouth, Southsea and Isle of Wight Aviation, Ltd., were using most of the surviving " Couriers " on their ferry services to the island and elsewhere at the outbreak of war. Their fleet included no less than seven of these machines as well as the original A.S.4 " Ferry."

A few " Couriers " were until recently still flying on various duties with the R.A.F. One of these, formerly G-ACNZ, carried the service serial number X.9346 and was painted in the standard training camouflage scheme

Specification. Six-seater low wing passenger-carrying aircraft.

Span : 47 ft. 0 ins. Wing area : 250 sq. ft.
Tare weight : 2,340 lbs.
Length : 28 ft. 6 ins. Max. load : 1,700 lbs.
Height : 8 ft. 9 ins.
Maximum speed—
(" Lynx ")—162 m.p.h.
Cruising : 143 m.p.h. Landing : 55 m.p.h.
(" Cheetah ")—170 m.p.h.
Cruising : 148 m.p.h. Landing : 59 m.p.h.



AIRSPEED A.S. 5. COURIER.

F.T.

AIRFRAME STRUCTURES

(FOR WAKEFIELDS)

BY M · F · BOULESTEIX

GREAT strides have been made in aerodynamic development of model aircraft in the past few years; at no time during this evolution has progress been more marked than the present. This is largely due to a better understanding of the principles involved, which have been thoroughly threshed out from time to time in this magazine. The average aeromodeller can now embark upon a design of his own with certain sound data, some theoretical and some practical, which was hitherto only accessible to a very few. The varied problems have been sifted, simplified, adapted, and published in the form of a few excellent but simple text-books which are not for the specialised engineer, but admirably compiled for our simpler needs. Unfortunately, interest has been so centred on aerodynamics as to allow airframe structures to be neglected, in consequence of which the present day model is no better structurally than that of five years ago. The immediate reaction of many readers will be that more weight would be superfluous and that their models have stood the test of wear and tear. In this they will be deceiving themselves, because all good luck taken into consideration, there is no reason why a model should not last several flying seasons, and all-the-year-round flying, before going into honourable retirement: at present few survive more than a single summer.

At this stage an analysis of the simple slab-sided fuselage would not be out of place. Contrary to popular belief, this mode of construction is a good deal stronger than general streamliner construction; but that is merely by the way. The first and most obvious objection is the plain butt joint, though this can be made adequately strong; secondly, the misuse of diagonal bracing; and, thirdly, workmanship. The latter is very important; a thing will never " have to do "—it has to be as perfect as you can make it. When making a joint, each component should be thinly smeared with cement to fill up the pores and form a foundation, and when this is DRY, another thin layer of cement applied to one of the surfaces and the two parts joined immediately (i.e., before a skin can form over the exposed cement surface) and allowed to dry under slight pressure. It should be unnecessary to say that all joints must be a good fit before sticking, though this is very often not at all the case. An inaccurate piece must be scrapped and a new one made.

Longerons should never be steamed to shape AFTER the cross braces are in place, otherwise it will weaken even a waterproof-glue joint. All this has been said many times before, but too often has the author seen a hastily made joint slapped in place; or the fuselage completed in a couple of lunch hours! This is not good enough, and it may be realised when an old machine is pulled to pieces and 20 per cent. of the cross pieces are unstuck or fall out at a touch. With a really good joint, the cross brace will tear off a thin piece of the longeron when pulled out. Again, butt joints are certainly not a sound engineering proposition, and some form of reinforcement is well worth while. As shown in Fig. 2, this may take the form of small gauge corner struts, balsa triangles, or built-up formers. One of the best methods yet evolved is the T-section bracing of Mr. Houlberg's "Isis," where maximum sticking area for minimum quantity of material is aimed at.

The use of diagonal bracing must also be dealt with fairly comprehensively. It is, of course, practically impossible to calculate stresses in such soft wood as balsa, which varies immensely with grade and grain. Landing loads may be given priority over flying loads, which will result in an amply strong frame for all purposes. One point to note is that diagonal braces should be made to take compression, because a cement joint cannot be relied on to take tension in shocks. Fig. 1 illustrates how bracing may be applied. It is well to remember that if parts of a fuselage only are rigid, loads will be transmitted to the weakest part which may fracture indirectly. It is often worth while bracing the whole of the fuselage in really heavily loaded models, and the resulting torsional strength will also be much greater. These subsidiary braces may be of small gauge wood and are not really redundant, but guard against a weak link.

Landing loads in the fuselage comprise :—

(1) Undercarriage—backwards, upwards, and twisting.
(2) Wingshocks—backwards and forwards.
(3) Tail loads—upwards.

In all cases the designer should endeavour to distribute loads over as much of the structure as possible. Plywood fishplates, balsa triangles, and judicious use of sheet may all be used to advantage. The extra weight is very slight, as diagonals can be from 3/32 in. square stock, and even 1/16 in., with discretion. Another use

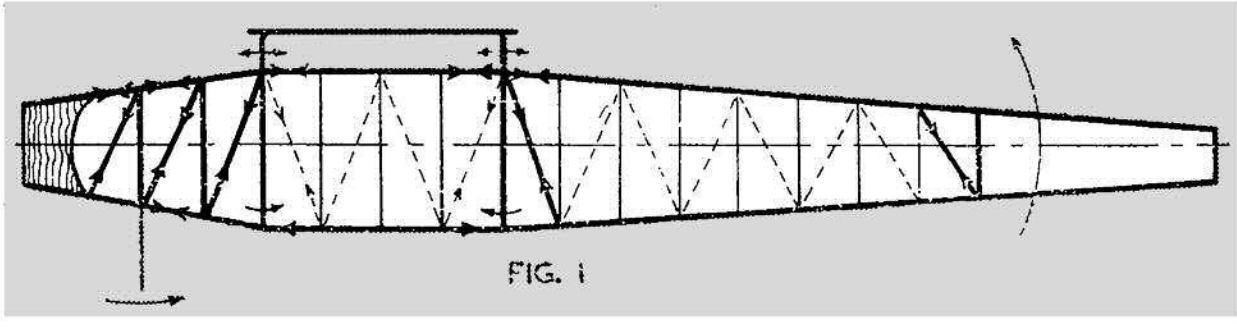


FIG. 1

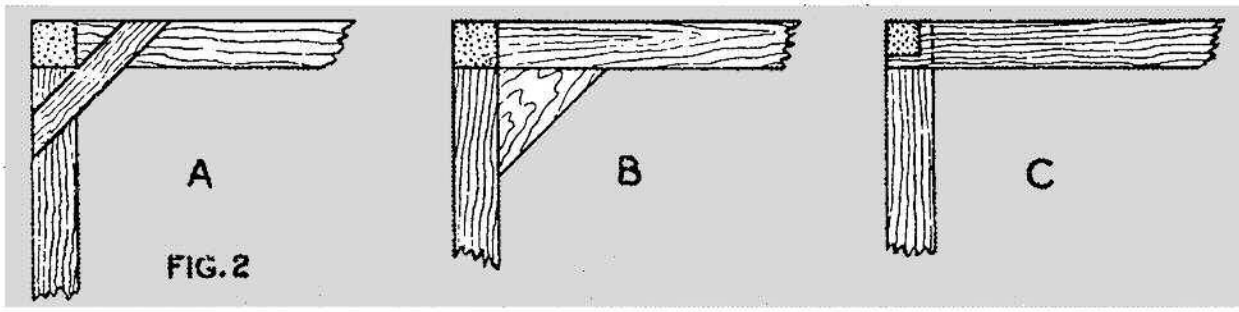


FIG. 2

for diagonal bracing is to keep asymmetrical fuselages to the required shape, in which case small gauge spars will suffice.

The ideal fuselage construction is monocoque, but lack of materials has made this a thing of the past, for a while at least. For those who are set on this method, 1/64 in. bass wood can be amply strong if correctly treated and finished, but it requires craftsmanship of a high order.

The popular streamline fuselage with multi small gauge stringers is not a good structural proposition. Firstly, it depends mainly on the skin for torsional strength; and, secondly, 1/16 in. square stringers are very vulnerable. The streamliner is a doubtful quantity in a damp atmosphere, when all kinds of things are liable to, and often do, happen. One solution is to use a stouter covering, such as bamboo paper, double jap tissue, or silk. The latter was extensively used on French Wakefields before the war. Internal triangular bracing can be incorporated in a streamline fuselage to advantage.

Concerning mainplanes, the case is not nearly so bad as the fuselage, but the author would like to take this opportunity to express his disapproval of the sparless wing with large section leading and trailing edges. This again relies largely on the tissue covering to take shear and torsional loads. If the designer is willing to spare so much material, he would be well advised to make a hollow built-up structure similar to general glider practice. The only thing to be said for this construction is that it can take a lot of " tree hiding " and is easy to build. It is not at all suitable for large wings or high aspect ratios. For our purpose, single spar wings are hard to beat. This should not, however, be misunderstood, because many such wings leave much to be desired. The leading edge should be of fairly large gauge: 3/16 in. or 1/4 in. square set on edge, diamond fashion, so as to expose a large sticking area, or set square with the ribs notched in. 1/8 in. square will not take many knocks and should be avoided. On no account should ribs be butt jointed to either leading or trailing edges without some kind of reinforcement in wings of any reasonable size. Even some of the veterans continue to do this, but it is bad practice, and something is bound to come adrift sooner or later. Always notch in ribs; it makes a great deal of difference, and is essential where such thin material as 1/32 in. sheet is used.

For structural reasons, taper and low aspect ratio

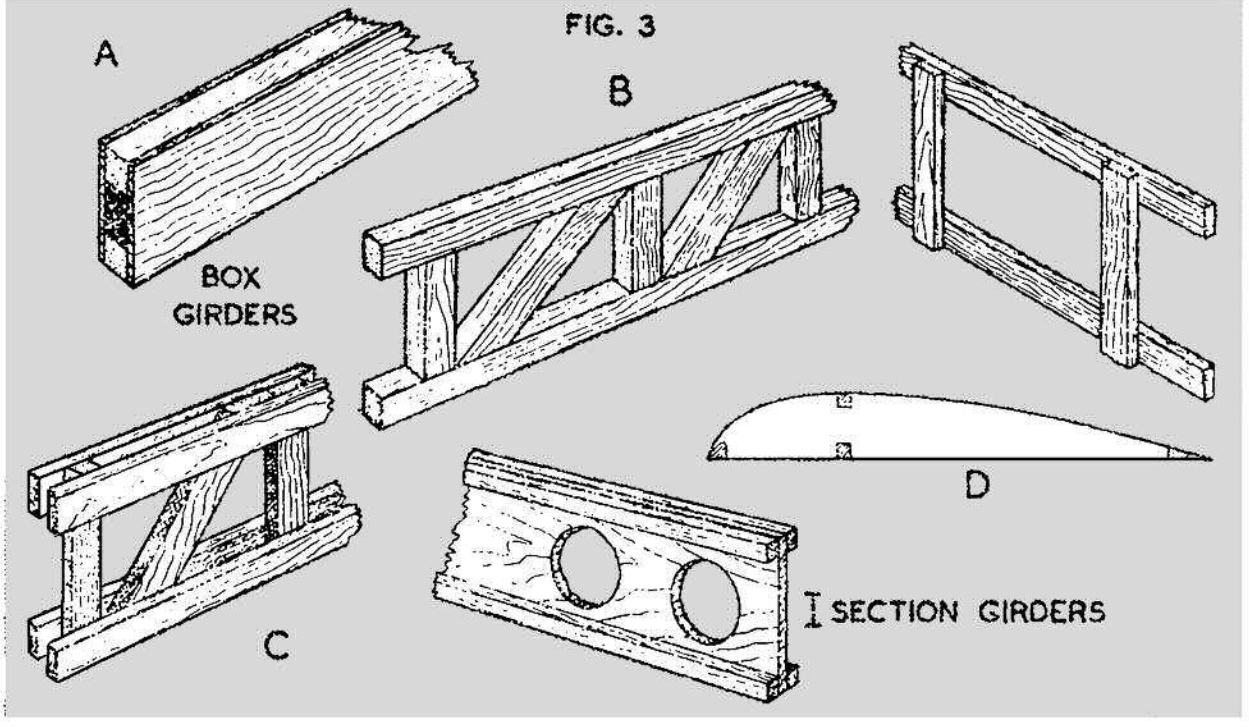


FIG. 3

are desirable, and in fact, coincide with the very latest aerodynamic requirements. A good stout tapered spar should be used, to which all loads should be transmitted as far as possible. Plain solid wood spars are undesirable, inasmuch as they have low strength/weight ratios and are very prone to warping. Several built-up forms, which are very much more efficient, may be used with the added advantage that susceptibility to warps is cut down to a minimum (Fig. 3). It is a popular misconception that a thick airfoil is required for rubber models to accommodate a deep spar, since 90 per cent. of Wakefields have a main spar only 3/8 in. deep.

Two isolated spars, as shown in D. in Fig. 3, are quite strong, but warp very easily and are not in any way so good as a girder. Any connecting link, such as vertical struts spaced at intervals along the span, or diagonals, improve the efficiency considerably, but then a girder similar to B. in the diagram is the result. Two spars in tandem are satisfactory but seem to be less rigid than a good monospar in models under 5 ft. span. Diagonal bracing in a wing is to be recommended, increasing all round rigidity immensely. The points to note are :—

Large sticking areas ;
Notch joints ;
Built-up and tapered spars ;
Diagonal bracing.

The latter is especially advantageous where the ribs are thin or the airfoil tail is very fine.

Another common mistake is to rely on rib strength at the roots. This has been pointed out again and again, and yet it is still being done. Sheet wood covering should be used over the first three or more ribs, which in turn should be of thicker and harder wood than the others. In this way all shocks which are transmitted to the root must be taken not only by the strongest part of the spar, but also by the leading and trailing edges. It also makes a firm foundation for handling purposes. An added refinement is to continue the sheet at the corners in a semi-circular curve instead of going straight across the chord, where severe stresses may snap the wing—remember, no weak links. Corner triangles and ply may be used generously and wisely.

The most neglected part of a wing is, quite wrongly, the tip. 1/16 in. square birch or thin sheet balsa is insufficient in itself. The former always warps eventually, and the latter often comes unstuck in a severe wing-tip landing and is also inclined to warp. Tips may be built of small gauge hardwood backed with balsa, laminated sheet, and perhaps best of all, thick medium grade balsa sheet (say 3/16 in.) which can be sanded to conform with the profile and symmetrical at the extremity. Wing-tips come in for more than their fair share of hard knocks—so see to it.

Tail planes must be kept as light as possible consistent with strength ; small gauge structures warp easily, so that a compromise must be made. Large section leading and trailing edges without spars, or other light construction, is adequate so long as it is a knock-off fit. Otherwise use a strong tapered spar, and remember those little points about notch joints and diagonal bracing. Fins need no exceptional strength, but must be braced for somersault landings. A firm root is important but often neglected ; sheet and triangles once again answer the question. Taper increases the all-round efficiency. A structure with two spars forming a triangle with the root, the vertex being at the top, is excellent bracing for turnover landings, as the load is widely distributed to the fuselage.

So much for the main structure, though an article of this kind must necessarily be incomplete. There still remain some minor points which deserve attention. Ribs should be cut from quarter grained sheet. I-section ribs are to be recommended, and due to their greater rigidity, increase shear strength especially. Built-up ribs have been discussed in this magazine from time to time and are worthy of note. It is important that all ribs should be sanded together to ensure smoothness of contour.

Finally, a grudge against cantilever undercarriages. These should be braced against twisting and splaying outwards, externally by means of a wire spacer, or internally with strong binding between the two paper tubes. An excellent, but slightly heavier, method is to build the tubes into a box former which may be fixed inside the fuselage as a permanent component and braced all ways.

Most of the foregoing is common knowledge to the larger part of the aeromodelling community, but if this brief review has given a little food for thought, then it will have achieved its primary purpose.

To summarise :

(1) Use built-up structures and spars.
(2) Make good butt joints, reinforce them. Avoid where possible.
(3) Design correct diagonal bracing.
(4) Do not rely on tissue covering for rigidity.
(5) Small gauge structures warp.
(6) Bent parts should be steamed to shape before glueing or they may spring apart later.
(7) Good glue is stronger than cement. Use glue for hardwoods.
(8) Don't be sparing with balsa triangles and plywood.
(9) Mind your workmanship.
(10) MIND YOUR WORKMANSHIP.

(*Continued from page* 189.)

Consistent Fuel Feed, or rather lack of it, is still *the* greatest bugbear of all model aero-engines produced before the war. Unless the jet or needle valve is placed vertically above the tank, any alteration in the longitudinal attitude of the model, which is inevitable during flight, results in variation in the height of suction necessary, and the same used to apply to the variation in the " head " of fuel at the jet in the days of gravity feed. (See page 179 of this issue.)

Even with suction feed, using the tanks commonly fitted to the " direct induction " types, in my experience very few engines will continue to run absolutely steadily from full tank to empty without any re-adjustment of the needle valve. Almost without exception, if an engine under 10 c.c.s. is started up with a full tank, and the ideal needle setting for that level quickly found, towards the end of a run the mixture invariably becomes too weak and revs. begin to fall off, and in some cases the engine actually stops altogether unless the valve is opened a little more. For this reason one always took the precaution of sending off a model on a flight with the mixture just a fraction richer than appeared ideal when at rest on the ground.

Therefore, when making tanks, avoid large capacities (they are quite unnecessary and dangerous in the event of a fly away), and in particular, *avoid* making *deep* ones. For steady and continuous running the tank must be kept as shallow as possible, which is as near as we have so far got to a constant level float chamber.

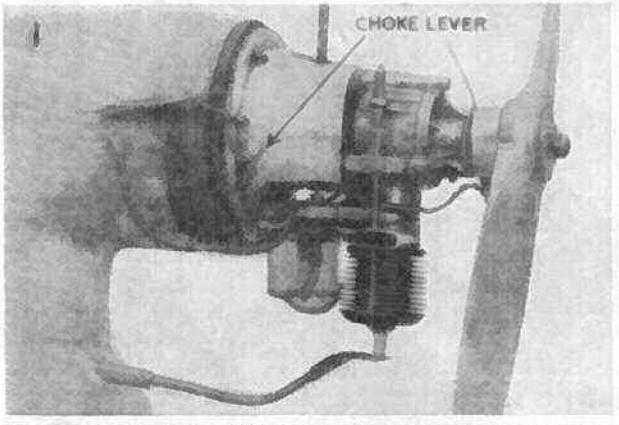
Induction and Fuel Feed in Model Aircraft Petrol Engines

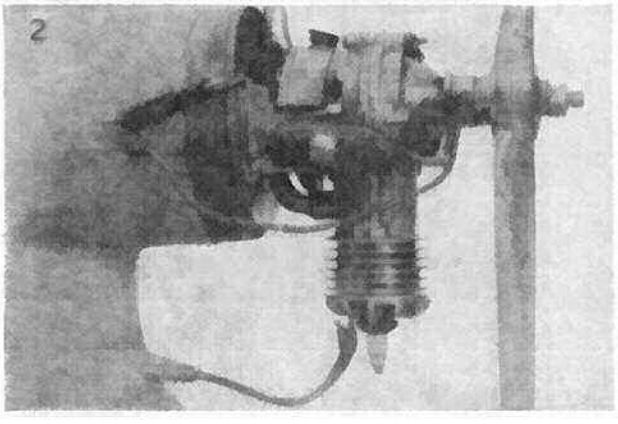
Some Observations and Developments — By J. F. P. FORSTER.

THE first more or less successful two-stroke engines used in Model Aircraft in this country were almost all considerably over 10 c.c.'s capacity. The Americans very early turned their attention to the commercial production of smaller and smaller engines, so making possible the reasonably small and portable model.

I shall doubtless shock many makers and enthusiastic owners of this or that famous engine when I say I have reluctantly come to the conclusion that not a single one of these owned or tested by me has fulfilled all the ideal requirements of a model aircraft engine. Some were better than others in one way or another, particularly the rotary valve types, and the reason is not far to seek. The rotary inlet valve can be timed to open during almost the whole of the up stroke and close at, or preferably 5 degs. after t.d.c., giving a full crankcase of charge for transfer to the cylinder, while the cylinder requires only two ports (transfer and exhaust) which reduces distortion and loss of compression.

The two main types, therefore, require separate consideration:—





I.—The 3-port or "direct induction types."

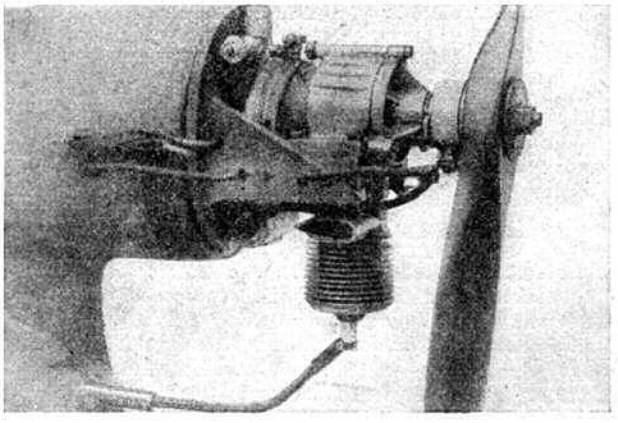
Apart from the above-mentioned inferiority in theoretical efficiency (chiefly apparent at low speeds) these all suffer from two main defects:—(1) "Blow-back," and as a consequence of the awkward arrangement of the induction pipe and tank (2) The mounting problem.

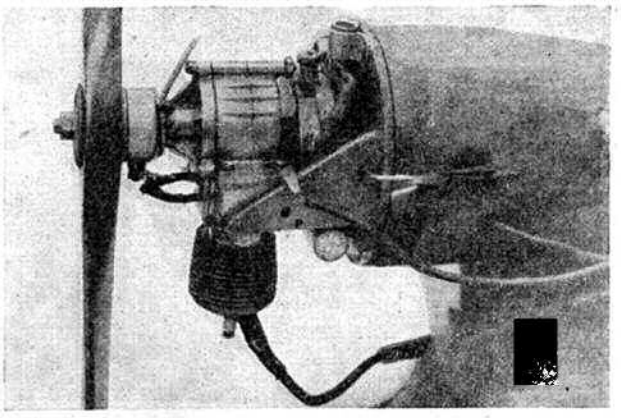
(1) "BLOW-BACK." The inlet port remains open during the first part of the down stroke (and at low speeds) and consequently, when starting, there is a considerable waste of crank-case capacity by the rejection of mixture into the induction pipe until the inlet is quite closed. There is an actual reversal of air flow past the needle valve, especially where this is placed close to the port, with a building up of pressure in the induction pipe which tends to nullify the suction of the venturi. On some engines this is sufficient to blow air bubbles down the feed pipe into the tank when starting.

Thus in order to induce a rich enough mixture to start these small engines, very considerable choking is necessary. This means that room must be left behind the induction pipe for the insertion of a finger tip. Several makes of engine attempted to reduce the effect of "blow-back" by fitting very long induction pipes, thus still further aggravating the mounting problem. I proved, in a series of practical tests, that the efficiency is undoubtedly increased by the use of a long induction pipe on these types of engines, and it is explained by the momentum or "follow through" action of a long moving column of air helping to overcome the blow-back through the port, and more consistent carburetion, steadier running and slightly higher maximum revs. are obtained by its use.

(2) THE MOUNTING PROBLEM. Faced with the problem of mounting these engines inverted, I first used a mechanically operated spring-loaded flap covered with leather to act as choke or air strangler instead of a finger, thus reducing overhang by avoiding the necessity of leaving room behind the induction pipe for the insertion of a finger. (Fig. 1 shows one of my Ohlsson 23's on a cone mounting—the lever operating the choke is seen below the hook for the rubber retaining bands.) This was and still is quite satisfactory, but the whole problem of accessibility to the fuel tank in direct induction engines to a large extent remains, and the induction pipe, far from being extended to the optimum of 3 to 4 ins. is, in fact, shortened somewhat.

I have therefore developed a completely new system of induction for 3-port engines which, after extensive tests on several different makes of engine, both British and American, has proved so satisfactory that I am now converting all my pre-war direct-induction engines to this system. Not only does it improve performance but it also gives excellent accessibility to both tank filler and needle valve. Choking is simplified; starting





is made much more reliable and easy, and for the Scale enthusiast, it renders cowling of the engine easy and practical from an operational point of view.

In cases where the induction pipe screws into a threaded port on the cylinder, the original pipe is discarded altogether and replaced by a length of. similar diameter aluminium tubing bent at right angles and tapped with the correct external thread as close to one side of the bend as practicable. The needle valve is passed through the pipe through the *correct size* holes (this is important to avoid air leaks) drilled from side to side, well above the engine bearers. The fuel tank, made up from sheet celluloid pressings the requisite shape and dimensions, is then interposed between the induction pipe and the back of the crankcase, resting on or between the engine bearers. The needle valve is then connected to the fuel feed pipe passing nearly to the bottom of the tank. Personally I use synthetic rubber tubing for this, as it facilitates disconnection of the tank and washing out both tank and needle valve.

In cases where the existing induction pipe is brazed or welded to the cylinder the best method is to cut this off fairly short and secure the new bent induction pipe, with internal diameter reamed out to a tight push fit over the original, with a light steel strap and bolt. (Fig. 2 illustrates the well-known British Hallam Nipper, whose performance has been improved out of all recognition by this induction system and by the judicious enlargement of its ports. Above are two views of an Ohlsson 23 and below an Elf fitted with the "Forster Induction System!" and mounted compactly and accessibly on detachable electron mountings.

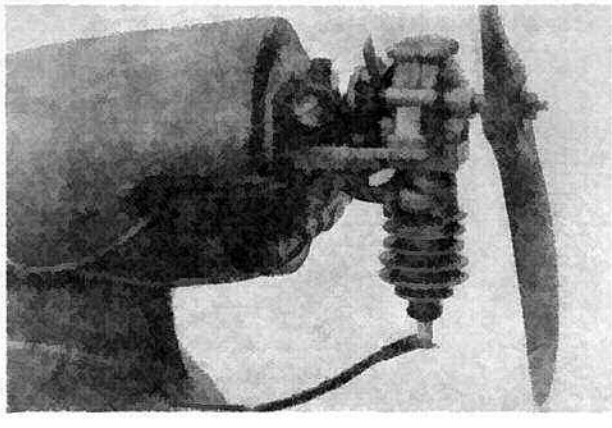
II.—Rotary Valve Types and Fuel Feed.

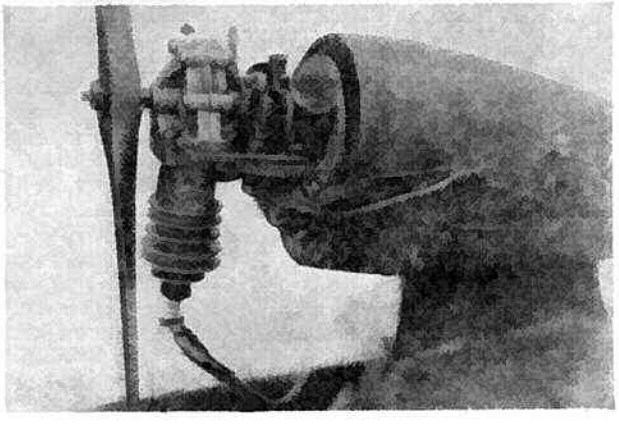
Even the rotary valve type is not entirely free from snags. In the early days gravity feed was common, and in order to avoid engine becoming flooded, makers avoided down-draught induction pipes and usually cast this pointing downwards when the engine was upright, so that while master was hurrying to retrieve his model after a flight, the fuel continued steadily to drip away from the open end of the induction pipe.

As stated in my book, it is my opinion that these engines were never designed primarily as *aero* engines. At all events, after bitter experience, gravity feed has now gone for good, or at least until someone can devise a float chamber which will continue to operate reliably with engine vibration as it is and with accidental aerobatics as they frequently are!! I hope soon to see that in this country at least, the installation of upright engines is also a thing of the past.

However, the famous Baby Cyclone (but unfortunately not its new brother the Super Cyclone), so deservedly popular in this country, and one or two other engines including the British Wasp and Hornet, fortunately for our purpose, retained this relic of the past. With the almost universal adoption of suction feed, the inversion of these engines results in a very accessible down-draught carburettor, and indeed the starting of this type of engine when mounted upright yet using suction feed, is practically impossible, as it is virtual suicide to one's fingers to attempt to choke the inlet pointing downwards just behind the prop.

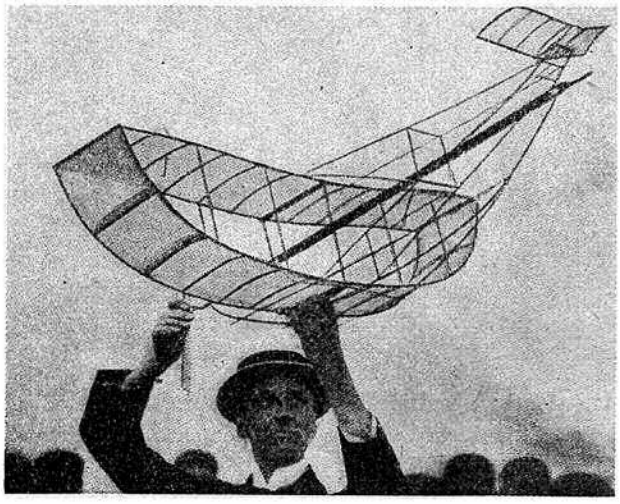
(*Continued on page 186*).





AS THINGS WERE IN THE BEGINNING

By H.J.P.



Competition day June 6th 1910! A Bragg-Smith biplane about to be hand-launched.

ALMOST everyone is interested in old things or old happenings, and perhaps aeromodelling is now an old enough hobby for the Aeromodel Antiquarian to start delving into the past.

It may, therefore, be of interest to cast one's mind back to 1909, the year when Bleriot flew the Channel and flopped to ground with a broken undercarriage on a steep hillside near Dover Castle.

In the autumn of this year some of the more enterprising toyshops were selling two varieties of model aeroplane. These differed greatly from each other in construction and appearance, and one was of French origin and one English.

The English variety was known as the "Clarke Flyer," being a product of T. W. K. Clarke and Co., of Kingston-on-Thames. It was a pusher monoplane, with wings made of thin birch or spruce and had no undercarriage. Its propeller was of steamed and twisted wood, the motor stick being either a single rod, or two rods, bent into a curve and joining fore and aft. The instructions were more or less of the "wind it up and throw it into the air" variety. Its flight was short, circular and highly erratic.

The French variety followed Bleriot practice in that the aeroplane was a tractor. It was really an extraordinary "creation," yet it had several features which might, had they been mechanically more perfect, have been surprisingly advanced in conception. Let me try to describe it:

The backbone, or motor spar, was of aluminium tubing, about ¼" in diameter. The front third of the motor spar was composed of a rather larger tube which slid over the rear tube and gave a ready means of shortening the machine, before packing it into its flat cardboard box. The propeller bracket was an aluminium casting which fitted into a slot on the end of the tube and was quickly detachable. The airscrew, obviously based on the Farman and Antoinette propellers of the period, was a lamentable affair both structurally and aerodynamically. It consisted of a length of aluminium tube, slotted and flattened at either end, into which were inserted and riveted two blades of some "tortoise shell" material. The bearing was a bead, and the airscrew shaft was some mild steel wire which bent if you looked at it. (Probably it was devised from that well-known mechanical contrivance, the ladies' hairpin!)

The wings, both main and tail, were of thin round cane, to which was stuck on the underside only (thereby leaving the very worst imaginable "upper" surface), some coloured gold beaten skin. A fin, *under* the tail plane, completed the outfit except for the undercart. This was surprisingly modern, was quickly detachable, had a backward travel and carried streamlined "doughnut" wheels of cork. Thus it accidentally anti-dated present practice by some thirty years!

Under incredibly good conditions such an outfit would rise from the ground and hop a few yards. Hand-launched it flew, with terrific vibration and a shuddering noise from the flapping goldbeaten skin, for a distance of perhaps thirty yards.

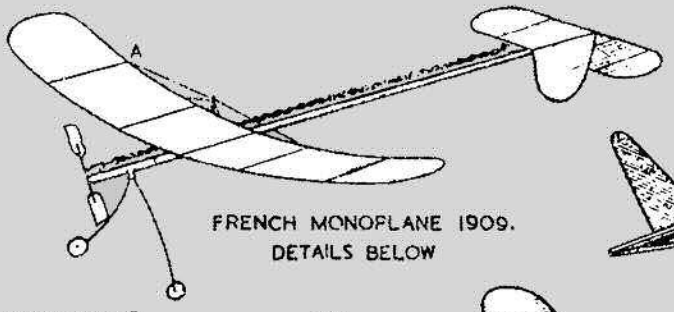
What is hard to realise now is that everyone was completely ignorant of the ways of the wind, and we boys tried to make our unfortunate aircraft fly in courtyards, alleyways and suchlike places, where the wind was performing the most incredible contortions and where down-draughts and other such devilments abounded!

My next model was a far superior affair, and when I unpacked it from its box at Christmas, 1910, I was proud indeed. This was a Bragg Smith biplane, really well made—though extremely heavy by modern standards. It had well-covered silk wings (single surfaced, of course), a heavy, blue-painted motor rod, a large and fairly efficient blue propeller, and a whalebone skid—at least, that's what I think it was made of. It was a good and consistent flyer up to sixty yards or so (we never lubricated the elastic, of course), and lasted a couple of years, despite innumerable crashes into buildings. It must have been very strong as, except for its tiny front elevator which was held on by rubber, the whole of the rest of it was built up solid. I think this was about the only biplane on the market, though the French model described above also appeared in biplane form (but that was an "extra," far too expensive for my modest purse).

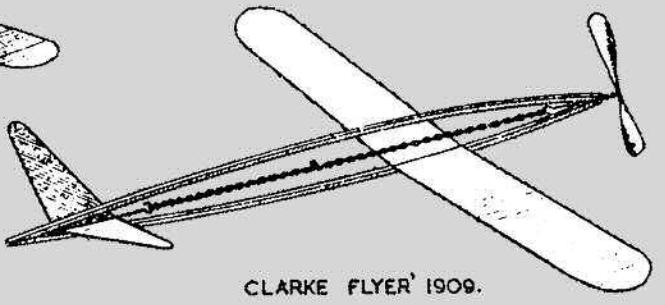
After the first attempts at a tractor model the type faded out, amidst much correspondence in those pages of *Flight* which the Editor allotted each week to Model Aeronautics. The general reasons for its temporary eclipse seem to have been instability (though anything much more unstable than the tail first designs of the period would be hard to find!) and, probably, the difficulty with the fixed undercarriages then used.

During the period from about 1912 to 1914 the A frame, twin propeller model undoubtedly reigned supreme. There were two main "themes" either "canards" (tail first) with a small heavily loaded front elevator at the apex of the A, and what were known as "floating tail" types in which there was no front elevator but a largish non-lifting tail at the base of the A. In general both types performed well and flights of up to 500 yards were possible, though improbable, with the best of them.

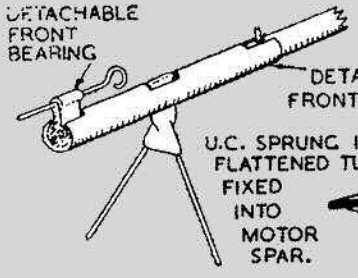
They flew fast and straight—fast because their wing was single surfaced and not very efficient, so they just *had* to; and straight because the propellers

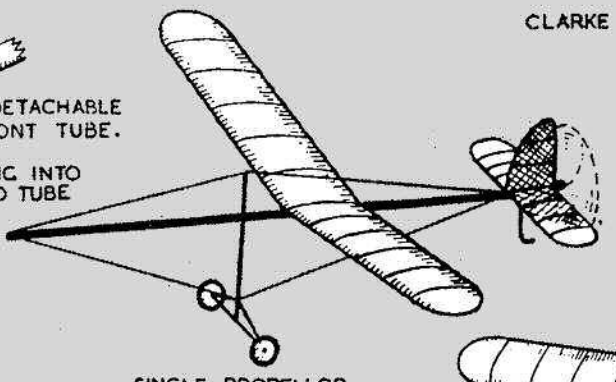


FRENCH MONOPLANE 1909.
DETAILS BELOW

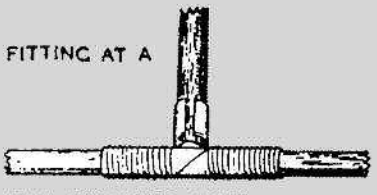


CLARKE FLYER' 1909.

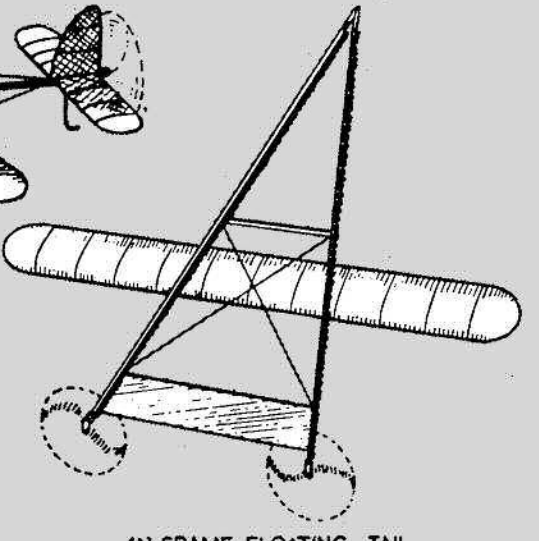




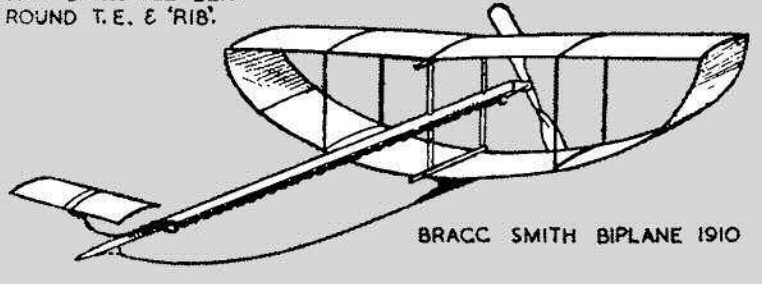
SINGLE PROPELLOR
PAULHAN-TATIN' TYPE.



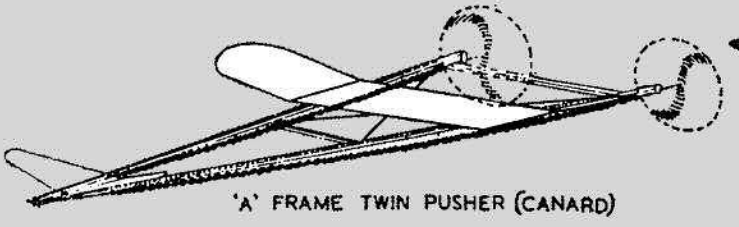
THIN BRASS 'TEE BENT
ROUND T.E. & 'RIB'.



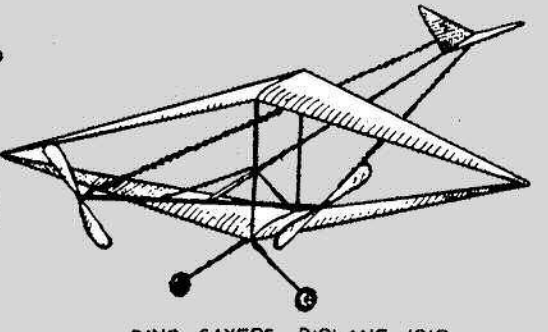
'A' FRAME FLOATING TAIL.



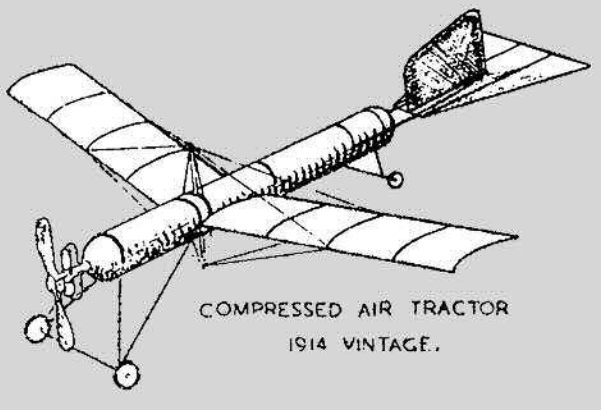
BRACC SMITH BIPLANE 1910



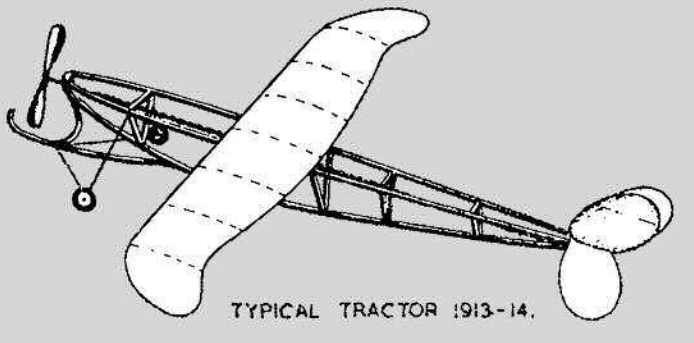
'A' FRAME TWIN PUSHER (CANARD)



DINC SAYERS BIPLANE 1910



COMPRESSED AIR TRACTOR
1914 VINTAGE.



TYPICAL TRACTOR 1913-14.

of opposite "hand" cancelled out torque. (Incidentally, in a fairly recent *Aeromodeller* someone described a modern "balsa" version of the A frame floating tail type.)

The best known of the A frame models which were actually on the market was probably the Mann monoplane, made by Mann and Grimmer, who later produced an original but unsuccessful full-sized twin pusher biplane (early 1915). A reproduction of their advertisement, taken from *Flight*, is shown above.

There were many other makes, some of which were so bad that they ought never to have seen the light of day, and I, in common, I suspect, with other schoolboys, "got my fingers burnt" with some of them.

Judged by modern standards the models were *very* heavy, the A frames were made of hard wood of ample cross section, the propellers were of carved or steamed hardwood, the wing structure of piano wire and oiled silk (sewn on), and the stabilizers often of spruce or whitewood sheet. Undercarriages, when fitted, had to be high and "stalky," as did the tail skid, in order to give prop. clearance, and the framework of the undercart was always of rigid and fairly heavy gauge piano wire, with aluminium wheels.

About 1913 a few sportsmen tried experimenting with double surfaced wings, and, looking through back pages of *Flight*, one occasionally finds a really advanced effort —one in particular was a tractor monoplane with large span, cantilever, wing *with a thick wing section.* When one considers the revolution effected at least four years later by the first appearance of the thick wing cantilever Fokker biplanes, this was a surprising effort at "prophecy."

A number of "weight lifting" models were made, about 1913 and early 1914, as there was a vogue for competitions of this nature (they might well be revived, I think), and some most interesting designs were produced, notably a large, geared, single pusher by Mr. Slatter.

Another Aeromodeller, Mr. Stranger, deserves much renown for designing and flying successfully the first large petrol models. (Langley's model "Aerodrome" which flew so well about 1903 was steam driven, as were all Mr. Groves "Canards" which he flew on Blackheath around 1913.) His big "tail first" biplane held the petrol duration record of 51 seconds, until Capt. Bowden some sixteen years later (if memory serves aright) took it off him.

In those old days petrol models were tremendous affairs which vied with the full-sized aircraft of the period in the amount of wires, turnbuckles and "built-in head winds" which they possessed!

One most astonishing aircraft was on the market, but not for long, and I was given one by our local doctor. It was a pusher affair, with a large fabric propeller and plenty of rubber. Its wings had an aspect ratio of about 2 and were heavily twisted in the opposite sense to the propeller. It flew by screwing itself through the air like an inebriated paper dart, and after a short flight lay writhing on the ground till the rest of the power ran out. What the big idea was I never really gathered.

About the end of 1913 tractors started to come along a bit better, and many had the Zanonia form of main wing made popular at that time by the German "Taube" and the Handley Page monoplanes. Nearly all had open fuselages of triangular section and very hefty undercarts with big curved skids. Their universal failing (a failing common to almost all the "grown up" types of the period also) was far too small a rudder and consequent spiral instability.

Compressed air (and even CO_2 driven motors—worked off sparklet bulbs) started a brief career about then and some were well designed and flew quite decently. Their chief trouble was that after a bit their owners were left friendless on their flying fields, having been deserted by their "pumpers-up"—it was indeed no joke at all on a hot day!!!

The Great War put a stopper on most of the model activities. At the end of it there was an era of tractor models (mostly of the stick variety and all with single surfaced wings). Some of these later concealed their rubber in nicely-made hollow spar "sticks"—the firm of A. E. Jones produced some lovely models of this type. Gradually the covered fuselages appeared (though certainly there *were* a few in 1914), and finally the whole affair was revolutionised by the appearance of balsa.

Don't get away with the idea that all the early models were badly made. A great deal of skill was often shown, and indeed the production of soldered joints, spliced and bound joints, bracing wire systems and carved hardwood props was a highly skilled job. Everyone was, aerodynamically speaking, groping in the dark, thermals were unheard of, and rubber motors little understood. A 200 yard flight under such conditions was not to be sniffed at and had meant a lot of hard thought, hard work or colossal luck.

Wouldn't it be rather fun to get hold of some pre-Great War *Flights* and reconstruct some of those models? One wouldn't want balsa, and we were told in the November, 1943, issue of this most reliable (and we had thought, respectable) journal of ours that the motive power could still be found in ladies' knickers!

A 1 inch to the foot Flying Scale Model of the AIRSPEED HORSA

By IAN H V. HAYES.

THE Airspeed Horsa is a British, Heavy Transport Glider, which has been used on a number of occasions during the campaigns in the Mediterranean. It is not an elegant aircraft, but as one constructs the model it can be seen how the full-size machine has been designed to make use of simple flat sheets of material. Even the large glazed cabin is made from flat sheet bent in simple curves. The plywood covered fuselage is truly cylindrical for the greater part of its length.

Recently several modifications have been embodied in the full-size machine. A large skid has been added under the fuselage, together with wing tip skids. These new details are not shown on the drawings, but may be added by a careful study of new photographs and plans. With the skid added, the machine may be seen flying without the rear tripod undercarriage, which can be jettisoned after take-off.

The Model follows the lines of the real Horsa very closely, but dihedral has been added to the outer wing panels. The construction makes extensive use of thin white cardboard, and "Balsa" Substitute wood is used throughout. The finished weight of the model is 48 oz.

A WORD OF WARNING.

The wing-span of the Horsa is 88', using the standard S.M.A.E. scale of 1" to 1' the model has a span of 7' 4". In order to comply with the Defence Regulations, the wing tips have been made detachable to cut down the span to 6' 11" for flying purposes.

The fuselage is constructed round a built-in jig, which forms a Central Vertical girder with a horizontal girder on each side. The web of the vertical girder is cut out of cardboard, two or more sheets being overlapped and glued together if necessary. (The glue used throughout should be of the cold water casein variety. Cellulose cement may, however, be used for sticking some of the smaller sections of card covering in place.)

The lightening holes are cut out by first forming the rounded corners, with a sharpened piece of tube, of approximately the same diameter shown on the drawings. These holes are then joined up with cuts made with a razor blade. Do *NOT* try to save time by making angular corners. Try for yourself on a waste piece of card, and see how the stresses are distributed round a curved corner, whereas a sharp corner will tear easily.

After building up the Vertical Girder, the two Side Girders should be made in a similar manner. The starboard side girder is glued in place first, by the card tabs. The cross bracing is now added, continuous across the fuselage, and the port side girder can then be glued in place.

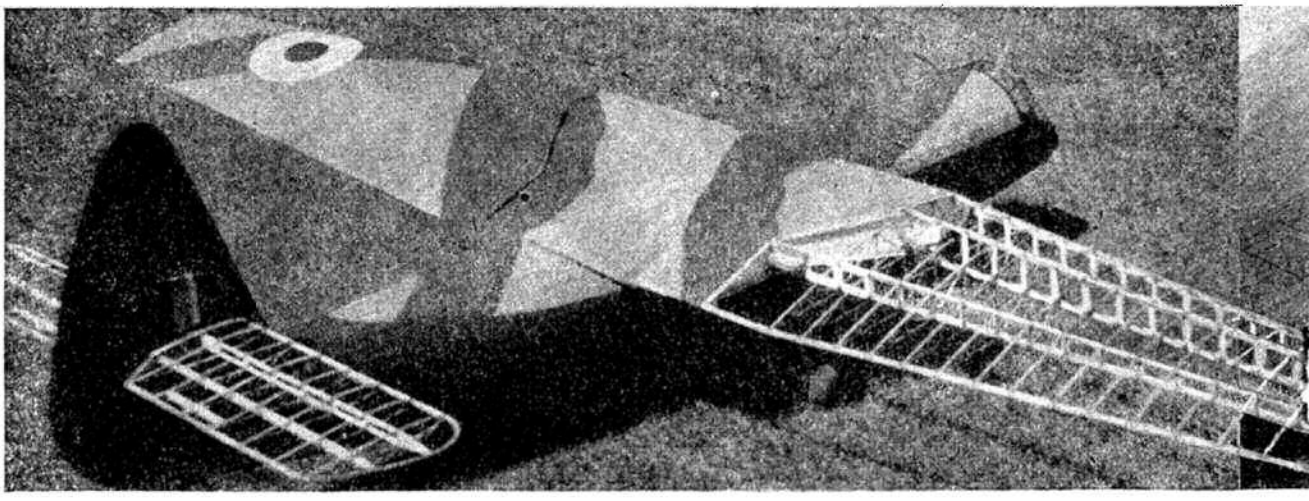
The fuselage formers are rolled from $\frac{1}{4}$" x $\frac{3}{32}$" wood, round a thick card former, cut to the shape of the inside of the former. These card shapes are shown on Drawing 4. In order to fix these formers on to the silhouette shape formed by the girders, the joints should be staggered as shown.

The $\frac{1}{8}$" x $\frac{1}{16}$" stringers are now glued in place. If necessary they should be joined with a long scarf joint. Note that the side girders follow the centre lines of the formers, and the stringers follow this curve, keeping their relative positions.

Between formers 5 and 13 there is a special $\frac{1}{8}$" x $\frac{1}{8}$" stringer, which is glued to the formers in line with the top of the vertical girder, in the "Well" of the fuselage.

The two sloping formers which form the ends of the well in the fuselage are glued in their respective positions to the vertical girder and the $\frac{1}{8}$" square stringers.

The cabin, which is removable to gain access to the balance weight and the rubber springing of the front wheel, should be built up on a card jig. After covering with celluloid, the framework should be covered with $\frac{1}{8}$" strips of card. Note that the strips on the edge of the cabin are slightly larger to overlap the fuselage and



hide the joint. The cabin is held on with three small rubber bands.

Wings.

The construction of the wing is quite straightforward. The only unusual features being the card webs to the three spars and the card covered leading edge. Note that on the drawings of the wing ribs, only the centre lines of the bracings are shown, and all ribs have gussets of thin card both sides of each joint.

The centre portion of the wing should be constructed in the same way as the outer panels. When complete, the portion of the Vertical Girder should be glued in place together with the two stringers of $\frac{1}{4}$" x $\frac{1}{16}$" and $\frac{1}{8}$" square which fair the centre section into the fuselage. The two sloping formers can now be glued to the ends of the small portion of girder, the ends of the $\frac{1}{8}$" square (Forward), and the trailing edge (Aft).

The top parts of the fuselage are now formed with $\frac{1}{8}$" x $\frac{1}{16}$" stringers, glued to the top parts of the fuselage formers. (These sections of the fuselage formers should be cut off after the fuselage has been built up.) The card covering on the leading edge must be pierced to allow the stringers to pass through. Their ends are notched to fit the $\frac{1}{16}$" square outline on the sloping formers.

The small portions of the fuselage thus formed on the centre section are now covered with card. This butts up against the covering on the leading edge at the front, but should be notched to clear the ribs and continue into the wing at the rear. Strips of $\frac{1}{16}$" square are now glued to the rear card covering, between the ribs, to support the tissue covering.

Fin, Tailplane and Tail Struts.

These need no explanation, except to point out that the Fin outline, as are all tip outlines, is formed by soaking two strips of $\frac{1}{16}$" square, bending to shape by pins in the usual manner, and gluing with casein glue.

Undercarriage.

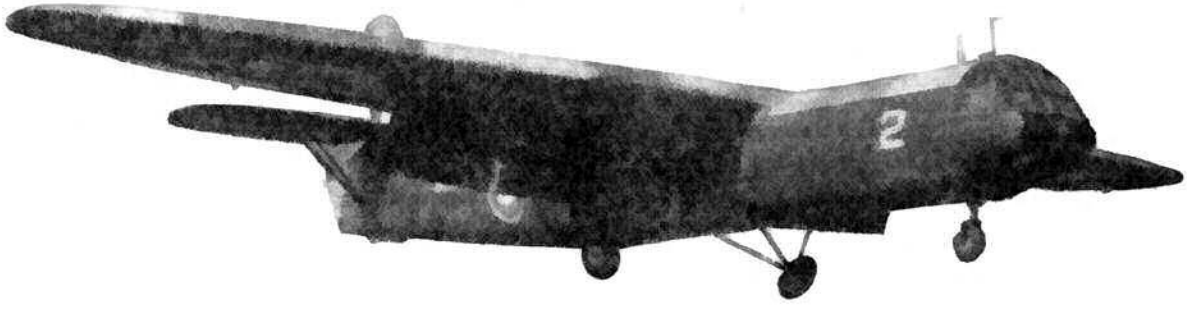
The undercarriage legs are formed by 16 S.W.G. wire streamlined with wood, which is glued to a strip of wood bound to the wire.

The method of springing the rear compression leg is an adaption of the one shown on page 78 of *Scale Model Aircraft that Fly*. The four springs were bought ready made in the form of two lighter springs which were then cut in half.

The covering to the springing mechanism should, if possible, be carved from balsa. The original model had these fairings worked-up from card, to avoid using material which is hard to obtain. Fairings carved from balsa should, however, prove more satisfactory. (If you happen to have any of this material available, the tail surfaces could be conveniently built-up in the balsa wood style. This will keep the weight down in this part of the model, and consequently the balance weight will be less.)

The model is covered throughout with tissue. Do not cover over the sheeted-in portions as would be done with normal balsa covering. The model may now be sprayed in the usual way, but first give the card-covered parts a coat of dope to waterproof it.

Two schemes of colouring are possible—either Day camouflage with yellow undersides and black diagonal stripes or Night camouflage.



Assembly.

As the main rubber bands holding the component parts together are internal, a few notes on Assembly may be of use.

1. Insert the "V" undercarriage legs in the fuselage and fix in place by means of rubber bands stretched between the two hooks.

2. Hook four strong bands on to the hooks in the fuselage. Attach the special hooks to these bands, stretched taut and pass a $\frac{3}{16}$" square stick through each pair. The hooks thus stand up above the vertical girder and the centre section can be hooked on easily, the $\frac{3}{16}$" sticks removed and the centre section allowed to settle in the fuselage well.

3. The compression struts are now swung up, inserted into the wing and held in place by small bands.

4. Slip the front undercarriage leg into its box in the fuselage and insert the split pin to act as a pivot. The springing is formed by rubber bands as found necessary.

5. Add Cabin cover.

6. Add Tail-plane, Fin, Tail struts, in that order (Before adding the second tail strut, stretch a rubber band through the tube in the fuselage to hold the strut in place.)

7. Hold the Fin in place by a small band between the hooks at the tail skid.

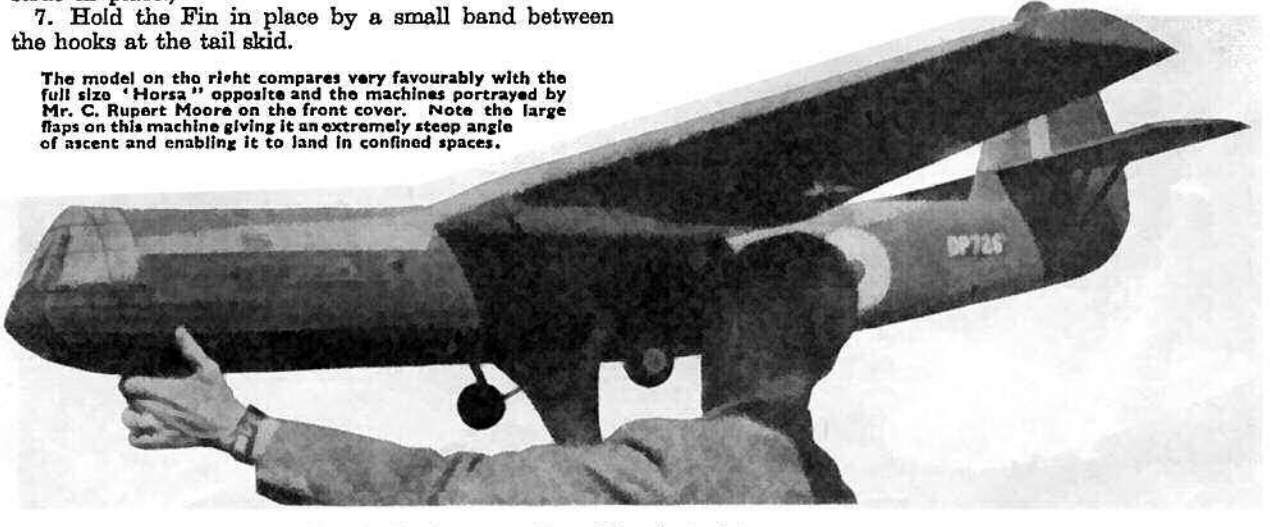
8. To add wing panels, hold inner ends of trailing edges together and swing tip of wing forward. If the tongues are correctly aligned, they should engage while the wing panel makes an even, forward curving movement. Two small bands on the hooks on each panel hold the three sections of the wing together. (In a bad landing the backward movement of the outer panels, combined with the up and down movement of the centre section, acts as a safeguard to the whole of the wing.)

9. During war-time add wing tips for *EXHIBITION ONLY*. No rubber bands are necessary.

Balance the model with lead shot glued in between the nose girders, which are not perforated with lightening holes for this purpose.

The model is launched by a tow line having twin rings. It has been towed up off the ground, becoming airborne after a very short run along the ground.

In conclusion, I should like to point out that my own model now has Air Wheels made on the lines set out in the *Aeromodeller* for September, 1943. These are proving very satisfactory indeed.



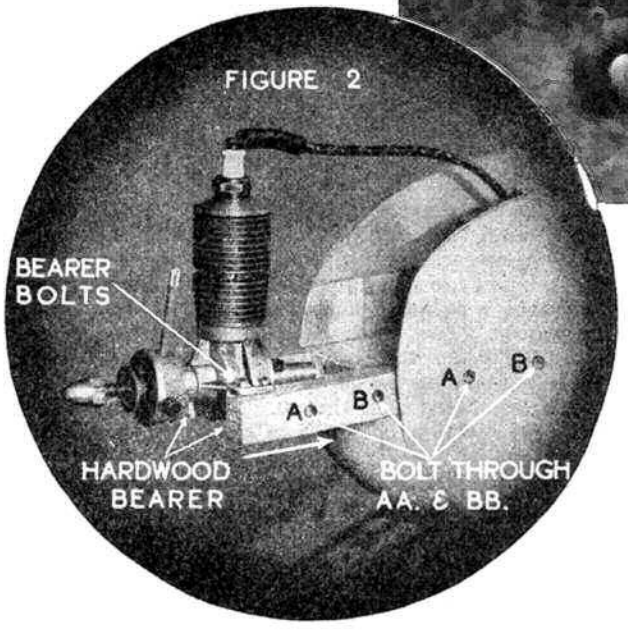
The model on the right compares very favourably with the full size 'Horsa" opposite and the machines portrayed by Mr. C. Rupert Moore on the front cover. Note the large flaps on this machine giving it an extremely steep angle of ascent and enabling it to land in confined spaces.

price 1½d. The Aeromodeller Plans Service, Ltd., Allen House, Newarke St., Leicester

EXPERIENCES WITH AN AMERICAN GAS-JOB UNDER ENGLISH CONDITIONS

BY B. J. STEDMAN
& J. W. C. JUDGE

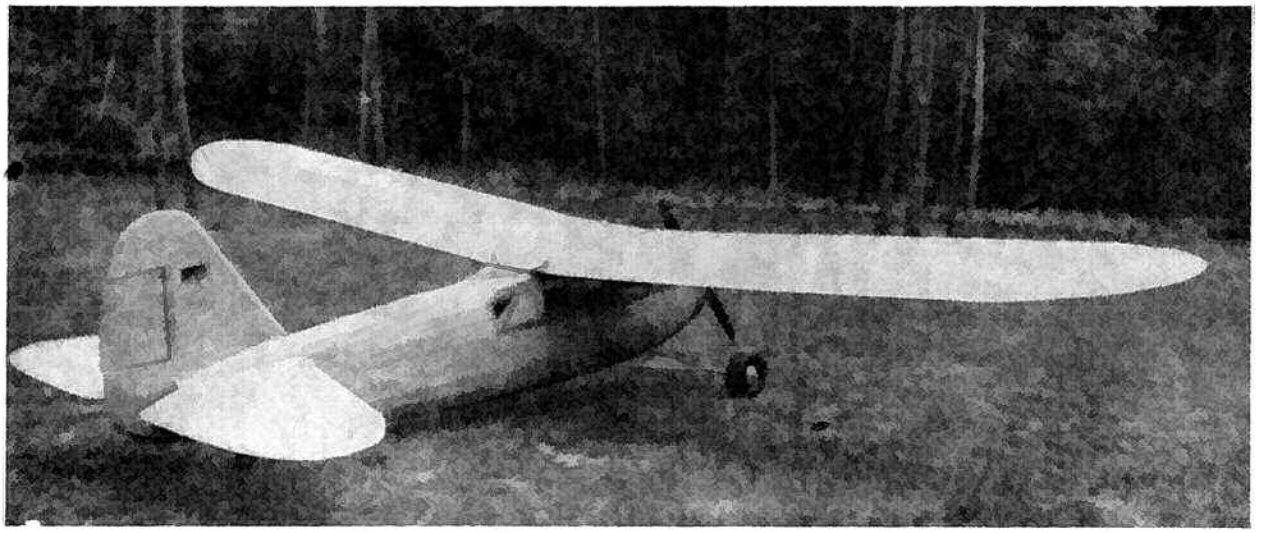
The Super Buccaneer, "Big 'Earted Arthur" before modification Note the wing in one piece, and the undercarriage has only two struts per leg having a pronounced forward sweep. No backward movement is possible.

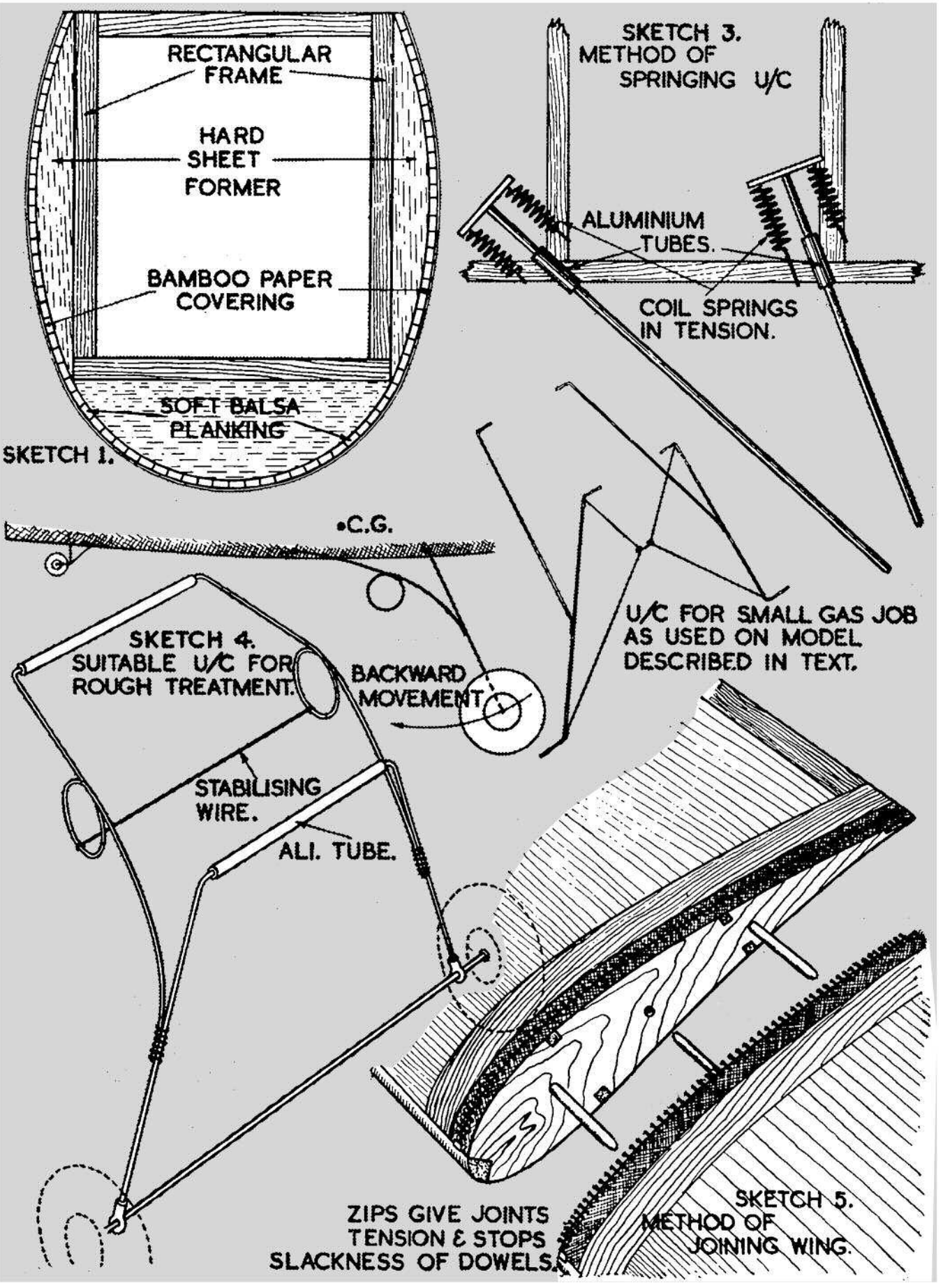


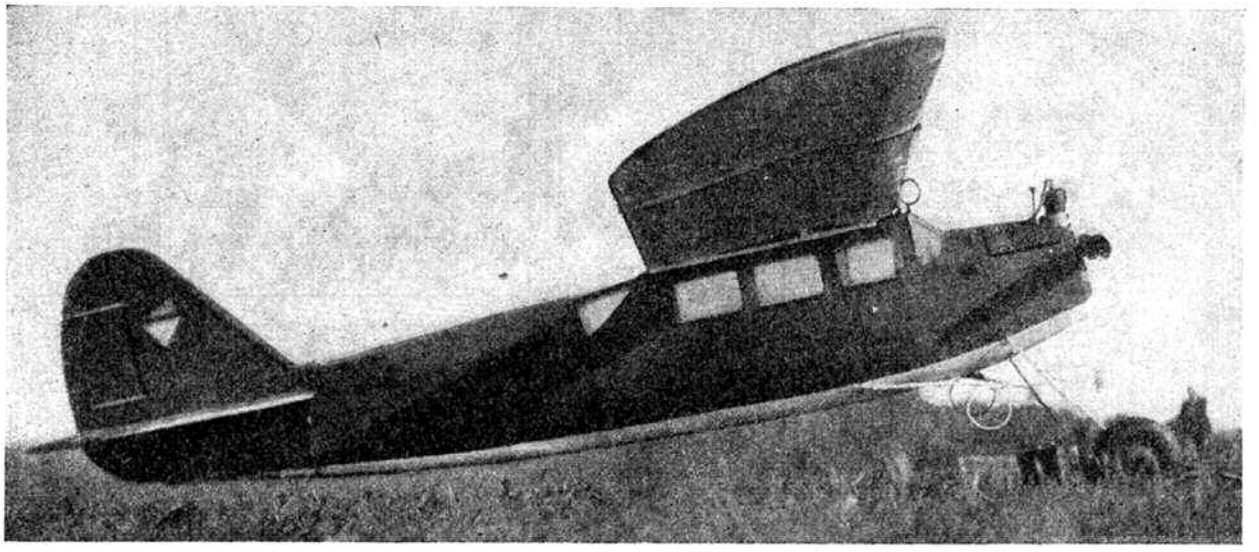
The lowness, almost belly-sliding position is very apparent here, also the lack of propeller protection.

MODEL airplane meetings for years have been the scene of many discussions, even heated debates on whether spruce and silk, or balsa and tissue should form the basis for "gas-jobs" in this country. In 1937, the writer's sole experience of petrol modelling has been confined to the hardy Comet III powered by the 2.3 c.c. Spitfire engine. Partly due to a close study of American gas-job propaganda in their leading journals, and partly due to the chance of securing a kit of the then latest model, the writers decided to wade into the problem and see for themselves exactly what were the advantages and disadvantages of the American gas-job technique.

They accordingly waited one day during the summer of 1937 for the station van to deliver a long blue packing case labelled "Super Buccaneer," the size of which almost immediately made them think of 78-6 in. of wing being held down in what our "Met." men choose to call "wind at 25 m.p.h., unusually gusty."




RECTANGULAR FRAME
HARD SHEET FORMER
BAMBOO PAPER COVERING
SOFT BALSA PLANKING
SKETCH 1.
SKETCH 3. METHOD OF SPRINGING U/C
ALUMINIUM TUBES.
COIL SPRINGS IN TENSION.
•C.G.
U/C FOR SMALL GAS JOB AS USED ON MODEL DESCRIBED IN TEXT.
SKETCH 4. SUITABLE U/C FOR ROUGH TREATMENT.
BACKWARD MOVEMENT
STABILISING WIRE.
ALI. TUBE.
ZIPS GIVE JOINTS TENSION & STOPS SLACKNESS OF DOWELS.
SKETCH 5. METHOD OF JOINING WING.



The Buccaneer after modification. Note the new undercarriage placed well forward, pivoted and sprung by means of the single coil-spring per leg.

The contents, however, more than exceeded our expectations. The liberal supplies of balsa (Oh! those palmy days of peace!) and the excellent full scale plans combined to make first impressions very favourable.

Construction was completed in the space of a school summer holiday . . . six weeks. It was during this period that the writers realised that despite what they feel must be prejudice on some British modellers' parts, you can get strength out of balsa construction. A glance at sketch No. 1 will illustrate this point.

It was after construction, and when the writers came to covering that they discovered the first major defect in the "American technique" . . . Bamboo Paper. In support of bamboo paper it can be said that it is light, shrinks well and takes dope well, and is cheap. But when it comes to strength, it falls very badly. The slightest knock or misplaced finger jab, and *bang*, a hole appears in a surface that was as taut as a drumskin. Similarly, later on, long grass and twigs wrought havoc with surfaces, in many cases making them look like a 'plane that had had a very strong dose of flak.

The writers had decided to power the model with the 9 c.c. Ohlsson engine, and little need be said about that, except to praise its amazing power and general "good engineering" qualities. While on the subject of motors, it is opportune to mention engine mountings here, Fig. 2 shows a typical American type engine mounting similar to that employed in the "Buccaneer," which is of course, by no means crashproof or "knock-offable." The writers had some qualms about not having a knock off engine mounting, especially with experience of the Comet coming in to land in typical British meadowland. However, it was found that the question was not so much that of the safety or otherwise of not having a knock off engine mounting, but resolved itself into the problem of how much protection can be given by an efficient undercarriage. The problem of nosing over progressively decreases as the size of the machines goes up.

This photograph shows the zipps on the wing joining up the three portions. The white bottom of the fuselage is part of the camouflage, modelled on the early fighter schemes, and carried out in order to try and strengthen the bamboo tissue.

This brings us to the third and perhaps most important stage . . . flying. Here the writers had the greatest doubts and the least knowledge of how things would turn out. Test hops of five seconds showed a fairly quick tailup and good stability when taxying. Ten seconds took her off the ground and without any alarming nose-up with engine cut out, she gently glided in. The weather was as near perfect as possible with perhaps wind at 5 m.p.h. Surface was aerodrome grass. After a few more such hops, the Buccaneer was "given the gun," and with their hearts in their mouths, the writers watched. The results were very surprising. "Big 'earted Arthur" shot across the aerodrome for about seven yards, then, the covering wrinkling along the top surface, she put her left wing down in a colossal 180 degrees climbing turn, after which she flattened out and continued wide climbing turns in the most stable fashion possible. Upon cut out a very flat glide resulted, ending with a fairly fast landing. In other words the flying characteristics were not so very different from British models, except for that amazing climbing turn off the ground, and . . . horrible sight . . . that wrinkling of the fabric along the top surface of the wing. Some further flying that day showed up another weakness, that was the undercarriage.

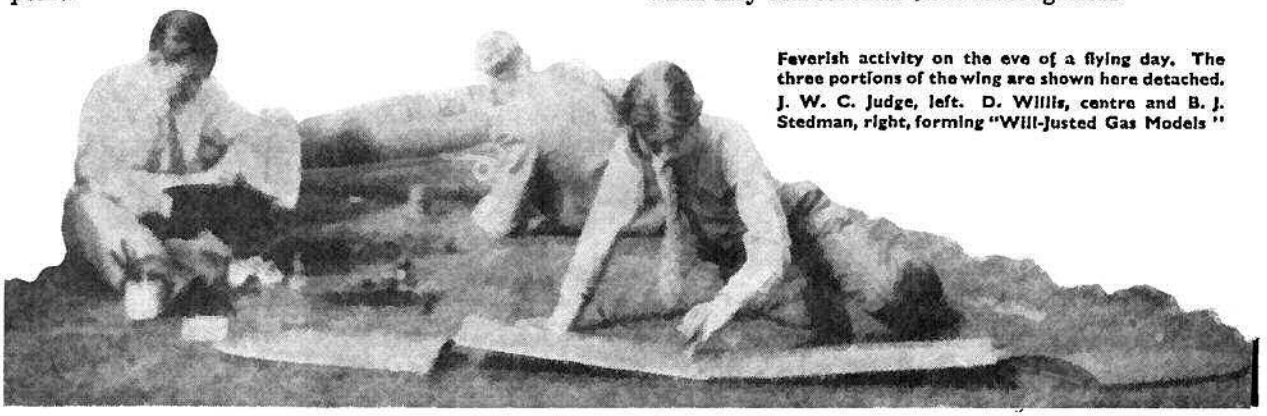
The usual type for American models appears to be a two-strut leg affair, and large section air wheels. For fast landings on ordinary grassland this type was very soon found to be unsatisfactory, as it finally buckled and tore away inside the fuselage. Several types of undercarriage were tried, including a compression type functioning by means of tension coil springs inside the fuselage. See sketch 3. This functioned quite well until after a flight at Fairey's during the Bowden Trophy, when a wing shifted forward during flight, and many switchback descents ended in a nose-dive into the earth from about twenty-five feet. The result was one broken propellor, and another disintegrated undercarriage. Further experiments yielded a kind of Anglo-American undercarriage. See sketch 4. This was found to be entirely satisfactory for the following reasons: backward movement was given by the coil spring, and downward rigidity by the axle linking up both legs. It has been found that if the undercarriage legs are linked up as a triangle, the sloppiness of the traditional type of American undercarriage can be cured. If the machine is too small for an axle, it can be linked up as in sketch 4. Nosing over was found to be almost impossible with this type. Anchoring was made really secure by moulding plastic wood all round the tubes, against the bulkhead inside the fuselage. This greatly facilitated transport . . . a fourth important point.

The writers are able to trail the fuselage along the road, and the planked construction enables all the accompanying equipment, such as batteries and tools, to be carried inside . . . a great advantage. The question of transporting 7ft. 6in. of wing was a very difficult one, and handling it in a wind was almost impossible. So the wing was sawn into three parts, dowelled and socketed so that the span of the two outer parts equalled that of the centre section. Beside the dowels, each part was anchored by zips, the wing being covered with 1/32 in. sheet along the edge of the joints. See sketch 5. The front and rear spars were also strengthened by 12 gauge piano wire along the length of the centre section. This greatly increased rigidity.

By these modifications, an excellent American model was made really suitable for English conditions. Stable flying was assured in the most "gusty" weather, and the landings were entirely satisfactorily absorbed, even on rough meadows. This showed that a machine of light wing loading and large span, when correctly designed aerodynamically, as the Buccaneer certainly must have been, can be flown quite successfully under ordinary English conditions. The one defect which remains, which the writers were not able to amend, was the use of bamboo paper covering, and they recommend the use of silk in its place. With the above improvements they feel that a really sound model can be made.

Certain conclusions can be drawn. Balsa can be used in a large petrol model very successfully, the advantage of lightness and ease of working being easily combined with strength and rigidity. This construction, combined with silk covering, will prove amazingly strong, yet still light. American type undercarriages are too near the centre of gravity, relying on a forward staggered undercarriage leg giving upward movement, and much more satisfactory results are obtained if they are replaced by a single coil spring and axle type, with the front leg well in front of the centre of gravity, and good backward movement. The undercarriage should also be higher.

After much thought, all these improvements were embodied in a model designed round the 2.3 c.c. Spitfire engine, and based on the Pee-Wee model in Frank Zaic's Year Book, 1937. Although of only 3 ft. 6 in. span, the construction was almost all balsa, and the covering was of silk. The undercarriage was two-legged, but linked in the method shown in the sketch. Unfortunately results cannot be ascertained as yet, due to the petrol model ban forestalling flying tests, but taxying and "dropping and general robustness" tests appear amply to bear out the writer's contentions. It is with great eagerness that they look forward to the days when they can continue their investigations.



Feverish activity on the eve of a flying day. The three portions of the wing are shown here detached. J. W. C. Judge, left. D. Willis, centre and B. J. Stedman, right, forming "Will-Justed Gas Models"

PHOTOGRAPHIC SECTION

J. A. HODGSON

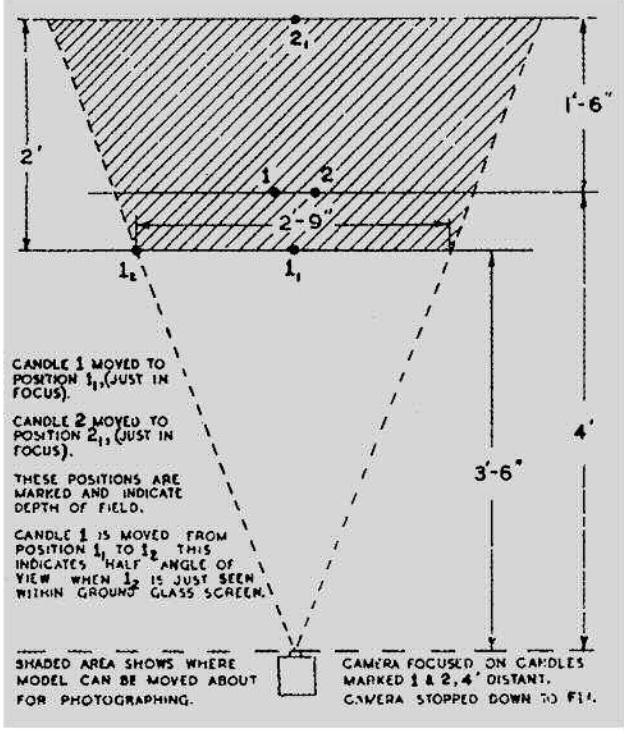
WHENEVER a book dealing with aeromodelling is written the question of photography of models arises and more often than not a chapter or two is devoted to this so-termed art or hobby.

Photography is essentially a science, but to the majority of our readers it must remain just an additional hobby, and it is for the guidance of this majority that the "Aeromodeller" Photographic Section is written. To the photographic enthusiasts who devote much time and money on equipment and experiments we recommend the numerous excellent text books which flood the market. In the interests of a clear understanding we touch briefly on some of the basic principles of photography, but only those concerning the photographing of model aircraft.

No matter whether you are a beginner possessing only a humble Box Brownie and wishing to photograph your first model, or whether you are an old hand well equipped for the job, certain fundamentals exist. The camera is only the means to an end. Our purpose is to explain the correct procedure and our aim, to help our readers to secure successful pictures with the minimum of film wastage.

This, the first article, is perhaps a little dull—but bear in mind that the serious modeller sets about understanding the theory of flight. He delves deeply into aerodynamics, so as to attain ultimate success. With photography, we must at least have an elementary knowledge of what takes place when we "push the button."

Fig. 1



Right then! The sensitised plates or films forming the basis of all photography are coated with an emulsion composed of certain salts of silver, subject to chemical changes by the action of light. This sensitised material is prepared, spooled and packed in dark rooms. In use, it is fixed in a convenient position in the camera, and upon its surface is projected, by means of a suitable lens, a small image of the subject to be photographed. This image will consist of certain brilliantly illuminated parts, other parts which are in the shadow, and further portions with no illumination at all. Before we can even consider composing a picture, decide at what angle to "take" it, or to arrange lighting we must understand that the primary fundamentals are, to project the image in *sharp* focus upon the sensitised emulsion, and secondly to project it for the exact length of time necessary to cause the desired change in the emulsion. All that need concern us regarding developing, is that the sensitised films are immersed in certain chemical baths which turn black all those portions of the emulsion affected by light during the exposure.

Clearly, those portions affected by the more brilliant part of the image will be turned blacker than the remainder, and the negative will be composed of gradations of light and shade corresponding to the variations in illumination of the original image. The exposure must be of sufficiently long duration to record the shadow details, but not long enough to render highlights and intermediate lights as one tone. Let us emphasise that correct exposure is vitally important as enlarged prints are invariably made from the small images on the negatives. Positive prints are made by placing the negative over a sheet of sensitised paper and exposing to light for a certain time, then developing as before. The printing will thus produce the necessary reversal. The white portion on the original image will be white on the print and so on, giving a more or less faithful half-tone print of the original picture. The sensitised paper can, however, only record a "positive" of the shadow details on the negative and a good picture cannot be made from a poor negative.

So much for the sensitised material. Now let us consider the camera in relation to the particular work which we wish to do with it. Photographing models can never be regarded as simple, the reason being that usually subjects are small. The first trap into which we are prone to fall is that of placing the camera much too close to the model in order to get a large picture on the film. To avoid too much technical explanation we have to ask our readers to take for granted some of the statements which follow.

A normal box or folding type camera of fixed focus is designed to be as nearly fool-proof as possible and simple in operation. Normal subjects photographed

Sketch on the left shows a Voigtlander camera with an F 7.7 lens of 12.5 centimetre focal length, set up and focussed on four feet.

The measurements indicated refer only to this particular camera when stopped down to F 11.

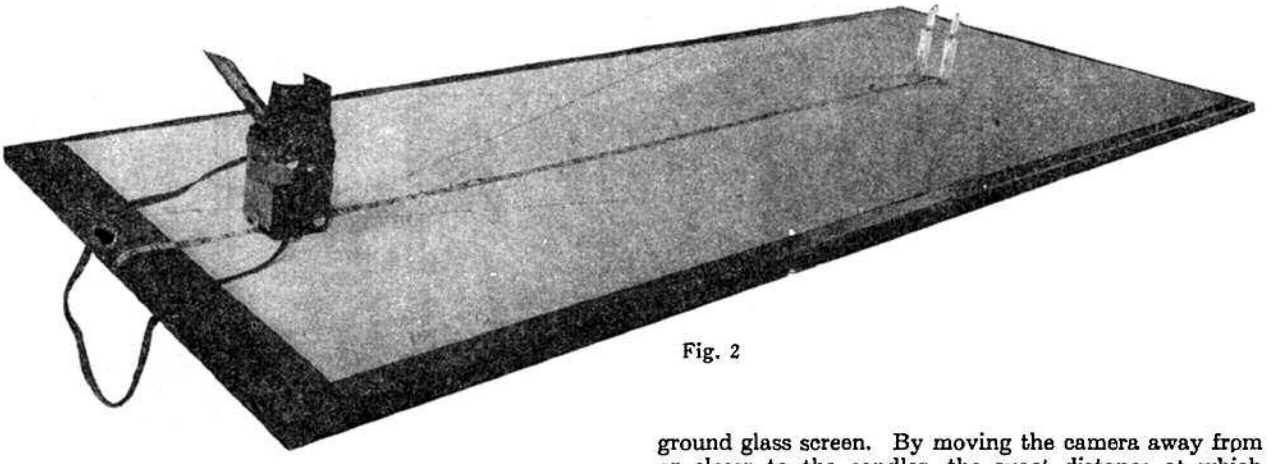


Fig. 2

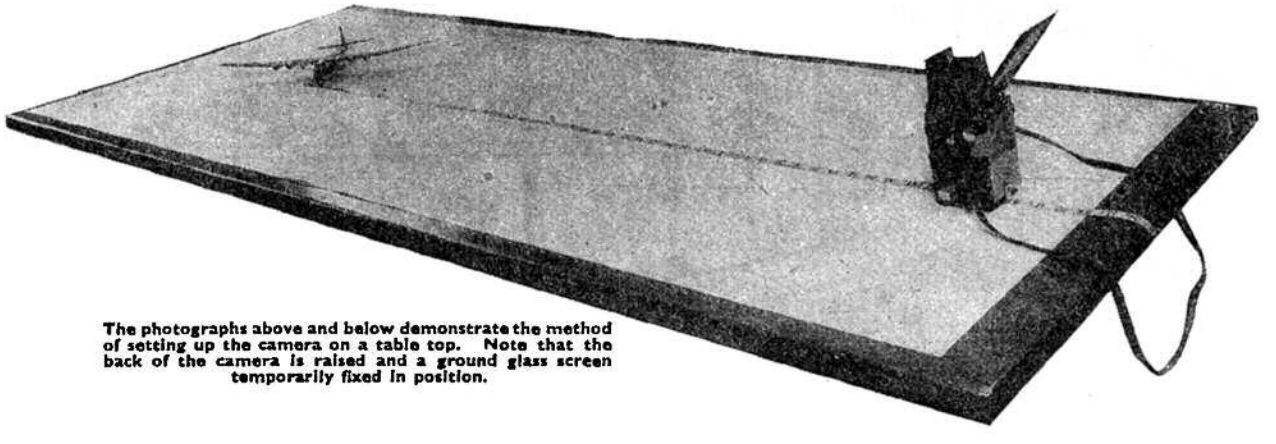
are distant views and single or groups of people, and the camera is focused on a point which will render all these subjects reasonably sharp and clear. If you are restricted to using a fixed focus camera never get closer to the model than eight feet, unless using a portrait attachment. A word of warning to the more fortunate who may be able to adjust focus: The depth of field dwindles rapidly as the camera approaches the subject. Depth of field is the distance from the nearest point to the camera rendered in sharp focus, to the farthest point in focus.

Another point, the greatest depth of field is provided when the lens is used at its smallest stop or aperture (if this is adjustable). Professional photographers use a focussing screen and check the image for focus before making an exposure. With a roll-film camera this is not possible, but it is possible to check distances with a focussing screen before loading the camera. In order to check distance and the depth of field we need: the camera, a piece of ground glass (obtainable from any good photographic chemist), two candles and a tape measure. First remove the back of the camera and fit the ground glass in the position normally occupied by the sensitised film. It may be necessary to consult a photographic dealer or chemist and have the glass cut to fit. This, however, depends on the camera; usually a piece of quarter plate size or 3½ in. by 2½ in. will do. It can be temporarily stuck on with sticking plaster. Light the two candles and place them at one end of the dining room table. Place the camera at the other end. Using a coat or odd piece of black-out material over one's head to keep out extraneous light, an inverted image of the candles may be viewed on the ground glass screen. By moving the camera away from or closer to the candles, the exact distance at which they are rendered in focus may be noted (see Fig 2).

It is advisable to make a sketch of the layout (see Fig. 1), measuring the distances accurately with a tape measure. Then commence moving one of the candles nearer to the camera and the other further away from the camera. Make a note of the distances at which they go out of focus. The distance between them will be the depth of field. By moving them away from each other as indicated, the angle of view can be checked and the resulting trapezium on your sketch will give the boundaries of the area in which the model may be moved without being out of focus when selecting the angle at which to take your pictures. It will be understood from this that further plans may be drawn up for greater distances if larger models are to be photographed, and so we shall learn to appreciate the remarks upon depth of field increasing as the distance from the camera increases. Here of course, we are mainly checking for the closest distance at which we may safely work. If those readers who have adjustable focus cameras carry out the same procedure they will find that in order to arrange for sufficient depth of field their working distance will not be much closer than that for fixed focus cameras with portrait attachments fitted.

Complete your sketch and when photographing models always set up your camera, outdoors or indoors, in exactly the same way.

There are certain inexpensive gadgets and devices which may be used in order to get closer to the subject, and these will be described fully in the next article when we shall also discuss exposures, lighting, and back grounds.



The photographs above and below demonstrate the method of setting up the camera on a table top. Note that the back of the camera is raised and a ground glass screen temporarily fixed in position.

The "SWALLOW"

DESIGNED BY
·L·W· CURRY·

· SCALE: HALF FULL SIZE ·

WEIGHT 4 ozs.

PERFORMANCE

1 ST.	FLIGHT	1 MIN.	22 SECS.
2ND	"	2 -	20 -
3RD	"	3 -	13 -
4TH	"	2 -	27 -
5TH	"	5 -	5 -

PLAN OF SIDES

ALL LONGERONS & SPACERS 1/8" × 1/8"

DATUM LINE

14 S.W.G. HOOKS

1/8" SHEET.

OFFSETS TO D.L.

HALF PLAN OF TOP.

SECTION AT STATION No 7.

3/8" × 1/8" BALSA AT BOTTOM.

WING ROOT RIB · FULL SIZE ·

· FIN ·

1/8" SHEET.

1/8" SQ.

1/8 × 1/4

1/4" × 3/32"

1/32" RIBS

1/32" SHEET

TRIM TAB 1/8" SHEET

· PORT TAILPLANE ·

1/4" SHEET

1/4" × 1/8"

1/32" RIBS.

1/8" SQ.

1/8" SHEET

1/8" RIB.

1/32" SHEET.

· PORT WING ·

1/8 SHEET

L.E. 1/4 × 1/4

SPAR 3/4" × 1/8"

SPAR 3/8" × 1/8"

1/16 RIBS

T.E. 1/8 × 3/8

RIB CHORDS

DIHEDRAL 1 1/2"

NOTE: 3/16" DIA. DOWELS IN PORT WING - PAPER TUBES IN STARBOARD WING

Readers' ..... Letters

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

DEAR SIR,

"Naval Pilot's" comments on the handling characteristics of the Lysander are of considerable interest, since they may represent the view of a great number of R.A.F. and Fleet Air Arm personnel who flew this aeroplane of "considerable character."

The technique of piloting he described is based on the handling of conventional aircraft, but when the Lysander was designed in 1936, it was envisaged that the aircraft would be put to very different purpose from the various wartime uses that actually eventuated. Therefore, certain aspects were stressed, such as ability to get both in and out of very small fields, to fly slowly under full control, and to have a steep angle of descent and angle of climb. This led to the adoption of the unique full slot and automatic flap, which gave the ability to fly at steep angles of incidence—a state of flight normally avoided in conventional aircraft. That the requirements were met in remarkable manner, was shown at a Press demonstration of the prototype, when the aircraft was landed and taken off with ease from a football pitch.

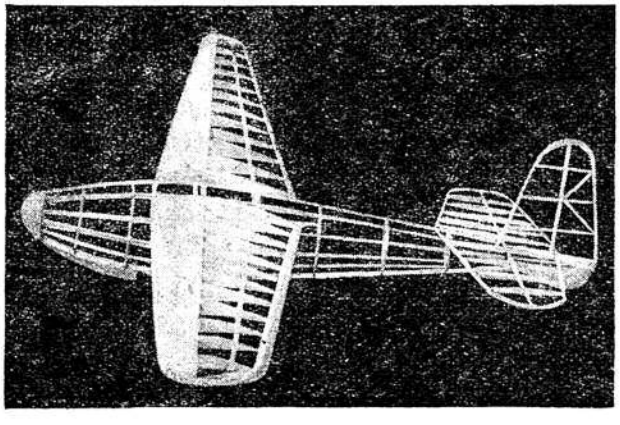
The "sensational rate of sink" was a peculiar impression which the aircraft gave, owing to the fact that the approach was made at a steep incidence and thus gave a form of glide that would normally be regarded as a stalled descent. However, because the nose was high, it gave the pilot the impression that the aeroplane was gliding on a flat path but sinking fast. The measured rate of descent was, in fact, less than that of a Spitfire making its normal, rather flat glide. Further, the Lysander had the ability to vary its rate of descent enormously, by appropriate use of engine and incidence, and it was this feature, properly used, which enabled it to be landed in abnormally small space. Thus, to get the shortest possible landing, my normal procedure was to approach at 50 A.S.I. and about 600 R.P.M., when the aircraft would make the whole descent in the landing attitude and there was then no necessity to flatten out as ground was approached, for the aircraft would touch without a bump and without further action on the part of the pilot.

More generally, approaches were made at about 65 A.S.I., using slight engine. At this speed all the slots were fully extended, and there was not the unpleasant "bobbing in and out" of the slots, mentioned by "Naval Pilot," which was due to the fact that the aircraft was being flown in the vicinity of the critical slot opening speed. It might be added that there was no trick in carrying out these landings, since one or two practice approaches soon showed the appropriate amount of engine for any particular rate of descent as a function of forward speed; once this was known the Lysander could be landed under conditions of zero visibility with confidence—and this was in fact many times demonstrated when test flying.

The Lysander would not spin, but it could gambol quite gaily if need be. The inhabitants of Yeovil constantly saw these aircraft being looped, slow rolled and flying inverted

H. J. PENROSE,

Senior Experimental Pilot, Westland Aircraft, Limited.



DEAR SIR,

In a recent AERO MODELLER there was an article entitled "Soldering Simplified." May I submit two points from workshop practice which may be of use to fellow modellers, as soldering is part of my everyday life.

(1) Keep the face of the bit as blunt as possible, for if you have a long narrow point you lose heat and therefore it takes longer to do the required job, more so when you are holding a joint in position with one hand.

(2) If using "Killed spirits" or bakers' fluid, and you get some on your hands, it will burn; but if you wash in *cold* water you will find it comes off very easily. Remember that it is not the amount of solder you apply to the job and then clean off, but the sweating, i.e., the way that the solder is sweated through the joint. Now go to it and make sure those joints are sweated.

Basingstoke. E. J. ALEXANDER.

DEAR SIR,

I have been a reader of the AERO MODELLER for some years and thought some of your readers would be interested to know of an experiment at turning with a lathe similar to the one described in the August AERO MODELLER. No doubt some of your readers who made this lathe have had difficulty in centring round pieces of wood of smaller diameter than the two nails of the centre bit and bigger than the maximum capacity of the chuck of the drill. I overcame this difficulty by filing the head off a suitably sized screw nail. This was then chucked, and after the round rod is squared on the sanding disc and centred it is screwed on. With cowlings and other short articles it will not be necessary to use the tailstock at all. I have found this method so useful that I do not use the centre bit at all now.

Montrose, Angus. A. R. MEARNS.

DEAR SIR,

I am enclosing a photograph of a 52-in. span sailplane of all balsa construction, designed and built by myself. The best flight to date is 102 seconds slope soaring. (Better weather will, I hope, bring better results.)

I am rather inclined to disagree with a point made by Mr. R. H. Warring on page 31 of his book "*Model Gliders.*" It is a small point, but worthy of notice, I think. He says that wing fillets on the trailing edge of a model glider should be just big enough to maintain a smooth airflow at the junction of the wings and fuselage, and yet as small as possible in order that the incidence should not be unduly increased.

As you will see in the photograph, the fillets on my sailplane, "The Gannet," are very small. I tried this arrangement first and then fitted very large fairings. Thus as the chord increased at the fairing, so I decreased the incidence by reducing the undercamber. (In this case I modified the wing section from approximately 65 per cent. to the trailing edge.) Consequently, I obtained an excellent fairing with a negligible loss of lift, which modification not only improved the gliding angle slightly but also increased longitudinal stability considerably, due to the smoother airflow over the tailplane.

I think this would make an appreciable difference to the "super" competition model.

Cambridge. A. V. RUSHTON.

DEAR SIR,

I read with great interest the article by Dr. Forster, in which he concerned himself chiefly with a discussion on Mr. Sparey's proposed engine. Dr. Forster's article was at times highly critical, so he will not mind if I, in my humble way, dare to criticise his contribution.

In the first place, let me say how in agreement I am with Dr. Forster on his views on inverted engines and the necessity of making the average "petroleer" inverted-minded. I should like to see, as he would, all advertisers' illustrations depicting engines in the inverted position. Furthermore, I might suggest that the engine beneath which Dr. Forster's name appears with great regularity, should also assume an inverted position, even if not specifically designed as such, on the principle of "That's my story and I'm sticking to it."

One would have thought it obvious that the detachable cylinder head makes for much greater ease of production, particularly with the off-set combustion chamber, with which Mr. Sparey proposes to experiment. Surely magnesium alloy as specified for the head is advantageous if it is a more efficient dissipator of heat, in order to preclude possibilities of local hot spots and distortion. One does not have to be inspired to know that if the head runs too cool, the finning may be reduced.

Dr Forster strikes a pessimistic note concerning cast-iron bearing, without stating any reason, though it is well known that a properly fitted steel on cast-iron bearing is durable and comparatively frictionless at the rubbing speeds likely to be encountered, i.e., less than 400 ft. per minute.

Dr. Forster's contact breaker seems to be good enough in principle, but the practical application is very poor. The rocker arm is surely far too springy for high revs., there is no adequate provision for side thrust, and rubbing speeds are likely to be high. Perhaps the most curious claim for this contact breaker is that the spring would assist crankcase compression for starting purposes. If Dr. Forster designs and runs his engines in such a state that he relies on spring pressure, or airscrew thrust for effective crankcase sealing, then my faith in him is shaken to the foundations. Furthermore, if his main bearings are to be so slack, then the crankshaft inlet port is a doubtful asset and one would be strongly biased in favour of the disc valve. In any case, from a mere amateur's point of view, a disc valve would be far easier to time correctly than a crankshaft port.

In conclusion, let me say that I have no doubt that Dr. Forster will be able to correct my views and enlighten my outlook on the points expressed in my letter, though there can be no adequate reply to the suggestion concerning inverted engines.

St. Annes-on-Sea. A. RELLS.

DEAR SIR,

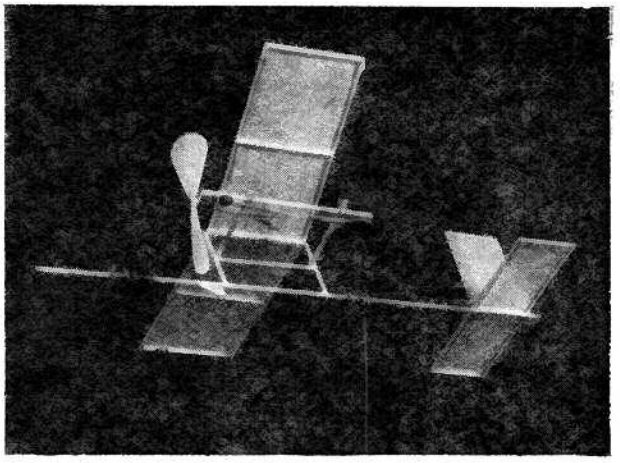
In view of the interest aroused by "Petrol Topics" in the problem of making a twin-engined model fly safely on one engine, and especially since Dr. Forster seemed to take a rather poor view of my "side-thrust" suggestion, I should like to place on record the results of an experiment which I conducted recently.

A simple little stick glider, which I use for tests of various kinds indoors, was fitted with an outrigger motor stick and a propeller positioned under the left wing at ⅜ of the semi-span outboard of the centre line, and half a chord length forward of the leading edge. The motor stick was adjustable to give any angle of side-thrust, and a small weight on the opposite wing tip kept the C.G. central. The accompanying diagram and photograph show the arrangement.

TEST 1. The motor stick was set parallel to the centre line, thus giving 0 degrees side-thrust and a moment arm of 1·5-in. from the C.G. to the thrust line. When the model was flown the result, as might be expected, was a right-hand circle of about 8 feet radius.

TEST 2. The rear end of the motor stick was moved inboard to produce left side-thrust, the angle being increased by stages until the model flew in a straight line. With this setting the side-thrust angle was 9 degrees and the moment arm 1·35-in. (or 90 per cent. of the original moment arm).

TEST 3. The side-thrust angle was further increased until at 17 degrees and 1·2-in. moment arm (80 per cent. of the original) the model was flying in 8 feet radius *left-hand* circles.



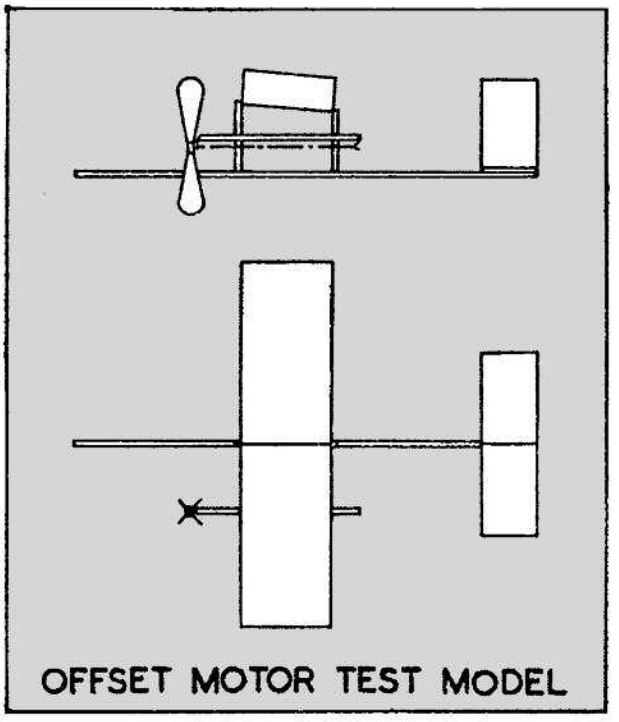
I am well aware that setting the engines toed-out is not new, but I think I am correct in saying that most aero-modellers have the idea that the main effect of this is to reduce the thrust moment about the C.G. Actually, there is much more to it than that, and the theory of the business is substantially the same as my downthrust theory (October AERO MODELLER), with, of course, the difference that downthrust acts about the lateral axis, while in this case the vertical axis is the one concerned. Hence the connection with downthrust which apparently eluded Dr. Forster.

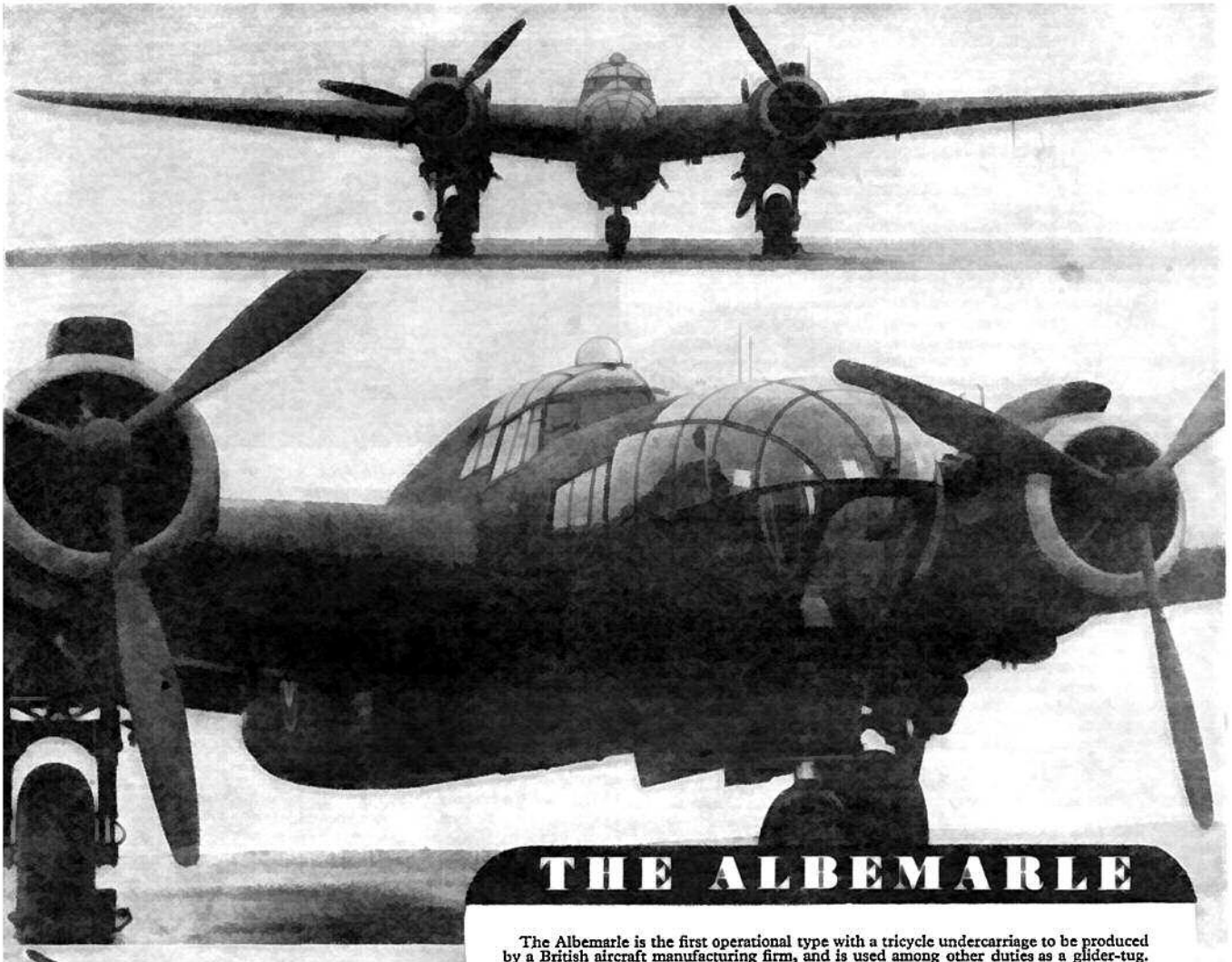
Naturally I am not suggesting that the above results can be applied directly to larger models, but they prove that the principle is sound.

It may be concluded that side-thrust can be a complete safeguard against the dangers of partial or complete failure of one engine of a twin-engined model, even without the aid of toed-in fins or similar drag-increasing devices. Further, the side-thrust need not be excessive, and in any case there is no need to toe-out the whole nacelle.

Yours faithfully,

Bristol. J. H. MAXWELL.





THE ALBEMARLE

The Albemarle is the first operational type with a tricycle undercarriage to be produced by a British aircraft manufacturing firm, and is used among other duties as a glider-tug. It was intended in the first instance that the Albemarle should be used as a reconnaissance bomber, and it was designed during the early part of the War. At this period the shortage of the necessary aircraft constructional materials was becoming acute, and the Albemarle was in fact designed with this consideration in view. Consequently most of the construction is of wood and steel, and light alloy has been used only at essential points.

The four-gun Boulton-Paul turret fitted in the dorsal position on the first version has been abandoned on the glider-tug, which is armed with a two-gun manual position.

The photographs on this page (by the AERO MODELLER Staff Photographer) reveal the Albemarle as rather a hybrid in appearance. The nose is suggestive of the Blenheim IV, while in the air approaching head-on there is something about it very like a Wellington. In certain views the sit of the Hampden is noticeable.

Powered by two Bristol Hercules XI sleeve-valve radial motors the Albemarle has a maximum speed in excess of 250 m.p.h.; and a normal range of over 1,300 miles. Three-bladed fully-feathering 'Hydromatic' airscrews are fitted.

The tare weight is 22,600 lbs., and the main dimensions are: Span, 77' 0"; length 59' 11"; height 15' 7"; wing area (total, including ailerons), 803.5 sq. ft.

MONTHLY MEMORANDA

BY O·G·THETFORD

A Grumman TBF "Avenger." *Photo by courtesy of the Grumman Aircraft Engineering Corporation.*

Shades of the "Circus" Days

The bizarre colour schemes common on German fighting scouts during 1916 and 1917 in the Great War are, in some measure, being revived on current types of German fighters operating over Western Europe, according to the combat reports of British and American daylight bomber crews and fighter pilots.

In recent months machines described in dogfights over France and Germany have had black and yellow stripes painted chord-wise across the wings, and some FW 190's were seen with black and white stripes across the wings in a manner similar to those on the British Typhoons. A few examples have been reported of red, yellow, red and blue checkerboard devices painted either on the wings or over the entire aircraft. Some machines have been the natural metal colour all over and had no paint whatever apart from the national markings.

Twin-motor fighters such as the Junkers 88C have been seen on daylight operations painted all-black (obviously night fighters pressed into service owing to shortage of equipment) and other Ju 88 fighters were painted in British day fighter type camouflage. Many single-motor fighters have been painted bright blue on the upper surfaces and a vivid yellow on the under surfaces. Despite all these unorthodox schemes, the original standard scheme of bluish-grey or dark green on the upper surfaces and pale blue or pale green underneath still persists on many fighters. Fighters at present in use over North-West Europe painted in one or other of the foregoing schemes include the Me 109F, Me 109G, Me 110, Me 210, FW 189 and a few Do 217's.

German fighters observed by a correspondent in Sicily and Italy were painted as follows: Me 109G, mottled blue and dark green on upper surfaces and pale blue underneath; Me 109G, dark blue on upper surfaces and yellow underneath; Fw 190, dark blue on upper surfaces and pale blue underneath; Ju 88, dark green on upper surfaces and light blue underneath.

Naval Nomenclature

It was officially announced in January, 1944, that the British names "Martlet" and "Tarpon" for the Grumman fighter and torpedo-bomber used by the Fleet Air Arm were to be abandoned in favour of the American service names "Wildcat" and "Avenger" respectively. The close co-operation between British and American carrier-borne squadrons in future operations in the Pacific have apparently governed this decision.

The name Seafire II has been bestowed upon the Fleet Air Arm version of the Spitfire IX. Seafire II Fleet fighters aboard H.M.S. *Indomitable* were numbered MB250, MB 251, MB 252, etc.

Land-based Patrol-bomber Markings

Land-based patrol-bombers of the U.S. Navy operating on anti-submarine sorties over the Atlantic and Pacific have been painted white underneath and halfway up the sides of the fuselage since the latter months of 1943. This scheme is reminiscent of that employed on Coastal Command aircraft. The three types involved in the scheme are the Lockheed PBO-1 (now rapidly going out of service), the Lockheed-Vega PV-1, the Consolidated PB4Y-1 conversions and the new PB4Y-2. These machines are painted cerulean blue on the upper surfaces and white beneath the wings and tail, half-way up the motor nacelles and cowlings and half-way up the fuselage sides. The white paint on the fuselage meets the blue in an undulating line and the dividing line rises to meet the leading and trailing edges of the mainplane root and the leading edge of the tailplane root. The leading edges of the vertical tail surfaces are also painted white, the remainder of the surface being blue.

U.S.A.A.F. Code Letters

Further British-type code letters used on machines of the U.S.A.A.F. in England have recently been made available. One escort squadron of Lightnings carries the letters "CG" on the sides of each tail-boom aft of the radiators, and a squadron of Fortress B-17G day bombers the codification "FY" on the fuselage sides ahead of the Star insignia. It is now established practice for American day bombers to carry their group code letter against a square, circular or triangular background at the top of the fin(s) and above the starboard wing tip.

York Service Number

A limited number of Avro York four-motor transport aeroplanes are serving with the R.A.F., and one of them is serially numbered LV 625. The serial number is painted on the fuselage immediately aft of the cockade and not in the usual location near the tail. Yorks in service have Land Temporate shadow shading on the upper surfaces and are finished in a pale sky shade underneath. The usual cockades are painted on the upper surface of the wings and fuselage sides and small-diameter cockades in red, white and blue appear beneath the wings.

AEROPLANES DESCRIBED—XIV BY H·J·COOPER

Photo by courtsey of "Flight."

THE PANDER Eg. 100

Next Month
The Grumman F6F-1 Hellcat

THE Pander E biplane appeared first in 1926, and, fitted with various types of motor, was in production until the liquidation of the manufacturing company, H. Pander & Sons, of The Hague, in 1934.

The initial motor installation was the 45 h.p. Anzani five-cylinder radial, with which a speed of 78 m.p.h. was attained. Later versions were fitted with the 60 h.p. Walter radial (Pander Type Ec. 60, see photograph above), the 85 h.p. Walter Vega (Ef.85), or the Armstrong-Siddeley Genet. The version shown in the accompanying g.a. drawing and in the lower left-hand photograph is known as the Eg.100, and has a 100 h.p. D.H. Gipsy I motor.

The Pander is a true sesquiplane. The term is often misused, for literally it means "one-and-a-half" planes, although most biplanes with the lower wing of smaller area than the top are known as sesquiplanes. The Eg. 100 is a smart-looking aeroplane, and was often seen at the various International Air Meetings in this country before the War, when its ease of manœuvre readily won it popularity with pilots and spectators alike. The Pander PH-AFZ shown below (right) is fitted with a Genet motor and is giving a demonstration of the now officially unpopular "crazy" flying by an instructor of the Dutch National Flying School, who is performing at no height to speak of. An Eg. 100 from the same School is coloured all silver, with a red streamline on the fuselage. Red, white and blue horizontal bands are painted in a circle on the rudder, with the red at the top. Its letters are PH-AFM which are in white.

A single-seat version, with the forward cockpit dispensed with, was similarly coloured and carried the letters PH-AFH.

The upper plane of the Pander is constructed in two pieces. It is built up on two wooden spars, with wooden ribs, and is covered with fabric except for the ply-covered leading edge and the centre section, wherein are housed the two fuel tanks. The lower plane has one spar and is also built in two pieces. There is no external wing bracing except for a flying wire on the Gipsy and Genet versions between the bottom of the front centre-section strut and the top of the forward interplane strut.

The forward portion of the fuselage is metal-framed and covered with metal plates, while the remainder is of wood with ply covering.

The tail unit is a metal framework covered with fabric. On the earlier versions only the movable surfaces were metal-framed.

Main dimensions of the Eg. 100 are: Span (upper), 32 ft. 11½ in.; (lower), 16 ft. 5 in.; chord (upper), 5 ft. 3 in.; (lower), 2 ft. 8 in.; length, 22 ft. 9 in.; track (static), 6 ft. 9 in.; tailplane span, 10 ft.; airscrew diameter, 6 ft.; wing area, 191 sq. ft.

Performance figures are as follows: Max. speed, 102 m.p.h.; landing speed, 50 m.p.h.; climb, 660 ft./min.; ceiling, 16,400 ft.

The tare weight is 960 lb. and the gross weight 1,760 lb.

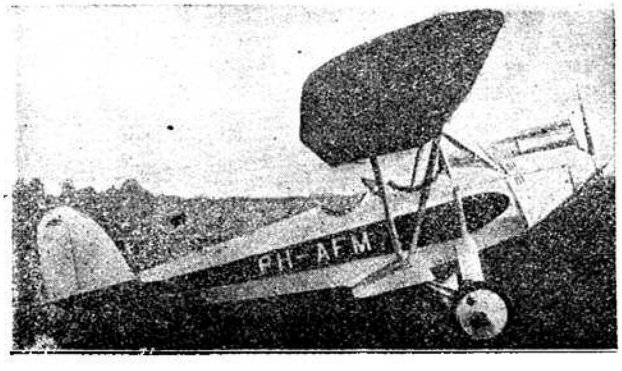
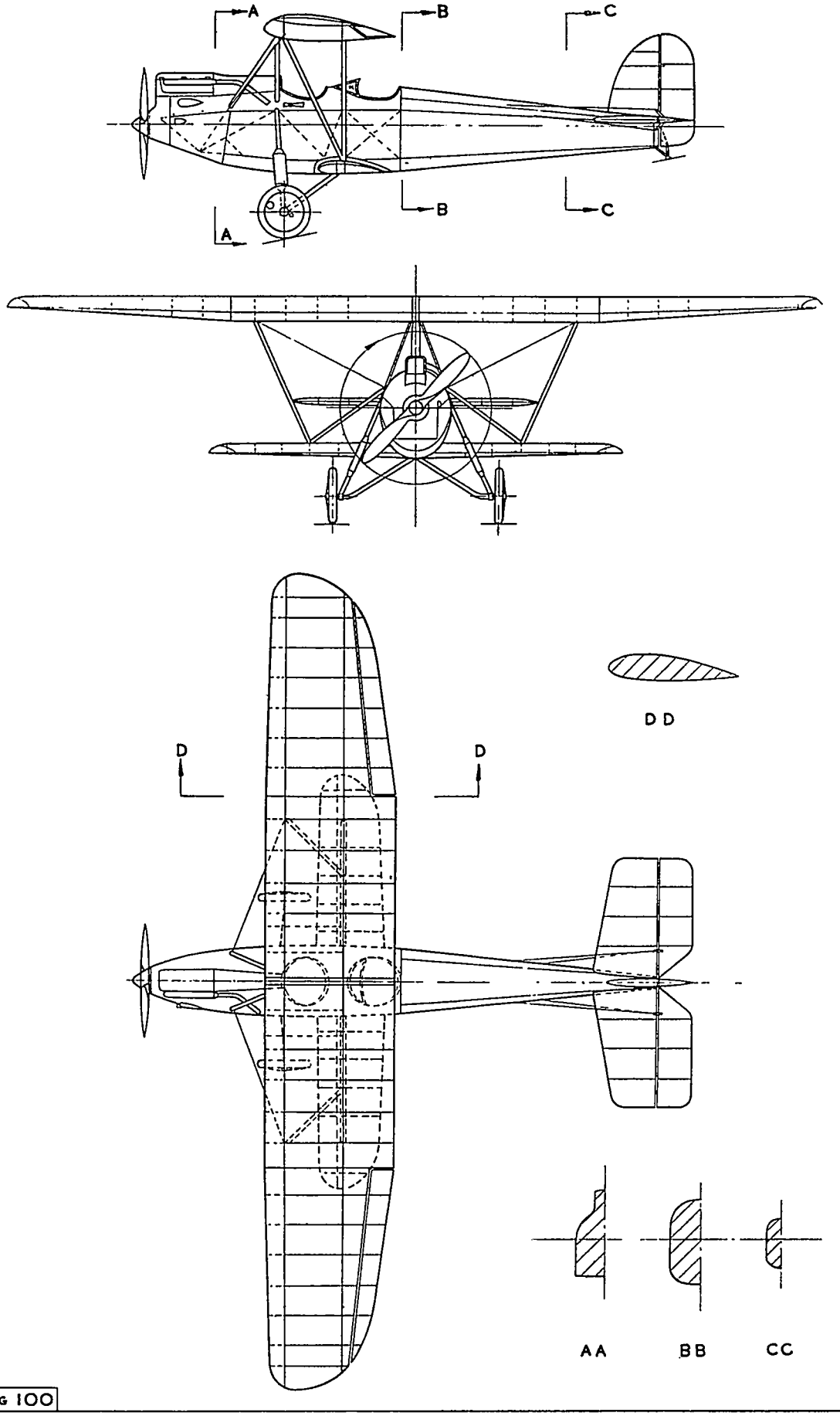


Photo by courtsey of "Flight."



PANDER Eg 100

CLUB NEWS

BY CLUBMAN

Members of the Aylestone M.F.C. at their Club rally held at Aylestone Park.

OI! What's happening to all the clubs these days? Don't tell me they are all packing up or hibernating for the winter season—though it would appear so from the sad lack of reports just lately. I thought my "caustic" remarks last month would have brought about an improvement, but my words seem to have fallen on deaf ears! Or is it that Press Secretaryship is now a redundant office in most clubs? Anyway, chaps, let's hear from you, as I know the interest taken in your activities by others, and it is up to you to keep your own publicity on the up and up. (Don't, of course, start writing me pointing out that "such-and-such a report was not printed, so I'm not going to send any more, so there." As always, it's news of interest we want, and yards of tripe about Bill Bloggin's rabbits will still find its way to the W.P.B.)

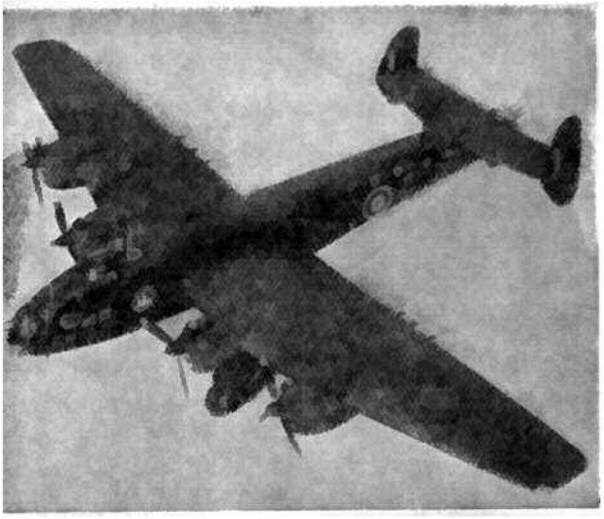
The S.M.A.E. seem to be going at things in a way never before experienced. Many new features are scheduled for the coming season, and a real honest-to-goodness attempt is being made to bring the benefits of membership to all and sundry. I should, however, like to see more modellers taking advantage of the newly-introduced Country Membership, as I know from my "fan mail" that there are many enthusiasts in this country unable to partake of the hobby in company with others having the same interests. Obviously, club membership is the best every time, but where circumstances deny this advantage, association with the movement *via* the S.M.A.E. should be undertaken at the first opportunity.

It is a remarkable fact that no matter what activity you care to mention, there is always a holding back on the part of the majority until "things have got moving." Trouble is they don't realise that *someone* has to get cracking! However, I look forward to seeing a big jump in the Country membership once the season gets under way, and an ever increasing interest in national matters all round.

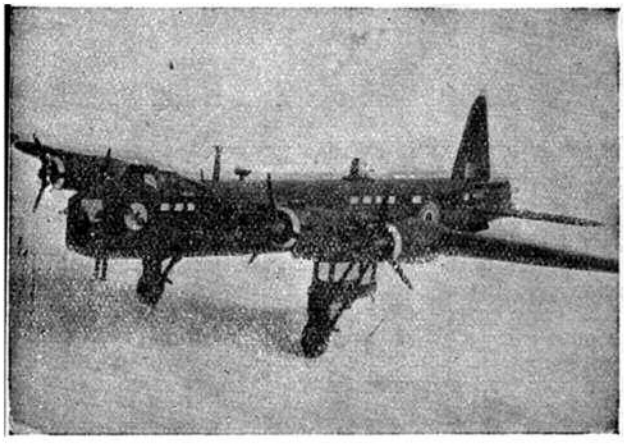
Following the success of the Northern Heights "bunfight," the S.M.A.E. is to hold a dinner, etc., in its old haunts—the Lysbeth Hall, Saturday, April 8th. I am sure that this is the ideal time to get cracking with a meeting of this sort, and I for one am making a big effort to be on hand! (Now, don't let that put you off—I promise not to make any notes, or hold anything against those who don't buy me a beer! Perhaps you had all best treat everyone in the room, then you will know I haven't been left out!!)

I have been meeting a lot of R.A.F. chaps lately, and it is amazing the interest shown in model matters everywhere. Some stations have their own special model clubs, and some extraordinary work is turned out with the most primitive equipment. Fortunately, many Commanding Officers are "model minded" and encourage this hobby among their personnel, and quite good competitions are held from time to time. Service conditions are not ideal for the pursuit of the hobby, but it makes an ideal recreation for those chaps who find spare time (!) hanging heavy on their hands. Solid models are naturally the greatest attraction, reasons being use of any kind of wood, small size generally, and the fact that storage space for delicate flying types is not liberal. However, it is surprising just what can be done when the will is there, and some models I have seen would surprise those who think that a good model can only be produced from a fully equipped workshop. Perhaps some enterprising person will some day conduct an exhibition of Services model work—I can assure them there will be no lack of suitable material.

The New Year has certainly dawned brightly for the NORTHERN HEIGHTS M.F.C., a marked increase being shown in the attendance at meetings. A very interesting meeting was held recently, when Mr. A. S. Cox gave a demonstration and talk on the making of a microfilm model. He actually made a tailplane structure and covered it with microfilm, as well as demon-



A prize-winning 1/72 scale Halifax I built by Cadet F. Hays of Wallsend.



Above is a 1/72 scale Stirling built from plans in "Aircraft of the Fighting Powers," by R. Broaderwick of Birmingham.

Below, a "Lancaster Dispersal Area," by D. H. Hughes. A Spitfire IX can be seen in the background.

strating how to make the boom and shaft bearings. This sort of demonstration is of great assistance to members, and I can recommend this practice to other clubs.

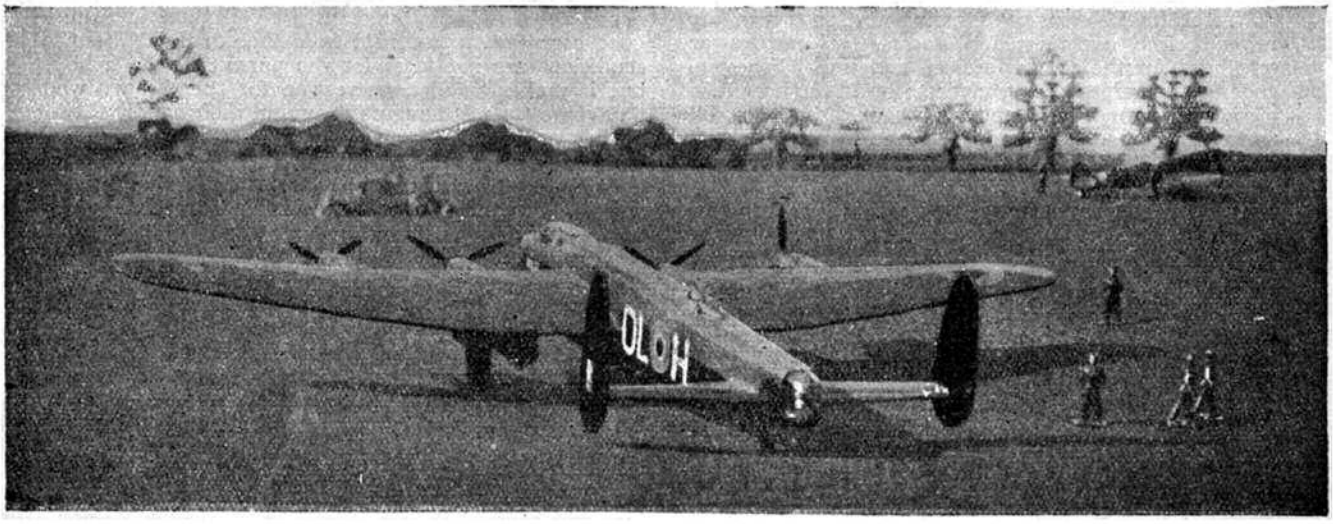
The AYR Y.M.C.A. M.A.C. has been doing plenty of building but little flying this past three months, but an exhibition just held proved a big success. R.T.P. flying was conducted during the show, best time being put up by W. Rillie with a time of 1.15.

The RHYL AND PRESTATYN M.F.C. have almost completed their wind tunnel, our R.A.E. contributor, N. K. Walker, having been of great assistance. Results of the tests should become available about Easter, and the members would welcome suggestions from readers concerning the make-up of the pamphlets. Write direct to the secretary, Mr. J. M. Hardman, Carrington, The Dell, Prestatyn, N. Wales.

The secretary of the SHEFFIELD AIR LEAGUE SOCIETY, Mr. C. F. A. Cudworth, 18, Derbyshire Lane, Sheffield, 8, would be pleased if all model enthusiasts who are contemplating building gliders this season will get in touch with him as soon as possible with a view to making arrangements for the holding of a competition on Easter Sunday or Monday, April 10th or 11th. Models to be over 78 ins. span, and tow launched.

The BLACKHEATH M.F.C. indoor "Marathon R.T.P. Rally" was marred by something horrible in the way of weather—ceiling zero, sparrows walking, etc. Nevertheless, upwards of a hundred enthusiasts attended, and spirited competition resulted. Times were not good—some of the fog must have got into the hall—and there were bad currents. Most of the London clubs were represented, and the winners were: Class "A," R. W. C. Rock (Streatham), 2:10; Class "B," J. Buckeridge (Pharos), 2:07. A very close finish to the Class "B" event was provided by a junior Blackheath member, W. Eveson, who clocked 2:16.5. A. D. Piggott—well known for his lightweight winners of a year or two ago—has returned from abroad, and hopes to demonstrate his new plastic fuselage technique, which he developed successfully in Canada.

H. Tubbs won the LEEDS M.F.C. "Anderton Cup" for the second year in succession, being closely run by C. Furse, who only scored one point less during the season. Points are awarded for all competitions (three for a first, two for a second, and one for a third), but for this season points will also be awarded for record



breaking flights. The present list of club records is as follows :—

Duration H.L.	P. Holt	5:22	o.o.s.
Duration R.O.G.	B. Crocker	6:37	o.o.s.
Glider H.L.	B. Crocker	1:46.3	
Glider Run Launch	H. Tubbs	23:13.6	o.o.s.
Glider Catapult	P. Holt	2:20	
R.T.P. H.L.	C. Furse	1:40.2	
R.T.P. R.O.G.	C. Furse	1:44.4	

A rally staged by this club last September was blessed with fine weather, though a fair wind took most of the models o.o.s. behind trees. Best flight of the day was by C. Furse's model, with 2:03 o.o.s. Full results were :—

Glider. Tow launch—		
P. Holt	(Leeds)	2:46.1
H. Tubbs	(Leeds)	2:25
Under 30 secs. duration—		
B. Crocker	(Leeds)	3:31.2
N. Tubbs	(Leeds)	2:31.4
Over 3 secs. duration—		
C. Furse	(Leeds)	4:48.7
H. Tubbs	(Leeds)	3:09.4

All flights were an aggregate of three. Other clubs competing were from West Yorks., York and Knaresborough.

The CHESTFIELD M.F.C. have devoted almost all their activities to R.T.P. flying recently, and have worked up some interesting stunts in consequence. One is to fly two models on the pole at once till one catches the other and crashes it ! All planes have to be weighed in before the contest, and must conform to S.M.A.E. formula and Queensbury rules, *i.e.*, no jousting with the tailskid, and no blows behind the C/G. The club indoor record has been raised to 1:07, but there are rumours that the model will never hold its head up again, having set this time up when running away from a big brutal Wakefield !!

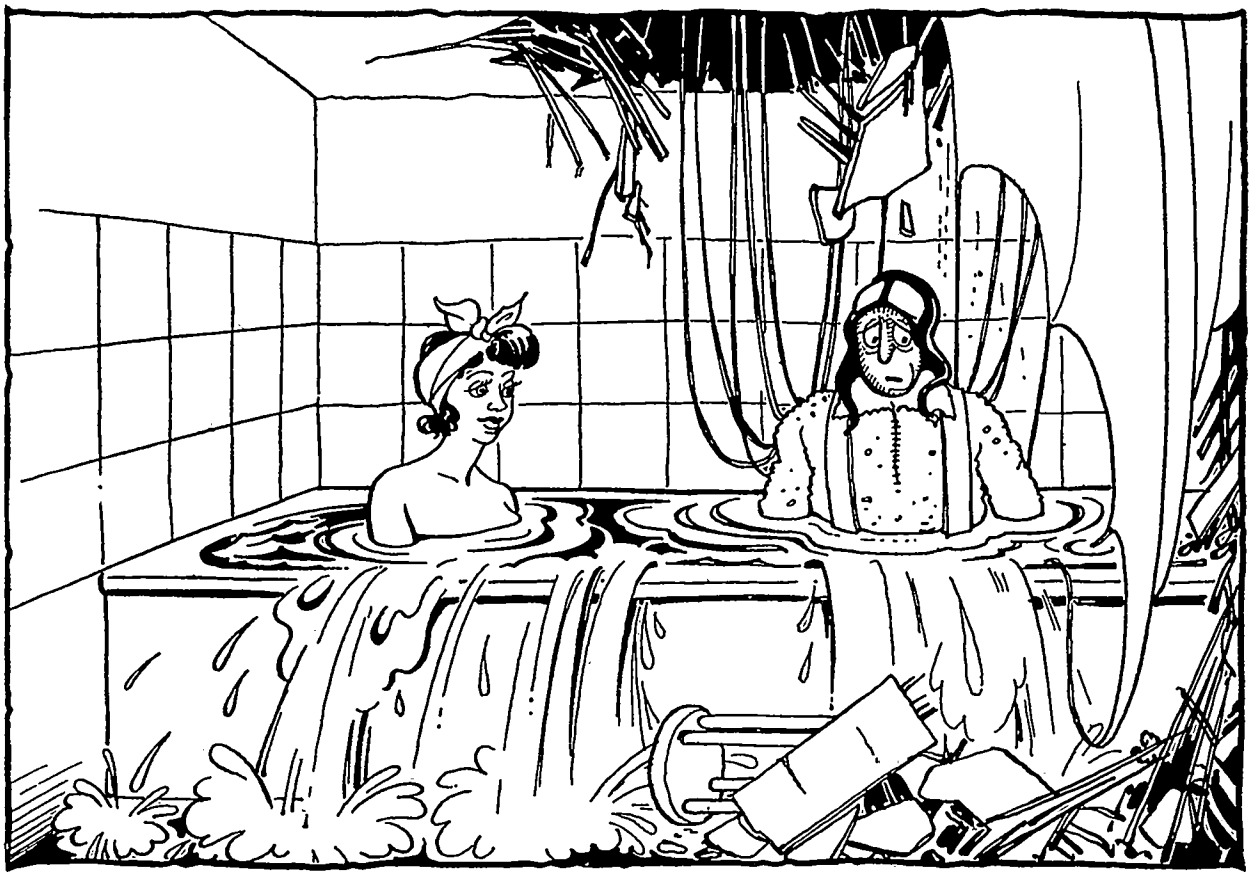
The LEICESTER M.A.C. are lucky in having at their disposal a cinema with a 60-ft ceiling for microfilm flying, and the following records have recently been set up :—

Microfilm (fuselage)	H.L.	G. E. Dunmore	3:53.8
Indoor fuselage	R.O.G.	F. W. Davies	2:45
Indoor stick	H.L.	J. Marsh	2:7.2

R.T.P. work has also been on the increase, best times for December being 1:15.9 by B. A. Germany, and 1:13.5 by D. Dawson. January's best so far is 1:17 by Germany. A competition resulted in a win for J. Marsh with an aggregate for two flights of 1:41.8.

Another club to do well in R.T.P. flying is the PHAROS M.A.C., who wound up a fine 1943 season by placing second in all the monthly S.M.A.E. comps. Club R.T.P. records are :—

Class " A "	J. P. Buckeridge	2:21.6
Class " B "	J. P. Buckeridge	2:07
Junior	A. Armes	1:41.5



" WHAT WAS THAT CLEVER THING ARCHIMEDES SAID ABOUT THE DISPLACEMENT OF WATER? "

W. Jones, secretary of the Aylestone M.F.C. with his machine (a modified "Mick Farthing,") which made a flight of 1¾ hours this past season.

●

A flying, semi-scale Hybrid, "The Javelin," built by A. S. Bailey of Cheadle. Incorporating a retracting and detracting undercarriage and bomb racks which operate during flight. Weight is 10¾ ozs. with rubber and the span 36 inches. The machine has yet to be test flown owing to the rubber shortage, but its originator is hoping for a spectacular performance!

A return challenge match with the Uxbridge club resulted in a win for Pharos, whose total flying time was 568 secs. against the loser's 354 secs.

A new club to be formed is the AGRICOLA M.A.C., initiated by members of the Ministry of Agriculture and Fisheries staff at St. Annes-on-Sea. Flying is conducted each week end on the sands (when the tide is out) north of the pier, the only obstruction being anti-invasion posts! Club record stands at 1:22, though an unofficial flight of five minutes o.o.s. has been recorded. Those interested in the St. Annes district should get in touch with the secretary, J. Owen, of 21, Wood Street, St. Annes-on-Sea, Lancs.

As the BISHOP'S STORTFORD AND D.M.A.C. is fortunate enough to have some balsa on hand (!!!), they decided to use it to the club's advantage as follows. A " solids " class was formed on the following lines :—

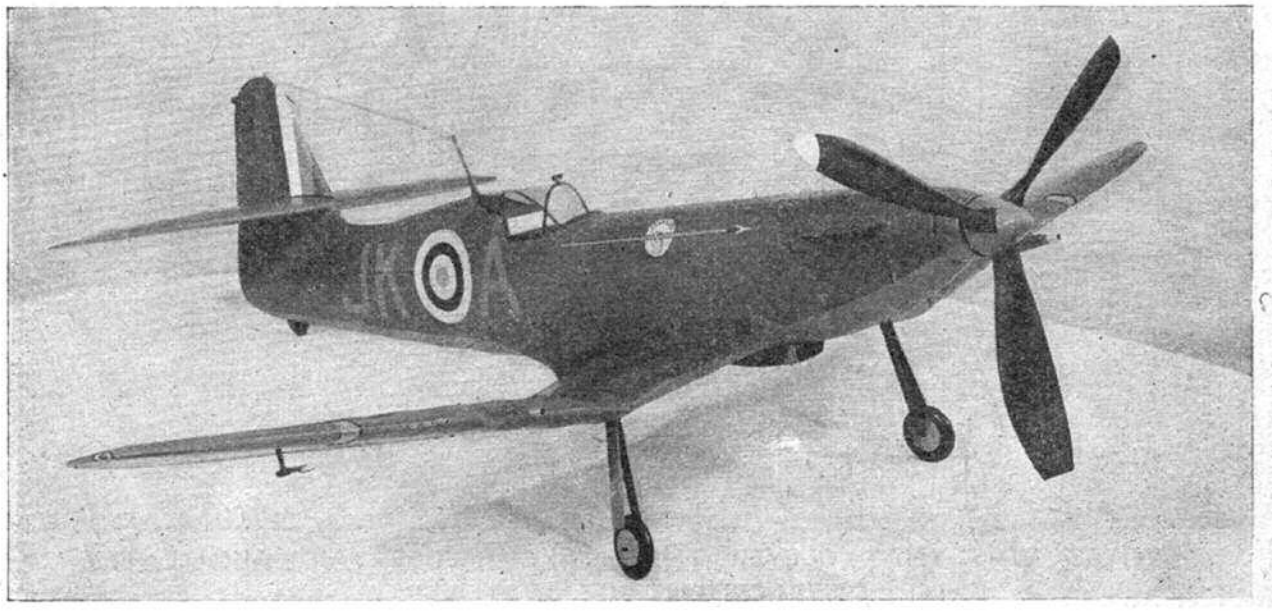
(1) The class consisted of six members and one senior instructor.
(2) All materials were club property.
(3) When finished the models belonged to individual builders.
(4) Instructors demonstrated all working, use of templates, etc., this being of great help to the juniors.

Three of the seniors have since started the construction of (they hope) a super R.T.P. model of 30-in. span, diamond fuselage, shoulder wing, twin fins and single wheel undercart.

The old Marton M.A.C. has decided to change title to the MIDDLESBROUGH AND D.M.A.C., and all in that area who are interested in model aircraft should get in touch with W. F. Holmes, 657, Marton Road, Middlesbrough, Yorks.

The COVENTRY M.A.C. are now holding indoor flying meetings (r.t.p.) every other Sunday afternoon from 2.30 to 5 p.m. at the Barras House Hotel, Stoke Heath. Any local enthusiasts, members or non-members, are invited along.

The flying ground of the WILLESDEN AND D.M.A.C. has grown steadily smaller with the encroachment of allotment holders, but the club still carries on. Best flights last year were :—



THE SOCIETY OF MODEL AERONAUTICAL ENGINEERS

The A.G.M. will be ancient history when this appears, but the Council takes this opportunity of thanking members for their past support, and is confident that they will be equally loyal in support of the 1944 Council. This can be a big year in the history of the movement—as the posters say, "It all depends on YOU."

Affiliations.—The following Clubs were granted affiliation at the Council meeting held on January 16th :—

Grantham M.A.C.
Tetbury and District M.A.C.
Stretton (Staffs) M.A.C.
Eston Area M.A.C.
Dolcoath Cadets and Camborne Boys' Club A.M.C.
Clayesmore M.A.S.

In addition, about a hundred Country and Associate Members have applied during the first month of this year. This compares with 68 for the whole of 1943 ! So it looks as if the Society's latest publicity campaign is bearing fruit.

A SPLENDID FLIGHT.

An application was received from P. B. Jones, of Merseyside and Northern Heights, for a Tailless Glider Record Handlaunch of 2 : 7·1. In the absence of such a class in the records list, it is at the moment only possible to congratulate Mr. Jones on his splendid effort. Should demand justify it, there is nothing, of course, to prevent the introduction of a Tailless Class. Anybody else interested ?

WINGS FOR VICTORY.

Judging of the Regional Finalists took place on January 16th, and in a very close finish, with only a point or two separating the winners, awards were made as under :—

National Winner	..	L. G. Temple	Sailplane : "Celestial Horseman."
2	.. ..	R. Jefferies	Sailplane.
3	.. ..	H. Simmonds	Duration.
4	.. ..	H. F. Dare	Flying Scale.
5	.. ..	J. Wood	Solid.

Prize money and diplomas have been sent off to these and other Regional winners ; while all claims received up to the closing of the account have been settled.

S.M.A.E. DINNER, PRIZE-GIVING AND DANCE

In response to popular demand, the S.M.A.E. first wartime Dinner, Prize-giving and Dance will be held at the Lysbeth Hall, Soho Square, London, W.C., on Saturday, April 8th, commencing at 6.30 for 7 o'clock. A Saturday evening has been chosen in order to give provincial members every opportunity of attending. Diplomas will be presented to the season's prize winners, and a strict limit placed on the number of after-dinner speeches, so that ample time should remain for dancing and getting together. *Tickets are 10s. 6d. each.*

As only a strictly limited number of covers are possible, applications should be sent in at once—and in any case *before March 21st*, to A. G. Bell, 70, Nelson Road, Hornsey, N.6. Allocations will be fairly made to each Club should it be necessary to impose any rationing scheme. A Social Committee has been formed to organise the event.

S.M.A.E. SOLIDS TROPHIES—SENDING IN

In order to provide a good show, entries from both No. 1 and No. 2 Contests will be shown together in April at a grand All-Britain Show in London. Entrants living *north* of a line drawn from the mouth of the Thames to the mouth of the Severn should send in to :

Mr. J. Mansfield, Hon. Secretary, Uxbridge M.A.C., Sunnydene, Richings Way, Richings Park, Iver, Bucks.

Those living *south* of this line should send to :

Mr. E. A. Walker, Hon. Secretary, Bromley Solids M.A.C., 43, Holbrook Way, Southborough, Bromley, Kent.

Essex entrants may send to :

D.E. Chandler, 35, Little Gaynes Lane, Upminster, Essex ;

to take part in a three-day show at Brentwood School and qualifying for the trophies. Entries should be sent to reach the London receptionists by April 4th, or to Essex show by March 31st. Clubs organising local shows should not send in, but hold their shows, advising Mr. Towner of winners, who will arrange for their final judging.

Venue for the main All-Britain Show has not been fixed, but it is hoped to hold it at one of the big departmental stores.

ROUND THE POLE RESULTS

Class "A"	*December*		*Class "B"*
Streatham	1	403 secs.	
Pharos	2	348·5 ,,	
Blackheath	3	300·4 ,,	381·6
Aylestone	4	290·2 ,,	
Bromley Solid	5	270 ,,	
Blackpool	6	266·7 ,,	(N.B.—Two
Leeds	7	261·05 ,,	flights only.)
Leicester	8	222·2 ,,	
N. Birmingham	9	—	

Best Individual Flight—

Class "A"	W. J. Bishop	Blackheath	162·6 secs.
Class "B"	M. W. White	Blackheath	135 ,,

POSITIONS FOR FIRST HALF OF SEASON (OCT.-NOV.-DEC.)

Pharos	1	988·7 secs.
Aylestone	2	888·8 ,,
Blackpool	3	854·9 ,,
Blackheath	4	832·5 ,,
Streatham	5	817 ,,
Leeds	6	468·45 ,,
Cheam	7	468 ,,
Bromley Solid	8	270 ,,
Leicester	9	222·2 ,,
Croydon	10	207·1 ,,
E. Birmingham	11	195·4 ,,
N. Birmingham	12	

CLUB NEWS—*continued.*

R.O.G. Duration	Brett	:45
H.L. Duration	Setchfield	1:10
H.L. Biplane	Coombes	:35
R.O.G. R.T.P.	Brett	1:35
H.L. R.T.P.	Brett	1:50

Another new club to start up is the ROGERSTONE M.A.C., secretary, A. Lowery, 5, The Uplands, Rogerstone, Newport, Mon. Meetings are held every Monday evening, and all interested are welcomed.

E. Robinson, of 18, Rhodes Street, Hightown, Castleford, Yorks., wishes to start a club in his district. Any helpers ?

WANTS : AERO MODELLER from No. 1, Vol. 1 to No. 72, Vol. 7, by J. Stafford, 5a, Goldsmith Street, Mansfield, Notts.

DISPOSALS : Drawings of the Cloud "Airmaster," 7-ft. span petrol plane, from R. B. Ryall, 20, Sheldon Road, Chippenham, Wilts. ; AERO MODELLERS, June, 1941, to January, 1944, inclusive, from E. P. Peacock, 61, Stirling Road, Bournemouth, Hants.

And so, for another month, I leave you to your slumbers, r.t.p. flying or building—whatever it is you do at this time of the year. Don't forget what I said about rousing your Press Secretaries, and let's hope that this year sees the last of wartime flying—or is that too much to ask just now ? Not too impossible, I think.

Keep 'em flying—as our American friends say, even if it means pinching the elastic from someone's unmentionables !

THE CLUBMAN.

NEW CLUBS

ROGERSTONE (Mon.) M.A.C.
A. Lowery, 5, The Uplands, Rogerstone, Newport, Mon.

AGRICOLA M.A.C.
J. Owen, 21, Wood Street, St. Annes-on-Sea, Lancs.

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H. Dalziel, 5, Scott Crescent, Kilmarnock.

WHITSTABLE, TANKERTON AND D.M.A.C.
R. D. Hunt, 21, Church Road, Whitstable, Kent.

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