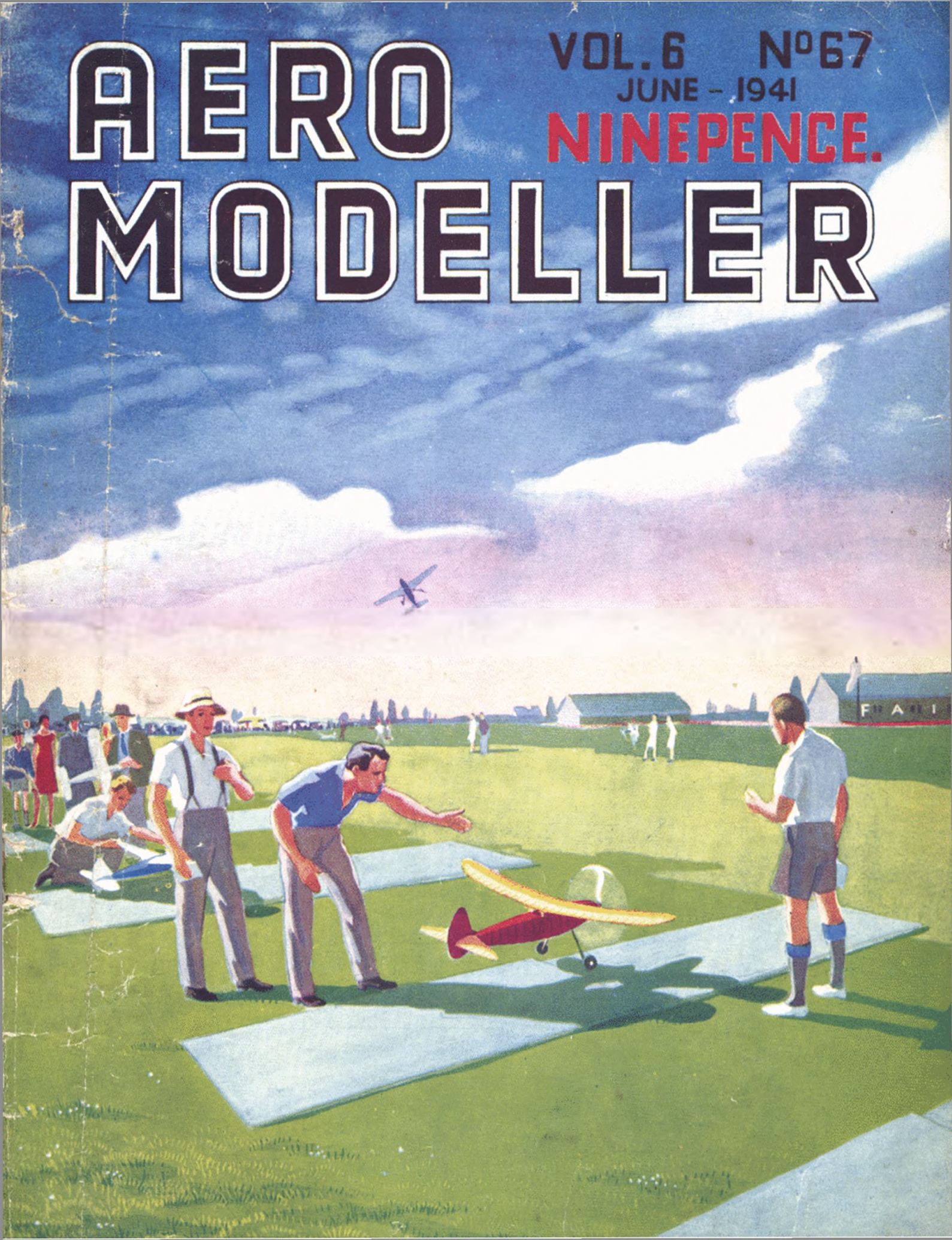
AERO MODELLER

VOL. 6 Nº 67
JUNE – 1941
NINEPENCE.



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.

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Diligence Work by Hlsat.

DEFIANT • GRUMMAN
CURTISS HAWKE
OR
WRIGHT
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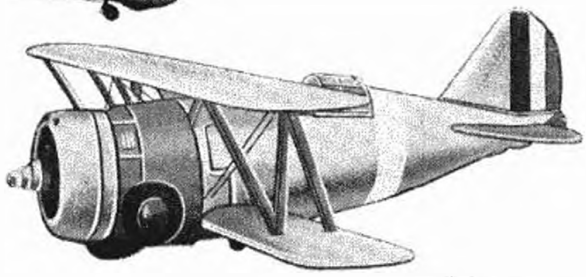

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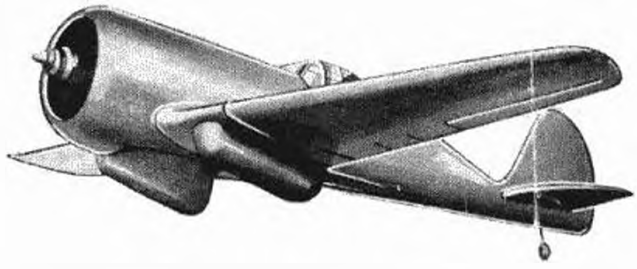

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AN INCIDENT FROM THE 1914-18 WAR

The photograph shows a Sopwith "Camel" which has crashed behind the German lines. The pilot is being marched off under escort, whilst the propeller and other parts are salvaged. An excellent example of "table-top" photography staged by Mr. J. H. P. Green, of Dundee, who took the photograph and also constructed the model.

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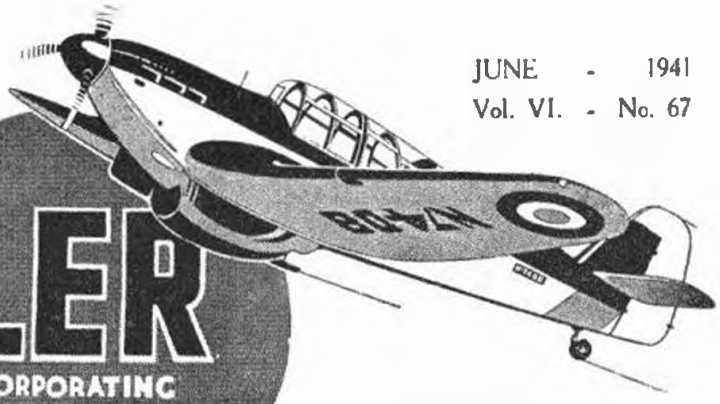
The AERO MODELLER

INCORPORATING "THE MODEL AEROPLANE CONSTRUCTOR"

JUNE - 1941
Vol. VI. - No. 67



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Editor:
C. S. Rushbrooke

Editorial

Another Year Goes By.

WITH this issue we begin the fifth year of publication of THE AERO-MODELLER under its present ownership, and introduce into it certain changes.

Firstly, the half-page space devoted to the Index becomes advertising space, and the Contents are brought forward to the opposite page and, for the duration of the war at least, will continue to appear underneath the photograph. Thus we save a half-page occupied by an advertisement which would otherwise have appeared in the body of the journal and so obtain an extra half-page for literary matter.

A second and considerably more conspicuous change is the "stippling" of certain of our line illustrations. We feel that this will vastly improve the appearance of the larger plans, and we shall be interested to have readers' comments on this innovation.

Another alteration is in the slightly different types used for the article headings, which we hope will be judged a further improvement in the make-up of THE AERO MODELLER.

Another "Harborough" Revised Edition.

On page 340 we give particulars of the latest book to be revised and brought up-to-date by the Harborough Publishing Co. Ltd.

Stubbs's "Design of Wakefield Models" created something of a sensation when it was first published; in fact, the first print of 2,000 copies sold out in close on a month. A further print was run, which has since sold out and so, when the time came to run a third impression, the Author was asked to revise the book.

The result is that the number of pages is now increased from 48 to 64 by the addition of new chapters on Construction, and a considerable number of new photographs.

The plan size of the book remains the same, viz. 8½ in. by 5½ in., but the cover is now in full colours, and was specially painted by Mr. C. Rupert Moore.

Copies of the book are now available, and may be obtained at the price of 2s. per copy from any model shop, newsagent or bookseller; or for 2s. 2½d. post free from the publishers at Leicester.

The "Aircraft Identification" Competitions.

We regret that two separate notices for the closing date were mentioned in our last issue. In one place it was stated that the closing date was May 10th, and in the other as May 15th. May 15th was the date intended, and all entries received up to that date will be considered. Already we have received a very large number, but despite this we shall be able to announce the prizewinners in our next (July) number, on sale about June 20th to 22nd.

Our "Solid" Competitions.

The number of entries for these two competitions were not as many as we anticipated. One competition was for members of the Air Training Corps, and the other for non-members. However, the general standard was good, and there appeared to be little to choose between members and non-members.

Names and addresses of the prizewinners are below.

All prize cheques will be posted on May 25th.

Warring's 1940 Wakefield Model.

In presenting a full description of Mr. Warring's 1940 Wakefield Model, we have endeavoured to cater for all classes of Wakefield fans. That is to say, that in this issue there are reduced scale plans of the model, but with rib sections and other details printed full-size. Whilst for the benefit of those aero-modellers who wish to build their replicas from full-size plans, same are available for the sum of 3s. 6d. post free, per THE AERO-MODELLER "Plans Service."

The Eighth Annual "Skybird" Model Rally.

We have been asked by the Skybird League to announce that, owing to prevailing difficulties and loss of trophies consequent upon the destruction of their premises, the 1941 Skybird Leafue 8th Annual Rally has had to be postponed.

It is possible that the North of Ireland Rally will be held with a section open to all members in the United Kingdom. Aero-modellers who are interested may get into touch with the League Headquarters at their new address: 9 Southampton Place, High Holborn, London, W.C.1.

The National Guild of Aero-Modellers.

On the last page of this issue we publish an entry form for membership of the N.G.A., and once again we appeal to readers to take advantage of the wide Third Party Insurance cover offered under this scheme for the nominal sum of 6d. per annum.

As we write these words "double summer time" has come into operation, and we can imagine a considerable increase in the number of "flying" hours put in by many of our readers.

Referring to this Insurance Scheme is in no way to point to possible dangers in the flying of model aircraft. There are none—provided sensible precautions are taken.

However, occasionally a 'plane flies where it should not, occasionally an animal roams where it should not, occasionally a house is where it should not be—and possibly even an aero-modeller himself is in the wrong place!

It is to provide against incidents arising from these kinds of contingencies that the N.G.A. Third Party Insurance Scheme is of such great value to readers.

The N.G.A. policy is underwritten by Lloyd's, and has paid out claims for as little as 3s. 6d. for a broken window pane, to as much as £30 on an occasion when a 'plane struck a pedestrian in Hyde Park.

Full particulars of the policy, which will meet individual third party claims up to £5,000, have been published from time to time in THE AERO-MODELLER, and a copy can be obtained free on application to the Secretary, N.G.A., Allen House, Newarke Street, Leicester.

Black and gold transfers for affixing to the members' models are obtainable for ½d. each, and for 1s. a gilt lapel badge is also available.

The form printed at the end of this issue serves a dual purpose of enrolling a member and enabling a copy of THE AERO-MODELLER to be reserved for him by his local newsagent each month. We, therefore, suggest that all readers of THE AERO-MODELLER who as yet have not joined the N.G.A., turn to the back page and consider making use of the form printed there.

Our Next Issue.

The 'plane featured in our next issue will be the Gutteridge Trophy winner.

Here again reduced scale plans, with wing sections and other features in full size, will be printed in the new "stippled" style; whilst full size scale plans will also be available per THE AERO-MODELLER "Plans Service."

Another 'plane of which plans will be published, is the "Diasphere," designed by Mr. I. C. Lucas, which obtained sixth place in the *Flight* Cup as a land 'plane, and when fitted with floats has clocked a time of 2 minutes 28 seconds r.o.w.

Mr. Warring will continue his very interesting series of illustrated articles by one on Retractable Undercarriages; whilst other features will include an intriguing article by Mr. W. Anderson (designer of the magnificent flying-boat illustrated in our last Christmas number); on an automatic control for twin petrol engines, a description of an easy-to-make aero-modeller's balance, accurate to 1/1,000 part of an inch; and scale plans and instructions for building a flying scale model of the "Blériot," that historic machine which first flew the English Cannel. This little model is very "easy-to-build," and has a certified duration of 28 seconds.

Mr. H. J. Cooper, continuing his series of War-time 'Planes, describes the "Caproni Reggione R.E. 2000," sometimes known as the "Falcho 1."

Another good cartoon by "Freddie," and many smaller articles, will go to make the next issue of THE AERO MODELLER one of the finest we have published: so once again we remind readers that "they have been warned" to see that they have a standing order with their local newsagent for delivery of their copy, otherwise they may not receive one, owing to the demand exceeding the supply.

(Will Mr. J. Swain, of Leyton, and Mr. F. Bontoft, of Hampstead, please communicate their present addresses to the Editor?)

D. A. R.

The "Solid" Competition Results

MEMBERS OF AIR DEFENCE CADET CORPS.

First Prize (£5 cash and solid silver trophy):

Reginald Rose, 93 Bell Green Road, Coventry, Warwickshire. Short Sunderland. (Three-quarter front view from above).

Second Prize (£3):

D. Goodyear, 200 Rectory Road, Grays, Essex. Dornier Do 215. (Side-view on ground).

Third Prize (£2):

G. Lauder, 113 Burton's Road, Hampton Hill, Middlesex. D.H. Hertfordshire. (Plan view).

Fourth Prize (£1):

H. R. Holton, "Westlake," Blundells, Tiverton, Devon. Blackburn Roc. (Three-quarter side view on ground).

NON-MEMBERS OF AIR DEFENCE CADET CORPS.

First Prize (£5 and silver trophy):

D. Collier, 102 Broadstone Road, Reddish, Stockport. Handley Page Hampden.

Second Prize (£3):

Douglas Jones, 8a Gordon Road, Boscombe, Bournemouth. Dornier Do 17.

Third Prize (£2):

Stanley G. Knowler, 208 Fallowden Way, Northway, N.W.11. Junkers Ju 87b.

Fourth Prize (£1):

D. H. Marshall, 40 Oak Road, Bedford. Heinkel He 111K Mk. Va.

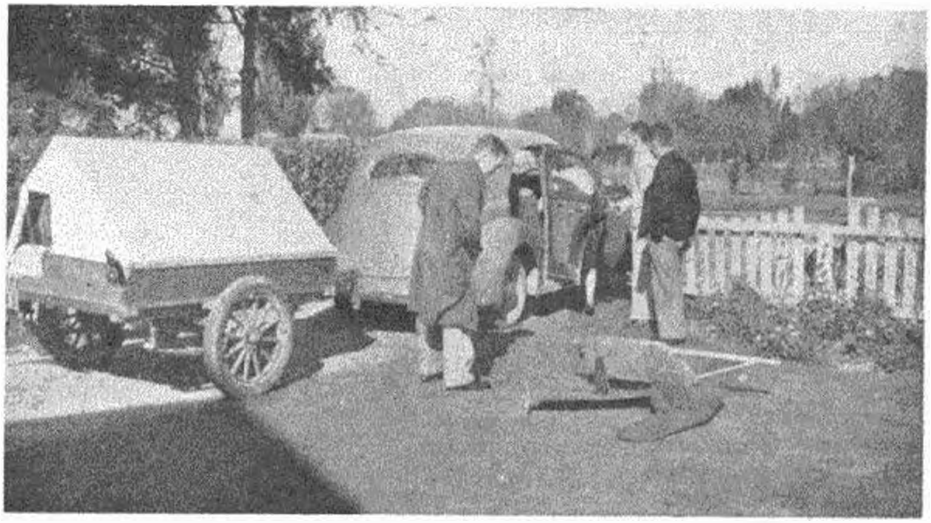
MODEL AIRCRAFT ACTIVITIES IN NEW ZEALAND

By HECTOR GRAY

THE controlling body in New Zealand is the New Zealand Model Aeroplane Association, with its headquarters, up till the end of 1939, in Auckland. In 1940, however, after putting the matter to the vote amongst the affiliated clubs, the headquarters were moved to the capital, Wellington, which has the advantage of being more central.

The South Island had a sub-Association, with its headquarters in Christchurch. The S.I.M.A.A. controlled flying in the South Island, clubs affiliating with it and paying a proportion of the affiliation fees to the N.Z.M.A.A. The N.Z.M.A.A. made the rules for model flying throughout the country, these rules being patterned on the S.M.A.E.'s rules. I was a member of the S.I.M.A.A. for about six months in 1939, and for the same period I was the secretary-treasurer of the Canterbury Power M.A.C. The only other affiliated clubs in the S.I.M.A.A. at that time were the Star M.A.C., also in Christchurch, and the Oamaru M.A.C.

The N.Z.M.A.A. conducted the New Zealand contests and arranged for the Moffett and Wakefield teams. All these contests were decentralised. In all probability English aero-modellers have, at one time or another, flown these Wakefield entries, and will recall that a few years ago Vernon Gray—no relation of mine, by the way—won the Moffett. The New Zealand-wide contests were for the New Zealand Championship—both rubber and petrol-engined models—and for the Texaco Trophy (which was presented by the Texas Oil Co.). The Texaco Trophy was for petrol-engined models only. The trophies for the New Zealand Championships were of the usual type, whereas the Texaco was a petrol engine. The first year this engine was a Brown Junior, but in successive years it has been a job made in Christchurch by one of the oldest builders in the country—A. J. Dacombe, who started back in 1912.



About to start out for a day's flying. Note the "Tadpolarius" fuselage.

I will confine the next part of this article to South Island activities, mainly because I haven't much knowledge of activities in the North. In the South Island we ran the South Island Championships at Easter, and these were also for New Zealand. These contests were for both rubber- and petrol-engined models, and there was also a Gotch-type contest for "gas jobs" only. In this latter contest points are awarded for the appearance, workmanship and finish of the model, its take-off and flight-attitude, and the landing of the model. These contests were held at Easter, because of the time at our disposal, Good Friday and Easter Saturday being allotted to the rubber models and the Sunday and Monday to the "gas jobs."

Easter, 1939, saw some twelve or so "gas jobs" and rather more rubber jobs out. We had quite good weather, but for some unknown reason there were a large number of crashes amongst the gas jobs that year—mine included! Most of them were caused by sheer bad luck, the 'planes flying into trees and fences; mine crashed because of insufficient dihedral. One crash was one of those which makes everybody on the field feel sorry for the builder of the 'plane. One chap, who won the Gotch contest in '38, set to work in '39 to win it again. He built a really beautiful job, with elliptical wings and tail surfaces, all faired neatly into the fuselage, the whole job being balsa planked. He had just finished the model the night before the contest, and she stalled on her first test flight and crashed. But I don't want you to get the idea that we always crash our 'planes out there, for on another occasion another 'plane belonging to the chap who had the crash just mentioned put up a flight of 1 hour 19 min. Unfortunately, this flight could not be reckoned as official because his motor ran for 56 sec. instead of the official 45 sec. Incidentally, most of us in the C.P.M.A.C. used to make our own timers out of small cheap clocks. They were quite reliable and were fairly light.

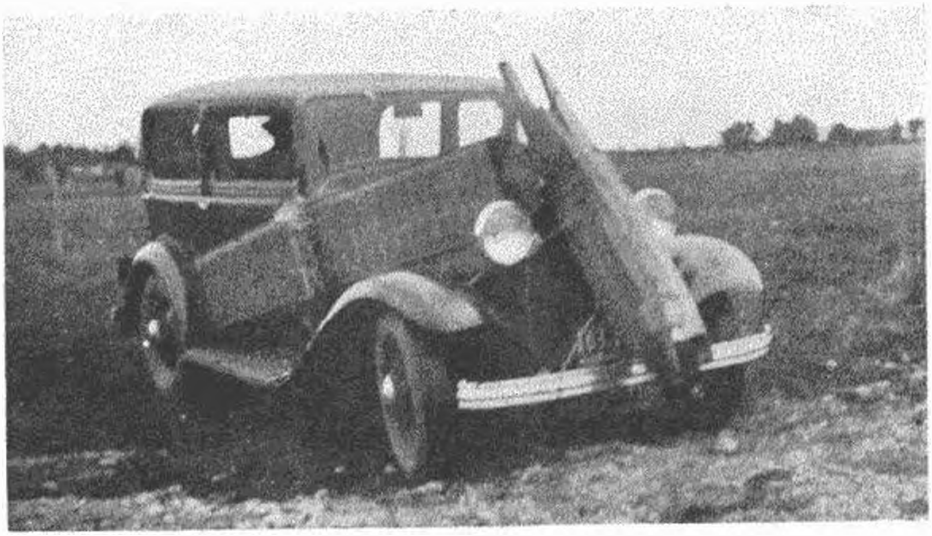
About two weeks after the Easter contest we arranged a visit to the O.M.A.C., which meant a trip of 169 miles each way. Notwithstanding this, we took about nine 'planes down, and we all clubbed in for petrol and oil. The Oamaru boys gave us a jolly good time, and at the field day we managed to beat them. They had a trophy which they were going to present to the S.I.M.A.A., and they, good-naturedly, put it up for the contest. It was the best contest which I have ever been to—everybody helped and criticised everybody else, and a good time was had by all. We, at least, came home with a feeling of brotherliness which is apparent whenever aero-modellers get together. While we were down there we arranged for the Oamaru chaps to return our visit on the King's Birthday week-end.

During the winter—that is, between about May till August—club flying is more or less non-existent in the South, but a few hardy souls do get out to fly their "all-weather" jobs.

When the Oamaru boys returned our visit we gave them as good a time as they gave us, I think. As it should be, they beat us on our home ground and took their trophy back with them. For the Monday we had managed to arrange a visit to the R.N.Z.A.F. Station at Wigram.

Shortly after this I had to go to another part of the Island to work, and so I had to give up modelling then.

Although we are well away from England and the U.S.A., we are quite up to the minute in our ideas.



The author arrives for a day's petrol 'plane flying.

I would like, if I may, to give a few impressions gained in this country since my joining the Northern Heights Club. One thing which I like is the good spirit which prevails amongst members at meetings, and also the more robust type of construction which prevails in the average model. Spruce and wire is much more prevalent than it is at home, and I used to wonder why. I don't any longer, though. Not after I went out to a field day. Personally, I wouldn't have cared to have flown a 'plane there. Firstly, I didn't like the breeze that was blowing; and secondly, there were rather more trees than I cared for! I realised then that if you didn't have that spruce and wire you'd be jolly lucky (if your job hit one of those trees when travelling down-wind) if you had a job left afterwards.

THREE IDEAS——From E. T. DE LA PERRELLE

A method of fixing a rudder to the end of the tail of a model with twin rudders.

MODELS often slew round on landing and hit their rudders, especially on uneven ground. If the rudder is made strong enough to prevent breakage, there is considerable weight where it is least desirable.

The idea is that the rudder should be hinged to the under surface of the tail by a hinge consisting of a strip of silk cemented to the bottom end of the rib and the rudder, the end tail rib being made from two flat strips as shown. A wire hook is cemented to the main spar and rudder, and an elastic band is stretched between, so as to keep the rudder upright. This method of attachment has the following advantages:—

(1) It cannot be broken by side impact.
(2) A light construction may be used.
(3) The rudders may be folded flush with the tail for transport.
(4) The elastic band is invisible.

A propeller drive incorporating a free-wheel and rubber tensioner.

This drive has the following outstanding features:

(1) The propeller may be removed merely by pulling it off the bush, and replaced by pushing it back.
(2) Its action is perfectly automatic; it has no catch to set either before or after winding.
(3) A hook can be incorporated for stretch winding.
(4) The back of the spinner is close to the front of the nose-block, and there are no external fittings to spoil the appearance.
(5) The motor hook is close to the extreme front; this allows a longer rubber or shorter fuselage.
(6) The thrust bearings are enclosed, and protected from grit.
(7) The propeller is not pressed by the action of the spring when "free-wheeling," so it operates with the minimum friction.
(8) The double motor hook prevents the rubber creeping on one side, half the loops being put on each side.
(9) The bent wire in the brass tube attached to the back of the propeller engages in the piece projecting from the shaft, but disengages when free-wheeling occurs.
(10) The propeller is a tight sliding fit on the bush "A," that is sufficiently tight to prevent falling off but it may be easily pulled off.

A "crash-proof" method of fixing a wing.

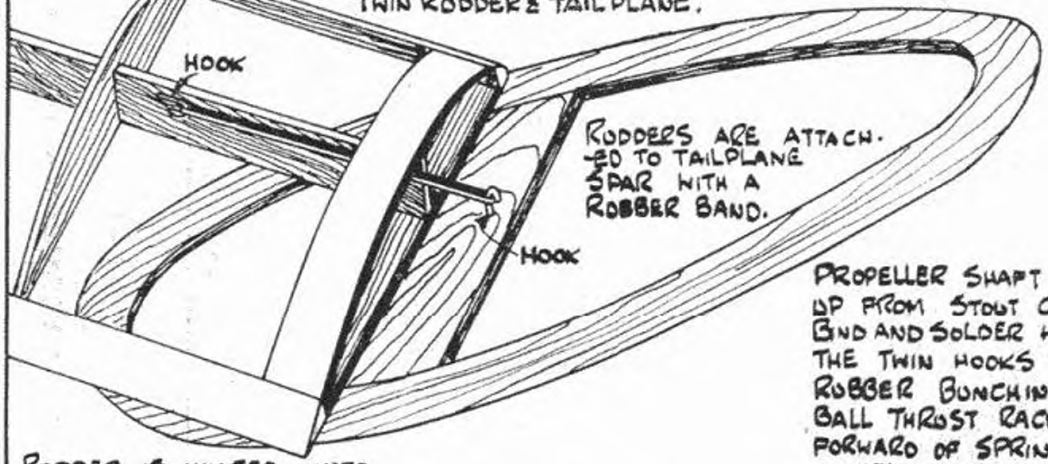
This method has worked well in practice, and is simpler than the one described in the January, 1940, AERO-MODELLER.

The wing is held to the centre section by a balsa strip which fits tightly in a balsa box in the wing, and into a wide box in the centre section. In order to keep it from sliding and to prevent any variation in the wing incidence, two small pieces of hard balsa at the leading and trailing edges of the wings fit into holes in the centre section rib.

Should the model land on its wings, or strike or fly into some obstacle, the wing is knocked backwards, or in the event of a serious crash, the balsa dowel is broken, but may be easily replaced.

This has the great advantage over the usual method of fitting with dowels that the wing is usually knocked out without the dowels breaking. Also the flying and anti flying stresses are transmitted directly from the main spar to the dowel without undue stress on the ribs.

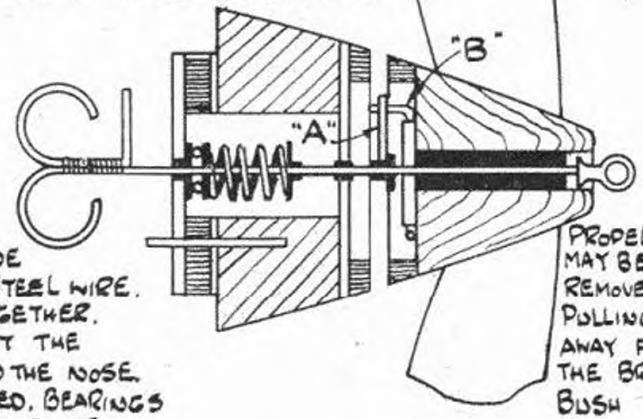
SKETCH SHOWING METHOD OF BUILDING A CRASHPROOF TWIN RODDER & TAILPLANE.



RODDERS ARE ATTACHED TO TAILPLANE SPAR WITH A RUBBER BAND.

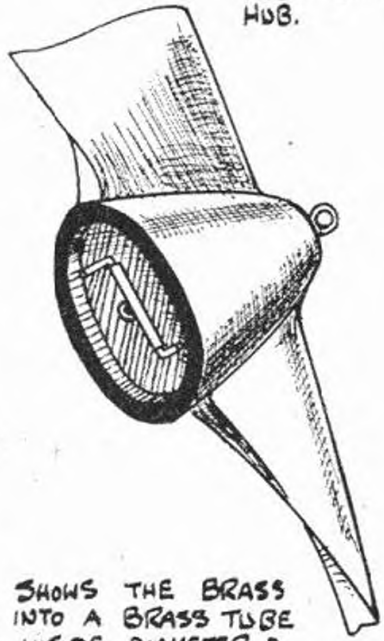
RODDER IS HINGED ONTO TAILPLANE BY MEANS OF A SILK STRIP.

SKETCH SHOWING METHOD OF BUILDING A SIMPLE FREE-WHEEL & PROPELLER MOUNTING.



PROPELLER MAY BE REMOVED BY PULLING AWAY FROM THE BRASS BUSH IN THE HUB.

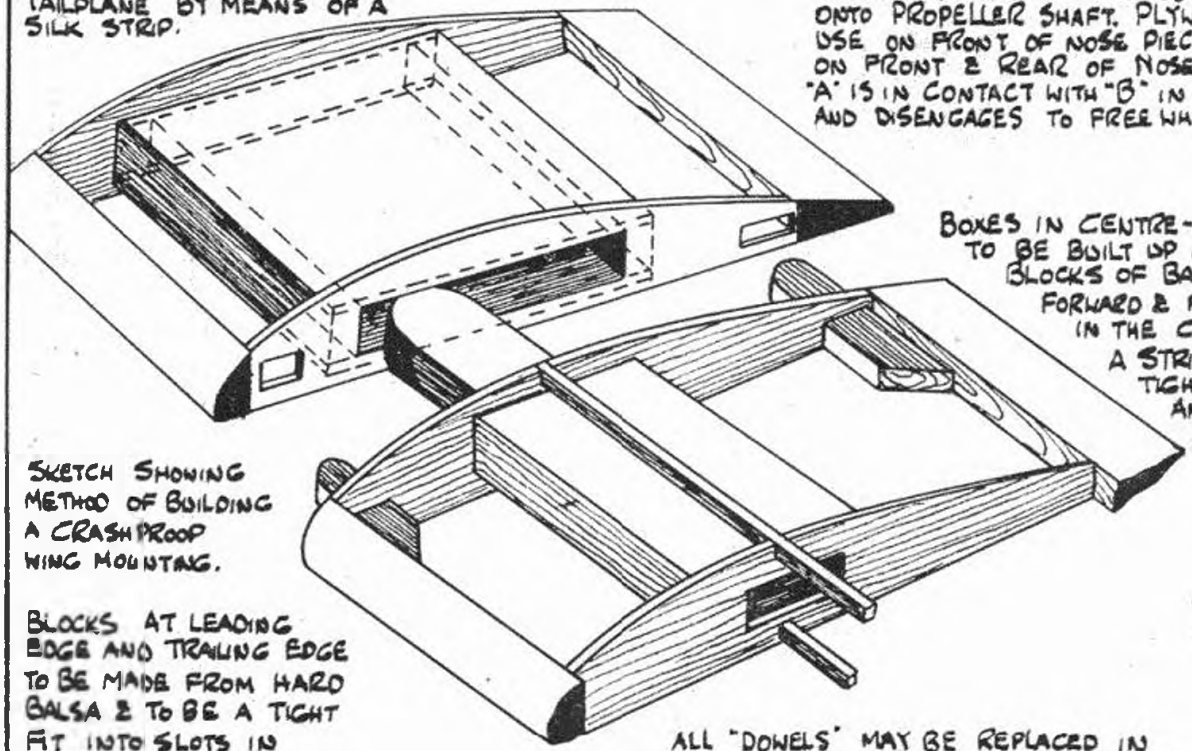
PROPELLER SHAFT IS MADE UP FROM STOUT GAUGE STEEL WIRE. BEND AND SOLDER HOOK TOGETHER. THE TWIN HOOKS PREVENT THE RUBBER BUNCHING UP IN THE NOSE. BALL THRUST RACE IS USED. BEARINGS FORWARD OF SPRING AND THE FREE-WHEEL ATTACHMENT ARE SOLDERED ONTO PROPELLER SHAFT. PLYWOOD IS USE ON FRONT OF NOSE PIECE AND ON FRONT & REAR OF NOSE PLUG. "A" IS IN CONTACT WITH "B" IN FLIGHT AND DISENGAGES TO FREE WHEEL.



BOXES IN CENTRE-SECTION & WINGS TO BE BUILT UP OF SHEET BALSA. BLOCKS OF BALSA ARE GLUED FORWARD & AFT OF THE BOX IN THE CENTRE-SECTION. A STRIP OF BALSA IS A TIGHT FIT INTO EACH BOX AND SLIDES OUT OR BREAKS OFF UPON IMPACT.

SKETCH ABOVE SHOWS THE BRASS ROD "B" FITTED INTO A BRASS TUBE OF THE CORRECT INSIDE DIAMETER & GLUED INTO CUTOUT AT REAR OF PROPELLER HUB.

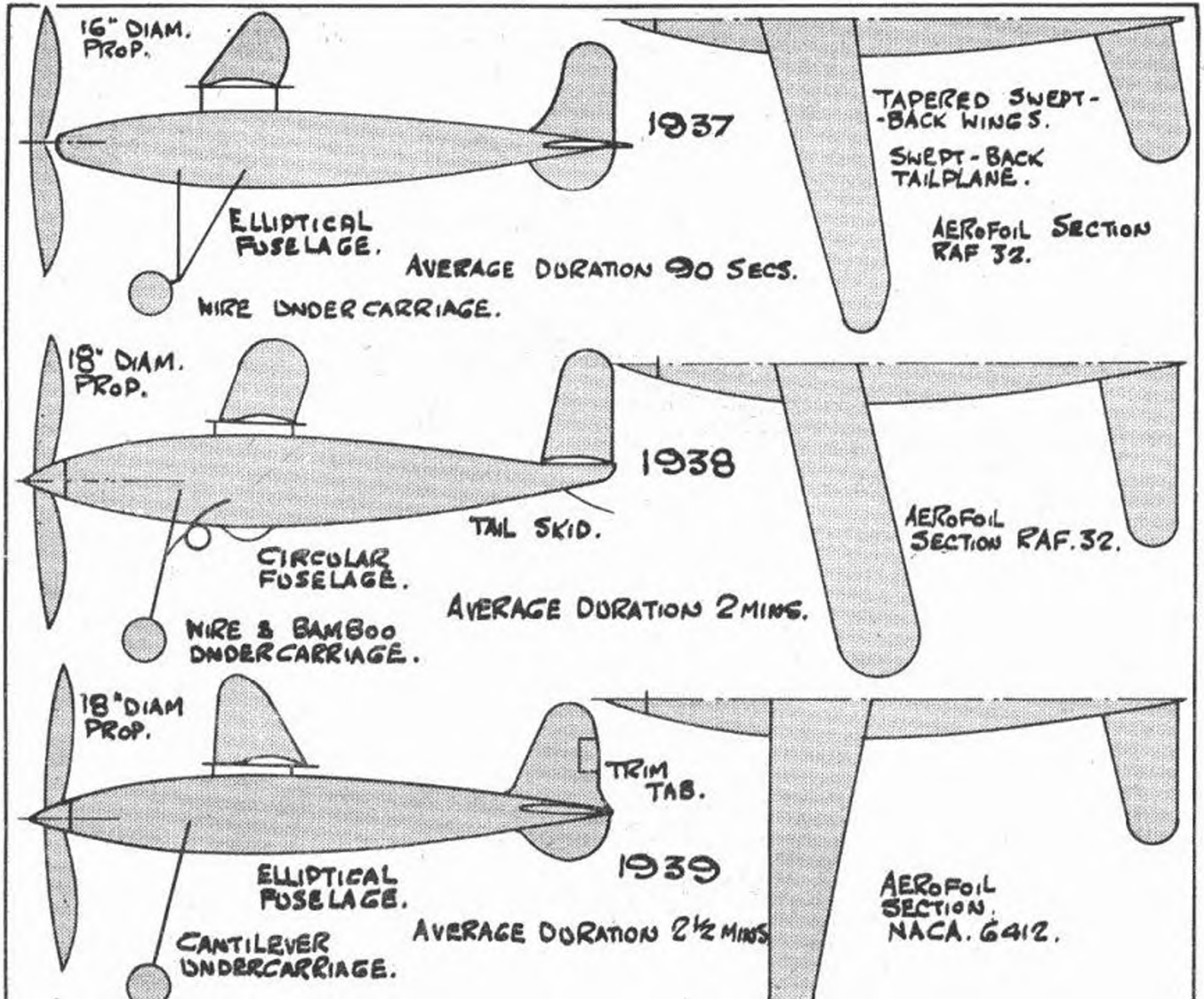
SKETCH SHOWING METHOD OF BUILDING A CRASHPROOF WING MOUNTING.

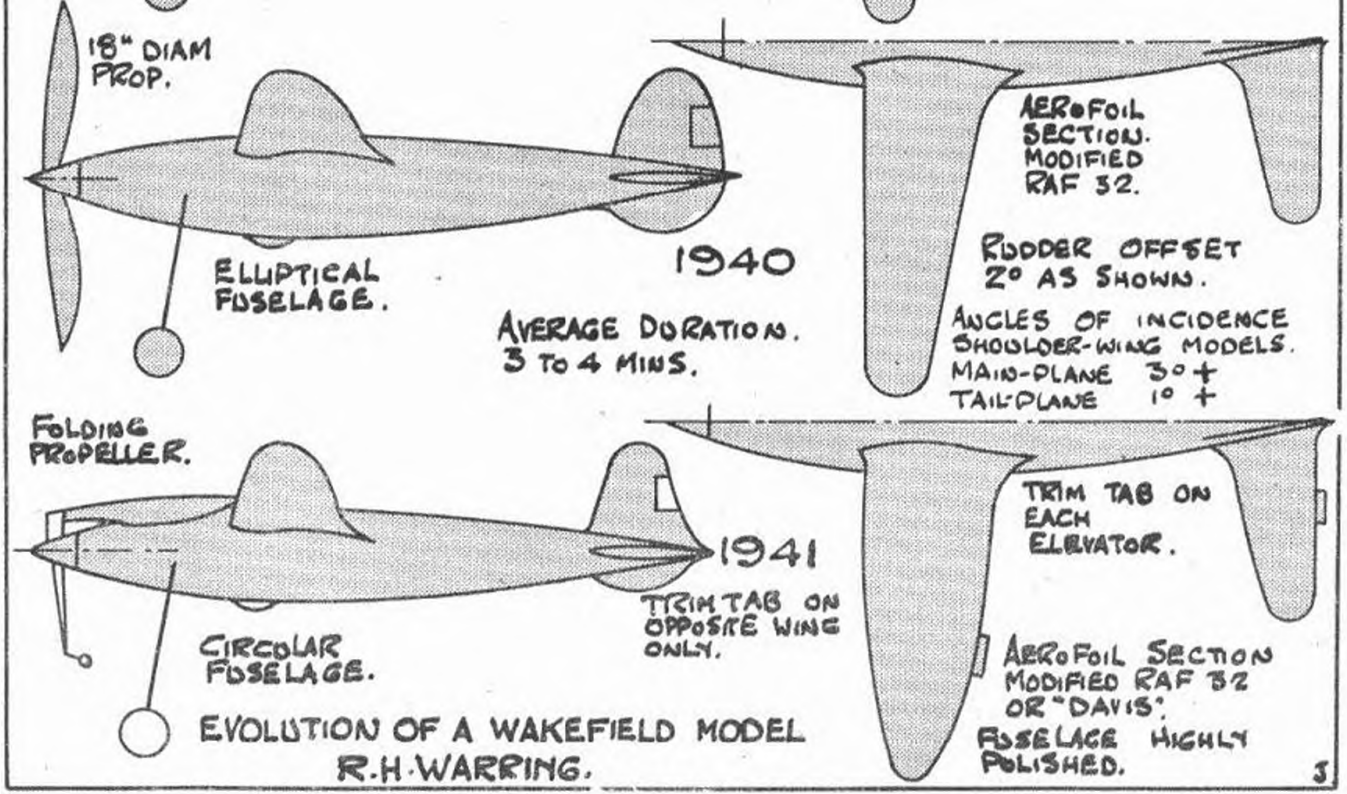


BLOCKS AT LEADING EDGE AND TRAILING EDGE TO BE MADE FROM HARD BALSA & TO BE A TIGHT FIT INTO SLOTS IN CENTRE-SECTION.

ALL "DOWELS" MAY BE REPLACED IN IN THE EVENT OF A SERIOUS CRASH.

THREE USEFUL IDEAS FROM E.T. de la PERRELLE


16" DIAM. PROP.
1937
TAPERED SWEPT-BACK WINGS.
SWEPT-BACK TAILPLANE.
AEROFOIL SECTION RAF 32.
ELLIPTICAL FUSELAGE.
AVERAGE DURATION 90 SECS.
WIRE UNDERCARRIAGE.
18" DIAM. PROP.
1938
TAIL SKID.
AEROFOIL SECTION RAF. 32.
CIRCULAR FUSELAGE.
AVERAGE DURATION 2 MINS.
WIRE & BAMBOO UNDERCARRIAGE.
18" DIAM PROP.
TRIM TAB.
1939
ELLIPTICAL FUSELAGE.
AEROFOIL SECTION. NACA. 6412.
AVERAGE DURATION 2½ MINS
CANTILEVER UNDERCARRIAGE.


18" DIAM PROP.
ELLIPTICAL FUSELAGE.
1940
AVERAGE DURATION. 3 TO 4 MINS.
AEROFOIL SECTION. MODIFIED RAF 32.
RUDDER OFFSET 2° AS SHOWN.
ANGLES OF INCIDENCE SHOULDER-WING MODELS.
MAIN-PLANE 3° +
TAIL-PLANE 1° +
FOLDING PROPELLER.
CIRCULAR FUSELAGE.
1941
TRIM TAB ON OPPOSITE WING ONLY.
TRIM TAB ON EACH ELEVATOR.
AEROFOIL SECTION MODIFIED RAF 32 OR "DAVIS".
FUSELAGE HIGHLY POLISHED.
EVOLUTION OF A WAKEFIELD MODEL
R.H.WARRING.
5

MY 1940 "WAKEFIELD" MODEL

British H.L. Record Holder: 26 min. 45·6 sec.

By R. H. Warring

FIRSTLY, let me try to give you a brief description of the development of this particular model. My 1937 Wakefield was a "Zaic" type parasol, monocoque fuselage, and following typical American construction of that time. In 1938 I had progressed to a streamlined (circular formers, sixteen ½ in. sq. stringers) parasol. This model was the first I had built featuring the "sparless" wing, i.e. large leading and trailing edges, and no secondary spars, and close spacing of the ribs. 1939 saw me with another streamlined parasol with a fairly high aspect ratio wing and parasol slabsider, the argument streamliner versus slabsider having left me very undecided!

Well, the "slabsider" won, and I flew that model away on its second flight in the "Trials." Further experimenting and, more especially, Copland's performance finally decided me that the streamliner was by far the better model, and all my future Wakefields will undoubtedly be of this type.

The '40 Wakefield is a shoulder-wing monoplane, cantilever undercarriage, with "hubless" wheels, fairly low aspect ratio wings, and the now familiar sliding weight for trimming. A low aspect ratio was chosen in the light of previous experience. Whilst I firmly believe a high aspect ratio wing leads to greater soaring properties, there are other difficulties, both structural and aerodynamic. Amongst the latter is the difficulty I experienced in getting such a model to circle evenly throughout its flight—the tendency to spin was always prevalent, or at least a very steep bank. I have no doubt this will condemn me in the eyes of Messrs. Stott, Lees and Co., who have had such marvellous results with the "Flying Minutes."

Well, my idea was that by having a lower aspect ratio, and in consequence a larger chord, I should gain in two ways. Firstly, the wing could be robustly constructed, and large spar sizes used without any increase in weight, and secondly the gain in efficiency in using a larger chord would at least offset the greater induced drag.

The results so far obtained with the model have more than convinced me that I am right. It soars in the slightest thermal, and turns in an average flight of 3—4 minutes in evening air.

At the close of our flying in the S.M.A.E. Cup last year I put my Wakefield up with 400 turns on. It was 6 p.m., so I imagined any thermals still about would be very weak. Still it found something—on these turns it clocked 4 min. 7 sec. o.o.s.!

The record flight itself was made on 1,000 turns out of a possible 1,250. Most of the flight was carried out at an altitude of about 2,000 feet, just below the cloud base. The model was timed by me as taking eleven minutes to reach earth from this height, corresponding to a sinking speed of approximately 3 ft./sec., which confirmed my theoretical calculations on the model's performance of a L/D ratio of 10 : 1. Quite a good figure for a model, but my 1941 Wakefield (if only I get a chance to build it!) should have a L/D ratio of 13 : 1.

Thermals were not prevalent on this day—in fact, *no other model* made a thermal flight that day. Here then is fair proof that this model is ready to soar whenever the opportunity occurs. Again, in a high wind, it shows a remarkable degree of stability.

Now for a few general notes on Wakefields, and I'll get on to a description of the model.

Folding propellers have proved a mixed blessing. Admittedly they decreased the drag, but unless the blade can be made to fold snugly and *flat* along the fuselage they act as an auxiliary rudder, and lead to spiral instability. Believe me, I've had some sticky landings due to this, especially on my high aspect ratio Wakefields.

A good folding propeller has one great "mechanical" advantage. In a bad landing or striking an obstacle when a normal propeller will be snapped off, the blade will just fold back unharmed.

I'll leave you to decide what type to use, but if you do decide on a folding propeller, do make sure it lies flat when "retracted," and have a good firm hinge, and a "stop" to take the strain off the hinge when it is revolving. All the above remarks apply to single-bladed folding propellers, as I have never felt the additional complications of having two blades to fold justified experimenting with the latter. My spare time was not unlimited!

Propellers and rubber are the two items that distinguish the contest winner from the ordinary builder and flyer. There are so many good designs on the market now, and many brilliant constructors, but it's still the fellow with the right combination of power and propeller that stays at the top. For myself I tried four propellers of different pitch before I was finally satisfied.

Drag must be reduced to a minimum (obvious you say?), and here are my views as to how it should be done. The undercart is always a d—— nuisance once the model is off the ground, but although I have got several to retract quite well I have never been confident enough to adopt such a scheme for the all important Trials. Until I strike on a simple, foolproof method, I'm sticking to a cantilever undercarriage with "hubless" wheels, giving a minimum of drag for a fixed unit. I never have enough weight to spare on my Wakefields for complicated gadgetry!

If you do find a good method of retraction and adopt it, fit a folding propeller as well. Otherwise you'll want one propeller per flight! Seriously, though, I would like to hear of a good scheme for tucking the undercart well out of the way.

Fuselage shape—either elliptical or circular, with 18—24 stringers. Cover with tissue, double cover if you can afford the weight. Keep the thrust line slightly above the centre line of the fuselage.

Wings I have dealt with, except for the plan form. I

should like a compound ellipse plan, but for constructional reasons I use a swept forward trailing edge and compound ellipse tips. Wing section—a modified R.A.F. 32 formed by taking 80 per cent of the ordinates. This gives a very efficient wing, especially if the tip ribs are given no undercamber.

Wing tips should be washed out slightly, to decrease the drag of the wings when gliding.

The rigging angle (rigger's angle of incidence) should be from 2½ deg. 4 deg., depending upon the design.

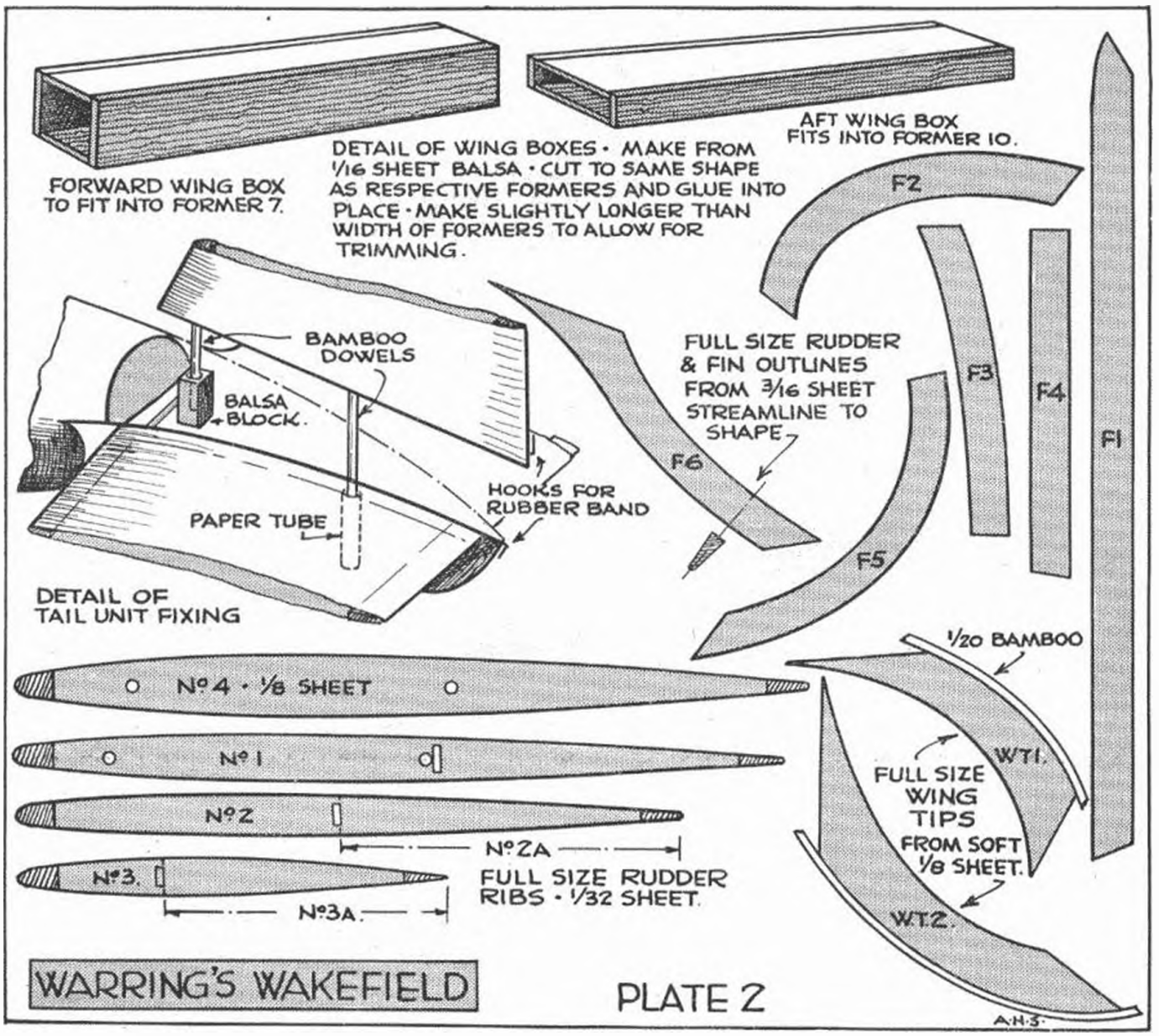
The tail-plane is not so critical as regards shape. Use a tapered plan form, with the leading edge longer than the trailing edge. Sweep back the trailing edge as well, if you think this necessary. Use a thin section to minimise the drag—I use modified Clark Y—taking 80 per cent of the ordinates again.

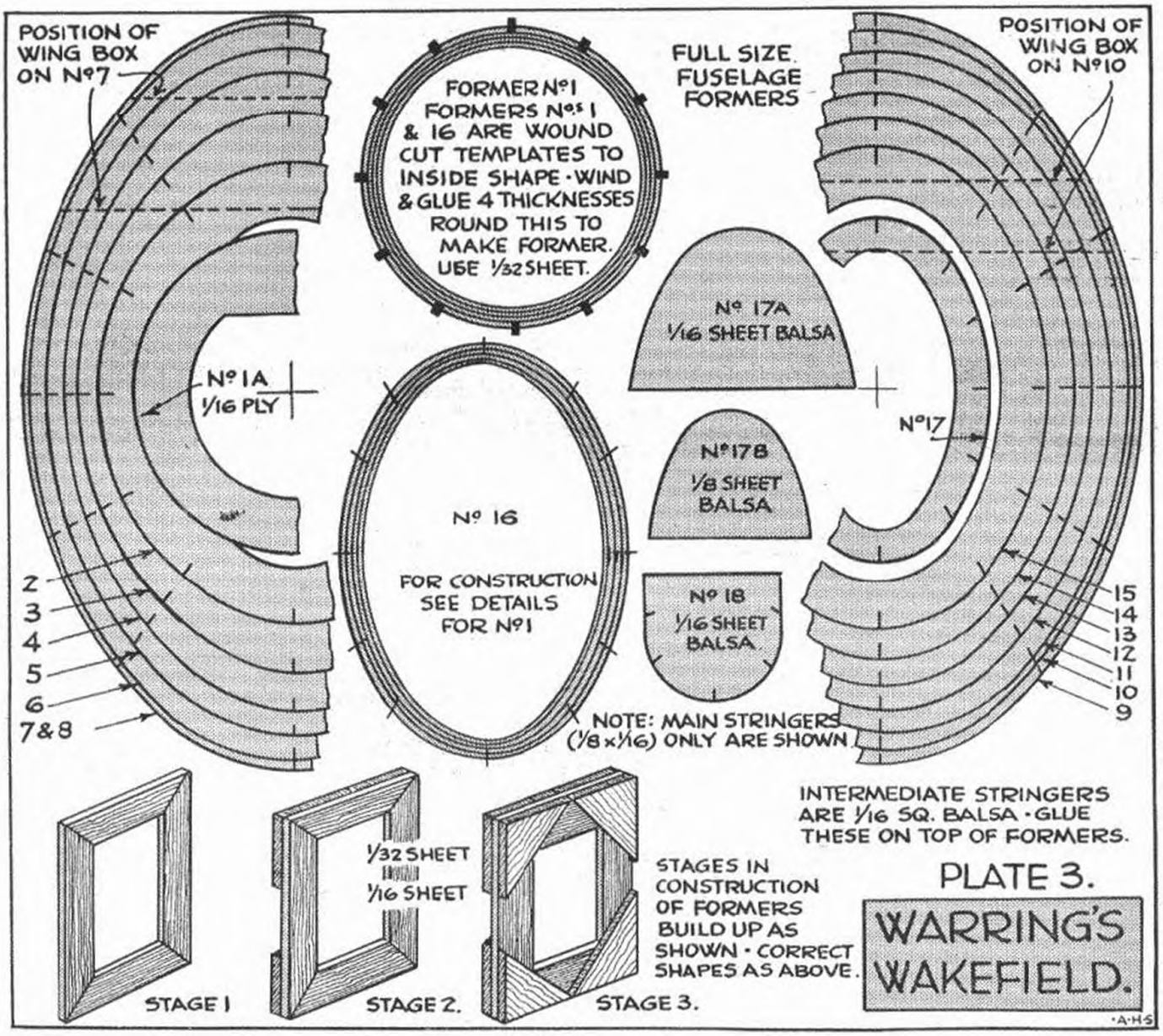
For accurate trimming I found it necessary to have a *fixed* fin with a trimming tab. By fixed I *do* mean fixed—not held on by elastic bands, so that it's never set up in the same place twice when putting the model together.

Offset the whole about 2 deg. to the right, and use the trimming tab in conjunction with the side-thrust to get a constant right circle of 150 ft.—200 ft. diameter throughout the flight.

Fair the wings, and even tail-plane, into the fuselage wherever possible, to further reduce parasitic drag. In my '41 model I am going to fair the undercart legs into the fuselage, or fit small slats here (yes, slats!), to smooth out the turbulence at this point. Finally, I anticipate polishing the whole to reduce skin friction. That's where I'm hoping to get my L/D of 13/1!

A word or two about rigging angles before I finish. It is common knowledge that the airflow after passing over the wings is deflected downwards. This "down wash" reduces the effective angle of attack of the tail-plane by an angle whose value is a little less than half the angle of





attack of the wing. We can assume with very little error that the angle of attack of the main wing is for our purpose equal to the rigger's angle of incidence.

Now, suppose the angle of incidence of the main-plane is 3 deg. (positive). By setting the tail-plane at a rigger's angle of incidence of 1 deg. positive the angle of attack of the latter will be about 0 deg., giving very little drag in normal flight and just sufficient lift for our purpose. (Also incidentally a very good longitudinal dihedral angle).

These rigging angles should give us a position for the C.G. corresponding to 60—69 per cent of the average chord. A glance at the diagrams enclosed should clear up any doubtful points.

Well, there's our Wakefield. Include all these good points and you'll still find room for improvement in the completed model. That's half the beauty of the game—one model leads to another, and, once having got going you just can't stop! In fact, as soon as I have finished building a model I've already several probable improvements in mind—before flight testing even!

BUILDING INSTRUCTIONS FOR THE MODEL

The wings are the first components to be tackled, since, once finished, they act as a "jig" to hold the wing boxes in position in the fuselage.

Carve each leading edge from $\frac{5}{8}$ in. by $\frac{1}{2}$ in. balsa, tapering each to $\frac{1}{2}$ in. by $\frac{3}{8}$ in. at the tips, and conforming to the shape of the nose of the airfoil. Trailing edges may be cut from $\frac{1}{4}$ in. hard sheet balsa. These taper from 1 in. by $\frac{1}{4}$ in. at the roots to $\frac{5}{8}$ in. by $\frac{1}{16}$ in. at the tips. Both leading and trailing edges are slotted to a depth of $\frac{1}{16}$ in. to accommodate the ribs.

The ribs are cut from $\frac{1}{32}$ in. sheet balsa, with the exception of No. 1, which is from $\frac{1}{16}$ in. sheet.

Prop the front of the trailing edge up with small pieces of scrap $\frac{1}{16}$ in. balsa to avoid a reflex trailing edge, and

cement the ribs in position, holding the leading and trailing edges in their correct positions on the plan.

Allow about 12 hours for the cement to set (24 hours for Durofix), before removing from the board. The tips may now be fitted. These consist of an outline of 1-20 in. dia. bamboo bent to shape, backed with soft $\frac{1}{8}$ in. sheet balsa.

Now trim the root ends of the spars off and scarf joint an additional "wedge" on top of each, as in diagram. Trim the butt ends formed, so that when the ends are resting flat on the table, the tip of the wing is raised 4 in. This gives a dihedral angle of about 11 deg.

Leave the wings now and start on the fuselage. Formers are elliptical in shape, constructed of $\frac{1}{16}$ in. sheet balsa, except Nos. 1 and 17, which are "wound" formers of four lappings of $\frac{3}{16}$ in. by $\frac{1}{32}$ in. balsa.

Rectangular "frames" of approximately the same size as each former are constructed, and triangular gussets of $\frac{1}{32}$ in. sheet balsa cemented at each corner *on both sides*. The exact shape of each former is then traced on to these "frames," and cut out.

All formers are now mounted on cardboard templates, and the whole threaded on to a straight rod of $\frac{1}{4}$ in. square birch.

Formers 1, 9 and 17 are notched and marked for stringer positions before assembly. With these as a guide the remaining stringers can be lined up and the formers notched where required.

Four main stringers of $\frac{1}{8}$ in. by $\frac{1}{16}$ in. hard balsa are first cemented in position, lining up all the formers correctly. The remaining eight, $\frac{1}{8}$ in. by $\frac{1}{16}$ in. medium balsa stringers are then cemented in place, and after allowing 12 hours to set, the templates and birch rod may be removed.

The tail area is then trimmed up, and the rear rubber anchorage fitted. This is two plates, $\frac{1}{2}$ in. by $\frac{3}{4}$ in. by $\frac{1}{16}$ in. birch 3-ply, faced with $\frac{1}{16}$ in. hard balsa, strongly cemented in position shown in diagram.

The wing boxes should be constructed next, and are made entirely of $\frac{1}{32}$ in. sheet balsa. Build these around balsa blocks, 6 in. by $\frac{3}{8}$ in. by $\frac{1}{4}$ in. and 6 in. by 1 in. by $\frac{1}{4}$ in. (portions of unshaped leading and trailing edges). Remove these "formers" before the cement dries, however!

When set bind with tissue soaked in cement, and allow a further 12 hours to set.

Now cut the boxes to the approximate width of the fuselage, push the wing halves into the boxes, and line up the whole assembly so that the front of the leading edge box is $1\frac{1}{8}$ in. above C.L., and rear of trailing edge box $\frac{7}{8}$ in. above C.L. When in this position, and also laterally true cement firmly. Remove wing halves when set and proceed to sheet in the boxes with $\frac{1}{16}$ in. sheet, using rather more cement than normally.

Next firmly cement in the paper undercarriage tubes and brace as shown. The track should be 13 in.

The remaining twelve stringers of $\frac{1}{16}$ in. square balsa can now be cemented in position, being cut where necessary, in the region of the wing boxes.

Finally, fill in between formers 1 and 2 with hard $\frac{1}{16}$ in. sheet balsa, face the front to give $\frac{1}{16}$ in. right thrust, and fit former 1A of $\frac{1}{16}$ in. birch 3 ply.

The underfin is then cemented in position and fin retaining tube secured: deck in the last 3 in. with $\frac{1}{32}$ in. sheet.

Cover the fuselage, either in eight strips along the direction of the stringers, or by squares of tissue, small size where the greatest curves occur, and *vice versa*. Then give either two coats of banana oil, or one coat of slightly thinned glider dope.

Plug the wings in again and form the fillets of soft $\frac{1}{32}$ in. sheet balsa. When these have been cemented in place the wings are ready for covering.

When covered with tissue give two coats of banana oil, allowing about twelve hours between each coat. The change of section gives a "wash-out" to the wing tips, and it is only necessary to hold the wings true whilst drying.

Undercarriage consists of two bamboo legs 10 in. by $\frac{1}{4}$ in. by $\frac{1}{8}$ in., of streamlined or oval section, tapered to $\frac{3}{16}$ in. by $\frac{3}{32}$ in. at the axle end. The axle is of 18 s.w.g. wire, and "hubless" wheels are attached to these. A glance at the plan should clearly explain the construction of these wheels.

The paper tubes fitted into the fuselage can be made by forming around the undercarriage leg itself. Do not wind paper tape spirally around the legs, but cut lengths the required length of the tube and build up the tube in this manner.

The noseblock is slightly unconventional in that the "plug in" part is of $\frac{1}{8}$ in. birch 3-ply, and the "retaining" part of $\frac{1}{16}$ in. birch 3-ply. This gives a very firm seating for the 16 s.w.g. brass bush. I have found that in balsa nose-blocks with high power the bushes are liable to loosen up.

The propeller is carved from an 18 in. by 2 in. by $1\frac{3}{4}$ in. medium hard balsa block, spinner carved integral with the blades. It is bushed with a 16 g. brass bush and slightly hollowed out at the back of the spinner to accommodate the free-wheeling device. The free-wheel clutch pin of 20 s.w.g. wire is bushed with aluminium tube, and extends to the front of the propeller, where it is terminated in a loop to facilitate engagement when the motor is wound.

The whole assembly is shown on the plan. A large-sized, American type, ball race should be used, if obtainable, otherwise the standard British type will do. The propeller shaft is bent to hold a "Runtrue" bobbin.

The fin is of straightforward construction; the outline being of $\frac{1}{16}$ in. sheet and $\frac{1}{8}$ in. sheet, with a mainspar of $\frac{3}{16}$ in. by $\frac{1}{16}$ in., tapering to $\frac{1}{8}$ in. by $\frac{1}{16}$ in. A trimming tab is incorporated, being hinged on soft iron wire.

Two bamboo pegs are cemented in place to act as retaining and positioning plugs, which register with the tail-plane.

The tail-plane is of two-spar construction, with ribs of $\frac{1}{32}$ in. sheet. The centre section is faired in to conform to the shape of the top of the fuselage to the rear of former 17. It is located in position by a balsa locking piece 17B, which fits snugly inside former 17. The rear is held down by an elastic band attached to underfin of main fin.

Both fin and tail plane are tissue covered, and given one coat of banana oil. Pin down to prevent warping during drying.

Finally there remains only the motor. This consists of 3 oz. of $\frac{1}{4}$ in. by 1-30 in. rubber made up into fourteen (14) strands pre-wound to tension. The motor is attached to bobbins, and the rear fixing is a bone or bamboo peg.

Should you wish for a really remarkable climb, increase the number of strands to sixteen (16), but retrim carefully as a streamliner is a "lively" model and really does fly. Once having seen a good streamliner performing one cannot help thinking it looks almost effortless compared with a corresponding slabsider.

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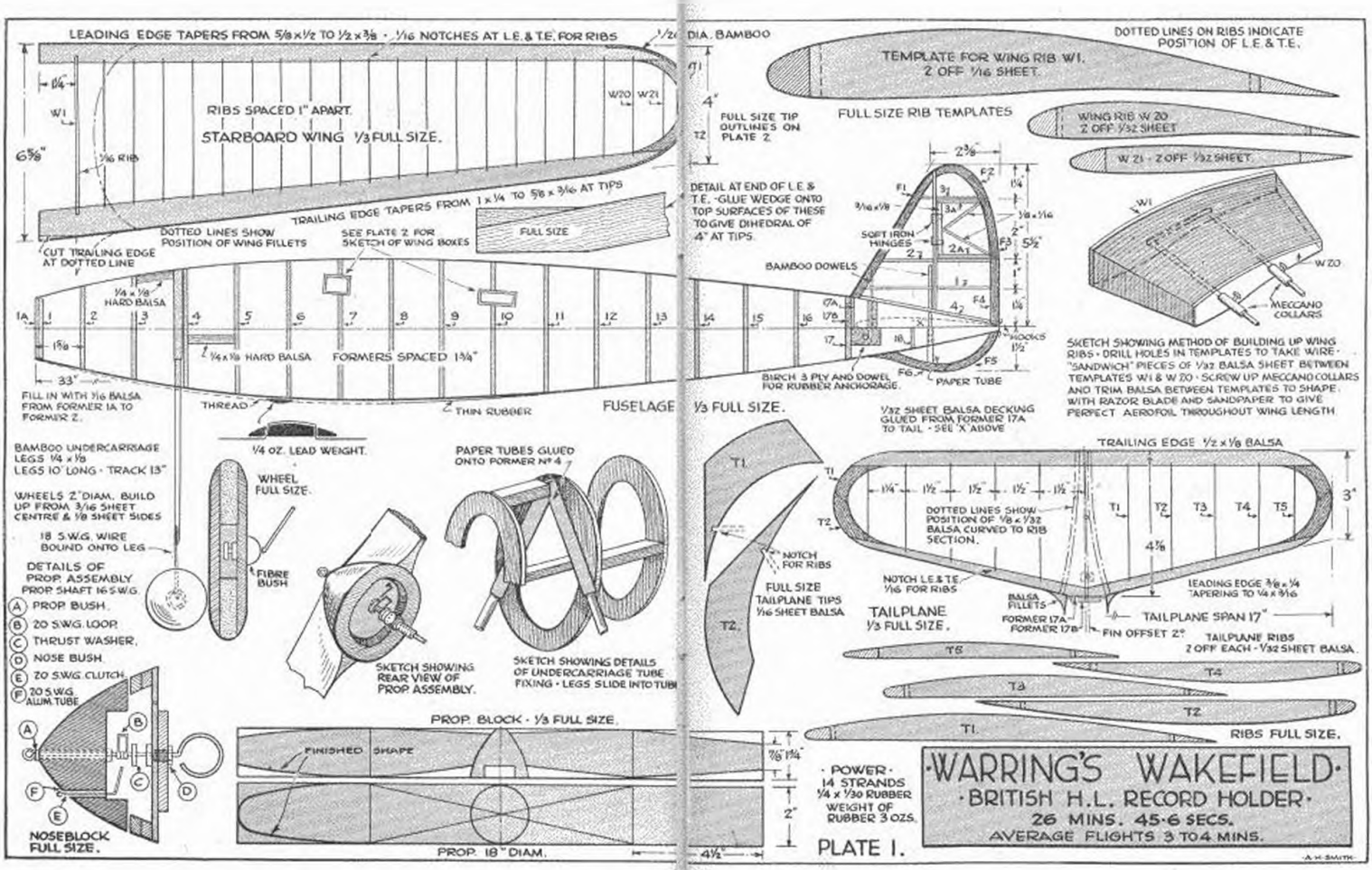
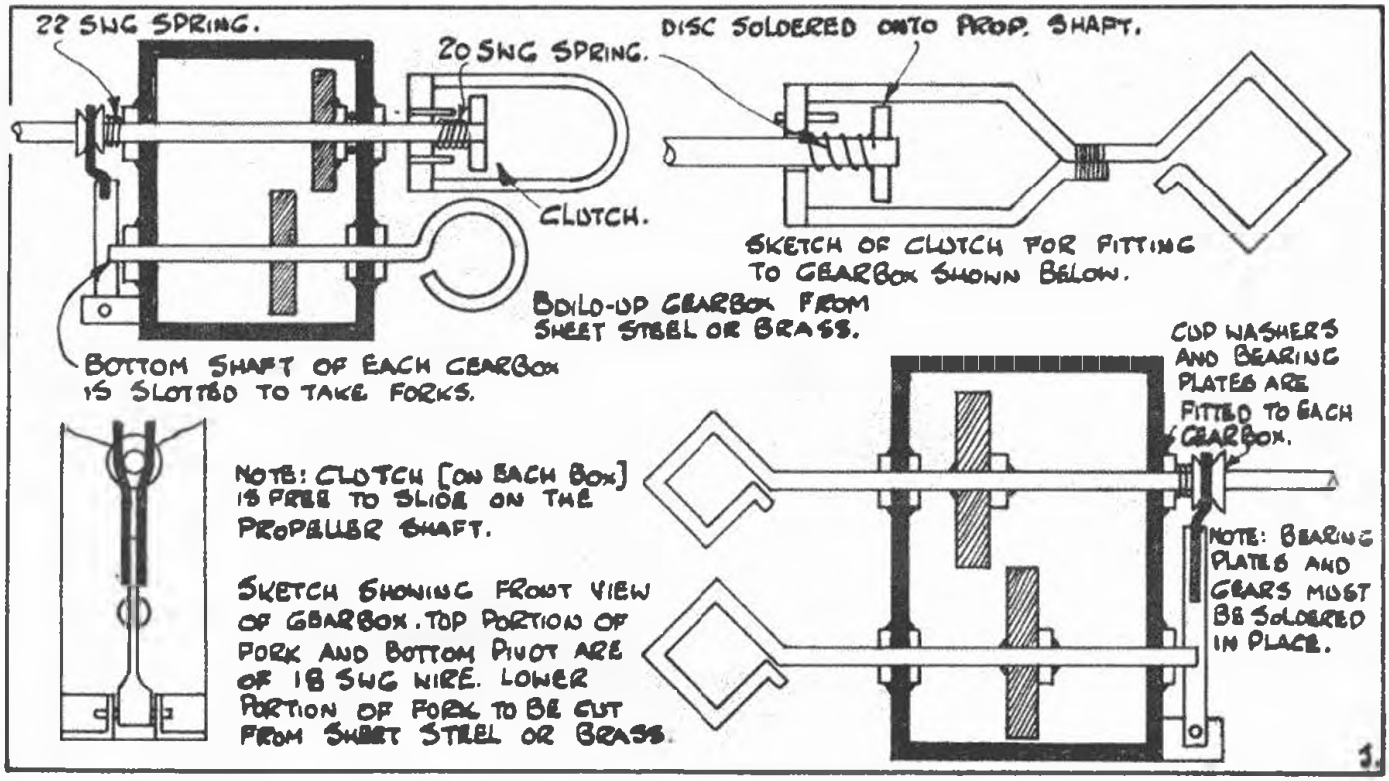

LEADING EDGE TAPERS FROM 5/8 x 1/2 TO 1/2 x 3/8 · 1/16 NOTCHES AT L.E. & T.E. FOR RIBS
RIBS SPACED 1" APART.
STARBOARD WING 1/3 FULL SIZE.
W1
W20 W21
1/16 RIB
TRAILING EDGE TAPERS FROM 1 x 1/4 TO 5/8 x 3/16 AT TIPS
FULL SIZE
DOTTED LINES SHOW POSITION OF WING FILLETS
SEE PLATE 2 FOR SKETCH OF WING BOXES
CUT TRAILING EDGE AT DOTTED LINE
1/4 x 1/8 HARD BALSA
1A 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
1/4 x 1/8 HARD BALSA FORMERS SPACED 1 3/4"
FILL IN WITH 1/16 BALSA FROM FORMER 1A TO FORMER 2.
THREAD
THIN RUBBER
FUSELAGE 1/3 FULL SIZE.
1/4 OZ. LEAD WEIGHT.
BAMBOO UNDERCARRIAGE LEGS 1/4 x 1/8 LEGS 10" LONG · TRACK 13"
WHEELS 2" DIAM. BUILD UP FROM 3/16 SHEET CENTRE & 1/8 SHEET SIDES
18 S.W.G. WIRE BOUND ONTO LEG
WHEEL FULL SIZE.
FIBRE BUSH
PAPER TUBES GLUED ONTO FORMER Nº 4
SKETCH SHOWING REAR VIEW OF PROP ASSEMBLY.
SKETCH SHOWING DETAILS OF UNDERCARRIAGE TUBE FIXING · LEGS SLIDE INTO TUBE
DETAILS OF PROP ASSEMBLY
PROP SHAFT 16 S.W.G.
A PROP BUSH.
B 20 S.W.G. LOOP.
C THRUST WASHER.
D NOSE BUSH.
E 20 S.W.G. CLUTCH.
F 20 S.W.G. ALUM. TUBE
NOSEBLOCK FULL SIZE.
PROP. BLOCK · 1/3 FULL SIZE.
FINISHED SHAPE
PROP. 18" DIAM.
DIA. BAMBOO
4"
FULL SIZE TIP OUTLINES ON PLATE 2.
DETAIL AT END OF L.E. & T.E. · GLUE WEDGE ONTO TOP SURFACES OF THESE TO GIVE DIHEDRAL OF 4" AT TIPS.
DOTTED LINES ON RIBS INDICATE POSITION OF L.E. & T.E.
TEMPLATE FOR WING RIB W1. 2 OFF 1/16 SHEET.
FULL SIZE RIB TEMPLATES
WING RIB W 20 2 OFF 1/32 SHEET
W 21 · 2 OFF 1/32 SHEET.
2 3/8"
F2
F1
3/16 x 1/8
SOFT IRON HINGES
F3
2"
5 1/2"
BAMBOO DOWELS
F4
F5
F6
PAPER TUBE
BIRCH 3 PLY AND DOWEL FOR RUBBER ANCHORAGE.
HOOKS
W1
W20
MECCANO COLLARS
SKETCH SHOWING METHOD OF BUILDING UP WING RIBS · DRILL HOLES IN TEMPLATES TO TAKE WIRE · "SANDWICH" PIECES OF 1/32 BALSA SHEET BETWEEN TEMPLATES W1 & W20 · SCREW UP MECCANO COLLARS AND TRIM BALSA BETWEEN TEMPLATES TO SHAPE. WITH RAZOR BLADE AND SANDPAPER TO GIVE PERFECT AEROFOIL THROUGHOUT WING LENGTH
1/32 SHEET BALSA DECKING GLUED FROM FORMER 17A TO TAIL · SEE 'X' ABOVE
TRAILING EDGE 1/2 x 1/8 BALSA
T1 T2 T3 T4 T5
DOTTED LINES SHOW POSITION OF 1/8 x 1/32 BALSA CURVED TO RIB SECTION.
3"
4 7/8"
NOTCH FOR RIBS
NOTCH L.E. & T.E. 1/16 FOR RIBS
LEADING EDGE 3/8 x 1/4 TAPERING TO 1/4 x 3/16
FULL SIZE TAILPLANE TIPS 1/16 SHEET BALSA
TAILPLANE 1/3 FULL SIZE.
BALSA FILLETS
FORMER 17A
FORMER 17B
TAILPLANE SPAN 17"
FIN OFFSET 2°
TAILPLANE RIBS 2 OFF EACH · 1/32 SHEET BALSA.
RIBS FULL SIZE.
· POWER · 14 STRANDS 1/4 x 1/30 RUBBER WEIGHT OF RUBBER 3 OZS.
PLATE 1.
·WARRING'S WAKEFIELD·
·BRITISH H.L. RECORD HOLDER·
26 MINS. 45·6 SECS.
AVERAGE FLIGHTS 3 TO 4 MINS.
A.H. SMITH.

A DOUBLE MOTOR DEVICE FOR DURATION AND SCALE MODELS—By N. G. CROOK



THE gear-case can be made of sheet steel or brass, with steel washers soldered on to form bearings. The gear wheels should be made of brass and should be of equal size. The shafts are best made of $\frac{1}{8}$ in. steel knitting needles and must be softened to form hooks. The fork which engages with the cup washers is built up of brass and 18 s.w.g. wire (perhaps the individual builder may have some ideas of his own on this point). The springs are made of the gauge of wire shown. It is very important that the front spring should be weaker than the rear one.

When both motors are fully wound the clutch is engaged and the front spring compressed, so that the fork, guided by the cup washers, is engaged in the slot in the lower shaft, preventing rotation, and the gears are disengaged. While this state of affairs exists, the top motor drives the propeller direct until it is run down. When the top motor is unwound and slack, the clutch disengages and the remaining few turns are spent in turning the loose part of the clutch round; when the motor is really slack, the front spring pulls the top shaft forward and the two gears engage; also the fork comes out of the slot in the lower shaft, allowing the lower motor to drive the propeller shaft through the top gear.

Plenty of oil should be used, taking care that none gets on the rubber.

A normal free-wheel should be fitted to the propeller shaft, and a folding propeller can be used if necessary.

A RETRACTABLE "UNDERCART"—By D. A. S. LLOYD

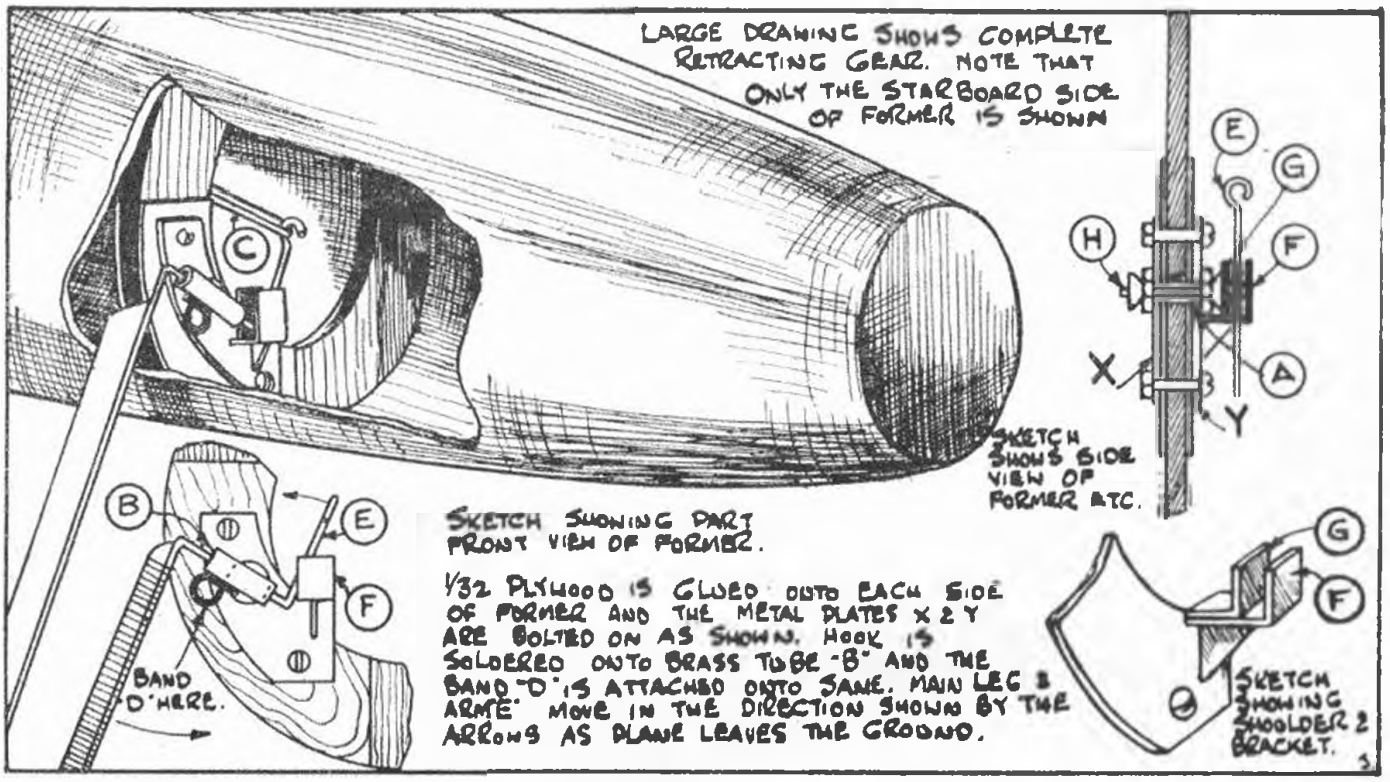
THE undercarriage is located at the C.G. of the model or thereabouts, and folds up inwards and then forwards. Thus, because the path of the legs in moving inwards is part of a circle, it will be seen that the model must rise materially before the undercarriage can retract.

The positioning of the undercarriage at the C.G. reduces the length of the legs required, and also because the legs fold up forwards, any change in the position of the C.G. will be forward, which is better than backward, because of the decreased tendency to stall immediately after the take-off.

Such an undercarriage naturally demands a landing on the belly of the aircraft, and consequently a folding propeller.

The undercarriage is made in two similar parts, each leg being, so to speak, independent of the other. Each "unit" is mounted on opposite sides of a fuselage former. This should be stronger than the rest—made preferably from two laminations of medium $\frac{1}{16}$ in. sheet balsa, reinforced each side, where the undercarriage plates are bolted to it, by small pieces of $\frac{1}{32}$ in. birch plywood, glued on.

As the size of the undercarriage required by different types of models may vary somewhat, the dimensions of the plans should be altered accordingly.



When the model is on the ground the undercarriage legs (the starboard leg alone is shown, as they are alike) are in the position shown in Fig. 1, and are kept there solely by the weight of the model resting on them. When this weight is removed (as when the model takes off), the legs are drawn inwards, round the axis of the bush "A," by the tension of the band "D," which is fixed to the two small hooks on the tubes "B." The arm "E" is thereby released from the brass shoulder "F," and the tension of the band "C" (which is anchored to the former next to the rear) is allowed to act upon the leg through arm "E," and pulls it into a horizontal position, round the axis of the tube "B."

During the take-off run, the legs are prevented from being pulled forwards, by the bands "C," or swept backwards, by the shoulders "F" and "G," respectively.

The actual construction of the undercarriage can be left to the discretion of the builder; but I would make one or two suggestions that may be of help. The front plate is best made from sheet brass about 3/64 in. thick, while the rear one, for the sake of lightness, may be from thinner aluminium (since it has not got to be soldered). Both may be drilled further to decrease weight. The brass plates, of course, must be bent oppositely for each leg "unit." Touches of solder on the fixing nuts will ensure that they remain tight. The actual axles at the top of the legs are from 16 g. wire, while the arm "E" is from 18 g. wire, to allow its hook to be bent. Cup washers prevent its movement in tube "B."

Experiment will show the tension required on the bands used, but with a little patience the whole may be made to work very nicely.

THE CARE OF BRUSHES

HOW many modellers, either young or old, using a brush to dope or paint a model, give even a moment's thought as to its origin. Generally, the only point which they think about takes place at the time of purchase, and is: how much? I only want a *cheap* one. I usually lose or spoil them.

War time conditions, however, insist that imports of non-essential goods must be drastically curtailed, and *cheap* brushes, which are generally of foreign origin, come into this category.

Consequently, such restrictions result in two things—higher prices and reduced supplies, and the time has arrived when the warning must be issued to all users of brushes to *look after them and clean them after use*. In some cases warm soapy water is sufficient, in others turps or paraffin, while for such materials as cellulose enamels and dopes, the appropriate cleaners or thinners only can be used. These are generally marketed at quite reasonable prices, and their purchase ensures a much longer life to your brushes.

We are indebted to Messrs. Chadwick and Shapcott for the following most interesting information on the supply of bristles for brush-making.

There is but one source of supply of bristles—and that source is the back of the pig.

Until the early part of the present century, Russia, with Siberia and Poland, provided the bulk of the world supply, China and India the remainder; since then the supplies from Russia and Siberia have steadily declined, until now China provides the larger part.

Pigs in Great Britain do not produce any bristles worth

mentioning. There has been brought about through the progress of domestication, the improvement in the quality of the meat, and breeding for earlier maturity, the evolution of a type of animal in which the coat is fine, short and scanty.

Now, this same development has been going on for some years in Russia and other countries; the semi-wild pig of the Continental areas is passing away, and its place is being taken by an animal which, owing to the selective crossing with strains imported from England and elsewhere, reaches maturity at an earlier age and produces a superior quality of meat; but, alas! less bristles for the brush maker.

All are familiar with the accounts of the rapid and intensive methods adopted in Russia to develop agriculture and commerce, so this change in pig breeding, which would have taken place but slowly, has now overtaken us very rapidly.

For the present, India and China are almost untouched by this modern phase of development; but it is not difficult to see that before long these countries also will become involved in the same intensive commercialisation, and this will lead to a further shrinkage in the supply of the longer bristles.

Who is likely to develop a strain of pigs requiring three years' feeding to produce perhaps less than 2 lb. of bristles per head, and with a carcass of inferior food value, when from these improved strains the maximum value of meat is obtained in twelve months?

Besides this falling-off in supply there is an increasing demand brought about by the growth of population in the civilised areas, and also the higher standard of hygiene and decorative art which now prevails.

Taking war conditions into consideration, there are the additional causes of shortage due to stoppage of some sources of supply, sinkings at sea, the restrictions of imports due to lack of shipping space, the higher cost of freight and insurance, and adverse rates of exchange when supplies come from dollar countries.

During the past twenty-five years bristles measuring from four to six inches in length have increased four to ten times in value.

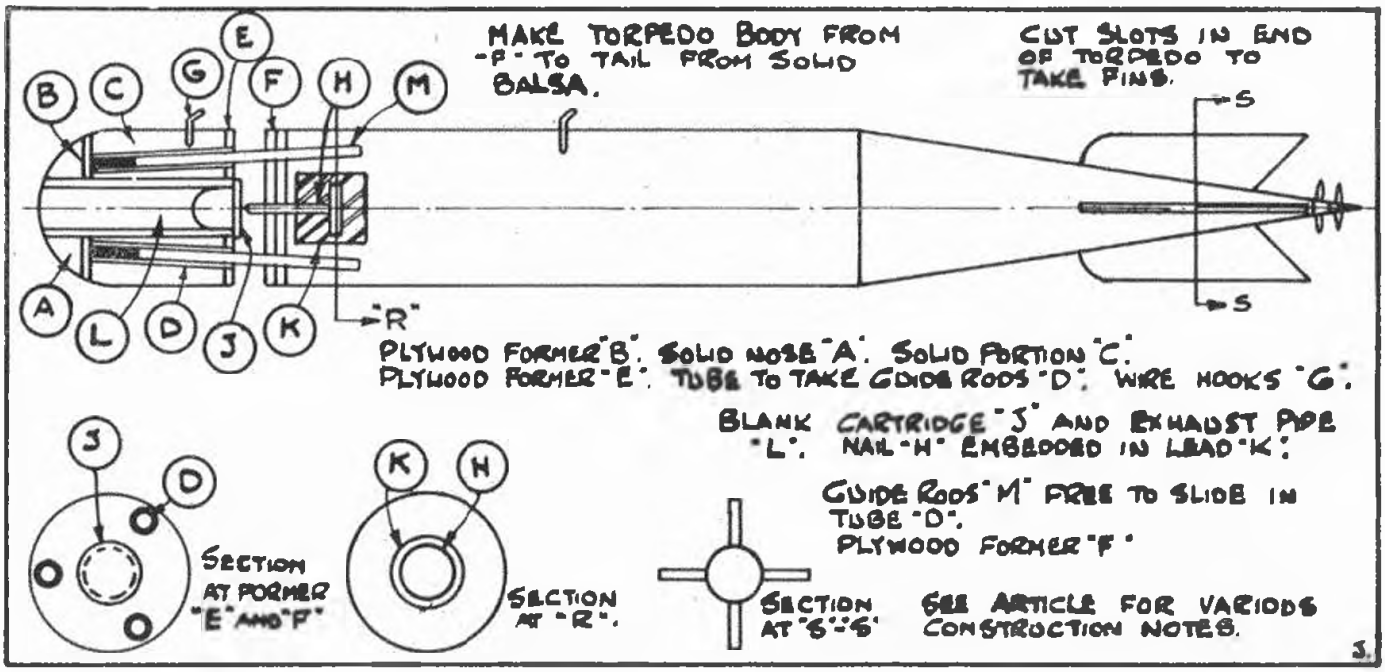
Since September, 1939, the price of bristles has more than doubled.

Therefore, be advised in time, and adopt the slogan:

Look after your brushes and keep them clean.

A MODEL TORPEDO

By I. G. HUNT



FIRST start with the main body. This consists of two laminations of $\frac{1}{4}$ in. sheet balsa, with one sheet of $\frac{3}{16}$ in. balsa on each side. Cut the required wood to shape, according to plan, and glue together. This glueing is of a temporary nature only. When dry, carve and sand down the block to correct cylindrical shape. Now remove the outside sheets of $\frac{3}{16}$ in. balsa, firmly glue together the two pieces of $\frac{1}{4}$ in., and cut out of the latter the well which is to take the hammer mechanism. When this is done, replace the $\frac{3}{16}$ in. outer sheets and glue firmly. The hammer mechanism consists of a small clout nail, with the head embedded in molten lead, and the whole allowed to cool off. The wall of the well and the bottom are coated with plastic wood, and the hammer mechanism is pushed in, ensuring that the point of the nail is in the correct position, so as to meet the rim of the cartridge. Now cut a disc of plywood and glue it in place on the end. When all is hard, cut grooves in the body to take the bamboo guide rods.

Now start on the nose. First take a piece of hard tubing of correct bore, and then cut a disc to shape, and also drill all necessary holes. This disc should be of plywood, or, preferably, metal. Either solder or glue it with plastic wood to the tubing, according to what it is, wood or metal. Next fix the 1 mm. plywood bulkhead with plastic wood

and coat with a thin layer of plastic wood, and allow the whole to dry hard. When all is hard, add the aluminium tubes and guide rods, fixing them all with plastic wood. For this the nose-cap should be in place on the body. The plastic wood will allow final adjustments. Without the nose being removed, allow the whole thing to harden. Next mould the nose with plastic wood and fill in all cracks and hollows to give a smooth finish. The nose-cap should be held in place by the converging guide rods, which have to be sprung apart each time to fit it on.

The fins have now to be fitted. Cut these to shape from 1 mm. plywood and slot them together. Then cut through the body at Z and Y and quarter longitudinally the part from Z to Y. Shave off enough from each quarter to allow for the thickness of the fin and glue them in the angles formed by the fins. It may be necessary to withstand the shock of the impact to reinforce the glue at Z by letting a piece of bamboo into the body and into a quarter of balsa on the fins. This bamboo should be embedded in plastic wood. The small cone carrying the propellers should be made of lead, and the propellers of thin sheet tin. It should not be used when bombing, but should be plugged in for exhibition purposes. The whole torpedo should be finished in much the same way as a solid model aeroplane, and no cracks should be left on discs F and N, or the blast will blow them to pieces.

When it is slung under the plane, the hammer point should be ¼ in. from the cartridge or the latter will not explode.

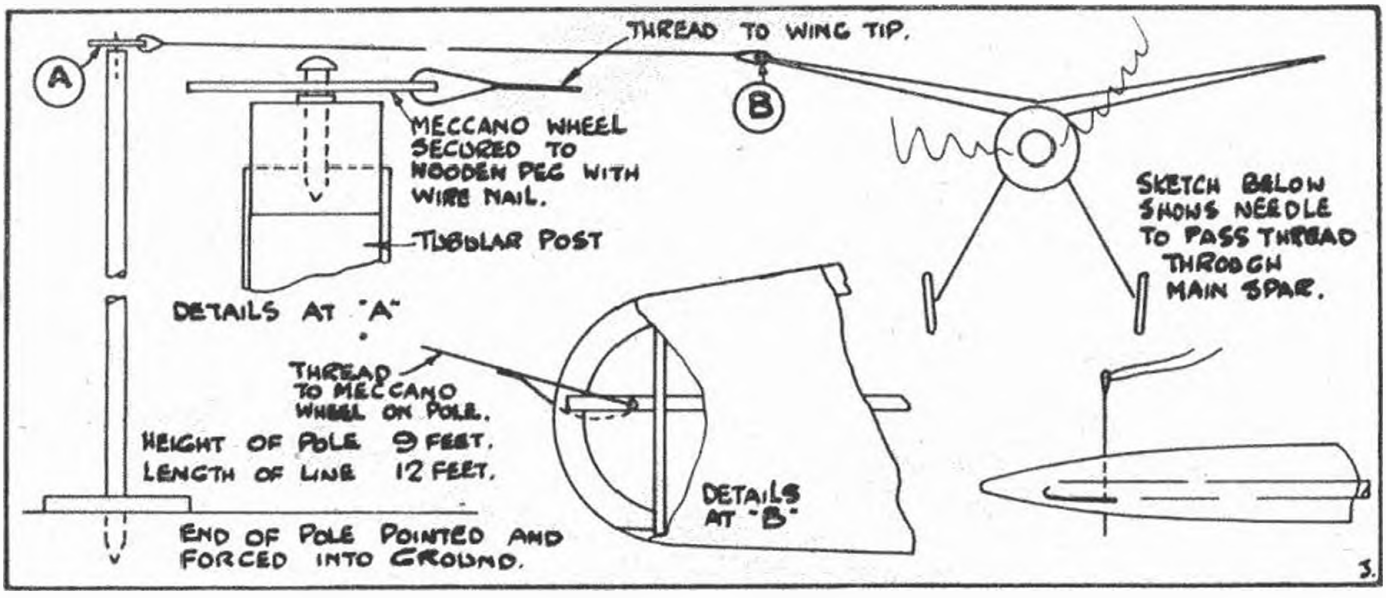
N.B.—Do not test this torpedo by dropping it on a carpet or anything of value.

POLE FLYING IN THE GARDEN—By M. P. LLOYD

"POLE flying in your garden," and here is Mr. Flywell—

"Good afternoon. Well, a very nice day for flying, isn't it? How about a spot of pole flying? But that does not mean that you have to stay indoors all day to do it. Oh, no. On the contrary, one can get plenty of good sport in the way of r.t.p. outside, providing, of course, the weather is suitable for ordinary flying."

To this wheel the cotton is attached, the length of which is left to your discretion, according to the space available. In a large garden or field a length of cotton up to about twelve feet can be used, but care should be taken on a gusty day that the cotton is not too long. The wind may tend to make the 'plane alter its course suddenly, with the result that some part of the machine, the undercart, propeller, etc., may get caught, sometimes with rather unpleasant results.



I have carried out experiments in all weathers, but, needless to say, I have found that a warm day with a gentle breeze is ideal for outside r.t.p. Did I hear murmurs from disgruntled readers? What did you say? Such weather is rare? I know, but don't be discouraged. Spring is nearly here, and the sun will soon be shining again.

However, to get down to business, "the pole" that I have been using is an old nine-foot tennis boundary netting standard. A small portion (about three inches) of the top of this has been cut off and a round wooden peg driven into the tubular top (see Fig. 1).

Next, a Meccano wheel (or any type of disc or wheel with a hole drilled in the centre, or even an old cotton-reel will do), is fixed to the wood by a nail, or something similar.

The method of fixing the cotton to the wing of the 'plane (either wing will do) is also left to the flyer. The method I employ is simple, namely, to pass the cotton through the main spar of the wing, about an inch or more from the wing tip (see Fig. 2).

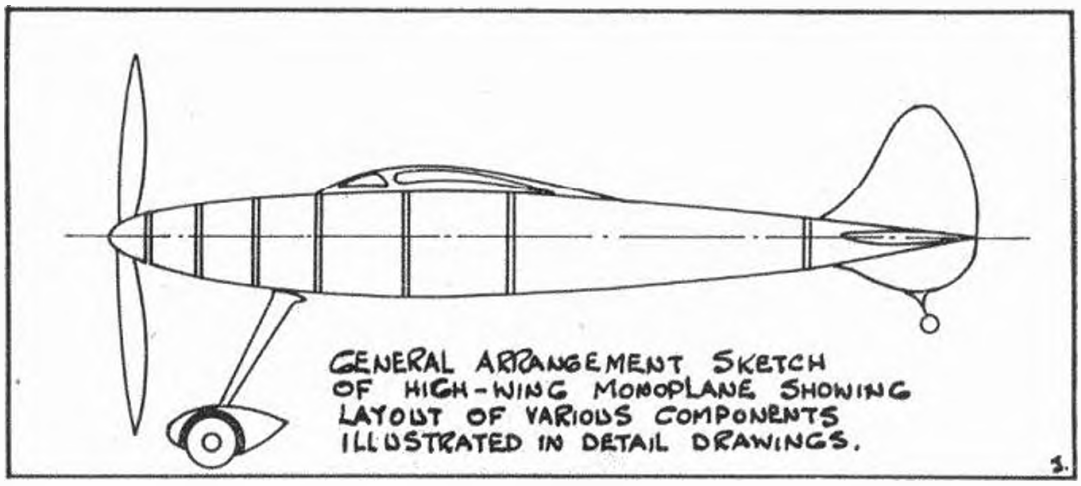
Almost any type of model can be used—light or heavy, "Parasol," "mid" or "low wing"—and, after the war, I see no reason why petrol models should not be equally well adapted for the same purpose. The model can be made to fly clockwise or anti-clockwise; generally speaking, torque makes no difference.

This type of flying, besides being an excellent sport, is very useful for the modeller who has no large open stretch of ground readily available for flying.

DETAILS IN CONSTRUCTION

By W. DAVIS

Whilst this article is not confined literally to Wakefield models, many of the ideas described are applicable to models of this type, while flying scale enthusiasts should also find it of particular interest.



Plans.

FIRST, obviously, accurate diagrams are required, and plans must be drawn so that every detail of the chosen model is absolutely concrete. This point cannot be overstressed.

(NOTE. The datum line is generally parallel to the line of flight, and the line taken by the elastic rubber motor in tension.

Fuselage (adaptable to monoplanes, high or low wing, or biplanes).

Where the somewhat trickier construction of the super streamline monocoque fuselage is concerned, the best method is to adopt the stressed skin type of construction.

It is a wise plan to make the first and last bulkheads of the fuselage (A. and R.) of $\frac{1}{16}$ in. 3-ply, as also those two upon which the attachment of the wings is dependent. All others would quite well be cut from $\frac{1}{8}$ in. sheet balsa.

Assembly of Fuselage.

When all the bulkheads have been cut to correct size and shape it is as well that each should be marked clearly A, B, C, D, etc., as this helps in assembly and allows each one to be identified as it is wanted for construction.

The spruce and balsa longerons are inserted and glued (with Seccotine) in the first and last bulkheads. These are immediately secured with an elastic band over each. At this stage, glue into position those bulkheads immediately under the wing by allowing the top longeron to slide down into position as marked in sketch for bulkheads P and Q.

A long rod is now passed (not forced) through the middle of the fuselage, from beginning to end of the model, and bound at each end to prevent the end bulkheads from moving farther apart than their pre-designed total distance. The other bulkheads are then inserted in their correct order and position, but the glueing of these is carried out after the others have set

Before leaving to set, however, ensure that those bulkheads which are glued are accurately placed (i.e. vertical and true).

After about 24 hours glue the other bulkheads and leave again to set. No difficulty should be experienced in using this method of assembly, and personally I have found that it is a system which prevents much awkward "side-slipping" of those bulkheads which have been aligned while engaged on others elsewhere.

When the whole has set, the covering with 1/64 in. sheet balsa may be started, *still keeping the "former" rod through the centre datum line.* This ensures that the stressed skin is applied while the position of the fuselage is true and normal about the datum line. The balsa is to be applied in two distinct layers, the lower layer having its grain running round the fuselage, the other layer (topmost) having the grain running horizontally. The stressed-skin construction is essential in this type of fuselage, as the bulkheads and longerons alone are not sufficient to withstand the torque set up by the motor. Regardless of this point the entire fuselage is considerably "clean" in its lines, and there is no sagging between longerons, and the strength/weight ratio is tripled. In fact, this type of construction will withstand much hard usage.

Covering with Sheet Balsa.

The balsa sheet (1/64 in.) should be in varying strips and about 2 in. wide, since their length is dependent upon the circumference of the fuselage at the position of covering.

The strips are placed in a bath of hot water and left to stand for one hour before using. This softens the grain and allows the wood to follow the contours of the fuselage without splitting.

One strip (suitable for the middle of the fuselage) is taken from the water and lightly smeared with Seccotine over one side, the longerons also are smeared at the section to be covered. The strip is placed round the fuselage and secured with one or two light rubber bands. This procedure is continued along the fuselage, and the whole job is bound with a length of elastic prior to leaving it to dry overnight.

When thoroughly dry, remove the elastic fastenings and, adopting the previous method, wrap the second stressed layer over the first, with the grain of the balsa sheet this time horizontal, and secure for drying with elastic wrappings. After the wood is dry and hard, the whole model is sandpapered with fine glass-paper until all irregularities are gone and the surface is smooth to the hand. The fuselage should now appear very smooth and even, with a shape and streamline depending upon original plans.

Covering with Silk.

The silk should be cut in as large pieces as can be handled comfortably, and dipped into a *weak* solution of Seccotine until soaked. The silk is opened out and laid centrally over the underneath of the fuselage, where it is smoothed out over the wood surface, working the creases out from the middle to the sides, and hence round to the top. (Except at the position of attachment of the streamline wing fairing and cabin, of course).

When dry, frayed edges are trimmed, and the extremities of the silk made fast with Seccotine. The assistance of a friend is very useful in helping to smooth creases, as the whole appearance of the model is detracted by an uneven finish (regardless of efficiency losses by the formation of eddy currents in passing over them).

The whole fuselage is now given two coats of clear dope when perfectly dry, with delicate sanding between each coat. The final finish is with one or two applications of good silver dope (preferably two).

The finish obtained will be perfect if carried out correctly and will have low drag properties and structural strength more than compensating for the increase in weight.

The Tail Boom and Rear Plug.

The next step in the construction is the forming of a tail boom from solid balsa, which will complete the streamline. The purpose of this will be to act (integrally with the rear plug) as an anchorage for the tail and rudder units.

The sketches should make the construction of the rear plug and boom explanatory. The rear plug is drilled to take two light wires (with hooks) from the fuselage, where they are permanently fixed. When the rubber motor has been inserted in the fuselage, the rear plug is slid over the two wires and engaged into the end of the fuselage. The bulkhead R will stand the strain of the motor torque and tension, being of 3-ply. A light rubber band is then fastened over the two hooks and allowed to tighten snugly into the niche made for it. Actually, when the motor is running, there is no need for this arrangement, but when the motor is run down in the air, the hooks and band keep the boom steady and, incidentally, the tail surfaces, which are attached to the boom. The boom slides over the rear plug, and is secured by a dowel, which is a tight fit through the holes A and B. The dowel is trimmed down until it is level with the surface of the boom. To disengage it, for examination of the motor, the dowel is forced out with a small piece of metal rod of smaller diameter.

Rudder and Stabiliser Junctions.

The boom is now ready to receive the streamlined and faired attachments for stabiliser and rudder fin. Rectangular solid blocks of balsa are cut and glued to the tail boom, as shown in sketch No. 6. When these are set the blocks are drilled to take a dowel rod (about $\frac{5}{32}$ round). Assistance is welcome at this stage to direct the position of the drill, so that the dowel holes are horizontal in the case of the stabiliser, and vertical in the case of the rudder and fin.

Stabiliser and Rudder (with Fin).

The lay-out for the boom shown is where the fin has some of its area below the fuselage. This helps to keep the model from going over on to one wing in a stiff side wind and is, therefore, aerodynamically, more sound than the model with all its fin on top (except in the case of a low-wing monoplane, where the high fin holds good).

From the plan cut the necessary ribs, $\frac{1}{8}$ in. sheet (which should be of streamline or lift section, to take the thick dowel spar) and drill through them all at once, such that the dowels when passed through will coincide with the holes at A and B in Sketch No. 6. This point, incidentally, at A should be the centre of pressure of the stabiliser; or in the case of B, the centre of pressure of fin and rudder. The wing roots of the stabiliser are of solid balsa, so that the dowels are firmly held.

When stabilisers and rudder are completed, the dowels are cut to the right length and passed into the solid balsa fairings of the boom. The fairing blocks are carefully sanded down until they appear as in Sketch No. 8. They are finished with plastic wood at W, X, Y and Z, until a rounded contour is formed. Subsequent sanding gives a smooth finish. The stabiliser and rudder are covered with silk (or tissue), doped and silvered, or, if preferred, suitably coloured.

Construction of Rear Skid Integral with Lower Fin.

A dowel is inserted and *glued* into the bottom of the boom; to this is attached wire for a rear skid, or, alternately, a streamlined fairing for a tail wheel. Sketch No. 9 shows the method of attachment for the rear landing system. The remaining fin area (calculated from formula) which goes below the fuselage may be of $\frac{1}{8}$ in. sheet balsa carefully sanded to give clean leading and trailing edges. The projecting dowel is faired into the wire (or wheel fairing) and sanded. The whole boom unit is finally silk covered, doped and silvered (or coloured) as desired.

Wing Fairings, Cabin and Wings.

For the cabin type 'plane, the main wing attachment is as for the stabiliser and rudder, but using two dowels per wing. That part of the cabin between P and Q (bulkheads) is for the main wing fastening, and a solid block of balsa is glued between bulkheads P and Q. This block takes the dowel holes for the wings. Fore and aft of this point the streamline cabin should be hollowed out, as it has no structural load upon it, and only serves to complete the streamline and general shape of the model. Cabin windows may be cut as needed, and covered from the outside with tough cellophane.

The wing dowels should project at least one third into the main wing structure, and these considerably strengthen it. They need not be glued, but simply slid into paper tubes running through the ribs of the wing. In the event of broken dowels through crashing, new dowels can be speedily fitted. Wing fairings are carved and shaped from solid balsa as before, as these all assist in cutting down drag, faster flights, and better duration being attained on the same power as the "blunt" line model of equal size.

Wings.

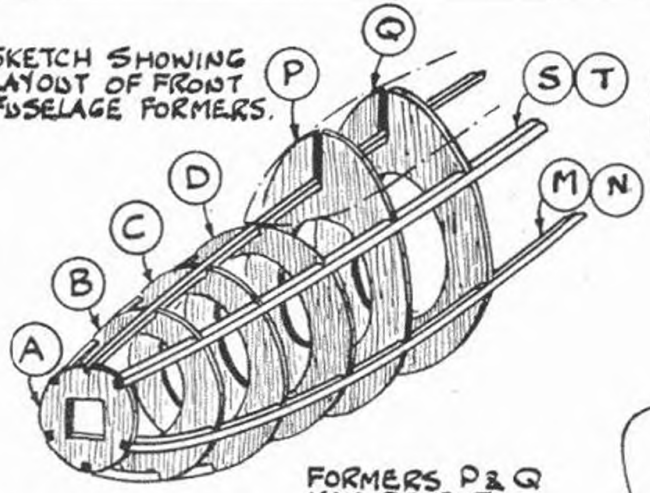
Tapered wings are recommended on this type of model, as they reduce trailing edge vortices and are generally more aerodynamically efficient in other ways; they are also in keeping with the latest types of aircraft.

The wing should preferably have its leading edge covered with 1/64 in. or $\frac{1}{32}$ in. sheet balsa and the wing covered with silk, doped and silvered (or coloured).

Propeller.

The propeller should have a normal pitch ratio of about 1 : 4 (pitch/diam.), and should have a streamline boss, in

SKETCH SHOWING LAYOUT OF FRONT FUSELAGE FORMERS.

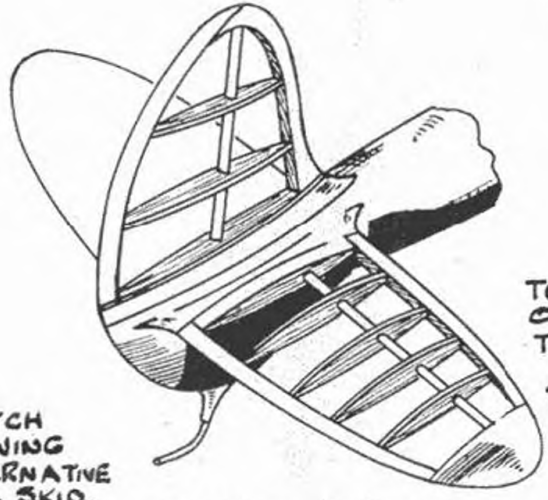


LONGERONS M.N.S.T ARE TO BE 1/8 SQUARE SPRUCE, TO TAKE THE WEIGHT OF WING MOUNT AND UNDERCARRIAGE.

FORMER "A" IS CUT FROM 1/16 PLYWOOD

FORMERS P & Q MAY BE CUT FROM 1/16 OR 1/8 PLYWOOD.

CUT OTHER FORMERS FROM 1/8 BALSA.

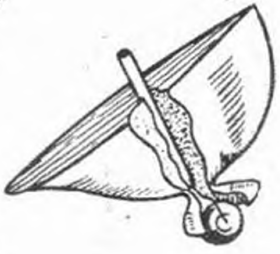


GENERAL ARRANGEMENT OF TAIL UNIT

DSE LIFTING SECTION TAIL-PLANE RIBS.

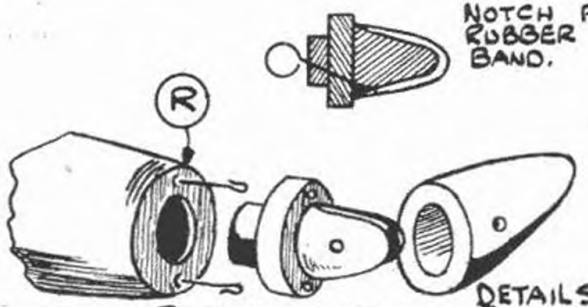
SKETCH BELOW SHOWS RUDDER AND TAILPLANE ROOT FAIRINGS ON BOOM.

SKETCH SHOWING ALTERNATIVE TAIL SKID.



DETAILS OF TAIL WHEEL AND LOWER "ANTI-SPIN" FIN.

BREAK RAZOR BLADE AS SHOWN AND INSERT INTO WOODEN HANDLE.

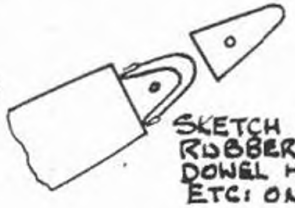


NOTCH FOR RUBBER BAND.

REAR PLUG ETC:

DETAILS OF BOOM ETC:

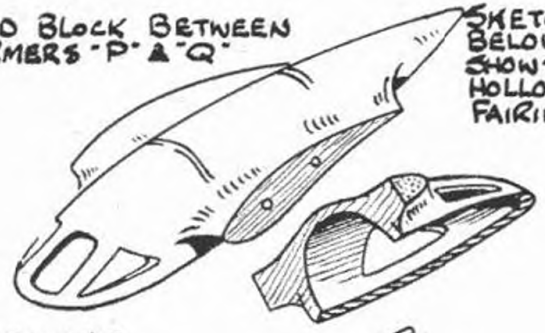
METHOD OF HOOK ATTACHMENT.



SKETCH SHOWING RUBBER BAND, DOWEL HOLES ETC: ON PLUG.

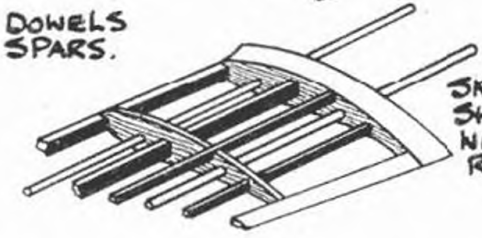
TOP FAIRING FORWARD OF "P" & AFT OF "Q" TO BE HOLLOW.

SOLID BLOCK BETWEEN FORMERS "P" & "Q"



SKETCH BELOW SHOWS HOLLOW FAIRING.

NOTE DOWELS AND SPARS.



SKETCH SHOWING WING ROOT.

corporating one of the standard free-wheel devices. With the motor, the model is complete except for the undercarriage which, for various reasons, I have left until the end.

Undercarriage.

The fully equipped model (less undercarriage) is now balanced at its true designed centre of gravity (that C.G. which has decided the rudder and stabiliser area in conjunction with dihedral angle, aspect ratio, etc.). On this type of model, with a substantial propeller (not balsa) the C.G. lies at about 40—45 per cent of the total length from the nose.

The amount of mass now needed to restore the model balance about its C.G. decides the position of the undercarriage, which can safely be moved backwards or forwards, provided that :—

1. The propeller is protected on landing.
2. The C.G. is kept as far as possible behind the landing wheels.

It is advisable to have a substantial undercarriage of the following design, which is not unsightly if faired with balsa. (Many types of aircraft have single strut undercarriages, e.g. Gloster "Gladiator.")

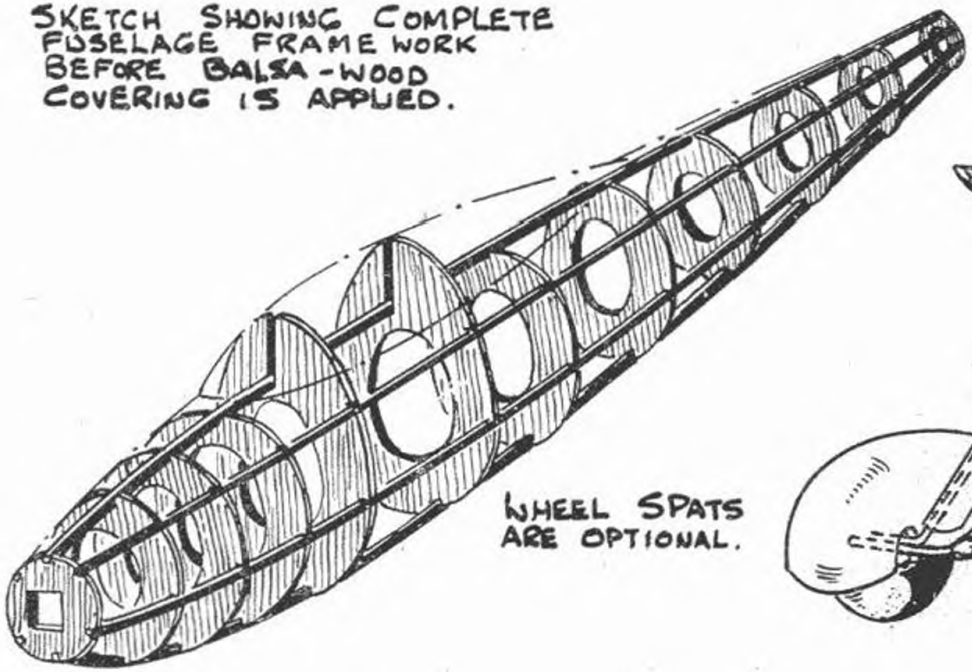
Attachment.

At the two points of attachment of the undercarriage (where C.G. is restored) cut out small sections of the stressed-skin covering at the positions of the two *spruce* longerons—the plan will show their position almost exactly.

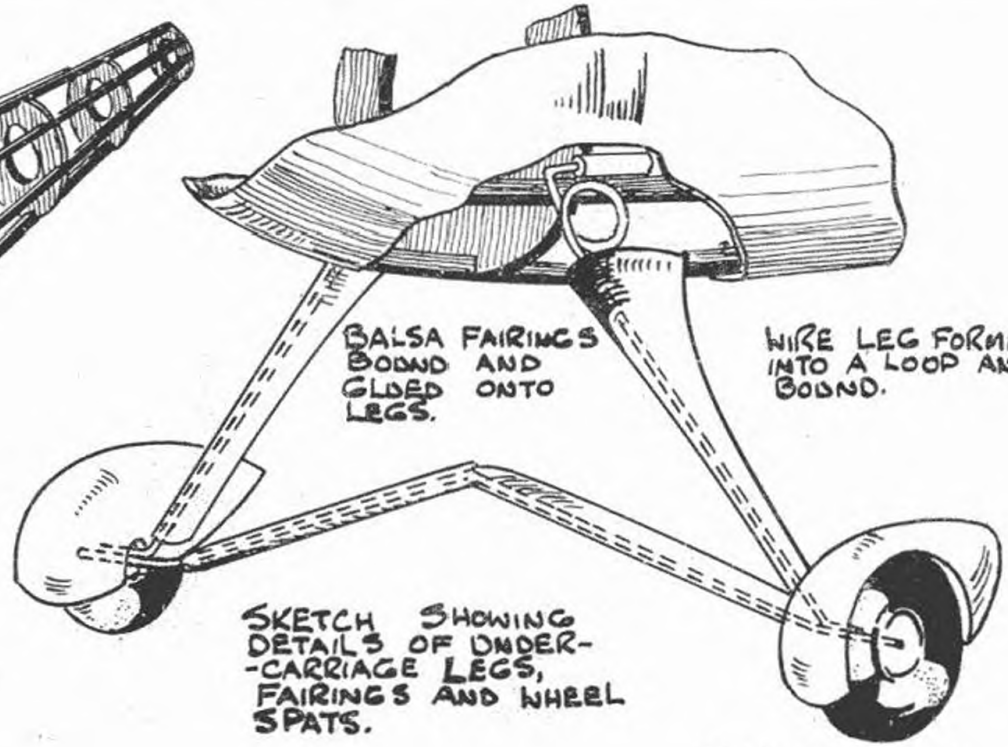
At these places bind and glue rigidly (near a bulkhead, preferably) small lengths of brass or aluminium tube, of such gauge that the wire landing struts will fit tightly. Only as much of the stressed skin as is necessary to pass a small needle (for binding the tube) should be removed. When these tubes are dry and solid, replace the stressed skin with glue, and finish with plastic wood, leaving only the small tubes projecting to take the wire undercarriage.

The undercarriage is made of strong wire, as shown in Sketch No. 12, with a "hairpin" shock-absorbing bend at H, which allows the force of a heavy landing to be damped in the same line as the resulting forces set up. The wire is streamlined with solid balsa fairing, which is silk bound and doped. The hairpin bend may be embedded to some degree in solid balsa or simply covered over with silk, allowing room for ample movement on landing.

SKETCH SHOWING COMPLETE FUSELAGE FRAME WORK BEFORE BALSA-WOOD COVERING IS APPLIED.



WHEEL SPATS ARE OPTIONAL.



BALSA FAIRINGS BOUND AND GLUED ONTO LEGS.

WIRE LEG FORMED INTO A LOOP AND BOUND.

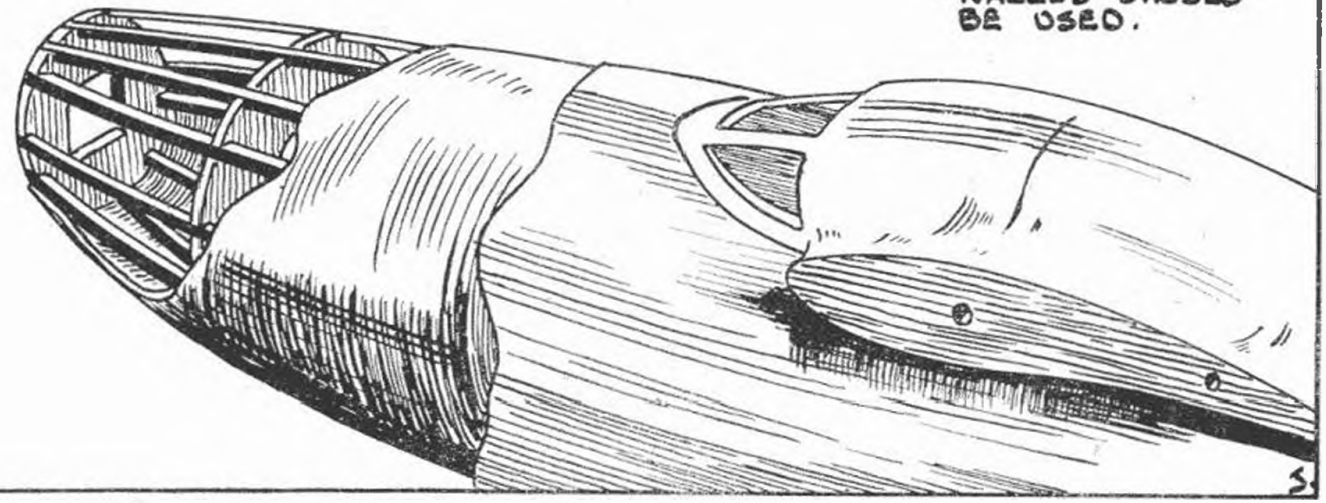
SKETCH SHOWING DETAILS OF UNDER-CARRIAGE LEGS, FAIRINGS AND WHEEL SPATS.

BALLOON AIR-WHEELS SHOULD BE USED.

SKETCH SHOWING FUSELAGE PARTLY COVERED WITH WOOD

NOTE THAT THE FIRST SKIN HAS VERTICLE GRAIN AND THE SECOND SKIN HAS HORIZONTAL GRAIN. SILK COVERING IS APPLIED AFTERWARDS.

WING-RIB SECTION SHOULD BE R.A.F 32.

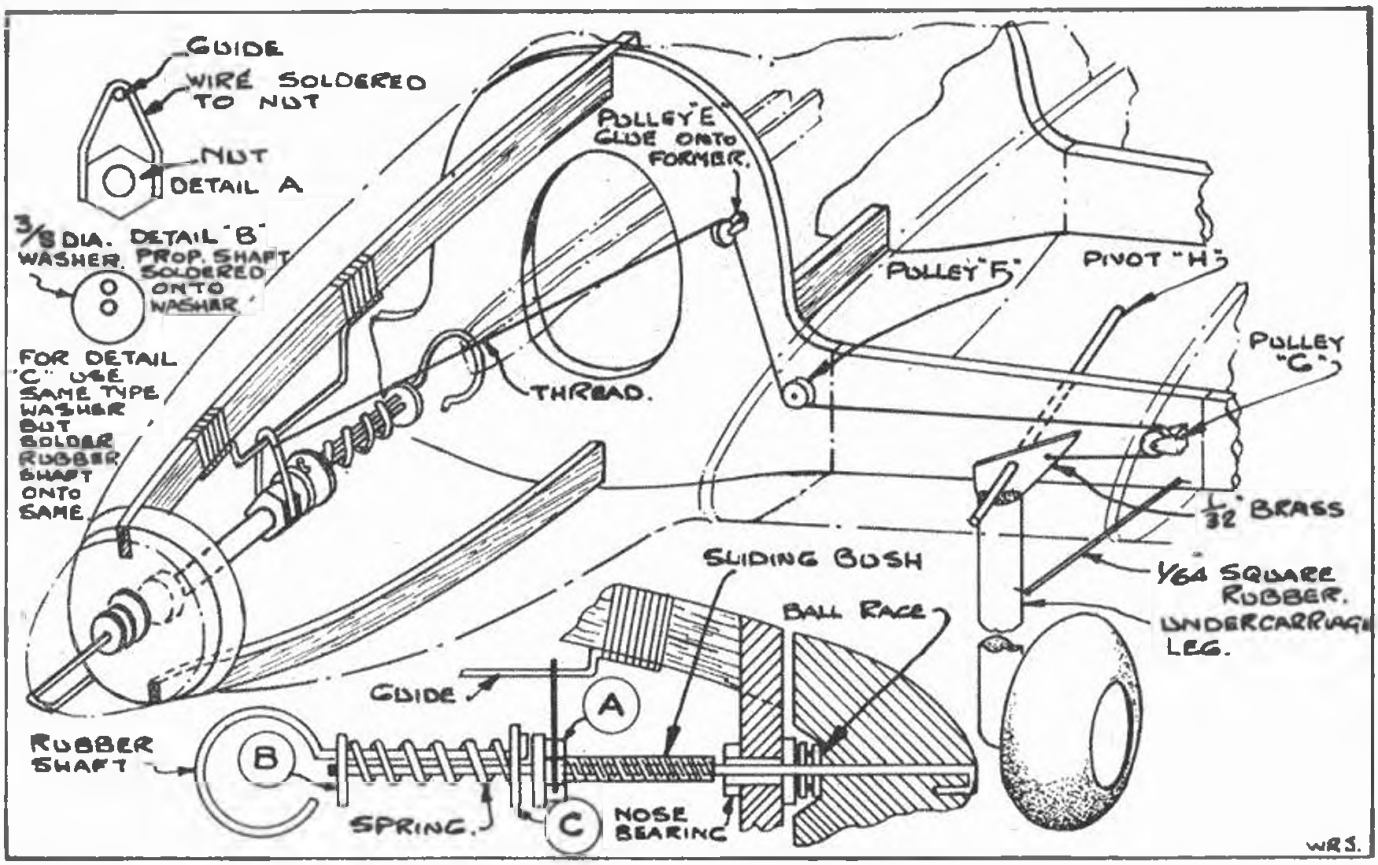


A DETRACTABLE and RETRACTABLE UNDERCARRIAGE

By G. COX

THIS model undercarriage is different from most others in the respect that it retracts at the take-off, and also detracts at the end of the flight.

When making the mechanism the propeller shaft is made first. A piece of 14 gauge steel piano wire 4 in. long is first obtained. One end of this is bent into the airscrew boss, and fixed with cement; on to the other end are now passed, firstly, cup washers, or preferably a ball race. The shaft is now passed through the nose bearing, and then another bush ¾ in. long is put on, which has been previously prepared as follows: At the head (A) of this bush, for a distance of ⅛ in., all the thread is filed away, so that the nut may revolve free on the bush. The nut itself has a loop of wire attached, through which the guide wire runs and to which are attached the control threads. Also the ¼ in. double-bored brass washer is soldered to the bush at A. This washer is soldered to the rubber hook shaft, but the main shaft is free to slide through its centre. After the bush AD, with the washer C and rubber hook attached, has been slid on the propeller shaft, a spring is slid over the hook followed by another double-bored washer B, which is soldered to the main shaft, leaving the rubber hook shaft free to slide through it. The threads from the wire attached to the nut on the bush are led over the pulleys E down into the centre section of the 1½ in. by ¼ in. wing. They are then led as shown in diagram round the pulleys at F and G, and finally attached to the shaped top of the undercarriage legs, above the pivot at H. To the legs lengths of thin rubber are attached, so that they may be pulled up into the wing when the threads are not attached.



Operation.

The motor is wound up in the usual fashion, during which time the spring BC is compressed, drawing A to the back end of the slide. For the last 30 turns, however, the nut is moved from the filed part of the bush on to the thread, and hence when the motor is completely wound the nut is again at the forward end of the guide wire.

When the propeller is released the bush on the shaft turns with it, and hence the nut moves towards the tail, slackening the threads, and allowing the rubber in the wing to retract the undercarriage. When the motor is unwound, however, the spring between B and C extends, pushing the nut now at A back to the other end of the slide, thus tightening the threads, which pull down the undercarriage. Hence, when the model lands the undercarriage is again in the down position.

This mechanism is suitable for all "outward" retracting undercarriages for models of Spitfires, etc., but if an "inward" retracting undercarriage is required it may be obtained by leaving out the pulleys at G, and attaching the threads straight on to the top of the legs, which must be carved so that the bend at the top is in the opposite direction.

Calling all Air Cadets.

Mr. C. A. Rippon reports PROGRESS

I ANTICIPATED that owing to the change over from A.D.C. to A.T.C. there would be a pretty sharp decline in the progress of aero-modelling sections associated with the many squadrons of Air Cadets. I need not have worried, for in spite of the upheaval occasioned by the change in the methods and syllabus of subjects, it is refreshing to note that even more squadrons are becoming interested, and express a desire to know how to start their model 'plane section, and ask my advice how best to set about it.

The Air Training Corps authorities at headquarters are fully alive to the value of aero-modelling in all its phases, and doubtless will, in collaboration with the Society of Model Aeronautical Engineers, formulate the lines on which the aero-modelling classes, clubs or sections will be run. In the meantime, squadrons with an urge to get on with the job are left wondering what to do about it.

My advice is that the aero-modellers in each squadron get together and form their own self-contained club to operate outside squadron hours unless the Commanding Officer indicates that their activities can be fitted into official time. This seems to be doubtful, however, at the present juncture in most cases under my notice, because of the intensified training in more important subjects, and this is obviously where a lead should come from H.Q.

However, I feel that if they can meet together and get going as a spare time club, notice will soon be taken of their efforts, especially if they make a good show.

Interesting letters have reached me from North, East, South and West, and all express this urge to get going. Cadet R. S. Bate, of Sutton High School Squadron of Plymouth, Devon, which is one of the new ones, expresses doubts as to the reception he will receive if he suggests a model aero section. I do not think he need worry about it. In these enlightened days only the very ignorant express the view that aero-modelling is "playing with toys," and one would surely not find such people among A.T.C. squadrons. I am sure that Cadet Bate, with the courage of his convictions, will win through.

254 Squadron, Aberdare, Glamorgan, South Wales, next claims our attention. Cadet Phillips has been appointed Secretary of the recently formed Aero-modelling Section, and the section has held two meetings after parades.

He writes: "Aero-modelling is not new to the majority of us, as there are a few local enthusiasts who have been building models for years, and also a number of evacuees who are experts. There are a few models in course of construction, and these include duration types and a model of the 'Avro Cadet,' from plans given in THE AERO MODELLER.

"This model has been modified to make it a flying job, although difficulties have been encountered owing to using different materials. One of the Cadets has been using an 'enlarger' to obtain correct outline of the wing ribs for a model of the 'Owlet' day and night trainer, and round the pole flying is to be started in the near future." Well, Aberdare, you certainly start with a strong hand, and other squadrons will be interested to hear of your further progress, I'm sure.

We next move to Nottingham, where Cadet Frank Adcock is keen on getting a section going in his squadron—number unknown.

Here is a chance for Mr. Chapman and his fellow members of the Notts and District Model Aircraft Club to get busy and help their local squadron. They can contact Cadet Adcock at 42 Charlton Avenue, Long Eaton, Nottingham. Nottingham has been noted for aero-modelling for many years, and I'm sure it will hold out a helping hand to the new A.T.C.

Over to Cleethorpes, Lincs, where R. M. Brady is ploughing a lonely furrow, for as far as he knows at present he is the only person associated with the Aston Grammar School Squadron who is a model enthusiast, and he means to start in the right way, for he (as did many others) sent in for a copy of the *S.M.A.E. Journal* containing the rules of competitions, etc., so that he could get the "low down" on pole-flying.

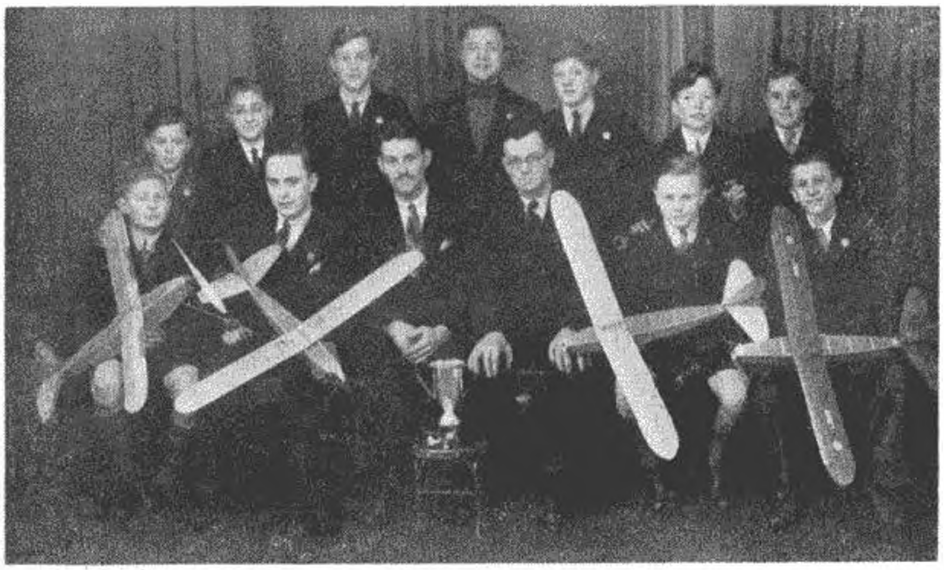
West again to Bath, where a member of the Bath Model Aircraft Club is doing his bit instructing members of the local A.T.C. Squadron. This enthusiast, Mr. H. Alexander, apologises for a class of six only, but six "good men and true" are worth more than fifty lukewarm specimens, and are easier to instruct.

It appears that Mr. Alexander has hopes that, if their first models turn out successful, they will attract more enthusiasts. I'm sure they will, and I look forward to them entering for THE AERO-MODELLER Trophy.

In the April issue I made an appeal for information concerning the Air Scouts, who are open to boys who are not old enough for the Air Training Corps, and I am pleased to be able to give you some interesting information by way

of a letter from Scoutmaster Thomas Murphy, of Hounslow. As his letter breaks entirely new ground, and will undoubtedly interest many more of my readers, I am asking the Editor to publish it, together with the examination questions for the Air Scouts' proficiency badges, and should any scouts or aero-modellers living in the Hounslow district desire further information, they can contact him direct. I am sure that Mr. Murphy will find a good variety of plans, etc., suitable for lads with limited pocket money included in the pages of THE AERO-MODELLER, but if any of my readers have plans laying by I m sure if they send them to him they will do more good than by going to waste on the owners' shelves.

The article I am starting this month, "Let's build a flyer," will include a design for a sound, but simple model, which can be built at a very low cost, and which will be eligible for the test for "Air Apprentice" badge among Air Scouts.



At right are shown members of the Ebbw Cale Model Flying Club with the "Friendship" Cup," won by one of their members. This cup was purchased jointly by the Ebbw Vale and Northern Heights Clubs, and is for annual competition by the novices of both clubs.

★ ★ ★

The following is Scoutmaster Thomas Murphy's letter. Details of the Proficiency Badges for which his Air Scouts qualify will be of particular interest to those not yet old enough to join the Air Training Corps.

BOY SCOUTS . . . . . TO . . . . . AIR SCOUTS

DEAR SIR,

It was with very great pleasure I read in a recent issue of THE AERO MODELLER your remarks regarding Air Scouts. If you should get any enquiries regarding Air Scouts in this district perhaps you would be good enough to refer them to me, but I think I should first of all explain some of the details in connection with the particular group I am interested in.

Firstly, the troop is known as Fifth Spring Grove, and were originally Boy Scouts pure and simple, but owing to demands of the Services the troop found themselves short of senior boys and leaders, and in order to get them interested again it was decided to go over (as a troop) to Air Scouts. As I am somewhat interested in aero-modelling I offered my services and was accepted, having been in Scout movement for a good many years.

Secondly, any boy who wishes to join must in the first place be prepared to accept training as for ordinary Scouts; that is the backbone of all classes of Scouts, whether Rovers, Sea Scouts or Air Scouts. The latter, of course, are only in their infancy, and so far beyond the fact that there are three new proficiency badges for them very little can be said for any special training. However, I am enclosing a copy of the details of the three new badges referred to above, and if you can assist me in arranging lectures covering the questions mentioned therein I shall be very much obliged.

Thirdly, there is the question of plans. Now, as you will no doubt appreciate, boys in the Air Scouts will very largely be schoolboys, and consequently short of pocket money. I am afraid unless we can find some alternative or get some help we shall be short of plans. Boy Scouts, as you probably know, are not allowed to beg, to put it mildly, and when there is only a very small weekly subscription coming in, and with H.Q. to run, there is not a very large surplus, if any. Still I suppose these bridges should be crossed when we come to them! Up to the time of writing we have not started any modelling at H.Q., although quite a number of the boys have already had some experience. You see, before they can embark on any of the new proficiency badges they have to pass their Tenderfoot and second-class tests, and as yet quite a few of them have to complete their second-class test, while of course new boys have to contend with both. Anyhow, if you can at all help it will be much appreciated, and may be of value to the boys who need more than ever now someone to keep them together.

Thanking you on behalf of the troop.

I remain,

Yours truly,

THOMAS MURPHY,

Scoutmaster.

P.S.—I forgot to mention—do you think I could get any co-operation from local on nearby airports in so far as at some future date a visit could be arranged for my boys that should be of great interest to them and would probably help in getting recruits?

PROFICIENCY BADGES FOR AIR SCOUTS

AIR APPRENTICE.

1. Know the proper conduct to adopt, and the ordinary safety precautions to follow, when on an aerodrome or near aeroplanes.
2. Know how to be of practical help to a pilot by indicating wind direction both by day and by night.
3. Know how to help a pilot by picketing an aeroplane, how to use chocks and improvise them.
4. Understand the importance of keeping people away from an aeroplane when stationary or moving, and the necessity of leaving a grounded or crashed machine and/or parts thereof undisturbed until the proper authority arrives.
5. Know what constitutes a reasonable landing ground and name three possible landing grounds in the neighbourhood. In towns of over 100,000 inhabitants know where the two nearest possible landing grounds are.
6. Have a knowledge of the theory of flight—shape of an aerofoil, airflow round an aerofoil, streamline bodies.
7. Make a model aeroplane which will fly at least 25 yards.

AIR MECHANIC.

1. Explain the general position and functions of flight control surfaces.
2. Name three well-known distinct types of aircraft and their engines, understand and describe their differences briefly.
3. Have a clear idea of the working of the internal combustion engine, and know the names and positions of all the principal parts.
4. Show a knowledge of the use of hand tools in common use in engineering practice, including precision filing.
5. Make a well-finished scale model of an aeroplane—it is not necessary that the model should fly, and it must be a separate model from that used to qualify for air apprentice; or a glider weighing not less than 1 lb. which will glide at least 100 yards.

AIR NAVIGATOR.

1. Keep from personal observation a daily record of the weather for two months, using the Beaufort letters and symbols, and understand how the weather map is prepared.
2. Understand what is meant by latitude and longitude.
3. Understand fully the principles of the magnetic compass and compass bearings. Plot on a map a route given by the examiner in the form of a compass bearing from one spot to another, allowing for a specified angle of drift.
4. Show a knowledge of the conventional signs of an aero map and landmarks used in cross country flying.

LET'S BUILD A FLYER!

I THINK the most important facts about model aeronautics are that the very simplest of models can give most satisfying and spectacular results, and to obtain these results one doesn't have to possess an expensive tool kit, neither does one necessarily have to be relegated to a special workshop situated, possibly, in a cold, damp shed!

The fascination of model aeronautics is wrapped up in a spirit of experiment and adventure, which combine to teach one in a very happy and interesting manner the secrets of air navigation and all its attendant problems of stability, power, gliding, etc., etc. Now that it is an organised sport, we do, even with the simple model, stand an excellent chance of winning our spurs in open competition with other enthusiasts.

If you have never made a model, or even considered the possibility of making and flying a model 'plane, and you would like to learn how and why a "heavier-than-air" machine can remain in the air, in a really practical way, at small expense both in time and money, ponder over my leading remarks, and I am certain that you will "have a go."

I have before me a letter from a Flight-Sergeant, R.A.F., who is doing very important work as an instructor, and he says: "A groundwork in model aeronautics is the best foundation for a life in the Service, for it enables one like myself to talk to pilots and understand their point of view, for, basically, there is little difference between the guiding principles underlying the full-size aircraft and the models of to-day."

Now this represents the considered opinion of a man who has made good in the R.A.F., and who learned the first principles of flight with the aid of simple models while he was still at school. It is very pleasing to look back on those days and to feel that model aeronautics has played an important part in the career of those who are to-day serving their country with such gallantry.

The moral, if one is sought, is not to despise the humble and simple model but to start in a simple fashion and work gradually up to the heights attained by such giants of the model world as Korda, Copland, Chasteneuf, Zaic, and many others.

Let us consider, therefore, the "lay-out" of such a model, and weigh up the chances of a reasonable performance from it.

It has been found in practice that a model of about 30 in. span, weighing about 2 oz. or so total weight, can give very satisfactory results.

One can design the structure so that the loading per square foot is in the region of 2½ oz., which gives us a speed of 9½ miles per hour necessary to maintain level flight.

As we propose to use a rubber motor to drive the airscrew, this speed will be considerably exceeded at the commencement of the flight, due to the fact that the last 15 per cent of the available turns wound on to a rubber motor nearly double the average power developed, and present the greatest problem in model aeronautics to those who use rubber motors, i.e. the power is not constant, and, as a matter of fact, drops very rapidly after the commencement of the flight.

By careful design, and even more careful trimming of the model before each flight, this phenomenon can be turned to good account and made an asset instead of a loss, for if one can control the initial power output and maintain the trim of the model so that the over-powered airscrew pulls the model up to an immense height, one can be certain of more than doubling the duration of the rubber cum airscrew run by a long glide, and even, on occasion, contact a "thermal," possibly getting a "fly-away."

Now, to get such results means not only a sound design and careful attention to trim, but, most important of all, careful and accurate workmanship.

You may be absolutely certain that those fellows who remain in the limelight of success in competitions are the ones whose work is beyond serious criticism, and although occasionally one hears of a " rough " job putting up a remarkable performance, it is the exception rather than the rule.

Let us run over together the various parts of an elementary model, and try and gauge the work that each part has to do, and how dependent each part is to its fellows.

Most of us know that a model aeroplane consists of (1) The fuselage or body, which has mounted upon it (2) the main planes, (3) the stabilising tail and fin, (4) the undercarriage, (5) the airscrew. In addition, the rubber motor which drives the model is stretched between the airscrew—situated usually at the forward end of the fuselage—and a fixing at the rear end of it, so it is quite evident that the fuselage is the backbone of the whole assembly, and on its stable and firm construction depends a large percentage of responsibility for the success of the model. In addition, it has to stand the tension and the racket of the temperamental rubber motor, quite a problem on its own, although, if thought and care is put into the job, it resolves itself into quite an interesting and easily-surmounted one.

The fuselage must be considered as a cantilever beam supported by and from the main lifting surfaces and steadied in a horizontal position while in the air by the stabilising surface or tail. This state of affairs imposes considerable strains upon it, owing to the long moment arm between the wing and tail. Again, when a model lands, there is an even longer moment arm between the wheels and the tail-skid. When the model lands the tail hits the ground with considerable force, again imposing large strains upon the fuselage. Occasionally, the model collides with a solid object, such as a tree or a house, and if the rubber is partly wound at the time, the fuselage not only has to stand the collision stresses, but the stresses are aggravated by the tendency of the wound-up rubber skein trying to pull the front and rear ends towards each other; so even in an elementary model it is wise to try and estimate these strains and build a true engineering structure.

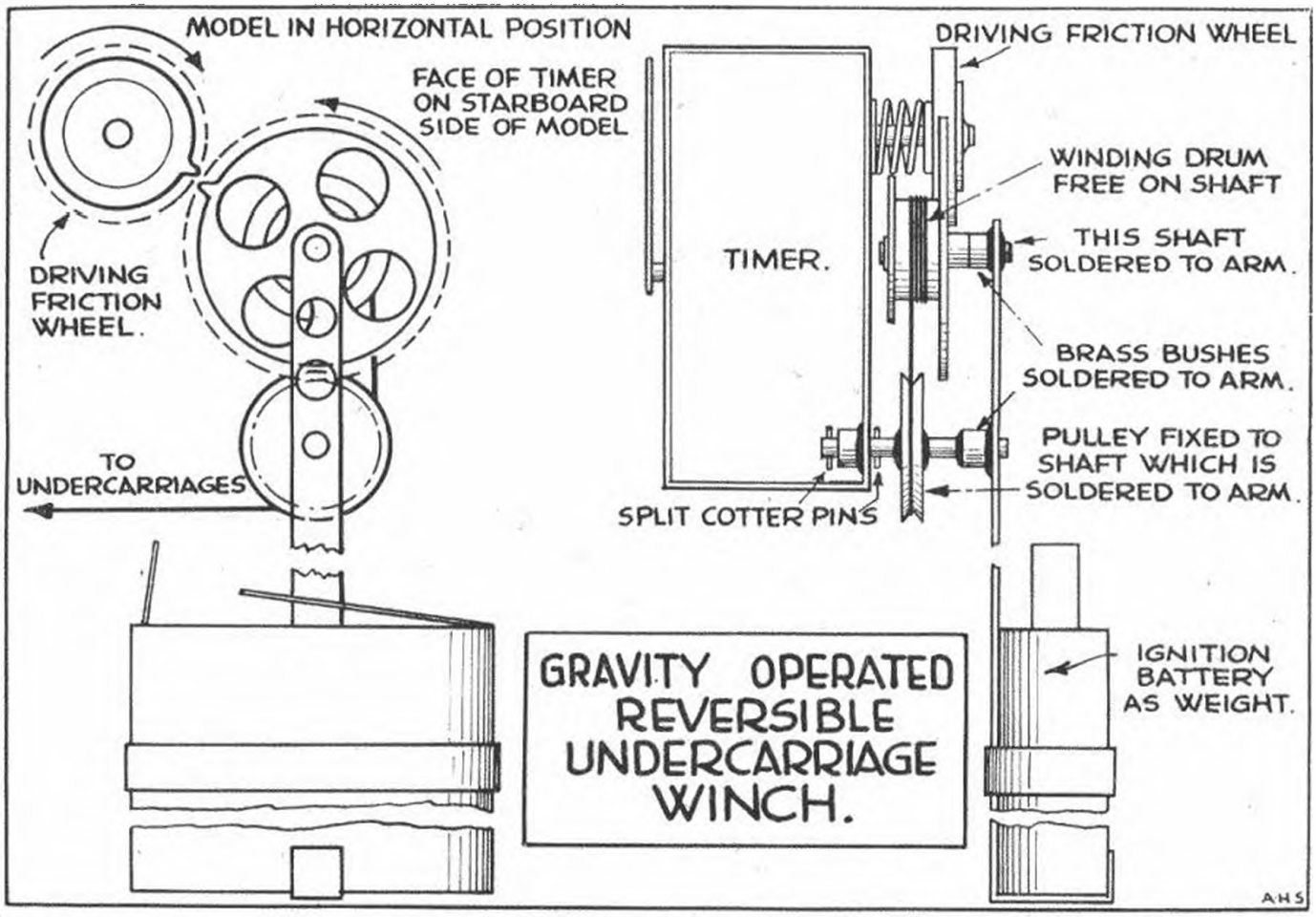
We hear a great deal about " stressed-skin construction " nowadays, and for those who do not know exactly what is inferred, I would point out that the average model aeroplane fuselage is a very good practical example of this form of construction, for the Jap tissue paper covering, when shrunk and doped with banana oil, takes care of the " explosive " stresses caused by collision and the pull of the rubber motor, and the torsion stresses caused by the twisting of the rubber. Because of this, it is important that the covering of the fuselage should be kept trim and taut.

Of course, while we can take advantage of such a simple way of stiffening the fuselage, there are occasions when it doesn't quite work out as we want it to, and one of these is when the covering has been punctured or split, or when, late in the evening or on a rainy day, the covering is inclined to get flabby. Under these conditions we have to rely entirely upon the basic structure, and it must be designed to take shocks under such conditions. So you will appreciate that the fuselage design is fundamentally a combination of stressed skin and sound structural design, which allows us to use the minimum amount of material, and it results in a light, rigid foundation for the rest of our model.

(*To be continued*).

A GRAVITY-OPERATED REVERSIBLE WINCH FOR A PETROL 'PLANE UNDERCARRIAGE

By W. G. ROBERTS



THIS winch is for those modellers who are prepared to go to lengths for a model which is something out of the ordinary. I am one of those people who think that the extra weight and complication which go hand in hand with gadgets mounted in model 'planes worth while. To see one's model take off and climb with the undercarriage steadily being wound up, then as the engine cuts out the undercarriage gradually letting itself down, puts more interest into model flying.

As the heading implies, the winch operates by gravity. The procedure is as follows: the timer is wound up and set, the model runs along the take-off board, and as soon as the model takes on a definite climbing attitude, and not before, the friction driving wheel, fixed to a shaft on the timer, engages with the winding drum by reason of the weight on the end of the arm, to which is mounted the winding drum shaft.

The undercarriage begins to wind up; when at the end of its travel the winding drum obviously will not turn any more. The driving friction wheel now comes into the picture; the spring of this wheel is so adjusted that when the undercarriage wheel is tucked away in the wing the friction driving wheel starts to slip (the driving spindle of the timer still rotating), but is just strong enough to prevent it slipping during the upward travel of the undercarriage. When the timer cuts out the engine (it does not matter whether the timer stops or not) the nose drops, with the result that the winding drum disengages, thereby releasing the tension on the winding cord or wire, and the undercarriage drops ready for landing. It should be mentioned that the undercarriage should retract against some arrangement of spring loading.

Although the drawing is full size, the individual modeller can vary the diameter of the driving friction wheel and winding drum wheel, according to the speed at which he wants the undercarriage to retract. Some of the parts can be made from Meccano or similar sets. If Meccano gear wheels are used, drill holes to lighten them, also keep the shafts as short as possible.

The fixed pulley guide wheel and angle of a line drawn through the centres of the two gear wheels to the horizontal must be rigidly adhered to, because the gear wheels are thus assisted to be in constant mesh.

IDENTIFICATION

SINGLE-PAGE PLANS

U.S A.

Douglas (Northrop) 8a Attack Monoplane
North American Harvard Trainer
Curtiss Hawk 75a Fighter
Curtiss P.40 Tomahawk Fighter
Brewster F2A-2 Buffalo Fighter
Bell Airacobra Fighter
Curtiss SBC-4 Scout-Bomber

FRANCE

Morane-Saulnier Ms406C Fighter
Dewoitine D.520 Fighter

GERMANY

Messerschmitt Me109E Fighter
Heinkel He113 Fighter
Junkers Ju87B Dive-Bomber
Henschel Hs126 Army Co-operation Monoplane
Bücker Jungmann Trainer

DOUBLE-PAGE PLANS

GERMANY

Dornier Do17 Bomber
Dornier Do215 Bomber
Heinkel He115 Seaplane
Dornier Do18K Flying Boat
Dornier Do24 Flying Boat
Focke-Wulf FW 58 Weihe Trainer
Heinkel He111K Mk.Va Bomber
Junkers Ju88K Dive-Bomber
Blohm & Voss Ha139 Seaplane
*Focke-Wulf FW 200 Condor Troop Carrier
*Junkers Ju89K Troop Carrier
Junkers Ju52/3m Troop Carrier
Junkers Ju86K Troop Carrier
Messerschmitt Me110 2-seat Fighter and Jaguar Fighter-Bomber

POLAND

P.Z.L. Los Bomber

FRANCE

Potez 63 Fighter-Bomber
Breguet 690-1 Fighter-Bomber

HOLLAND

Fokker G-1 Fighter-Bomber
Fokker T-8-W Seaplane

** These plans are actually treble-page size.*

AIRCRAFT USED BY 8 NATIONS DURING 1940 . . .

fications, and identification markings. In addition, there are 87 3-view 1/72 scale plans, ideal for "silhouette" recognition tests and for the use of solid scale model builders. The book contains close on 300 pages, is printed on art paper, cloth bound in stiff boards, thread sewn, and gilt blocked, and is wrapped in a coloured dust cover as illustration. Size is 11 in. x 8½ in. Weight 2 lb. 14 oz.

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BUILD THE "POLYROCKET" —By P. G. BROWNE

Fuselage.

THIS is built in the usual way, with longerons and uprights of $\frac{3}{32}$ in. square. On the original model the portion of the fuselage above the wing was cut away to make a removable hatch, achieved by cementing sheet gussets into all the corners of the fuselage around the hatch, as shown, and by cutting through the longerons and uprights where shown. The hatch need not be held down by rubber bands, as the wing is attached by them, and it makes a neat and fairly crash-proof fixing.

The undercarriage tubes are rolled around the legs and then inserted through holes in the nose sheeting, at the sides, and are braced at the top of the fuselage. Don't be stingy with the cement where the tubes are concerned! The motor dowel passes through $\frac{3}{32}$ in. sheet at the rear of the fuselage. The tail lies between the longerons on the thrust line. The undercart legs are shaped from bamboo, tapering from $\frac{1}{4}$ in. square at the tubes to $\frac{1}{32}$ in. by $\frac{1}{16}$ in. at the ends.

Wings.

These are of perfectly straightforward construction, and no details are necessary, except that where the wing cracks for the polyhedral, use plenty of cement.

Tail.

Leading edge is of $\frac{3}{32}$ in. square, trailing edge of $\frac{1}{8}$ in. by $\frac{1}{16}$ in., and ribs of $\frac{1}{32}$ in. sheet. The rudder is steamed to shape from $\frac{1}{16}$ in. square birch and cemented to the fuselage.

The power may seem excessive, but the model flies well with it, with a genuine "Ammurrican climb." This power is best used with the 10 in. hardwood propeller, as it is rather likely to strain the hinges on the folding propeller, with which I used four strands of $\frac{1}{4}$ in. by 1/80 in. of the same length. The folding propeller is simplicity itself, with no soldering or sheet-metal bending, the hinge consisting of two pins or short pieces of 20 gauge wire, bent into hoops to fit the 18 gauge wire bracket, and then driven firmly into the propeller hub and cemented. This is a very reliable method for light-weights, scarcely weighs any more than an ordinary propeller. The model is quite tricky to adjust with the folding propeller, but it should present no difficulties to anyone who has butchered a few yards of balsa before, and who reads his AERO-MODELLER regularly.

The original model turned in consistent flights of from 60 sec. to 80 sec., flying especially well in high winds. The model is light—mine weighed exactly 2 oz.—strong, if carefully built, and is an ideal job to "chuck about" while waiting for the wind to die down so that you can test your Wakefield winner.

I am confident that it would have put up far greater durations if I had waited for summer weather, and had tried a few more power combinations, but I tried it with a short eight-strand motor just to see for myself whether Bob Renaut was right, and I took the pieces home in a matchbox (you could get matches in December!).

THE SOCIETY OF MODEL AERONAUTICAL ENGINEERS

Notes on a Council Meeting of the S.M.A.E. held at the Royal Aero Club, 119 Piccadilly, W.1, on Sunday, April 6th, 1941, at 10.30 a.m.

There were present at the meeting: The Chairman, Mr. A. F. Houlberg; General Secretary, Mr. A. G. Bell; Hon. Treasurer, Mr. L. J. Hawkins; Hon. Competition Secretary, Mr. J. C. Smith; Hon. Press Secretary, Mr. H. York; Records Officer, Mr. C. R. Clarke; Editor of the *S.M.A.E. Journal*, Mr. C. A. Rippon. Council members: Messrs. Gutteridge, Knight, Costenbarder, Hills and Briggs.

Mr. Houlberg occupied the chair.

The Minutes of the previous Council meeting were read and confirmed.

The chief business arising from the Minutes was the question of the Air Training Corps. As instructed at the previous meeting, the Secretary had written to the Air Ministry. As the matter was still in the correspondence stage, the Council decided to review the matter at a later date.

An application had been received for patron membership to the Society. Under the old rules it was possible for anyone to apply to become a patron member. The Council felt that under the new constitutional rules this matter should be discussed by a delegate meeting.

A report from the Irish Junior Aviation League on their 1940 activities had been received. It is hoped that, with the Irish Junior Aviation League's sanction, extracts of this report will be published in the *S.M.A.E. Journal*.

Mr. J. C. Smith read a letter from the Halstead (Essex) Baptist M.A.C. requesting permission to fly decentralised competitions on Saturdays. Permission was granted.

The Council then affiliated the Allerton and District M.F.C., with eleven members.

The following clubs were reaffiliated: Furness, Dulwich, Reading, Aldersbrook, Peterborough, Chelmsford, Huddersfield and Ealing and District.

An application from the Edinburgh M.F.C. for reaffiliation was put back so that further details could be obtained.

The next item on the agenda was club subscription cards. Mr. C. A. Rippon and Mr. A. G. Bell offered to draft a suitable card for consideration at the next meeting. It was decided to have printed on these cards the general competition rules.

Mr. Rippon produced drafts of certificates which will be issued to all affiliated clubs. After consideration and one or two slight alterations, the Council passed one of these drafts.

Prizes for the 1940 season were then reviewed, and it was decided that all first prize winners should receive one pound and a diploma, second prize winners ten shillings and a diploma, and third prize winners a diploma.

The Council decided that the constitutional rules as passed by the A.G.M. should be issued in the form of a small booklet. These will be issued to all clubs as soon as they are printed.

The meeting closed at 1.15 p.m. with a vote of thanks to the chair.

H. YORK, *Hon. Press Secretary.*

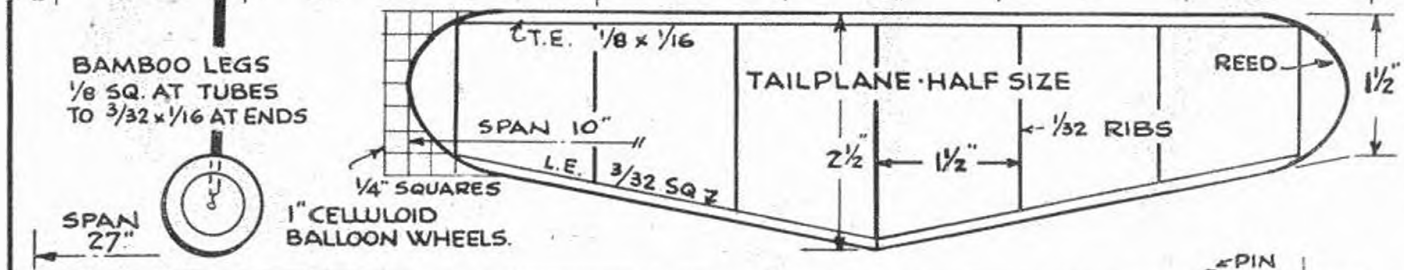
POLYROCKET II.

DESIGNED BY

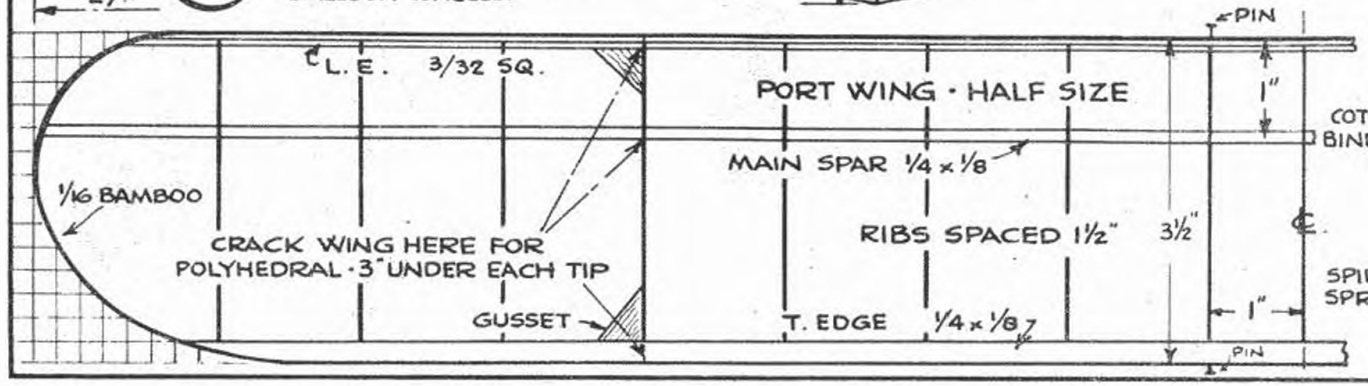
·P·G·BROWNE· B.D.M.A.C.

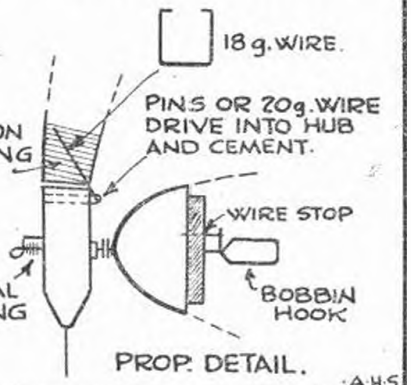
FULL SIZE RIBS · 18 OFF · 1/32 SHEET.

FULL SIZE TAIL CENTRE RIB.



POWER: 6 STRANDS 1/4 x 1/30 28" LONG · PRETENSIONED · WITH 10" HARDWOOD PROP. - 4 STRANDS 1/4 x 1/30 28" LONG WITH 6" SINGLE BLADED FOLDING PROP.





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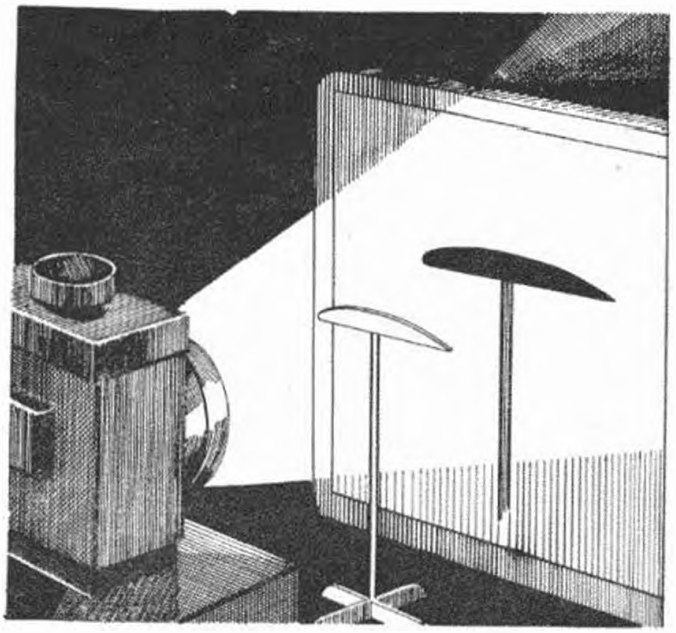


GADGET

With this review Mr. Pollitt concludes the series he has conducted under the above heading. We continue to invite aero-modellers to send in their gadgets, however, as a further series of reviews by a well-known aero-modeller will be commencing shortly.

THIS month, by way of a change, I am going to be brief, and apart from saying what the gadgets are and indicating their possible shortcomings, I shall leave the sketches to explain the more general and obvious features of the various ideas. So here goes.

The often raised problem of how to draw out most easily and quickly a series of wing ribs, all of different chords, is once again answered by a contributor. In Fig. 1 is seen an idea from Mr. D. Homely (junior), of County Durham. A conveniently sized cardboard or wooden pattern of the airfoil section is mounted on a stand and its shadow thrown on a screen. The shadow, which can be traced off the screen on to a piece of paper, can be varied in size by simply moving the flash lamp closer to, or farther away from, the pattern, as required. It is most important that the lamp should shine absolutely square on to the face of the pattern, as well as being in the same horizontal plane.

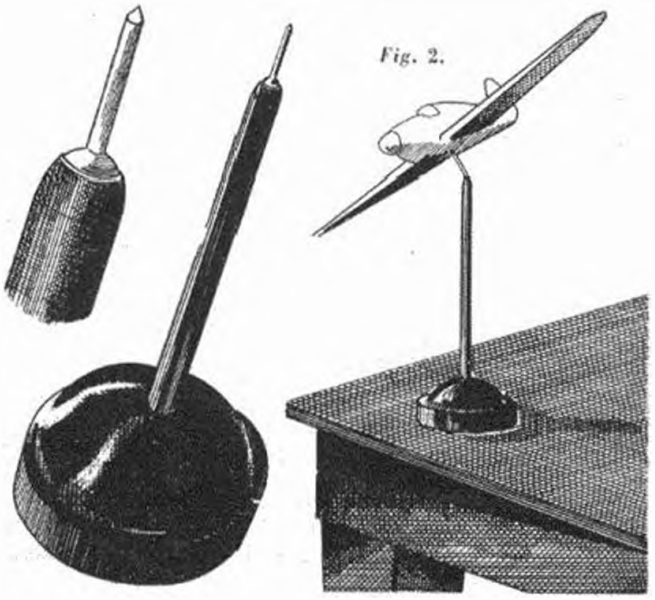


Fig. 2.

Fig. 1.

Fig. 2 is a pedestal or stand for showing off to advantage, say, a small solid model. The base is a turned wooden fitting, while the pillar is a piece of mild steel bar about

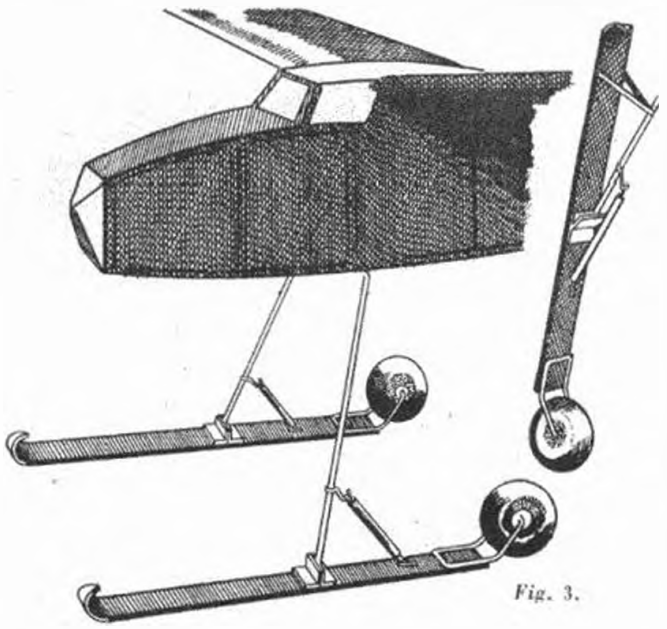


Fig. 3.

$\frac{3}{16}$ in diameter; the ball joint arrangement at the top of the pillar is a small machined fitting turned from a piece of $\frac{5}{32}$ in. diameter steel bar. In the top of the pillar a $\frac{5}{32}$ in. diameter hole is drilled about $\frac{3}{16}$ in. deep, and into this is is fitted the ball joint. The top edge of the pillar is then peened over and the stand is ready to take the model. A.C.2 L. T. Green, No. 1172758, sends this idea from a R.A.F. Station, "somewhere in England."

The next idea is from Mr. S. Ibbotson, of Wombwell, near Barnsley, and it comprises a ski undercarriage which, with a minimum of trouble, can be rearranged as a land undercarriage. The legs are hinged to the skis, and the two are further tied together by elastic bands, housed within small cardboard tubes. On the right of Fig. 3, the undercarriage is shown with the wheel down; the elastic band passing round the top of the ski and the undercarriage leg ensures that the device stays put.

Six small dowels reasonably positioned and let in a wooden base, can be used to advantage for bending bamboo wing tips, etc., as shown in Fig. 4, and suggested by Mr. A. T. Gow, of South Harrow, Middlesex.

REVIEW

By C. A. H. POLLITT

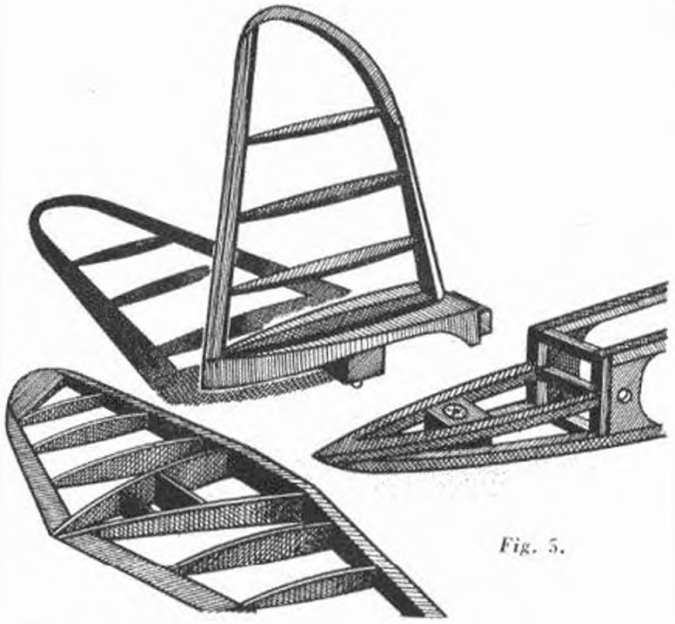


Fig. 5.

In Fig. 5 is shown an empennage assembly submitted by Mr. Victor R. Dubery, of Wimbledon Park, S.W.19, and utilising an ordinary press stud fitting as a fore and aft

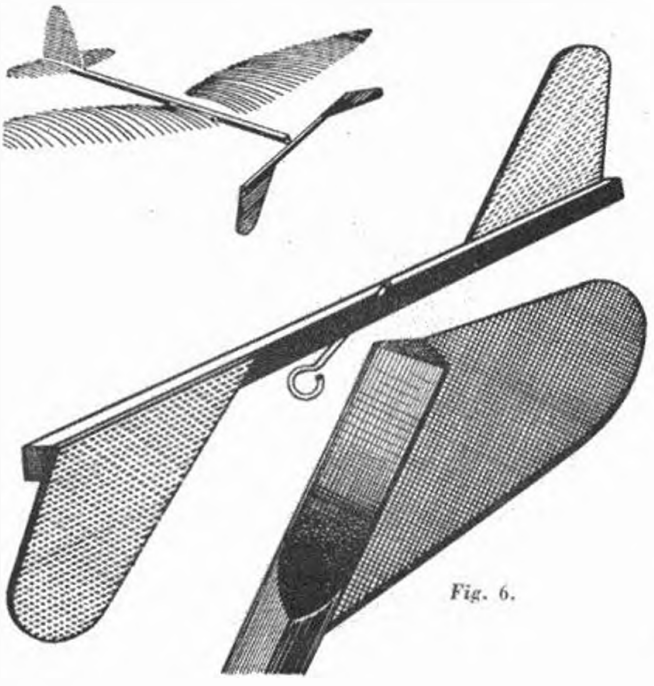


Fig. 6.

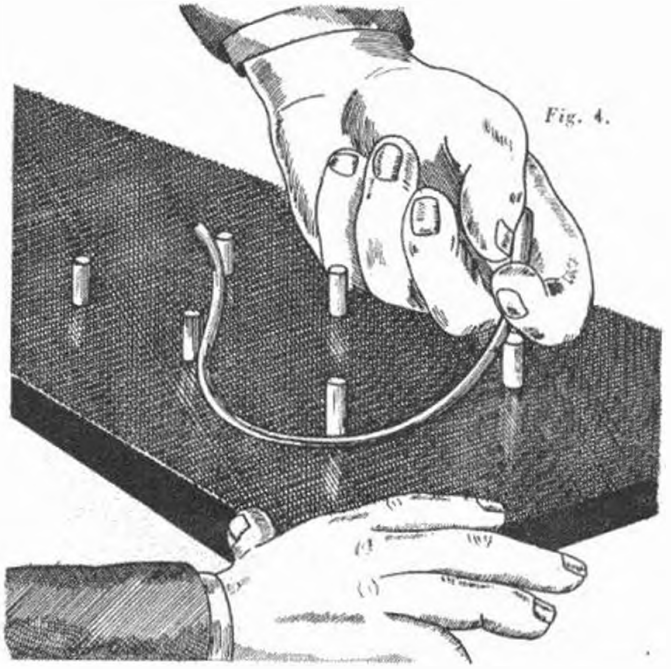


Fig. 4.

means of location. Another register this time a rectangular block of wood can be seen just below, and to the front of the fin. This fits into the recess in the fuselage "step." This, of course, is a "knock-off" fitting.

Mr. J. F. Murison, of Fraserburgh, Aberdeenshire, has designed quite a simple, though unusual, propeller suitable for indoor models. From Fig. 6 it will be seen that the two blades, made from stout paper, are attached to a length of $\frac{3}{32}$ in. square balsa, the ends of which are cut away, as shown in the lower view.

Finally, from Mr. W. D. Brook, of Measton, near Leeds, I have had a suggestion for using a modified pair of joiner's clamps. The modification is nothing more than bevelling the inside faces of the clamps to suit the usually sharp taper of most fuselage noses. The purpose of the clamps is, of course, for glueing—or should I say cementing?—sheet balsa to the fuselage.

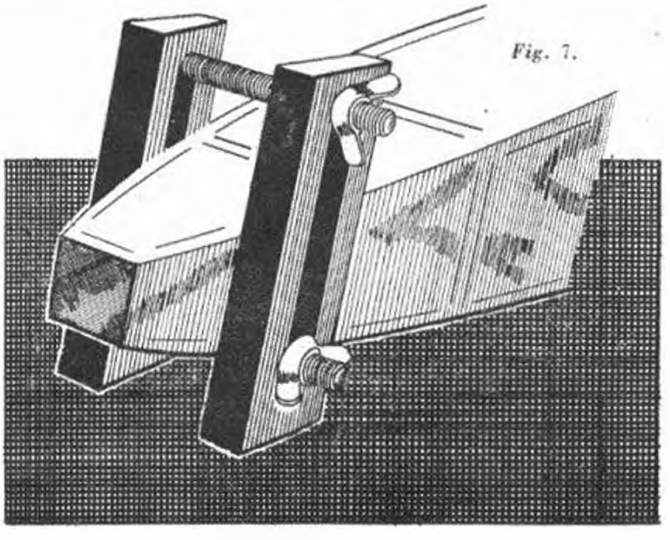


Fig. 7.

FIGHTING AIRCRAFT OF THE PRESENT WAR —— V

THE LOCKHEED P.38 "LIGHTNING"

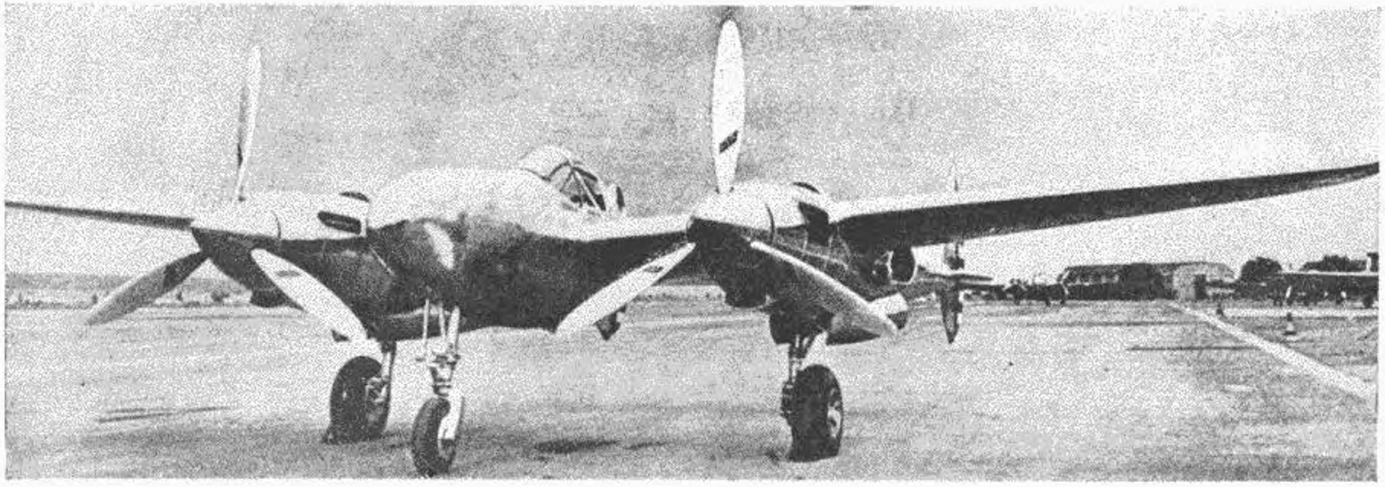


Photo: Courtesy of Planet News Ltd.

By **H. J. COOPER**

THE Lockheed P.38 (or 322-61, the manufacturers designation, for those who can remember it), twin engined fighter, belongs in the category which lay journalists writing of aircraft delight in terming "freaks."

This fast, mid-wing monoplane, which is now coming into service with the Royal Air Force, is a single-seater of rather unusual design. The pilot's cockpit is situated in a short, ovate nacelle, while the tail unit is carried on a pair of slim booms extending from the motor nacelles.

This arrangement is similar to that employed by the late Tony Fokker in the design of his G-1 two-seat fighter, a number of which were used successfully against the German invaders in May last until Holland was overrun, and various other continental designs. The Focke-Wulf company have produced an army co-operation monoplane, the Fw 189, built to the same formula.

The P.38 is the first aeroplane of this lay-out to go into large-scale production, and its capabilities are awaited with interest. Presumably it will be used for long range escort duties by day, as its maximum speed is only equal to our single-engined fighters. An order valued at £15,030,000 has been placed for 800 Lightnings, which are being produced at the Lockheed Aircraft Corporation's factory at Burbank, California.

The prototype P.38 put up some fast times in America. In February, 1939, piloted by Lieut. B. S. Kelsey, of the U.S. Army Air Corps, it flew from Riverside, California, to Mitchell Field, Long Island, New York, in a flying time of a little over seven hours, undershooting the latter aerodrome while landing and crashing. A speed of 389 m.p.h. was attained. The production version does 401 m.p.h.

Reports say that the version which is being delivered to the fighter squadrons of the R.A.F. is arranged as a two-seater with a turret, but there is no confirmation of this, and this article applies to the monoplane in its original form.

The Lightning is the second Lockheed type to be in squadron use with the Royal Air Force, the other type being, of course, the Hudson reconnaissance bomber, which, although some stories about it might have been more favourable, has been doing some excellent work with the Coastal Command. That the two aircraft are related is evident from the plan view of the wings. The aspect ratio is higher on the Lightning, but the same sharp taper will be noticed. The tail units are also obviously allied.

The Lightning is of all-metal construction with stressed metal covering. The nacelle is of oval section, with a large glazed cockpit covering which cannot afford the pilot as extensive a view as might be desired. The long nose and the motors, and the wing, must obstruct quite a lot of view. This point is particularly bad on an escort fighter.

The wing is of stressed-skin light-alloy construction and is sharply tapered. The wing-tips are detachable. Split flaps are fitted to the trailing edge of the wing between ailerons and motors and between motors and nacelle.

The twin booms and tail-unit are of similar construction to the nacelle. The rudders are aerodynamically balanced and are fitted with trimming tabs, as are the ailerons and elevator.

The undercarriage is composed of three legs, two retracting into the motors, and the central one, with a wheel of smaller diameter, contained in the main nacelle. All of them swing backwards and upwards, the two larger wheels being closed by doors, while the nose-wheel, at any rate on the prototype, remains uncovered. It is possible that the production model will be fitted with doors to enclose this wheel also.

The Lightning is normally fitted with two Allison V 1710 C15 liquid-cooled vee motors, each of 1,090 h.p., but it is reported that the British version may be fitted with Rolls-Royce Merlins of about the same power.

The Allison is the only well-known American liquid-cooled motor, and is comparatively unproved. A noteworthy point about it is that it has an exhaust-driven supercharger. On the prototype P.38 these were situated towards the ends of the motor nacelles and were uncovered. Large air intakes are situated in the booms, with outlets just beyond them.

The armament of the Lightning, as on all American "aeroplanes" which have so far appeared, is not nearly sufficient according to modern standards, but the P.38 is in fact more heavily armed than any other fighter from the United States.

A 23 mm. Madsen shell gun with 50 rounds, two ·30 Colt machine guns, each with 500 rounds, and two ·50 Colt machine guns, each with 250 rounds, are grouped in the nose, all firing forward, and the fire-power is thus inferior to that of our own and German fighters. No doubt those in service with the Royal Air Force are fitted with more guns, and are at least equal to other types now in service. American reports state that our Westland Whirlwind is fitted with fourteen guns and canon; this may be true, but the first two words of this sentence bear a certain significance. If, as has already been suggested, a two-seater version of the Lightning is supplied to this country, it should be more formidable, but the addition of a turret will, of course, decrease the maximum speed and the all-round performance.

The Lightning is the only aeroplane of its kind in this country, unless one includes the Cunliffe Owen flying-wing, and consequently will be easily recognised. In a direct side view, the bulge of the nacelle will show below the motors, and will give the Lightning a rather "tadpole" look. A large area of the fins and rudders is below the tail-plane and will be apparent. Compared with the Fokker G-1, the Lightning is much more slender, and certainly looks the faster, which, of course, it is. The Fokker does around 800 on 1,700 h.p., while the Lockheed's speed is about a hundred more, gained with another 500 h.p. The large span tail plane of the Lightning is of high aspect ratio, with rounded tips, and extends outwards of the rudders, while that of the Fokker terminates within the rudders and is square cut.

The Focke-Wulf Fw 189 previously referred to is powered by a couple of Argus in-line motors of low power, and is intended for army co-operation duties, so is unlikely to be seen over this country.

The prototype P.88 was left the natural aluminium colour all over except for a dull black anti glare decking to the nacelle in front of the cabin and the inner half of each motor ahead of the wing. Cockades were carried above and below each wing, slightly in from the tips, and the rudders bore the vertical blue and horizontal red and white stripes of the U.S. Army. Those in service with the American pursuit squadrons are similarly coloured, and carry squadron markings on the outer sides of the booms.

British Lightnings are doped with the green and brown camouflage, but the brown is now considerably darker than it was on the first machines to be camouflaged in 1937.

Underneath, the Lightnings are painted with the port wing dull black and the other wing light "duck-egg" blue. The tail-plane and motors and booms are camouflaged on top and sides, and are black and blue underneath. The nacelle is also camouflaged on top and sides, and is half black and half blue underneath. The airscrews and spinners are black.

Two-colour cockades are painted above the wings; those underneath are red, white and blue on both wings. Red, white and blue cockades, with additional yellow outer rings are painted on the outer side of each boom. The fins each bear three-colour stripes, with red foremost, on both sides.

It may be of interest to modellers who like to bring their models up-to-date according to latest colouring experiments to know that the writer has recently observed a number of Spitfires coloured entirely "duck-egg" blue, on both upper and lower surfaces and the fuselage. The usual cockades are carried, and the fins bear the stripes. One of these Spitfires in particular carried a couple of cannon mounted one in each wing.

SPECIFICATION:

Dimensions: Span, 52 ft. 0 in.; length, 37 ft. 10 in.; height, 9 ft. 10¼ in.; wing area, 327·5 sq. ft.

Weights: Tare, 11,171 lb.; disposable load, 2,329 lb.; loaded, 13,500 lb.; maximum overload, 14,348 lb.

Loadings (at max. overload): Wing, 43·9 lb./sq. ft.; power, 6·6 lb./sq. ft.; span, 5·4 lb./sq. ft.

Performance: Maximum speed, 404 m.p.h. at 16,000 ft. (2,180 h.p.); cruising speed, 350 m.p.h. at 16,000 ft.; duration, 1 hr. 48 min.; range, 600 miles (191 Imperial gallons); range, at 350 m.p.h., with 300 Imperial gallons), 1,070 miles; climb to 16,000 ft., 5·6 min.; absolute ceiling, 30,000 ft.; take-off to 50 ft., 735 yd.

Next month: THE CAPRONI REGGIANE R. 2000

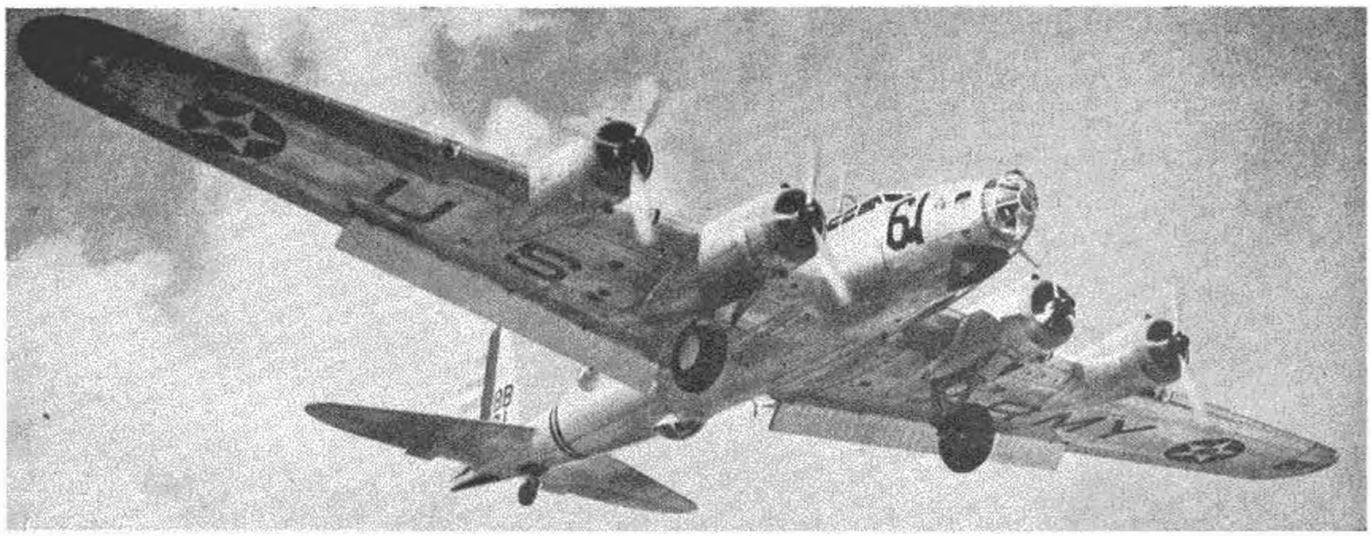
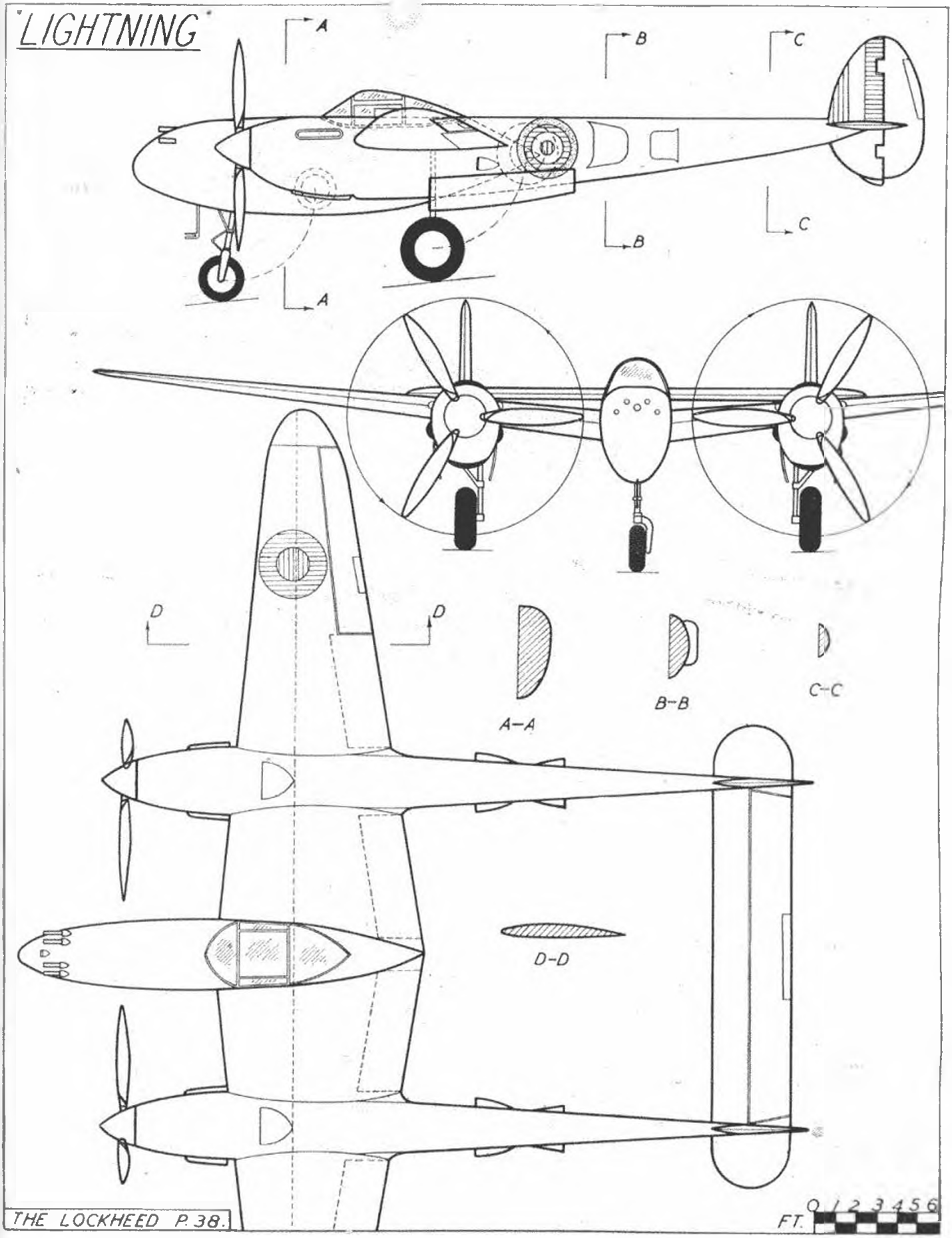


Photo: Associated Press.

YOU'VE ASKED FOR IT! The Boeing B.17b monoplane, commonly called the "Flying Fortress," which if space permits will shortly be included in this series.

LIGHTNING



THE LOCKHEED P.38.

Q. *Can you please inform me the pros and cons of three-blade verses two-blade propellers. In the case of fairly high-powered streamline model, is it possible to use a three-blade propeller and cut down the diameter of a two blade propeller that would otherwise be necessary?*—(F. G. H., Godalming).

A. The three-bladed airscrews have recently been introduced to full-size aircraft so as to get the overall diameter within reasonable limits, and the tip speed below that of sound.

So far as model work is concerned I don't think there is any great advantage to be gained, unless, of course, you are building a flying scale model and must, therefore, get the three-bladed airscrew if one is used on the full-size machine. If you fit a three bladed air screw instead of one of two blades, the pitch should remain the same, and the diameter should be reduced so that the area of the three blades is equal to that of the two blades of the two-blader. Without knowing the weight and many other characteristics of your model it is quite impossible to give you a complete specification, but I would advise you to try a three-blade airscrew of 10 in. diameter in place of your present one, which you say is 13 in. in diameter.

Q. *How can I find the correct block size for a propeller?*—(R. W., Guildford).

A. A very informative article on this subject appeared on page 430 of the July, 1940, AERO-MODELLER.

Q. *Can you tell me the F.A.I. glider rules?*—(H. A. K., Portslade).

A. Generally the rules are as follow:—Wing-loading at least 4·92 ounces per square foot, over all span between 27·56 in. and 137·789 in., tail-plane area must not exceed 33 per cent of wing area, and the fuselage cross-section (Gliders) to be $\frac{L^2}{200}$. Under the present Air Ministry ban no model glider must be over 7 feet in span.

Q. *Could you tell me the official colours of the "Gloster Gladiator," and if any squadron letters are carried?*—(J. W., Sherborne).

A. The "Gloster Gladiator" is coloured according to standard practice with green and brown irregular bands and patches on the sides of the fuselage and rudder, and on all upper surfaces.

Underneath, it is painted with the port wings black and the starboard wings pale blue.

Cockades underneath are red, white and blue; on top they are red and blue only, while on the sides of the fuselage are red, white and blue, with an additional yellow circle.

Squadron letters are painted in light blue on both sides of the fuselage. On the port side they are in front of the cockade, with an individual letter (which varies from A to Z) painted aft. On the starboard side the letters are behind the cockade, with the other letters in front.

One squadron which flies (or, at any rate, flew) "Gladiators," has been allotted the letters "HE." Thus an authentic combination would be:—

H E cockade M.

Q. *Can you answer the following:* (1) *What is the device fitted just behind the lower rear-gunner on the "Heinkel 111K Mk.VA"?* (2) *I am told there is a large 'plane to be seen with a ring going right round it, and I have heard it is for exploding magnetic mines?* (3) *Have the latest "Gladiators" only one exhaust pipe?*—(J. H. H., York).

A. (1) The device you refer to on the "Heinkel He.111K Mk.VA" is a pair of handrails for lifting the aeroplane's tail when on the ground. (2) We, too, have heard rumours of these devices, but regret that we are unable to give you any information. (3) All "Gladiators" have twin exhaust pipes.

Q. *I am building a Me.109 with movable control surfaces, but am rather hazy how the flaps can be worked when the wing radiators seem to be directly below them.*—(A. E., Sunderland).

A. The water-coolers on the Me.109 are under each wing, just ahead of the flaps, which are thus allowed to operate.

Q. *Can you tell me the difference between the Avro "Cadet" and the Avro "Tutor"?*—(M. C., Bradford).

A. The "Tutor" is slightly larger than the "Cadet," and has a more powerful motor. A direct descendant of the old Avro 504K, the "Tutor" was the standard R.A.F. trainer before the introduction of the Tiger Moth. Main dimensions and performance figures are as follow:

Span, 34 ft. 0 in., length, 26 ft. 6 in.; height, 9 ft. 7 in.; maximum speed, 122 m.p.h.; cruising speed, 100 m.p.h.; landing speed, 50 m.p.h.; climb, 950 ft./min.; ceiling, 16,000 ft.; duration at cruising speed, 2½ hours.

Q. *Are any German aircraft fitted with the Pratt and Whitney engine?*—(N. J., Cardiff).

A. No German aircraft is, to my knowledge, fitted with the Pratt and Whitney Wasp motor, though a number of types have been fitted with B.M.W. radial motors, which were originally Pratt and Whitneys, built under licence. These types include the Henschel Hs 123 and Hs 126, and the old Junkers Ju 52/53m commercial liners now used for the carriage of parachute troops. (This machine sounds very like the Harvard—which has to be heard to be believed!)

Q. *What are the registration letters of the Short Empire Flying Boat "Clare"?*—(J. W., Leicester).

A. G-AFCZ.

Q. *Can you give me particulars of the Fairy "Fantome" or "Feroce"?*—(F. G. P., Bowness).

A. Span, 34 ft. 6 in.; length, 27 ft. 6 in.; height, 11 ft. 4 in.; maximum speed, 270 m.p.h.; landing speed, 60 m.p.h.; climb to 13,120 ft. in 5½ min.; ceiling, 36,080 ft.; duration, 2 hours; armament, four Browning machine guns, and one shell-gun.

CORRECTION: Rate of fire of the "Spitfire" is 1,250 rounds per minute, total for 8 guns, 10,000. Sorry we left off the final and very important 0's last month.

MY IDEA of a SUPER WAKEFIELD WING

By M. F. BOULESTEIX

WAKEFIELD rules of 1939-40, and presumably of the future, allow a wing area of 200 square inches to be used with a plus or minus tolerance of 10 square inches. It is naturally advisable to use the very maximum area allowed. This will be 210 square inches. I suggest an aspect-ratio of about 9. This will ensure that your wing has a really efficient average chord throughout.

Wing Shape.

It is advisable to taper slightly a model wing. This should not, however, be overdone. Root-chord/tip-chord = 1·5 should suffice (e.g. a wing tapering from 6 in. to 4 in. at the tip).

One always admires a really stable model. "Super-stability" can be attained by incorporating sweep-back and polyhedral wing shape. This, of course, does not by a long way completely stabilise a model, but it certainly does improve things a great deal. Personaly I like a fair amount of sweep-back, say 10 to 15 degrees. This should be measured from the centre of pressure and not from the leading or trailing edge. If measurements were taken at the leading edge, it should be stated that the wing was swept-back so many degrees at the leading edge.

Now everyone has his (or her) own ideas about the most efficient proportion of polyhedral to use. Moreover, the quantity will vary according to the type of model in mind. But whatever the size, the aim should be to have four times more tip-rise in that position than has been built at the inner panels (e.g. 1 in. at inner and 4 in. at outer panels). These conditions only hold good so long as both panels are of equal span. It should also be arranged for all panels to have an equal (or very nearly equal) area. In a normal tapered wing the centre of area will occur at approximately 40 per cent distance from the root chord (i.e. of half span).

(N.B. When using an excessively swept-back wing, remember that if the angle of attack is some three or four degrees, the wing *tips* will actually be approximately ½ in. than when the dihedral is measured with the wing at 0 degrees angle of incidence. Remember also that 10 degrees of sweep-back are equal to one degree of dihedral.) It is useful to bear in mind that if a very swept-back wing is used, less fin area should be necessary.

Wing Sections.

Slow flying model work demands a fairly "high lift" section. It would be most advantageous to use one with a high lift to drag ratio and a fairly high lift coefficient. R.A.F. 32 and Eiffel 400 would suit these conditions admirably. The centre of pressure movement is not so very important so long as it lies within reasonable limits.

There has been much discussion on the subject of angles of attack. But in spite of all that has been said, I do not think that you can do better than to use that corresponding to a calculated lift coefficient (i.e. $Cl = \frac{2L}{p\ AV^2}$).

This method has always given good results in the way of glide and climb. If any of you have had the opportunity of seeing Copland's three-degree job gliding you will certainly not find anything lacking there. As for the climb, I believe that the power unit, propeller and thrust-line setting is the key to the whole problem.

Disruptors are novel but unnecessary on a well-designed job, and, moreover, they reduce the lift to drag ratio.

Wing Tips.

Wing shapes and tips have always intrigued me. Most things for which there is no hard and fast rule or definite data have that effect. There are so many contradictory theories that one has to choose the happy medium. I, as have most people, have my own ideas about wing tips. The following are of a form that was evolved for the swept-back wing. I have been taught that if one takes away area from the trailing edge at the tips, that the aimed at efficiency is almost entirely eliminated. Hence—why not round off one's tips from the leading edge (this should not be exaggerated)? A minimum chord of 3 in. should not be more than 1½ in. to 2 in. from the extreme tip. This last section should be of a lower lifting type than the others. Say M6 or R.A.F. 34. Now, to have a really efficient wing throughout, it would be necessary to have a tip of not less than 4 in. from leading to trailing edge (i.e. if the tip were out of square). But since tips must be tapered in some fashion, I suggest that the trailing edge be left straight (except for the last inch), and that the leading edge be brought round. This rounding off might occur at about 5½ in. to 6 in. from the extremity.

Construction.

Built-up leading and trailing edges certainly stand high above all other methods when it comes to discussing strength to weight ratio. Wing ribs should be of $\frac{1}{32}$ in. sheet, 1 in. apart, and capped with 1/64 in. by $\frac{3}{16}$ in. cap strips. Rigidity would also be greatly increased if $\frac{1}{16}$ in. balsa sheeting were cemented behind the hollow leading edge. This admittedly does not make a "super-light" wing, for a little increase in weight it is well worth while in the long run because of its excellent strength to weight ratio. If this type of construction is *not* used, make sure that spars do *not* lie "flush" with the skin.

It is a known fact that the greatest torsional force acts forward of the centre of pressure. It would consequently seem wise to add strength here. This may be done by using "riblets" or even a small gauge sub-spar. A wing is also much strengthened by locating the "rib-tails" into a notched trailing edge. Multi small spar construction is not advisable, as this type does not give long life, average breakage being very high. Wings can be plugged together by means of dowels. Any approved fixing method may be used.

Covering.

Covering is never perfect in model aeroplanes, owing to the sag between ribs or spars. This cannot be avoided—but it can be minimised. Cover wings with the grain running from leading edge to trailing edge, as tissue always pulls out more at 90 degrees to the grain than parallel with it. In this fashion the covering pulls out between the ribs, which is just what we want. Matters may be simplified by covering the tip with a separate piece. Two thin coats of banana-oil are sufficient. After having been well brushed in, the drying banana-oil may be smoothed with a finger. Do this especially over the ribs.

This method will eliminate any shiny spots or poor finish.

MY IDEA of a SUPER WAKEFIELD WING

By M. F. BOULESTEIX

WAKEFIELD rules of 1939-40, and presumably of the future, allow a wing area of 200 square inches to be used with a plus or minus tolerance of 10 square inches. It is naturally advisable to use the very maximum area allowed. This will be 210 square inches. I suggest an aspect-ratio of about 9. This will ensure that your wing has a really efficient average chord throughout.

Wing Shape.

It is advisable to taper slightly a model wing. This should not, however, be overdone. Root-chord, tip-chord = 1·5 should suffice (e.g. a wing tapering from 6 in. to 4 in. at the tip).

One always admires a really stable model. "Super-stability" can be attained by incorporating sweep-back and polyhedral wing shape. This, of course, does not by a long way completely stabilise a model, but it certainly does improve things a great deal. Personaly I like a fair amount of sweep-back, say 10 to 15 degrees. This should be measured from the centre of pressure and not from the leading or trailing edge. If measurements were taken at the leading edge, it should be stated that the wing was swept back so many degrees at the leading edge.

Now everyone has his (or her) own ideas about the most efficient proportion of polyhedral to use. Moreover, the quantity will vary according to the type of model in mind. But whatever the size, the aim should be to have four times more tip-rise in that position than has been built at the inner panels (e.g. 1 in. at inner and 4 in. at outer panels). These conditions only hold good so long as both panels are of equal span. It should also be arranged for all panels to have an equal (or very nearly equal) area. In a normal tapered wing the centre of area will occur at approximately 40 per cent distance from the root chord (i.e. of half span).

(N.B.—When using an excessively swept back wing, remember that if the angle of attack is some three or four degrees, the wing *tips* will actually be approximately $\frac{1}{8}$ in. than when the dihedral is measured with the wing at 0 degrees angle of incidence. Remember also that 10 degrees of sweep-back are equal to one degree of dihedral.) It is useful to bear in mind that if a very swept-back wing is used, less fin area should be necessary.

Wing Sections.

Slow flying model work demands a fairly "high lift" section. It would be most advantageous to use one with a high lift to drag ratio and a fairly high lift coefficient. R.A.F. 32 and Eiffel 400 would suit these conditions admirably. The centre of pressure movement is not so very important so long as it lies within reasonable limits.

There has been much discussion on the subject of angles of attack. But in spite of all that has been said, I do not think that you can do better than to use that corresponding to a calculated lift coefficient (i.e. $Cl = \frac{2L}{\rho AV^2}$).

This method has always given good results in the way of glide and climb. If any of you have had the opportunity of seeing Copland's three-degree job gliding you will certainly not find anything lacking there. As for the climb, I believe that the power unit, propeller and thrust-line setting is the key to the whole problem.

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This method will eliminate any shiny spots or poor finish.

Also, when dry, the tissue will be firmly stuck to the ribs by the banana-oil, which will ensure great torsional strength.

By the way, talking of covering reminds me of something that might interest some of you "streamline addicts." Have you ever thought what a shame it was to have to hide that beautiful piece of construction with covering? Well, you need not do so. Why not cover your model with cellophane? Coloured cellophane would make a very attractive finish. It can be tightened up with alcohol. (Now where has that bottle of whisky got to?) Petrol or methylated spirits are ideal. I cannot imagine anything causing less skin friction than cellophane.

Now that I have told you about my ideal wing, I should welcome criticism. If I can improve my ideas I shall be more than willing. I know that many of you will not agree with me entirely, but I think that you will admit that there is something in what I have written here. Especially all you "angle of-attack fiends." Bearing in mind what I have said on the matter of wing sections, their angles and results, you might begin to realise straightaway that the power unit takes care of the climb. After all, most of you must know that the power adjusts the machine to its own climbing angle.

So now I shall leave you cursing and raving at me and assuring yourselves that this chap is crazy. But I beg you all to think carefully before making your final decision.

DOWN-THRUST and a POSSIBLE SOLUTION

By H. H. O. HILL

MANY aero-modellers think that down-thrust is a waste of power. It *is* a waste of power, but its necessity on rubber-powered models I will endeavour to explain.

There are three main stages in the flight of a model: (1) The climb and take-off, during which the model climbs at a steep angle, but with a decreasing motor power; (2) a stage of more or less normal horizontal flight, during which the model flies at a fairly constant speed and height from the ground; and (3) the glide to earth when the power has been expended. The conditions alter in each of these stages of the model's flight, so we must decide which set of conditions we will take as basic before we can design our model. The obvious set of conditions would be that of normal horizontal flight, modifying our design to suit the requirements of other conditions.

The forces acting upon our model to keep it in a state of normal horizontal flight are: (1) Lift, created by the wings and tending to pull the model up vertically; (2) the weight, tending to pull the model down; (3) the thrust, operating through the propeller shaft and forcing the model forwards; and lastly (4) drag, operating against the thrust and tending to pull the model back. These forces are illustrated in Fig. 1.

Down-thrust is the usual method of preventing the stall (which will occur owing to the stabiliser being set at a negative angle of incidence), and so obtains longitudinal stability during the burst of speed due to the sudden initial burst of power, when the model is released and the motor fully wound. Fig. 2 illustrates the flight of the model affected by down-thrust. It may be seen that the model has a tendency to climb at a very steep angle, but the down-thrust makes the 'plane follow through a path of flight between the normal path of model and direction of down-thrust.

We may now conclude that down-thrust is necessary to check that initial burst of power delivered by the propeller when the model is released, but I think the following will check this burst of power without wasting any.

The trailing edge of the stabiliser should be hinged to the fuselage so that "packing" may be inserted to vary the angle of incidence from 0 degree to about 3 degrees positive. The model should be tested for glide in the usual manner and with the stabiliser at 1 degree positive to start with, the glide being perfected by varying the C.P., i.e. moving the wings up or down the fuselage so that the C.G. is just in front of the C.P., yet not too far or the glide will steepen. The model should then be given a few turns for the first test-

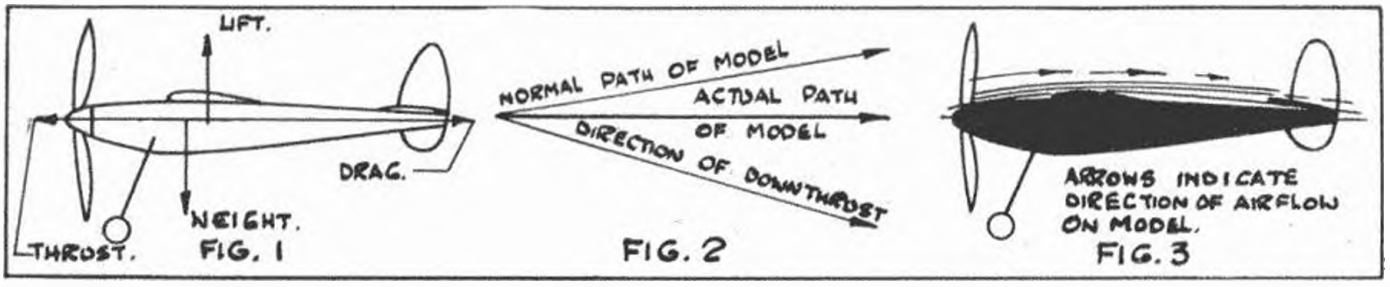


FIG. 1 FIG. 2 FIG. 3

The thrust should be made as near as possible along the same line as the drag. Centre of gravity or weight should be placed in front of the centre of pressure or lift. Although it is possible to balance the C.P. and C.G., it would be to advantage to place the former in front of the latter, so that when the power is expended the 'plane automatically resumes its gliding angle.

By placing a small stabiliser at a small angle of negative incidence, the tendency of the nose-down attitude will be counteracted. This operates in the following manner. When the propeller is revolving, the slipstream exerts pressure on the upper surface of the stabiliser, thus forcing it down. When the propeller ceases revolving, the slipstream ceases, the tail rises, and the 'plane falls into its normal gliding angle.

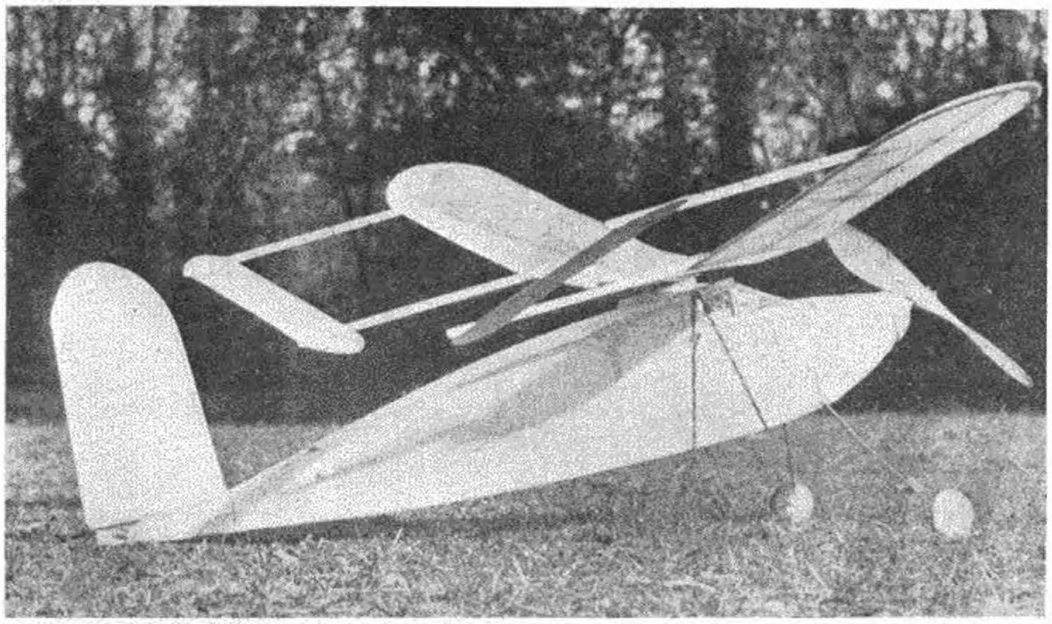
flight with power. If the model stalls, give the stabiliser another degree or two of positive incidence and readjust the glide, and try again. When the model climbs nicely without stalling and falls into a gentle glide back to earth after the power has been expended, then the model is properly trimmed and may be flown under more power. There is no chance of the model stalling now, because if it does not stall with little power, it will not stall with increased power, as I will explain below:—

Fig. 3 illustrates a model in flight and the slipstream, which is the air displaced by the propeller, exerting pressure on the underside of the stabiliser, and holding it up. When this slipstream diminishes, the tail automatically rises, and the 'plane falls into its gliding attitude.

A "FLOATING WING" DURATION 'PLANE

. . . or the "Thermal-Hunter's" dream come true!

By
R. M. SMITH



Here is something to "get your teeth into." One of the most revolutionary ideas seen for a long time. We shall be pleased to hear of readers' experiences with this innovation.

HERE is a design which will solve all our problems of model aeronautics. The 'plane shown has automatic fore and aft stability, cannot help gliding efficiently and is proof against stalling, down thrust, lifting tails, and all the problems of flying without a pilot.

The secret of this 'plane is its "floating wing." Instead of fixing the wing rigidly to the fuselage it is pivoted at a point just below and behind the mainspar. To keep it stable stabilisers are attached on the ends of booms. The

forces acting on this unit are shown in Fig. 3. Note that both wing and stabilisers provide the lift. The result of this arrangement is that the angle of incidence can be adjusted to give the L/D maximum, which angle will remain constant throughout the flight irrespective of the attitude of the fuselage or the airscrew thrust. The 'plane is quite stall-proof, flies at an almost constant speed and climbs or glides according to the thrust developed. As the fuselage is free to pivot in relation to the wing, it simply weathercocks into the line of flight. The thrust is also along this line, and the total drag is constant throughout the flight. A normal size rudder is fitted, but the tail-plane is much smaller than usual and may prove unnecessary.

In this model the fuselage was pivoted well above its C.G., with the result that the nose was apt to rock up and down, although this did not alter the height or airspeed. It would probably be better to pivot the fuselage at the C.G. itself, but the centre section would need redesigning, possibly an aluminium tube would be the answer.

I have had many successful flights from this model, both with and without the tail-plane. The take-off was normal and the climb rapid and stall-proof. The glide was always good, even in a gusty wind, and it never stalled when the power suddenly dropped off. Nor would it stall after a hand-launched glide however hard it was thrown. It was sensitive to the stabiliser setting, and especially to the position of the wing pivot in relation to the mainspar. The wire hinge itself must be short and stiff, but adjustable. Note that the hinge can also be adjusted fore and aft along the fuselage.

I suggest this design as a basis for experiment. It may or may not prove better than standard practice. The total drag is probably greater owing to the stabilisers, but other advantages may outweight this. Much experiment is needed with the stabilisers to find their best area, section, distance and angle of incidence in relation to the wing. The pivot position can be varied infinitely, both in relation to the mainspar and the C.G. of the fuselage. Which positions are best I cannot say. This model, as shown, flew quite well. The wing section should have the highest possible L/D maximum. A lifting tail plane might improve the performance, especially if the wing is pivoted in front of the C.G. As you see, there is a lot with which to experiment in this design, and I shall be interested to hear of the results obtained by others.

Unfortunately we receive far too few really "classy" photographs for use as headings to these columns, so this month we fall back on a Flight *photograph showing a group of "Hurricanes" on patrol way up over the clouds. We trust we shall see more and better model photographs submitted, and would remind readers that a fee of 5s. is paid to the sender of any photo used to head the Club News Section.*

BY the time you read this, the first National Competition of the season will be a thing of the past, and while as I write this (nearly three weeks before the event takes place), the weather is very poor, I trust things will have improved by May 18th, in order that we have a bumper crop of entries for this most popular event. Over a period of years, the "Gamage Cup" has always attracted the largest entry of any decentralised event, and it is a toss up to know whether this is due to its being the first competition after the winter inactivity, or because the rules allow any and every type of model to compete. I incline to the latter view personally, as while every aero-modeller has some kind of model to chuck up in this event, a specialised type of contest is limited to those who have the particular type of machine required.

While on the subject of models, I think you will find that this issue contains the answer to many readers' prayers, in so far as the drawings for Warring's record holding model contain ample details, from which anybody can prepare their own full size sketches, at the same time including full size details of all those awkward parts, such as tips, ribs, etc., which so many of us fight shy of. Also, for those who do not wish to go to the trouble of enlarging the drawings there are the fully detailed plans available through the popular Plans Service.

The Editor invites comments on this new feature, and I am of the opinion that we shall have nobody complaining about this particular innovation.

With the advent of the summer season, and a consequent greater activity in outdoor flying, it is as well to remind all readers of the restrictions under which we are now operating. In spite of a good deal of grumbling, I think the majority of flyers have realised that the Air Ministry ban has not inconvenienced them a great deal, with the possible exception of petrol model flyers. However, as I said before, there is nothing to stop a chap building and preparing petrol models for use at such time as the ban is lifted, and he can still get quite a bit of fun out of the rubber-driven models, even though some may consider this a retrograde step!

A very necessary precaution is third party cover against any possible claims for damage caused by your models to either property or persons, and the largely increased membership of the N.G.A. proves that I am not alone in my advocation of this very necessary step. Sixpence a year added to your modelling outlay is surely a very small sum to pay for the comfort of knowing you are fully insured against most risks. I do not say there is any risk in model flying, but we all come up against the odd case when a model dashes into a bystander, or tries to go through a window that should be open and isn't.

The new list of clubs is now complete (at any rate complete as far as your notifications have informed us, though I am very sure that a number of clubs have omitted to send in details). Owing to the fact that this list would have taken up four full pages in THE AERO-MODELLER, the Editor thought (and I think you will agree with him) that it would not be equitable to take this amount of space from that available for general aero-modelling matters. Therefore, this list has been printed separately on one large sheet, and may be obtained on application to THE AERO-MODELLER offices, all requests being accompanied by a 2½d. stamp. Do not send a stamped addressed envelope, as the list will not go into the usual type of cover. This list should be in the possession of every club secretary, as besides the club information contained, there are a number of useful tit bits of information that will be very handy to anybody connected with the movement.

There is one item of general interest I note from the latest copy of the *S.M.A.E. Journal*, where it is pointed out that under the new constitution there is no limit to the number of timekeepers allowable to any one club, the minimum, of course, being two. This is a very wise step, inasmuch as many clubs are working under extreme difficulties, and it is quite possible to come across a case where the recognised timekeepers may be engaged on other duties, and a competition becomes void owing to the lack of the necessary officials. The only thing to remember is that timekeepers must be 16 years of age or over, and that the S.M.A.E. must be supplied with a list of the timekeepers' names.

Many modellers, especially those of the old brigade, will know of Mr. D. A. Paveley, and for the newcomers to the hobby who may not have heard of him I would say that he is a very well-known modeller of the old school, being particularly well known for his work with compressed-air motors. I have received a cutting containing information that Mr. Paveley's nephew, R. F. Paveley, has received the D.F.M. for his efforts on a recent reconnaissance expedition over Germany. His 'plane caught fire during a hot scrap somewhere off our coast, and partly due to his efforts the fire was kept under control, and the machine brought safely back to land, all of its crew escaping with only very slight injuries. Young Paveley took an active interesting in aero-modelling, assisting his uncle with the design and manufacture of many models. This is just one instance of the good work aero-modellers are doing to-day. As our American contemporary, *Model Airplane News*, pointed out in a recent editorial, the authorities will realise more and more that a sound aero-modelling experience goes a long way towards building up the best type of R.A.F. personnel.

IMPORTANT.—Owing to the increasing difficulties in the printing trade, we are obliged to allow our folk more time to produce this monthly magazine. This brings about a general tightening up in the time factor all round, and in future all Club reports and notices **must reach the AERO-MODELLER offices NOT LATER THAN THE 20th of the month preceding publication.** Please keep this in mind, as many reports still continue to arrive late, and are omitted in consequence.
20th ——————**REMEMBER**—————— 20th

The members of the DUNDEE M.A.C. staged a very successful exhibition at a local cinema, and membership has benefited in consequence. The standard of workmanship brought very favourable comment, also a very good write-up in the local paper.

I regret to hear that the LYSANDER M.A.C. appears to be suffering a slack period, presumably owing to long working hours at the factory, which is quite understandable.

R. Calvert, of the HUDDERSFIELD A.M.S., won both classes at a recent concours d'elegance competition, the judges being Messrs. Stott and Lees, of Halifax. Workmanship in all classes was very good, and it was rather difficult to decide who was the winner.

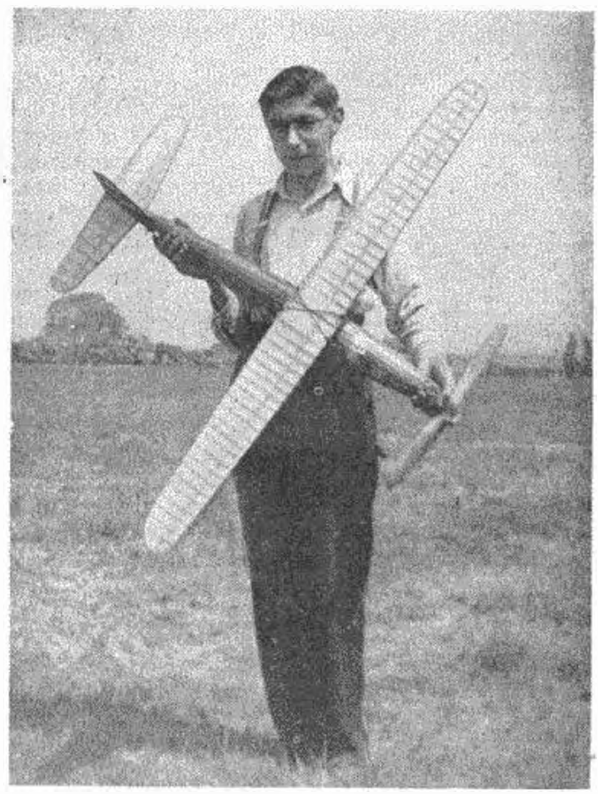
A new club has started in the Manchester area, under the title of the SALE AERONAUTICAL SOCIETY. I am informed the membership is "mixed." (I wonder how!) The secretary is Mr. A. Holyoake, and he would be pleased if interested modellers in his district would get in touch with him at 6 Hartford Road, Woodhouse Lane, Sale. This club is undertaking N.C.A. insurance as a whole.

R. Perrett, of the TORQUAY AND D.M.A.C., won a recent open duration competition with an aggregate of 297 seconds, the runners up being J. W. Jackson, 282·5 seconds, and E. J. Taylor, 233 seconds. Indoor flying is still going strong with this body, and some very good times have been put up, J. W. Jackson now holding the r.t.p. record with 126 seconds. E. J. Taylor put up a speed of 37·5 m.p.h. in the speed competition, and carried off the club Indoor Trophy in consequence.

The members of ST. LUKE'S M.A.C. seem to be an industrious lot of blighters, and have now constructed an office adjoining their workshop, which is also pressed into service as a "drawing room." Some of the younger members are experimenting with ornithopters, while the more experienced chaps are making a 5·8 cc. petrol engine.

Mr. J. Dolittle, of 12 Cargate Avenue, Aldershot, whose photograph appears in these columns, would like to get in touch with some of the earlier aero-modellers, especially those from the old Blackheath club. This chap joined the R.F.C. in 1915, and since that day has met very few of these old enthusiasts. Certain names he calls to mind are Messrs. Rippon, A. B. Clarke, S. Hunt, and Fred Whitworth, and if any of these gentlemen are still about and would care to get in touch with him I am sure he would be very pleased.

Dicky Skinner, of the BEVERLEY AND D.M.A.C., was naturally very pleased to hear that he had won the "Caton" Trophy for 1940. This club held its opening flying meeting on Easter Sunday, with a very good turn out, the members of the Kingston-upon-Hull M.A.C. turning up in full force. Likewise a terrific wind! In spite of the weather some very good flights were seen, and D. Houldsworth made two or three o.o.s. flights over the town with a glider. Messrs. Wragg and Wainwright followed Houldsworth's example, and, in fact, gliders seem to be claiming



"Dicky" Skinner, of the Beverley Club, and his "Flying Minutes," with which he won the Caton Trophy for 1940.

all the news lately. There was very keen competition at a scale model contest, the final winner being C. Verity, of Hull, with a very detailed "Vought S.B.U.1."

Mr. L. J. Mitchell, of 38 Stanley Avenue, Copnor, Portsmouth, is very keen on obtaining a copy of the February, 1940, AERO MODELLER (which is, unfortunately, entirely cleared from stock at our offices). If anbody has one for disposal will they please get in touch with this chap direct. He also would like a pen pal with whom to exchange views and experiences on aero-modelling in general.

A pole flying contest was staged by the STRATFORD ON-AVON M.A.C., the competitors being set to average nearest to 30 seconds over three flights. The times were exceptional, and Mr. L. Austin, the winner, averaged 30 seconds exact. R. Higham was placed second with an average of 29·2 seconds; and A. Milne third, average 29·2 seconds. Outdoor flying, while limited, has seen the establishing of club records as follow:

R.O.G. Duration: R. Higham, 52 seconds.
H.L. Duration: R. Higham, L. Austin, 70 seconds.
T.L. Glider: Again R. Higham, 62 seconds.

P. Pearce has raised the r.t.p. record to 60 seconds.

The Easter competition staged by the ROWDITCH (DERBY) M.A.C. was, unfortunately, spoilt by very high wind, but in spite of this some fairly decent times were put up, G. Pagan making a flight of 86·3 seconds with a medium weight model. The open duration event was won by J. Wright with a flight of 72 seconds, and F. Tansley won the light-weight event with 36 seconds. The flying scale contest was abandoned owing to the conditions.

The BARRY M.A.C. have finished their indoor season, the club record being finally held by I. D. Walker with a time of 48 seconds. These chaps have successfully used disruptors on their models, and find that really bad stalls can be turned into a climb when these gadgets are used. These chaps are having some real success with flying boats

"LOOK HERE, HERMANN—I CAN'T TELL WHERE MY SPAGHETTI FINISHES OR YOUR RUBBER MOTOR BEGINS!"

and seaplanes, and with the formation of a junior section, plus the forming of an aero-modelling section in the A.T.C., things seem to be going very well in Glamorganshire.

Over 60 models were on show at the HAWKER M.F.C. annual exhibition, winners being Messrs. Barton, Summers, and Newton, the models being respectively a 50 in. glider, a 22 in. Hurricane, and an 18 in. Gladiator. An exhibition of pole flying rounded off a very enjoyable afternoon.

Since the last report of the DERBY SHORT WAVE EXPERIMENTAL SOCIETY, their headquarters have been taken over by the local A.F.S., but they are carrying on in temporary premises. It is felt that a number of letters have gone astray as a result of this shift and I am asked to request anybody interested to write to Mr. H. Clamp at 18 Mortimer Street, Derby. One of their members collected just over £10 for the Derby Fighter Fund with a one-man exhibition of models, which is very good going.

An interesting side light on present day conditions is given by the report of the LANCASTER M.A.S., where Capt. C. C. Horner has offered a cup for the best model built of any sort of wood other than balsa. Mr. J. H. Bond has also presented the club with a fine silver trophy for Wakefield competition, and should stimulate this type of model in the club. The results of a recent r.t.p. competition are as follow:

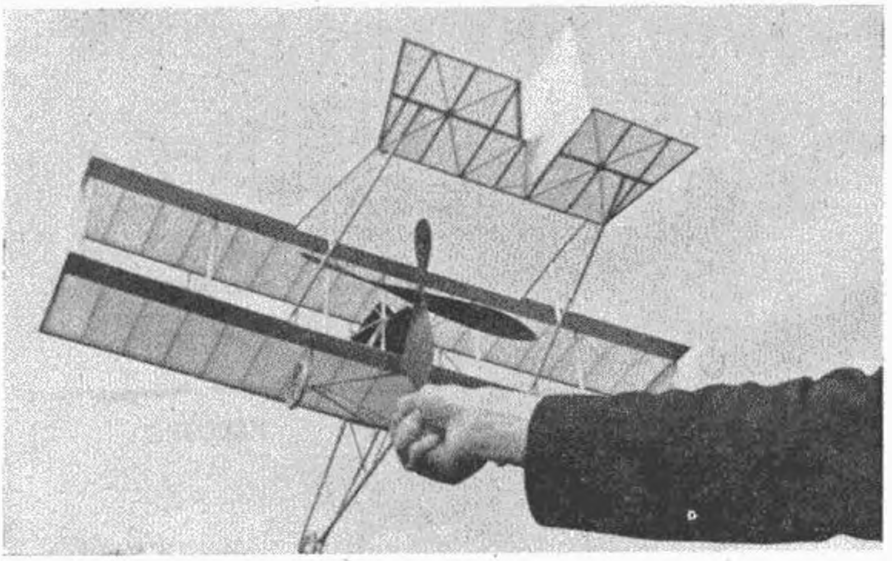
1. A. F. Bond, "Defiant," 84·25 sec. agg.
2. R. Dymock, "Puss Moth," 56·25 sec. agg.
3. B. Halliwell, "Lysander," 48·0 sec. agg.

The first outdoor competition of the year staged by the OXFORD M.F.C. resulted in a win for R. A. Everard with 74·6 seconds, followed by R. Courtney, 59·9 seconds, and P. L. Curtis, 58·4 seconds. Some very interesting flights were made and some very original models were seen, two being from AERO MODELLER plans. I am told the story of a new recruit who stood watching Mr. A. F. Houlberg assembling his model. After standing in awe for a few seconds, he remarked: "Gosh! You wouldn't think he was Chairman of the S.M.A.E.—he looks too homely!"

As you will see from the notice, the BLACKHEATH CLUB do not intend to let conditions get them down, and their usual rally will be held. These chaps recently paid a visit to the Croydon Club at Addington for their "Blitz Rally."

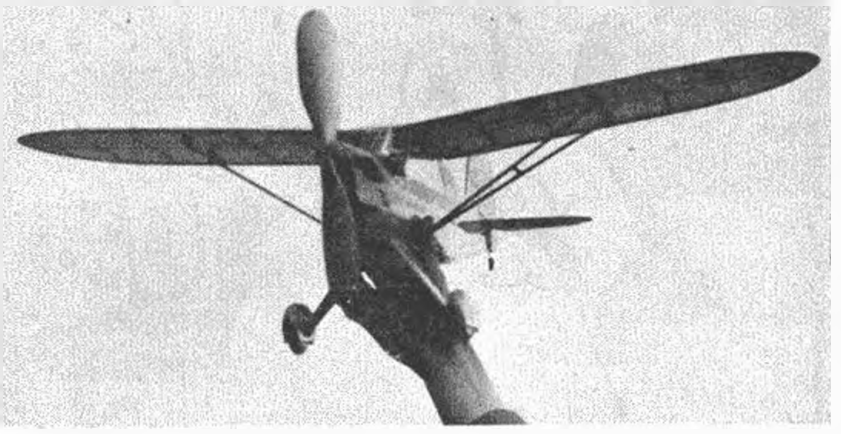
Mr. White took first place in the nearest of 45 sec. contest, with a time of 45·6 sec. He had bad luck to lose his new glider o.o.s. after hand launching from the brow of the hill, and I am told that this job incorporates a dihedralled tail-plane situated high on the fin. Ron Galbreath shows real Scotch economy with balsa in his new seaplane, the wings and surface being built entirely of 1/64 in. sheet, with the exception of two $\frac{1}{16}$ in. spars in the main-plane!

In spite of restricted membership, the WHITSTABLE, TANKERTON AND D.M.A.C. are going strong, and several of the members who have joined the A.T.C. are busy forming an aero-modelling section in that club. High wind has again played its part at this end of the country, and D. Rice clocked 60 sec. o.o.s. with a "Lynx" on its initial test flight.



A finely built flying scale model of the Curtiss biplane (1912), constructed by F. S. Harris, of the Warwickshire M.A.C. (We hope to obtain plans for this model, so keep an eye on the Plans Service announcements).

(Below) A "Rearwin Speedster," built by W. Brown, of the Dundee M.A.C. This machine makes a tip-top flying scale model, and some useful durations have been put up with replicas.



Mr. Dolittle, of Aldershot, prepares one of his models for flight. This chap wishes to get in touch with other "old" modellers who were at the game before the last "spot of bother."

The BUSHEY PARK M.F.C. are holding an open rally on Chobham Common on June 22nd, and those interested are asked to consider the following programme and to turn up in full force.

OPEN DURATION. 11 A.M.—2.30 P.M.
All models to conform to S.M.A.E. fuselage formula.
Aggregate of three flights r.o.g.
Only one entry per person.
Entrance fee, 6d. First prize 10s., second 5s.

CLUB TEAM CONTEST. 2.30 P.M.—4.30 P.M.
Any number of teams from each club.
Teams to consist of three members.
Models to conform to S.M.A.E. fuselage formula.
Aggregate of nine flights, three flights per member.
Entrance fee, 1s. 6d. per team. First prize 15s.

GLIDERS. 4.30 P.M.—6 P.M.
S.M.A.E. fuselage formula models, winch launch, 200 ft. of line.
Aggregate of three flights.
Entrance fee, 6d. First prize 10s., second 5s.

In spite of a long silence from the CHINGFORD M.F.C. activities are still going ahead, and many new models being built. In order to keep the club in contact during these difficult times, they are endeavouring to arrange an inter-club contest for May 11th, and any individuals or clubs in this district who are interested are asked to get in touch with the secretary.

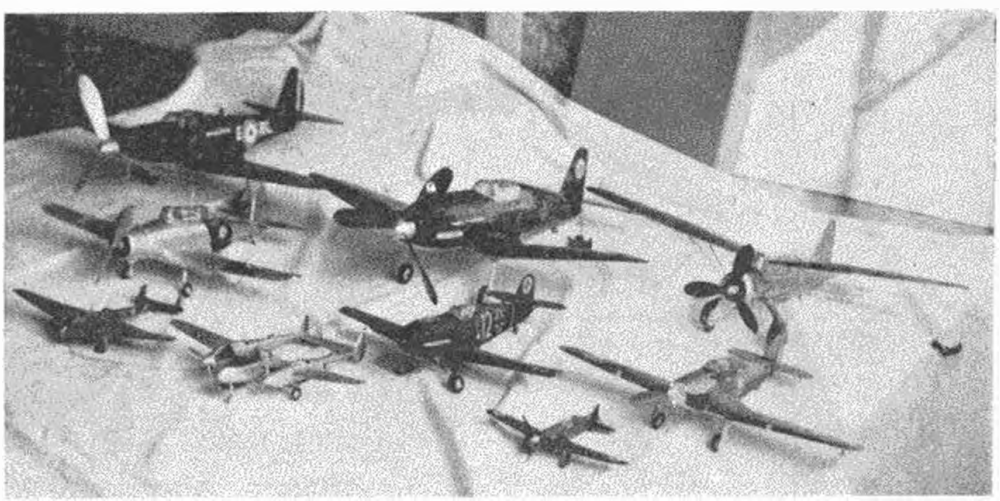
BLACKHEATH MODEL FLYING CLUB.

Roll Out the Models!

GRAND OPEN DAY, AUGUST 10th, 1941,
ON EPSOM DOWNS.

All being well, this will be even better than last year.
Contests and Prizes to be announced later.

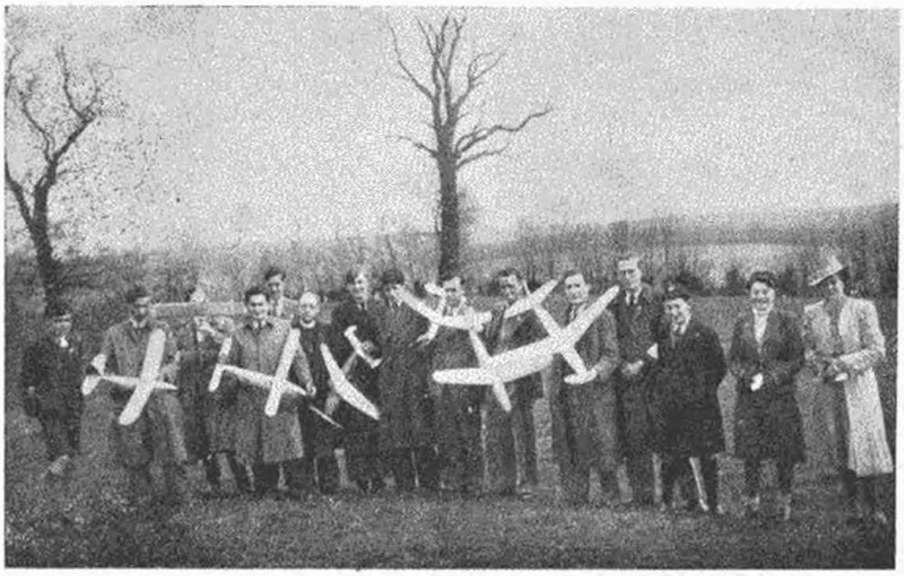
Lectures and r.t.p. flying are playing a big part in the ALDERSHOT M.A.C., the club record having been raised to 117·4 sec. As there are many juniors in this club, most of them having had little or no building experience, a special club model has been designed of simple construction.



How's this for a nice bunch of scale models? Built by E. Saxton, of Grays, the models range from a He112 to the trusty Lysander.

A complete set of materials is provided, including a ready-carved propeller, for 2s., and, with special jigs installed, building takes place on the club premises under the guidance of experienced modellers. This is a very good scheme, which I thoroughly recommend to other clubs.

W. Downey, of the LIVERPOOL M.A.C., has raised



Members of the Halstead M.A.C. out for an airing with their models. I spy a "Copland's Wakefield" and a "Lynx" in the foreground.

the club duration record to 76 sec., while Messrs. Forster and Parkhurst have been trying their flying-boats, with interesting results. Mr. Forster's model is a twin-engine flying-boat, and is fitted with pilots, dashboard, and even a dummy radio set!

A new club to be formed is the DENBY DALE M.A.C., the secretary being Mr. A. Peace, of Oak Cliffe, Denby Dale, Huddersfield.

The RIPON M.F.C. have been fortunate in obtaining a large flying field, the only drawback being a wide and deep river a quarter of a mile away. Also, permission has been obtained from the local Grammar School to use the big hall for indoor flying, where the following records have been put up:

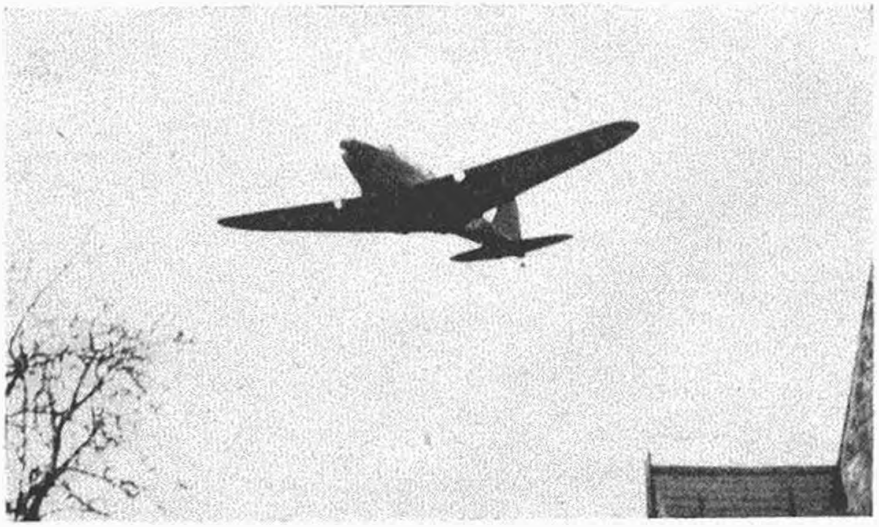
Over 18 in. span.—C. F. Elliott, 55 sec.
Under 18 in. span.—W. S. Elliott, 35 sec.

Mr. W. E. Attwater thinks there is a good possibility of the formation of a club in Preston, and he would be obliged if anybody interested in that district would get in touch with him at 130 Victoria Road East, Fulwood, Preston.

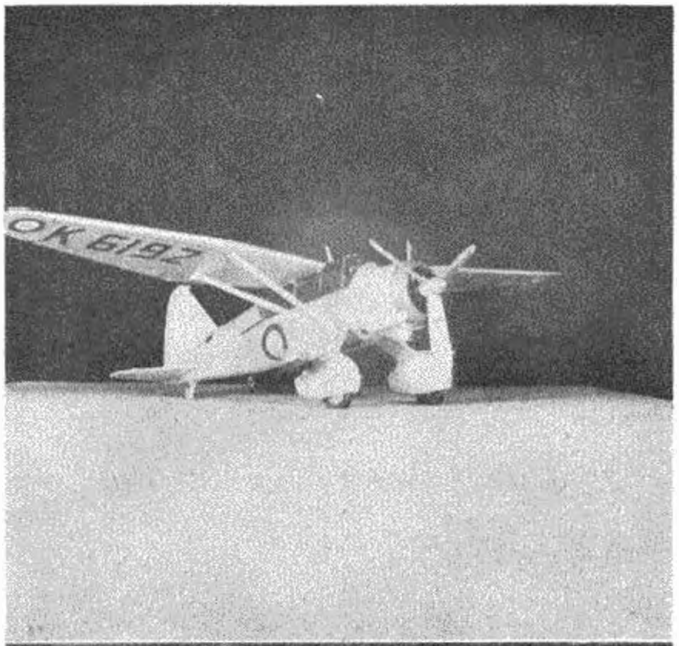
The membership of the LEICESTER M.A.C. has now passed the fifty mark, but still more members would be welcomed. Flying meetings are held every Sunday morning from 11 a.m. onwards, at Charity Field, Stoughton. It is hoped also to arrange inter-club meetings with other clubs in the vicinity. Messrs. Claypole and Shaw have been doing some good flying lately, the best being 2½ min. o.o.s. by the former. The 'plane was actually in the air for about 5 min., and unfortunately, when returning with the model, the builder ran into a juicy thunderstorm and appeared rather the worse for wear!

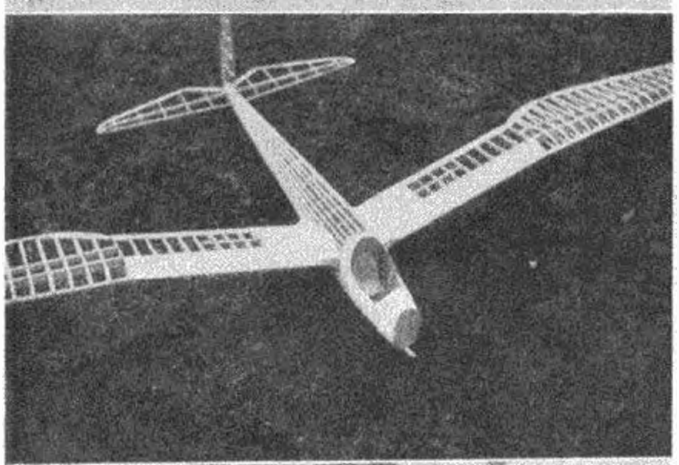
In spite of war-time exigencies and the exodus of old members to fresh fields of aeronautical endeavour, WOKING AND D.M.A.C. show a satisfactory balance sheet, with receipts almost wholly composed of flying members' subs., of which exactly one-half was devoted to prizes and another pound or so to medals. Bert Hollis, an enterprising junior, took his chance and collared most of the trophies last season, breaking the club record in doing so with a Wakefield type flight of over three minutes with his "Victrace." To other clubs who would deem this mediocre, this club has not an ideal flying pitch, especially just now, with pit props and such-like obstructions, as the song has it, "all over the place." However, all the lads in this part of our beleaguered fortress look forward to a spot of the sport of King Peter, of whom we all are thinking so much just now. Woking, at any rate, are determined to keep the flag flying. Or should one say the model?

As the direct result of an exhibition staged in aid of the "Garnock Spitfire Fund," a club has been formed, to be known as the GARNOCK M.A.C., Secretary, W. Allison



A good show of posing, the model being suspended on a thread against just enough "domestic background" to make it look real. Model and photograph by A. F. Leighton, of Wolverton.





(Above) Top: A nicely built 25 in. Lysander, by R. Sturridge, of Hampstead.

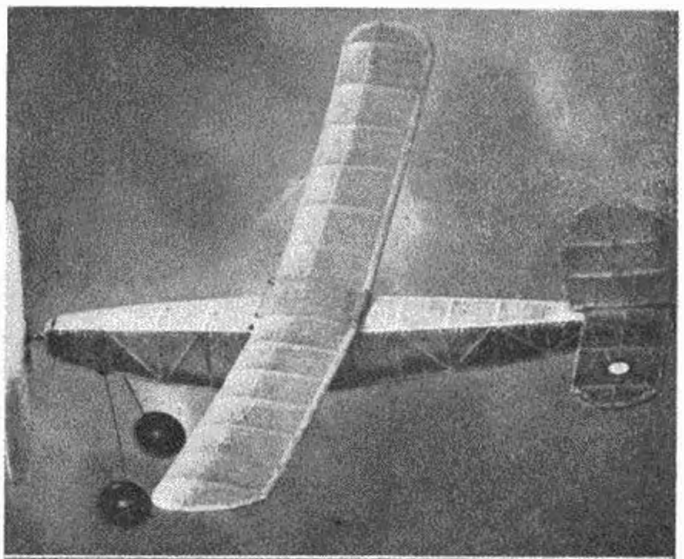
Middle: Nice constructive work, by P. J. Fan, of the Aldenham School, M.A.C., the model being a glider of 6 ft. 8 in. span.

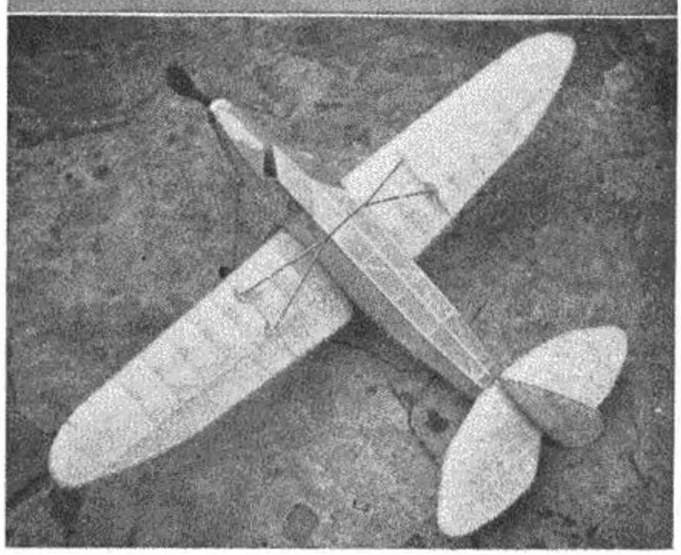
Bottom: A 19 in. Fairey Fox, built by a reader.

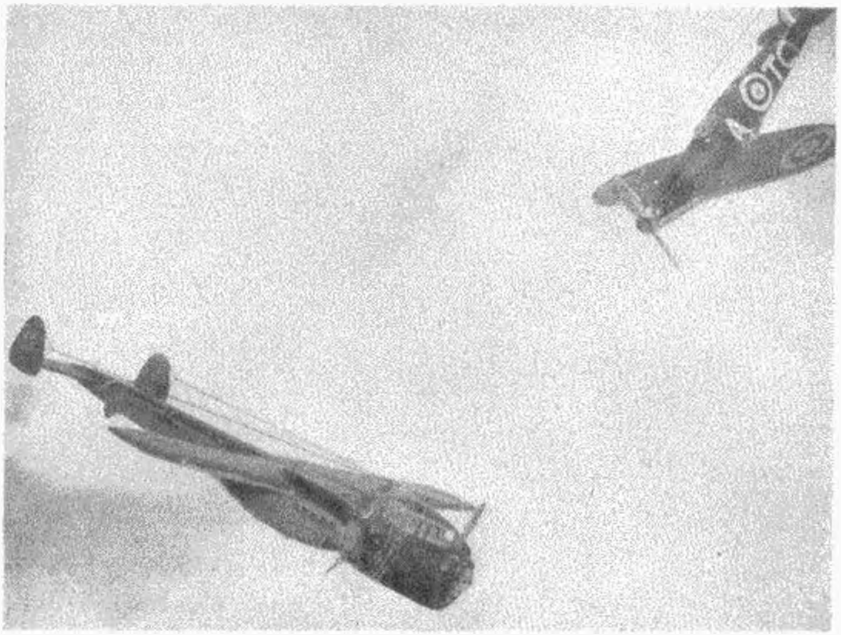
(Below) A "Skyscout" duration model by K. Smith, of Bradford.

Nice scale model constructed by J. Fox, of Leeds.

The well-known "Cruiser," as built by A. Sturridge.







C. Bluemel, of Beckenham, built and posed these fine replicas of the Spitfire and Do215, the only defect being the slight shadow thrown on the backcloth.

Dale, 59 Eastern Crescent, Kilbirnie, Ayrshire. A hundred and twenty models were on show, ranging from small-scale models to the "King Falcon" glider, and over £25 was realised as a result of this exhibition.

The final details of the open rally staged by the ILKLEY M.A.C. are now to hand, commencing at 11.30 a.m. on May 25th. Four events will be held, being as follow: Nomination, Glider, Open Duration, and Wakefield. Those attending should go to "White Wells" and take the upward right-hand path from there to the top of the moor. The first club contest was held on April 20th, having been postponed owing to bad weather, and the results were as follow:

E. J. S. Townsend	206·5 sec.
R. H. Crow	142·3 ..
K. E. Anning	106·8 ..

Mr. Townsend also won the r.t.p. contest for March with a time of 116 sec.

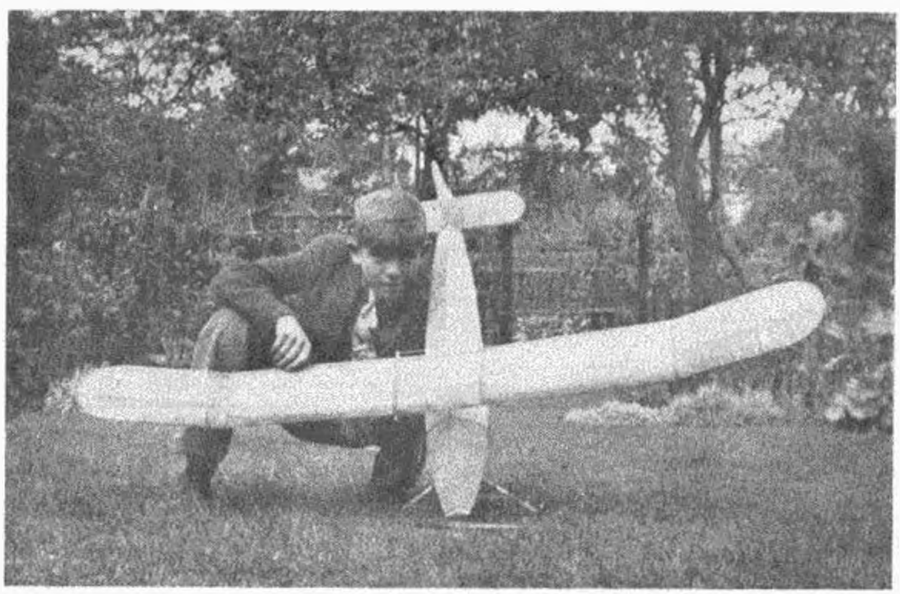
G. Topham raised the "Under 150 Square Inch" club record of the ALLERTON AND D.M.F.C. to 2 min. 33 sec. B. V. Haisman won the only event staged at an inter-club affair, clocking 82 sec. in a howling gale. This same chap later won a heavy-weight event with a time of 5 min. 25 sec. o.o.s. A. Topham won the light-weight event with an average of 59 sec.

The BATLEY AND D.M.A.C. have forwarded me a copy of their new club magazine, which makes very interesting reading. A very full competition programme has been arranged for the coming season, and things look very promising indeed. It is rather unfortunate that this club have adopted the title of "Wings" for their publication, as this is also the title of a similar magazine published by the HALSTEAD (ESSEX) M.A.C., who, I must state, were first in the field! This latter body staged an open rally at Easter, and in spite of a rather disappointing day, some excellent flying was obtained. Mr. R. Ince made the best flight of the day with a 94 sec. hop, and thus wins the club "pot" for the third time in succession. Mr. D. Fisher set up a new club record for a glider with a time of 62 sec. from a 50 ft. towline.

The HAWICK A.M.C. reports another successful exhibition, as a result of which £10 was handed over to the Red Cross.

Well, that's that for this month, and I'm hoping that by the time our next little chat rolls round we shall have a lot more of interest to talk about. I sincerely hope all clubs and individuals will support the various open meetings noted in these columns, and that the S.M.A.E. decentralised events entice an ever-increasing entry. Till next month, cheerio!

THE "CLUBMAN."



N. Harrison, of the Harrow M.A.C., with his modified beginner's duration model.

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.

BIRMINGHAM Model Supplies, 96 Dale End, wish to draw the attention of buyers to our MAIL ORDER department: send for lists of Aircraft, Solid, Flying, also Ship Kits and Accessories.

BLACKPOOL.—The Sports Shop, Palladium Buildings, Waterloo Road. All model supplies. Joy, Studiette, Cloud, Drome, Kits, balsa, cements, dopes; grand flying scale kits at 1s. 9d., including postage. Latest models, solids, duration. Remember "The Sports Shop."

BROMLEY.—H. E. Hill & Son, 481 Bromley Road, Downham; 646 Downham Way, Bromley. ('Phone HIT 4197). Model aeroplane supplies. Dozens of kits, plenty of spares, and 1/72 scale plans.

CHISWICK, W.4.—A. A. Baker, 526 High Road. Large selection of flying scale, duration and solid kits. Ball races, propellers, wheels, and other accessories. Balsa cut to sizes as required. Agents for Hobbies. 'Phone 3816 Chiswick.

CHISWICK.—G. W. Jones Bros. & Co., 56 Turnham Green Terrace. (Chiswick 0858). Largest stock of Kits and Accessories in West London. Agents for Veron, Keil Kraft, Club, Airyda, Aero-models, Penguin, Scalecraft, Skybird, Skyleada, etc. We specialise in spare parts for Solids, and balsa wood cut to size. Caton's rubber, Joy-plane products, Aircraft publications, and photographic postcards. Stamp brings list.

DUMFRIES.—Campbell's, 46 High Street. Send for our free lists all model aeroplane kits, balsa wood, and sundries. Largest stockists in Scotland. Frog, Penguin, Airyda, Scalecraft, Truescale, 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, ropes, Japanese tissue, ball races, etc.—Wade & Co., 40 Chambers Street.

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.—E. Pascall (Guildford) Ltd., 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.

HORNCHURCH.—D. W. Huett (The Printers), 4 North Street (corner of High Street). For all your model aero requirements. Everything in stock: balsa, spruce, kits, dopes, etc., and full range of accessories.

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 Aeromodeller's Stores. Large selection Accessories and Kits. Catalogue, 3d. post free. 34 Belgrave Gate and 67 Braunstone Gate; also at Oakham, Melton Mowbray, Market Harborough.

SHEPHERD'S BUSH, W.12.—K's, Hanover Court, Uxbridge Road. Large selection of flying scale, solid and duration kits of all makes. Balsa wood cut to your requirements. Accessories of every description, and Joy-plane products.

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.—Materials and accessories in stock. Large range of kits: Cloud, Studiette, Keil Kraft, Airyda, Drome, Skyleada, and Chingford, etc. 54 Wellington Road South.

WARRINGTON.—Burton's Radio Service, 55 Bewsey Street. 'Phone 1135. Kits and accessories for the aero-modeller. Drome, Keil Kraft, C.M.A., Solids, Skyleada, Penguin, Scalecraft, all Joy-plane products.

WEST DRAYTON.—Sipson, 45 Sipson Way. Spencer's Cycle, Radio. Cloud, Atlanta, Skyleada, Keil Kraft, C.M.A. Solids, Studiette, Plans. All accessories. Balsa. Leyden Ship Kits. Open Sunday mornings. Post orders.

WOLVERHAMPTON.—Regent Cycle Stores. Kits by all popular makers, Duration, Flying Scale, Solids, cements, dopes, tissues. Expert advice given.—Regent, Cleveland Street, Wolverhampton.

WOLVERHAMPTON.—The Aero-Modellers' Rendezvous: Start & Sons, 61 Victoria Street. Kits by all popular makers. Selected balsa wood, cements, dopes, etc. Complete range of materials and accessories. Expert advice.

WORCESTER.—A. N. Cutler, Bridge Street. For balsa, dopes, tissues, elastic, propellers, cements, etc. In fact, all accessories for the aero-modeller. Stockist of Drome, Studiette, Skyleada, Scalecraft, etc. 'Phone Worcester 4137.

MISCELLANEOUS AND PRIVATE ADVERTISEMENTS

WANTED.—Bound copy of Volume 4, AERO MODELLER.—Write, stating price, to Box S.N.3.

MEMBERSHIP FORMS for 1941

FORM No. 1.

Christian Name ..... *Surname* .....
(Block Letters).

Address .....

Herewith 6d. for enrolment as a Rubber Modellist.

Herewith.....-pence for transfers at rate of 2 a penny
(Please state whether small or large size required).

Herewith 1/- for N.G.A. Lapel Badge.

Herewith P.O./cheque No. .....

Value .....

NOTE.—*The above form must be completed and returned to: The Hon. Sec., N.G.A., Allen House, Newarke Street, Leicester.*

FORM No. 2

TO BE HANDED TO YOUR NEWSAGENT

If you have not already registered for the regular delivery of THE AERO-MODELLER each month.

Name of Newsagent .....

Address .....

Commencing with the next issue, please deliver or reserve for me THE AERO-MODELLER *until further notice.*

Signature ..... *Date* 1941

Address .....