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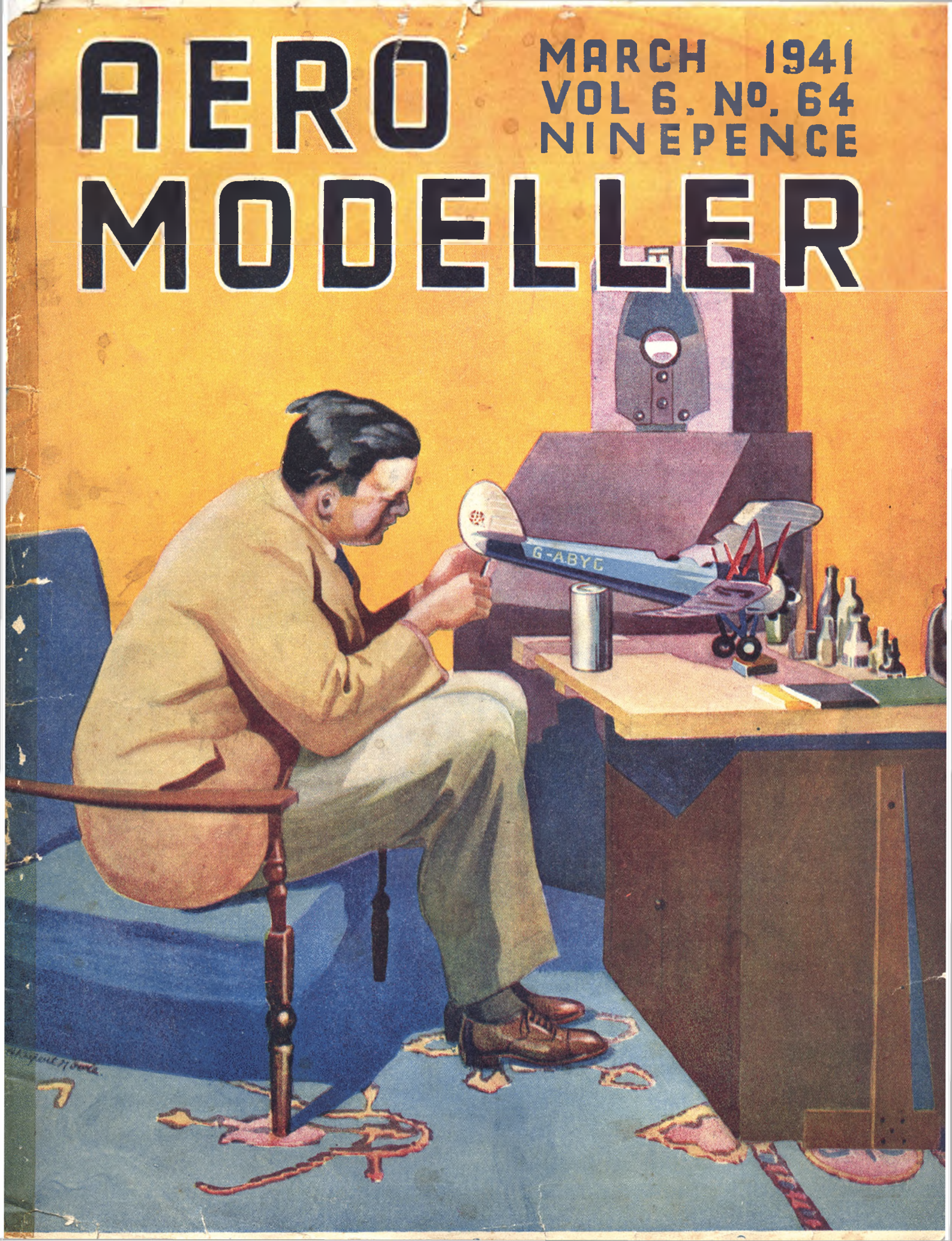

Digital Edition Magazines.

This issue magazine after the initial original scanning, has been digitally processing for better results and lower capacity Pdf file from me.

The plans and the articles that exist within, you can find published at full dimensions to build a model at the following websites.

All Plans and Articles can be found here:

Hlsat Blog Free Plans and Articles.

http://www.rcgroups.com/forums/member.php?u=107085

AeroFred Gallery Free Plans.

http://aerofred.com/index.php

Hip Pocket Aeronautics Gallery Free Plans.

http://www.hippocketaeronautics.com/hpa_plans/index.php

Diligence Work by Hlsat.

THE AERO-MODELLER

ALLEN HOUSE

NEWARKE STREET, LEICESTER, ENGLAND

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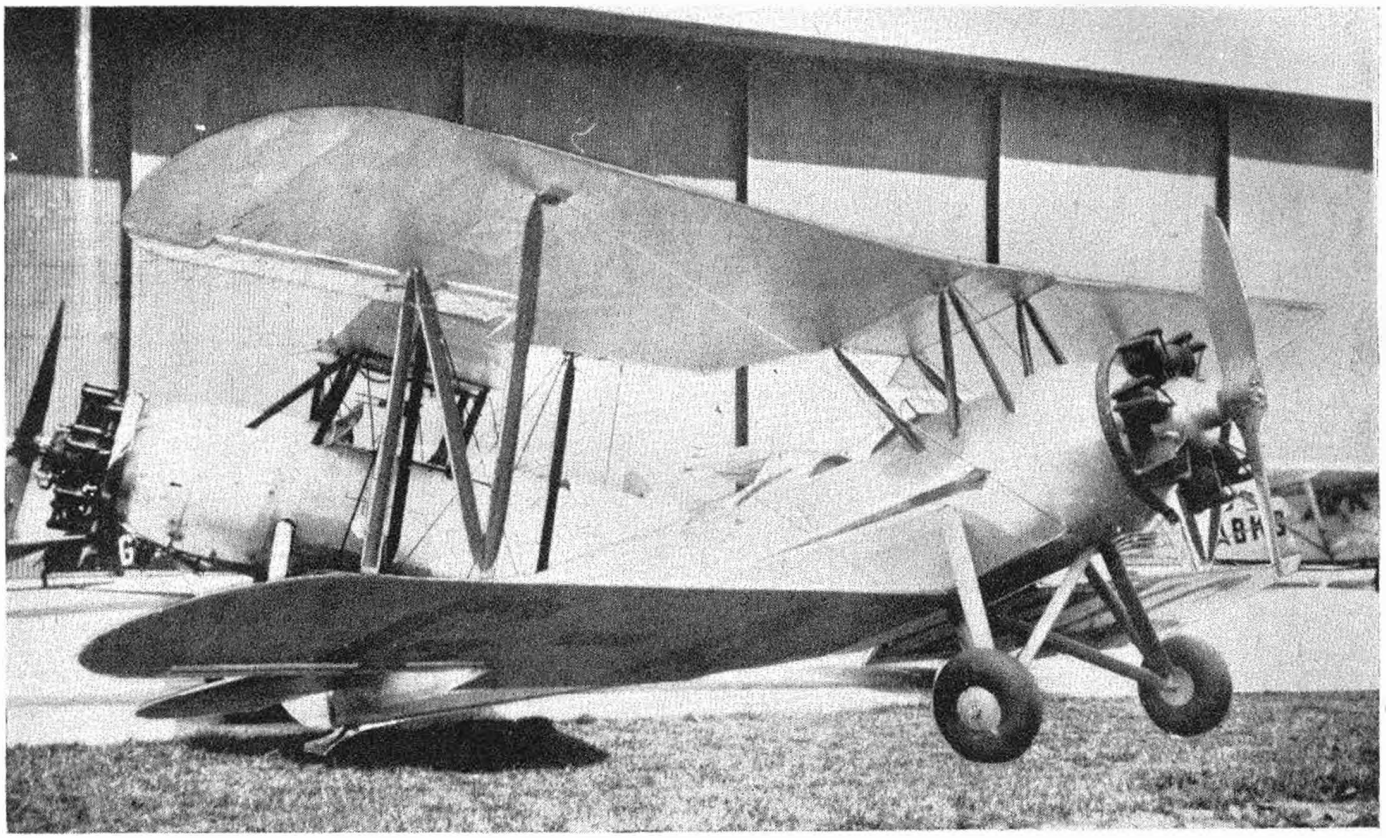
THE AVRO "CADET"—TYPE 631



There is no reason for readers to write in and tell us that this photograph is a fake. We know it, because we faked it! In the foreground is the "solid" scale model of an Avro "Cadet," type 631, built by Mr. E. J. Riding, which is fully described in this issue.
The background of the photograph is "real" and shows other variations of the Cadet in front of some hangars.

The AERO MODELLER

INCORPORATING "THE MODEL AEROPLANE CONSTRUCTOR"

MARCH - 1941
Vol. VI. - No. 64

Tel. Leicester 65322

Editorial

POSSIBLY because our wits have been sharpened by the entertaining correspondence which we have published recently; possibly it may be the inherent delight in "scoring one on the other man," to which most of us are susceptible, be that as it may, we begin this month's Editorial by bringing to the notice of all readers that, at the moment, we have over a hundred letters with postal orders for plans, which we cannot deal with *owing to their senders having omitted to send their names and addresses also!*

On an average, we receive about five letters a day containing apologies for omission of this vital information.

However, there are well over a hundred readers who have recently ordered plans from us who have not yet realised why they have not received them.

Only the other day a young man came into our office, looked sideways at us, and, proudly producing his postal order counterfoil, said that he had sent us a postal order for 4s. some weeks previously but had not received his plan.

We asked him whether he had included his name and address. "Oh yes," he answered, "most certainly I did. Do you think me a *complete* fool?"

We led him gently to the special file in which we keep such uncompleted orders, and suggested that *he himself* might search through, lest he think we might "put one across him."

He did so. *There* was his postal order, and order for a plan, with no name and address given to which to send it.

We draw the curtain on the rest of the scene.

Possibly a few plans have been lost in transit (although it would appear that well over 99·5 per cent of our dispatches safely reach our readers), but before those who have not received their plans write and complain, will they please try to think whether they included their names and addresses . . . and will those hundred-odd people who are still awaiting their plans kindly communicate with us as soon as possible?

The Air Training Corps.

A short while ago the Air Ministry announced the inauguration of the Air Training Scheme, as a scheme for pre-entry training for the Royal Air Force.

The scheme comprises (*a*) the establishment of an Air Training Corps, (*b*) the formation of University Air Squadrons, (*c*) special educational facilities, and (*d*) short University courses for air crew candidates.

We are, of course, primarily concerned with the establishment of the Air Training Corps as affecting boys of sixteen years of age and upwards.

All those who are physically fit and desire to serve in the Royal Air Force or the Fleet Air Arm will be eligible to join.

It is pleasing to note that the Air Defence Cadet Corps (founded many years ago by Air-Commodore Chamier, C.B., C.M.G., D.S.O., O.B.E.) will become part of the Air Training Corps, and in effect will form its backbone.

The administration of the new scheme is to be in the hands of Mr. J. F. Wolfenden, who has been released from Uppingham School for a period of six months to take up the post of Director of Pre-Entry Training at the Air Ministry.

Mr. Wolfenden will be responsible to Air-Marshal A. G. R. Garrod, C.B., O.B.E., M.C., D.F.C., who is the Air Member for Training on the Air Council.

The Commandant is Air-Commodore Chamier, who is already so well known to all our readers.

Already many new units have been formed throughout the country, and the scheme is undoubtedly assured of the fullest support.

It was with a view to catering for the particular needs of the Air Defence Corps that we recently commissioned Mr. C. A. Rippon, Hon. Instructor to No. 85 (Southgate) Squadron, to write a monthly feature in THE AERO-MODELLER.

Mr. Rippon will continue his series under the heading, "Hail to the Air Training Corps!"

This month Mr. Rippon gives some very valuable hints to solid modellers, and next month he will begin a description of the building of an efficient and easy-to-build model aircraft, which every member of the Air Training Corps should build with a view to familiarising himself with the elementary principles of aircraft construction and flight.

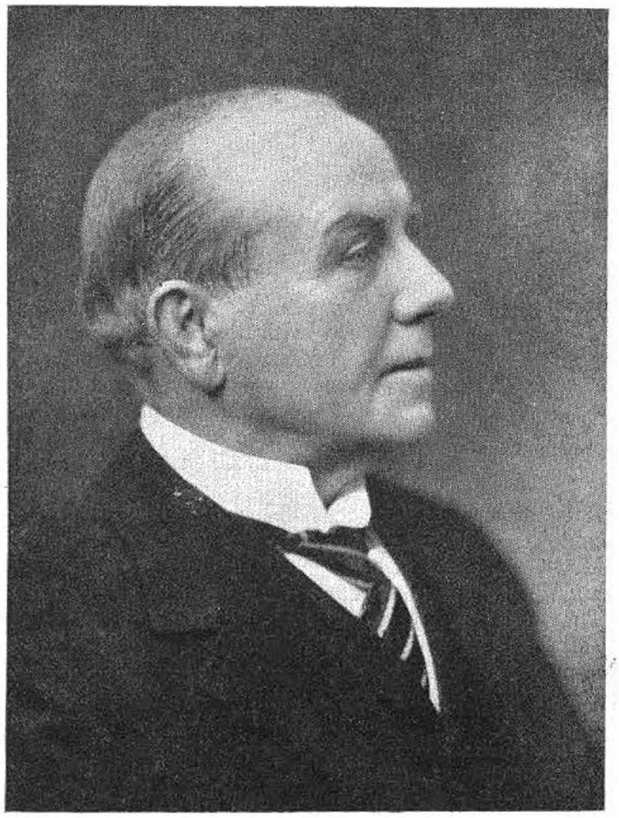
We look forward to receiving increasing numbers of reports from the Squadrons as the scheme develops, and would at all times be pleased to assist officers and education authorities in any way we can in regard to the organising of their units.

Our Two "Solid" Competitions.

In our January issue we made a primary announcement of two "solid" competitions, one for members of the Air Cadet Squadrons *only*, and the other for readers of THE AERO-MODELLER *other than* members of the A.D.C.C.

In our last issue we announced the rules, in the Air Cadet

LORD WAKEFIELD — AN APPRECIATION



THE recent death of Viscount Wakefield of Hythe is an irreparable loss to aviation and to the model aeroplane movement, for which he has done so much. Lord Wakefield was justifiably proud of the nickname which he earned of "The Patron Saint of Aviation," and although he extended his generosity to various projects, the flying movement was nearest to his heart. His shrewd business brain early recognised the immense possibilities of aviation, and its importance to a nation with a widely scattered Empire.

As the patron of the Society of Model Aeronautical Engineers, Lord Wakefield was not content to be a figurehead, and he always took a very keen interest in the society's work, particularly in the international sphere of model aeronautics. He also understood and appreciated the difficulties created for the governing body by the enormously rapid growth of the movement.

In the early days of the society, Sir Charles Wakefield, as he then was, attended a number of meetings, and I know that, had his health permitted, he would have been frequently seen at our flying meetings at Fairey's Aerodrome and elsewhere in recent years.

His presence at the King Peter Cup Banquet in July, 1939, made this a memorable occasion, and I have retained a vivid memory of his lordship's emotion at the wonderful reception which was accorded to him by all the aeromodellers present.

As a writer recently said of Lord Wakefield: "He was truly interested in people and the things they strove honestly and courageously to do. And his interest as much as his generosity served to evoke efforts which otherwise would have died while they were still mere aspirations."

E. F. H. COSH.

feature, but unfortunately omitted the statement that these rules applied *equally* to the competition for readers of THE AERO-MODELLER other than Air Cadets.

We therefore hasten to repeat that there are *two* competitions in which the rules, prizes and closing dates *are exactly the same in all respects*.

The "Air Cadet" Competition will, of course, be open to all members of the Air Training Squadrons now being formed, and the other competition will be open to all readers of THE AERO-MODELLER, *except* those who are members of the Air Training Corps Squadrons.

A full set of rules and a list of prizes are published on page 176 of this issue, and apply to *both* competitions.

In regard to the Air Training Corps Competition, we are pleased to announce that Air-Commodore J. A. Chamier, C.B., C.M.G., D.S.O., O.B.E., who has recently been released from his Royal Air Force duties to devote all his experience and energies to the Air Training Corps, has accepted the chairmanship of the judges.

We look forward to receiving a large entry for both of these competitions, and once again would remind readers that they stand little chance of winning if they send in tiny photographs that do not clearly reveal the detailed work and degrees of finish of their models.

"Aircraft of the Fighting Powers."

On page 186 of this issue appears an announcement of the Harborough Publishing Company Ltd., explaining the apparent shortage of copies of "Aircraft of the Fighting Powers."

Intensive preparation for six months, on the part of several experts, was put into this book, and it *was* therefore anticipated that there would be a large demand for such an up-to-date and comprehensive reference book.

However, the demand *far* exceeded the first supply, and it was thought wisest that the first copies should be held up until a fair stock had accumulated, so that, once dispatch began, it could take place over the whole of the country simultaneously.

This Editorial is being written in the first week of February, just after the release of some thousands of copies, and it is confidently hoped that by the time it is being read that all orders placed up to January 31st will have been executed.

No doubt many of our readers have seen a new publication, *The Aircraft Spotter*, sponsored by the *Aeroplane*, which has recently been published and is now appearing weekly.

It is an eight-page bulletin, edited by Peter G. Masefield, Technical Editor of the *Aeroplane*, and it incorporates the bulletin of the Observer Corps Club.

The Aeroplane Spotter, as its name implies, is intended for members of the Observer Corps, roof spotters and all those who, in the Forces or in other spheres, are concerned in the identification of aircraft.

In other words, *The Aeroplane Spotter* is *the* magazine dealing with identification of aircraft.

In the issue for February 6th, " Aircraft of the Fighting Powers " was reviewed in the following terms :

> *" It is beautifully produced on art paper, and obviously an immense amount of painstaking research has gone into its preparation. The result is the best book of its sort which has yet appeared. . . We know how difficult this business is, and we congratulate the compilers on a fine effort. . . . "*

Coming from such a quarter, we feel that this is the highest praise that this publication could receive.

On pages 146/147 are printed full particulars of an " Identification Competition," organised by the publishers of " Aircraft of the Fighting Powers," in which cash prizes totalling £75 must be won.

This competition will be run during the next three months, and we feel sure that not only will it evoke considerable interest, but that it will be most instructive to many readers of THE AERO-MODELLER.

Mr. Furneaux Gets His Replies!

In our last issue we published a somewhat lengthy letter from Mr. H. C. Furneaux. We have not met this gentleman, and know nothing about him or his activities in the model worlds.

That he must be completely unaware of the present-day organisation of the S.M.A.E. was clearly shown in his letter ; that he held views which would evoke considerable interest was certain—and most certainly has he received the criticisms that he asked for !

We publish in our correspondence pages this month several letters selected from a considerable mail, and below we publish a letter received from Mr. Houlberg, Chairman of the S.M.A.E.

In an editorial note at the end of Mr. Furneaux's letter we dealt with his criticisms regarding the plans published in THE AERO-MODELLER, and it is interesting to note that in every letter which we have received in regard to his letter of complaint, support for our policy has been clearly indicated.

We feel that Mr. Furneaux does not make the appropriate allowances for the present-day conditions.

The ban on the flying of petrol 'planes has now existed for some months, and prior to that the shortage of balsa would necessarily have curtailed the building of these models, to say nothing of the fact that many builders would be otherwise engaged.

If, then, during the past year or so, there have not been plans of petrol 'planes published, has there been much reason to do so?

Since the war started we have passed through two winters and one summer.

Is it not evidence of our " keeping up with the times " that there have been a greater number of plans of small and indoor types of 'planes published in THE AERO-MODELLER, rather than a preponderance of plans of large models?

As to whether we *can* produce plans of petrol 'planes we are pleased to inform Mr. Furneaux that we are definitely not " resting on our oars," because there is a war on ; and that he may rest assured that as and when peacetime returns THE AERO-MODELLER will be there with its " Plans Service " right up-to-date.

In view of Mr. Houlberg's able reply on S.M.A.E. matters, we confine our remarks to the observation that it is a pity that Mr. Furneaux is no longer a member of the S.M.A.E. Had he remained a member no doubt he would have been present at the annual general meeting held at the Royal Aero Club on Sunday, February 9th, when he would not only have seen how the officers of the Society are elected, but might even have stood for one of the vacancies himself !

Following is Mr. Houlberg's reply :—

MR. HOULBERG, Chairman of the S.M.A.E. replies to MR. FURNEAUX

DEAR SIR,

I have read the piece of correspondence in the February issue, over the signature of H. C. Furneaux, on the subject of various aspects of the model aeroplane movement in this country.

In his opening statement this correspondent informs us that his criticism is going to be severe. A futile and bombastic statement. Surely those who read his letter are the best and only judges of the severity or otherwise of any criticism he may put forward.

May I remind Mr. H. C. F. that a first essential to pertinent and successful criticism is a sound basic knowledge of the subject being criticised?

Here our correspondent makes an early breakdown, since he proudly informs us that he has had nearly *five years* experience of aero-modelling, and in the next sentence admits that even this short acquaintance has been largely devoted to the theoretical and scientific side rather than the *practical* and *constructional* side.

Now no one is a greater admirer of theory than I am, but experience has long since taught me that theory alone is insufficient, and that it must perforce be backed up by the necessary practical experience required for its effective application, and in the long run it is the practical experience which is the decisive factor.

Mr. Furneaux gives us no clue as to how he entered the " organised model world," as he is pleased to call it, but his reference to the " old school," and people who have done " two minutes," indicates that he came in by the wrong entrance and obtained an altogether wrong idea of the existing situation.

Mr. Furneaux makes the statement that progress in this country has been slow, and has fallen behind the U.S.A. in many cases, but fails to give any actual examples of this.

If, however, we take the example of " organised aero-modelling," we very definitely find Great Britain years ahead of the U.S.A. Organised aero-modelling has existed in this country since the days of the old K. and M.A.A. before the last war, and since then under the guidance of the S.M.A.E. Not so with the U.S.A., who are only now just beginning to realise the value of a national organising body and are striving hard to establish their N.A.A. as the national governing body in that country.

Reviewing the theoretical aspect of aero-modelling in this country and the U.S.A., I am definitely safe in saying that our models are in no way inferior to the American examples —rather the reverse—and this is borne out by the opinions of American aero-modellers themselves, as expressed in the American Press. As a recent example I would quote from the November issue of the American paper, *Air Trails*, where we find this statement : " English authors have done a good job of writing an impressive list of books on model aircraft. They seem to have passed the American authors in number and quality." We do not, therefore, appear to be behind either in theory or its propagation.

Now let us look at the performance angle. Until the advent of Dick Korda's extraordinary flight in the last Wakefield Cup Contest the best officially recorded flight was that of Bob Copland, made in Yugoslavia, and there is further ample evidence to show that the British models as a whole are capable of performances in every way equal to those of the Americans. So what!

Now to deal with Mr. Furneaux's criticism of the S.M.A.E., which he states appears to be composed of a lot of "yes men." This statement and his following one, that "I never really found out how they came to power," when referring to officials of the society, clearly indicates how little he knows of his subject, and the organisation of the S.M.A.E. in particular.

Apparently he does not know that by far the greater proportion of the Council consists of representatives of the affiliated clubs, who are appointed by the clubs themselves, and that their voting power greatly exceeds that of the appointed officials, or that these officials in their turn are only elected for a term of office of one year at the annual general meeting, to which all members of affiliated clubs have access if they are sufficiently interested to attend.

If certain officials have in the past appeared with some regularity it is a certain indication that, in the opinion of the majority of aero-modellers, they possess some special qualification and ability over other contemporary aero-modellers which makes them specially suited to the office to which they have been appointed.

The patrons of the S.M.A.E., to which he makes slighting reference, have never exercised a controlling influence on the officials of the society, or even attempted to do so, with one possible exception, which was soon eradicated, and I defy Mr. Furneaux to produce an atom of evidence to the contrary.

Mr. Furneaux indicates that he is no longer a member of the S.M.A.E. Why did he leave it? If he was genuinely interested in the model movement why did he not stick to his guns and put forward the organisation reforms which he implies are so badly needed, instead of abandoning ship? If this was too much trouble it proves that he is no real aero-modeller and not to be taken seriously.

In the paragraph in his letter dealing with the question of his "constructive criticism," he shows such ignorance of the organisation of the S.M.A.E that he has the temerity to propose a scheme exactly parallel to the Area Scheme, which was inaugurated in the society three years ago, and which has only been interfered with by the advent of war, with its dislocation of travelling facilities and increased costs.

Here again Mr. Furneaux shows his lack of appreciation of the true situation when he states that this scheme would cost less than the old one, because the very reverse is the actual case, and it was one of the major problems which the S.M.A.E. was facing immediately prior to the outbreak of war, a problem to which it was attempting to find a satisfactory solution.

Now for Mr. Furneaux's criticism of the existing competition rules.

Once again he demonstrates that he is unable to marshal his thoughts properly, because he mentions nothing at all of competition rules, but immediately switches off on to the question of records, and again goes all American without in any way explaining why, in his opinion, the American system of record classification is superior to that supported by the S.M.A.E.

One gathers from his plaint that the S.M.A.E. establish a new record class to include any new types which may be developed, that he objects to too long a list of records. If this is so I would advise him to look further into this question, and obtain a full list of American records. The one in my possession shows thirty different classes, the majority of which are sub-divided into junior, senior, and open classes, to make a grand total of some 74 record classes.

No, thank you, Mr. Furneaux, our own system is to be preferred, I think, since it covers all types in which aero-modellers are interested in this country and, contrary to Mr. Furneaux's statement, is sufficiently flexible to give full scope and incentive to scientific development.

Concerning petrol models, while it is agreed that the movement in America has surpassed that in this country so far as *quantity* is concerned, there is no evidence whatever to indicate that the American machines are in any way superior to the English version in aerodynamic or performance qualities, and I do not think the average English aero-modeller admires the modern American version of a gas model with its exaggerated parasol lay-out.

Owing to their greater manufacturing enterprise, the Americans have certainly produced some better motors at a more reasonable price than are obtainable from home sources. This, however, is not the fault of the S.M.A.E., but our manufacturing conservatism.

The model movement, whether on this side of the Atlantic or the other, is by no means perfect, but no good purpose is served by ill-considered letters of the nature of Mr. Furneaux's. What is wanted is not idle criticism, but sound suggestions backed with the will to help the governing body in carrying them through.

If Mr. Furneaux is sincere let him rejoin the S.M.A.E. and assist in maintaining the model movement in this country in a flourishing condition during the present difficult period.

A. F. HOULBERG,
Chairman, S.M.A.E.

AND THE "MOVING FINGER," TOO!

DEAR SIR,

I read with amusement that I, as the "Moving Finger," have been effectively muzzled. I am sure that you appreciate my hellish delight in finding fault with all and sundry, but I would like to ask Mr. Furneaux when I ever mentioned the S.M.A.E. Council in connection with notepaper, billheads, diaries or other minor sundries? Indeed, I should like to know when I ever criticised the S.M.A.E. in any way whatsoever? Furthermore, I think Mr. Furneaux who, by his own statement, makes tin gods out of our American confrères, might at least learn how my contemporary, Walter Winchell, spells his name.

Yours faithfully,
THE MOVING FINGER.

NOW MR. FURNEAUX . . . . . What about it!

So we say to Mr. Furneaux, "What about it?" We will hold the space of one page available for you on which to publish your reply, and look forward to receiving same by an early post! D. A. R.

PETROL TOPICS

By Dr. J. F. P. FORSTER

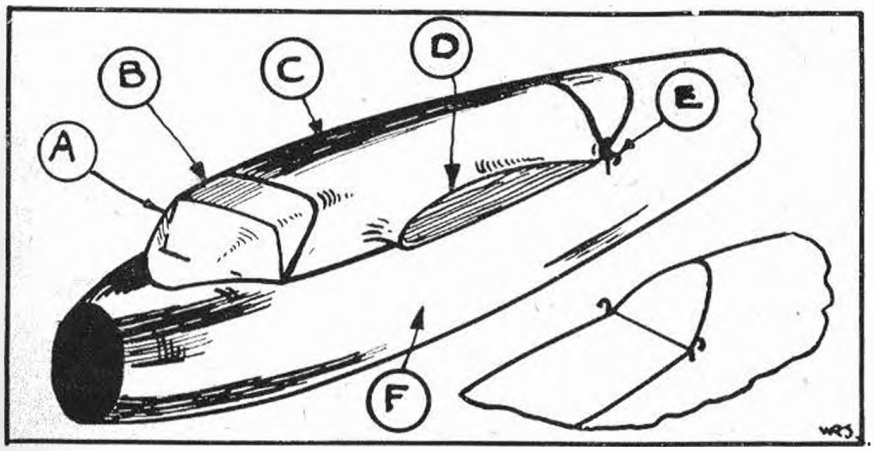
In the sketch below, descriptive of D. W. Greenslade's method of fairing-in a shoulder-wing (a) *is the windscreen,* (b) *is a balsa block,* (c) *is the streamlined centre section in which is formed the wing stubs* (d), *and* (e) *is a rubber band stretched over the centre section and held down by hooks on either side of the fuselage* (f).

A YEAR has now gone by since the Editor first inflicted my outpourings upon you, my long-suffering readers! "Britain can take it," in more ways than one! I admit, in retrospect, that I have been a bit "vitriolic" on certain topics at times. I have had some dozens of letters, expressing approval and even delight, at the feature as a whole, but not a single one taking umbrage, offence, or even differing seriously from views expressed by myself. I think this is rather a pity, as I've been quite prepared for it, and have perhaps asked for it, once or twice!

The only topic over which I seem to detect any real difference of opinion is undercarts. Several chaps have openly expressed satisfaction with the outward splaying cantilever type, even after my final reasons for the "backward travel" type given in last September's issue of THE MODELLER (p. 545)) had had time to sink in. All right, I accept this. Over 75 per cent of photos received appear to show undercarts of this type, which in the opinion of their senders have functioned to their satisfaction, though several have confessed that at one time or another the rear member has bent or broken adrift, the latter involving considerable labour to repair. I think the majority of chaps fly under happier geographical conditions than I am able to myself, and henceforth I shall not criticise this type of undercart as being inefficient. In fact, it is the most efficient (five-bar gates and ploughed fields excepted!) It is certainly a great deal easier to fair-in, and to make look realistic.

For some reason, chaps haven't entered the *inverted v. upright controversy* to any extent yet, but I hope, after last month's "Topics," to hear some of your views on this matter. My own views were expressed pretty forcibly, and to put them in a nutshell, I contend that the chief (perhaps the only?) reason so many petrol models have been seen both here and in America with upright engines is because they are sold mounted this way up, and some are troublesome to invert in their present form. And further that the present form is purely a result of a habit of mind acquired by engine designers, many of whom started on marine engines, which, requiring a low thrust line, were naturally installed upright. A man, starting with an aeroplane, and designing an engine around the ideal thrust line, would almost certainly design it with the crankcase on top, unless it was some ultra-low-wing freak. The only advantage of an ultra-low-wing would seem to be a short undercart, and this would be defeated by considerations of ground-clearance for the propeller, with a low thrust line.

While sorting out the year's correspondence, I have come across a miscellaneous assembly of snaps, which did not at the time seem to call for comment, but many are good snaps, as such, and since they deserve reproduction, I include a selection herewith.



D. W. Greenslade, of Torquay, sends the sketch of what appears to be a sound and neat method of fairing-in a shoulder wing, and photo 1 shows his 5 ft. 6 in. model, weighing just over 3 lb. (monocoque), and powered with a 6 cc. Wasp, which was completed just before the "ban," and incorporates the arrangement in the sketch.

R. Edwards, of Burnham, sent the well detailed photo (2) of his Wasp-powered model, mentioned in the September "Topics."

Another good snap (photo 3) was sent in by Peter, Matthews, of Woodford Green, and is of an American designed Parasol he was

building, and even he himself remarks with disapproval the low thrust line. Again this upright engine business! I know these Parasol freaks are all the rage in America just now; they *are*, of course, extremely efficient flying machines, due largely to the low angle of incidence at which the wing has to fly to counteract the stalling tendency of the low thrust-line, and also to the free airflow round the wing and reduced fuselage interference, but they give me a pain in the neck to look at! He puts two layers of cycle inner-tubing between engine and bearers to damp vibration.

G. A. Chappel, of Bromley, who has had some experience of radio-transmission on five amateur wave-bands, wants to see in " Topics " letters from radio-control fans, on the subject of apparatus design, power used, and whether below 10 watts frequency of radiation and antennae systems. He wants to be able to ventilate his own and other people's ideas in these columns, " and so kindle a dormant spark in the *already valuable* pages of THE AERO-MODELLER." (Editor, please note!) This also goes for W. G. Evans, of Horsham, and one or two others. C. R. Jeffries' letter has been very well received, and this is what they want. So do I, but who is going to write?

D. J. Dawson and G. E. Dunmore, of Leicester, sound an active pair of lads, having built several biggish American designed machines powered with Ohlsson 60 and Forster engines; also a Porlock Puffin with Spitfire. Photo 4 shows how they have solved their transport problem.

Geoffrey Day, of Welwyn Garden City, sends some very good snaps of curious looking objects, which as flying machines are the last word in efficiency. Photos 5 and 6 show a stick model of his own design, with a span of 8 ft. With 8 sq. feet of area, and an all-up weight of 4 lb., it is powered by a Brown (½ h.p.), housed in a monocoque "pod" finished to the " nth " degree of smoothness. Another "flying powerhouse" built by this man is the " Comet Zipper " parasol, again powered by his Brown, which he is seen starting in photo 7. Both these machines climb at over 45 deg., and the larger has the flattest glide he has ever seen. His reply to critics of this type of machine is in the form of a pertinent question: " Just how many of these critics could design a 'plane weighing just under 2 lb. of only 4 ft. 6 in. span, which will repeatedly perform with ½ h.p.? "

We might reply, " Who wants to? " But we'll skip that, in view of what's coming! After saying he finds " Topics " always very interesting, he concludes by saying, " I'd like to see photos of more models with that ' eye-appeal '; I'm sure you will agree it's possible to combine ' eye-ability ' with ' fly-ability.' Evidently this is a case of ' One man's meat . . . ' "! He wants to know if there are any other possessors of " Comet Zippers " in the country?

Beginners and Scale Models.

For the sake of many enthusiastic beginners—and there will be dozens of them after the war—whose one ambition is to possess a flying scale model of some well-known fighter or civil 'plane, I shall have to hark back four or five years to the early days of balsa constructed petrol 'planes, and to the findings of the early pioneers of the game in this country.

The most successful of them, such as C. E. Bowden, who wrote extensively on Petrol Models, and whose book, " Petrol-Engined Model Aeroplanes," should still be the " Petroleer's Bible," soon found that there *must* be certain fundamental differences between a model and its full-size aeroplane if it is to fly successfully, consistently, and without damage. So many beginners seem to forget that what goes up must come down. It is quite easy to build a perfect scale model which would take off and fly perfectly, and even glide quite decently, but who is going to pull that stick back or lower those flaps while it is getting back on to the deck again?

We cannot build scale low-wing undercarts intended for 3-point landing, and expect them to function safely (or, in fact, at all) when the 'plane hits the deck at a gliding angle, which every model does unless it is going haywire or is radio-controlled.

I am continually getting letters from youthful readers wanting plans of such machines as " Spitfires " and " Magisters," from which to build their *first petrol 'plane!* The latest is from D. Hodges, of Southsea. All I can say to them (apart from the fact that I don't supply plans in any case, and I personally don't encourage the lazy habit of using other people's plans, though the success of THE AERO-MODELLER Plans Service only goes to prove how unoriginal is the average modeller!) is that they are starting the hobby the wrong way round. First build a *flying* machine, crashproof, stable and reliable. Then sit down and think how you can alter its appearance without upsetting its aerodynamic and landing qualities and without covering up everything that needs to be accessible, e.g. ignition points, petrol filler cap, needle valve, plug, induction pipe, battery, flight timer—yes, even coils and wiring need looking at sometimes. It is a great advantage to be able to get at least one hand inside the fuselage somewhere.

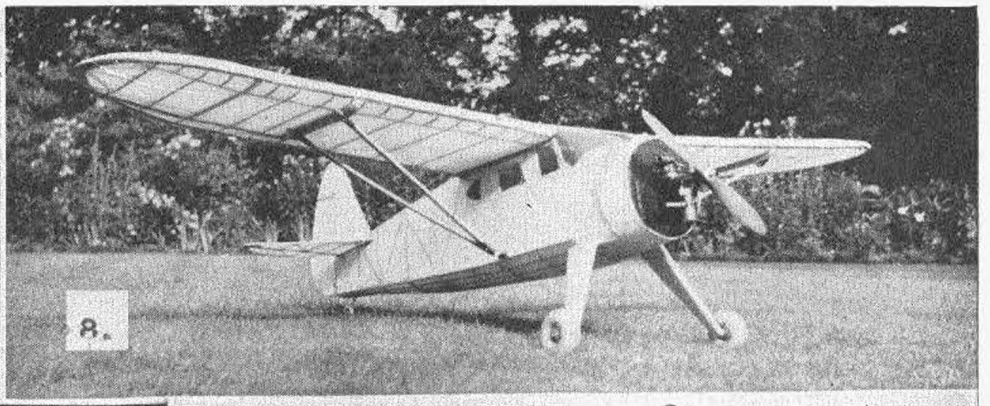
There is nothing quite so unsatisfactory as a beautifully cowled and faired model, whose owner has to confess when something goes wrong, " . . . but I can't get at it now without pulling the fuselage to pieces." For competition work and even friendly demonstrations, this sort of thing is fatal; if anything does go wrong with engine or electrical equipment let it at least be accessible, and if possible repairable, *on the field*. This not only saves disappointment, but also gives a favourable impression to those impatient onlookers who are quick to appreciate the chap who can put it right on the spot.

To beginners, therefore, I say, " Play for safety." Have your whole engine unit detachable (preferably "knock-off"); put your undercart well forward, and don't make it too rigid fore and aft, and do some serious thinking about wing attachment before you embark on a low-wing, if you want to preserve your first petrol engine from becoming a heap of wreckage.

Just to show that scale model work is not impossible, provided a suitable high-wing prototype is chosen, I include a very nice photo of Brian Maxwell-Muller's Howard D.G.A.8. Apologies for the confusion of this with his geodetic model in September " Topics " should have appeared the following month (photo 8). Powered with an inverted Cyclone, this was the model which unfortunately came to a sticky end from the top of a tree. It is, perhaps, noteworthy that the engine, on a detachable mounting, was the only thing saved from the wreckage which had to be *swept* up!

It is a pity so many photos received are unsuitable for reproduction. Will contributors please note that these must be *black* and *white* and *glossy*. Next month I hope to include sketches and photos of still another crashproof method of wing attachment, sent in by G. Temple, which has proved itself in practice.


A23
1.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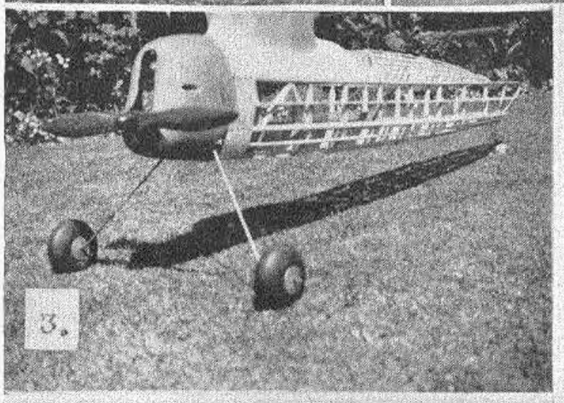
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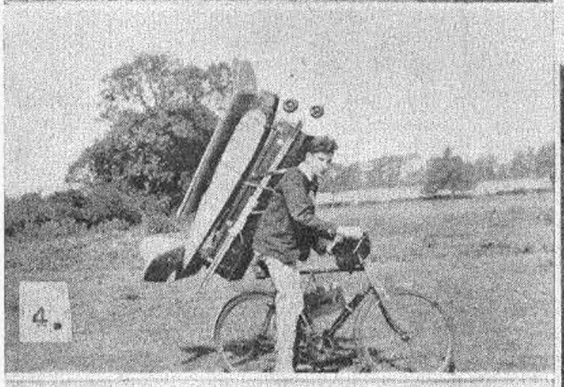
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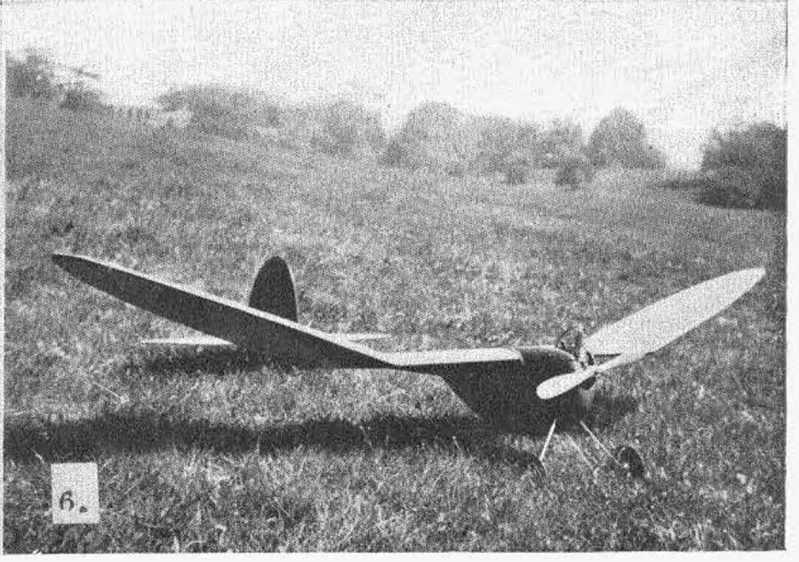
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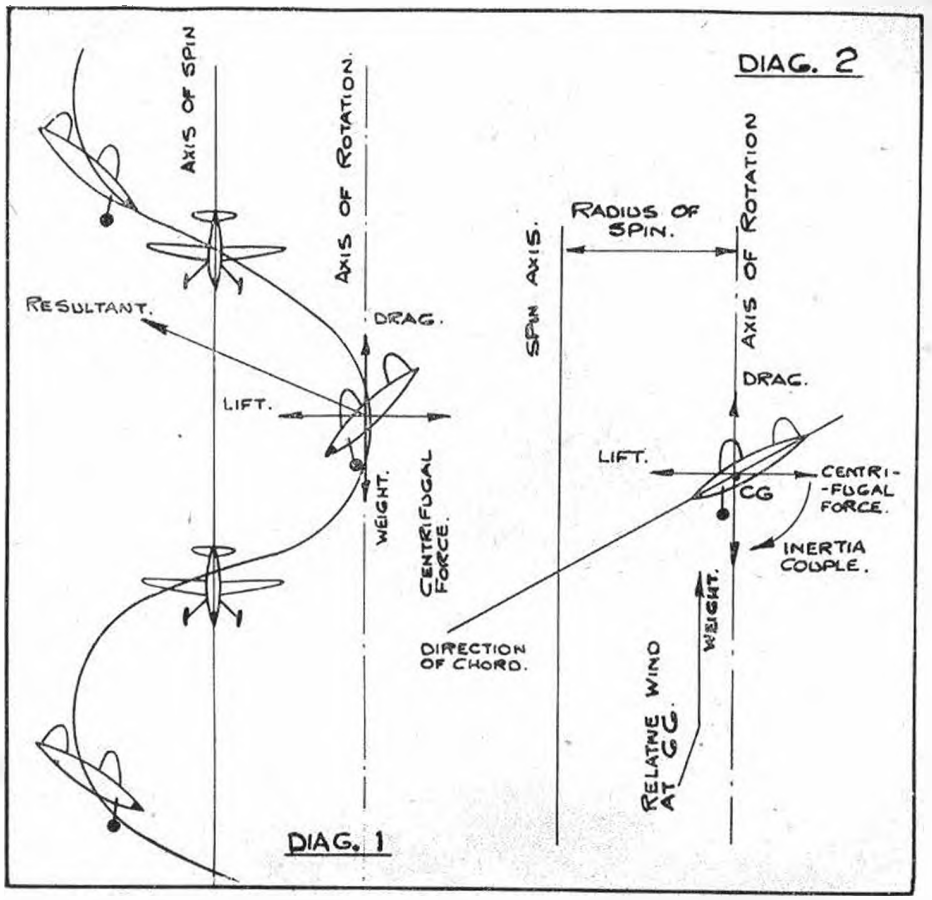
SPINNING—



UNDER this heading I intend to collect together sufficient data to enable the interested aero-modeller to discern the probable reasons causing spiral divergences, and thus avoid them. Now that modern designs are tending to a higher wing loading and consequent higher flying speed, the need for correct design is very real. How often has your Wakefield made a wing tip landing soon after launching? In many cases side-thrust is to blame, but more of this anon; we will deal with the aerodynamics of the case first.

There are two parameters affecting lateral stability: (i) Fin surface, and (ii) dihedral. The fin surface affects yawing couples, which arise from a sideslip and angular velocity in yaw about C.G. The dihedral affects the rolling couples arising from the sideslip.

A large fin, with small dihedral, tends to spiral instability. A comparatively gentle yaw leads to spiral *weathercock instability*, and, in manually controlled 'planes (to the uninitiated I mean full size 'planes!) correction is by means of ailerons and rudder. With a small dihedral the fin area is always critical, and the spin instability which may be incurred quickly leads to spiral instability.

A small fin and large dihedral give us instability referred to the body axis and consequent spiral instability again. In any case it is hard to avoid near the stall, which may arise from the model climbing at a large angle of attack. The subsequent spin may be vicious, but recovery should not be difficult with a good design, and a large dihedral is helpful here. The loss of altitude is usually considerable, and should the stall occur just after take-off, disaster is unavoidable. Perhaps many of you remember Copland's Wakefield on its second flight in the 1939 trials. A stall of considerable altitude was followed by a spin, losing about a hundred feet altitude. Recovery was complete, however, and the subsequent climb away was a true indication of marvellous design. Remember, too, all those stalls and spirals into the ground straight off the take-off board? Bad design, or, more probably, bad trim; perhaps a combination of both.

The limiting value of the dihedral for inherent lateral stability is given mathematically by:—

$$\frac{4A}{mb^2} \leq \cdot 15 \text{ and } \frac{AC}{mb^2}$$

where m = mass in slugs.
b = span.
A = moment of inertia about rolling axis.
C = moment of inertia about yawing axis.

These are more applicable to large petrol models. Small models can rely on practical determination of the dihedral. The lower limit, as outlined above, gives a very small value (for model work that is). An increase in the dihedral introduces a rolling couple which is stable, but rolling velocities due to sideslip or cross wind are large. Thus a 'plane with a large dihedral is usually inherently stable, but often rocks from side to side, this being most noticeable in gusty weather. This would seem to suggest an upper limit, but this is never reached. The designer knows the minimum value of dihedral he can use, and also knows that he is not leaving any margin of safety if he uses it. Accordingly he increases the value, the increase depending upon the amount of wing efficiency he is prepared to sacrifice.

For rubber models:

Parasols	6°—10°
High wings	8°—10°
Shoulder wings	11°—12°
Low wings	?

The dihedral of the latter is entirely dependent upon the remainder of the design, and in particular the disposition of forces. I'm not a low-wing expert, and I should not like to give a definite ruling on such types. I can only say that way back in the early 'thirties both my "Wizard" and "Kinglet" (low wing monoplanes, birch and spruce, silk covered) flew well on a moderate dihedral.

We have arrived at the following results then:—

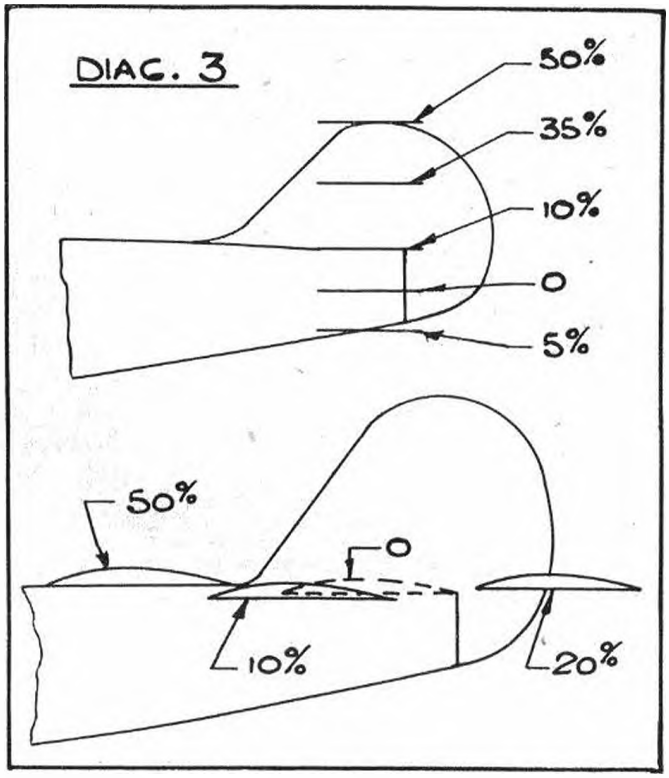
1. Dihedral. (*a*) Too small gives spiral divergence at low speeds (e.g. at high angles of attack). (*b*) Too larrge—sensitive to side winds.
2. Fin area—dependent on dihedral. Too large leads to spiral divergence; too small, weathercock instability.
3. Weathercock stability (with reference to an axis normal to the wind direction) is desirable at all speeds.

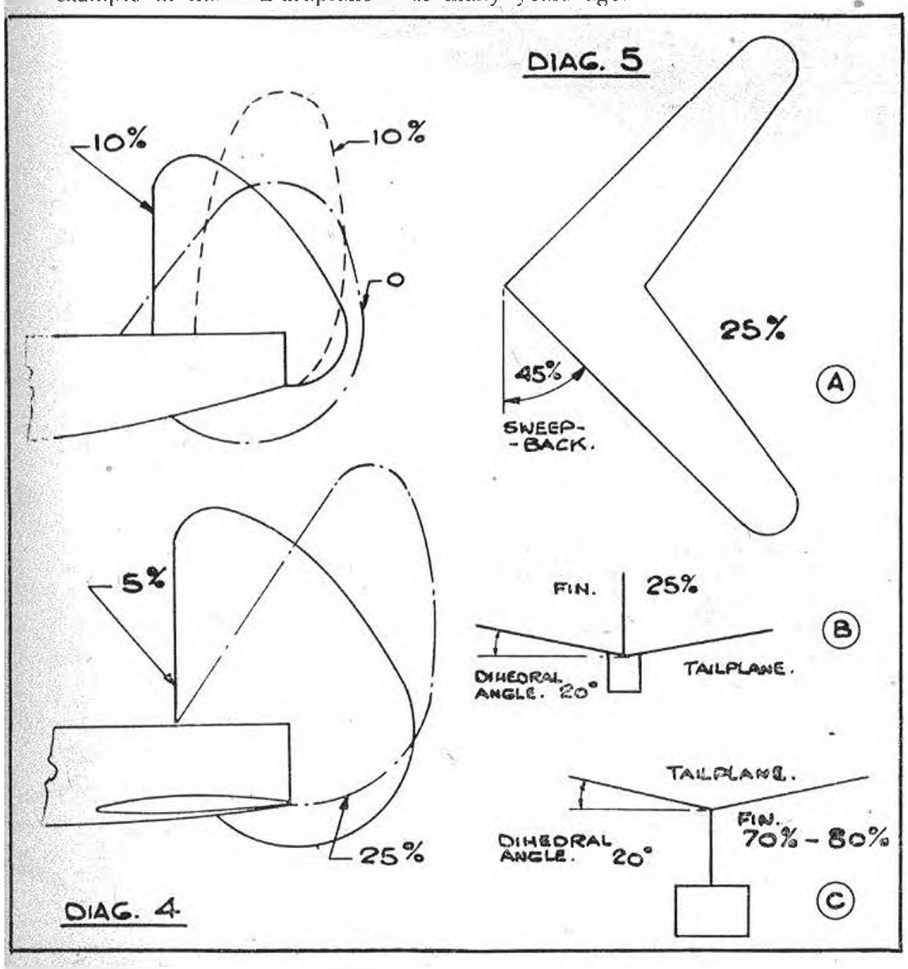
—— AND THE LIKE

By R. H. WARRING

Now for spinning itself. There are three aspects to consider. Firstly, the entry into the spin, which is an accelerated spiral motion, with loss of control occurring beyond the stall. The model one moment is climbing at a high angle of attack when the next it suddenly stalls and, if laterally unstable to any degree, a roll and yaw are introduced. The roll tends to increase both the rolling and yawing moments, while the yaw tends to increase only the roll. Thus we see that the rudder power necessary to recover from the second phase of spinning, i.e. the spin proper, is greater than that required to prevent entry into the spin. An important point to note here is that at high angles of attack the rudder power may be lessened by the shielding effect of the fuselage.

The spin proper consists of a steady downward spiral motion about an axis, and other angular motions. See diagram 1. A sideslip accompanies a spin, since all wings have a tendency to roll when sideslipped, and vice versa, thus making the non spinnable *model* aircraft difficult to design. It is not impossible, however. Our old friend " Rip " produced an excellent example in his " Duraplane " of many years ago.

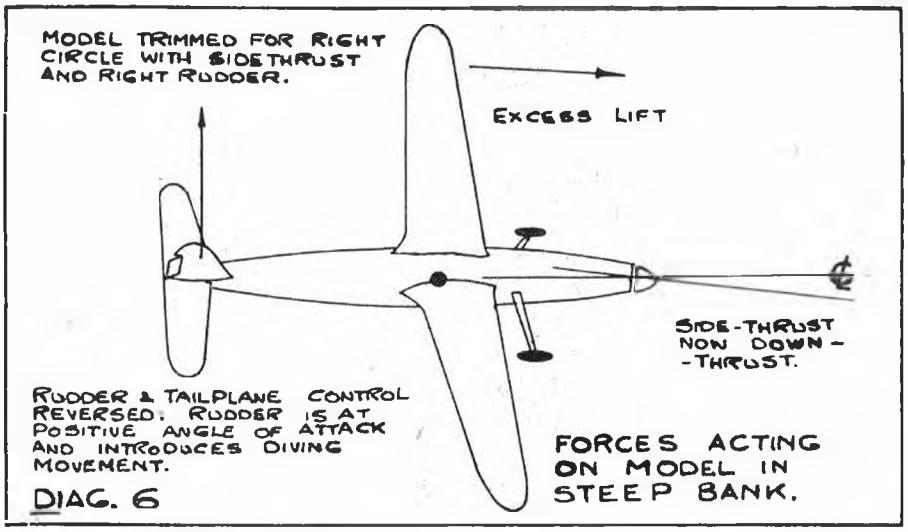




The third phase of the spin is the recovery, which is accomplished naturally if the design is reasonably stable, but the resulting loss of altitude is usually considerable. It is far better to prevent the spin occurring, since, as we have seen above, the corrective forces applied do not need to be so great. Let us see what we can do in this respect.

Wing tip control, up to and beyond the stall, opposes the roll, which is the main cause of the incipient spin, and I cannot praise too highly the work done by Mr. Forster and Lieut.-Col. Bowden with their " letter-box " slots on their petrol models. I cannot advocate their use on such models too strongly, especially on taper wing jobs. I think their work is a big step forward in the right direction, and, like true aero-modellers, they have not hesitated in placing their experience and results before everybody. For rubber-driven models, unless of exceptionally large size, I suggest other methods of wing tip control, as, on the usual small chord wing tips, the slots would probably contribute more drag than they are worth. It is up to the individual designer to decide whether to employ a plan form or sweepback, such that the tips stall last; thicken the tip ribs, wash out the wing tips, or employ some other "trick" of design. Remember our design is only a compromise between lift and drag, to get the highest L/D ratio and still keep the weight down to reasonable limits.

The other control is the rudder. Rudder power mentioned above is measured mathematically by the formula—



Power $R = \frac{10^3 \, KS''l}{Ss}$ and is never less than 10.

S″ = rudder area.

l = moment arm (i.e. C.P. of rudder to C.P. of wing).

S = wing area.

s = semi-span.

K is a coefficient which varies from about ·25 to ·4 for full size aircraft.

Since in a model the fin and rudder are normally fixed, K will have a value of between ·6 and ·9, model rudders being proportionately larger, and, if calculated for a stable model, can be used for calculations on a future design *of a similar type*. These last few ominous words are to avoid any discrepancies due to " blanketing " of fin and rudder in a dissimilar design.

Stability of Forces in a Spin.

See diagram 2.

1. Rate of rotation dependent upon pitching couples or balance being reached where aerodynamic forces equal the inertia forces.
2. The radius of the spin is such that the lift equals the centrifugal forces.
3. Rate of descent is such that the drag is equal to the weight.
4. A slight roll adjusts the balance of lateral forces. The balance of yawing moments is controlled by the fin, and incidentally limits the incidence range over which spinning is possible.

Ignoring yawing moments about the normal body axis all the other forces can always be balanced. Thus the controlling of the spin resolves itself into the provision of an adequate anti-spin yawing moment, provided by large values of l, the fin moment arm, and sufficient *effective* vertical fin area. On occasions, and more particularly in some designs, the fin may be shielded, or even reversed, by the tail-plane during a spin.

Thus we see that the disposition of the tail surfaces is important also. Wind tunnel experiments have shown that raising the tail-plane may result in a 50 per cent increase in anti-yawing moments, and my own practical experiments seem to substantiate this. The only difficulties arising are structural ones. A word of warning, however. This has a very bad influence on low wing monoplanes, and, since these are the most popular full-size types to-day, probably accounts for the fact that only a few 'planes employ a tail-plane so situated. Strut bracing is essential, even on a model, but this should not add to the drag unduly; the main fear is adding too much weight to the tail-end with fittings.

Diagrams 3 and 4 show the percentage increase in anti-yawing moments for various dispositions of the tail surfaces.

Diagram 5 shows corresponding values for a swept back tail-plane, and also a dihedralled tail-plane with the fin disposed below and above it.

Now finally a few points of design which lead to instability, and should be rigidly avoided where possible. A heavily loaded low wing monoplane with large body weight (e.g. large motor) and unstaggered biplanes with large wing weight, are particularly " vicious." Large wing weights on any model are likely to lead to trouble, especially in high aspect ratio wings. Now, you petroleers! How often have you fitted your models with solid balsa wing tips? Remember, once the model starts to bank the outboard wing tip is travelling faster than the rest of the machine, and the weight on the wing tip may cause something more than just a bank!

To conclude, a few words on side-thrust. My best advice would be, *use it in moderation*, especially on high aspect ratio machines. Most modellers now can trim their Wakefields on side-thrust alone now, but it's apt to be dangerous. A little overdone, and the increased lift on the outboard wing forces the model into a steep bank when the side-thrust is now down-thrust. Worse still, the tail-plane and rudder controls are now partially reversed, and the rudder is nearly always turned to give a circle the same way as the side-thrust. No wonder we often get a turn into the ground under power! Perhaps there is something in " figure of eight " flying after all.

No! Limit the side-thrust to 2 deg. or 3 deg., and turn the model so that the take-off is straight, and the first circle is of large diameter. It's slightly harder to do, but it's well worth it.

As a little postcript, a word of warning about folding propellers. These must fold *flat* and not offer any side area to the relative wind. Otherwise you are liable to witness a perfect example of a spin without a recovery, especially if the fin area is rather powerful, due to the reduction in side area forward of the C.G. when the propeller is folded.

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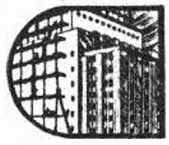

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1. This competition is open to all readers of THE AERO-MODELLER, and is organised by the Harborough Publishing Co. Ltd., Allen House, Newarke Street, Leicester.

2. There is no entry fee.

3. Employees of the Harborough Publishing Co. Ltd. and of the Model Aeronautical Press Ltd. (proprietors of THE AERO-MODELLER) are not eligible to enter.

4. The competition consists of identifying aircraft from the portions of photographs reproduced in Section 1 on the opposite page; Section 2 to be published in the April issue, and Section 3 to be published in the May issue of THE AERO-MODELLER.

5. About three-quarters of the photographs used in this competition have been taken from *Aircraft of the Fighting Powers*, and the remainder from other aeronautical journals, to the proprietors of which acknowledgment is hereby made.

6. A schedule is printed below containing the names of 167 aircraft, from which 130 (which form the subject of the competition) have been selected.

7. The first prize of £50 will be awarded to the entrant who identifies correctly the largest number of aircraft out of the 130 represented in the three sections.

The second and other prizes will be awarded to those competitors who identify correctly the next largest number of aircraft.

8. Should more than five entrants identify correctly all the 130 aircraft, the whole of the £75 prize money will be distributed equally amongst them.

9. No aircraft is represented more than once.

10. No photograph has been touched-up or altered.

11. Entrants must use the entry forms printed in THE AERO-MODELLER.

That for Section 1 is printed on the back inside cover of this issue.

That for Section 2 will be printed in the April issue, and that for Section 3 will be printed in the May issue.

12. The entry forms for Section 1 and 2 must be retained until that for Section 3 is available.

13. All three entry forms must then be posted in one envelope addressed to "Identification Competition," The Harborough Publishing Co. Ltd., Allen House, Newarke Street, Leicester, and must be adequately stamped.

Envelopes received without appropriate stamps thereon will not be accepted; and entry forms incorrectly filled in, mutilated or not completed in ink or typewritten will be disqualified.

14. The closing date for this competition is May 5th, 1941. Entries received after this date will not be opened.

15. If an entrant, after publication of the list of prize-winners in the THE AERO-MODELLER, considers that he has a claim to a prize or portion thereof, he must, by registered post, notify the Harborough Publishing Co. Ltd., Allen House, Newarke Street, Leicester, within ten days of the publication of the results.

Any claim must be accompanied by the sum of £1, which will be refunded in the event of the claim being allowed.

16. No correspondence can be entered into with regard to the competition, and the act of submitting a set of entry forms by a reader will be construed as an unqualified acceptance of the above stated rules, and an acknowledgment that in the event of any point arising which is not covered by them the decision of the directors of the Harborough Publishing Co. Ltd. will be unreservedly accepted as final and legally binding.

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Arado Ar.196.
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Armstrong-Whitworth Whitley III.
Armstrong-Whitworth Whitley IV.
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Blohm-Voss Ha.139.
Blohm-Voss Ha.140.
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Boulton-Paul Sidestrand.
Boulton-Paul Overstrand.
Boulton-Paul Defiant.
Breda 65
Breda 88.
Breguet 690.
Brewster Buffalo.
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Bristol Blenheim IV.
Bristol Bombay.
Bristol Beaufort.
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Bucker Jungmeister.
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Cant Z.506.
Cant Z.506b.
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Consolidated 28-5.
Consolidated B.24 Liberator.
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Curtiss SBC-4.
Curtiss P.40 Tomahawk.
D.H. 60 Moth.
D.H. Tiger Moth.
D.H. Hertfordshire.
D.H. Moth Minor.
Dewoitine D.510.
Dewoitine D.520.
Dornier Do.17.
Dornier Do.18K.
Dornier Do.215.
Dornier Do.24.
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Douglas B.18a.
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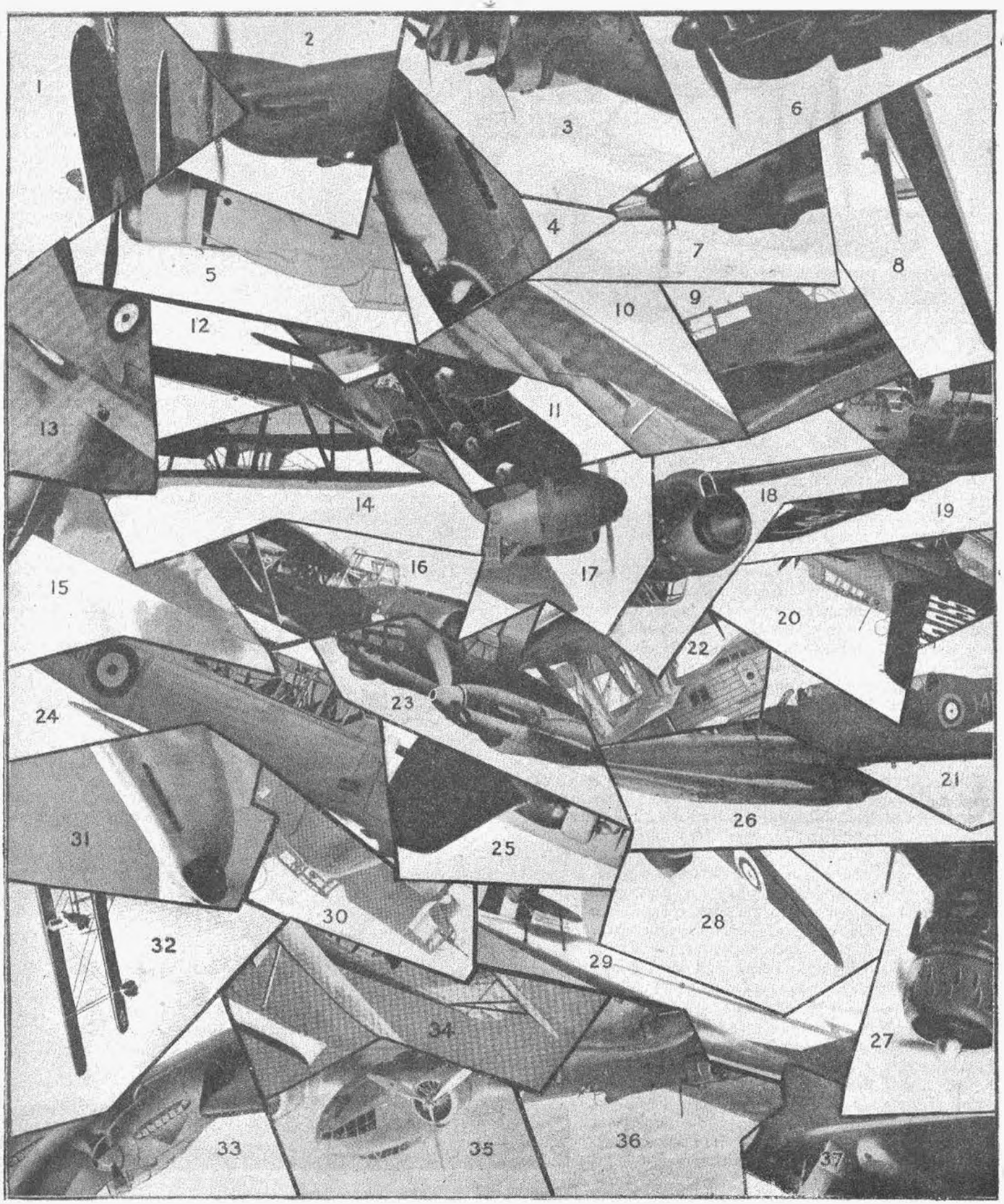
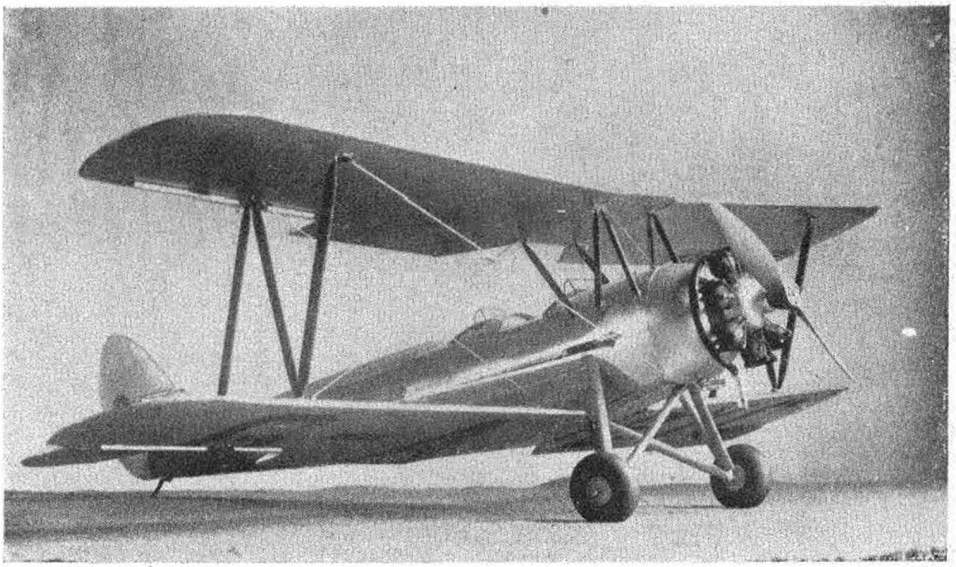
P.Z.L. Sum.
P.Z.L. Mewa.
P.Z.L. Los.
P.Z.L. P.24.
Republic Guardsman.
Republic Lancer.
Saro Lerwick.
Saro London.
Saro Shrimp.
Savoia-Marchetti S.M.79.
Savoia-Marchetti S.M.79b.
Savoia-Marchetti S.M.81.
Short Scion Senior.
Short Singapore III.
Short Sunderland.
Supermarine Spitfire.
Supermarine Stranraer.
Supermarine Walrus.
Vickers Wellesley.
Vickers Wellington.
Vought-Sikorsky V-156
Vultee Vanguard.
Westland Wapiti.
Westland Wallace.
Westland Lysander.

IDENTIFICATION" COMPETITION





The two photographs on this page are of the model. The accuracy of the engine detail work may be gauged by comparing the photograph on the left with that of the full-size 'plane on the next page but one.

THE Avro Cadet made its first appearance in civil aviation in the early part of 1932. Designed by A. V. Roe and Co. Ltd. and built at the company's works at Newton Heath, Manchester, the Cadet was a two-seater training biplane, fitted with a 7-cylinder Armstrong-Siddeley " Genet Major " engine of 135 h.p.

Like most other types of aircraft that have been built in large quantities, the Cadet has developed into several versions, the 638, 639, 640 and 643.

The 638, or Club Cadet, was similar to the 631 in most respects, except that it had folding wings, and consequently little or no stagger.

Naturally, this model proved extremely popular with operators having limited hangar space. The 639, Cabin Cadet, was, at its name suggests, an enclosed machine, similar in appearance to the 638. The pilot sat in front, with two passengers behind him ; alternatively, the machine could be adapted for dual control by simply sliding one of the seats forward and to the centre of the cabin and connecting up the dual controls. One or two of these machines were built, but the type was not adopted for general use.

The 640 was designed to fulfil the requirements of a joy-riding aeroplane as laid down by Sir Alan Cobham, who had three of these machines operating on his National Aviation Day Campaign tours. It was also adopted by Scottish Motor Traction Ltd., Midland and Scottish Air Ferries Ltd., and later by Utility Airways for the same purpose.

The fuselage of the 640 was considerably wider than the standard version, enabling two passengers to be carried side by side in the front cockpit, the pilot occupying the rear one. These machines were fitted with either the Genet Major or the Cirrus Hermes Mk. IV engine. Petrol was carried in a gravity tank situated in the centre section.

The final version, the 643, ultimately became the standard Cadet, and except for an additional 7½ inches on the front end of the fuselage, it was identical with the 631. The pilot's seat was also raised slightly above that of his pupil, giving him an improved view forward.

A number of flying schools and clubs throughout the country have used the Cadet in its various forms, and up to the outbreak of hostilities it was doing a tremendous amount of good work in connection with the Civil Air Guard Scheme.

The 631 fuselage was of welded steel tubular construction, the top and bottom longerons being interconnected by diagonal and vertical struts. Bracing wires supplied additional rigidity to the structure.

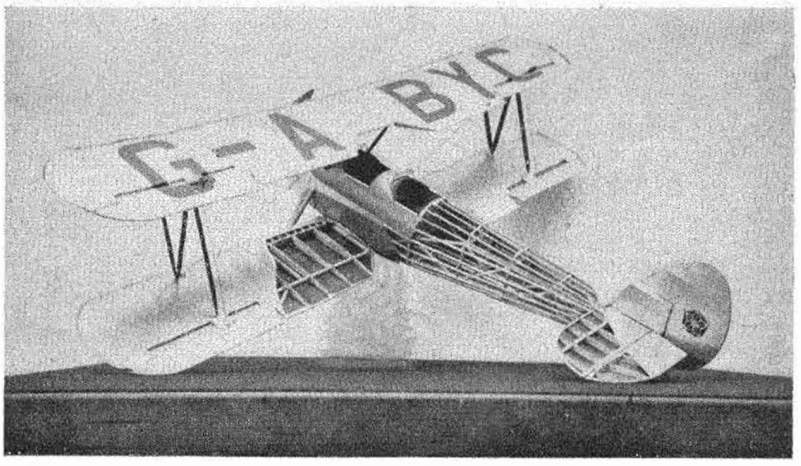
Wooden stringers mounted on reinforced plywood formers secured to the framework by steel clips gave streamline form to the fuselage.

The wings were of wooden construction, employing " I " section spindled spruce spars and plywood ribs, with spruce cappings ; they were non-folding, had a very pronounced stagger, were rounded at the tips and cut away at both top and bottom centre-sections. Bristol Frise type balanced ailerons were fitted to both upper and lower main-planes.

The fuselage and wings were covered throughout with fabric, except for the plywood decking, which, incidentally, was built up separately in a jig and fitted to the top longerons with steel clips. An interesting point about the fabric covering was the zip fastener running the whole length of the underside of the machine to facilitate internal inspection.

The controls were identical in both cockpits, and, as will be seen from the accompanying photographs and sketches, access to and from the cockpits was made simply by dropping the top longerons at a point immediately behind the rear cockpit.

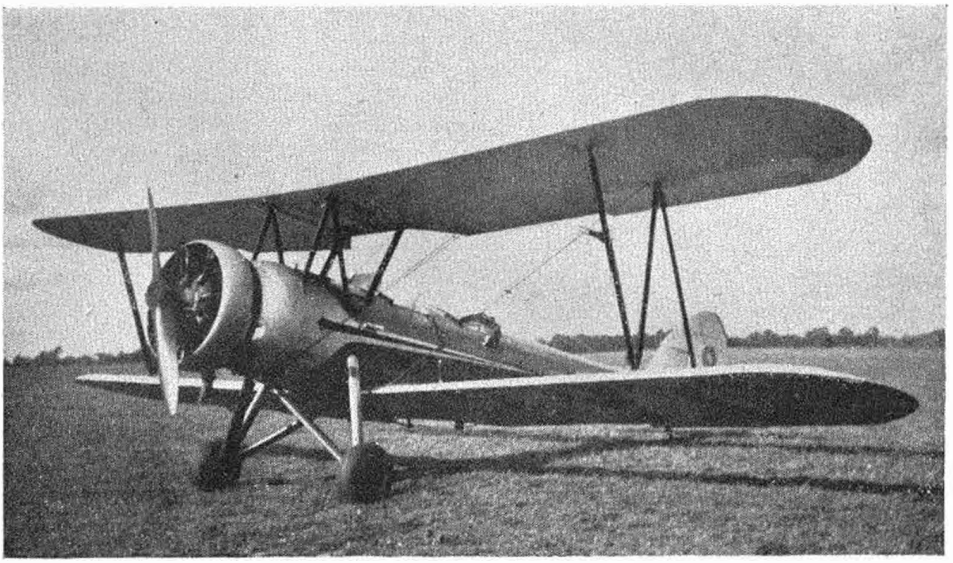
Twenty-eight gallons of fuel were carried in a tank situated in the forward part of the fuselage, between the



— THE AVRO CADET — TYPE 631 ——

A 1/15 FULL-SIZE SCALE MODEL—24 in. SPAN

Designed by **E. J. RIDING**



This photograph is of the real machine. The engine is a 135 h.p. "Genet Major."

front cockpit and the fireproof bulkhead.

The centre section, supported by six steel tubular streamline struts in the form of two sloping "Ns," was placed well forward of the front cockpit, giving both occupants of the machine an excellent view upwards, in addition to giving easy exit in case of emergency.

The adjustable tail-plane was also of wooden construction and was actuated by handwheels on the left-hand side of each cockpit, which, through an arrangement of cables and a screw jack, raised or lowered the tail-plane, the whole being hinged about the front spar.

The Cadet's undercarriage was similar to that of its predecessor, the Avian, in that it was of split triangulated pattern, consisting of two shock-legs employing coiled steel springs, attached to the top longerons and braced fore and aft with streamlined radius rods; low-pressure air wheels were fitted. The swivelling tailskid was of leaf-spring pattern tipped with a cast-iron shoe.

With the Armstrong-Siddeley Genet Major engine, the Cadet could do 118 m.p.h. at ground level and 105 m.p.h. at 10,000 ft. The cruising speed was 100 m.p.h. and the landing speed 35-40 m.p.h. The duration at cruising speed was about 3½ hours.

Photographs of the 631, 638 and 640 appear elsewhere in this article. The presence of the Townend Ring on two of the machines illustrated is explained by the fact that the photographs were taken prior to 1936; in that year an Air Ministry Notice to Ground Engineers and Aircraft Owners (No. 34 of the year 1936) ordered all Townend Rings fitted to Avro Cadet aeroplanes with Genet Major I and Ia engines to be removed, in order to facilitate adequate cooling.

Instructions for Building a 24 in. Span Scale Model.

The model described in these pages is built to a scale of 1/15 actual size. This scale was chosen for the convenience of making a 24 in. span model, and although the following description refers to a non-flying built-up type, so as to incorporate as much internal detail as possible, "solid" modellers will find no difficulty in building the machine to their own requirements, as the dimensions apply to both methods. No doubt the majority of scale modellers have their own particular scale to work to, in which case the three-view general arrangement drawing can very easily be scaled down to suit their requirements.

Commence construction with the fuselage framework shown in Fig. 1. The side elevation of this framework should be drawn out on white paper pinned to a conveniently flat surface and covered with a sheet of grease-proof paper. The longerons, made from $\frac{3}{32}$ in. dia. birch dowelling or any similar material, are pinned into position on the drawing. The vertical and diagonal cross-members and compression struts are then cut to size and cemented into place. When the frame has set, repeat the operation for the opposite side of the fuselage.

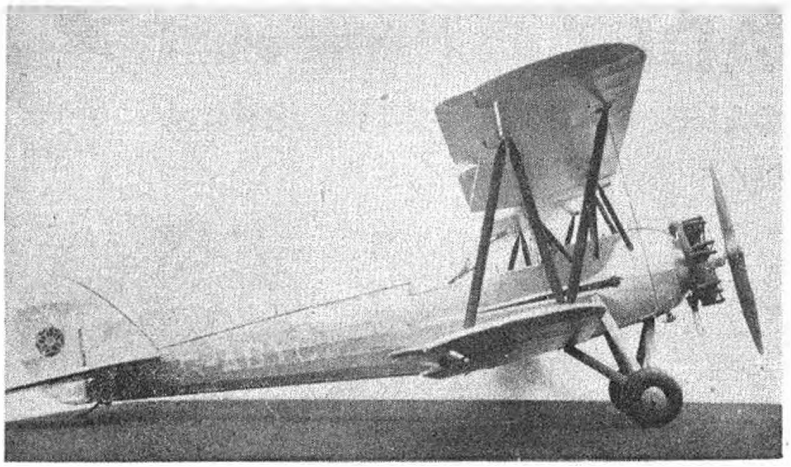
The two frames are then joined together with top and bottom cross-members of $\frac{3}{32}$ in. dia. birch dowelling, checking periodically for squareness.

In assembling the frames it is essential to refer constantly to the dotted outline in the plan view on the general arrangement drawing to obtain the correct taper on the fuselage.

Whilst the fuselage is setting, work can commence on the cockpit decking. This is constructed in one piece, which runs from the front bulkhead to just behind the rear cockpit. It is almost semi-circular in shape and is made of either smooth white card or $\frac{1}{32}$ in. balsa sheet bent over six formers, as shown in Fig. 1. The cockpit openings are cut out and the completed decking cemented into position on the top longerons.

Cut out the almost circular front bulkhead from 0·5 mm. ply or $\frac{1}{32}$ in. hard balsa and cement it into position flush with the front end of the fuselage for guidance when fitting the stringers.

It will be observed that the fuselage is roughly circular in cross-section at the front bulkhead, changing through various degrees of ovality until it reaches the sternpost, where it is virtually slab-sided. Aft of the rear cockpit there are 15 stringers, distributed evenly round the back and sides of the fuselage, and two additional ones running the whole length of the underside. Owing to the slight variations that are bound to occur when individual modellers apply their



The fine workmanship of the wing coverings may be seen in this photograph of Mr. Riding's model.

own particular methods of construction to a job of this nature, I have omitted to give separate scale drawings for any of the stringer supports. Provided there is close adherence to the three-view diagram, they can soon be drawn out on 0·5 mm. ply or $\frac{1}{32}$ in. hard balsa sheet and trimmed to an exact fit on assembly. Admittedly, this is the hardest job of the lot. The stringers themselves should be made from fairly stout material, in order to preserve the shape of the fuselage after doping. $\frac{3}{32}$ in. by $\frac{1}{16}$ in. spruce is recommended.

The completed fuselage is covered with superfine Jap tissue and treated with two coats of clear, followed by two coats of whatever pigmented dope is required.

The engine cowling, roughly hemispherical in shape, can now be cut to shape from a block of hard balsa, or, if facilities permit, it can be spun from 22 s.w.g. aluminium sheet. The engine is built up from balsa dowels wound with black thread, seated on a crankcase of hard balsa; rocker boxes and push-rods, of which there are two to each cylinder, are added, and the complete engine mounted on the nose cowling. Carve the airscrew from a block of mahogany, $5\frac{1}{4}$ in. by $\frac{3}{8}$ in by $\frac{1}{2}$ in., and mount on a spindle of 20 s.w.g. piano wire pushed through the centre of the crankcase. An aluminium face-plate and pin heads to represent bolts will add to the appearance of the model.

The undercarriage legs and radius rods, made from 20 s.w.g. wire and faired with balsa, are fitted in position as shown in Fig. 1.

The wings are drawn out on paper as in the case of the fuselage. Ribs are cut from $\frac{1}{16}$ in. or 3/64 in. balsa sheet to the rib template shown in Fig. 5, and threaded on to the two spars of $\frac{1}{8}$ in. by $\frac{3}{16}$ in. and $\frac{1}{8}$ in. square spruce or hard balsa and pinned into position on the drawing. Leading and trailing edges are made from $\frac{3}{32}$ in. dia. dowel and $\frac{1}{16}$ in. by $\frac{1}{32}$ in. spruce respectively and cemented into position. Wing tips are made either from 20 s.w.g. wire or $\frac{1}{16}$ in. dia. reed. Details of the Frise type ailerons are shown in Fig. 2.

Similarly, the tail-plane, fin and rudder are drawn out and assembled, using $\frac{3}{16}$ in. by $\frac{1}{8}$ in. spruce for rear spar, sternpost and rudder spar, 3/64 in. or $\frac{1}{16}$ in. balsa sheet for ribs and riblets, and reed for trailing edges.

All the flying surfaces are covered in the same way as the fuselage with superfine Jap tissue, given two coats of clear and two coats of silver dope. Details such as tailskid, pitot head, venturi head, windscreens, etc., may be added after the final coat of dope.

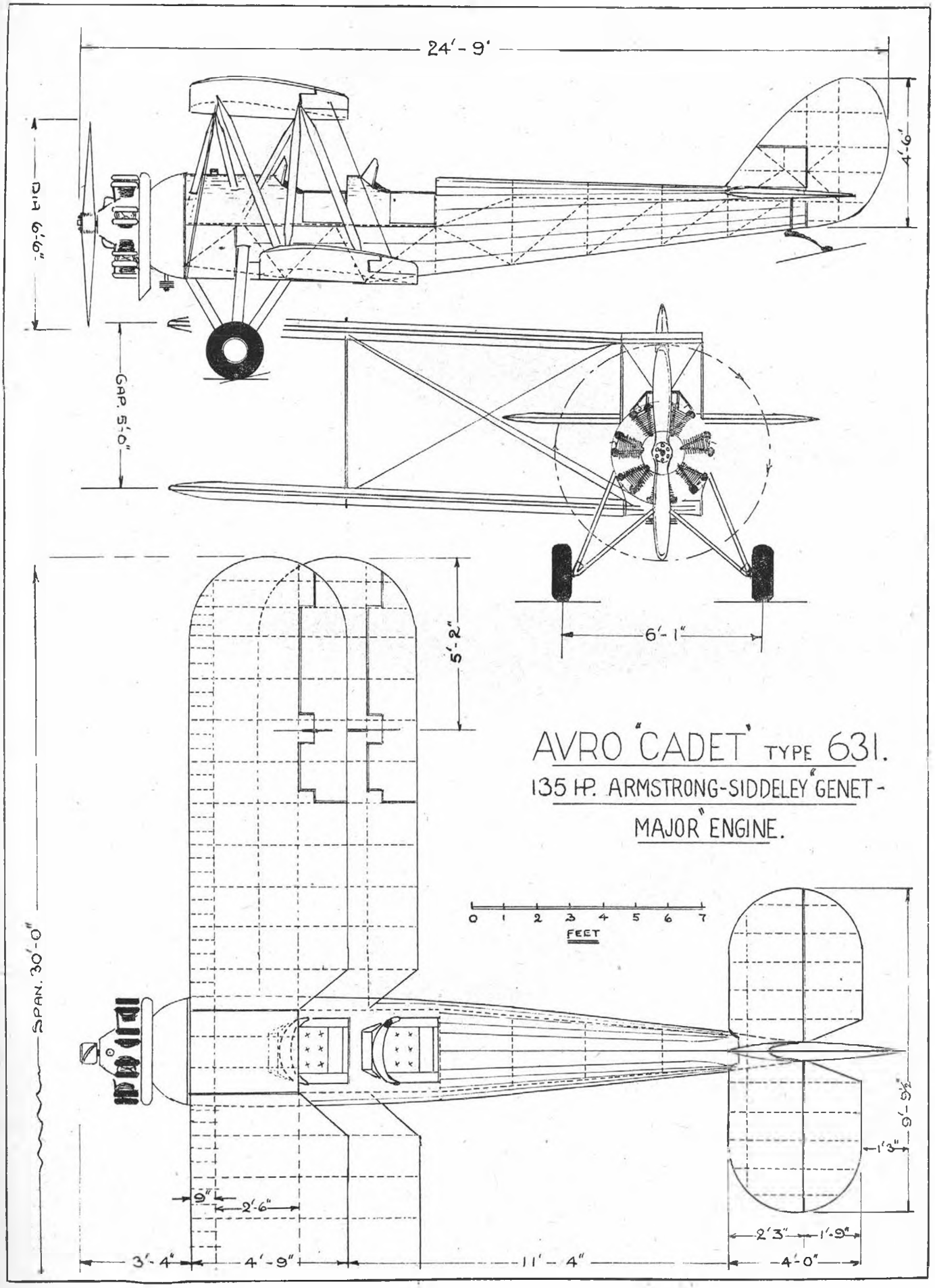
The method of attaching the wings to the fuselage or top centre-section is shown in Fig. 3, and it is recommended that all four wings be fitted on to top and bottom centre-sections before fitting the interplane struts.

Cut the interplane and centre-section struts from $\frac{3}{16}$ in. by $\frac{1}{16}$ in. spruce and sand to a streamline shape. The method of fitting these struts, and also the bracing wire lugs, is shown in Fig. 4.

A few suggestions about colouring may be of help. The aero clubs mentioned in the beginning of this article adopted special colour schemes of their own; for instance, the Lancashire Aero Club, York County and Bristol and Wessex Aero Clubs all had their machines painted royal blue with silver engine cowlings, lettering on the fuselage, and silver flying surfaces, with black lettering. Airworks Ltd.'s aircraft had white fuselages with green letters, and those of Air Service Training Ltd. black with white letters. The model illustrated is one of the Lancashire Aero Club's machines and is painted in their colours, i.e. blue fuselage, red struts, silver flying surfaces and the red rose insignia on the rudder.

The registration letters are G-ABYC (C for Charlie!), and are painted in silver, $\frac{3}{4}$ in. high and $\frac{1}{6}$ in. wide, well down towards the rear end of the fuselage. The letters on the wings are black, 3 in. by 2 in., spaced $\frac{3}{4}$ in. apart. On the top wings the G-A is painted on the top surface of the port wing and the BYC on the starboard wing, and vice versa on the underside of the lower planes, with the tops of the letters adjacent to the leading edge.

Here is a "close-up" of the full-size machine, showing details of the undercarriage, oil cooler and engine.



AVRO "CADET" TYPE 631.

135 H.P. ARMSTRONG-SIDDELEY "GENET-MAJOR" ENGINE.

THE AVRO CADET—TYPE 631

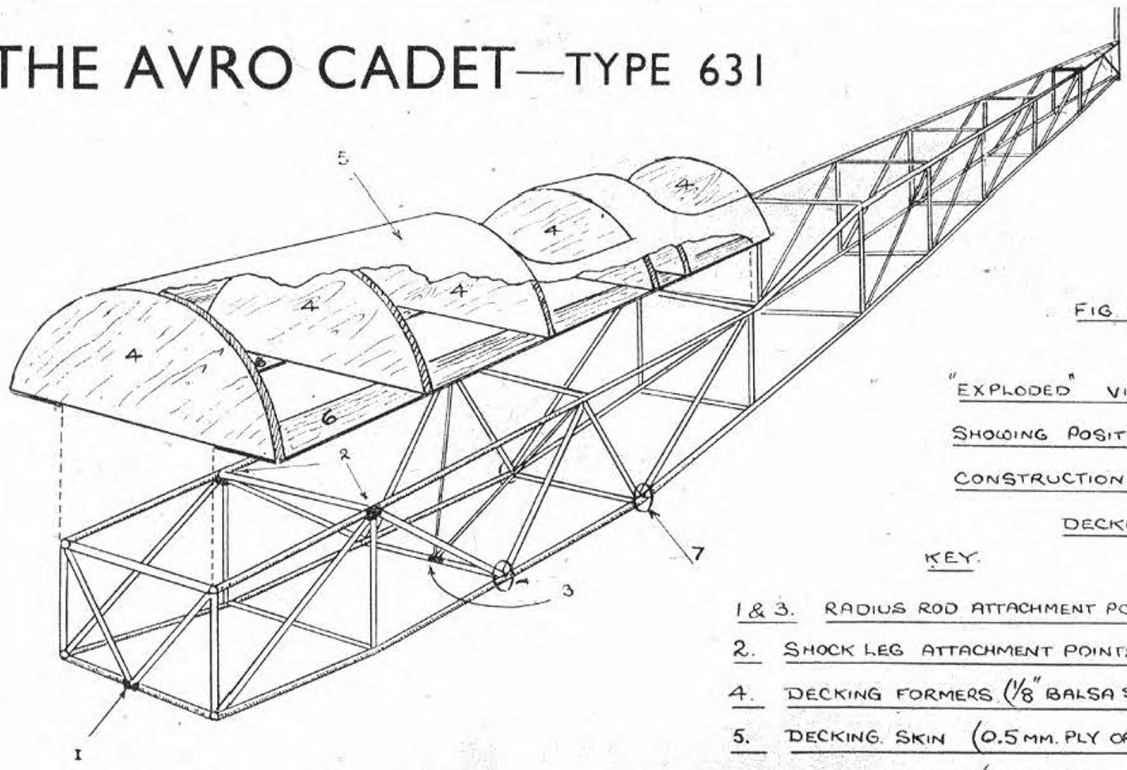


FIG. 1.

"EXPLODED" VIEW OF FUSELAGE SHOWING POSITIONING AND CONSTRUCTION OF COCKPIT DECKING.

KEY.

1 & 3. RADIUS ROD ATTACHMENT POINTS
2. SHOCK LEG ATTACHMENT POINTS
4. DECKING FORMERS (1/8" BALSA SHEET)
5. DECKING SKIN (0.5 MM. PLY OR 1/32" BALSA SHEET)
6. COCKPIT LEDGES (0.5 MM. PLY OR 1/32" BALSA SHEET)
7. WING ATTACHMENT POINTS

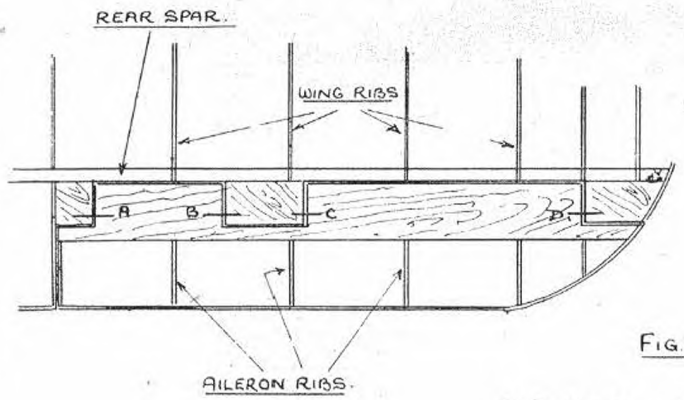


FIG. 2

A, B, C & D:- HINGE POSITIONS ON FRISE TYPE AILERONS.

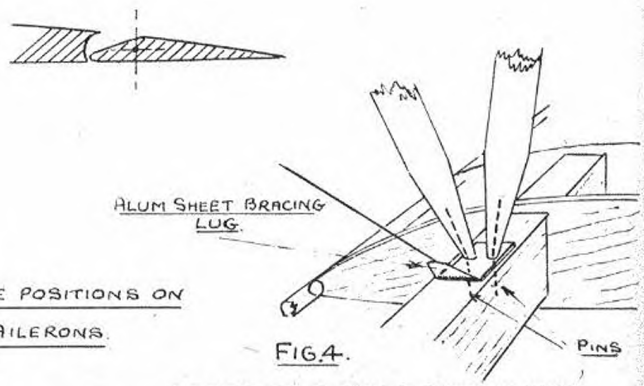


FIG. 4.

INTERPLANE STRUT & BRACING WIRE LUG ATTACHMENTS.

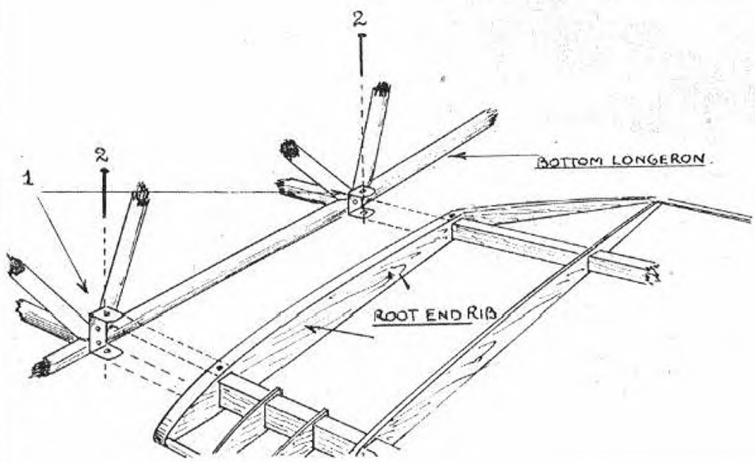


FIG. 3

METHOD OF ATTACHING WINGS TO FUSELAGE OR TOP CENTRE SECTION.

1.1.:- 22 OR 26 S.W.G. ALUMINIUM "U" PLATES

2.2.:- ATTACHMENT PINS.

E.J.R. 1940

FIG. 5.

TYPICAL MAINPLANE RIB.

SCALE: FULL SIZE

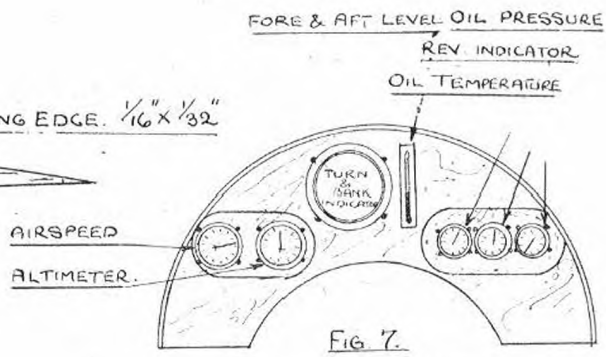


FIG. 7.

INSTRUMENT BOARD.

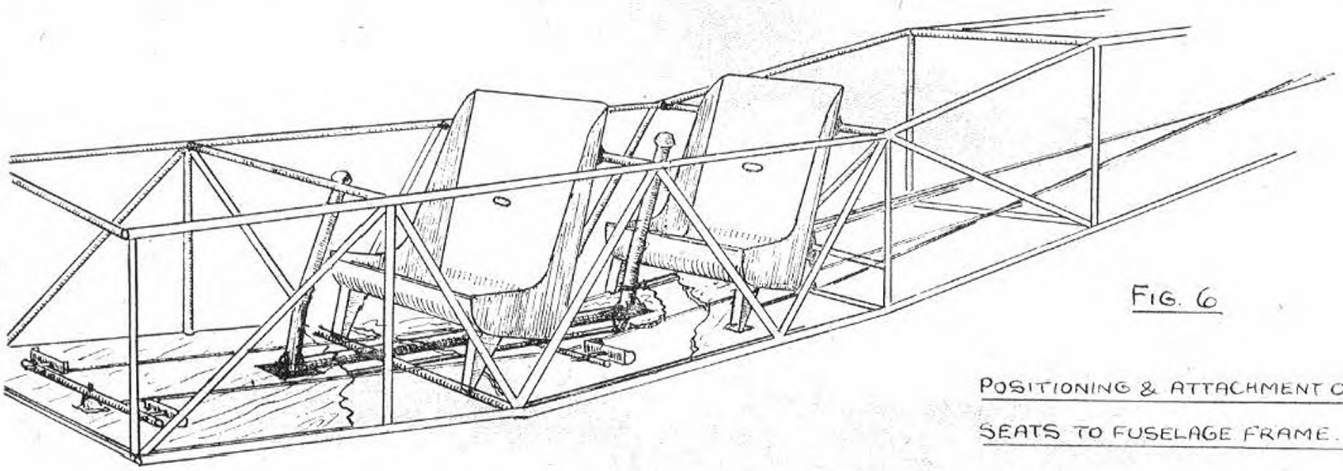


FIG. 6

POSITIONING & ATTACHMENT OF SEATS TO FUSELAGE FRAME.

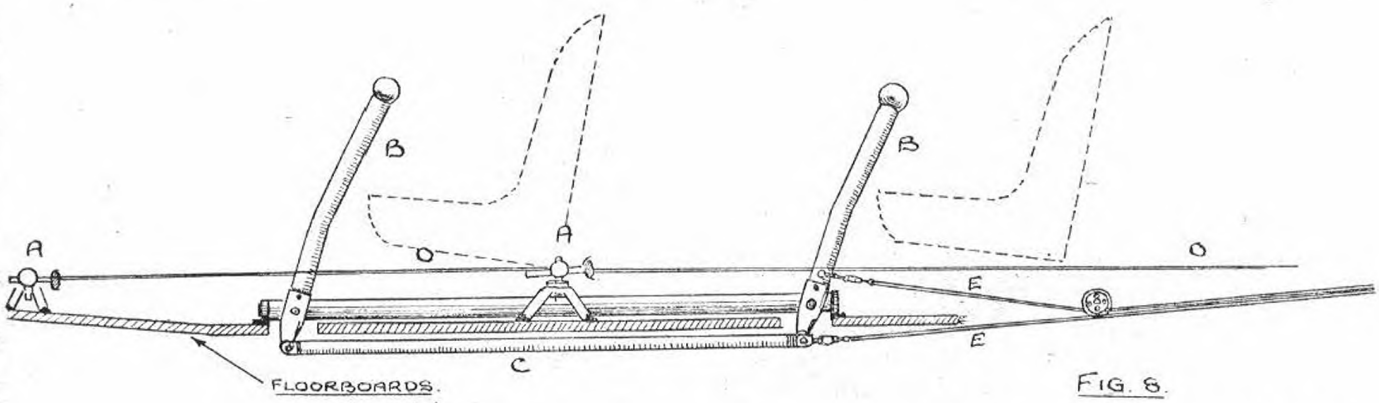


FIG. 8.

ARRANGEMENT OF COCKPIT CONTROLS.

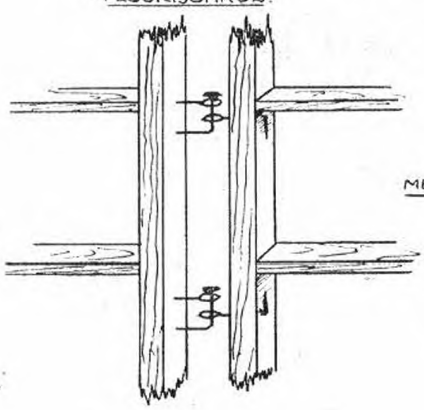
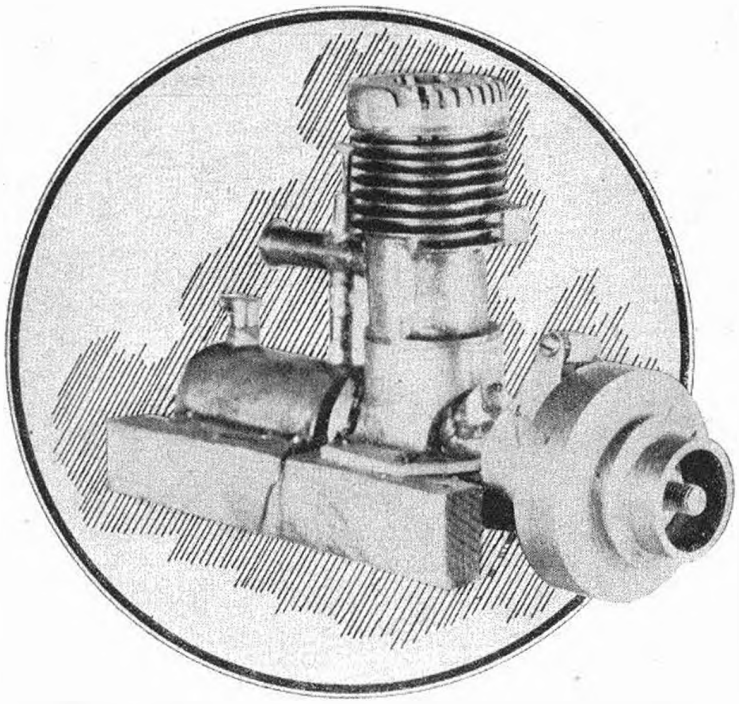


FIG. 9.

METHOD OF MAKING RUDDER & ELEVATOR HINGES FROM 3 DRESS-MAKER'S PINS

A.A.	RUDDER BARS.
B.B.	CONTROL COLUMNS.
C.	CONNECTING ROD.
D.	RUDDER CONTROL CABLES.
E.E	ELEVATOR CONTROL CABLES.



THE MECHANICS

ENERGY, POWER and EFFICIENCY

By C. WILLIAMS

THIS month's pow wow is about power, energy, and we're going to touch on efficiency. Before entering into this month's business a definition some kind reader has sent me is in order :—

" A model airplane builder is said to be a person who knows a great deal about very little, and who goes along knowing more and more about less and less until finally he knows practically everything about nothing."

" Whereas a gas-modeller, on the other hand, is a person who knows a very little about a great deal, and keeps knowing less and less about more and more until he knows practically nothing about everything."

" A model aviation writer (bless this reader's lil' heart !) starts out knowing practically everything about everything, but ends up by knowing nothing about anything, due to his association with model airplane builders and gas-modellers !"

And so, to business.

Power.

Power is the rate of doing work, or the work done per unit of time. A great deal of work can be done by a small engine or motor in a very long time, but only a powerful motor can do a large amount of work in a short time. Power is measured by the amount of work done per second or minute. The unit we employ when talking of power is horse-power, which is equal to 550 foot-pounds per second, or 33,000 foot-pounds per minute. The work expended in lifting, say, 330 lb. through a distance of 100 feet would be : 330 (lb.) × 100 (ft.) = 33,000 foot-pounds, and this would be the same amount of work in whatever time the operation took (an amount of work has no reference to " time," while h.p. has). If the operation takes one minute, the power required to lift 300 lb. would be 1 h.p. ! if it takes ½ min., the work per minute is $\frac{33,000}{2}$ = 66,000 foot-pounds per minute, which is 2 h.p. If the operation takes 5 minutes the work per minute would be ⅕ × 33,000, and the horse-power spent would be ⅕ h.p.

To find the horse-power spent in any operation, we divide the work done in foot-pounds per minute by 33,000, or the work done in foot-pounds per second by 550.

Example :—What power would be spent in lifting an aeroplane weighing 1,500 lb. through a vertical height of 40 feet in 10 minutes?

Total work done in 10 min. = 40 × 1,500 = 60,000 ft.-lb.

Work done per minute = $\frac{60,000}{10}$ = 6,000 ft./lb. per min.

Horse-power (or number of times 33,000 ft. lb./min.) = $\frac{6,000}{33,000}$ = ·19 horse-power.

which is usually written ·19 h.p.

Energy.

A body is said to possess energy when on account of its condition it is capable of doing work. Thus, in virtue of its position, velocity, high temperature, electrical pressure and chemical composition, a body may be capable of doing work, and is said to possess " energy."

Gasoline and oil fulfil those requirements on account of their chemical composition. A waterfall, because of its position (height) possesses energy. As it descends, it has velocity, so we obtain energy from it and transfer it into electricity, and thousands of other things. The sun possesses energy, and can do work because of its high temperature.

Relation between Heat and Mechanical Work.—When work is spent overcoming friction, heat is produced, and for every foot-pound of work so spent, a perfectly definite amount of heat is produced. Heat is measured by engineers in British thermal units, written briefly as B.T.U. A British thermal unit is the amount of heat required to warm 1 pound of water 1 deg. F. in temperature ; if you had, say, 20 lb. of water in a pan and you put a thermometer into the water and it registered 0 deg. F. and you wished to warm it to 8 deg. F. it would take (20 × 8) = 160 B.T.U.

To produce 1 British thermal unit of heat by mechanical work would require 778 ft. lb., or to simplify—if a piece of lead weighing 1 lb. was allowed to drop from a tower 778 feet in height into a pan containing 1 pound of water, the work converted into heat when the lead struck the water would be (1 lb. × 778 ft.) 778 foot-pounds, and the water's temperature would have been raised 1 deg. F.

Heat Energy in Fuels. Heat energy for conversion into mechanical work is usually obtaining by burning substances (gasoline, oil or coal) in furnaces or engine cylinders. It is interesting to see how much heat energy is obtainable from various substances. The following short table gives approximate values :—

OF GAS ENGINES — PART IV

Substance.	*Energy per lb.*
Good coal	14,500 B.T.U.
Wood (ordinary)	6,000 ,,
Petroleum oil	20,000 ,,

Ordinary gasoline contains 145,000 B.T.U. per gallon.

The Tremendous Energy in a Gallon of Gasoline.

The General Motors building situated in Detroit is one of the world's largest office buildings, and covers an entire city block. Its weight is 460,000,000 pounds, yet if all the energy contained in one gallon of gasoline could be converted into work, it would be enough to lift the entire building $2\frac{1}{2}$ inches off the ground.

Efficiency.

Seeing that we've got everything under control (or have we?) we'll top things off this month with the formula on efficiency. There are only two things that one needs to know to use the formula. They are: Input and output.

Let us imagine we have our engine all set up, ready to be test-run to determine its efficiency. After ten minutes of running we stop the motor. It has consumed 1 ounce of fuel and has delivered $\frac{1}{5}$ h.p. constantly throughout the test.

In Part I. of this series it was shown how to measure the horse-power (actual output) of a motor by the use of a brake.

We know all the factors involved in the formula, and applying them will be a cinch.

The input, as the name implies—the amount of fuel the engine consumes. The output is self-evident, too. It is the amount of power the engine delivers. This is measured in brake-horse-power (b.h.p.).

The formula used to calculate the efficiency of an engine is:—

$$\frac{\text{Output} \times 100}{\text{Input}} = \text{Efficiency (\%)}.$$

Output ... $\frac{1}{5}$ h.p. Input ... 1 oz. fuel.

Time: 10 minutes.

It is impossible to caluclate the efficiency of our motor with the factors we have, so they must be resolved into common factors.

The output being measured in h.p. can be reduced into work, as can the amount of fuel. One-fifth horse-power is equal to 33,000 ft.-lb. (1 h.p.) $\times \frac{1}{5}$ foot-pound per minute (6,600 ft.-lb. per minute). The engine ran for a period of 10 minutes, therefore the work done by the motor is $6,600 \times 10$ min. $= 66,000$ ft.-lb.

Resolving now, 66,000 ft.-lb. into British thermal units gives us $\frac{66,000}{778}$ B.T.U. Then the output in B.T.U. is 84·8.

The next factor we need to determine is the input. The test showed that the amount of fuel consumed by the engine was 1 oz. This quantity, if it were all gasoline, would contain 1,510 B.T.U. (145,000 B.T.U. per gallon). Note that the engine consumed 1 oz. of fuel, not gasoline, as some may think. If the ratio of gas to oil was 5 : 1, then the amount of B.T.U.s in the gasoline would be 1,258.

Which brings us to the following arguments: "Should the oil contained in the fuel be included in the calculation for efficiency? One side says that it definitely should not be included as the oil in the gasoline is put there for lubrication purposes only. The other side states that it makes no difference what the oil is used for, it is still included in the input; the engine is using it; some is being burnt, or there would be none or very little carbon deposit in the engine; some is being used for lubricating purposes, while a lot is being thrown out of the engine.

After the smoke of battle and the combatants subsided, it was agreed that the calorific content (the amount of B.T.U.s or calories in the fuel) of the oil, should be the same as the gasoline being used.

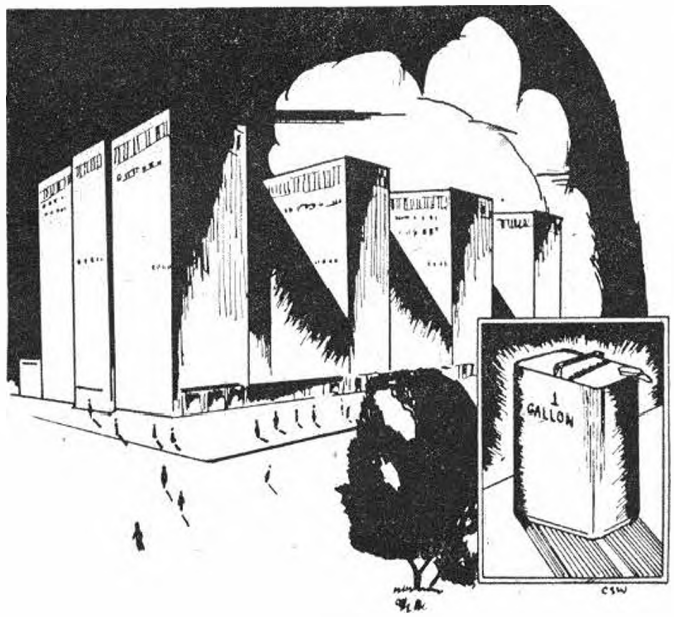
Then we have: 1,510 B.T.U. for the "input." 84·8 B.T.U. for the "output." Substituting in the formula, $\frac{\text{output}}{\text{input}} = \text{efficiency}$, we have:—

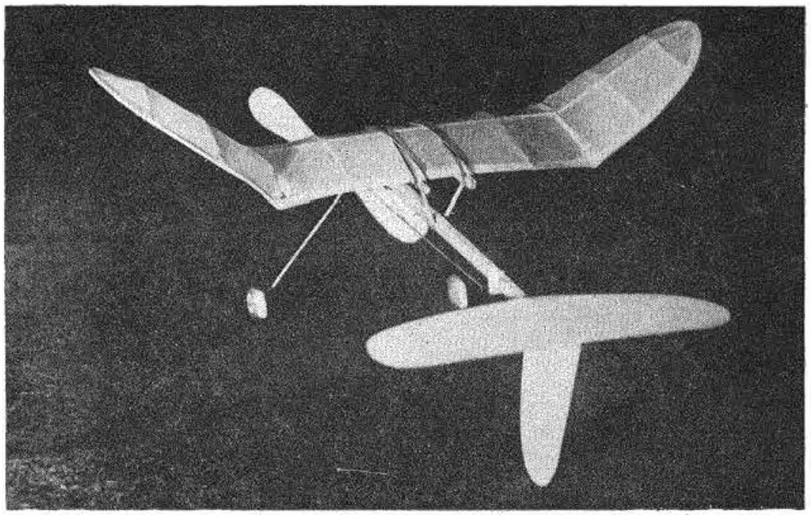
$$\frac{84{\cdot}8 \times 100}{1,510} = 5{\cdot}7\%$$

Then the efficiency of the engine is only a measly 5·7 per cent, or only ·057 of the fuel is being transferred into useful energy.

Why don't you test-run your engine to calculate its efficiency? You'll probably be tempted to throw it out of the nearest window. If you are not sure of the correct calorific content of the gasoline you are using, write to the firm who manufactures the gasoline, asking them to give you the calorific content of the grade of fuel you are using. The value, 145,000 B.T.U., was given by the Shell Oil Co. on their second-grade white gasoline.

Next month we will conclude our series of articles on gas engines, with a "chit" called "Increasing your engine's efficiency." Don't forget and look us up, and as Jimmie Fiddler says, "I do mean *you!*"





BUILD THIS

THE "POU"

A MODEL which can fly equally well, outdoors or indoors, free or tethered to a pylon, is unusual, but when it is also so simple that it can be built in a couple of evenings it is, indeed, of interest to every aero-modeller.

The "Pou" is such a model, and as for materials—there is probably sufficient scrap left over from that last duration job to build it!

Construction.

Cut the motor stick to shape from $\frac{1}{8}$ in. medium hard sheet balsa. At the front a further small piece of balsa must be cemented in place, and beneath this a $\frac{1}{2}$ in. × $\frac{1}{4}$ in. thrust bearing, as shown in the sketch. Finally, bind the three components with thread giving the binding a thin coat of cement

Wing Supports.

As the wing is to be "parasolled," supports are required. These are made from $\frac{1}{8}$ in. × $\frac{1}{16}$ in. bamboo, which must be forced into the sides of the motor stick and securely glued.

Two sets of supports are required, the sizes of both being shown. The longer ones it will be noticed are at the front, this being to give the wing the necessary incidence. Two $\frac{1}{8}$ in. sq. balsa runners must be cemented to the tops of the supports, the latter being previously sharpened to a point so that they may be easily thrust into the wood.

Undercarriage.

This is made from a single length of 20's gauge piano wire, which is bent at the top as shown, so that it can be clipped and cemented to the motor stick. A strip of superfine tissue coated with paste, and wrapped round the motor stick at this point, serves to hold it in place.

On the plan the undercarriage leg is shown full length, and it will be noticed that at the bottom extremity the wire goes through the wheels, which are of Pawlonia wood 1 in. in diameter, and then round the back of the wheel into a small streamliner cut from $\frac{1}{8}$ in. sheet balsa. The "tread," i.e. distance between the wheels is $3\frac{1}{2}$ in.

Tail Surfaces.

Both tail-plane and fin may be cut to the shape shown from $\frac{1}{32}$ in. sheet, which should be sanded slightly thinner. The tail-plane must be cemented to the top of the motor stick and the fin at one side underneath.

The underslung fin position was adopted so as to lower the centre of pressure, and thus prevent the model from overclimbing and colliding with the ceiling when being flown indoors.

Wing.

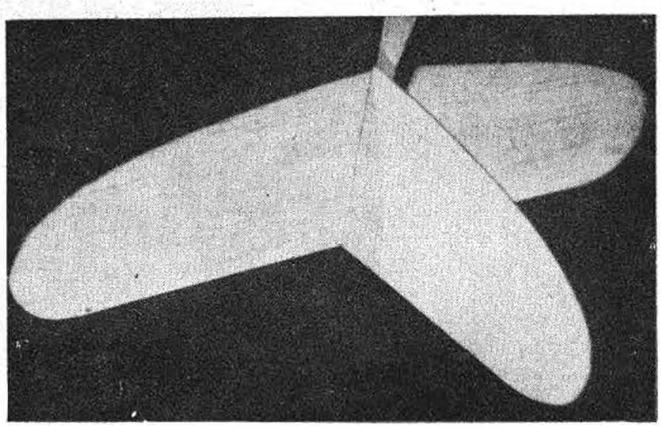
This is made in three sections, "double dihedral" being the model's main stabilising feature. The centre section should be made first. The leading edge is of $\frac{1}{16}$ in. sq. balsa, and this must be secured in place on the plan, together with the $\frac{1}{4}$ in. × $\frac{1}{16}$ in. trailing edge by means of pins knocked into the building board at each side.

The centre section ribs, which are, of course, the largest of the three shown, may all be cut from $\frac{1}{32}$ in. sheet balsa, and it will be noticed that they are notched so that they will fit over the leading and trailing edges. The ribs having been placed in position and securely cemented, the $\frac{1}{8}$ in. × $\frac{1}{16}$ in. mainspar must be lowered into position in the notches on top of the ribs, thus completing this portion of the wing.

As the leading and trailing edges of the wing tips are curved they must be cut from $\frac{1}{16}$ in. sheet. Tip breakage being a common fault with "double dihedralled" wings, they are left fairly wide on the "Pou." The leading and trailing edges having been pinned in position on the plan the ribs may be cut to shape and cemented in place. All the rib sizes are shown, and $\frac{1}{32}$ in. sheet is used as before. A length of $\frac{1}{8}$ in. × $\frac{1}{16}$ in. balsa again serves as a mainspar, and it must be cracked so that it comes down to meet the tip.

It will be noticed that the end rib is inclined at an angle so that when it is joined to the centre section it will automatically assume the correct dihedral angle.

The three sections having been joined together, it only



INTERESTING LITTLE 'PLANE

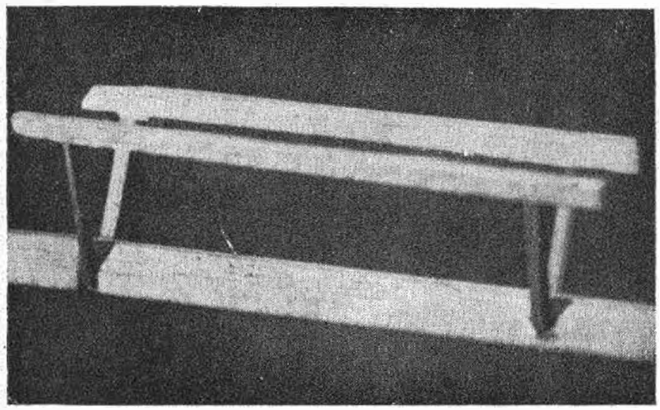
By **H. McDOUGALL**

The photograph at the foot of the opposite page shows a view of the tail unit as seen from underneath; and the photograph below shows the wing support.

remains to cover the wing with superfine Japanese tissue, spray with water, and then apply a single coat of dope diluted with 50 per cent thinner, to complete the wing.

Propeller and Accessories.

On the original model a machine carved propeller, with the rear of the hub removed, was used, but for those who prefer to carve their own propellers a suitable block is illustrated. The overall block dimensions are 6 in. × ¾ in. × ½ in., all other relative dimensions being given on the plan.

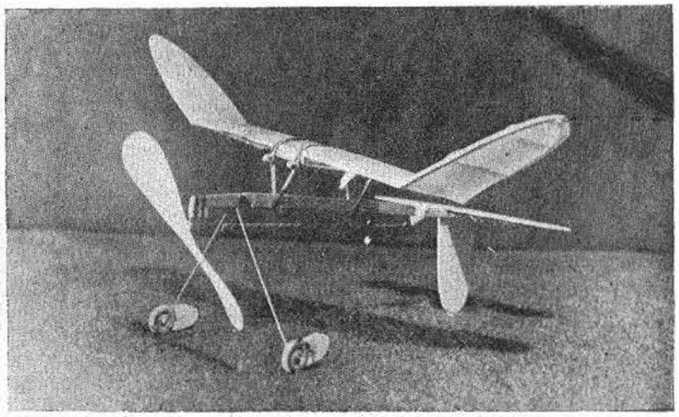


22's gauge wire is used for the propeller shaft, the front end of which is turned back and buried in the hub. Two small washers, preferably of the " cup " type, having been placed on the shaft, the latter may then be pushed through the hole in the thrust bearing, after which the hook can be twisted on the wire.

The shape of the 20's gauge rear hook is shown, and a small ⅛ in. sheet balsa triangle must be cemented to the underside of the motor stick to keep the hook away, and thus prevent the rubber motor from catching the motor stick. A strip of superfine Japanese tissue may again be used for binding purposes.

The power consists of two strands of ⅛ in. flat rubber 12 in. long for indoor flying, while for outdoors this may be increased to three or even four strands.

If a hand-drill winder is to be used for winding, a short length of 22's wire bent to form a tiny S-hook may be used at the rear of the rubber. This can be made to engage with the winder hook while the turns are being applied and then slipped on to the rear hook. While the model is being wound the other end of rubber must be firmly gripped between the finger and thumb just aft of the propeller shaft.



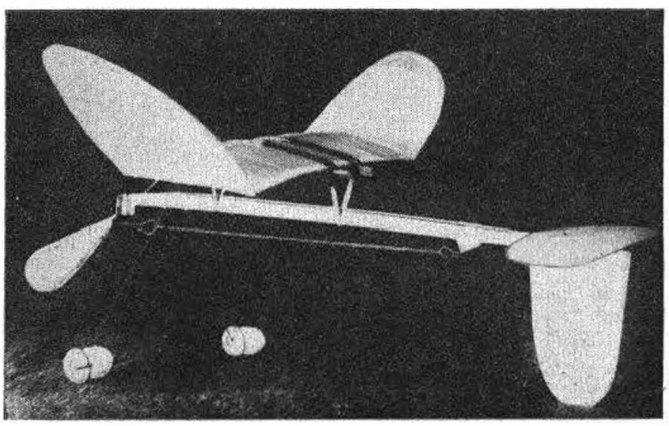
Flying.

The wing must be secured in position with rubber bands. Owing to the small size of the model it can be flown quite comfortably in a normal size living room by means of a pylon. No elaborate equipment is necessary. A length of thread with a hook fashioned from an ordinary pin tied to one end and the other end secured by means of a drawing pin to the top of a broomstick, the latter being suitably propped up in the middle of the room, is all the equipment necessary. The hook must, of course, be pushed through a hole in the wing tip of the model.

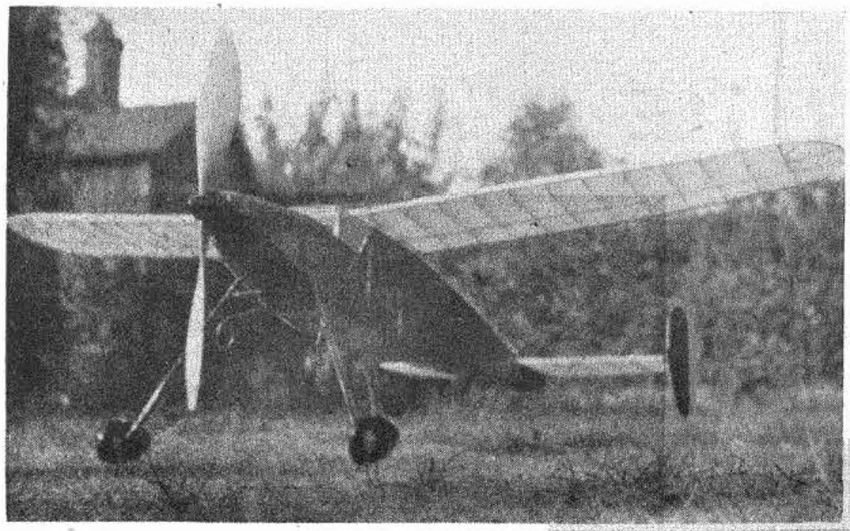
Flights of 25—30 seconds can be accomplished by this means, with the model taking off from a table top. If any extra wing incidence is required, it may be added by pushing a chip of balsa under the leading edge. In a large hall, such as is generally used for pylon flying, the model is small enough to be flown free.

The most surprising thing, however, is the performance outdoors. Owing to the ample dihedral, underslung weight and generally rugged construction, the " Pou " is sufficiently strong and stable to ride out any but the strongest winds, and although it must inevitably be carried along with a breeze it rarely lands without accomplishing at least half a minute's duration, which for such a midget model is quite a good performance.

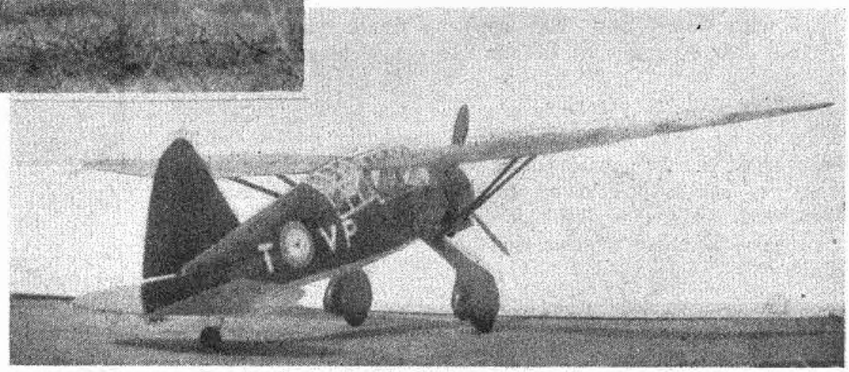
FULL-SIZE SCALE PLANS FOR THIS MODEL ARE PRINTED ON PAGES **162-3** *OF THIS ISSUE.*



"STARTING



Photograph No. 1 on left shows the author's second model, a "Wakefield" of Belgian design, whilst photograph No. 2 below is of the ½ in. scale "Lysander," which was turned out as a non-flying scale model.



By R. L. WALKER

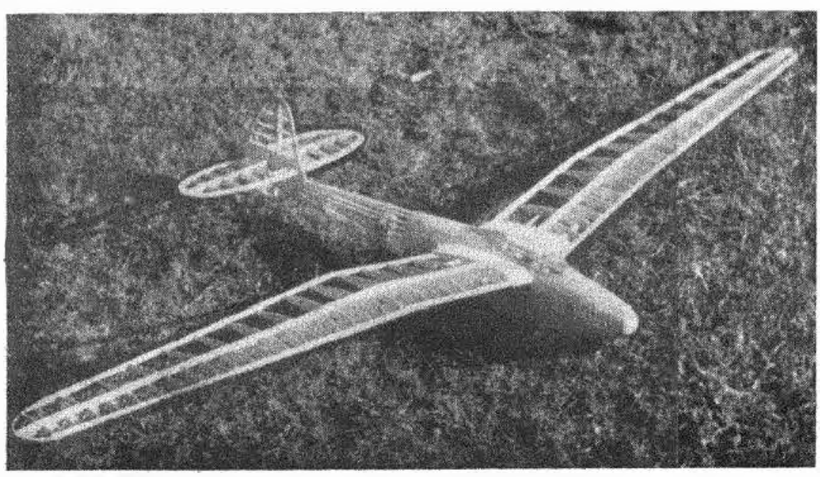
THIS is a description of some of my experiences in the field of model aeronautics, occupying a period of about six months.

It started last July, when we evacuated from the south-east coast. My foremost hobby is model shipbuilding, but leaving home and settling down in a new district made this branch of model building out of the question, owing to lack of space for tools, etc. Under these conditions model 'plane building seemed the next best thing, as the tools required are very few.

What to build was my next problem; having had little experience in the subject I decided on a 24 in. span "duration" kit. I found the construction very straightforward, and within a week it was undergoing trials. The result was good; an average of 50 seconds was maintained easily. Next, I decided to modify the design, so converted it into a biplane, made two rudders instead of one, and fitted a larger propeller with more elastic. The result was amazing; 1½ minutes on several occasions, with a glide like a "sailplane."

Next, I decided that I wanted something better, so out came Frank Zaic's "Year Book," and I selected a Wakefield class 'plane of Belgian origin. (Photo 1). At that time my week's holiday started, so I was fortunate to be able to spend nearly all day on construction. Within four days she was done, and what a "stunner" she looked, finished in red and white. Of course, I was anxious for the trials, and the arranged day came; a little windy I am afraid, but I thought that it would show up any weakness. On 100 turns she rose like an autogiro, did a dangerous right-bank, and landed "upside down"! Of course, I had previously tried for glide in the shelter of some trees. I then increased the "dihedral" by 2 in., converting the wings into a "polydihedral." The next trials were held in calm weather, and everything was perfect; I dare not give more than half-turns, owing to the confined flying ground. My best duration (on half-turns) was 120 seconds R.O.G. In other flying expeditions it has landed on busy roads, on railway lines, high up in trees; my worst accident was when it struck some trolley bus wires. I am glad to say that no damage resulted, in spite of a "power dive" on to a busy road. The wings, tail unit, etc., fell off when she hit the wires, and were still fluttering down long after the fuselage had landed.

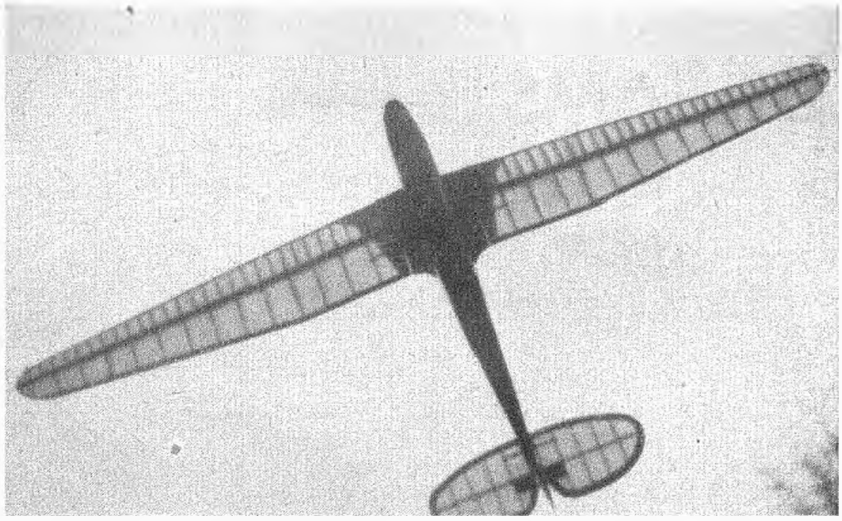
My next ideas were turned to scale models, and the result is as shown in picture 2—a ½ in. to the foot "Westland Lysander." I decided to



Photograph No. 3. The reduced "Record Catcher," which is a good model.

FROM ZERO"

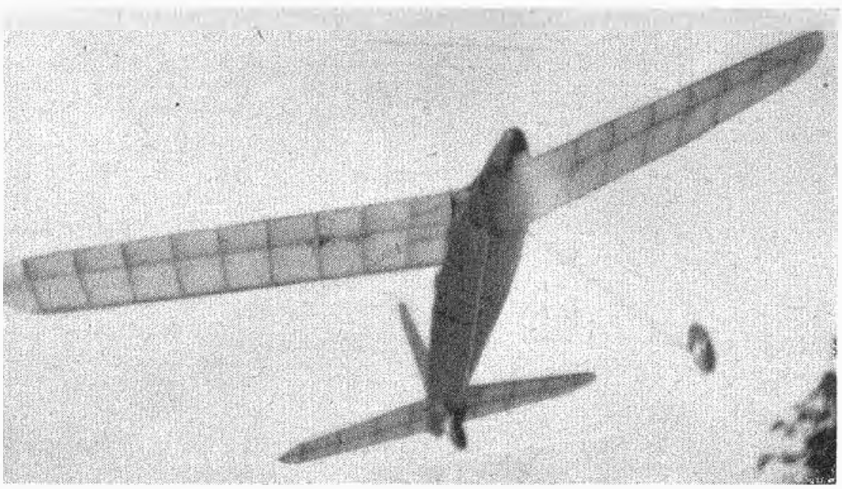
Here is another article by a newcomer to the hobby of building model aircraft. Our contributor shows that not only has he been successful at his building but also with his camera.



Photograph No. 1 shows the glider at the end of the tow-line.

abandon the idea of using it as a flying model, so I added the additional details that make up a detailed scale model.

Next I tried my hand at a glider; once again out came my faithful "Zaic's Book," and I selected a design, "The Record Catcher." I scaled the plans to give a wing span of 40 in., making a more portable model, which has very good flying capabilities. Photo 3 shows the framework before covering.



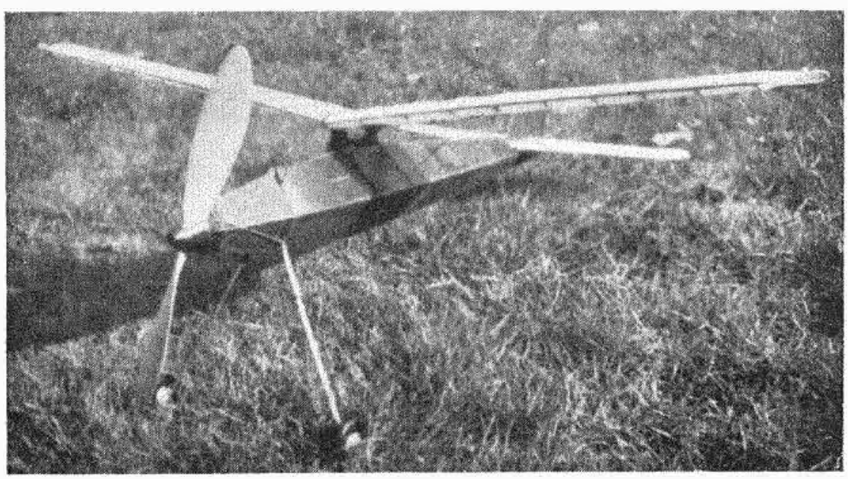
After this I got even more ambitious. I tried my hand at *designing* a machine. I used the formulæ and data from "The Design of Wakefield Models," by Stubbs. After about a week the calculations were completed, and after a further fortnight the plans had been drawn and the 'plane built. I am glad to say that it was perfect in all respects; the calculation error was only 1·5 per cent in the weight and only 1·2 per cent in the C.G. position. It proved to be a very slow and stable flyer even in a very high wind, evidently due to the high wing position. Having a "lifting stabiliser" it had an exceptional climb and quite good gliding qualities. Photo 5 shows the machine on the ground, and Photo 6 shows a "lucky shot with the camera" of it in flight.

I next turned my attention to a flying scale model—a "Rearwin Speedster" was finally decided upon, and I was fortunate enough to borrow some plans for a 30 in. span model. A sprung undercarriage was fitted, and movable wings to give additional adjustments. Unfortunately, full trials have not been carried out, but a very flat glide indicates good flying qualities.

My future building programme is very extensive, including another Wakefield class model, a 47 in. span "Henschel He.126," and a petrol 'plane for when the war is over.

Finally, I would like to say how much pleasure I have obtained from the building and flying of model aeroplanes. Looking back now, I can consider the past six months well spent; the knowledge and experience gained will be applied in the construction of a super petrol model, to be flown when the world is at peace.

* *

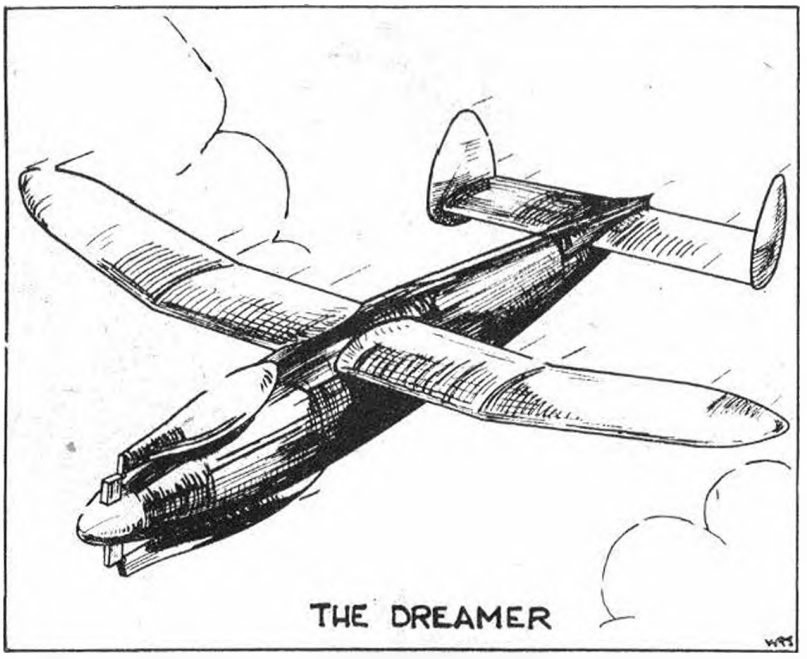


Photograph No. 5 at side shows the "Wakefield" model designed with the aid of Stubbs's "Design of Wakefield Models," whilst photograph No. 6 above shows it in flight.

DREAMS ——

or How to Design Your Next Wakefield Model

By E. J. S. TOWNSEND



"THAT'S the best meal I've had since rationing was introduced," said Bill, heaving himself up and staggering across the room to the nearest armchair. (Bill's chairs, by the way, are well known as the most comfortable in the district). We pulled at our pipes, filled them both from my pouch, as usual, and settled down. We sat yarning about past models, new ones, the competition season just finished, not to mention petrol jobs, pool petrol, and castor oil.

Talk soon turned to Wakefield models, both of us being true Wakefield enthusiasts, and a red hot argument on propellers, undercarriages, tensioners, twin-rudders, and, naturally, streamlining, was soon in full swing. However, the heat of the fire began to have its effect. Conversation dwindled, Bill began to snore away like a "Baby Cyclone" at full throttle, and I knew that nothing short of high explosive bombs would wake him up.

Marvellous steak we had for supper—pipe's gone out, dash it! Oh, let it stay on the floor! Gosh, never noticed that model on the mantelpiece before—thought Bill never made solids. Looks like a Wakefield model, too. Nice take-off, long steady climb. Mind that lamp-shade. Whew! Looks a good bus. Rather like my '41 Wakefield job when it's made.

Shoulder wing resting across a cut-away part of top of fuselage; wing in one piece, dihedral tips, straight centre section, aspect ratio ten. One thirty-second sheet ribs, no mainspar, thirty-second sheet folded round ribs to make leading and trailing edges, plenty of cement, reed cane tips, tissue covered, doped and banana oiled. Gosh, the section! Well, Eiffel 431 gives good lift and low drag, about five degrees incidence. Plenty of under-camber should help the glide a lot. Mustn't forget the disruptors!

Think I'll make the stabiliser like the wing; it seems stronger as well as lighter. Lifting section, of course, may be Clark Y. Twin rudders to keep it on an even keel at rest, and whilst taking-off on its one wheel. One wheel is only half the weight of two; much easier to retract as well. Just hinge the leg at the top, fix an elastic band, and the job's done. Or is it? Must have a stop to prevent it coming too far forwards. Easy. Now the weight of the model will keep the leg forward against the stop until she gets off. Fine! She'll have to lift at least an inch and a half before it can fold back. Of course, that means a folding propeller. Does one blade give enough area? Hm! No, don't think so. I'll carve an ordinary propeller, and then hinge both blades. Fit a hefty spinner to hide the hinges and hooks and she'll look fine. Better have it hollow, with detachable front to get at the winding hook. Have to hollow the back of the propeller out a bit, too, to take the tensioner spring. Needn't be very deep. That's fine, just about an eighth of an inch between spinner and nose-block.

Wonder what's the best way to make a monocoque fuselage. Let's look at some old AERO-MODELLERS! Aha! I know. Bob Copland's hoop formers of thirty-second sheet, circular cross-section, line 'em up, and cover with soft sixteenth sheet. That looks grand.

Dope—sand—dope—sand—dope. Doesn't she look fine. One coat of coloured dope and the Concours is a cert.

Now she's all done except the propeller. I bet she doesn't weigh five ounces. Four and three-quarters! Not bad! Half an ounce for the propeller, three of rubber, that makes eight and a quarter. Just right.

Now for that propeller. Just a moment, though; let's design it first. Wing area 208, weight 8¼ oz. That gives a wing loading of—er—5·7 oz. per square foot, so she'll fly at about 1,280 feet per minute. Three ounces of rubber should be O.K. in fourteen strands, which should take about 1,200 turns well lubricated.

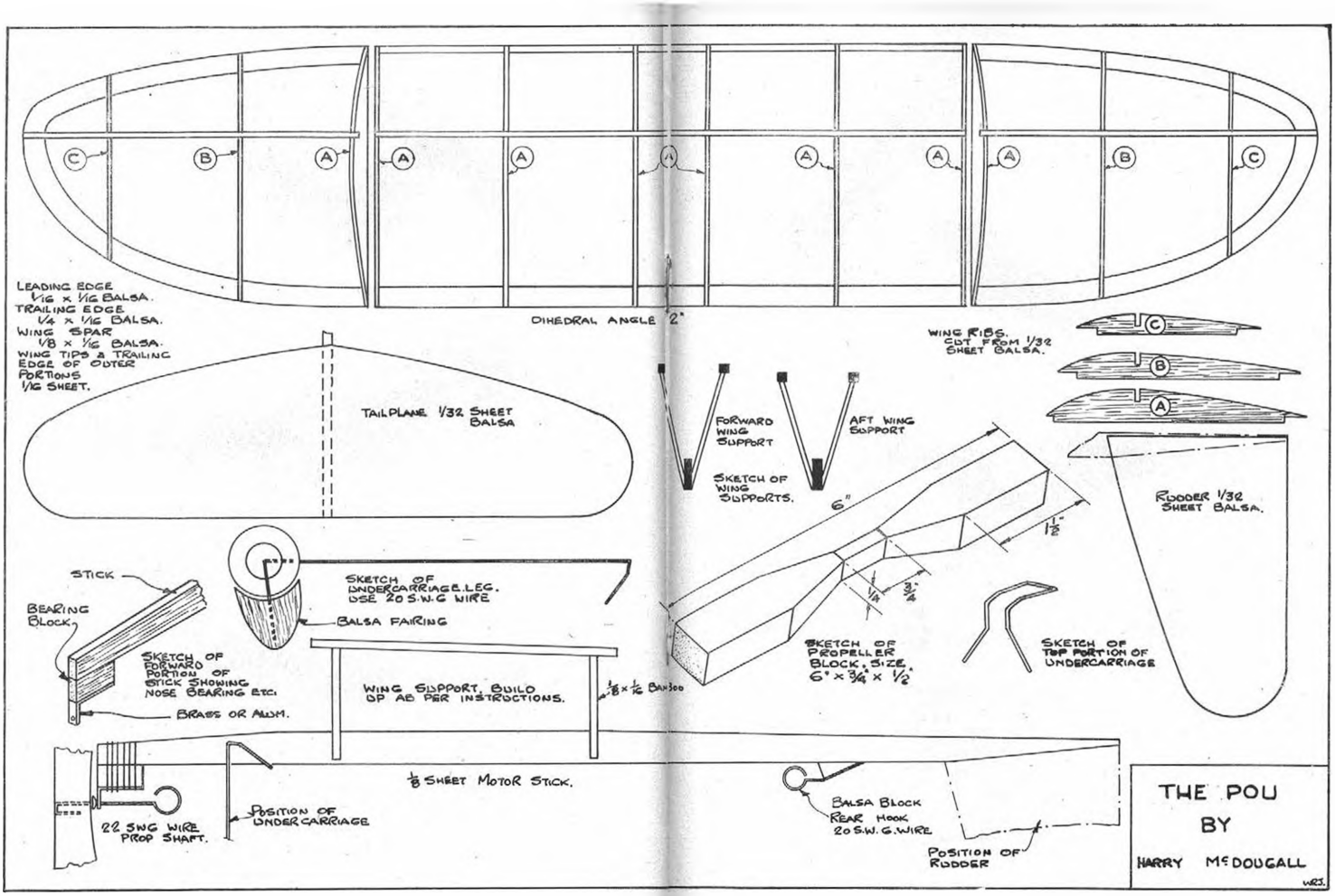
That means 1,200 turns to take her 1,280 × 2 feet, that's 2,560 feet in two minutes, aiming at a two-minute motor run. So each revolution of the propeller must take her 2·13 feet (or 25½ inches) forward; so actual pitch of propeller must be 25½ inches. Say, an 18-inch diameter propeller. Theoretical pitch, assuming 75 per cent efficiency, will be $\frac{25\frac{1}{2} \times 4}{3}$. That's 34 inches. 18-inch diameter and 34-inch pitch calls for a 1·5 × 1·7 × 18-inch block. Boy, will she hum with that propeller and motor.

Eleven hundred and ninety-eight, eleven hundred and ninety-nine, twelve hundred and . . . Whrrh—crash! Must be lousy rubber!

Bill looked ruefully at the shattered model he was holding. "Just been upstairs to get my new model to show you," he said. "It's got a motor run of 3 minutes."

Three-minute motor run—grrh!

Span	44 inches.	Weight	8¼ ounces.
Chord	4½ ,,	Propeller ...	18 in. diameter.
Length	37 ,,		34 in. pitch.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B
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LEADING EDGE
1/16 x 1/16 BALSA.
TRAILING EDGE
1/4 x 1/16 BALSA.
WING SPAR
1/8 x 1/16 BALSA.
WING TIPS & TRAILING
EDGE OF OUTER
PORTIONS
1/16 SHEET.
DIHEDRAL ANGLE 2"
WING RIBS.
CUT FROM 1/32
SHEET BALSA.
C
B
A
TAILPLANE 1/32 SHEET
BALSA
FORWARD
WING
SUPPORT
AFT WING
SUPPORT
SKETCH OF
WING
SUPPORTS.
RUDDER 1/32
SHEET BALSA.
6"
1 1/2"
1/4"
3/4"
STICK
BEARING
BLOCK
SKETCH OF
FORWARD
PORTION OF
STICK SHOWING
NOSE BEARING ETC.
BRASS OR ALUM.
SKETCH OF
UNDERCARRIAGE LEG.
USE 20 S.W.G WIRE
BALSA FAIRING
WING SUPPORT. BUILD
UP AS PER INSTRUCTIONS.
1/8 x 1/2 BAMBOO
SKETCH OF
PROPELLER
BLOCK. SIZE.
6" x 3/4" x 1/2"
SKETCH OF
TOP PORTION OF
UNDERCARRIAGE
1/8 SHEET MOTOR STICK.
22 SWG WIRE
PROP SHAFT.
POSITION OF
UNDERCARRIAGE
BALSA BLOCK
REAR HOOK
20 S.W.G. WIRE
POSITION OF
RUDDER
THE POU
BY
HARRY McDOUGALL
WR3.

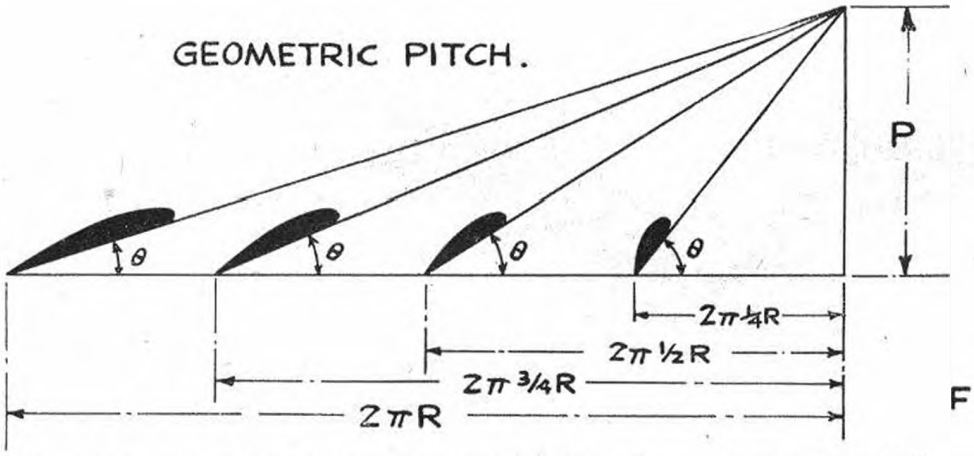
AERODYNAMIC FORMULA (5)

By A. H. SMITH

SO far our aerodynamic formulæ have been discussed in their application to the support of our aircraft in the air and its forward velocity. If the average modeller were asked what makes it go forward the answer would invariably be " the propeller."

This would be true if our aircraft was pushed through the air, but, as we are more generally using a tractive effort the component part of our aircraft which does this is termed the airscrew or tractor, and the object of this is to convert into thrust or forward motion the torque or turning effect given by the power of the engine to the driving shaft.

An airscrew blade is usually given, in cross section, an airfoil shape, and as the torque imparted to the driving shaft causes the airscrew to revolve, the rotational velocity at any point on the blade will be equal to the circumference of the circle through which it turns, multiplied by the number of revolutions (n) per unit time. Now π (the Greek letter pi) is the ratio of the perimeter or circumference of a circle to its diameter, and is equal to 3·1416. The circumference is therefore equal to πD.



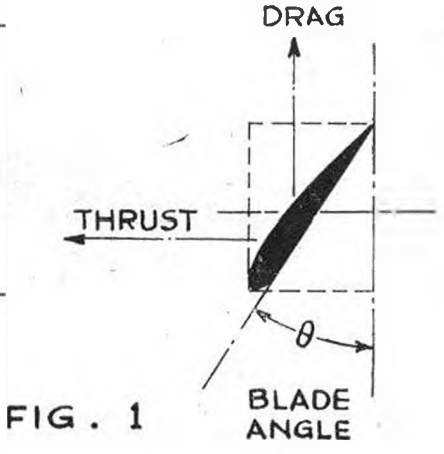


FIG. 1

If the diameter of the airscrew is measured in feet, the rotational velocity (V_R) will be πDn ft. per sec., or, since the radius (R) is equal to half the diameter, VR will be $2\pi Rn$ ft. per sec. at the tips, and at halfway along the blade from the centre VR will be $\pi \frac{D}{2} n$ or $2\pi \frac{R}{2} n$ ft. per second.

We can then consider our airscrew blade as being composed of a series of small strips of airfoil section, each moving at an increased rotational velocity as they get nearer to the tip. If all these individual strips of the blade were set at the no-lift angle of the airfoil section used we can see, from our previous discussions of airfoils as applied to wings, that there would be no reaction or lift, but if each strip is given an angle of incidence to the rotational movement of the airscrew we will get an immediate reaction at each point on the blade resolved into its two component parts, lift or thrust (T) and drag or torque (Q) (Figure 1), and our airscrew will " go forward."

The airscrew will now have, in addition to its rotational velocity (VR) a translational velocity (VT) which, for each strip of the blade, will be equal to the forward speed of the aircraft in normal flight.

The forward distance which our airscrew moves per revolution is called the pitch, this depending, of course, on the angle at which each strip is set, and to obtain a uniform forward thrust each strip must be set at the angle which corresponds to its own particular rotational velocity.

It will be seen from Fig. 2 that, if we treat each strip as an individual airfoil, it will travel forward in a helical path, therefore each strip will have its own chord line set to form a helical pitch or mean geometric pitch.

Now, as shown in Fig. 1, if P equals the pitch, the blade incidence or angle of attack θ, at any point along the blade, will be represented by a projection from P, shown as a vertical height of the pitch, to a distance along the base equal to the circumference of the circle travelled by that point in rotational movement.

It will be seen that, if the pitch is made too large, the airfoil elements of the blade will tend to " stall," and in power model aircraft practice to allow the engine to develop its power at its most efficient speed, usually between 3,000 and 4,000 r.p.m., the pitch to diameter ratio should be between ·7 and ·8. Now, owing to the viscosity of the air, our airscrew will not give out the same amount of work done that is transmitted to it by the engine shaft, and the difference between the theoretical pitch and the actual pitch achieved is called the " slip," and an airscrew is described as having a certain " efficiency," given as a percentage or ratio of work done to work applied. If we represent the forward velocity in feet per sec. by V and the thrust or work done in pounds by T, then

Work done = TV ft. lb./sec. or 60 TV ft. lb./min.

Again, if Q be the torque of the engine in pound-feet, P the horse-power, and n the revolutions per minute, then—

The work done per revolution = $2\pi Q$ ft. lb.

and the work done per minute = $2\pi Qn$ ft. lb.

It has been shown that 1 h.p. is equal to 33,000 ft. lb./minute, so the horse-power of our engine can be expressed—

$$HP = \frac{2\pi Qn}{33{,}000}$$

and the efficiency of our airscrew by—

$$\frac{\text{Work done}}{\text{Work applied}} = \frac{60\ TV}{2\pi Qn} \times 100\%$$

Now the velocity ($2\pi nv$) varies along the blade, and is al-

ways directly proportional at any point to the tip speed, πnD or nD. Then, if the non-dimensional coefficient value J is given as " the rate of advance per revolution per second expressed as a fraction of the diameter in feet," we can say that—

$$J = \frac{V}{nD} \quad (27)$$

For model use a metal airscrew will have an efficiency of about 70 per cent, and will be working at its highest efficiency when the value of " J " is approximately .5.

Having designed our aircraft to fly at a determined forward speed and our engine to run at a definite number of revolutions per minute, the diameter of our airscrew can be found from the formula—

$$D \text{ (in feet)} = \frac{88 \times \text{MPH (forward speed)}}{\text{R.P.M.} \times \left(\frac{V}{nD}\right)} \quad (28)$$

Now, taking an efficiency of 70 per cent for a metal airscrew the pitch necessary to attain the designed advance per revolution will have to give a theoretical forward speed of—

$\frac{100\%}{70\%}$ × Designed speed in feet per second.

The pitch required will then be equal.

$$\frac{\frac{100}{70} \times V \text{ (ft./sec.)}}{\text{Revolutions per second.}}$$

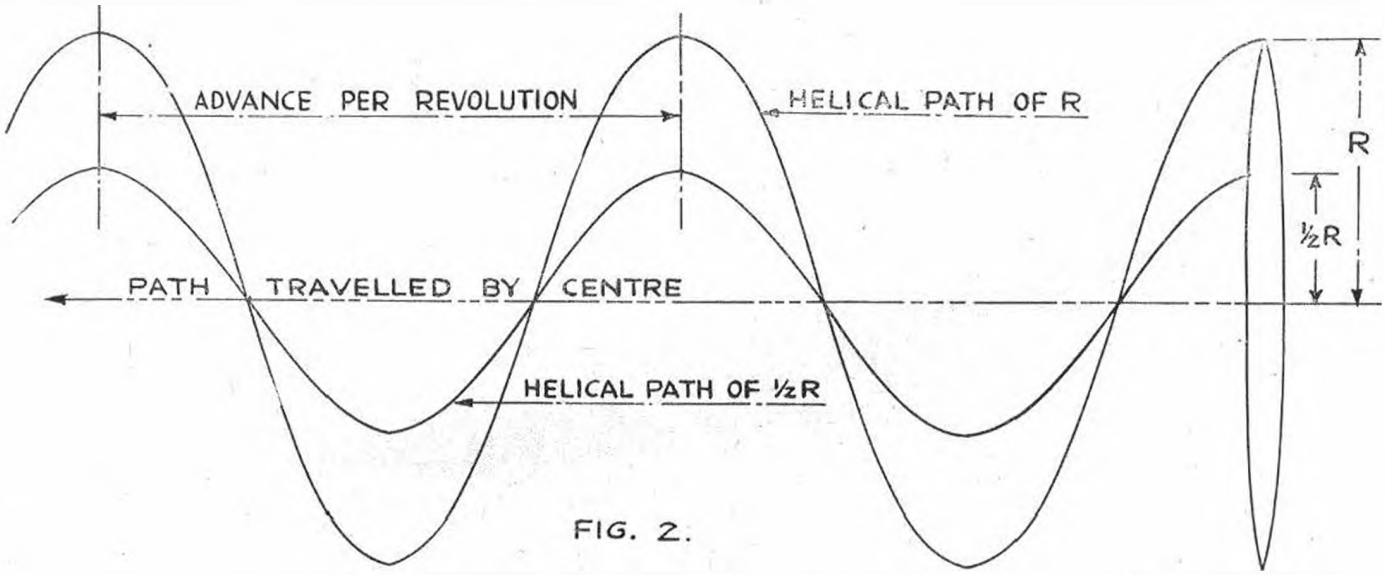


FIG. 2.

ANOTHER TEN-MINUTE TEASER — By D.M.H.

OUR last " Ten-minute Test for Tyros " having aroused so much interest (not to mention head-scratching), we are offering another test to see whether you have learned anything since then !

(1) The underside of an Eiffel 400 wing section is—
- (*a*) Flat.
- (*b*) Concave.
- (*c*) Convex.

(3) At what angle must the rotors of a model autogiro be set? (*a*) Positive.
- (*b*) Neutral.
- (*c*) Negative.

(3) A flapping wing model is called an Orni-
- (*a*) copter.
- (*b*) gyro.
- (*c*) thopter.

(4) Decalage is—
- (*a*) A substitute for silk.
- (*b*) Difference in incidence of biplane wings.
- (*c*) The tail unit.

(5) In building a model sesquiplane, which of these types would you have to build?
- (*a*) Seaplane.
- (*b*) Biplane.
- (*c*) Monoplane.

(6) A model which is able to rise by means of a propeller set horizontally is called an—
- (*a*) Autogiro.
- (*b*) Helicopter.
- (*c*) Aerostat.

(7) Of these types of clouds which is normally most productive of thermal currents?
- (*a*) Cumulus.
- (*b*) Stratus.
- (*c*) Nimbus.

(8) In what year was THE AERO-MODELLER founded?
- (*a*) 1934.
- (*b*) 1935.
- (*c*) 1936.

(9) A sailplane differs from a glider in that it is intended to—
- (*a*) Make circling flights.
- (*b*) Soar.
- (*c*) Fly against the wind.

(10) A rubber tensioner is—
- (*a*) An automatic fin adjuster.
- (*b*) A length of rubber between the undercarriage legs.
- (*c*) A device for retaining the last few turns on a rubber motor.

(*Solution on page* 195).

Re THE JONES-MAXWELL CONTROVERSY

By H. A. WARRING

HAVING so far resisted the temptation to be drawn into the "Jones—Maxwell" controversy, I have succumbed at last, and I am "butting in" with apologies to all concerned. I was mainly interested in the page surrounding the "minimum sinking speed question," which seems to be getting some people down. (Sorry!)

Mr. Howard Boys has approached the subject in the correct way with his reference to $C_D/C_L^{1.5}$ and graph on the subject. In any case the angle corresponding to slowest sinking speed is definitely far removed from that corresponding to the best L/D ratio.

In full size glider design we have what is called the *power factor*, which is numerically equal to $L^{1.5}/D$ or $C_L^{1.5}/C_D$. The higher this value the lower the sinking speed, and thus the more height gained in gusts or thermals, as well as a longer time taken to descend.

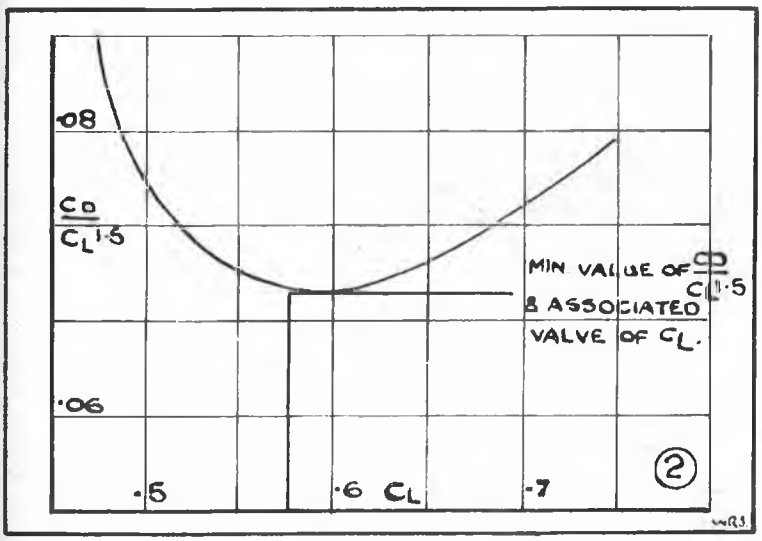
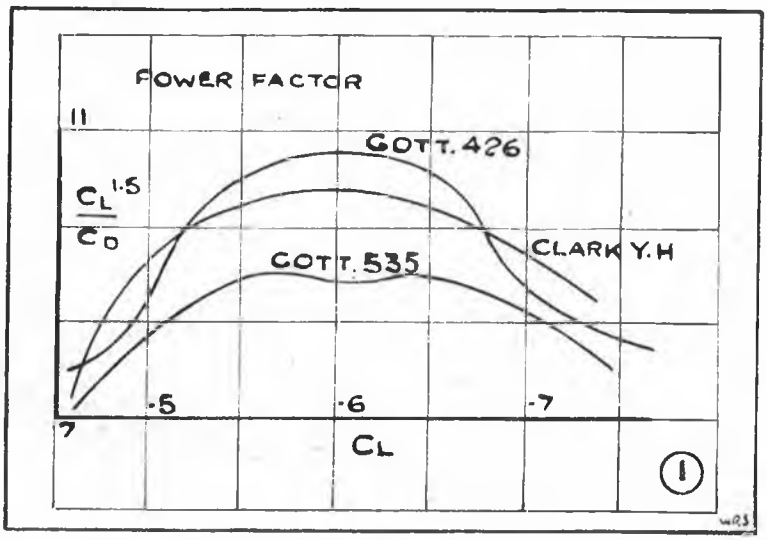


Diagram 1 shows the variation of power factor with C_L for three well-known sections. Note that there is a fairly broad "maximum band." When $C_L^{1.5}/C_D$ is a maximum $C_D/C_L^{1.5}$ is obviously a minimum, and a graph of this plotted against C_L is usually plotted for reference work. From this the value of C_L corresponding to the minimum value of $C_D/C_L^{1.5}$ can be found, and this also corresponds to lowest sinking speed. We can find the angle of incidence giving this value of C_L or plot angles of incidence against $C_D/C_L^{1.5}$ and read them direct, as Mr. Howard Boys did.

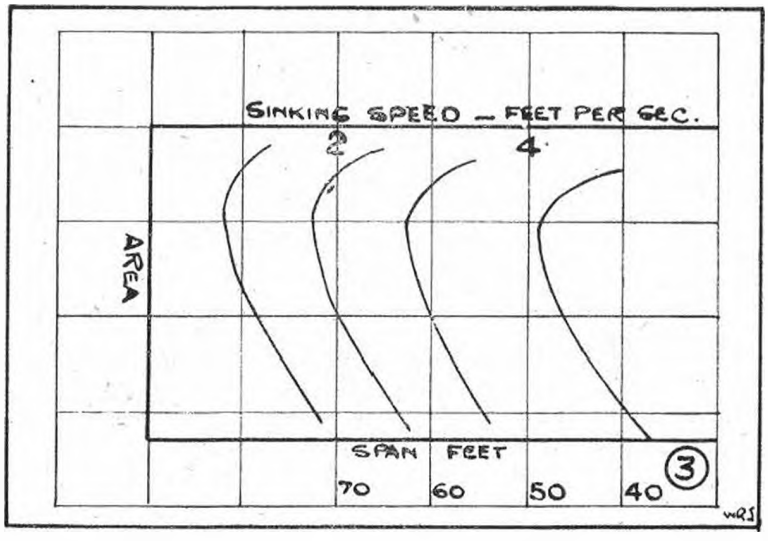
Provided we had the means of measuring the lift and drag of the model at various angles of attack, this would be the best way to get the correct angle for minimum sinking speed—we could just read it off the graph. Unfortunately, we have not all got wind tunnels or the time to experiment with same, and must rely on some sort of calculation. Unfortunately, there are so many things affecting the result that this is far from easy.

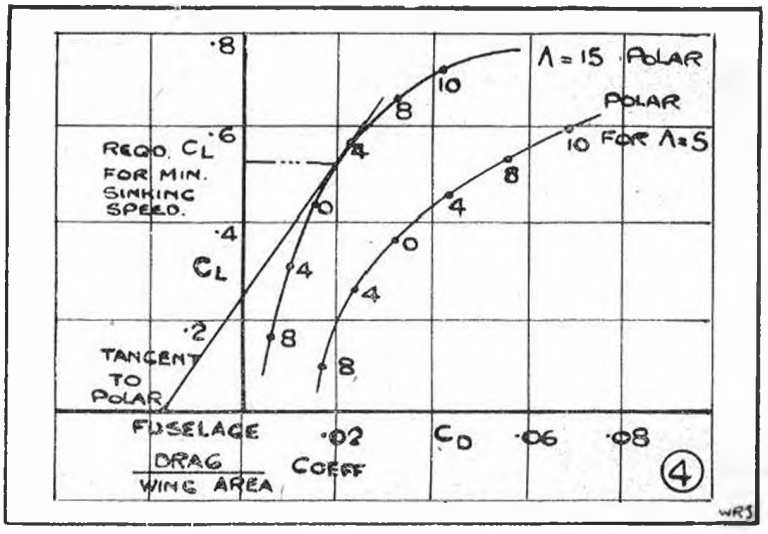


Aspect ratio plays quite an important part, and diagram 3 shows plainly that a high aspect ratio wing serves to greatly decrease the sinking speed. This is not noticeable so much on models, but theory does suggest a high aspect ratio of 12 to 15. (Actually, I have strong views against this from a *practical* point of view, but these do not enter here). On full size gliders each unit increase in aspect ratio above 5 results in a 3 per cent increase in C_L maximum, and an 8 per cent increase in L/D maximum. Since our model wings operate at much lower values of Reynolds Number, these figures will be materially reduced.

Well, we've seen so far if we had a flying wing our problem would be simple, but there is the drag of the rest of the model to consider. This varies considerably from ·005 to ·01 (that is, drag *coefficients*, depending upon the shape, interference, etc.

Diagram 4 shows two polas between C_L and C_D for aspect ratios of 15 and 5. The fuselage Drag/A coefficient (i.e. $\frac{A_F \times C_{DF}}{A}$ – A_F area fuselage, C_{DF} = drag of fuselage) is found to the left of the origin, and through this point a





normal is drawn to that pola corresponding to the aspect ratio.

The value of C_L corresponding to the normal, with its value of angle of incidence, gives the minimum sinking speed for the combination. You will not better this—if it is not good enough it only means the model has been badly designed.

Let me conclude these remarks on a different note. Without in the least wishing to detract credit from some of the excellent articles recently appearing in THE AERO-MODELLER, I do feel we are in danger of getting too mathematical. I maintain, as I have always done, that it is usually the more practical modeller that wins the competitions. Please do not take offence at this, Mr. Jones and others. I really enjoy your articles, but may I offer the criticism that they should be tempered with the practical limits the aero-modeller meets? I know you will take this criticism in the spirit it is meant—it's hard to upset a good aero-modeller.

DESIGNING FOR DURATION (2)—By G. W. JONES

THIS second article is on the effects of aerofoil-section upon the duration of a model; in the first, the formula was derived showing the variants affecting sinking-speed, i.e. :

$$Vs = \sqrt{\frac{2\,W\,C_d}{\rho.S.\,C_r^{1.5}}}$$

and since C_r directly depends on C_l, the "determinant ratio" is $C_d/C_l^{1.5}$, and this is the ratio of importance in sinking speed—the weight W, the density of the air ρ, and the area S, all being constants.

Our job, then, is to find an aerofoil which has a minimum value of $C_d/C_l^{1.5}$, and here I present various tables and graphs that go to tell us much about duration flying; which phenomena we will go into after the "results" have been given.

I thought it best to use Messrs. Powdrill and MacBean's graphs of aerofoils at thirty feet per second—they have been much quoted and are to be congratulated in their enterprise in obtaining these results; it is a great pity that they could not have gone further into this all-important sphere.

Let us first take R.A.F. 32 section, this being, apparently, by far the most popular section nowadays, even outdistancing the Clark "Y," which, a couple of years ago, had such a strong following for its "all round" qualities. R.A.F. 32's performance is shown in Figure 1, represented both graphically and numerically.

Of the five sections presented, the R.A.F. 32 section offers the best $C_d/C_l^{1.5}$ ratio, the minimum value occurring at 4¼ degrees angle of attack, and being ·0875. This may, or may not, substantiate the popularity it has gained; saying it is the best of this small batch of aerofoils is not, of course, saying much—but it *does* show a *trend*, and that is where I hope to be of some help to the reader.

The second best on the list is the N.A.C.A. 6512—with a minimum of ·08966, at angle of incidence = 6 degrees. There is something here to be noted, I think. The N.A.C.A. 6512 section has exactly the same amount of maximum mean camber as the R.A.F. 32, and yet its sinking speed is, on the percentage basis, quite appreciably smaller, showing that contour lines do play quite a part in the performance of the aerofoil, and will obviously come to be of greater importance as the field is narrowed down—you gather what I mean, I hope.

Next is Clark Y, with its smallest sinking speed value at approximately 4 deg., and standing numerically at ·09402. There is little one can say about this—the Clark Y does not seem to have any redeeming features, and as an all-round performance section it's just no good! The main attraction with this section is, I think, that it is comparatively simpler to construct a wing with this than with a deeply-undercambered section, for instance.

The fourth is the other N.A.C.A. section, the M-6, this one having its minimum at *eleven* degrees, being ·09806, really well below the R.A.F. 32.

Bringing up in the rear is C. H. Grant's section, the X-8; the flat top of the Cl curve is a little confusing, but the smallest rate of descent with this section would occur between the angles nine to eleven, inclusive (!), and at a ratio-value of ·1003.

Interesting points immediately arise; it is obvious that for good sinking speed *undercamber is inevitable*, and *must be incorporated*. For instance, comparing the R.A.F. 32 and the Clark Y (note that the Clark Y is possibly one of the *best* of the flat-bottomed sections, whereas study and use of the undercambered sections may reveal much better ones than their representatives here) it will be noted that a 7 per cent drop would result by using Clark Y.

It is also noteworthy that a 2·4 per cent loss would occur in the case of N.A.C.A. 6512; a 10·8 per cent if M-6 were used; and a 15·3 per cent drop if the Grant X-8 was decided upon. Further, if 100 seconds was the duration of the glide of an R.A.F. 32 model, then 97·6 seconds would be obtained from an N.A.C.A. 6512, 89·2 seconds from the M-6, 93 seconds from the Clark Y, and only 84·7 seconds from the X-8.

It also appears that a fair mean camber must be incorporated for the $C_d/C_l^{1.5}$ ratio seems to vary inversely as the height of this mean camber line.

Reflex trailing edges seem to have a detrimental effect on the sinking speed of a model—the stabilising effects obtained by the very small centre of pressure travel cuts down the drag—and the lift by large amounts as well. As

a general rule, " reflexed " sections have a high lift/drag ratio at a low positive angle of incidence, at a small lift-coefficient figure.

This brings up a point that has much to do with duration designing.

About two years ago I designed a streamlined Wakefield model with the idea of obtaining a model with the very minimum of drag; the wing section gave me a lot of trouble, for I had read much of the necessity of having a high lift/drag ratio, and, at the same time (sometimes in the same article), modellers advocated sections such as R.A.F. 32, Clark Y, and Eiffel 400, all of these having a L/D ratio maximum of about twelve; the more streamlined reflexed sections were hardly ever mentioned, even having a substantially higher L/D maximum.

Filled with the idea that I would bring out something new, radical, " world-beating," etc., I began to draw out views of a reflexed section. However, in this case convention won; I discarded the idea, and although I did not then know the reason, built my model with an Eiffel 400 section!

I would not have brought this matter up, however, had it not been that a club-mate of mine—designing his 1941 Wakefield—mysteriously referred to using a Clark Y H section on the main wing of the 'plane. Immediately I tried to dissuade him, but was not convinced. It occurred to me that there might be many modellers so confused, and do not realise why they build their models of R.A.F. 32, etc. Perhaps little theorising will help many back to the straight-and-narrow.

One of the points that induce pro-" M.6 " idea is that with the low drag figures of this type of section, climb *should* be improved, and the model—although the builder knows that it will be very fast—should have reached an altitude where the danger of hitting obstacles is small, and believing that, speed or no, the sinking speed will be, on the whole, smaller.

That is the hypothesis; let us examine it.

Now, using a 16-strand $\frac{1}{4}$ in. cross-section motor h.p. is developed in the region of ·008. Let us take the drag of the 'plane at the R.A.F. 32-speed to be ·30 oz.; this speed at Cl of ·88, is 20·2 f.p.s. (These figures are based on the minimum $C_d/C_l^{1.5}$). The corresponding speed of M-6 section is 25·6 f.p.s., and the drag force at this speed will be—excluding wing drag—·48 oz. The wing drags are: R.A.F. 32, ·0417 oz.; M-6, ·022 oz. Total drags, therefore, ·342 oz. and ·502 oz.

Most of you will now see daylight! However, the horse-power necessary for level flight is given by DV/375. It is, therefore, obvious that the DV factor will increase considerably with the use of the M-6 section, and therefore the h.p. for level flight will increase. For any given power plant, the R.A.F. 32 model will out-climb the M-6 one, since the rate of climb depends on:—

R/c = Excess h.p. × 33,000/weight in lb.

And using the motor as above, the R.A.F. 32 model would gain something like fifty feet greater altitude, which, with its smaller sinking speed, will give a large margin over the M-6. The figures—always very approximate—are in the region of 280 seconds versus 230 seconds. (Note: All the figures are entirely fictitious, and bear no relation to actual practice, or nearly so!) Adding to the glide figures a certain time for power-flight—says 60 seconds—we find that the M-6 falls short by about fifty seconds in total duration.

However, the above is taken with the M-6 section flying at some eleven degrees. Modellers would fight shy of this anyway. So now I think it would be as well if we looked into the M-6 section set on the 'plane at two further angles: (1) At the angle of L/D maximum, and (2) at the angle of minimum drag. These we will call 'planes " C " and " D." The angle of attack of " C " will be nine degrees (still high), and that of " D " 4 degrees (more reasonable to most modellers' eyes). Taking the R.A.F. 32 model as " standard," the speeds will then be:—

" C "	...	...	...	31 f.p.s.
" D "	...	...	...	37 ,,

and the " non-wing " drags—

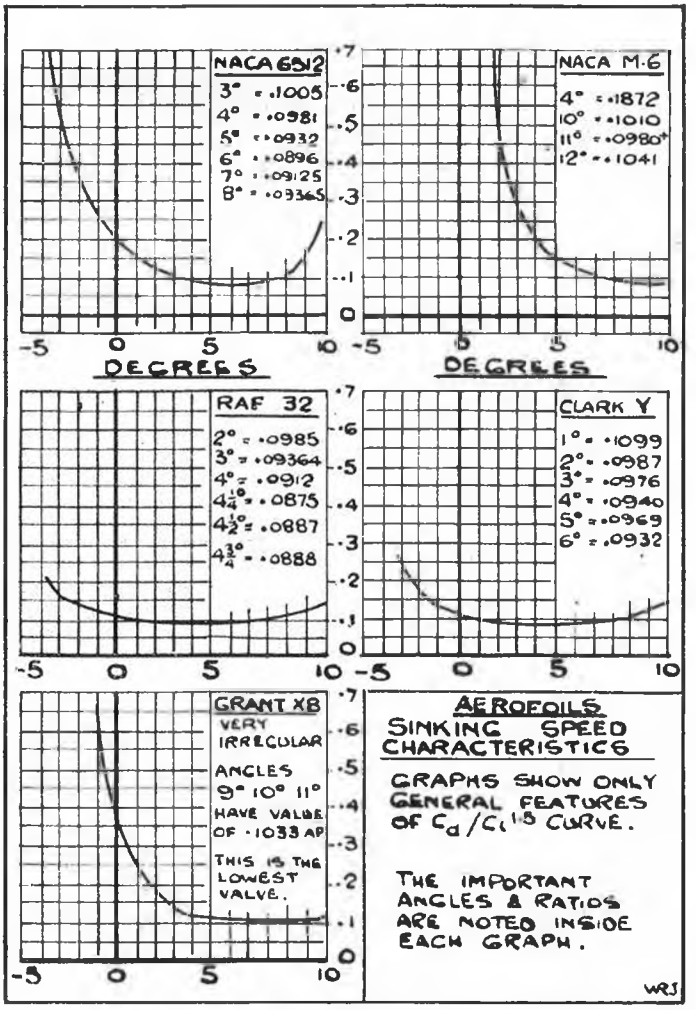
" C "	...	...	...	·72 oz.
" D "	...	...	...	1·024 ,,

Total drags:—

" C "	...	...	...	·773 oz.
" D "	...	...	...	1·072 ,,

Compare these figures with those of " A "; they fall by far to the rear. I shall go no further, for it is *too* clear. I have dwelt upon the point long enough, but I hope that you see the important bearings that it has upon duration-designing.

Conclusion: Obviously it is necessary to have a good lift-coefficient (as high as you can get it) to cut the speed down, and a good sinking speed ratio. The main point is *that the aerofoil section determines all the factors concerned*, about which more anon.



QUESTIONS AND ANSWERS

CONDUCTED By the EDITOR

Q. *Can you tell me where I can obtain scale drawings of the "Sunderland Flying Boat"?*—(A. N. C., Dunfermline).

A. Accurate scale drawings to the popular 1/72 scale are contained in the new Harborough Publishing Co.'s book, "Aircraft of the Fighting Powers," obtainable from THE AERO-MODELLER offices, price 10s. 6d., or 11s. 6d. post free.

Q. *Could you please give dimensions and details of power units of the aircraft, D.H.2.* (1916), *Bristol Scout* (1915), *S.E.5A.* (1917), *Sopwith "Snipe"* (1918), *Armstrong Whitworth "Siskin"* (1924), *Gloster "Gamecock"* (1926).—(D. C. G., Malvern).

A. *D.H.2.* Equipped with 100 h.p. Monosoupape Gnome.

Bristol Scout. Sometimes called the "Bullet." Span, 24 ft. 5 in.; length, 20 ft. 7 in.; height, 8 ft. 6 in. Equipped with 110 h.p. Le Rhone, 80 h.p. Gnome, 100 h.p. Mono, or 130 h.p. Clerget.

S.E.5a. Span, 26 ft. 9 in. Length, 20 ft. 0½ in.; height, 10 ft. 0 in.; chord, 5 ft. 0 in.; gap, 4 ft. 6 in. Tail-plane span, 11 ft. 0 in. Tail-plane chord, 3 ft. 3 in. Track, 5 ft. 0 in. Equipped with 150 h.p. Hispano Suiza, 200 h.p. Hispano Suiza, or 180 h.p. Wolseley Viper.

Sopwith Snipe. Span (upper), 31 ft. 1 in.; span (lower), 30 ft. 0 in.; length, 19 ft. 0 in.; height, 9 ft. 6 in.; chord, 5 ft. 0 in.; gap, 4 ft. 3 in. Tail-plane span, 9 ft. 0 in. Tail-plane chord, 3 ft. 6in. Track, 5 ft. 0 in. Equipped with 230 h.p. B.R.2 engine.

A. W. Siskin III*a.* Span (upper), 33 ft. 2 in.; span (lower), 24 ft. 2 in.; length, 25 ft. 4 in.; height, 10 ft. 0 in. Equipped with 450 h.p. Armstrong Siddeley Jaguar engine.

Gloster Gamecock I. Span (upper), 29 ft. 9½ in.; span (lower), 25 ft. 11 in.; chord (upper), 5 ft. 3 in.; chord (lower), 5 ft. 2½ in.; length, 19 ft. 8 in.; dihedral, 4°. Equipped with 450 h.p. Bristol Jupiter VI engine. Version supplied to Finnish Air Force known as Gamecock II equipped with 450 h.p. Gnome-Rhone engine, which is a Jupiter built under licence.

Q. *My friend and I have an argument as to who is the holder of the world model aircraft duration record. I say Bob Copland, and my friend is just as emphatic about Korda. Who is right?*—(A. C., Leicester).

A. Officially, Bop Copland holds the world record with his flight of 33 min. 9 sec. R.O.G., made in Llubljuna, Yugoslavia in 1938. Korda, of course, beat this time in the 1939 Wakefield event with a time of 43 min. 29 sec., but—and here is the crux of the whole matter!—this latter record has not been ratified by the F.A.I. (Federation Aeronautique Internatnoiale). To claim a world record a competitor must hold a current F.A.I. licence, and the record must be submitted within a specified time to the committee for ratification. These conditions were filled when Copland's record was passed, but there is some doubt as to whether Korda was the holder of a licence at the time he made his flight. Apart from this factor the commencement of hostilities prevented the F.A.I. from meeting, and therefore Korda's flight has not yet been submitted for recognition. Whether the matter is held in abeyance until the F.A.I. meet again is a matter for conjecture.

Q. *Is it practical to use bevel gears and shafting for driving twin propellers?*—(G. H. B. C., Sevenoaks).

A. In principle and from an engineering point of view the scheme is quite all right, but in practice it would be advisable to make the shafts flexible and not rigid. The usual practice is to use Woolworth's closely coiled spring curtain supports. Provided you very carefully clean off the trimmings from the ends, you can then solder these to the steel rod in the "bore" of the coil spring and then mount the gear wheels on the steel shaft. Of course, developing from this, you could cut out the gear wheels and make use of the flexibility of the spring to give you a direct drive. The flexible type of drive is fully dealt with by Mr. H. J. Towner in an article on his Amphibian in our Christmas, 1940, issue, and Mr. Towner used this type of drive in his "Envoy," a full-size scale plan of which is advertised in our Plans Service.

Q. *Can you give me dimensions of the "Flying Fortress"?*—(S. G., Crewe)

A. Main dimensions of the "Flying Fortress," or to use its code number, the Boeing B.17B, are as follow: Span, 103 ft. 9 in.; length, 67 ft. 11 in.; height, 15 ft. 4½ in.; wing area, 1,420 sq. ft.

Q. *I am rather hazy as to the exact method of retraction of the undercarriage of the "Defiant." Could you please explain?*—(T. A. M., Liverpool).

A. The undercarriage legs of the Boulton-Paul "Defiant" fold inwards in the same manner as those on the Hawker "Hurricane," that is, with a double action which turns the legs slightly, so that the legs do not retract at an angle of 90 degrees with the fuselage.

Q. *Could you tell me the colour scheme and markings of "Spad XIII," as used by No. 19 Squadron R.F.C.?*—(H. O. D., Middlesex).

A. The "Spad," as used by the R.F.C. between January, 1917, and January, 1918, was painted in the usual manner of that period, that is, all upper surfaces were coloured dark green or brown, as were the sides of the fuselage, and the under-surfaces were left the natural colour of the fabric. This can be represented by a very pale cream colour. Cockades were painted on the wings, upper and lower, and on each side of the fuselage. The rudder bore red, white and blue stripes, the red rearmost.

No. 19 Squadron carried a white square just aft of the targets on the fuselage. When this squadron was re-equipped with Sopwith "Dolphins" the marking was changed to a white dumb-bell, horizontal.

Q. *Can questions be answered through the post?*

A. Yes, provided a stamped addressed envelope is sent with the question. Replies published are selected from the several hundred we send out each month.

FIGHTING AIRCRAFT OF THE PRESENT WAR —— II

THE GENERAL AIRCRAFT "OWLET"

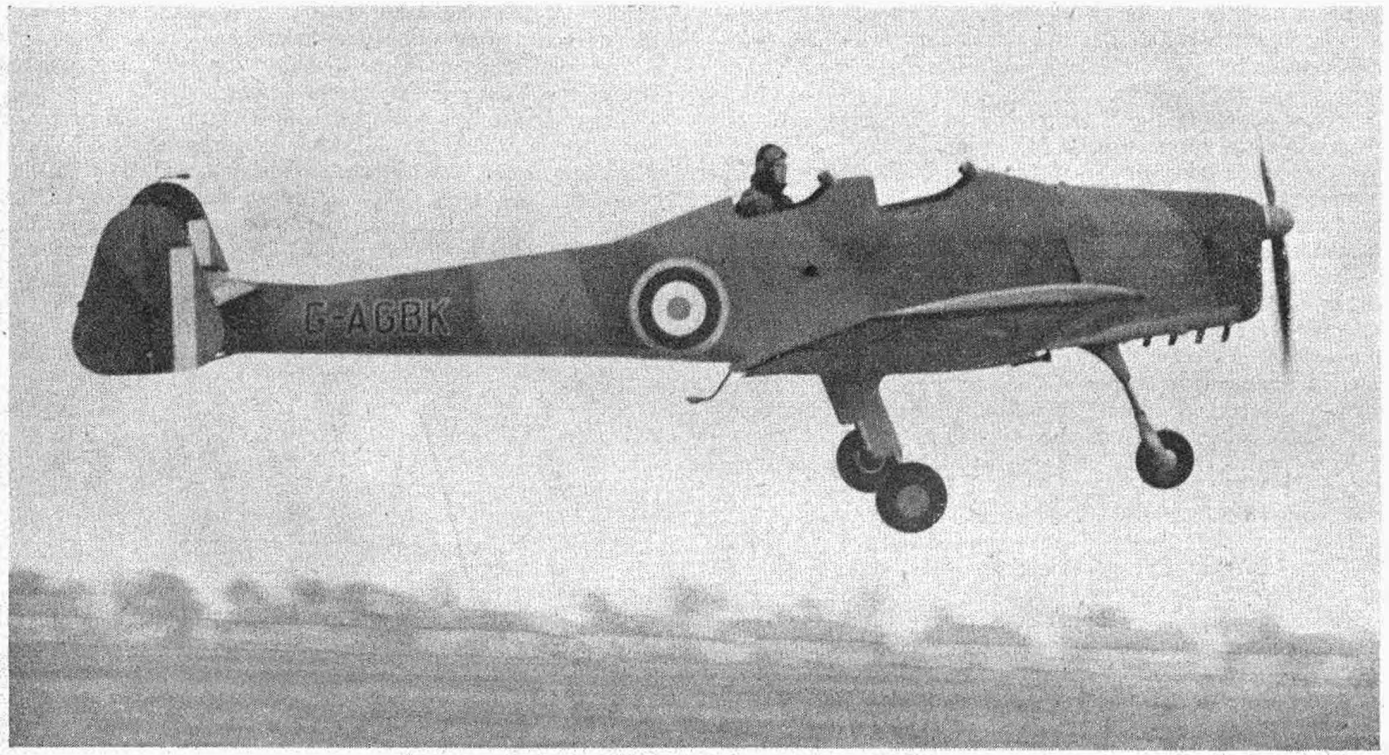


Photo courtesy "The Aeroplane."

By **H. J. COOPER**

THE "Owlet," the latest product of General Aircraft Ltd., and the first three-wheeled trainer to be produced in this country, had its genesis as long ago as 1936 in the rather unusual-looking tadpole-like "Cygnet" enclosed monoplane, which was then built by C.W. Aircraft, of Slough.

The "Cygnet" originally had a normal two-wheeled undercart. In 1937 the prototype—G-AEMA—was modified for that year's King's Cup Race, the chief alteration being an improved windscreen.

In the following year General Aircraft took over the production and further modified the "Cygnet" by fitting twin fins and rudders at the ends of the tail-plane in place of the single unit on the prototype.

After extensive experiments the "Cygnet" appeared early in 1939 with a nose-wheel added, and thereafter was put into production. This latest version is the only civil aeroplane which is at present being exported from this country.

The "Owlet" was developed with the needs of night-training in view, and is accordingly fitted with full night-flying and blind-flying instruments.

The various tricycle aeroplanes which are now coming to the Royal Air Force from America—Boston, Airacobra, Liberator—will necessitate the acceptance of a trainer of similar characteristics, so it is likely that the "Owlet" will be accepted not only for training pilots at home, but will play a prominent part in the colonies under the Empire Training Scheme.

The "Owlet" is an evident development of the "Cygnet," embodying many components of the latter, and in general appearance differing only in the accommodation and in the shape of the wing-tips.

In place of the side-by-side cabin of the "Cygnet" the newer aeroplane has two open cockpits in tandem. The pilot and pupil (who occupies the front seat) now sit up like sore thumbs.

The main fuselage of the "Owlet" is a metal structure with stressed-skin covering, except for the top coaming, which is of wood. The rear boom is a monocoque, and is attached to the front portion by four bolted-on steel plates. The rear fuselage can thus be easily removed.

The wings are of slightly less span than those of the "Cygnet," and are square-tipped. They are of all metal construction with stressed-skin covering. Control surfaces are also of metal. Split flaps are fitted to the trailing edge between the ailerons and the centre section. A sensible and reliable indicator attached to the upper surface of each flap projects through the top of the wing and shows the position of the flap. Trimming tabs are fitted to ailerons and elevators, but those on the former are not controllable in the air. All control surfaces are fitted with mass balances.

Navigation lights are fitted at each wing-tip and in the extreme rear of the fuselage. A landing light is installed in the leading edge of the port wing and, in case of engine failure, a wind-driven generator is provided in the leading edge of the starboard wing root.

Recognition of the "Owlet" should be simple, as there

is no other British light low-wing monoplane (except the "Cygnet"), which has a tricycle undercarriage. The open cockpits should be sufficient to identify the "Owlet," but the square-cut wings cannot possibly be confused with those of the "Cygnet."

From underneath, the wing of the "Owlet" suggests a Messerschmitt Me.109, but the rectangular tail-plane, with rudders at the tips will, of course, eliminate confusion with this aeroplane.

When modelling the "Owlet" care should be taken to ensure that the correct section is obtained at the point where the tail boom joins the front fuselage. A safe method is to make the fuselage in two separate parts (as on the actual machine) leaving the rear half slightly long, and inserting it into the main body, finishing off with plastic wood.

The first "Owlet," which was demonstrated at Hanworth a few weeks ago, was camouflaged in the usual manner all over the fuselage and top surfaces, and carried red and blue cockades on top of the wings. Both sides of each fin carried three-colour stripes. The cockades on the fuselage were standard. Underneath, this machine was pale blue, with three-colour rings at the wing-tips.

This particular "Owlet" carried the civil registration letters G-AGBK in black, with a yellow outline on each side of the fuselage just ahead of the tail unit.

If and when "Owlets" are supplied to R.A.F. Training Schools they will no doubt be coloured in a similar manner to the other types of trainers, that is, yellow with upper surfaces and the upper half of the fuselage camouflaged, unless, of course, a fresh colour scheme comes into force. (By the way: It may be of interest to some readers to know that there has been another change in markings on aeroplanes of the Fighter Command. The under-surface of the port wing is again to be painted black, while the other wing remains the light blue colour. It will be remembered that the port wing was formerly painted black with the starboard wing white underneath).

The undercarriage legs of the "Owlet" are painted black; the Fairey metal airscrew silver.

The "Owlet" is equipped with a 150 h.p. Cirrus Major motor, with which the following performance is obtained: Maximum speed, 125 m.p.h.; cruising speed, 110 m.p.h.; climb (at sea-level), 770 ft./min.; ceiling, 15,000 ft.; range, 450 miles; landing speed, 60—80 m.p.h.; stalling speed, 53 m.p.h.; landing run, 150 yards; take-off run, 210 yards.

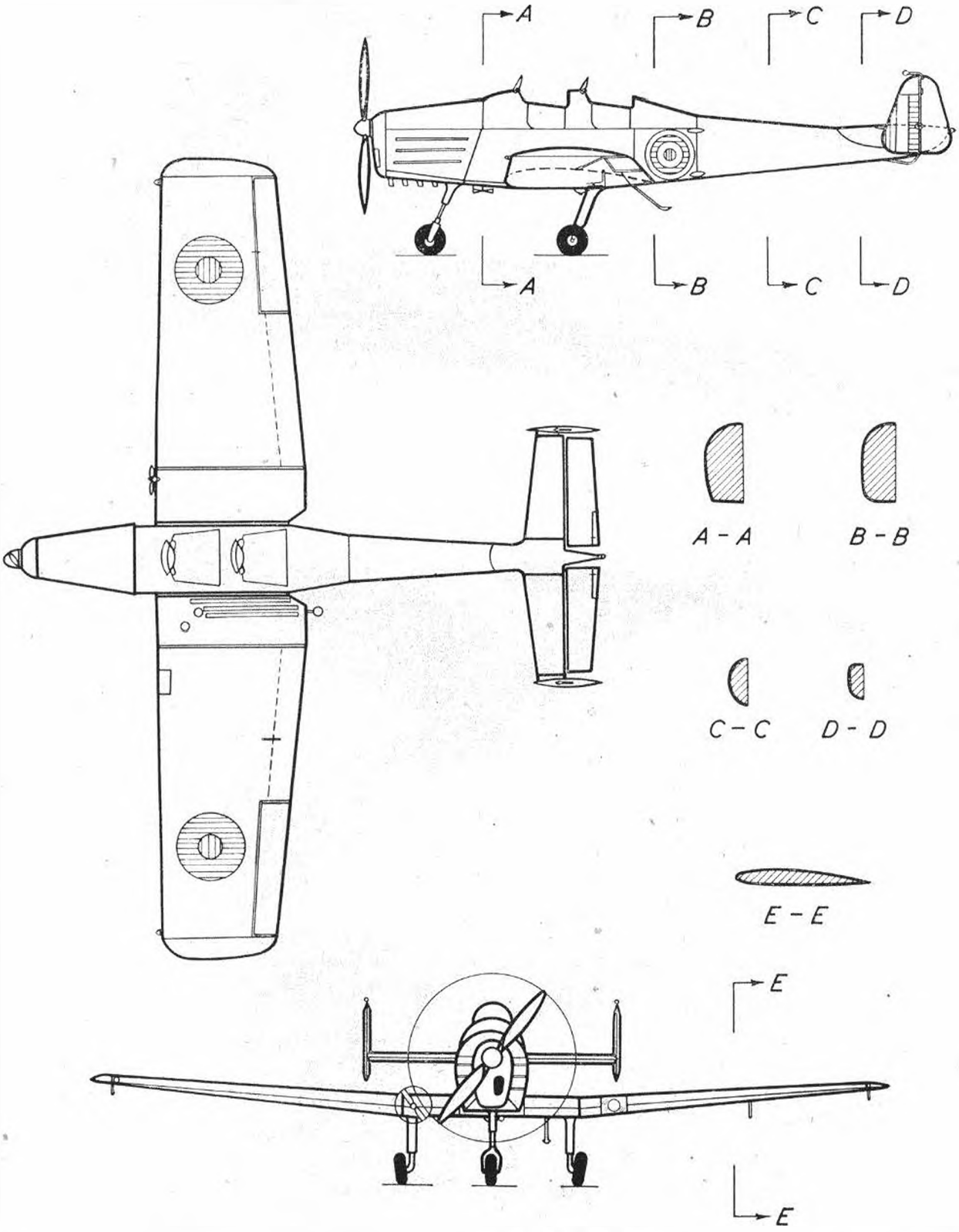
Dimensions.—Span, 32 ft. 5 in.; length, 24 ft. 7 in.; height, 7 ft. 3 in.; wing area, 173 sq. ft.

Weights.	Day Trainer.	Night Trainer.
Tare	1,563 lb.	1,644 lb.
Crew	340 lb.	340 lb.
Petrol (26 gall.)...	200 lb.	200 lb.
Oil (3 gall.) ...	27 lb.	27 lb.
Parachutes ...	40 lb.	40 lb.
Allowance ...	130 lb.	49 lb.
Gross weight ...	2,300 lb.	2,300 lb.

For aerobatics an all-up weight of 2,000 lb. is permissible.

NEXT MONTH—The ARAADO Ar 95

A TRICYCLE TRAINER



THE GENERAL AIRCRAFT "OWLET"

0 1 2 3 4 5 6
FT.

HAIL TO THE AIR TRAINING CORPS

February 1st, 1941, will long be remembered as a red letter day for the youth of Great Britain, for it was the day of recognition by the British Government, through the Air Ministry, of the importance and value of training youths in their 'teens in air lore and preparing them for entry into the Royal Air Force. This was a step that in my humble opinion was years overdue, but it has come to pass at last, and many of you will now, in addition to your aero-modelling, receive every encouragement from the Air Ministry to get a grounding in Morse, wireless, drills, engineering, rigging, etc., etc. What unlimited possibilities are opened up by OFFICIAL *recognition!*

It has been suggested to me that every member of the Corps should introduce at least one new member to help swell the ranks and give the new scheme a big send off, and from reports that I have already seen and heard it seems that a ready response is indicated.

You can have no idea how it encourages your officers and instructors when real enthusiasm is shown; it makes the machinery of organisation run so much sweeter and more efficiently.

If you are not already a member of the Air Training Corps you should contact your local squadron through the Town Hall, principal schools of the district, L.C.C. evening classes, etc., etc., or your local newspaper. FAILING THIS, *I will do my best to put you on the right road. If you need assistance, write to me direct at 58 Hampden Way, Southgate, N.14, and be sure to enclose a stamped addressed envelope.*

C. A. RIPPON.

Of course, most of you are going to have a go for THE AERO-MODELLER Silver Cup and £5, for 1/72 scale models, to say nothing of the accompanying 2nd, 3rd and 4th, and 10 consolation prizes of 10s.

There is such remarkable scope in solid modelling, and infinite variety of types to choose from "Aircraft of the Fighting Powers." that I'm sure there can be no excuse for not having a shot at one of these aircraft.

I hope to hear of thousands of entries for the competition, and I am looking forward to some excellent pictures.

In my following article, I attempt to give you a lead as to what constitutes a good model, and I hope the hints contained therein will help you turn out masterly jobs.

I have received from No. 83 Glasgow Squadron the very first Glasgow report, although there are several squadrons in the city.

Cadet Alexander, of No. 83, says: "We are trying to get aero-modelling going in the squadron, and a recent census showed that 80 per cent of the members are keen on it."

To have this percentage of the squadron keen on aero-modelling is very good indeed, and I'm sure that if No. 83 sticks to it, it will win through. Perhaps some competition from the other Glasgow squadrons would spur them on, for nothing is worth while without a struggle.

I have had a number of letters from aero-modellers asking for information on how to join squadrons. I refer you to my earlier notes which cover this matter.

Cadet L./Cpl. A. G. Steele, of No. 48 F. Hampstead Squadron, is very keen on his Commanding Officer allowing him to start an aero-modelling class, but alas! the difficulty is the lack of an instructor. May I make a personal appeal to an aero-modeller with experience to contact No. 48 F Squadron, and volunteer to help the cadets? He will be doing a good job, and an interesting one too. There are plenty of good aero-modellers in the Hampstead district I know. The address to write to, or visit, is Cadet L./Cpl. A. G. Steele, No. 48 F Hampstead Squadron A.T.C., 155 Goldhurst Terrace, Hampstead, N.W.6.

I have had a further report from No. 42 F King's Lynn Squadron. They are certainly a live body. Nineteen models already made, both scale and flying types, and many more on the stocks. The squadron's best "round-the-pole" time to date is 54 seconds, but this is by a model outside the accepted R.T.P. rules, being over weight. *Now* they know the rules they will doubtless do better!

The members sold programmes at a German bomber exhibition, and collected £61 for the local Spitfire Fund. Jolly good! What about a super effort for the S.M.A.E. FIGHTER FUND?

WHAT CONSTITUTES A "GOOD MODEL"

THE obvious immediate reply to the question is that it depends on what type of model you are interested in, and what is required of the model when completed.

Let me see if I can indicate to you the principal features of solid scale models, which would bring them within the description, "A Good Model."

Opinions of model aeroplanes are as varied as the types, and I have heard very pungent opinions of "duration" and "general purpose" models expressed by "scale model" fans, although I must confess that beyond passing comment to the effect that they "couldn't see any sense in putting so much work into a model just to get it knocked off, and that, anyway, it is performance that counts," the duration fans are always ready to admire first-class scale models of both flying and non-flying types. So as everyone seems to appreciate a good scale model, let us consider in some detail the desirable features of a good solid scale model of the type that you will be building for THE AERO-MODELLER Cup.

The principal factor that makes or mars a scale model is the finish, and the term "finish" includes not only the actual painting, but the *trimmings*, such as pitot tube, radio mast and aerial, insignia, squadron markings, and the various markings which appear at odd spots on a full-size 'plane, and which in miniature make all the difference between a model and a convincing copy of the real thing.

features, such as lettering, squadron markings, etc., are not purchasable, and it is easier to first draw them out on thin but strong paper, cut them out with a pointed piece of razor blade, and then paint them the required colours, afterwards sticking them in their correct position with a *strong* adhesive used sparingly. Care must be taken in the choice of a suitable fixative, to ensure that the surface being worked upon isn't soiled or "pulled."

Correct positioning and correct scale size of applied markings are important points to watch, and make a big difference to the convincing appearance of the model.

Where transparent cabins are called for, every endeavour should be made to get as near the real idea as possible, especially with regard to small 1/72 scale solid jobs. So many scale modellers are content to take the line of least resistance and scamp this part, because it entails extra thought and delicate work. Nothing detracts from reality in a scale model more than seeing the cabin represented by aluminium painting, just lined out with black "painted on" cabin framing. I feel that you could all make a good job of it if you followed out some of the excellent suggestions offered from time to time through the pages of THE AERO-MODELLER. One very good one is to make a form or mould from candle wax, and to paint it over with a suitable clear cellulose dope or glue to form the transparencies. When built up sufficiently any smears or blushing can be removed by judicious washing with acetone. The lines representing the cabin framing can then be painted on carefully, or black thread can be cemented upon the "glass" to give an even more realistic effect. The wax can then be removed by hot water, and the cabin fixed in its place on the model. Airscrews and spinners are almost the first items that meet the judge's eyes, and yet these are very often crudely shaped and finished.

I know quite well that shaping an airscrew is not everyone's pigeon, but with a little patience once more a quite creditable job can be made of it. The tiny 1/72 airscrews are best made from hardwood or sheet metal (tin or aluminium), or may even be moulded from cellulose glue. Small airscrews carved from hardwood are much more satisfactory than from balsa wood, for the same reasons set out earlier in this article. The metalised effect of airscrews and cowls, etc., can be obtained by using a fine grained aluminium cellulose paint, or by covering with aluminium foil.

Struts, etc., are best made from thin cane or bamboo, if required, in special sections, such as streamline, etc., but metal tubing or any bent parts are best represented by brass or steel wire. Wheels are of many different types, and it is wise to study pictures of the prototype to find out the exact shape, and to make your own wheels to suit. Wheel covers and removable cowlings can be made from stiff paper, and it is a good idea to first fit the parts carefully, but to paint them before finally fixing them in place, in order to avoid smearing of paint on adjacent parts of the model.

Whilst it is desirable to introduce as much realistic detail as possible into any scale model, you will be far wiser to concentrate on a really clean, smart job with few trimmings, rather than overload the job with too many botchy bits. After all, when looking at a 1/72 scale miniature, for instance, you have to consider it in correct perspective, and at the size the model appears to you, you wouldn't expect to notice every little rivet and bolt, would you? There is, in my opinion, a danger of introducing too much fiddling detail; rather would it be better to concentrate on making sure that the bold features are correctly proportioned, when I am quite certain the most critical judge would immediately exclaim, "Now that is what I call a good model; it looks the real thing."

FOR AIR CADETS!

A COMPETITION FOR 1/72 SCALE SOLID MODELS

1st PRIZE £5 CASH AND SOLID SILVER TROPHY

2nd PRIZE £3. 3rd PRIZE £2, 4th PRIZE £1.

10 Consolation Prizes of 10/- each.

RULES.

(1). This competition is limited to members of the Air Defence Cadet Corps.

(2). There is no entry fee for this competition.

(3). Each entrant may enter only one model for the competition.

(4). Entries must be made on the official entry form, which will be published in the April issue of THE AERO-MODELLER on sale on or about March 20th, 1941.

(5). All entries must be accompanied by coupons taken from the February and March issues of THE AERO-MODELLER. The February coupon is at the foot of the back inside cover page of this issue.

(6). The model which forms the subject of the entry must have been entirely constructed by the entrant. Proprietary accessories, such as propellers, wheels, machine-guns and the like, are not allowed. These items and similar ones must be constructed from raw materials which may be of any description.

(7). Models will be judged on:—
(*a*) Construction.
(*b*) Finish.
(*c*) Attention to detail.
as shown by the photographs submitted by the entrant. Up to six (6) photos may be submitted, and professional reproductions are advised.

(8). Models must be built to a scale of 1/72 full size, and must be chosen from one or other of the 87 aircraft described in "Aircraft of the Fighting Powers," published by the Harborough Publishing Company Ltd.

(9). It is a condition of entry that the copyright of all photographs of prizewinners will become vested in the Model Aeronautical Press Ltd., the proprietors of THE AERO-MODELLER.

(10). Whilst no legal responsibility for the care of photographs submitted for this competition is assumed by the proprietors of THE AERO-MODELLER, unsuccessful entrants' photos will be returned, as far as possible, provided suitably stamped addressed envelopes are sent with them.

(11). A panel consisting of the Managing Editor and the Editor of THE AERO-MODELLER, Mr. H. J. Cooper, and Mr. Leonard Taylor, and Squadron Leader C. F. Gordon, of the Air Defence Cadet Corps, will judge the competition, and it is a condition of entry that their decision must be accepted as final and binding on all points.

(12). Entries must reach the offices of THE AERO-MODELLER, at Allen House, Newarke Street, Leicester, not later than April 15th, 1941.

LETTERS TO THE EDITOR

DEAR SIR,

It seems to me that Mr. Renaut's article, " In Quest of Duration," and Mr. Powdrill's " Notes on Wing Incidence," ought to have been printed consecutively, to obviate feverish turning of pages from one to the other. I don't like my AERO-MODELLER to get thumb-marked and dog-eared!

Mr. Renaut doubts the need for slow forward speed. There is no cause for doubt! A slow forward speed *is* necessary. Presumably Mr. Renaut wants, in common with other " Wakefields," as low a sinking speed as possible in the glide.

But since sinking speed $= \frac{\text{forward speed}}{\text{L/D}}$ (*vide* Mr. Powdrill's article), it is difficult to see how an increase in forward speed is going to help matters.

Mr. Renaut states that " the wing should be flown at the best (highest) L/D ratio."

The angle of incidence of the wing giving the best L/D ratio does not, however, always coincide with the angle giving the lowest sinking speed.

To quote Mr. Powdrill's figures:—

	ANGLE FOR LOWEST SINKING SPEED.	ANGLE FOR HIGHEST L/D RATIO.
8 oz. model ...	6° ...	... 5½°
9 " " ...	6° ...	... 5°

The lowest sinking speed obtained with the 8 oz. model is 2·2 ft. per sec., whereas it is 2·3 ft. per sec. in the case of the 9 oz. model. Therefore, it appears that increased weight, giving increased wing loading, and *increased speed*, is undesirable, since it causes greater sinking speed.

To reduce its forward speed to that of the lighter model the 9 oz. job would have to have an incidence angle of something like 12—15 deg., giving low L/D ratio and, therefore, high sinking speed (3·5 ft./sec. or more, like the flying brick!)

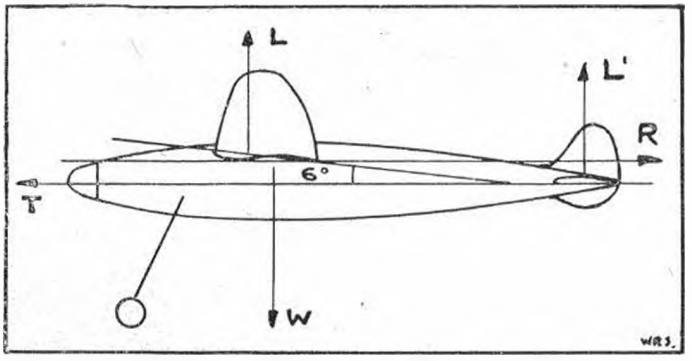
A " slabsided " Wakefield design has considerably more drag than a streamliner.

Since the lift cannot be increased by raising the angle of incidence further (already 5—6 deg. on a " streamliner "), the " slabsider " must have lower L/D ratio. Now Mr. Renaut wants to fly his wing at a smaller angle (3 deg.), thus reducing life, making the L/D ratio smaller still. He will also increase forward speed, getting, at the same time, a vastly increased sinking speed. Remember, sinking speed $= \frac{\text{L/D}}{\text{forward speed}}$!

As Mr. Powdrill says: " For the least drag the model should have a glide path along the centre line of the fuselage." Incidence to give lowest sinking speed (on a streamliner, as tested by Mr. Powdrill), is 6 deg., so the wing chord line must be at an angle of 6 deg. to the fuselage centre line.

The thrust (T) exerts a moment about the centre of resistance, tending to raise the nose, making the model climb. The greater the power, and therefore the thrust, the greater will be the angle of climb. In a low- or moderately-powered model, the climb is not steep, and the incidence is not increased enough to cause a stall, due to increased incidence (and therefore lift) at the lifting tail surface.

A high-powered model will nose up into a stall with excessive thrust, down-thrust usually being required to eliminate it. This causes more drag, and so reduces the effect of the higher power.



Mr. Renaut is greatly under-estimating the length of motor run of a streamliner at 75 seconds. 120 would be nearer the mark. With a two-minute motor run a model will reach 200—300 feet, which is as high as the high-powered model will get. Then the glide of the high-incidence streamliner is better than that of a model with 3 deg. incidence, as proved above. This means that it will take longer to come down, making a total duration considerably in excess of the low-incidence model, e.g.—

	INCIDENCE.	HEIGHT REACHED.	MOTOR RUN.	TIME FOR GLIDE.
1.	6° ...	300 ft. ...	120 sec. ...	150 sec.
2.	3° ...	300 ft. ...	50 sec. ...	136 sec.

N.B.—Model No. 1, sinking speed, 2·0 ft./sec.
Model No. 2, sinking speed, 2·2 ft./sec.

Thus the total duration of No. 1 is 270 seconds, whereas No. 2 will reach terra firma again after an interval of 186 seconds. Quite a considerable difference!

So it seems that the streamliner, with moderate power and 5—6 deg. incidence, is the key to consistently high duration.

It is hardly fair to compare our models and Korda's at the 1939 Wakefield contest, as the weather changed soon after Korda's grand flight, making it almost impossible for our lads to strike a record-breaking thermal.

Korda admits that one of his slabsided Wakefield jobs flew much better on three-quarters of its original power, turning in much higher durations, and therefore presumably climbing to greater height than it did with high power.

This principle is carried to its peak in the long motor-run streamliner, with its long, steady climb and flat glide.

So here's to the model that doesn't need wings at all! Perhaps it will glide upwards, with a motor to bring it down!

Yours sincerely,
E. J. S. TOWSEND.

DEAR SIR,

In your February issue a contributor made the following statement:—

" My answer to them is to seal up the fuselage of their 'planes and fill them with gas, then perhaps they will be satisfied with a duration of several hours!"

I do not know whether this gentleman offered it as a serious suggestion, but I am afraid that if he tried it out durations of several hours would hardly be obtained.

This idea has been suggested to me by a friend also,

and so the following calculation may be interesting to some.

For an example, suppose a fuselage of 1,000 cubic centimetres is taken.

The weight of this quantity of air is about 1·29 grams.

The weight of this quantity of hydrogen (the least dense of gases) is about ·09 grams.

The decrease in weight due to the filling with gas is, therefore, 1·2 grams, or about 1/24 ounce.

The operation is, therefore, of no practical value (unless the fuselage is of a terrific size, and then the model would no longer be an aeroplane; it would be a lighter-than-air craft).

The weights given are, of course, variable with conditions, but for our purpose they are sufficiently accurate.

Yours faithfully,

DOUGLAS COLLINSON.

DEAR SIR,

If Mr. Hugh C. Furneaux had had more experience in the practical and construction side of aero-modelling, rather than in the "theoretical, scientific, and executive side," perhaps his letter, published in the February AERO-MODELLER, would not have been so "severe in its criticism."

It is a fact that the people who criticise most are also the people who are never inclined to remedy the defect, if a defect there is. When they speak they say a lot, but when asked to do something, they immediately stop talking so much and try to get someone else to do that "something."

Mr. Furneaux also asks how often the names of various famous aero-modellers appear in THE AERO MODELLER, at the head of plans or technical articles.

Why does not Mr. Furneaux attempt to write an article himself, as he has spent such an interesting five years in the "theoretical and scientific side" of aero-modelling? Or is this too far beneath a "kibitzer" who, in his letter, so aptly described himself as a fool!

Yours faithfully,

F. W. SHEARN.

DEAR SIR,

I should like to make a reply of sorts to "Kibitzer" Furneaux's letter in the February AERO-MODELLER.

Firstly, with reference to the organisation of the S.M.A.E. perhaps I can say a few words in support of this much-maligned body. I have had some experience of the organising side of model aeronautics myself, and was for a time a member of the S.M.A.E. Council.

The S.M.A.E. appeared, during my association with it, to do very well, even though the proxy delegates were not exactly up to scratch. The competitions were organised properly, even though minor details were unsatisfactory, and when the Area Scheme came into operation things were made fairer still. The system of decentralised competitions was another great advancement. Mr Furneaux must remember that the S.M.A.E. is a purely voluntary body; it is still in its infancy as far as administration is concerned, and, if he *must* compare it with the States, it has not the sponsorship from the trade like the U.S.A., neither does it cater for so many people. As for "falling behind the U.S.A.," I consider that our principles of working are in advance of the Americans.

Admittedly, the society has made some "bloomers," but most probably Mr Furneaux would make many more if he was given something like the S.M.A.E.'s worries! Even the Area Scheme may have its faults, but it is the *best* idea yet put forward, and so the S.M.A.E. accepted it. The Editor will tell you all about the work involved in the starting of the scheme if you ask him—he did a lot of it.

The question of competition rules is very complicated, and the S.M.A.E. could do well to accept only the records as recognised by the F.A.I., and if they *do* think further records necessary, then submit them as a suggestion at the F.A.I. meeting. Anyway, what *is* really wrong with the S.M.A.E. record rules? If someone has the ingenuity to construct an ornithopter that does 15 sec., then give that man the credit for a "H.L. ornithopter record."

As for petrol advancement, and its comparison with the U.S.A., let me again remind Mr. Furneaux of the difference in population of the two countries. Has he heard of Lt. Col. Bowden, Mr. Sharvell, Mr. Ross and company? I defy him to give any examples of finer or more advanced petroleers from America. "Literally no progress," he says. The "progress" in America seems to have been confined to producing kits and engines to suit the pockets of all from 12 years old upwards, and selling thousands of them to people who probably don't know the first thing about power model flying.

Finally, I should like to support THE AERO-MODELLER policy of printing all types of plans. I am quite prepared to read THE AERO-MODELLER even if it mixes up 15 second duration models with stress analysis integrations. I like the mathematical side of aero-modelling, but I am sure that Mr. A. H. Smith's articles are not considered an insult by Mr. W. G. Heath.

As for the American magazines giving plans of models with durations of three minutes, with all due respect, of course, that is only what they *say*.

Well, I think I have had a little say in the matter, even if this letter does not constitute a reply as such. Other readers will probably have something to say, and I await their comments with interest.

Yours faithfully,

SAMUEL HODD.

DEAR SIR,

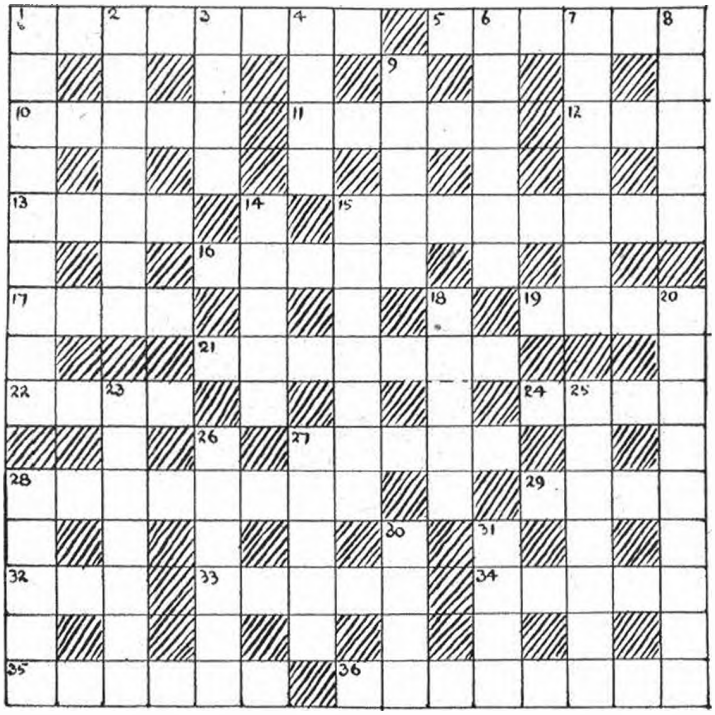
In defence of your "small-duration model" plans, to which Mr. Furneaux seems to object, I was in need of something to make during the long miserable evenings while "Jerry" did his stuff overhead, and, as I simply could not seem to be able to do any good at all at my old hobby of ship modelling, I tried my hand for the first time at "balsa butchering." Thinks I, I want something not too big or too hard for a start, but I want to be able to see it fly if I manage to get it together all right, so I built the "Wasp," and I was so interested over the work involved that I also built "Eureka," leaving out the wing bracing struts, as I wanted to be able to pack it up for transport. I am pleased to say I have derived many hours of real pleasure from constructing these little models, and I am sure I shall look forward to any more of the same class of plans in any future numbers of THE AERO-MODELLER. As to flying them, I am sorry to say that owing to the weather, and all local flying fields having been made "unflyable," I must wait until later to see what happens. In the meantime, some more 20 in. span plans, please. After all, you can't make 6 ft. span flyers on one end of the table while "Mrs." uses the other for sewing, etc.! My material had to be taken home from London on the footplate of a locomotive, of which I am a fireman, and long lengths of balsa just wouldn't fit in anywhere! (No supplies in *this* district). Thank you for a very interesting periodical, which, in my opinion, is well worth the sum charged.

I remain, Yours truly, A. WHITTEN.

THE AERO-MODELLERS' X-WORD — No. 5

ACROSS.

1. Visualise a machine with the road behind (8).
5. Sounds intended after this French glue (6).
10. Humans in this era hope to make this (5).
11. Cars do it at rear of 'planes (5).
12. Pa's favourite reptile? (3).
13. I look over this image (4).
15. Do you H.L. your model with this method (8).
16. Illuminated the tear at the end (5).
17. Many a mite is quite a one (4).
19. Front part of aircraft (4).
21. Topmost (7).
22. A dry measure (4).
25. Highest point reached by Asst. Commissioner and me (4).
27. Cut five in a prophet (5).
29. Hector's partner in the march with the Army of the air (8).
29. Roast and polish (4).
32. He likes us not (3).
33. It is warm behind such a garment (5).
34. Flat sound of flyer (5).
35. The star was resting on the vase (6).
36. The low fellow in the midst of the packages falls over the bed of the stream (8).



DOWN.

1. Quality sought by aero-modellers (9).
2. A high spot colour, the basis of liquids we use (7).
3. Her title (4).
4. Surely no direction for this piece is not right (4).
6. This is more facile (6).
7. Come out, the chap in the middle! (7).
8. Just moderately warm (5).
9. "Lop it," said the lad in the "Hurricane" (5).
14. I am amongst the upset pans (5).
15. What 9 down controls (7).
18. THE AERO-MODELLER to the aero-modeller (5).
20. Open individuals produce harmonics (9).
23. Esteem.
25. A shilling expert. Policeman! Come down! (7).
26. The correct retort to this clue (6).
27. An irregular verse will do as an anagram of 27 across (5).
28. Elevators or complete wing does (5).
30. Coin the lady (4).
31. The story of the winning of the Wakefield Trophy (4).

10s. 6d. will be paid to the sender of the first correct solution to this crossword puzzle received at our Leicester offices. Entries should be marked "Crossword" on the top left-hand corner of the envelope. —— *Closing date, March 4th, 1941.*

The 10/6 prize for X-word competition No. 4 has been awarded to Mr. J. H. Lewis, R.A.F.V.R., No. 5 Group, H.Q. Grantham.

Solution to No. 4 X-Word

1 W	I	2 D	E	■	3 C	4 H	O	5 R	D	■	6 S	7 A	I	8 L
A	■	I	■	9 P	■	O	■	E	■	10 M	■	M	■	O
11 K	E	S	T	R	E	L	■	12 T	R	A	I	N	E	R
E	■	T	■	O	■	I	■	R	■	S	■	E	■	D
■	13 W	A	I	V	E	D	■	14 A	S	S	I	S	T	■
15 F	■	F	■	E	■	A	■	C	■	E	■	I	■	16 G
17 I	N	F	A	N	C	Y	■	18 T	E	S	T	A	T	E
E	■	■	■	■	■	■	■	■	■	■	■	■	■	A
19 L	E	20 A	D	21 I	N	22 G	■	23 P	I	24 O	N	25 E	E	R
D	■	L	■	N	■	U	■	L	■	S	■	N	■	S
■	26 E	L	E	V	E	N	■	27 A	R	T	I	S	T	■
28 A	■	T	■	E	■	N	■	N	■	L	■	L	■	29 T
30 F	L	O	U	N	C	E	■	31 T	R	E	P	A	N	S
A	■	L	■	T	■	R	■	E	■	R	■	V	■	A
32 R	O	D	E	■	33 A	S	T	R	A	■	34 T	E	A	R

REMEMBER!

That there are two "solid" model competitions now running in this journal.

One is open to all members of the Air Training Corps, and the other is open to all non-members of the Air Training Corps.

The rules for both the competitions are exactly the same.

Entrants for either competition must enclose coupon No. 1 (which was printed on the inside back cover page of last month's AERO-MODELLER) and also coupon No. 2, which is printed below.

SOLID MODELS COMPETITION

This Coupon MUST be attached to entrant's entry form. It may be used by entrants for either the "Air Cadets only" Competition, or the "A.-M." Competition for non-members of the Air Defence Cadet Corps.

No. 2 ***March, 1941***

A PORTABLE RUNWAY

FROM A TEA CHEST—3 or 4 SECTIONS AS DESIRED —— By F. G. HINTON

OBTAIN, if possible, a tea chest 2 feet high. Take it entirely to pieces, carefully, so as not to split or crack the edges. You will find all the sides to be perfectly square and true, so that sections B and C will not need any attention beyond a final sandpapering of the finished board, but for the sake of lightness section A can be tapered off to about 2½ inches.

In these days one hesitates to blandly say " obtain " certain timber, but you will probably be able to obtain somehow 14 feet by ¾ in. by ¾ in. of deal for the stiffeners. Cut off 5 pieces 1 ft. 5½ in. in length, and having smoothed them fix securely to the ends of the " worst " sides of the three pieces that you have selected from the tea chest, by screws counter-sunk into the top surfaces of the 3-ply.

Now cut off two lengths of 2 feet each and one a little longer, according to the amount of taper you have made in section A. Saw all three of them down diagonally from end to end, so that you will have six pieces of triangular section, which when planed smooth along the sawn sides will be ¾ in. by ½ in. near enough.

These also are secured by screws along the sides of sections A, B and C, and nailed to the ends of the ¾ in. by ¾ in. end stiffeners. Fit in a short piece of ¾ in. by ¾ in. at the narrow end of section A.

Now lay sections A and B *top* sides up on your bench or table and neatly let in two hinges flush with the surface of the 3-ply, taking care to keep the sections well together and true at the edges and corners. Make sure that the holes in the hinges are sufficiently counter-sunk to allow the screws that you are using to go in flush.

Next turn these two sections over and place section C *bottom* up against the end of B.

With two more hinges let into and securely screwed to the undersides of the end stiffeners you will be able to fold up your runway.

One can always improvise some means of propping up the take-off end of section C a few inches, but it is well worth the small trouble of making two legs of oak with slots in them for a short round-headed square-necked bolt secured by a wing-nut and washer, so that they can be adjusted to any desired height within reason, especially on a forward slope or uneven ground.

These legs are attached to the end stiffener by preferably *round*-headed brass screws, with a washer under each head, and they must be about ¾ in. shorter than the stiffener to allow of a distance piece or some kind of packing to be inserted at D (in plan of under-surface), through which the screw holding the external or rear leg passes. Two strong books, engaging on round-headed screws at the junction of A and B will hold these two in suspension, if so desired, but I *don't* altogether recommend this, or consider it necessary.

But I *have* found it a great help to be quite sure of knowing the exact direction of the wind at ground level. All you need for this is a bicycle spoke and a piece of flexible curtain-rod some 8 in. in length. The spoke almost exactly fits the spirally constructed rod, and can be securely held therein by solder. (N.B.—Plastic solder will do!) Drill a hole through the short stiffener into which the curtain-rod should be a " nice " fit. Countersink to a depth of $\frac{3}{16}$ in. for a screw with which to lock the end of the rod in place.

As you may be like myself and prefer to have your pieces of silk thread attached to a swivel at the top of the mast, you can fill in the slot in the nipple with solder and insert a pin (so that it turns easily) from the inside (off which the point can be cut), and bend into a hook (also closed with solder), attaching coloured threads of silk to the loop formed.

It is also well worth while to make a neat little housing of thin wood to protect the silk during transport. In any case the mast has to be prevented from flopping about when not in use as such. I was able to obtain a cigar box with very small brass hinges, and used part of one of the hinges to contrive a tiny door with a slot into which the mast is a tight fit and keeps it shut.

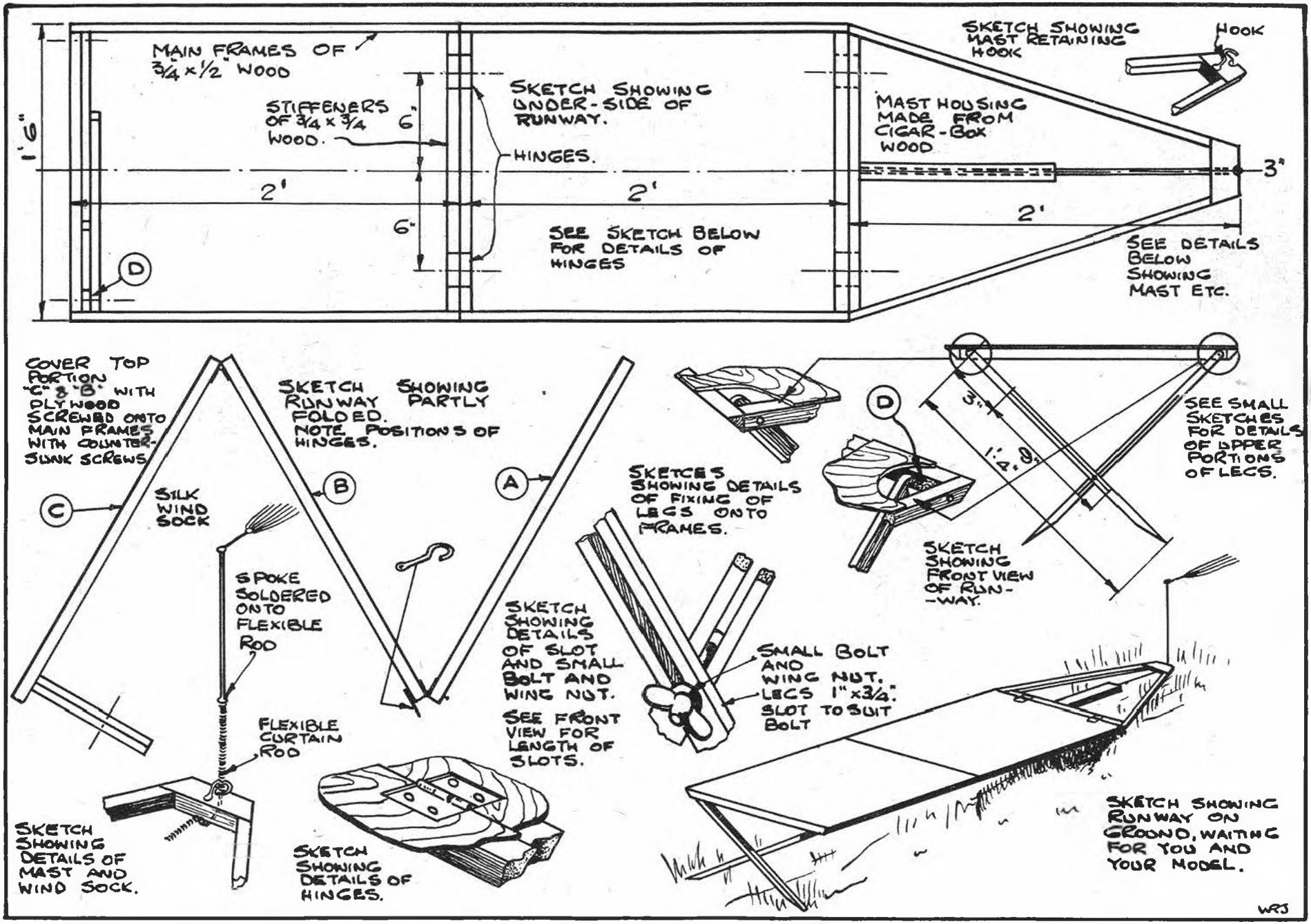
Now it is as well to cut and file a semi-circular recess into which the curtain-rod fits when bent round and up. Another hook will hold it in the erect position.

So far I have never found my board too short, but it is easy enough to add a fourth section by simply attaching it to C with hinges let into the plywood sufficiently for the central parts of the hinges to be flush with the " deck."

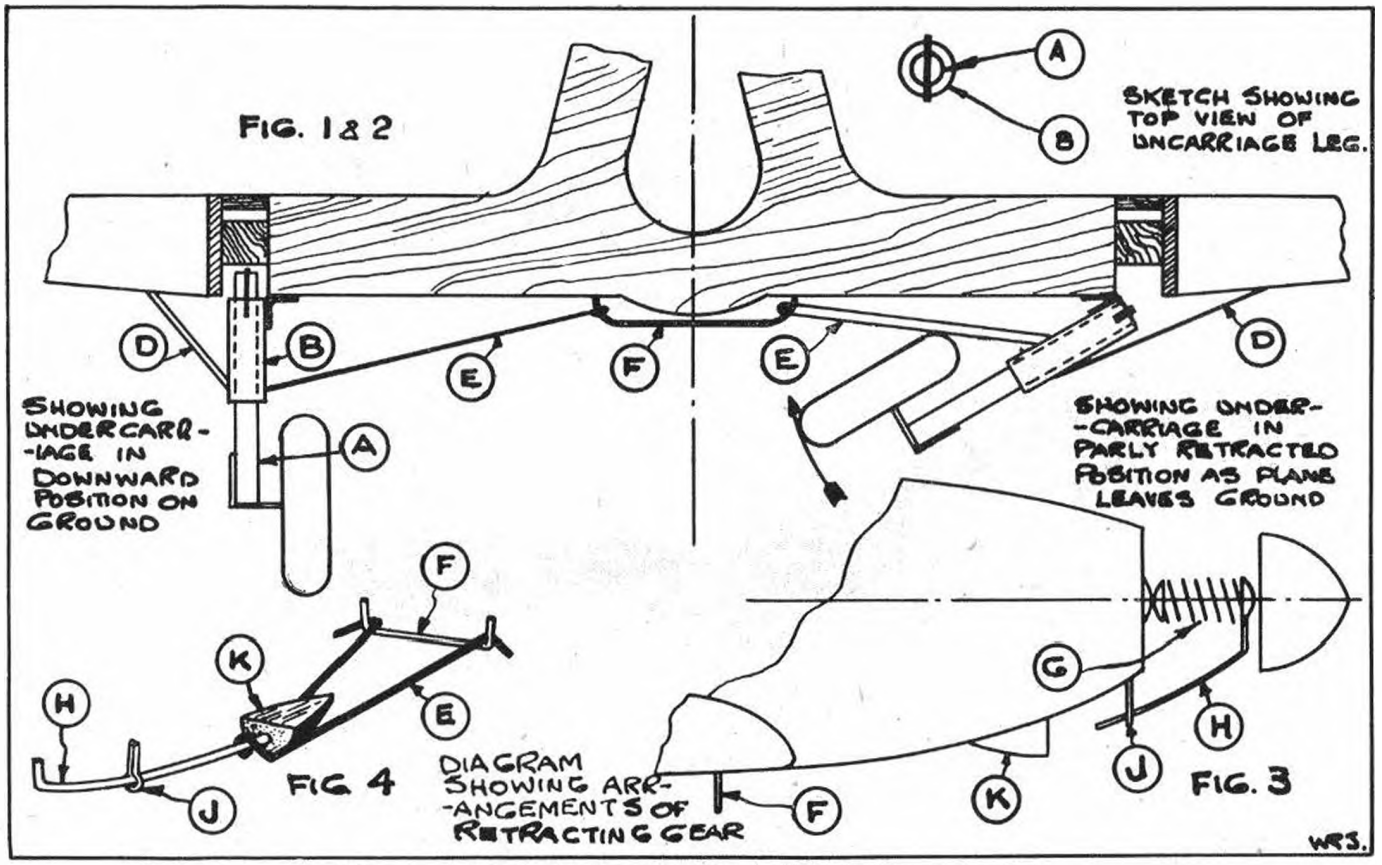
Have these screws *slightly* large for the holes, so that the heads project a little and fill up with layers of plastic wood pressed well down—the heads of the screws will hold it securely. With a 6d. strap carrier mine does not weigh four pounds, and is quite attractive-looking as well as exceedingly useful.

MECHANISM FOR AUTOMATIC RETRACTING AND DETRACTING UNDERCARRIAGE —— By P. O'KEEFFE

MANY and varied are the usual retractable and detractable undercarriages made by aero-modellers. Few, however, will retract after the take-off, and slip down when the power is finished, just like a real 'plane. The one shown in the drawings herewith (suitable for the usual scale models), will act so. The usual dowel leg " A " slides freely in tube " B," hinged at wing-root. A length of one-sixteenth inch square elastic is put across the top of the tube, and fixed to top of " A," as in inset diagram (top view). Elastic " D " holds undercarriage in a normal " down " position. Another, " E," just reaches from one tube to another, unstretched. A wire guide for this latter elastic is shaped as " F," the ends being upturned, and pushed into either wing-root. The nose assembly is shown at Figure 3. Cup washers are placed as shown, and a light spring " G " is between them on the spindle. A wire " H " is soldered to rear washer of front set. " J " is a guide to enable " H " to slide freely into


MAIN FRAMES OF 3/4 x 1/2 WOOD
STIFFENERS OF 3/4 x 3/4 WOOD.
6"
6"
1'6"
2'
2'
HINGES.
SKETCH SHOWING UNDER-SIDE OF RUNWAY.
SEE SKETCH BELOW FOR DETAILS OF HINGES
D
SKETCH SHOWING MAST RETAINING HOOK
HOOK
MAST HOUSING MADE FROM CIGAR-BOX WOOD
3"
2'
SEE DETAILS BELOW SHOWING MAST ETC.
COVER TOP PORTION "C" & "B" WITH PLYWOOD SCREWED ONTO MAIN FRAMES WITH COUNTER-SUNK SCREWS.
C
SILK WIND SOCK
SPOKE SOLDERED ONTO FLEXIBLE ROD
FLEXIBLE CURTAIN ROD
SKETCH SHOWING DETAILS OF MAST AND WIND SOCK.
SKETCH SHOWING RUNWAY PARTLY FOLDED. NOTE POSITIONS OF HINGES.
B
A
SKETCH SHOWING DETAILS OF SLOT AND SMALL BOLT AND WING NUT.
SEE FRONT VIEW FOR LENGTH OF SLOTS.
SKETCH SHOWING DETAILS OF HINGES.
SKETCES SHOWING DETAILS OF FIXING OF LEGS ONTO FRAMES.
SMALL BOLT AND WING NUT. LEGS 1" x 3/4". SLOT TO SUIT BOLT
D
3"
1" R. 9"
SEE SMALL SKETCHES FOR DETAILS OF UPPER PORTIONS OF LEGS.
SKETCH SHOWING FRONT VIEW OF RUN-WAY.
SKETCH SHOWING RUNWAY ON GROUND, WAITING FOR YOU AND YOUR MODEL.
WRJ

a hole in block " K." The whole thing is now ready to fly. " E " is gathered up into a loop and brought through " F " from the rear. It is stretched forward to " K." The propeller is wound, and " H " gets nearly into hole " K." " E " is slipped over wire, and a few more turns put on the propeller until " H " engages hole in " K." The position now shown in Figure 4, the undercarriage being retracted, as force in " E " overcomes that at " D," The legs are now forced to the " down " position, and the 'plane is put on the ground. " A " slides up inside " B," and catches between wing-root and the first rib; so preventing the legs from retracting, 'plane is released. On leaving ground, " A " is pushed down to normal position by elastic " C." Undercarriage retracts. At end of motor run, " H " disengages from " K," leaving elastic " E " to drop limply. Elastic " D " now comes into play, pulling legs down ready for a three-point landing.



BOOK REVIEW

THE ROYAL AIR FORCE IN PICTURES. Country Life Ltd. 5s.

Most " new boys " look forward to their first day at a new school with some misgiving.

What will it be like? What are the classrooms like? What clothes are worn? What will the *grub* be like?

These and many other questions pile up in the mind of the new boy or, for that matter, the youth entering business in his first job.

In a similar way, new recruits to the R.A.F. must wonder what it is all like.

What will the camp be like? What will the other fellows be like? What is the uniform like? *What is the grub like?*

In regard ot the R.A.F., answers to questions such as these may be found clearly set out in " The R.A.F. in Pictures."

This book, edited by Oliver Stewart, Editor of *Aeronautics*, is divided into two sections.

The first and greater " half " contains photographs of some sixty aircraft used by the R.A.F.

A number of these photographs have been published before, but lose nothing of their interest on that account, representing as they do high-class examples of the photographic skill of some of the leading photographers in the country.

Interesting descriptions of the various aircraft are placed opposite to them, and this section of the book will appeal to many collectors.

The second " half " of the book is a description of the R.A.F. training.

There are a number of extremely interesting photographs revealing practically every phase of life in the R.A.F., showing what the fellows look like, what sort of clothes they wear, what they do, and even what they eat.

With the tremendous expansion of youth training consequent on the inauguration of the Air Training Corps, there will be many youths who will find interest in such a picture book as this, and we recommend it as " good value for money."

GET SOME FUN OUT OF GWENNY

Build this tricky little Indoor Model that flies round the room

By **BOB RENAUT**

NO doubt a good number of aero-modellists throughout the country will have been experimenting with micro-film indoor models during the black-out, and will have gained some experience in handling these delicate little jobs. However, as the majority will probably not have had a very large room or hall available in which to fly their models, they may have found it a bit tricky to get good flights round the living room at home.

Well, here's a little model specially adapted for this purpose, which has given a great deal of amusement at parties at Christmas and New Year. Flights of 70 seconds have been obtained, while you sit down comfortably round the fireside, and when it circles lower you just reach up, catch it, and rewind for another flight.

The funniest thing is that this little model has dragged a small toy balloon, with Hitler's face painted on it (in Indian ink) round and round the room, much to the amusement of the onlookers. It also has flown round with a broad streamer with " Happy New Year " printed on it, trailing from the rudder. It is really amazing what fun can be had for very little effort.

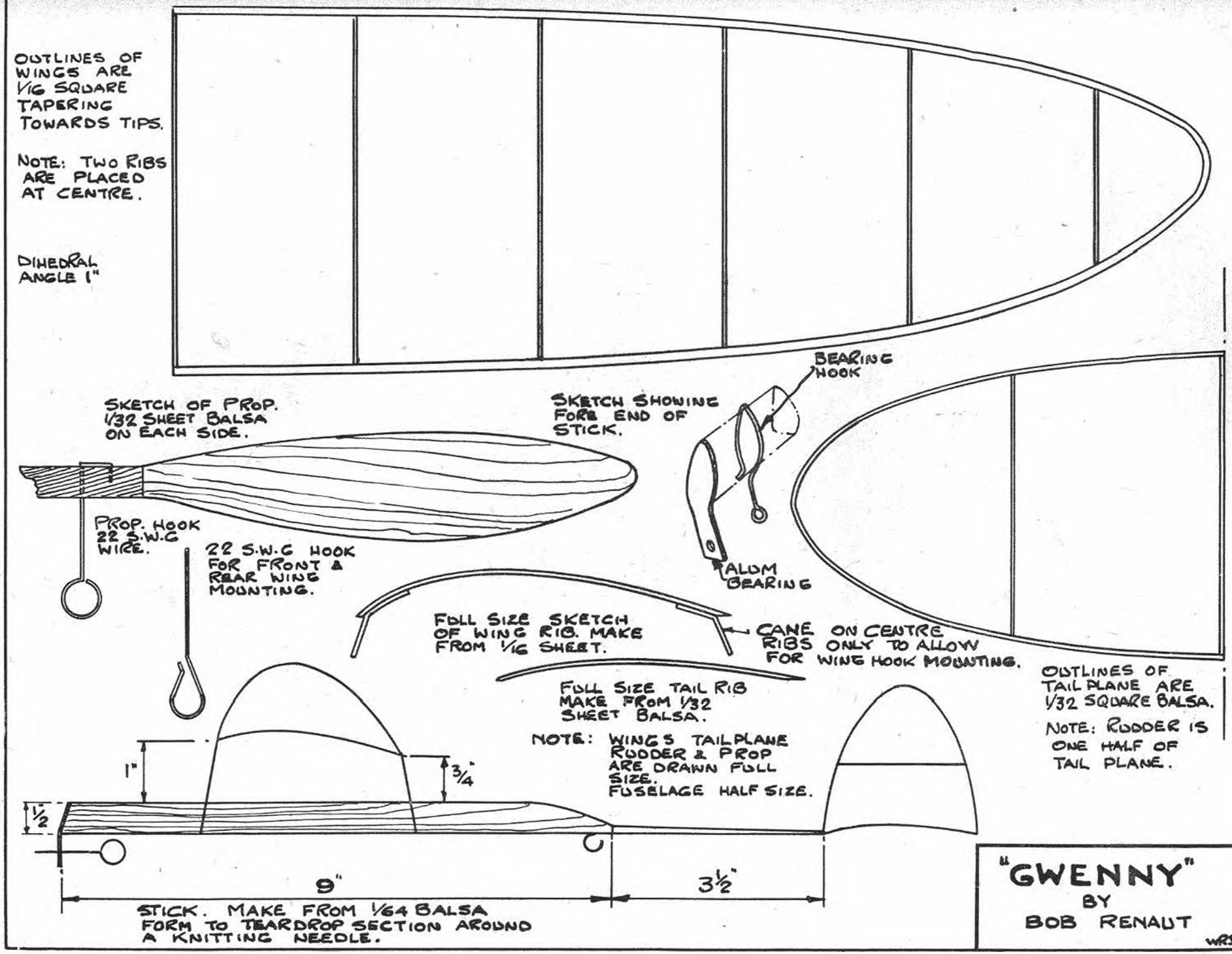
The secret of success lies in getting the model to make a slow yet tight circle, and this is obtained by a wire clip attached to the nose, which diverts the thrust line round with the tongue.

The model is built up in the usual manner, with tear-drop fuselage and microfilm wings, tail and rudder, to dimensions given in diagram. Complete, it should weigh no more than $\frac{1}{8}$ oz., powered with thin rubber bands looped together, or $\frac{1}{16}$ in. square rubber. Here are a few hints on flying the model to ensure success.

The propeller may be twisted to a high or low pitch, but the high pitch works much better owing to the light weight of the model, and this gives longer duration. The wire clip must give a side-thrust of about 10 degrees, and must not have any downwar when circling with the tongue or the model will spin into the ground. The rudder should be set at about 20 degrees to make a tight circle, while wash in must be given to the inside wing to keep the model level.

Although a lifting tail is used, the wing must always have more incidence than the tail, and should be moved by adjusting the clips so that the C.L. is just ahead of the C.G. This ensures slow floating flight. If the model touches the ceiling when circling with the torque, the propeller helps it round, but when circling in the opposite direction the model is driven into the wall.

If you attach the toy balloon, fasten it to the *front* wing clip on the inner circle side and move the wing forward. You will get perfect stability in this manner. Be careful with your mother's ornaments, if you use a toy gun to pop at Hitler's face on the balloon.


OUTLINES OF WINGS ARE 1/16 SQUARE TAPERING TOWARDS TIPS.
NOTE: TWO RIBS ARE PLACED AT CENTRE.
DIHEDRAL ANGLE 1"
SKETCH OF PROP. 1/32 SHEET BALSA ON EACH SIDE.
PROP. HOOK 22 S.W.G WIRE.
22 S.W.G HOOK FOR FRONT & REAR WING MOUNTING.
SKETCH SHOWING FORE END OF STICK.
BEARING HOOK
ALUM BEARING
FULL SIZE SKETCH OF WING RIB. MAKE FROM 1/16 SHEET.
CANE ON CENTRE RIBS ONLY TO ALLOW FOR WING HOOK MOUNTING.
FULL SIZE TAIL RIB MAKE FROM 1/32 SHEET BALSA.
NOTE: WINGS TAILPLANE RUDDER & PROP ARE DRAWN FULL SIZE. FUSELAGE HALF SIZE.
OUTLINES OF TAIL PLANE ARE 1/32 SQUARE BALSA.
NOTE: RUDDER IS ONE HALF OF TAIL PLANE.
1"
3/4"
1/2"
9"
3 1/2"
STICK. MAKE FROM 1/64 BALSA FORM TO TEARDROP SECTION AROUND A KNITTING NEEDLE.
"GWENNY"
BY
BOB RENAUT
WRS.

This month's prize-winning photo comes from W. A. Dean, whose "Mystery Man" petrol model is shown here. Note the lighting arrangements and the angle from which the photo was taken.

NEWS FROM ALL THE CLUBS

By CLUBMAN

HIYER Gang! Or am I pinching Vic Oliver's gags? Of course, like him, I'm colossal—or should it be collousy? I leave it to you—and anyway, why should I worry. That's the cream of working under a *nom-de-plume*. You can pull your pals' legs—and now and then throw a spot of dust into their eyes by guying myself—and no one knows who to sling the hatchet at!

S'funny, though, the guesses that have been hazarded at my identity. I have had many a good laugh at your efforts, having been variously identified as any of a hundred Clubites, the Editor, the Moving Finger (may he never die), and Uncle Tom Cobley and all. Still, joking on one side—as the Bishop said, as he shoved the comedian farther up the bar at the "Down-thrust and Thermal." Taking it all round, I am assured that my method of dealing with club reports is meeting with general approval, and I trust I can continue to please at least the present large majority. Naturally, a few object, but a process of elimination elicits the fact that the objectors are invariably those whose reports need the most editing and slicing! From which we gather what? As our American friends so succinctly put it—phooey.

I feel my first words this month should be on our sadly missed patron and "fairy godfather"—Lord Wakefield. The news of his death came as a great blow to all, and to none more so than the many thousands of aero-modellers in this and other countries. No one without a very close knowledge of S.M.A.E. internal affairs can realise just how much this most generous of patrons has done for the hobby, and he will be sorely missed.

When I say that I do not mean solely from a financial point of view, though it is in this direction that he was widely known to most enthusiasts. Granted his financial support will be missed, but to those of us who were fortunate to meet his Lordship personally, it will be his kindly personality and understanding that stands out uppermost. I class myself fortunate in having had the opportunity of conversing with Lord Wakefield, and to have had my opinion verified. His support of aero-modelling was not undertaken with a view to collecting reflected glory, but with a genuine desire to see the youth of the nation on top in all things—and in particular in the air. Our participation in international modelling events—which all will agree has elevated us to the top of the tree—would have been impossible (or at any rate greatly slowed down) had it not been for the bountiful help, both financially and morally, of our patron.

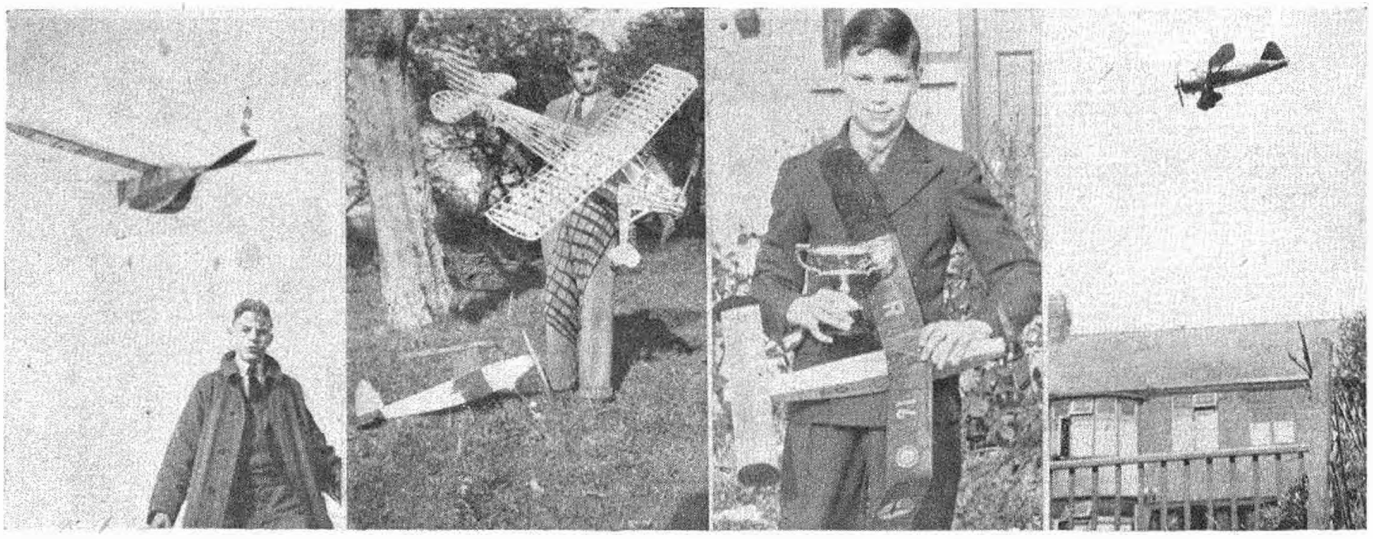
The Wakefield Cup itself was the instigation of a widespread and increasingly popular bringing together of the aero-modellers of all countries, and his generosity alone made it possible for an English team to travel to Yugoslavia and wing the King Peter Cup in the first competition for this new international event. But his financial help did not stop at the mere writing of a cheque. The great and powerful Wakefield organisation has been willingly placed at our disposal on many occasions, a benefit that only our officials can fully appreciate.

I think that the finest appreciation of Lord Wakefield we can offer is in the knowledge that his death will be felt just as keenly overseas as here at home. I know for certain that the American boys regarded him with as great a respect as ourselves, and I for one am eternally glad to know that we had the opportunity of collectively meeting and showing our appreciation of the greatest friend the aero-modelling fraternity has known.

Who can take his place?

I write this before the annual general meeting of the S.M.A.E. has taken place, so it will not be until next month that I can comment on changes (if any) that take place. I have received a copy of the bulletin, and certainly appreciate the concise form and knowledge contained. As the Editor says, it has been no bed of roses to conduct the business of the society to the best advantage, and many factors have mitigated against the regular holding of meetings of the Emergency Council. I have heard a few grouses from some directions, but I can heartily endorse the view that home and family must come before the duties of an honorary position, and I for one would not feel I was doing my duty by leaving my family in a danger area to attend a meeting that was not a matter of life and death.

I'm going to have a smack at the grousers here, though I guess I should have done so last month, thus preparing them for the annual general meeting. It is the easiest thing in the world to sit down in comfort and criticise others but, and here is my biggest rub, most of the grousers are living in "safe" areas, and can have no conception of the difficulties attendant on attendance at, and transport to, the meetings. Now, I am not talking from a Londoner's point of view. I am widely travelled these days, and have had many opportunities of confirming the utter impossibility of *guaranteeing* attendance—and this does not take into consideration the domestic aspect. Knowing that one's family is in a danger area—and there are not many parts of a



(Left to right) K. Williams (St. Helens M.A.C.) test glides his model. . . . Paul Ridley, of Tasley, with a couple of his models, one at least being a very ambitious affair. . . . K. Reary, of the Lancaster M.A.S., with the Junior Cup won last season. . . . Nice work—both model and background well focused. A Lysander built and posed by P. Fordham, of the Hull M.A.C.

large town that are not classed as such under the indiscriminate bombing activities of our " dear Fruiends "—would the said grousers feel happy—or justified—in leaving them at a time when weather conditions and precedence make it almost a certainty that a raid will take place?

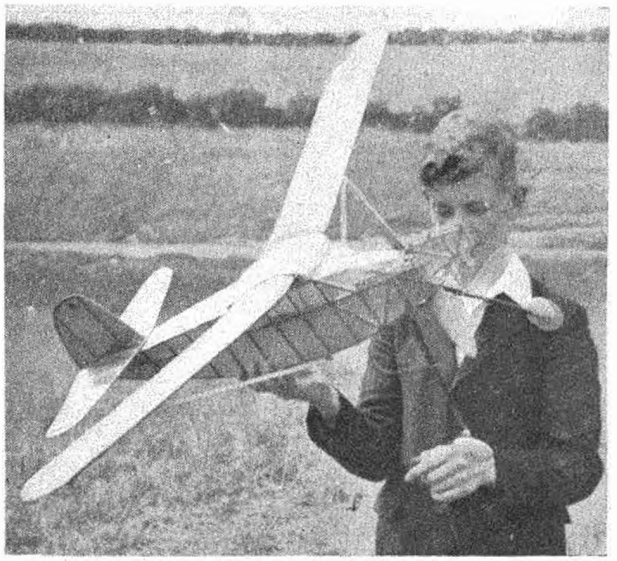
Credit is due to the Chairman, Mr. A. F. Houlberg, for his action in placing his home at the disposal of the committee for their meeting, following which it was possible to come to an amicable arrangement whereby the meetings were resumed. One thing must always be remembered, the chaps you elected to carry on for you have no sinecure of a job, and, if it were not for the unavoidable slow down that would inevitably follow the handing over of affairs to some of these grousers, it would be a lesson to them to have to look after things for a period.

However, more of this anon, when we have the results of the annual general meeting to consider. I am sure the 1941 competition programme will meet with approval, particularly the return of the National Cup rules to the standard under which they were run previous to last year. The idea behind a " limited time " contest was good in its conception, but impracticable in execution. It is a hard task to find that the last flight of a team must only be a matter of seconds, and I am sure that all of us would find it a far more difficult task to fly a model for five seconds than fifty seconds. Just try it some time!

I have carefully read through the proposed new Constitution of the S.M.A.E.—how many of you realised that up till the formulation of this Constitution by the Emergency Committee the Society had operated without such a safeguard?—and I can see nothing but good in it. I suppose some " lawyers " will find one or two holes in the armour, but that will have been thrashed out at the annual general meeting, and I hope you all agree with me that a good job has been done by those in office. Mr. Bell is to be particularly congratulated on his work in preparing the original draft of the rules, following which the committee as a whole were able to thrash out the details.

Some of you will wonder why I—who, in the past (and if necessary in the future!)—has flogged the S.M.A.E., is taking up the cudgels on its behalf now. Well, I like to think I am fair in all ways, and I feel sure that we are now beginning to see good things done, which will have their repercussions in time to come. Most of you will have read the fatheaded letter in last month's AERO-MODELLER, when Mr. Furneaux jumped off the deep end with accusations and recriminations, and perhaps have wondered in consequence. While much of what he wrote had substance in the past, I heartily disagree that such conditions obtain to-day; and the fact that the future of the Society is being cared for in such a way, and under such trying conditions, makes this sort of criticism all the more distasteful. As the Editor said, he is the sort who pays for the whole book and reads only a part. I would go further than that and accuse our critical friend of talking with his eyes shut and his ears stopped up, thus preventing him gleaning any light on a subject of which he is totally ignorant in the first place! Anyone who has the slightest knowledge of our movement knows the history and success of the Area Scheme, of which I was the most ardent supporter, and they also know of the attendant difficulties, under present conditions, of continuing the scheme. But, and this is something to keep well in mind, the scheme has not been dropped, and was and is encouraged in its continuity. The only thing that *has* happened is that those areas that were active and progressive enough to look after their own interests in the first place are now working under the same difficulties as the main committee, and are consequently not heard of to the same extent they were before the present " unpleasantness " started. As for those areas which failed to organise themselves (perhaps our impetuous friend belongs to such an area—and if so, why the hell hasn't he done something about it?) well, what they could not, or were not interested enough to do in peace-time, I'm darn certain they will not do now.

No, friend Furneaux, you are barking up a tree that you have not taken the trouble to discover the nature of, and it is your own fault entirely if you get a brick dropped on your head for your pains. Like many more, you are content to sit down with a vitriolic pen, and inform all and sundry of your entire ignorance of the subject. The Editor was fair enough to print your letter, but I could have found a better place for it! Confine your letter writing to *The Times*, informing all and sundry that you have heard the



" Bob Harvey Surveys the Damage "— or a new position for the propeller!

first cuckoo of the year, and we shall know that you have again been listening to yourself talking on something you know nothing about. That's the trouble with these people who are going to " put the world right "—they never seem to have any worth while suggestions to do the " righting " —and would run a mile if asked to take on some of the responsibility. Grrrr—it makes me fair sick, it do.

Who recognises the fair features contained in our "Puzzle Corner" this month? Yes, it's our old friend and former S.M.A.E. Secretary, Eddie Cosh. He is now in the R.A.F., training to be an instructor in a place that shall be nameless. (See official regulations Section XYZ/12345678, Clause Potty/1000). Recently promoted to Sergeant Pilot, Coshy is making steady progress, and if I am any judge, should make an ideal instructor. Tact has always been a large part of his make-up, and this, coupled with a most cheery disposition, should make learning under him a pleasure. I only wonder if he has learnt the " Instructor's Dictionary " off by heart, without which it seems no one is qualified to teach. At least, when I was learning to fly, I learnt more in ten minutes than I had done in my life. Eh—flying? No, you fathead, real " fruity " language. Ah me, happy days!

The institution of organised indoor R.T.P. meetings is a wise move on the part of the S.M.A.E. Unfortunately, far too many clubs just potter along from week to week with nothing formulated to stimulate interest, and then wonder why they gradually fade away. With the inception of decentralised " Round the Pole " contests, a fillip should be given those who have waited for the lead to be given them, and I am sure that the figures already reported will soon be exceeded. The classes instituted should meet with almost all conditions and restrictions, and in view of a remark made to me, I would stress the point that the limits laid down for length of line and height of pole are the *maximum* limits—in other words, " up to 6 feet, etc., etc."

I trust the efforts of the committee will be rewarded by your whole-hearted support, and I am certain we shall all find some good fun, and learn a lot from competing on a decentralised basis from now on. This type of flying has caught on in a number of places, and to those who have yet to try " swivelling " I say, you have a pleasure to come. The technicalities are in a different sphere from those encountered in outdoor flying, and a lot of the knowledge gained can be profitably used in the design, etc., of outdoor models.

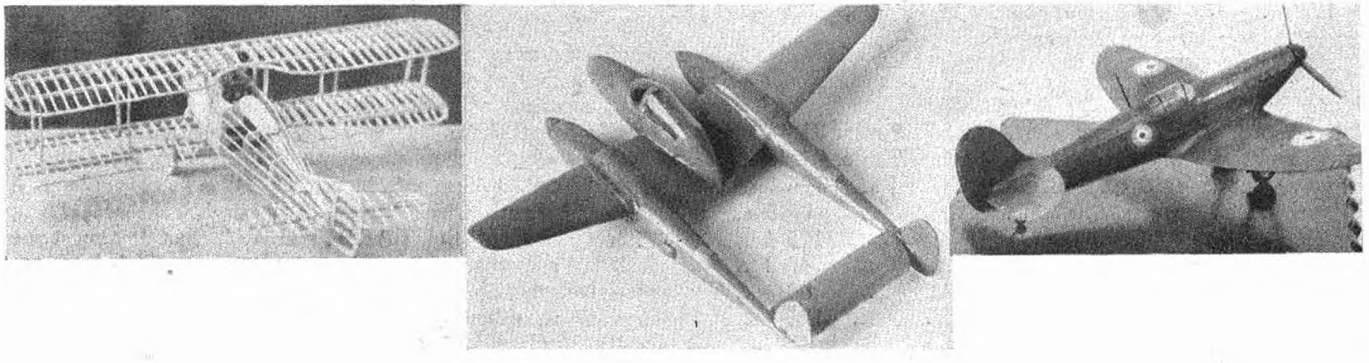
The Editor has passed on a very interesting letter, and I am sure that the contents will be interesting to you also. Mr. Dickson, the hon. sec. of the Bexley A.F.S. Social Club, writes on the birth of aero modelling among the fire-fighters of his section. The chance purchase of THE AERO-MODELLER last November pointed one way of spending leisure time hitherto unexplored. To quote the writer:—

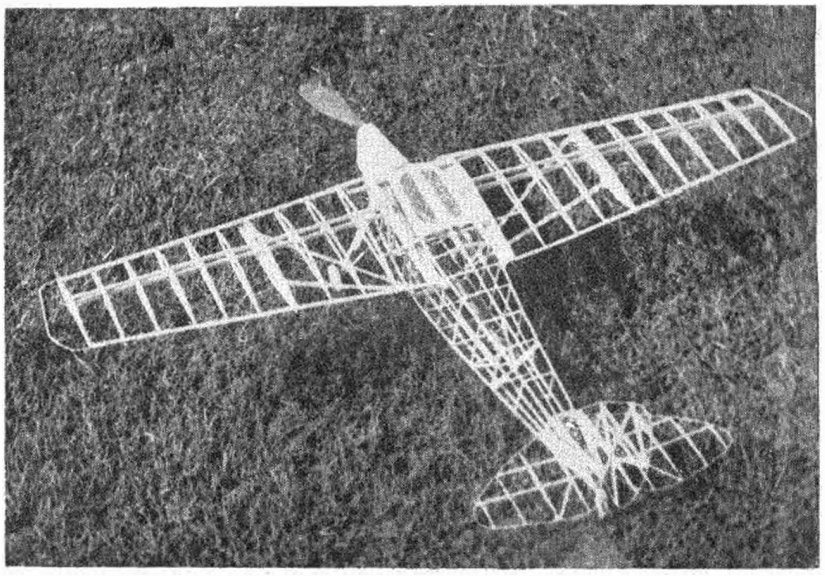
" Of course, in spite of Hitler, firemen do have a lot of leisure time in between fires, though it is necessary to be constantly on the spot ready for anything!

" A number of cheap ' scale ' kits followed, mounting from the ' shilling touch ' through the range to more ambitious efforts at six or seven shillings. Not many of them flew! But who really cared—there were enough successes spread over our six sub-stations to keep the spirit blazing. News of a Spitfire that flew about 200 yards at an elevation of 15 feet on half-winds spread round; rumours of a super job that was to beat everything under construction. The great day was when it was completed and took off on a concrete road, circled, and made a beautiful ' three-point ' in the adjoining field, clocking about 2½ minutes.

" THE AERO-MODELLER plans service has now come into its own—in our area there are already a number of Air Cadets under way, as well as Spitfires and more ambitious

(Left) A 13½-inch span Span built by L. Adams, of Cardiff.
(Centre) Interesting " solid " model of the Lockheed XP-38, constructed by A. Halls, of Dorking. Intelligent photography shows the model up to advantage.
(Right) Nice construction work by S. A. Girling, of Norwich.





Congratulations to Alan H. Mattock, aged 15 years, who built this 36 in. span "Leopard Moth."

projects. At the time of writing there are nearly half-a-dozen 'own designs' under construction, including a dual engined Blenheim, with pulley transmission to the nacelles from the main body—no guarantee of success here, I must admit—as well as a 4 ft. 6 in. wing span job that 'does its stuff,' together with quite a dozen other lesser jobs. Skuas, Saulniers, and even flappers."

Well, chaps, it seems we are in good company, and I have had many similar instances brought to notice, especially among balloon barrage and observer units. After all, with time dragging—as it must do now and then in some of these out-of-the-way places—what better occupation could one find than aero-modelling? Think of the advantages of building your own models for recognition training! I am sure that one learns far more by actually building a model than one could from a dozen lectures.

The annual general meeting of the LANCASTER M.A.S. showed that membership had more than doubled, while a substantial cash balance has been built up. Indoor flying is in full swing, and competitions arranged, similar meetings being held in conjunction with the R.A.F. club at Morecambe (the club having been instrumental in the promotion of this Service club). Capt. C. C. Horner, with the biplane, Wakefield type, and "over 3 oz." competitions to his credit, won the President's Cup, other contest winners being Mrs. Horner, Mrs. Halliwell, and Messrs. Reay, Harvey and Ford.

Indoor events were won by Messrs. Hooton, Biggs, Brodrick, Stokes, and again Mrs. Horner. The club records for 1940 are given here, and should make interesting comparison with your own figures.

OUTDOOR FLYING.

Club Record, Mrs. Horner	7 min. 31·43	sec.
Light-weight (max. 3 oz.), Mrs. Horner	7 min. 31·43	,,
Heavy-weight (over 3 oz.), Brian Halliwell ...	125	sec.
Biplane, C. C. Horner	65·5	,,
Wakefield Type, W. D. Foster...	105·4	,,
Scale, C. C. Horner	40·2	,,
Glider, J. R. Harvey	80	,,
Junior, Brian Halliwell	125	,,
Ladies, Mrs. Halliwell	49	,,

R.T.P.

Special Pylon Models, W. A. Stokes	81	sec.
Scale, L. Biggs	27·9	,,
Open Duration, W. D. Foster ...	53·6	,,
Junior Duration, A. Hooton ...	52	,,
Speed Record (Open), E. Brodrick...	20·7	,,

The NEWPORT M.A.C. arranged a very successful model show in a local shop window, those on show ranging from a 6 ft. span "Spitfire" to a full range of 1/72 scale models. The show attracted the attention of a number of R.A.F. officers, and several outlying districts have asked for the loan of models for their respective War Weapons Week efforts.

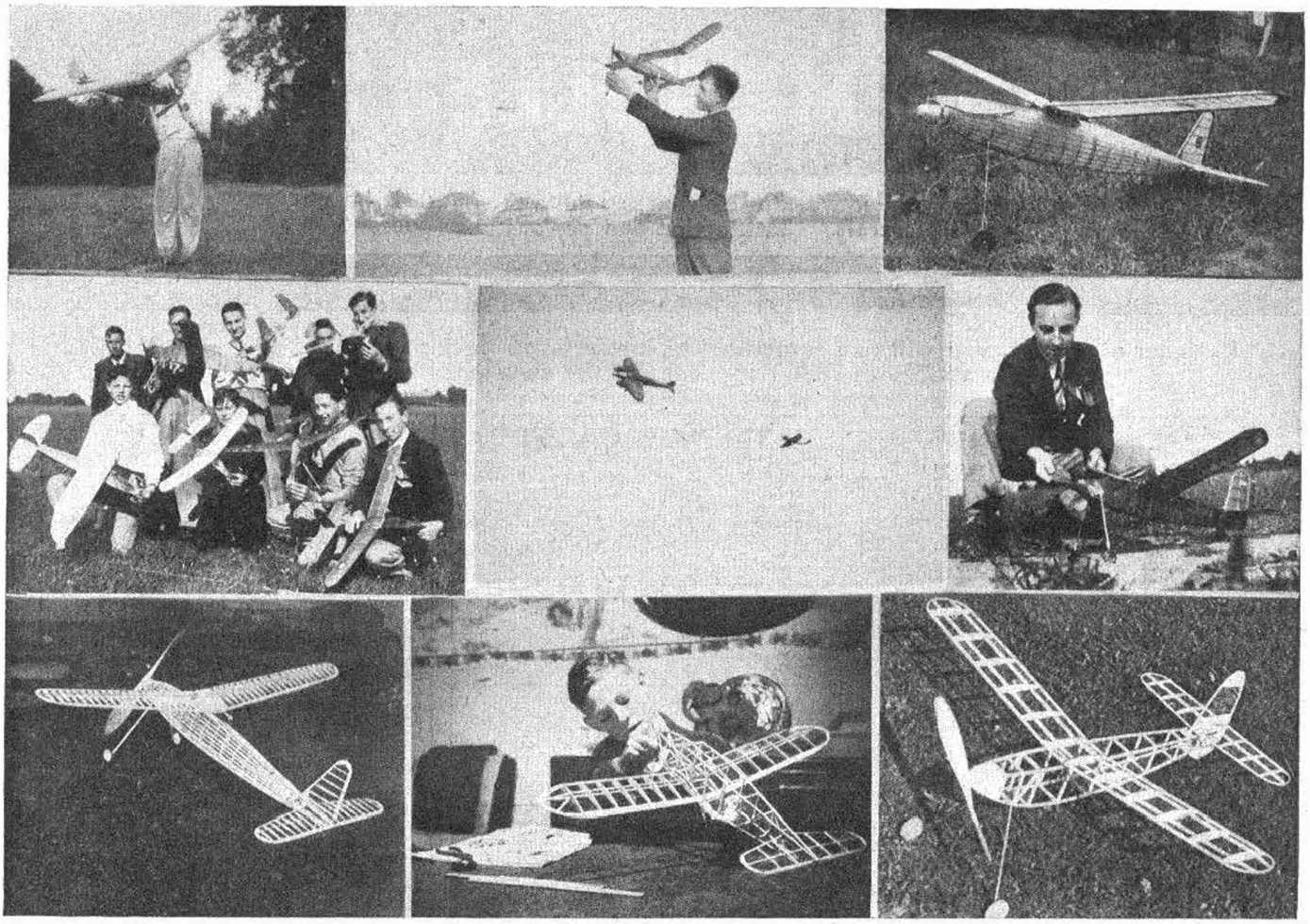
A new club to make its bow is the POTTERIES "VICTORY" M.F.C., with headquarters in the lounge of one of the members. Very tasty it sounds to me! Those interested in this district should get in touch with the secretary, Mr. K. A. Morgan, "Cromer," Beresford Crescent, Westland, Newcastle, Staffs.

During the recent snowy weather—thought we were going to have a repetition of last year's fun and games, didn't you?—the members of the LIVERPOOL M.A.C. fitted their models with skis, and obtained very good durations, best time being put up by R. Pankhurst at 51 seconds. These chaps are very keen on R.T.P. flying, and already have six special models built for the purpose. Clubs in the vicinity are requested to get in touch with a view to co-operation.

Now then, you radio-cum-aero-modelling fans, here's something to think about. The DERBY SHORT WAVE RADIO AND EXPERIMENTAL SOCIETY are forming a model aircraft section, and wish to combine with a view to radio control at such time as the ban is lifted. Those interested are requested to contact the hon. sec., Mr. H. Clamp, at the headquarters, Nunsfield House, Boulton Lane, Alvaston, Derby. I look forward to hearing much more of this venture and its findings.

The EDINBURGH M.F.C. has been entirely reorganised, and over 60 members are now on the books. An exhibition held in conjunction with a captured Junkers 88 resulted in the huge sum of £300 being raised for the local Spitfire Fund. (Boy-o-boy, couldn't the S.M.A.E. Fund do with a sum like that!) A 46 in. span model built by the secretary was auctioned, and realised £23, and this, together with over 200 models on show, makes one of the finest shows yet to come to my attention. Enthusiasts serving in the Forces are welcomed to the club, and should contact the secretary, Mr. W. A. Hogg, at his shop, 54 South Clerk Street, Edinburgh.

A member of the BARRY M.A.C. has "almost perfected" a method of remote control, about which he is very secretive, though I hope he will in time pass on his findings to us other folk. The full control of models is a really worthwhile pursuit, and I shall be pleased to hear



(Top, left to right) R. Duthoit, of the Croydon M.A.C., with a new 6 ft. petrol model, all ready for the lifting of the ban. . . D. Bosworth, of the Potteries "Victory" M.A.C., gets ready to "let 'er go." . . . A "Flying Minutes" built by R. Calvert, of Huddersfield. (Centre, left to right) Members of the Barry M.A.C. out for a spot of flying. . . . A model dog-fight staged by F. Brooks, of Isleworth. . . . R. Rowlands, of Barry, gets down to it.
(Bottom, left to right) Nice construction by David Allwood, of Poynton. . . . 14-year-old D. Damant, of Dagenham, gums up the communal dining table while building his Cloud "Commodore." . . . A "Pixie" built by J. E. Ede, of Claygate.

of other experiments on these lines. With the opening up of a local model supplies depôt, the members are now much better catered for, and the club is going ahead nicely.

A new club, the SUDBURY HEIGHTS M.F.C., has been formed, the temporary secretary being Mr. R. H. Moorhouse, of 56 Horsenden Lane, South Perivale, Greenford, Middlesex. His letter reflects the normal trend of things leading up to the formation of new clubs, and I give it here as a good example of how these things come about.

"The first phase opened when the B.B.C. televised the model boats and 'planes in Kensington Gardens in August, 1939. I am a member of the West London Model Power Boat Club, and was included in the televising.

"This was the first time I had ever seen a petrol 'plane (model) in flight. This aroused an interest in me, so I started to look around for some information. Mr. J. C. Smith, of the S.M.A.E., kindly assisted me in this.

"I built my first model, and when, to my surprise, it did really fly, the thrill was such as I experience when launching a new boat.

"Well, the first model lasted quite a while—not clocking many minutes, but quite satisfying me in the 50, 60, 70, and once 190 seconds flights. Since then I have built many models of all descriptions; and so to the formation of the club.

"Whilst flying I met several other modellers, and through the friendliness of these fellows we talked over the possibilities of a club.

"The room I succeeded in obtaining is quite comfortable, about 30 feet by 20 feet, and we have started indoor and R.T.P., with 12 'live' members to keep things going. We hope when funds permit to affiliate to the S.M.A.E..

"We meet Sunday mornings, and have started club records. They are: 24 in. wing span, tissue covered, indoor job, 5·0 sec. and 49 sec. R.O.G. R.T.P. This, of course, is low, but I know that not one of the members has ever built an indoor job before. Also we have 145 sec. for a 36 in. wing span, and 172 sec. for a Wakefield outdoor.

"I hope I have not bored you with the 'I's' in the first part of this letter, but I think it very interesting to be able to say how a club started and why. I myself have been elected president, and am also acting as secretary at the moment. When things move along smoothly I shall hand over the secretary's job to one of the younger mem-

bers, for I can see that it takes a young man to get really next to the boys, and I can hang around the outskirts."

All modellers in the Coventry area are invited to the open meetings to be staged by the WARWICKSHIRE M.A.C. at the Wyken Institute, Wyken, Coventry, when events for duration, speed and distance—all R.T.P.—will be held. Dates are March 2nd and 16th, and the times from 10.30 a.m. to 1 p.m.

In the six weeks since its formation, the ANDOVER M.A.C. has mustered some twenty members, and these have been busily engaged in fitting up a work-room-cum-club-room. Eighteen benches have been installed, and meetings are held every Sunday evening. Club records at the moment are H.L. 100 seconds and 60 seconds R.O.G., held by Messrs. Daw and Norridge respectively.

The LOUGHTON SCHOOL A.S. has been collecting for the "Fighter Fund," and promise to send regular contributions. Thanks, fellows. This club has about thirty members, of an average age of 14 years, and I wish them the best of luck.

Outdoor flying with the NORTHERN HEIGHTS M.F.C. has been hampered this month by inclement (French for "lousy") weather. Interest has therefore been manly centred on pole flying, and many interesting models have put in an appearance.

A scratch contest was held on Sunday, January 11th, for pole flyers, and attracted quite a good entry, being won by Mr. E. Ware, who also broke the club pole flying record with a flight of 121 sec. Result of the contest was as follows:—

1.	E. Ware	360·1 sec. aggregate.
2.	C. R. Clarke ...	283·4 ,, ,,
3.	A. G. Moore	212·4 ,, ,,

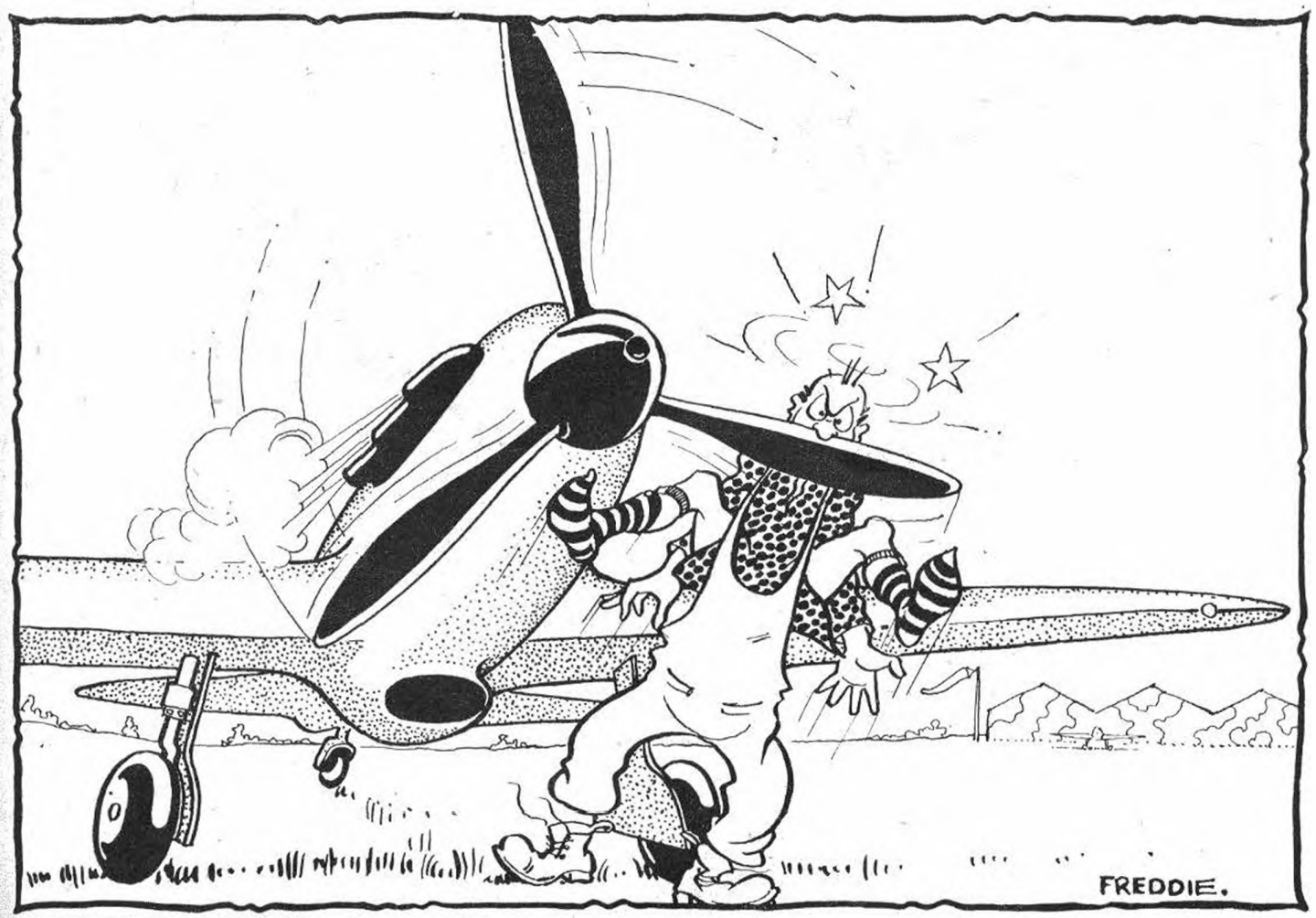
Mr. C. A. Rippon gave a most interesting talk on "Every-day Problems," in which he drew attention to many points which even experienced flyers overlook.

Gordon Allen, of the ST. HELENS M.A.C., has raised the club record to 108 seconds with an original Wakefield design, and in spite of poor weather conditions. A large club-room, in which both R.T.P. and "free" flying can take place, has been obtained, and competitions, etc., are being arranged.

The ILKLEY M.A.C. "indoor rally," held on December 22nd last, was very poorly supported, due to weather and warnings. However, with some support from Halifax, flying was carried out, the results being:—

NEAREST 50 SECONDS.

Senior:	1.	F. Hubbard (Halifax)	43 sec.
	2.	R. Crowe (Ilkley)	40·2 ,,



"CONTACT"

IMPORTANT

In spite of a good response to our request for notification of Club titles, and officials' names and addresses, there are still a number of delinquents. Now, the whole purpose of this list is for the edification of the very large number of prospective members who are continually asking us for the name, etc., of their nearest club.

To enable us to meet these requests, and also to help the clubs themselves in roping in new members, it is essential that we publish as complete and accurate a list as possible, and it is therefore up to club secretaries, etc., to forward full particulars of their clubs to the Editor.

If you have not already written, PLEASE send details at once, as the list will definitely be closed on February 28th. DON'T GROUSE IF YOUR CLUB IS NOT IN THE LIST. THE REMEDY IS YOUR RESPONSIBILITY. ALSO, THE FACT THAT YOU ARE A "BIG CLUB" DOES NOT MEAN AUTOMATIC INCLUSION. NO WRITTEN CONFIRMATION MEANS NON-INCLUSION. WRITE TO-DAY.

OPEN DURATION.

Senior :	1.	F. Hubbard (Halifax)	38·0 sec.
	2.	J. Townsend (Ilkley)	25·0 ,,
Junior :	1.	R. Crowe (Ilkley)	40·0 ,,

SCALE DURATION.

Junior : 1. R. Crowe, Lysander (Ilkley)... 11·0 sec.

No Senior entries. Length of line, 9 ft. ; height of pole, 3 ft. 6 in.

The rally was in aid of the S.M.A.E. Fighter Fund, the proceeds being £2 10s.

In spite of the previous disappointment, a further rally is to be arranged, the provisional date being Sunday, April 13th. ('Struth, that's asking for it, isn't it?) So watch these columns for further details. Two members kept up the old traditions by flying on Christmas Day, and averaging 80 seconds, in spite of poor conditions.

Since their last report the EASTERN ENFIELD M.A.C. have become affiliated to the S.M.A.E. A competition held in December for scale-planes was won by Mr. F. R. Marsden in the solid class with a very detailed Blenheim, and by Mr. S. Calmers in the flying scale class with an S.E.5. The club are grateful to the three members of the Northern Heights club, who acted as judges, and especially to Mr. Clarke, who explained where he and the other two judges considered that improvement could have been made in the models exhibited.

Indoor flying is now a regular feature of the club's activities, and there is a meeting for this every fortnight from February 2nd. A competition for R.T.P. flying under the S.M.A.E. rules has been arranged for the first indoor meeting in March.

At these indeer meetings the flying is interrupted for about three-quarters of an hour for a short lecture. The first one, on the designing of duration models, was given by the secretary. This lecture was given in connection with a competition to be held by the club, for a duration model designed by a club member. Points are being awarded for originality in design, and all models will have three R.O.G. flights. Among the rules for this competition is that all models must comply to the S.M.A.E. fuselage formula, and wing area to be 120—140 sq. in.

All enquiries for the newly formed ROWDITCH (Derby) M.A.C. should be addressed to the secretary, Mr. R. J. Baker, 102 Uttoxeter New Road, Derby, who will welcome any interested "prospects."

Messrs. Verity, Fordham, Whitworth and Longson were prize-winners at an open scale model competition staged by the BEVERLEY AND D.M.A.C., the proceeds of which went to the "Fighter Fund." Members are now busily engaged preparing for the summer season, in spite of the fact that the ground has been well and truly "planted" with obstructions. However, it is hoped to once again hold the annual rally, and I, with the usual supporters of this meeting, wish them all the luck.

I regret to record the lack of support given by some members to the CROYDON AND D.M.A.C., and trust this "public ticking off" will make them mend their ways. The club still meets on Sunday afternoons at the Adlington Ground, and new members are welcome.

Twenty members, owning 80 models of all types, form the SKYBIRD (654) M.A.C., which is quite good going for a club only formed four months ago. (Here's something that puzzles me. Many old-established clubs have faded completely away, yet we hear continually of new bodies being formed, and in many cases on the stamping grounds of the "old stagers." Summat screwy here, and I should like to know just why these clubs have folded up!)

Apropos the above, another new club is the HEYWOOD M.A.C., secretary being E. Hilton, 21 Pym Street, Heywood, Lancs. An old house has been secured as a clubhouse, and meetings are held three times a week.

Incidentally, can anyone tell me what has happened to the Lancashire, Ashton, Bolton, and Swinton clubs? These were "regulars" only a short time ago in this area, but seem to have drifted—or is it "blitzed"?

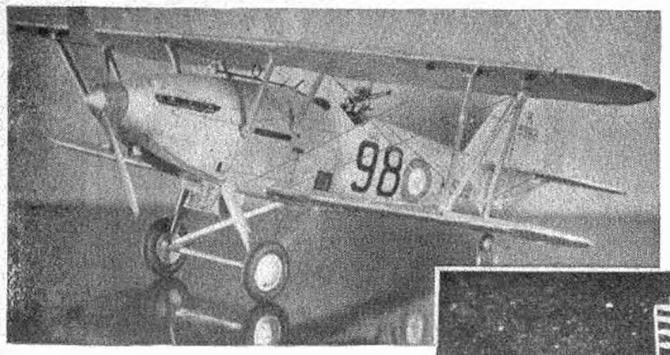
Although handicapped by adverse weather conditions, several hours flying has been put in by the KINGSTON-UPON-HULL M.A.C. With several inches of snow on the ground, a meeting was held, the winner being D. Fletcher, with a three-flight average of 80 seconds, closely followed by Messrs. Camsell and Baines. Messrs. Fordham and Watts were winners of a solid scale contest, the former also being among the prize-winners at the Beverley meeting.

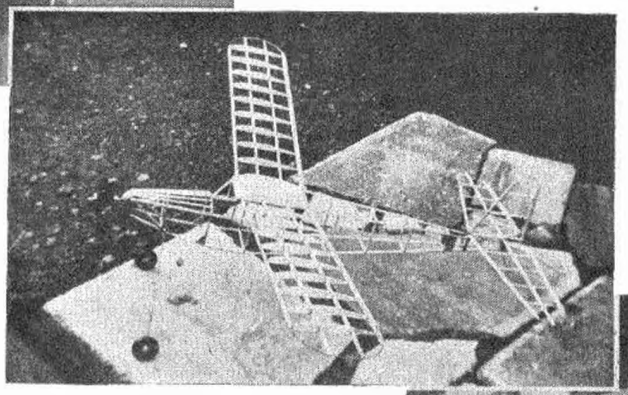
Yet another club has been started in Hull, this time the title being ST. SILAS AERO-MODELLING CLUB, and the secretary, Mr. R. Frank, 51 Northumberland Avenue, Hull. This club is unique in that no membership fees are charged, and I wait to see the results of this revolutionary method. I fail to see how any club can function without finance, but time will show.

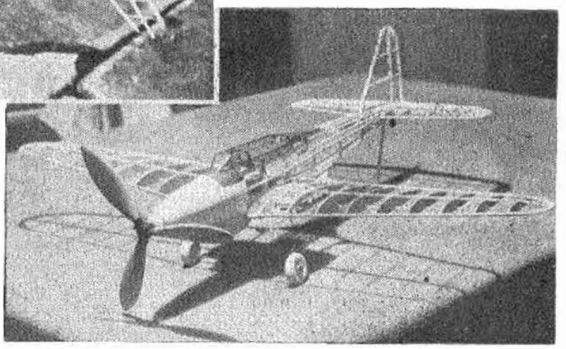
The prevalence of unwanted imports from Germany, dumped without sufficient address at inconvenient hours—to wit, the blitz, has necessitated the abandonment of the CHEAM M.A.C. winter programme, but the membership has kept well together by the aid of makeshift gatherings, and the advent of longer days will enable outdoors activities to be resumed with greater regularity.

Several of the "heads" have been taking a great interest in flappers (*not* the blonde type, George), and some extraordinary machines and arguments have developed. Whether they will flap sufficiently to fly depends apparently on the cranks, both animate and inanimate.

At the conclusion of their second year of existence, the following duly authenticated records are inscribed on







Still harping on the subject of good and bad photography, study these three shots of readers' models. Top left we have a small flying scale model of the Hawker "Hind," built by J. H. P. Green, of Dundee, who combines a fine model with good lighting and background. Bottom right is a fine picture of an uncovered "Battle" constructed by R. Nunn, of King's Lynn. The lighting and posing is nearly perfect, but an inadequate background spoils the effect. (Picture the improvement if the table could have filled the whole of the background.) The centre picture, of R. Mitchell's "Sprite," is an example of all too many photos sent in to us. The model itself is a good piece of work, and fairly well focused—but look at the background. You can't see model for bricks! This would have photographed 1,000 per cent better on the dark path seen at the top portion of the picture. So, you aero-modellers-cum-photographers — read, mark, learn and THINK.

Cheam's Roll of Honour. It is inevitable that some worthier efforts have failed to qualify, owing to the absence of two timers, notably a flight by Alf. Spencer's Wakefield, which was kept in sight for some seventeen minutes, and Bill Googe's glider, which legged it O.O.S. at 3 min. 30 sec. odd.

Record.	Holder.	Time.
		M. S.
Light-weight, H.L.,	P. Kelsey	3.34·5 O.O.S.
Light-weight, R.O.G.,	F. Briggs... ...	3.45 ,,
Medium-weight, H.L.,	W. Fields ...	4.53·5 ,,
Medium-weight, R.O.G.,	W. Fields ...	3.55·5
Spar Models, H.L.,	P. Kelsey	2.18·5
Glider (Winch-launch),	A. Begernie ...	2.0
Semi-Scale, H.L.,	J. Douglas	0.49

PUZZLE CORNER—*Sergt./Pilot E. F. H. Cosh, R.A.F.*

Since the last report of the HALSTEAD (Essex) BAP TIST M.A.C. the club has given an exhibition in aid of the Halstead Fighter Fund, the sum of £7 being realised. This exhibition was the most successful held by the club. Many fine models and drawings were on view, including Mr. Hewitt's club record-breaking Korda, which has clocked 248·8 sec. out of sight. Not content with this they held a large window display of solid models depicting an aerial dogfight. The models consisted of an assortment of Hurricanes, Spitfires, Lysanders, Heinkels, Dorniers, etc. (The German airman running away from his crashed Heinkel was a source of great amusement!) Much credit is due to Miss Le Messurier for painting a large background for this display, which added £5 to the local Fighter Fund.

As the money for the fund crept up at snail's pace a Messerschmitt 109 was put on view to step it up a bit. "Yes, you've guessed it," they were asked to give some solid model Me.109's, and to help at the exhibition. (Admittedly, the 109 went away lighter than it came, but that is beside the point!) The models were auctioned, and when all was totalled up, nearly £9 was in the till. After all these efforts they feel they deserve a well-earned rest.

A ladies' section has now been organised, much to members' enjoyment, for they have one or two keen young ladies.

And that's the lot for this month, chaps. I hope with you that the weather improves a bit, and enables us to get the winter sleep out of our eyes. It seems ages since I was out flying a model, and I'm beginning to get "flappers' shins" from sitting over the fire! See you next month, and till then—Tickity Boo. THE CLUBMAN.

Small Traders' Announcements

The charge for these insertions is 5/- each prepaid for a minimum of 30 words, extra words charged at rate of 2d. per word.

BERKHAMSTED.—J. W. Wood & Son, 20 Lower King's Road. M.A.T.A. for Flying Scale, Duration and Solid kits by Cloud, Veron, Aeromodel, Keelbild, Penguin, Skybird, etc. Selected balsa and full range of accessories.

BLACKPOOL.—The Sports Shop, Palladium Buildings, Waterloo Road. All model supplies. Joy, Studiette. Cloud, Drome, Kite, balsa, cements, dopes; grand flying scale kits at 1s. 6d. including postage. Latest models, solids, duration. Remember "The Sports Shop."

BROMLEY.—H. E. Hills & Son, 481 Bromley Road, Downham, 646 Downham Way, Bromley. ('Phone HIT 4197). Model aeroplane supplies. Dozens of kits, plenty of spares, miles of balsa.

CHISWICK, W.4.—A. A. Baker, 526 High Road. Large selection of Atlanta, Aeromodels, Cloud, Club, Comet, Keelbild, Skyleada, Truscale, Veron, Airyda, Chingford, etc. Balsa cut to sizes as required. Agents for Hobbies. 'Phone 3816.

CHISWICK, W.4.—G. W. Jones Bros. & Co., 56 Turnham Green Terrace (Chiswick 0858). Stock balsa wood and cut special sizes as required. Agents for Club, Cloud, Aeromodels, Atlanta, Skyleada, etc. Large selection of solid scale kits and accessories. Penguin, Skybird, Scalecraft, etc. Caton's rubber, Joy-plane products. Aircraft publications and photographic postcards.

DAGENHAM.—V. Cowing Ltd., 157 Broad Street, for Flying Scale, Duration and Solid Kits, by Keil Kraft, Cloud, Skyleada, Studiette, Veronite, Chingford, etc. Balsa stripwood, Joy-plane dopes, cements, Japanese tissue, ball races, etc., also Ship Kits. Fresh stocks now in.

DAGENHAM.—Whitehead's Model Airport, 11D The Market, Broad Street, Dagenham. We carry the most comprehensive stock of Balsa Wood, Kits, and accessories required by the model builder. Headquarters: 718 Eastern Avenue, Ilford.

DUMFRIES.—Campbells, 46 High Street. Send for our free lists all model aeroplane kits, balsa wood, and sundries. Largest stockists in Scotland. Frog, Penguin, Airyda, Scalecraft, Truscale, Star, C.M.A., Veronite.

EDINBURGH.—"Calling all aero-modellers." Whatever your requirements Frank Royle, 54 South Clerk Street, is at your service. Fullest range of kits, balsa wood, accessories.

EDINBURGH.—Everything for the aero-modeller. All the leading models stocked. Joy-plane cements, dopes, Japanese tissue, ball races, etc. Wade & Co., 40 Chambers Street.

EPPING.—Chase's, of Epping, for all flying and solid kits. Strip and sheet balsa, dopes, and all accessories. Remember! Let Chase's, of 190 High Street, supply all your balsa requirements.

GUILDFORD.—Everything for the aero-modeller. All the latest kits, Cloud, Studiette, Keil Kraft, Atlanta, Frog, Skyleada, etc. Balsa wood and all accessories. Good postal service.—Pascall, Woodbridge Road, Guildford.

HARROW.—A. H. Matthews, 15 Peterborough Road. For model aircraft supplies, balsa wood, cements, dopes, Japanese tissue, piano wire, celluloid wheels, plywoods and hardwoods of every description.

HERNE HILL, S.E.24.—For all model aeroplane supplies, Cloud, Keil Kraft, Skyleada, Keelbild, Studiette, Veronite. All accessories. Postage 6d. extra. Satisfaction guaranteed. —T. W. Standivan, 10 Milkwood Road.

IPSWICH.—A. J. Sneezum & Sons, 31-35 Norwich Road. 'Phone 2779. Model aeroplane supplies, Joy-plane products, Caton's rubber. Limited stocks of all leading makes of Duration, Scale and Solid Model Kits.

LEICESTER.—Harper's, The Aero-Modellers' Stores. Over 1,000 kits to choose from. 34 Belgrave Gate and 67 Braunstone Gate.

LEICESTER.—Aero-Modellers! C. Farmer can supply all your requirements. Kits, balsa, tissue, propellers, wheels, dope in bottle or sold loose, wire, cement. Caton's rubber, etc. Call and have a chat. The address is 183 Green Lane Road ('phone 27722). Also THE AERO-MODELLER in stock.

LONDON, SYDENHAM.—Toy and Model Shop, 15 Sydenham Road, S.E.26. Skyleada and other kits and all accessories, plans, balsa wood, dopes, propellers, etc. Warship kits. Tremo lead models. 'Phone SYD 8305.

NOTTINGHAM'S model shops lead with ample stocks of kits, accessories, wood galore, and Joy-plane products. Radet Electric, Arkwright Street, near Midland Station, and Wilford Road, near Imperial Cinema. AERO-MODELLER Sales still rising, on tap each month. Manufacturers please note: We want 10 gross solids, also miniature pilots, observers. Particulars and prices, cash with order, genuine.

OXFORD.—Hopkin's Stores, Hollow Way, Cowley, for all accessories, balsa, Caton's rubber, Joy dopes, etc. Kits by Keil Kraft, Cloud, Keelbild, Truscale, Skyleada, Studiette, Halfax, Atlanta, Chingford, Club, Veronite.

STAFFORD.—Aircraft Models, South Walls, is just the place to call and see a good variety of models and obtain advice on the best way to buy from modellers like yourself.

STOCKPORT'S Aeromodel Shop.—All materials and accessories in stock. Large range of kits—Frog, Cloud, Studiette, Keil Kraft, 'Drome, Tower, Chingford, etc.—54 Wellington Road South.

WATFORD.—All makes solid and flying kits, cement, balsa, dopes, accessories. Keil, Skyleada, Frog, Penguin, Skybirds, Megow, Guillow, Truscale. Large stocks. Quick postal service.—Watford Model Exchange, 29 Queen's Road.

WARRINGTON.—Burton's Model Aero, 55 Bewsey Street. Drome, Cloud, Keil Kraft, Scalecraft, C.M.A., Keelbild, Kits. Drome and Joy-plane dopes and accessories.

WEST DRAYTON. Sipson, 45 Sipson Way, Spencer's Cycle Radio. Cloud, Atlanta, Skyleada, Keil Kraft, C.M.A. Solids, accessories, dopes, cements, tissue, balsa woods, etc. Open Sunday mornings. 'Phone West Drayton 2357.

WILLESDEN'S leading Aero-model suppliers. Woods Sports Ltd., 98 Chamberlayne Road, Kensal Rise, N.W.10. Comprehensive stocks of all kits, materials, prints, etc. Write for free catalogue. 'Phone LADbroke 1414. Buses Nos. 6, 46, 52, 70 stop at door.

WOLVERHAMPTON.—Regent Cycle Stores. For kits by all popular makers. Duration, Flying Scale, Solids. Balsa, cement, tissue. Frog spares in stock. Expert advice given.—Regent, Cleveland Street, Wolverhampton.

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SOLUTIONS TO TEN-MINUTE TEASER. (See page 166).

1 *b*	5 *b*	9 *b*
2 *c*	6 *b*	10 c
3 *c*	7 *a*	
4 *b*	8 *b*	

Give yourself five points for each correct answer.

ANALYSIS.

40—50. Excellent.
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