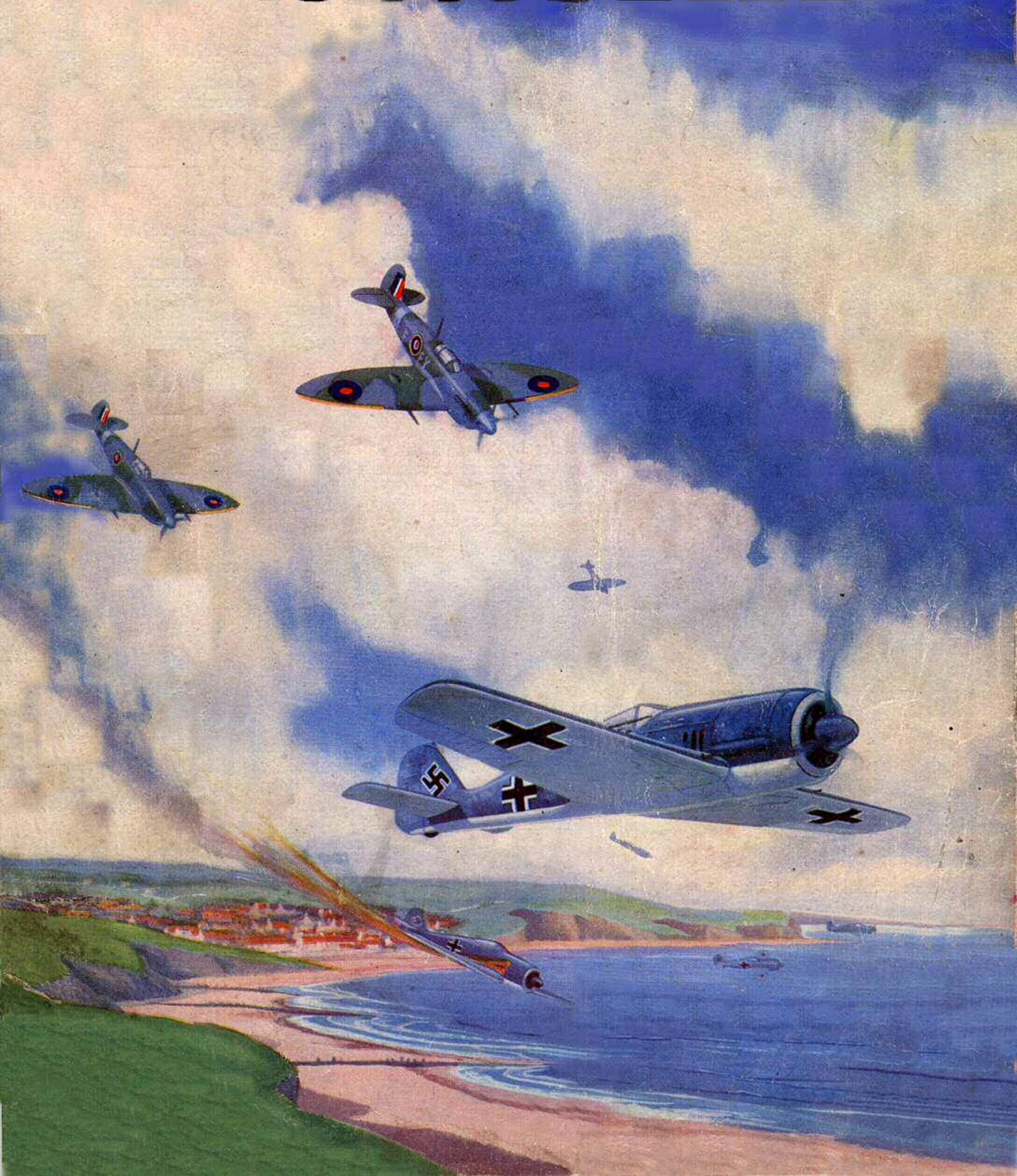
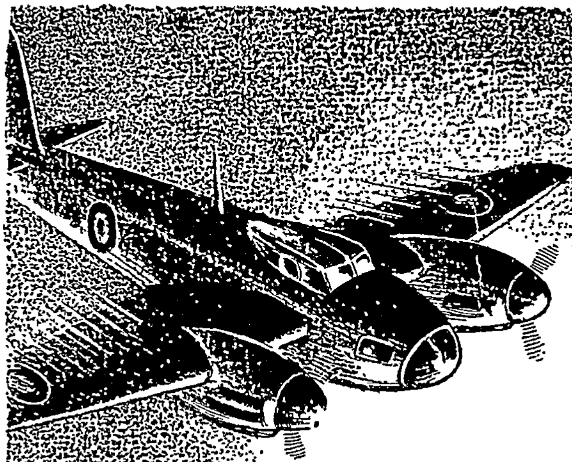
VOL 8. No. 91 ONE SHILLING JUNE 1943.

AERO MODELLER





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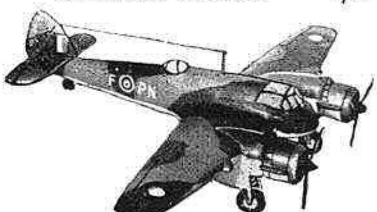
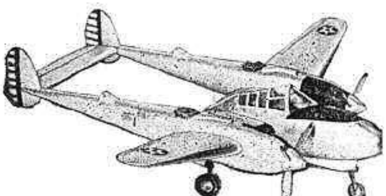

BEAUFIGHTER. 7/11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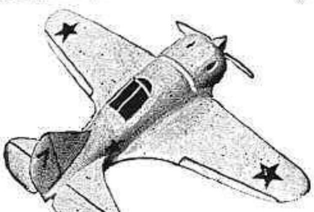
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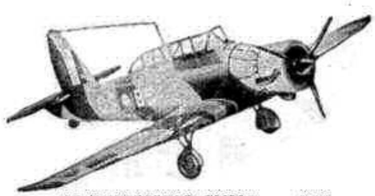
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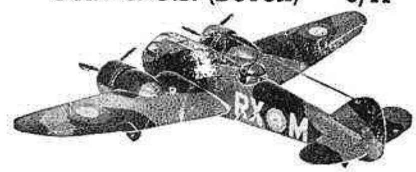
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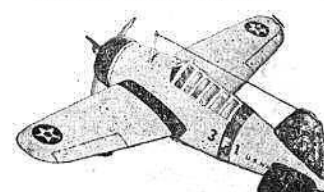
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3/4"	9d.	9d.	9d.	9d.	9d.	9d.	9d.	9d.
1"	1/-	1/-	1/-	1/-	1/-	1/-	1/-	1/-
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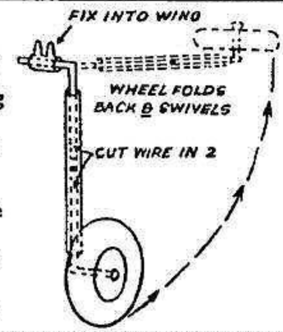

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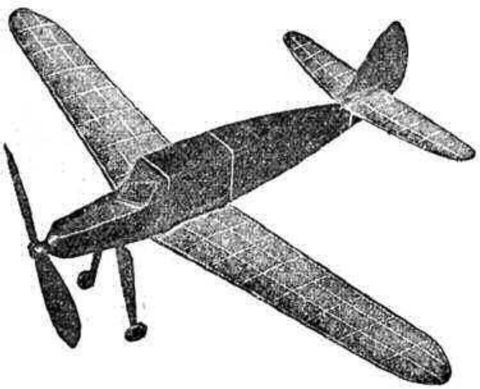

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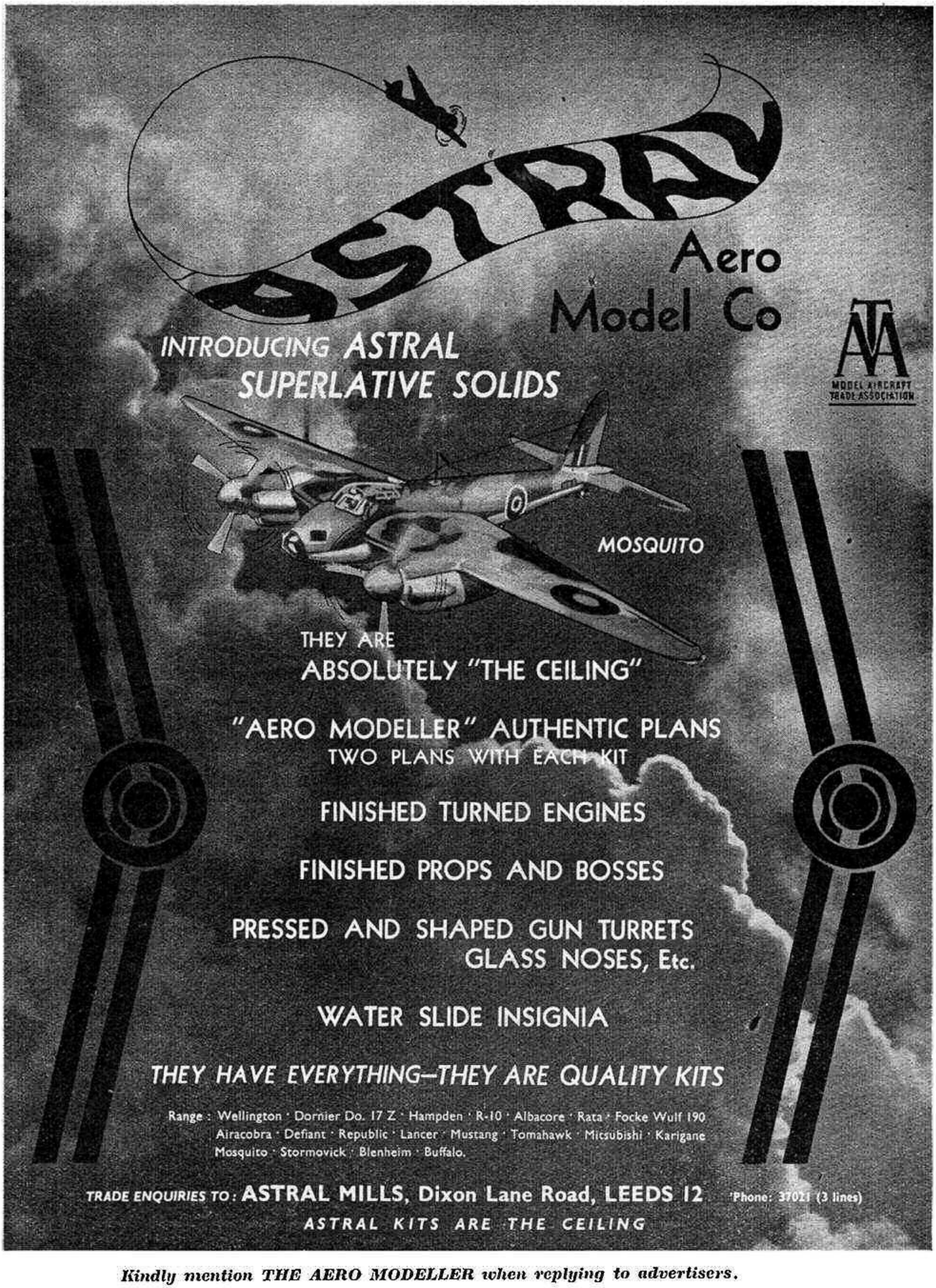
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THE MODEL AERONAUTICAL JOURNAL OF THE BRITISH EMPIRE

VOL. VIII No. 91 • JUNE, 1943

Managing Editor: D • A • Russell, *M.I.Mech.E.*

Editor: C • S • Rushbrooke.

THE "AERO MODELLER" IS PUBLISHED ON OR ABOUT THE 25th OF EACH MONTH.

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EDITORIAL

ABOUT a year ago a series of 36 Airfoil Section sheets was introduced by THE AERO MODELLER Plans Service and provided much-needed assistance to aero-modellers building models with tapered wings.

Recently we have made a survey of our sales as we thought that readers would like to know which are the most popular airfoil sections.

An interesting fact is that we have sold sheets of every section introduced in the series. There is no one least popular section, but quite a group of them! Nearly a third of the total (36) find little support! At the other end of the scale we find three very popular sections, sales of which are several times above the average. These three sections are: R.A.F. 32; Clark Y and Eiffel 400, in that order. After these three come Grant X8, Gottingen 387 and Eiffel 431, running pretty well level, and about half as popular as the Clark Y. Then we drop down to a number of sections of which sales are about a quarter of the leading three, followed finally by the group of least popular sections, which are: R.A.F. 19; N.A.C.A. 98; N.A.C.A. 4309; N.A.C.A. 4415; N.A.C.A. 6712; U.S.A. 35b; N.22; N.60 and C.72.

Reviewing these figures, we find rather what we had expected to find, particularly in regard to the three most popular sections; nevertheless, it is surprising to find N.A.C.A. 4309 and U.S.A. 35b amongst the group of *least* popular sections, because they have been enquired after and referred to by quite a number of aero-modellers. The former has quite a useful C_L at approximately ·4, with L/D max. of over 22, and a not large centre-of-pressure movement, making it quite useful for speed models; whilst the latter section would be suitable for a general-purpose model with a L/D max. of 20·6 and C_L of ·4.

The 36 sets of Airfoil Sections above referred to are those described in "Airfoil Sections for the Aero-modeller," by J. W. B. Cruickshanks, latterly revised by R. H. Warring; and priced 2/– or 2/2½ post free from the publishers at Allen House, Newarke St., Leicester.

The following is a letter received from Mr. A. G. Bell, Hon. Secretary of the Society of Model Aeronautical Engineers, which he has asked to be published in view of the importance of its contents to the aero-modelling movement in this country:—

"The S.M.A.E. is open to all aero-modellers. Just recently two new types of membership were created. Firstly, there is the 'country member.' This membership is designed for the benefit of those people who cannot become club members mainly because of geographical reasons. The fee to the Society is 7s. 6d. per annum. This member can enter all the S.M.A.E. competitions at the usual fee, i.e. 1s. per contest. He may contact any club and make arrangements with the club officials to fly in S.M.A.E. competitions on their ground. He will receive a member's card from the Society's Treasurer and should show this card to a club official on arrival at the Club's ground. A copy of the 'S.M.A.E. Journal' is sent to him every month. This service will keep him up to date with the Society's activities. This member has full voting power. Secondly, there is the class of 'associate member' interested in solid modelling. This member is entitled to enter all the Society's Solid competitions at the usual fee of 1s. per contest. Two National Trophies will be contested each year, and the Council will shortly decide the method of allocation of the £50 so generously given by THE AERO MODELLER for the benefit of the Solids enthusiasts. The annual membership fee to the Society is 1s., but this type of member has no voting power."

★ ★ ★

We acknowledge, with thanks, several hundred letters and postcards from readers and proprietors of model shops, giving names and addresses of the latter. We shall welcome many more, so as to make our list as useful as possible.

D. A. R.

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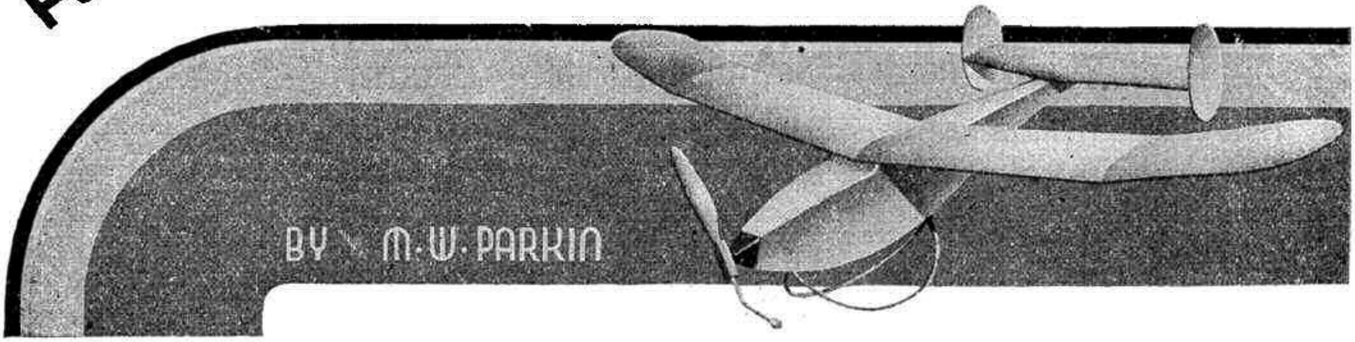
FLY WITHOUT AN UNDERCART



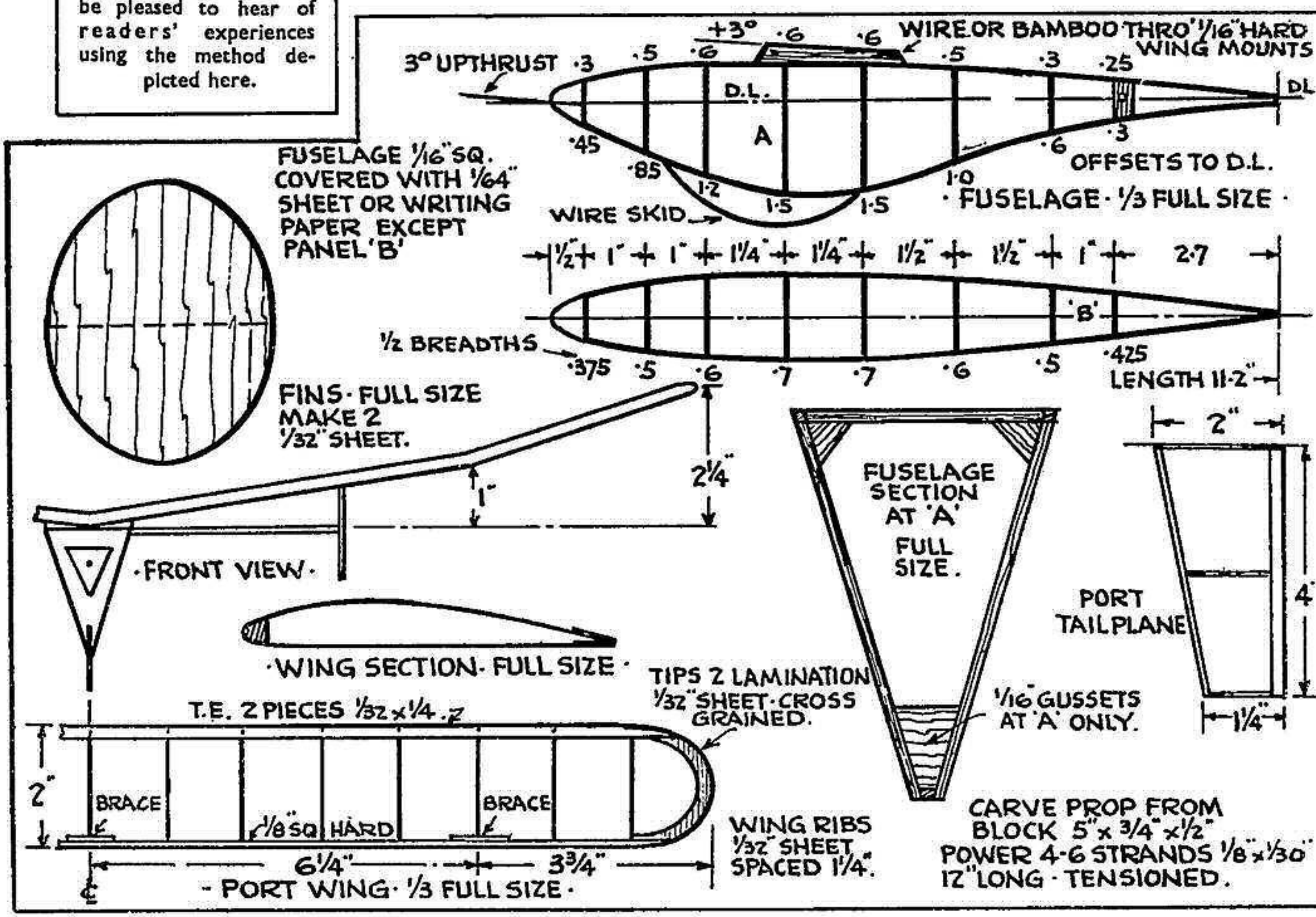
IN the August, 1942, issue of THE AERO MODELLER appeared an article advocating petrol models being fitted with crash-proof propellers and minus undercarriages. However, only H.L. flights could be made with the methods described, which naturally imposed certain limitations on the flying of such models.

The unorthodox method suggested by our contributor has possibilities, and could be adapted to a number of model types with advantage. We shall be pleased to hear of readers' experiences using the method depicted here.

I therefore prepared the system depicted in the sketches, applying the ideas to rubber powered models. As designed, R.O.G. flights can be made with safety, and the whole device is light yet strong, and affords less drag than the orthodox type.

A triangular cross-section fuselage is carried to a deep section, and the wire skid (or skids) extends to a sufficient depth to allow for ground clearance for the folding propeller. Twin fins are employed to give the necessary " triangulation " for ground stability.

Suggested proportions for the triangular fuselage 3–4 to 1 in depth, allowing the flat top of sufficient width to give a firm wing seating. The top plan view is built first and the sides added whilst still on the building board. Lower longeron is added last.



FOCKE WULF-190

by K · H · HODGSON

INTRODUCTION

AS many people desire a true-to-scale replica of a prominent fighting 'plane of this war, this flying scale model of one of Germany's latest fighters should prove very welcome. As can be seen by the photographs, it looks extremely realistic.

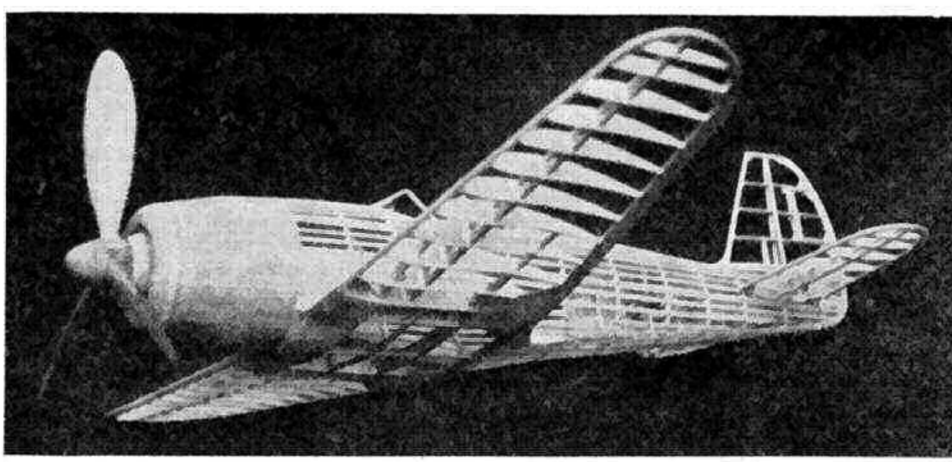
The model is designed with a view to reliable flying and, even more important, to be as damage-proof as possible. Construction is therefore much stronger than necessary. Tests have proved that it can take very hard crashes without suffering serious damage.

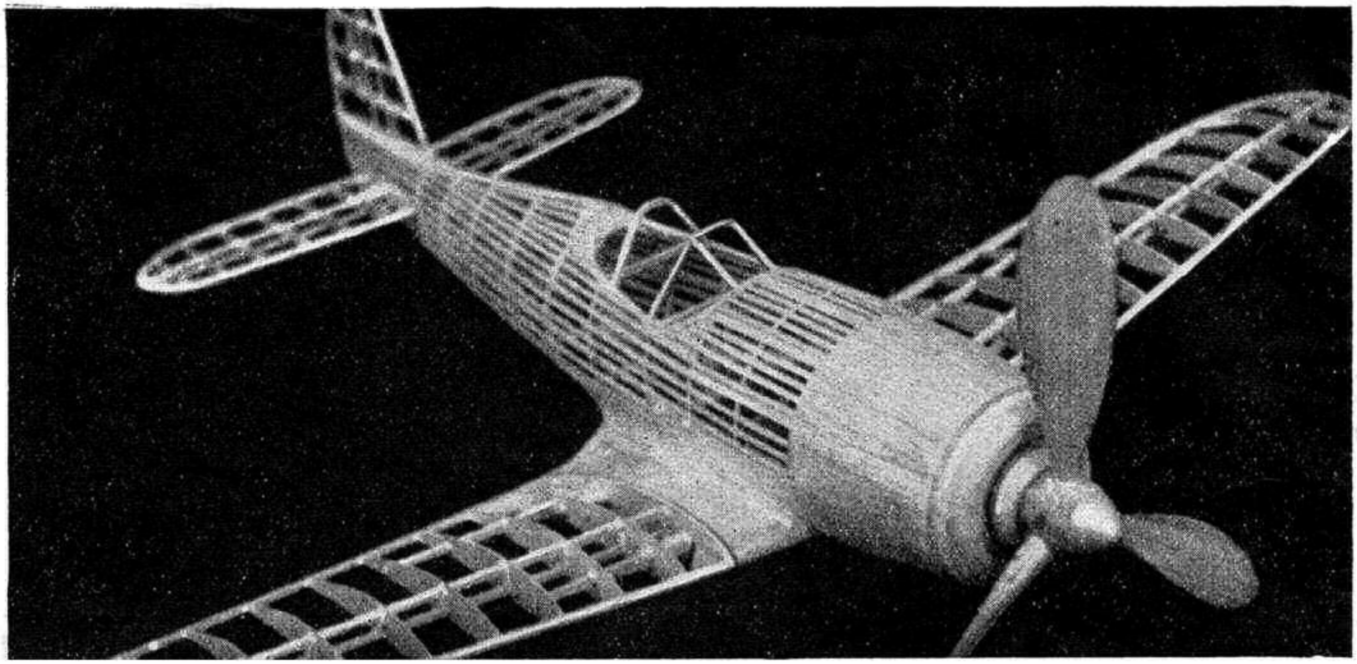
For simplicity, all unnecessary details are omitted and the complete model is covered with black tissue, even to the propeller. This was thought preferable to coloured tissue or dopes and also gives a silhouette appearance against the sky. The crosses and swastikas are in white paper glued on to double-covered tissue.

As low wings look " ugly " when flying with an under-carriage in the " down " position, it is flown without one, but the " prop." and nose are protected by two wire skids which are invisible in flight. An undercarriage is provided for whoever wishes it..

The total weight is $10\frac{1}{2}$ oz., which is not unduly heavy for its strength. Flying is realistic, having a gentle climb to about 40–50 ft., circling and gently coming down to make a perfect " belly " landing, with the last few turns, duration being from 20–35 sec. This performance should easily be improved upon as all flights have been with poor motors in unfavourable weather for this type of 'plane.

To the average aero-modeller, construction is not difficult, and all parts are detailed full size on the plan. The " three-blade prop." is probably the most difficult item to make, but anyone who has carved two-bladers will find





it quite as easy. It might be added that the "prop." used was practically unbreakable, and after crashes into trees and power nose dives (before correct trimming), the only damage was one slightly split blade. A point which many builders favour is that the propeller is direct drive, no gears are used, or anything which requires soldering.

BUILDING INSTRUCTIONS.

Fuselage.

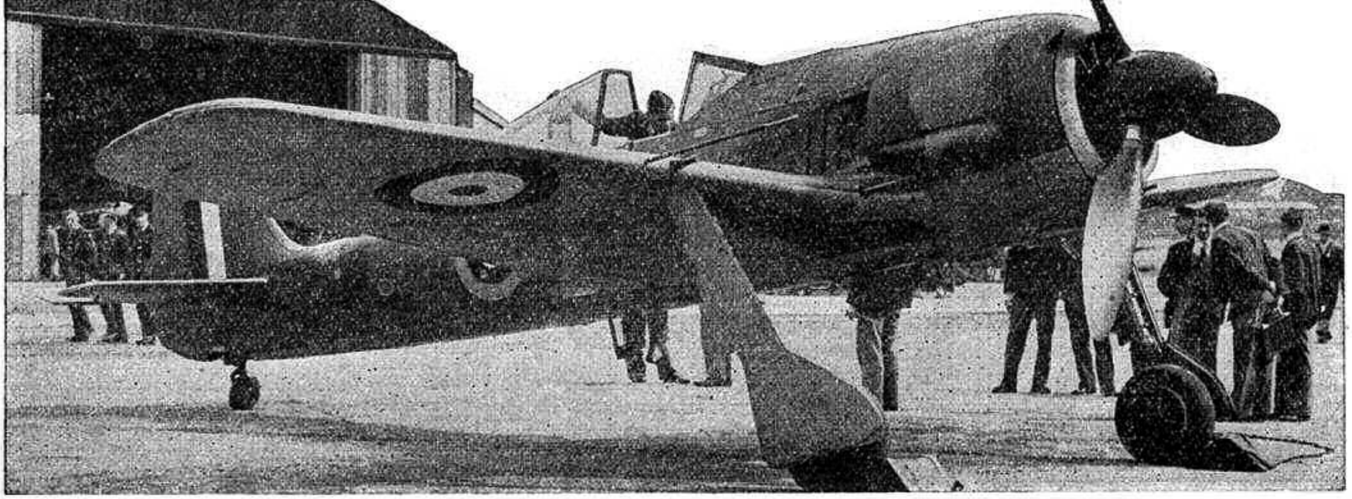
Many types of formers have been tried, and in the following, although heavier than usual, the strength compensates for extra weight. Most of them are out of 3/64 in. or thin 1/16 in. three-ply faced over with odd bits of ⅛ in. balsa. The others are ⅛ in. three-ply. They are all cut out with a fret-saw, and all fittings such as brass tubing, wing root spars and rear hook are fitted in position before commencing assembly of fuselage.

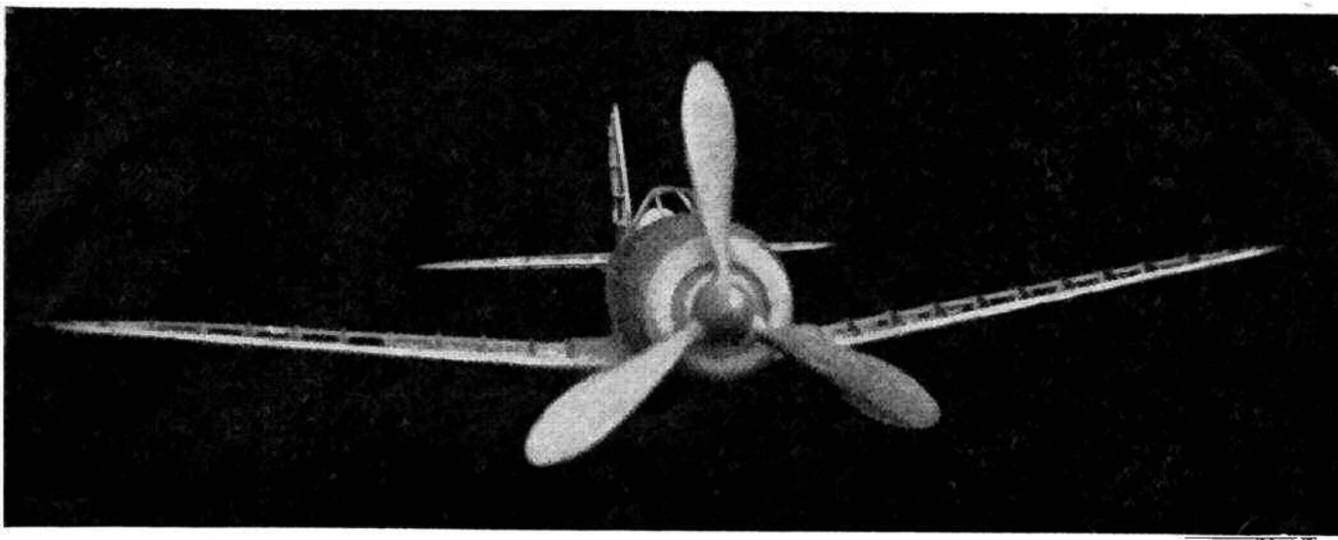
As no jig is used the ideal method is for the side and bottom full-length spars to have the "former" positions accurately marked on them from the plan. Construction is then commenced from the rear by pinning all the formers in position, also adding wing root ribs Nos. 1 and 2 and fin rib No. 1.

The framework is then viewed from the ends to check that all three spars line up straight and that there is no down or side thrust at the nose. Another check is to lay the framework on both views of the fuselage on the plan. When satisfied that it is correct all joints should be well cemented and other spars added in a suitable order.

The weight-box can now be built in, also cementing and binding the paper tubes in the wing roots. Sheet is now added where stated and finally the 1/32 in. by ⅛ in. stringers, which need not necessarily be the full length provided that the joints do not all come on any one former. As balsa is short, 1/32 in. substitute can be used for both sheet-covered surfaces and stringers, but the rear half of the fuselage must be as near as possible *all balsa* as weight should be kept off the tail end. The nose-cowl is built up to shape from odd pieces of ⅛ in. and 3/16 in. balsa.

Finally the cabin frame is added and the remainder of the fin. Complete job is rubbed down with fine sandpaper until all joints are smooth. For covering the cabin with celluloid it is possible that a slight error may have been made in the cabin frame, so paper patterns of the celluloid pieces are made from the drawing, checked for fit and any difference being





allowed for when cutting the celluloid (*note l*), the frame is first painted over with black ink.

Wings.

The wings follow the usual method of construction on the plan, only first of all the ribs are slotted on to the main spar, then pinned down. Leading and trailing edges are added and complete frame cemented except for rib No. 3, and paper tubes. These are cemented and bound after the wings have been fitted to the fuselage by the 5/32 in. dowels, and dihedral is checked to give 3 in. on each wing tip.

Wire hooks, brass tubing, etc., are cemented and bound in place, and cross-bracing added. When wings are complete, leading and trailing edges are shaped to agree with air-foil section. Wings are held in position by strong elastic bands, stretched from the hooks under the fuselage.

Tail.

The tail does not require much explaining, the construction is orthodox. The only point to bear in mind is that before cementing paper tubes, the tail should be fitted to the fuselage with wings fixed so that the tail lines horizontally with the fuselage. The tail is kept in position by the shaped wire which goes round the bottom of the fuselage, an elastic band looped over the fuselage holds the wire in position, the ends of which fit into the tube on each half of the tail. Incidence adjustment is carried out by moving the bottom part of the wire backwards or forwards. A pin fixes the wire in the required position.

Fin.

This is done at the same time as fuselage. Except for rib No. 1 it is made separate and added to the fuselage.

Propeller.

This is made out of hardwood and although it requires a certain amount of skill, with patience and carefully following these instructions, its construction should not be beyond the average builder.

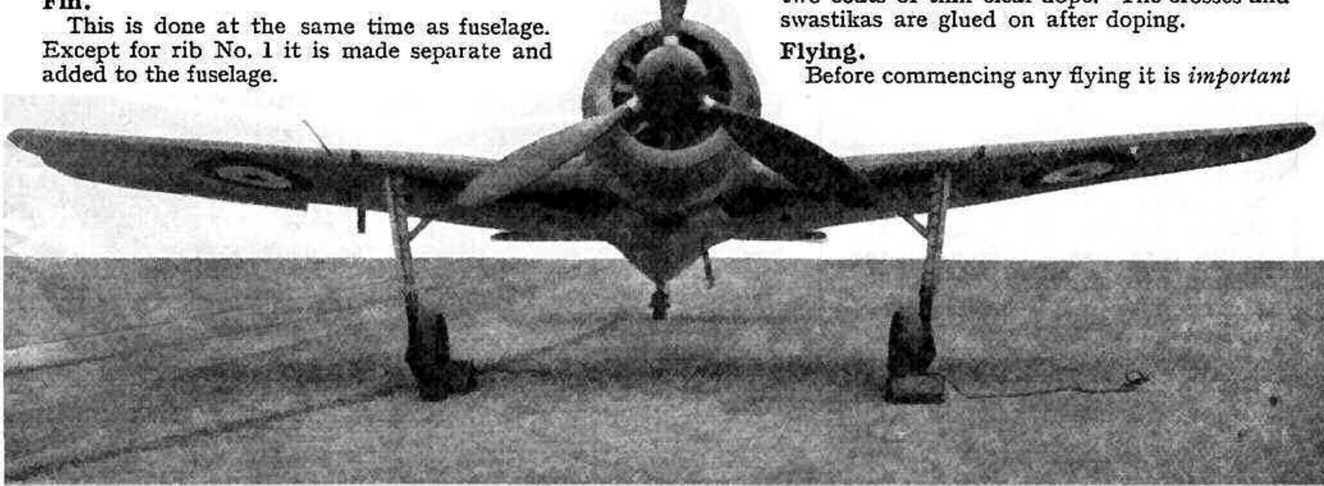
The three blanks are cut out, preferably with a fret-saw for accuracy, and the hubs are shaved down till all three are exactly ½ in. thick. They are then glued and pinned with panel pins to the rear ⅛ in. three-ply ring, which has centre hole already drilled. When dry the nose-spinner block (drilled, but unshaped) is glued on, but before quite dry the "prop." is spun on a 16 s.w.g. shaft to see that it runs true (i.e. that the spinner block is correctly centred). Finally small holes are drilled at correct angle for the screws and the screws put in. The "prop." can now be carved in the usual manner, the blades being hollowed out slightly. When balanced all blades are covered with one or two layers of black tissue, grain running across the blades. The spinner is coloured with black ink and complete "prop." with two coats of banana oil. Power is 14–16 strands of ¼ in. by 1/30 in. elastic, which is sufficient if the model does not exceed 10–11 oz. in weight.

Covering.

The wings and tail are covered in the usual way, grain running long-ways, but the fuselage is covered in small pieces, the grain going round the fuselage. Each piece approximately 5½ in. long by 3 in. wide. The tissue is doped on to the sheet-covered surfaces. On completion all surfaces are steamed, and when taut doped with two coats of thin clear dope. The crosses and swastikas are glued on after doping.

Flying.

Before commencing any flying it is *important*



that the model, motored, etc., *balances* on the wing tips in the *position shown* on the plan or slightly forward to this position. It is unlikely that the model will be too nose-heavy but it should under no circumstances be flown tail-heavy. Lead can be added in the weight-box if required. A method which may also be used to take weight off the tail is to have an extended rear motor hook about two inches or more long which loops round the fixed hook.

The original model for reasons stated was flown without an undercarriage, but if it is desired, one fitted will greatly help stability for first test flights and can be removed later without upsetting the trim. When model is ready the tail is to be set at + 1°–2° incidence to the " prop." thrust line.

Glide by giving a fairly hard push almost level into the wind; any further trimming is done by increasing or decreasing tail incidence, but it must be correctly trimmed for glide before power flights are attempted.

First flights can be made with about 200 turns on which the model *should* fly level and be made to fly in left-hand 60 ft.–70 ft. circles by *careful* adjustment of the trim-tab. With a greater number of turns, model will climb gently, and on full turns will reach about 50 ft. in height. No upthrust should be used unless the model does not climb. Should the "prop." torque turn the 'plane in small left-hand circles use 1/36 in.–1/16 in. sidethrust to counteract.

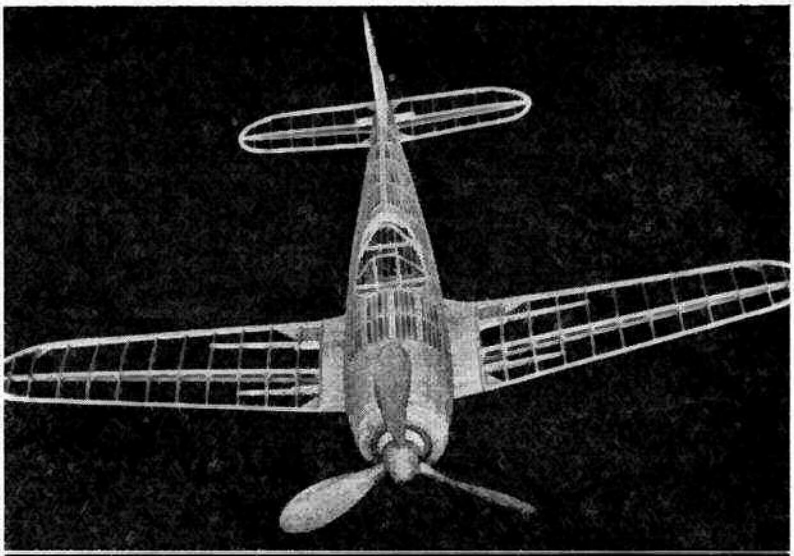
Finally, it is advised that the model is not flown in windy weather, but in any case should be launched at about 45° to the wind direction, the wind blowing from left to right.

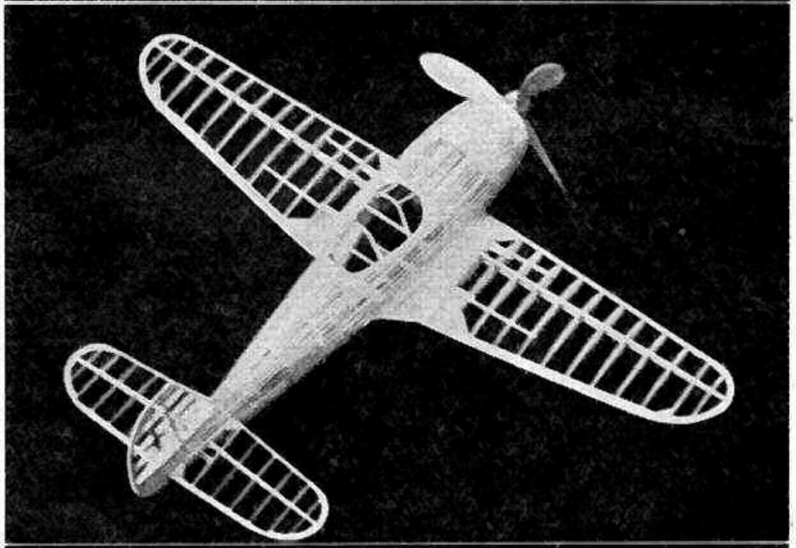
1 in. to 1 ft. SCALE PLANS ARE AVAILABLE
SEE PAGE 893.

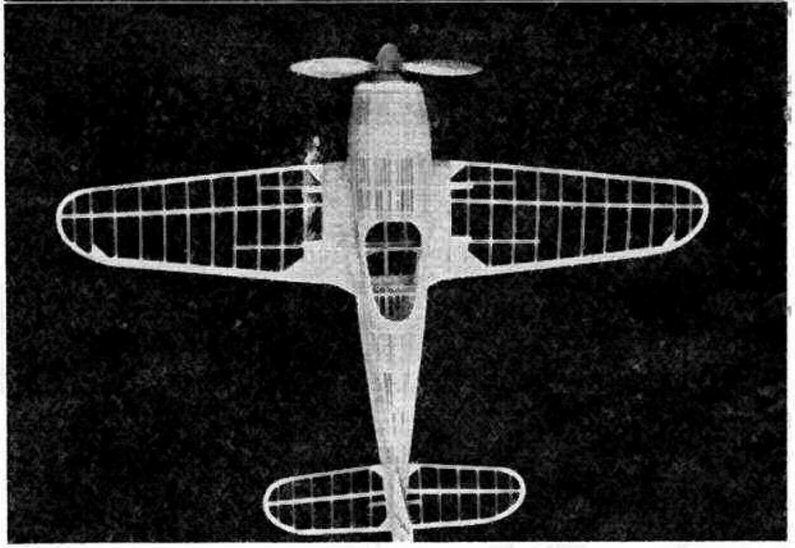
THE FOCKE WULF Fw 190 A-3

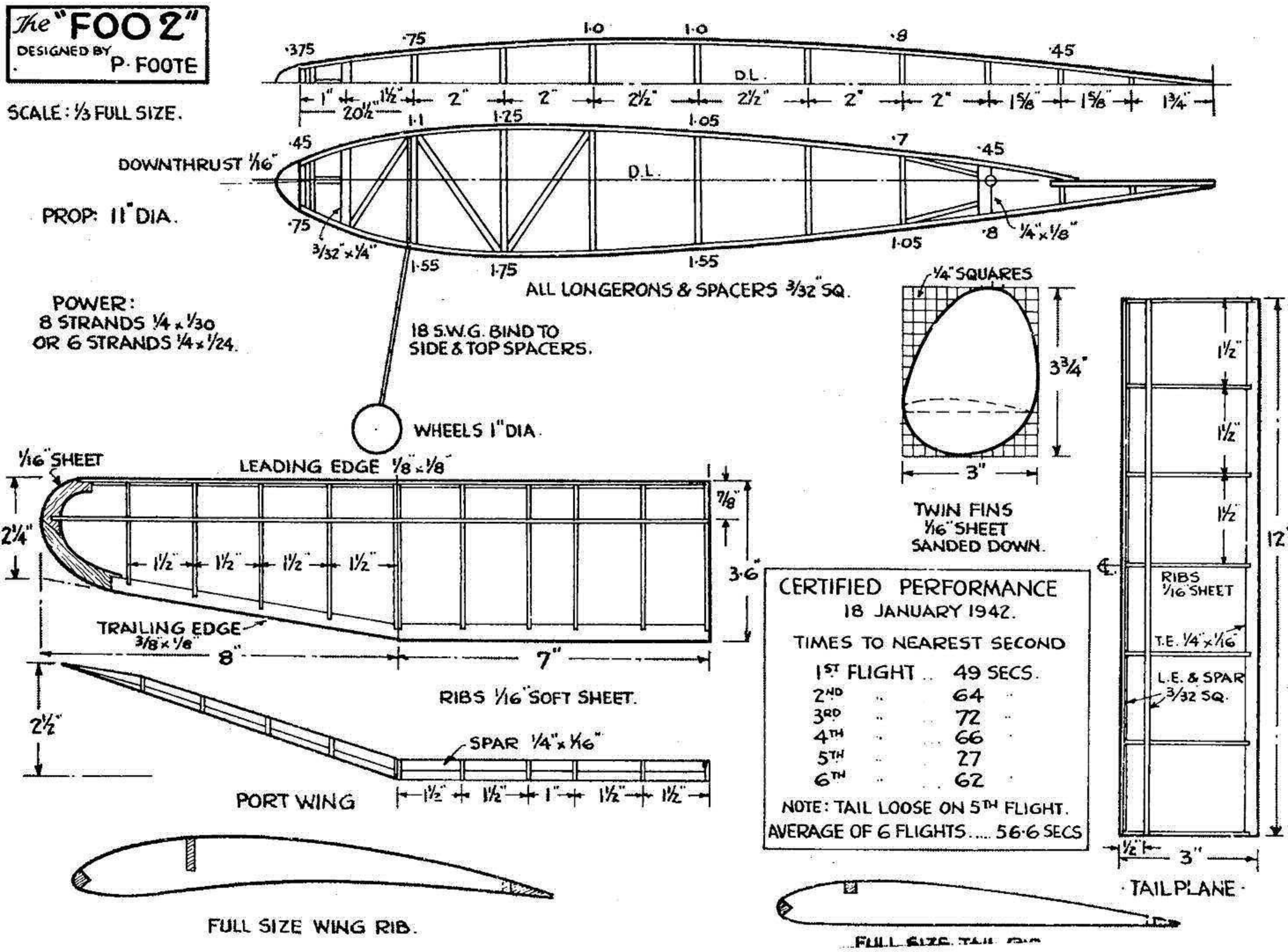
The full-size Focke Wulf 190, illustrated on these pages, is the best single-seat fighter which Germany has at present in service. It is powered by a 1,460 h.p. B.M.W. 801 D fourteen-cylinder, two-row radial motor with fan-assisted cooling.

Its maximum speed, as attained on a captured machine, is 375 m.p.h. at 18,000 ft., which is well below that of the R.A.F.'s fighters, but partial recompense is found in the exceptional powers of manœuvre it possesses. It is a good aeroplane, and has to be treated with respect.








The "FOO 2"
DESIGNED BY P. FOOTE
SCALE: 1/3 FULL SIZE.
·375
·75
1·0
1·0
·8
·45
D.L.
1"
1½"
2"
2"
2½"
2½"
2"
2"
1⅝"
1⅝"
1¾"
20½"
1·1
1·25
1·05
·45
·7
·45
DOWNTHRUST 1/16"
D.L.
PROP: 11" DIA.
·75
3/32" x 1/4"
1·55
1·75
1·55
1·05
·8
1/4" x 1/8"
ALL LONGERONS & SPACERS 3/32" SQ.
POWER:
8 STRANDS 1/4 x 1/30
OR 6 STRANDS 1/4 x 1/24.
18 S.W.G. BIND TO
SIDE & TOP SPACERS.
WHEELS 1" DIA.
1/4" SQUARES
3¾"
3"
TWIN FINS
1/16" SHEET
SANDED DOWN.
1/16" SHEET
LEADING EDGE 1/8" x 1/8"
7/8"
2¼"
1½"
1½"
1½"
1½"
3·6"
TRAILING EDGE
3/8 x 1/8"
8"
7"
RIBS 1/16" SOFT SHEET.
2½"
SPAR 1/4" x 1/16"
PORT WING
1½"
1½"
1"
1½"
1½"
FULL SIZE WING RIB.
CERTIFIED PERFORMANCE
18 JANUARY 1942.
TIMES TO NEAREST SECOND
1ST FLIGHT .. 49 SECS.
2ND .. 64
3RD .. 72
4TH .. 66
5TH .. 27
6TH .. 62
NOTE: TAIL LOOSE ON 5TH FLIGHT.
AVERAGE OF 6 FLIGHTS..... 56·6 SECS
1½"
1½"
1½"
12"
RIBS
1/16" SHEET
T.E. 1/4" x 1/16"
L.E. & SPAR
3/32 SQ.
½"
3"
TAILPLANE
FULL SIZE TAIL RIB

DECLINE

THE 1940 Wakefield sighed as it twisted and turned on the end of the string by which it was suspended from the ceiling. The dust lay thick on the scarred wings; there were numerous rents in the fuselage, and it was many months since it had seen a flying field. But it was sad because it had been so neglected by its builder, who rejoiced in the name of Plugs. One evening Plugs had come home from a club meeting with a strange look in his eye . . . and the Wakefield knew from experience that it wasn't due to a surfeit of liquid nourishment.

Plugs sat down in his favourite chair, pulled out a sheaf of papers and a pencil, and became absorbed in intricate calculations. He had worked far into the night, and the next day had come home with an armful of balsa and wire (black market). Curiously at first, but later with apprehension, the Wakefield had watched what was taking shape on the bench; and its fears were realised when, out of the mound of chips and shavings, there grew another Wakefield; and, it must be admitted, it looked the goods. Plugs spent hours at the work bench, fiddling with lengths of rubber and wire, and weird hinges and insignificant little wheels; for he had been bitten by the retraction bug, that nasty little animal that bites all serious modellers sooner or later, and leaves them sadder and wiser. But Plugs had yet to learn.

* * * * *

Now Wakefield No. 2 was finished, and stood on the table in all its glory; to its predecessor, it seemed almost to be bursting with pride. It certainly had good cause to be proud, as it stood there, elliptical wings flowing smoothly into the sleek fuselage, undercart poised on the verge of retraction, as though ashamed of the drag it was offering, and the glistening prop. nestling against the fuselage, with the counterbalance weight coyly tucked away. It stood there for some time, until the flying season came round again. Then Plugs, full of hope and confidence, sallied forth to show the world how competition models should be built and flown. With tender care, he packed the new model into his best coffin, and as an afterthought, chucked in the old Wakefield, as something to fling about if the weather wasn't too good. Arriving at the flying field, Plugs was greeted with the usual ribald remarks, but ignoring them with his most crushing glance, he proceeded loftily to unpack.

By now full of interest, the other members crowded round to have a look at this new masterpiece, and it was a rather agitated Plugs who lovingly plugged in the wings and carefully slid the motor down the fuselage. Taking a deep breath, Plugs walked out to the edge of the hill on which the ground was situated, uttered up a silent prayer, and launched the model for a test glide. It was perfect; the crate drifted smoothly over the valley, lazily turning in wide circles, while Plugs hared along below, for all the world like some anxious puppy, and rescued it from the loving embrace of a gorse bush. Bursting with enthusiasm, Plugs returned to the top of the hill, and demanded from the other members whether he had not at last produced a really smashing job. They agreed he had; which goes to show you that the glide must have been very good, if you know anything about F-liars.

Now Plugs was an ambitious sort of bloke, and he had always wanted to capture the club record. The day was perfect . . . blazing sun, practically no wind . . . what more could a modeller want? (All right, we know!) So Plugs did the craziest thing he had ever done; and he had done a good few in his time. He piled on full turns for the model's first power flight. Plugs' muscles bulged, the rubber bulged, the model holder's nerves bulged; and still Plugs wound on.

It was agonising to watch the writhing rubber, and you would have noticed a strange thing . . . there was no talking. Slowly Plugs walked in, and you could almost hear a sigh of relief when he carefully plugged in the nose piece. Trying to be casual, Plugs walked to the take-off boards, placed the model on the boards, gingerly pulled out the undercart and fixed the retracting gadgets, grabbed a wing tip, shut his eyes, and let go. Take heed, oh ye beginners! Never monkey with retracting undercarts on brand-new Wakefields! The model took off all right . . . just. It shot across the boards at terrific speed, and made its way across the field a few inches off the ground, leaving behind it a wake of flattened dogs, waving grass and gibbering aero-modellers. Then, as an afterthought, the undercart decided to retract. There was a hideous crash, and just as the model was about to charge a fence, it changed course, and began to climb vertically.

If that crate had had a self-respecting undercart, it would have made history with that climb. As it was it climbed until all we could see was a glistening dot high above us. Then something happened. We don't know what to this day . . . but we put it down to the undercart falling open again. We suddenly realised that the model was coming down again the same way it went up —vertically. Plugs was in agony; the sweat stood out in the proverbial drops upon his brow, and he shut his eyes and waited for it to happen. It *did* happen.

TO FALL

BY T. CONNOLLY

The model came closer and closer, until we could actually hear the wind rushing past it.

There was an agonised moment when it looked as though it might pull out, but it didn't. It hit the one and only electric pylon with which our field is accursed, and took it in its stride, leaving what had been a pair of beautiful wings fluttering gaily down behind it, while the tail plane swung to and fro in the topmost wires. The fuselage hit the concrete base of the pylon; and it hit it very hard indeed. I was the first to get there, and, believe me, it was a sight to make any self-respecting modeller go on the wagon for at least two days. There was just a MESS. The only item left intact was the motor, around which was wrapped an indescribably chaotic mess of what had once been perfectly good balsa and tissue, pieces of which were dancing merrily o'er the field. We never found the prop. . . . that lovely glistening piece of balsa-ware. One of the wings was seized by a dog, and was never retrieved, while the other was borne in state to Plugs, who sat with his head in his hands, watching the tailplane gambolling among the wires.

He could be heard muttering softly to himself the name of a certain authority on retracting undercarts; and I believe I detected the word " shotgun " several times, although I may of course have been mistaken.

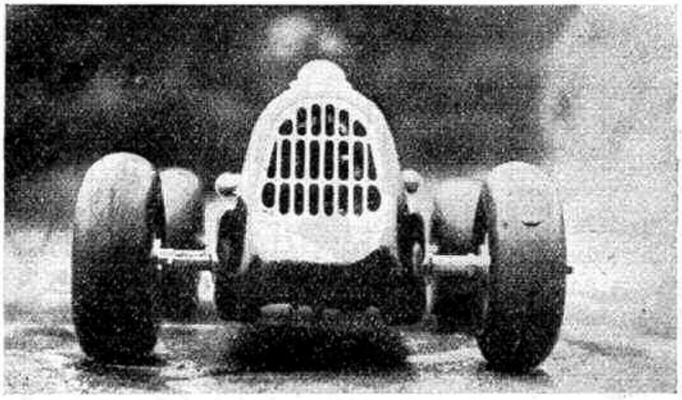
Well . . . Plugs' misfortune was soon forgotten, as is the way with the aero-modelling fraternity, and the rest of the club proceeded to enjoy themselves, while Plugs sat and brooded. The afternoon wore on, and towards tea-time, a super de luxe car drove up, and the owner got out, and came over to watch the flying. He became very interested; so much so in fact that he offered a price of £5 for the best flight to be made that afternoon. No aero-modeller will ever pass by a chance of getting something free and there was a rush to get hold of winders and models. My heart bled for Plugs; he sat there without taking the slightest notice . . . still thinking of that awful crash. So I went over to him and suggested that he should enter for the comp. His only reply was " What with ? " That stumped me, so I wandered over to his coffin to pinch a slice of downthrust. And there was the '40 Wakefield, almost pleading to be taken out. I rushed back to Plugs, lugged him over to the coffin, and made him assemble the ship. I lent him a motor, introduced him to our benefactor, and held on while he wound. At first he didn't take any interest in the proceedings; but once an aeronaut, always an aeronaut; the old look came back into his eye, and he began to pile on the turns, while willing hands splurged cement all over the tears in the Wakefield's fuselage and wing. At length even Plugs could wind no longer, and with the fuselage creaking and groaning and the covering rucked beneath the strain of the pent-up energy stored within, Plugs placed the ship on the boards, patted it affectionately, and let go. What a take off! It was as though the old crate was deliriously happy at being back in the air, remarked a bystander, who spoke words of wisdom, did he but know it.

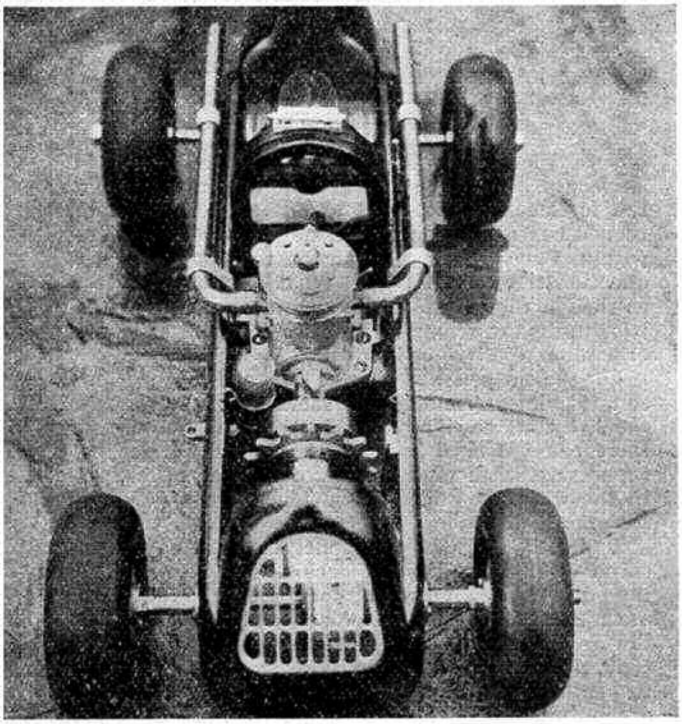
For the old 'bus was happy; and as it headed for the sun, its wings trembled with sheer delight at the feel of the sweet air flowing smoothly past; while once more there came that always to be remembered feeling of superiority when modellers were seen far below, slaves to the whims of the frail machines of their own construction.

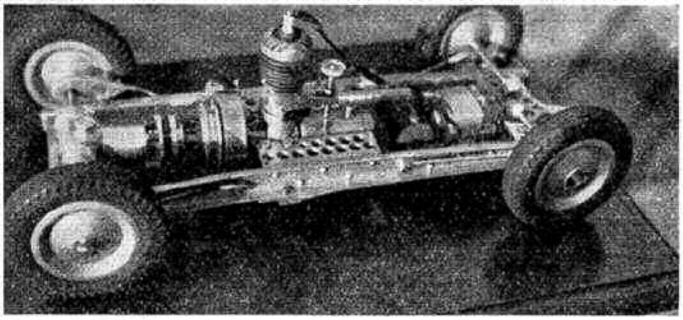
So preoccupied was the model that it came as quite a shock when the vibration slackened and stopped, and the prop. blade shivered and collapsed on to the fuselage, as though glad of the rest. The sun dropped away from the nose of the machine, and as it began its glide, in tight right-hand circles, the horizon slid past in a confusing kaleidoscope of trees, fences, sprawling cornfields, and in the far distance, the smoky haze of a great manufacturing town; while from below a shout of " 2 minutes 10, Plug! " floated up. Anxiously the model waited for the gentle push of a thermal; that would indeed fill its cup of happiness. Slowly it planed down towards the grinning Plugs, cautiously watching the barbed wire which was greedily coming up towards it; then it felt its starboard wing lift slightly, and, increasing the tightness of its circle, was soon soaring higher and higher with every turn, while an astounded Plugs stood below, alternately swearing and cheering. Climbing fast in a powerful thermal, the model was soon at a great height, and as it turned, it revelled in the warm touch of the sun, while outraged seagulls hovered at a safe distance, trying to identify the intruder. Drifting along just below the massive banks of cumulus whence came the thermal, the model recollected happy days of the past, when it felt ashamed if it didn't collect at least one thermal per meeting; while far below, Plugs strained his eyes to keep sight of the tiny red speck, outlined against the woolly cumulus . . .

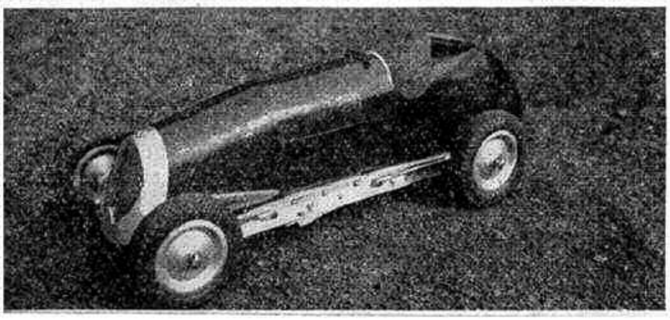
Cruising above the clouds, a Hurricane pilot heaved a sigh of relief as he glanced at his dashboard clock and saw that his patrol was over, and shoving his stick over, put the ship into a steep dive towards the cloud banks below, for he had an important date that evening. . . .

(*Continued on page* **926**.)









SOME MODEL

"RUNNER up" in the Class B competition for model race cars powered with engines not exceeding 6 c.c. in capacity, was Mr. R. H. R. Curwen, whose free-lance design, based on the E.R.A., is illustrated by the two upper photographs, and also the lower right-hand one on this page.

Wheel-base is 11 in., track 7½ in. and, as will be seen from the photographs, this model is a near-scale replica of a full-sized car and superbly finished.

The speed entered for competition was 33·7 m.p.h., but I understand that recently Mr. Curwen has been obtaining over 40 m.p.h. from his model.

The engine is of his own design and manufacture, and is of the two-port type. The sprocket is used for starting up, a centrifugal clutch being incorporated in the drive to the (bevel) front-wheel gear-box, which in the photograph is hidden by the radiator.

The workmanship in the whole of this car is of the highest order and Mr. Curwen is to be congratulated on turning out such a well-designed and beautifully finished model.

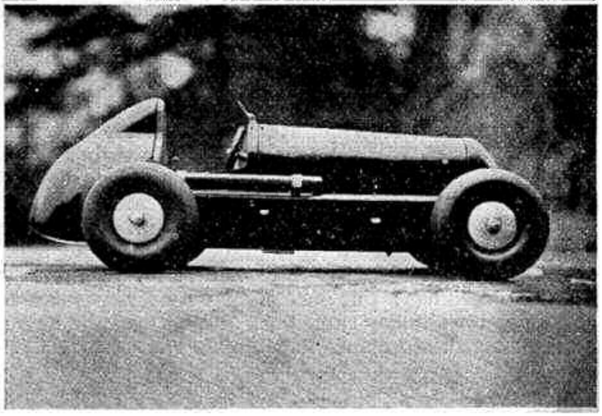
The two lower left-hand photographs on this page are of Mr. F. G. Buck's model, which won the prize in class A for engines between 6 and 10 c.c. The wheel-base of this car is 12 in., and track 7 in. Here is another finely finished model—also shown in the second photograph from the top on the opposite page—in which is illustrated in no uncertain manner the independent springing of the front wheels through which the drive is carried. Mr. Buck reports that he has been getting some 45 m.p.h., which, on a 13 ft. 0 in. line, is "pretty hectic!"

Mr. Buck, who lives at Hanley, Stoke-on-Trent, would be pleased to hear from other car enthusiasts in his district, as he is desirous of forming a Race Car Club. Communications addressed to him care of THE AERO MODELLER Office, will be duly forwarded.

The tyres on this car are 3½ in. diameter and were actually made (in America) for model race cars by Messrs. Sieberling. For his first attempt at building a race car, Mr. Buck built one which was close on 10 lbs. weight, which he found too heavy for the engine he was using, and so, for his second car—that illustrated—he went all out for lightness and "drilled holes in everything," which resulted in an all-up weight of 4 lbs.

Ball bearings are fitted to the gear-box and front-wheel bearings; a universal coupling is fitted to the engine shaft, and a free-wheel starting pulley is fitted to the 7½ c.c. "Gwin Aero" engine.

The two photographs at the bottom right-hand corner of next page are of the car which won the class B award,



RACE CARS

Described by D · A · RUSSELL

an M.G. " Midget," powered with a 5 c.c. Kestral engine. Wheel-base is $10\frac{3}{4}$ in. and track $6\frac{1}{4}$ in. This model was built by Mr. J. Cruickshank, and has been a very consistent performer on the 40 m.p.h. mark.

The remaining two photographs on this page are of my own scale model of a $2\frac{1}{2}$ litre S.S. "100." Wheel-base is 19 in., track is $9\frac{1}{2}$ in. and the overall length 26 in.; the car having been built to a scale which exactly " matched " the $5\frac{1}{4}$ in. diameter India tyres with which the aluminium wheels are shod.

The engine is a 10 c.c. " Dennymite," fitted with a centrifugal clutch designed and made for me by Mr. Curwen, who also made the back axle casing. The workmanship is to the same high standard as in his own model.

The centrifugal clutch allows the engine to be run " free " at speeds up to 1,500 r.p.m., but provides a " solid " drive from 2,000 r.p.m. upwards. The all-up weight of this car is 11 lbs., and the drive is as in the original, through the rear wheels, just behind which is mounted the battery (in the position occupied by the petrol tank in the full-sized model), thus providing plenty of weight on the driving wheels.

I have been running this car on a grass lawn and obtaining speeds of some 40 m.p.h., with a gear ratio between engine and back axle designed for a speed of 45 m.p.h.

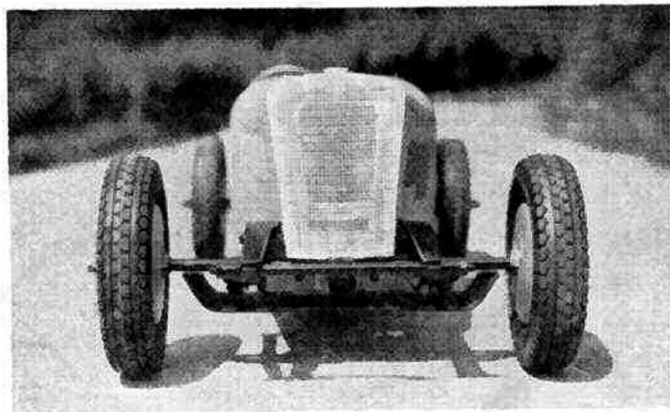
Later on I shall substitute a gear ratio of approximately 1·35 to 1, at which the car should do 60 m.p.h., with an engine speed of 5,000 r.p.m.

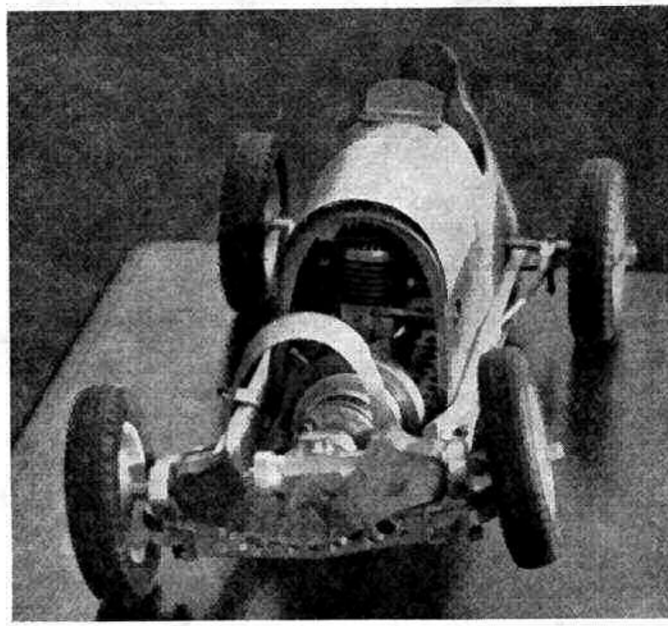
The car is fitted with ball bearings throughout, reducing " internal " friction to a minimum. There are 15 ball races in all! The $\frac{1}{4}$ in. diameter back axle is " solid " and runs on twin pairs of ball races mounted in rubber blocks anchored to the chassis, whilst the bevel gear box embraces four more races. There are three ball bearings in the reduction gear box behind the engine, and a further four more carry the front axles. These are arranged for radial adjustment for steering purposes. The propeller shaft between the engine reduction gear box and back axle is fitted with metal to metal universal joints at each end. A time switch is fitted, together with terminals for connecting an auxiliary battery for starting up purposes, and there is a scale type steering wheel, scale seats, instrument panel with all instruments marked on to scale, and I hope eventually to have a scale driver and mechanic sitting in the seats!

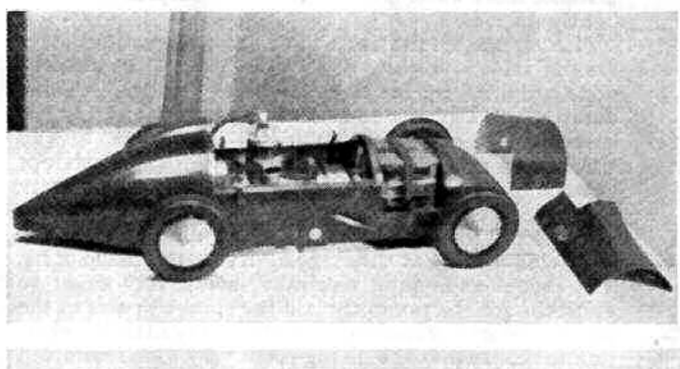
***NOTE:**—We have no intention of publishing more than an occasional article on model race cars in the " Aero Modeller " ; and this only as a war-time measure to keep alive, as far as possible, interest in model petrol engines.*

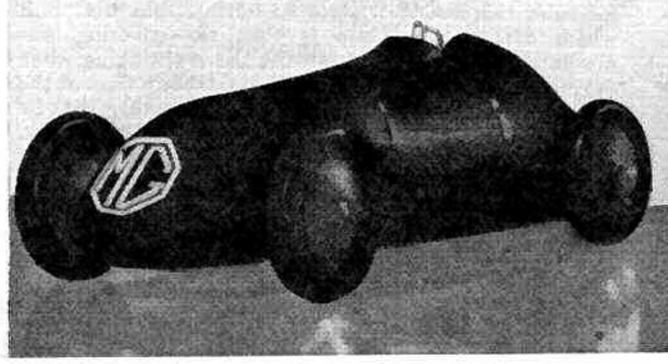
Nevertheless, as there appears to be amongst our readers considerable interest in model race cars, we are prepared to arrange for plans of suitable models to be made available through the " Aero Modeller Plans Service."

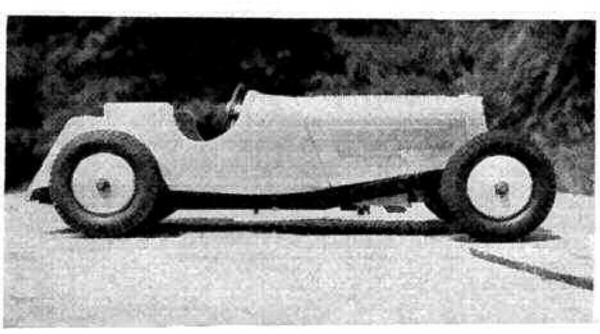
Will interested readers please send us postcards indicating which of the models they have so far seen illustrated they prefer. Ed.





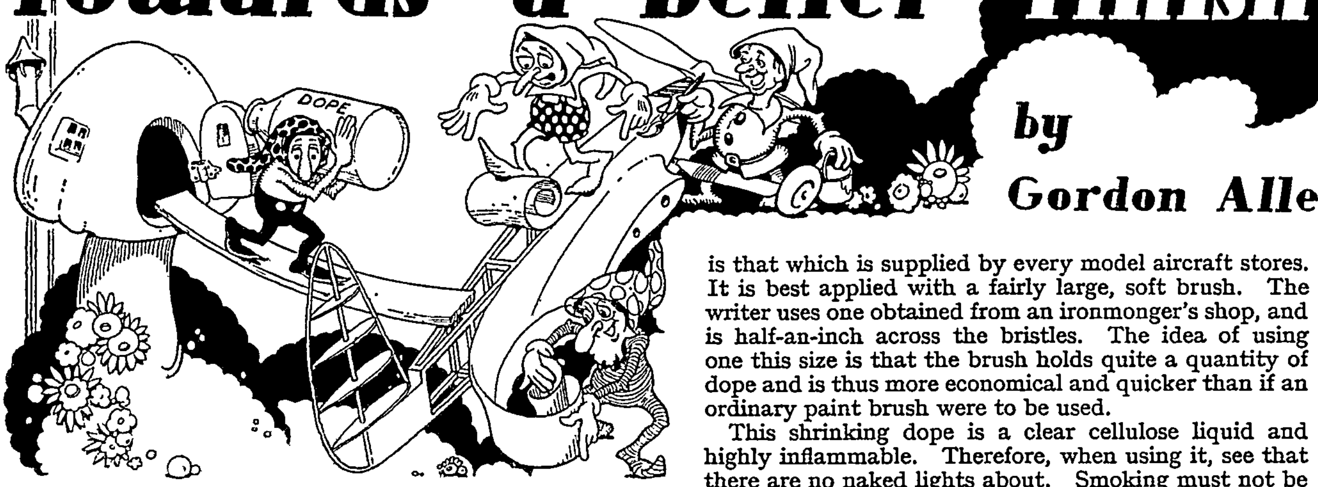






Towards a better Finish

by Gordon Allen



THIS month we are going to deal with the shrinking, doping, and finishing of a model, the covering operations having been described in the last issue of this journal.

Before any dope is applied to the covering it must first be water shrunk. This is done by spraying the various components with cold water, from a distance of about a foot, *only when the tissue paste is thoroughly set.* An ordinary insect spray, as used in the garden, can be used here to good effect. Care must be taken to see that the spray is not too near the covering, otherwise the force of the water may burst the wet tissue. The water must be applied uniformly, and not *too* generously, otherwise the tissue will become sodden and the eventual shrinking will be ineffective.

I would like to say a word here, however, about *silver* tissue. When water is applied to this, it seems to trickle off or remain on the surface in little drops. In *this* instance more water is applied, and the surplus then very lightly shaken off.

Having treated the tissue with water the various parts are put aside in a warm dry atmosphere. This must be done carefully, for the tissue becomes very fragile when damp. It is a good idea to suspend each part so that the covering does not touch anything.

All parts must be absolutely dry before any attempt is made to use dope, but forceful drying must be strictly avoided. To show why the latter rule must be observed, I will record an experience of a friend of mine.

Having arrived at the stage of drying the tissue of his first model and, quite naturally, being very eager to finish the job, he promptly laid the sprayed parts in the hearth, before a warm fire. It needs very little imagination to realise that the dining-room very soon resembled the wash-house on mother's washing day. To the aero-modeller this may not seem so terrible, but the point which *does* concern him is that the covering was absolutely ruined. Far from the tissue shrinking when dry, it had, in fact, more wrinkles and creases than at the outset. The moral to be learned from this is: *Be patient* and let the covering dry *slowly* and thoroughly. When you are satisfied that the covering is thoroughly dry, which, by the way, includes the edges of the tissue which are fastened to the framework, everything is ready for doping.

This must again be done in a very dry atmosphere with a temperature of about 70° F. The dope, of course, is that which is supplied by every model aircraft stores. It is best applied with a fairly large, soft brush. The writer uses one obtained from an ironmonger's shop, and is half-an-inch across the bristles. The idea of using one this size is that the brush holds quite a quantity of dope and is thus more economical and quicker than if an ordinary paint brush were to be used.

This shrinking dope is a clear cellulose liquid and highly inflammable. Therefore, when using it, see that there are no naked lights about. Smoking must not be indulged in during doping operations, the main reason for this being that the smoke often causes the drying liquid to precipitate, which produces streaky white lines on the covering. This is termed blushing and is likewise caused by using dope in a cold or damp atmosphere.

The dope when applied with the aforementioned type of brush, will give the best results if a long, slow, steady action is adopted. Avoid, if possible, going over a doped area twice. Let once suffice, and endeavour to make the second margin of dope merge into the first. All doping is done *with* the grain of the tissue as far as possible. It is advisable to give every part two coats of dope, applying the second after the first is dry.

There is a golden rule to observe before we pass on. Completely use a tin of dope before opening a fresh one. Above all never mix dopes, even if they are the same brand.

All components thus treated should be laid aside in a warm dust-free atmosphere until thoroughly dry. If it is possible to suspend them, without damage, then do so. In any event see that they are clear from all polished or varnished surfaces, for dope will ruin them.

You will sometimes find, in commercial kits, that banana oil is specified instead of dope. This is all right, but has a tendency to make the resultant coverings brittle. Apart from this it *does* impart a "sheen" to the tissue, and has better waterproofing qualities than ordinary dope.

There are a variety of coloured dopes on the market. These are cellulose and are opaque in appearance. For non-flying scale models and solid models these are excellent, but for the duration type they should be avoided as they increase weight considerably.

Some aero-modellers advocate a very high polish for their machines for efficiency's sake. To impart this high gloss, a very fluid type of paper varnish is utilised. However, apart from the definite "class" appearance which results, much can be said against using it.

It has been known for such a medium to increase the all-up weight of a model by at least an ounce and a half—a considerable weight wherever duration flying is concerned—even when it has been applied as sparingly as possible. Another snag, is that it takes about thirty-six hours to thoroughly dry. When it *is* dry, it will be found that the tissue has become very brittle. Indeed, it will only require a rather rough landing on tall grass for the latter to cut or puncture the tissue.

For my part, I do not recommend this high gloss varnish—or high gloss finishing dope as it is sometimes called—but it is not my opinion you want, but instruction, so in case you decide to use this medium, there are a few points to be remembered.

First, the paper covering *must* be doped at least once with ordinary shrinking dope before varnish is applied. The latter does not affect the doped surface, in so far as " tautness " is concerned.

Use a fairly broad brush. Do not flood the bristles with varnish, so that the liquid drips off. Use just enough. When you have a " brushful " adopt, as with doping, a long sweeping action, spreading the varnish over the surface *as thinly as possible.* Continue thus until the brush is all but dry. If the varnish is applied too thickly, it will run, and will produce " waves " when dry, which, by the way, will take days.

All components must be suspended free from any dust, to dry.

Another medium which imparts a mirror-like finish to tissue coverings is a thin transparent coloured liquid containing spirits. This, as you will presume, dries very quickly, but will sag the doped surface when it is administered, tightening it again as it dries. It is obtainable in various colours from model stores, but while it is considerably lighter than paper varnish the colours are not " fast." That is, they are inclined to run when in a damp atmosphere.

If, after ordinary doping, warps should appear in the various surfaces (i.e. wings, stabiliser or vertical fin) and, incidentally, this is a nuisance which develops in the best of frameworks, here is a safe and effective way of removing them.

Hold the faulty unit (usually, if not always, one of the lifting surfaces), with two hands, and gently align it by a steady twisting movement. Keeping it thus, hold the component near a warm fire for about half-a-minute. After doing this, move to a cold atmosphere, *still holding the unit in its righted position,* until it has cooled off. On release, it will be found that it has assumed its correct trim.

If this has not been sufficient to " iron out " the warps, then the twisting movement required to remove the warps in the first place, will have to be more acute prior to heating.

And now, to conclude this month's article, a few words about detail work on flying scale models.

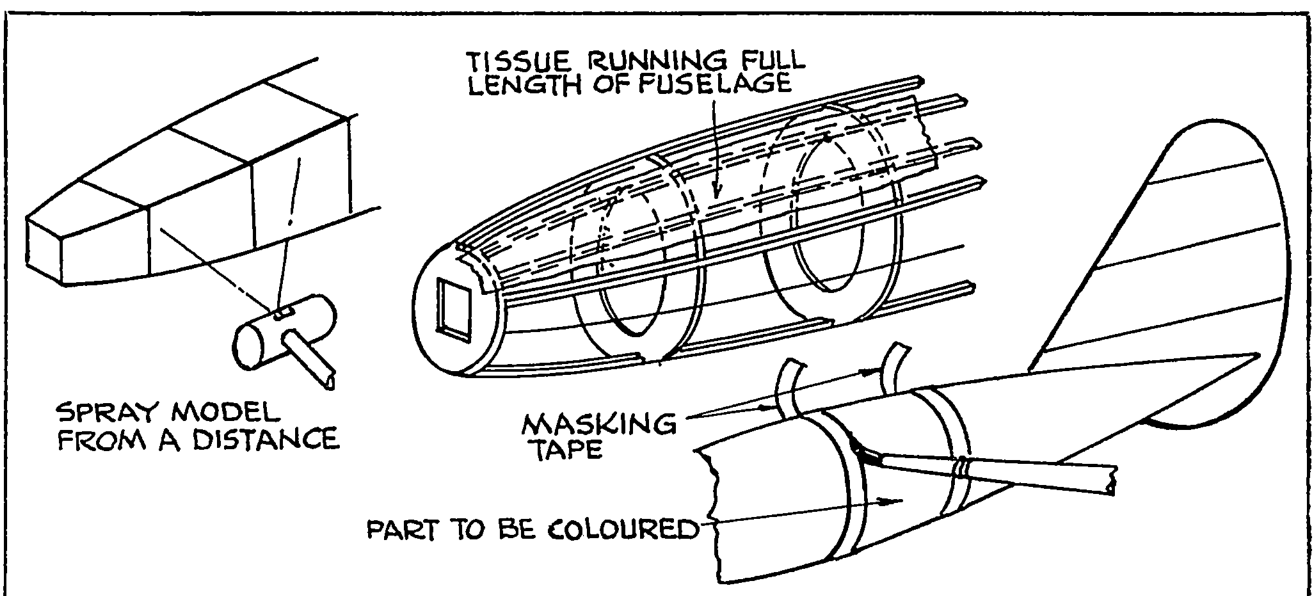
It is often desirable to terminate an area of colouring (coloured dope) by a sharp and definite line, for example, the vertical tricolour markings on the vertical fins of some machines. Although this can be done by means of a very fine brush, waiting until one colour is dry before attempting a second next to it, this method is open to a certain amount of inaccuracy—a very steady hand being necessary.

Marking tape is the answer.

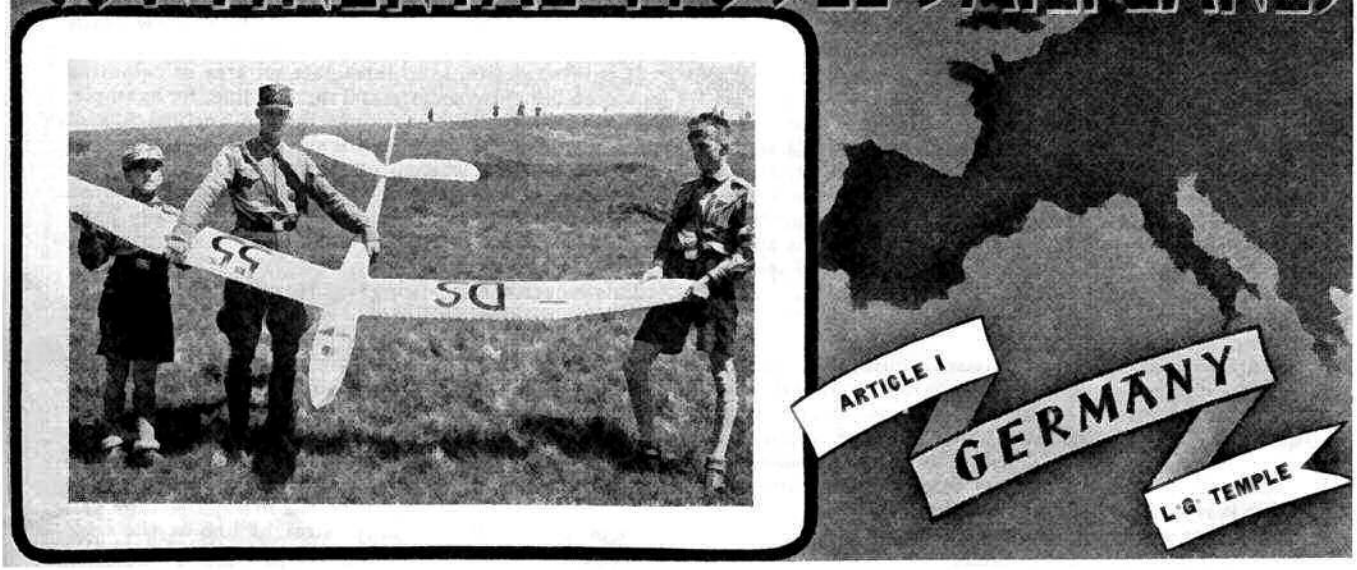
This is narrow tape, being slightly adhesive on one side. Ordinary sticking plaster will serve, provided it is cut into fairly long narrow strips (about ¼ in. wide). The tape is fastened to the covering of the model, with its edge corresponding to the desired termination of the colouring. It is smoothed. No wrinkles must appear. Using a fine camel hair brush the coloured dope is applied evenly. It can be seen that it will not matter if the dope runs on to the tape. In fact to do this deliberately is quite in order. *When the dope has dried,* the tape can then be peeled off. A sharp, straight line at the edge of the colouring will then result. This method can be utilised by those with enterprise in many different ways.

Do not forget that on all military 'planes of the operational type, i.e. those as distinct from trainers, are all finished with " matt " dope. This matt dope has no sheen or gloss, and is therefore a non-reflective surface. All coloured dope should be applied to covering which has previously been subjected to a thin coat of ordinary *clear* dope.

Next month we will deal with the " finish " of monocoque and " planked " machines as well as other wooden parts of our models.

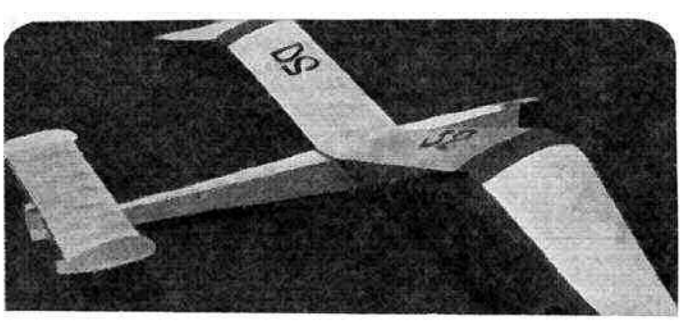


CONTINENTAL MODEL SAILPLANES



BEFORE the war, British aero-modellers paid little attention to model sailplanes, which were then very highly developed in several European countries. With the present conditions making it desirable to turn our thoughts towards this phase of model flying, it has been suggested that a short description of the types of models used abroad would be of general interest. I am afraid I shall have to leave out more than I put in, but there were features common to the models made in each of the principal model-building countries, so that one could pick out the nationality of most European models without much trouble.

I will begin with Germany, because it was there that model sailplanes were first widely used. The models built were generally of stereotyped design and construction, but there were several reasons for this, chiefly political and economic. The German policy before the war was to import as little as possible of everything, so models were invariably built with home-produced materials. Many of them were built and flown by students in the numerous state-controlled model-building schools and workshops, which accounts for a comparative lack of originality of design. These schools supplied standardised materials, and although there were many different sections and thicknesses of strip- and ply-wood to choose from, the Germans had not quite such a free hand as their English counterparts had in, say, 1939. Consequently it is possible to describe a "typical German" model, just as some people say it is possible to describe a "typical German."



The most striking thing about the usual German models was their extremely angular, even ugly, lines; this is in direct contrast to their full-scale sailplanes, which were streamlined to the very limit. One reason for their models' poor looks was that most of them were not built to F.A.I. rules, and the fuselages were made with a cross-section conforming to the $L^2/300$ rule, which was pretty well universal in Germany, whereas, of course, $L^2/200$ is the F.A.I. ruling. Latterly there was a F.A.I. class for models flown in the big National competitions, and these machines were without question far better looking. Those of you who have only seen German models outside their country of origin have doubtless seen the F.A.I. models, and the hideous fuselages of many of the $L^2/300$ models had to be seen to be believed.

Then again, the universal employment of hard woods in the models made real streamlining hard to achieve, though this is not impossible, as I have found from personal experience.

In nearly every case, except the very elementary models, German sailplanes were large; generally the span varied between seven and nine feet, though many were much bigger than that. The wing loading was usually fairly high and the fuselage length was usually about 65–70 per cent. of the span.

The majority of these fuselages were either rectangular or polysided in construction. Unlike balsa fuselages of this nature, which are built up as two separate sides joined by cross-braces, the Germans built even a true slabsider with formers cut from plywood. I think this was to eliminate the large number of gusseted joints essential in a hardwood slabsider if it is built like a balsa model. In the large contest models the polysided fuselages were most popular, with the more elementary types using the true slabsider. These polysided models generally had the forward portion built with flat sides and vee-decking top and bottom (six stringers) and often the thin rear portion changed to rectangular, flat-topped with a vee-bottom, or even triangular. The fin was usually integral with the fuselage structure, and consisted of light plywood ribs, a simple spar, and a cane or steamed birch outline.

These slabsided and six-sided fuselages generally looked rather " pot-bellied," with a straight top and the forward portion deep and narrow. The rear end was slim and often weak. The lack of side area aft made the models somewhat unstable directionally, though they looked worse on paper than they actually were in the air.

Tailplanes were in all cases small, and here again rigidly attached units were the most popular. The very long fuselages permitted the use of a long moment arm and so the small tailplanes were surprisingly efficient.

Most models had simple constant-chord wings with curved or elliptical tips; they had fretted three-ply ribs, ·8 mm. or 1 mm. thick, widely spaced as a rule, and cane tips. Leading edge sheeting was rarely employed, as were box spars, and the simplicity of the average wing was its outstanding feature. On the majority of models the wing was in one piece, though a few designs were produced with plug-in or tongue-and-box fittings and a certain amount of root filleting. In the case of the tongue method, the Germans believed in fitting the tongue in the wing and the boxes in roots extending from the fuselage; on large machines this is extremely unsatisfactory and sets up undue stresses in the wings unless bulky and unnecessary strutting is placed in the wings themselves. It frequently caused trouble on their machines, but I have never seen one with the tongue in the fuselage and the boxes in the wings.

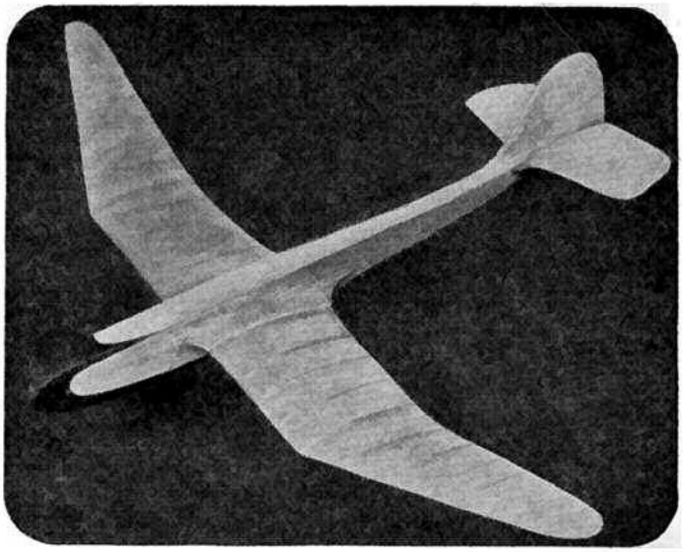
Apart from this, nearly all wings were attached with large rubber bands crossed over the centre-section and hooked on to pegs through the fuselage. Some designs, however, used metal clips to hold the wings on. These were too rigid when new and too sloppy when they became worn enough to be reasonably crashproof. It was not a very satisfactory method but its use persisted, on smallish models in particular.

The covering was generally German-made paper, though some large models used a lightly-woven fabric resembling thin calico: I have seen nothing like it in this country. The paper looked rather like the American " Silkspan " and was quite light, but prone to tear fairly easily. There was usually a good deal of sag between the ribs when the wings were covered.

Quite a number of all-metal model sailplanes were built in Germany. Certain firms marketed a very good selection of drawn light-alloy strips in different angle and channel sections, as well as sheets, gussets and tubes. Tools were sold for manipulating these parts and almost any shape or form could be constructed with ease. As a rule the metal models were not much heavier than even the simplest wooden ones, and were infinitely stronger. Some of them were really beautiful pieces of craftsmanship; monocoque fuselages were made of metal and the thin sheets could be, and were, beaten into magnificent fillets and fairings by some of the more experienced model builders.

When the Germans built streamline fuselages of wood, these were in most cases built with plywood formers set up in a jig and connected with many small stringers. The central boom method was occasionally used, but on the whole jigs were practically universal, being employed even on simple slabsided and polysided jobs.

The woods used were ply in various thicknesses from



·4 mm. to about 3 mm., birch, spruce, white pine and cane, and one or two other timbers not usually met with in this country. Balsa was never used on sailplanes, though it was to a limited extent on rubber-driven models.

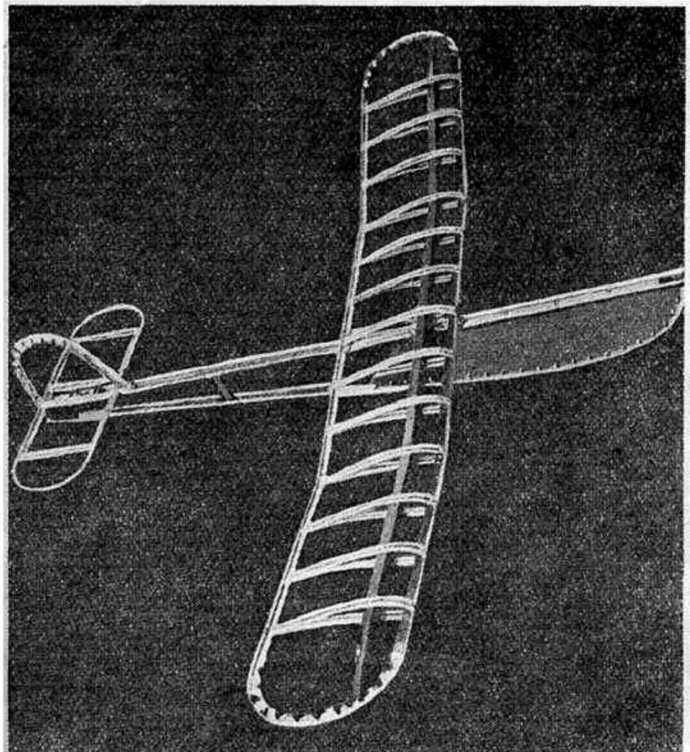
The models were launched by pulley-and-line methods, catapults, or by hand. In the latter case they flew from hillsides. Germany abounds in really good soaring sites and the good performances put up by their large heavy models could be equalled or improved upon by similar, but better designed, British models under similar conditions.

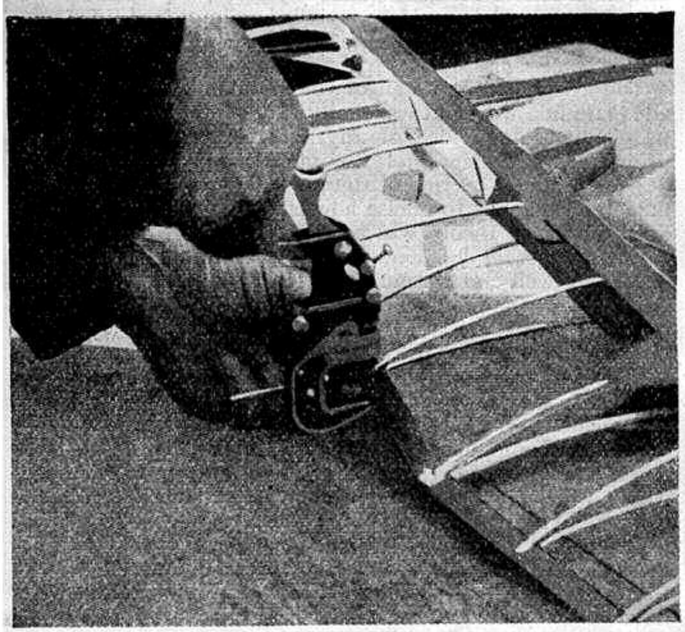
The aerodynamic design of the German models was adequate in a way, but was really rather sketchy. Few people had much idea of anything but the simplest principles of design, and the models were generally designed mainly by rule of thumb. To read a German model magazine is to realise how elementary even their most advanced theory was: again, in painful contrast to their full-scale designers. However, the models flew extremely well and we must not be too superior about our somewhat problematical " place in the sun " regarding model aerodynamics. (We do not know very much ourselves, yet!) Naturally the most popular airfoils were some of the Göttingen series, but Eiffel 400 was also a firm favourite. The models flew with very low angles of incidence (from $+1°$ to $+2\frac{1}{2}°$), showing once more the influence of full-scale design; but do not forget that these models performed beautifully in high winds, when the low angles of incidence produced speed to soar and a surprising immunity from stalling.

Polyhedral was popular and the models were stable, flew in lovely flat turns, and were really rather marvellous things in spite of a few faults. Models of all nationalities have drawbacks. On the German machines there were:—lack of crashproof features in the design; poor lines; and slight spiral instability.

So far I have dealt only with the more normal German models, but in spite of the somewhat uninspired design of these types, there were many interesting models of unorthodox layout. These fall into two classes: the tailless and " pusher " models, and those with automatic or remote control.

In this country a tailless or tail-first (" Canard ") sailplane would cause a sensation, but in Germany they were quite common, in fact there were special classes for them in the National contests, and many were entered. In construction they were generally similar to the normal models I have already described, but there are several rather interesting points about their design.



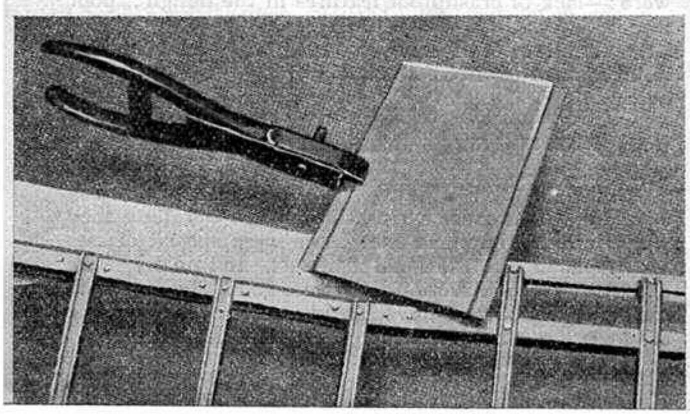


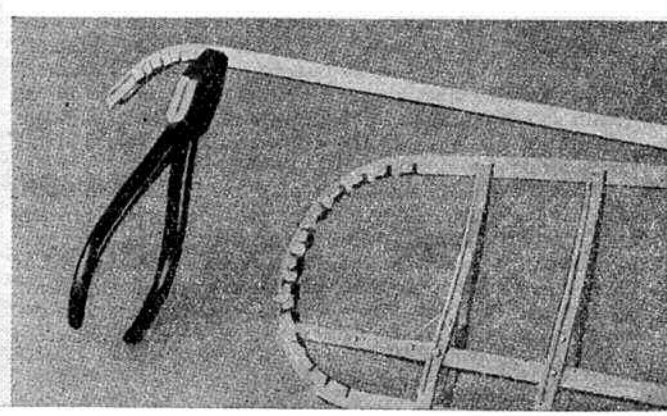
Tailless models have always been made in Germany since the very beginning of aero-modelling, and many of them have flown excellently, though their duration has not equalled that of models with tails. Most tailless models had sweepback, though a number have been built and flown with quite straight wings, relying on a constant centre of pressure for longitudinal stability. Lateral stability was no trouble, in fact some tailless machines were over-stable and wallowed from side to side; the Germans describe this type of flight as being "like a withered leaf." Apart from using airfoils with a constant C.P., other devices for obtaining longitudinal stability were: inverting the airfoil towards the tips; washing out the wings to a considerable degree towards the tips; and using auxiliary stabilising airfoils above and slightly behind the T.E. of the wings. Lateral stability was perhaps best on the famous "Leipzig Wing," a model having sweepback and a generous dihedral on the middle portion of the wing, with anhedralled tips. There was no standardisation as regards fins, some tailless models having tip-fins, some a large central one, and some, even none at all.

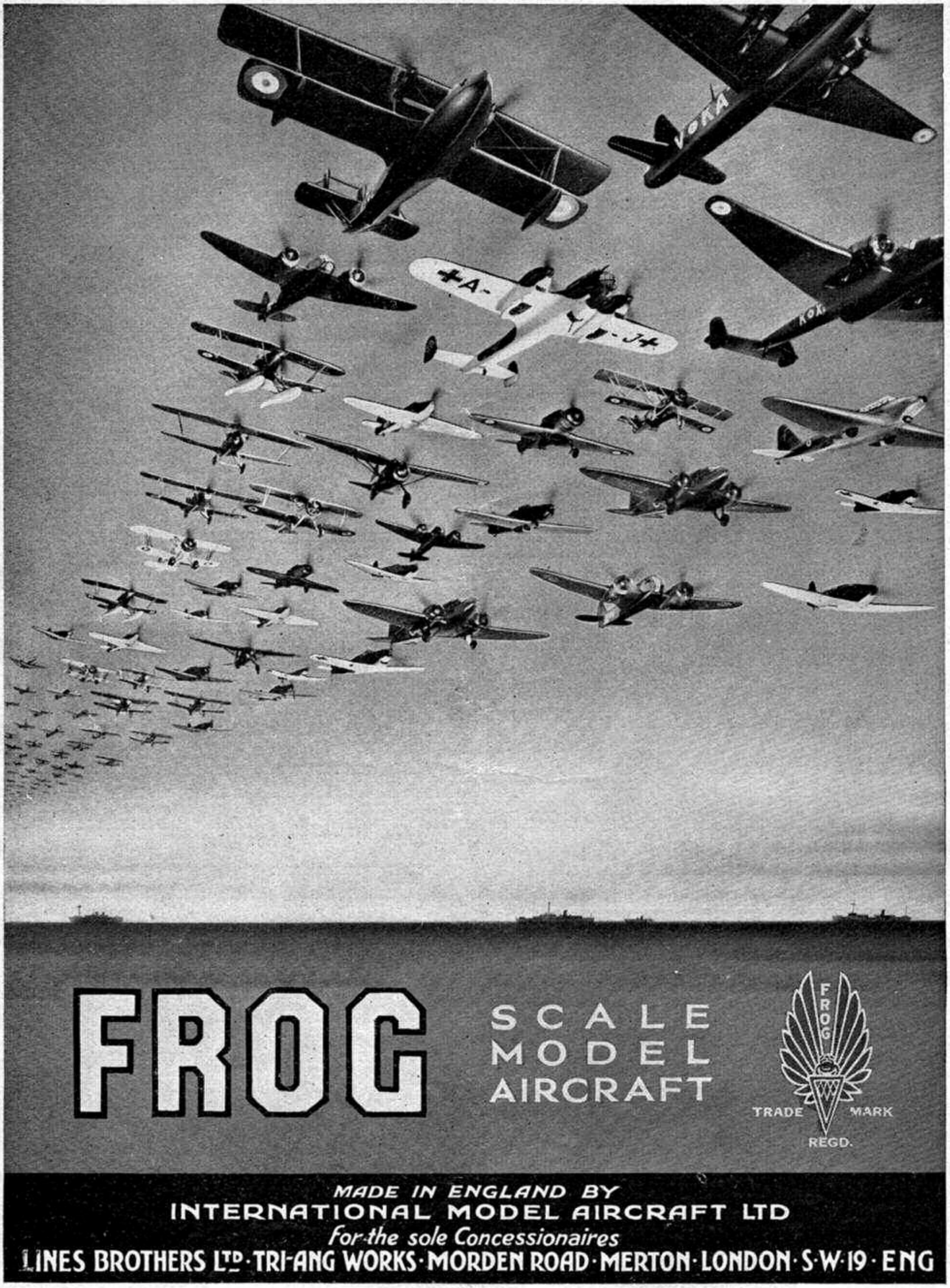
Pusher types had a small front wing, either with plain dihedral or tips sharply turned up, set at a high angle of incidence, and the large rear wing often had polyhedral too. Sometimes, however, the rear wing was of the "Leipzig" form, but without the sweepback. This was perhaps the most successful type. Fins were placed at the rear of the fuselages. Machines like this flew well, but not so well as ordinary models. They invariably suffered from too rigid attachment of the wings to the fuselage.

I will only write a few words about automatic and remote control models, as this is a subject in itself. Many successful models in this class were built and flown annually in the National Competitions, and some were so highly developed that plans for building them were on the market. They were all large, rather ugly machines whose merit lay in their control systems. These latter varied from the simple wind-vane or pendulum controlling a rudder or ailerons to keep the model nose to wind, to the elaborate machines built by the experts, with radio control. Among the most popular systems was that in which the model could be steered by means of compasses, electric contacts and solenoids. Others were worked by photo-electric cells, electrical contacts ("tremblers"), worked by whistles blown by the owner, and so on.

I hope that from this rather bald account it will be seen what a highly-developed sport model sailplane flying was in pre-war Germany. There is no reason why we cannot do better, and make use now of our opportunities to learn more about these interesting models.



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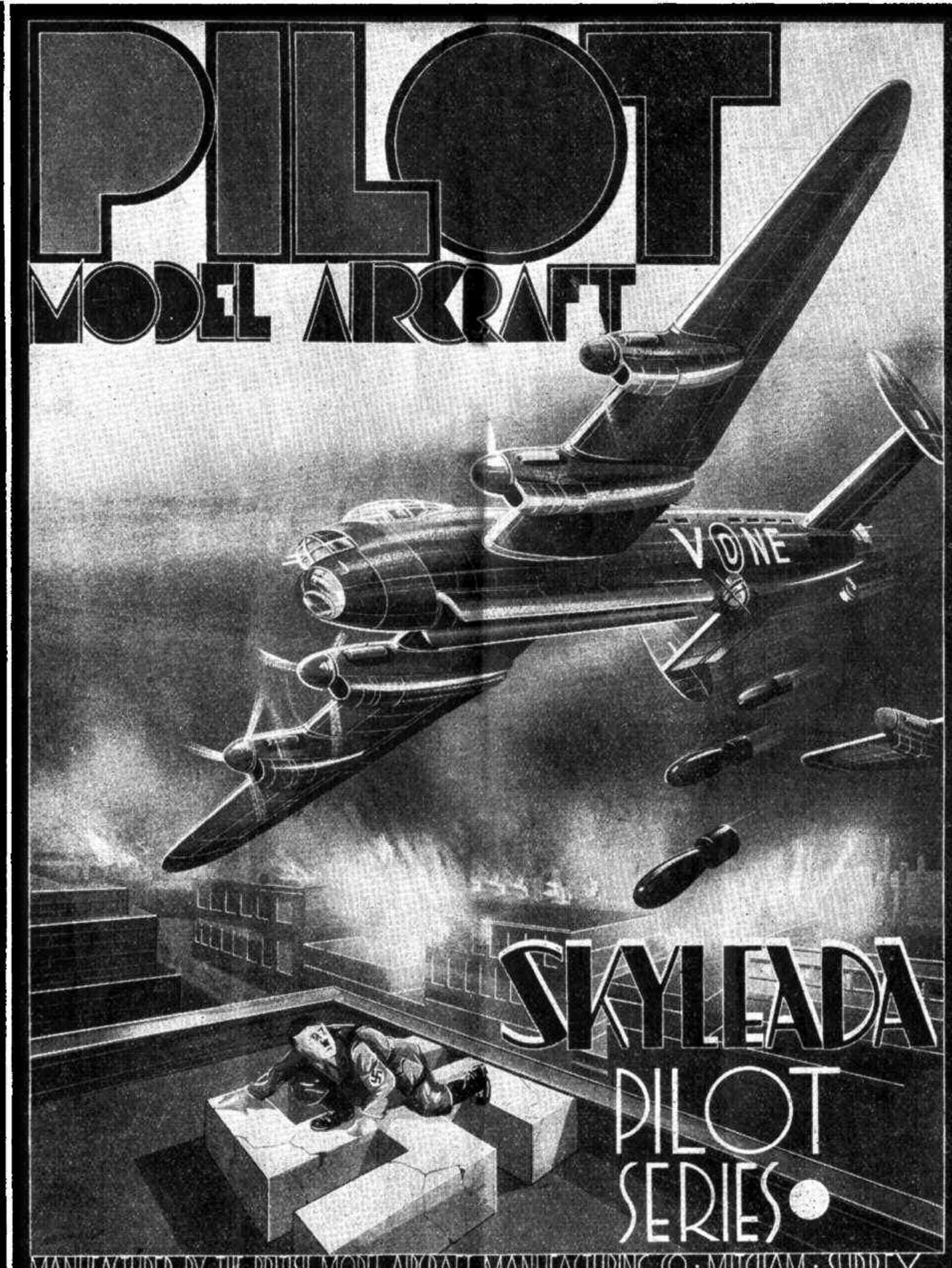

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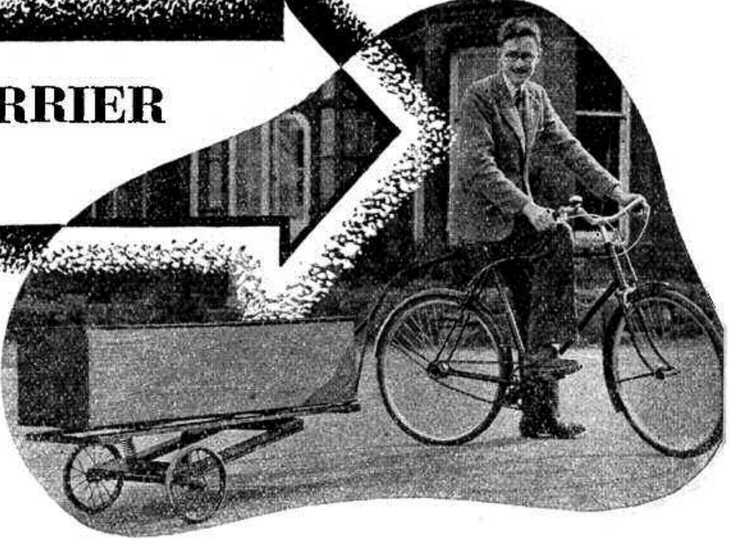


THIS trailer is simple to build and should be quite easily made at home.

Wheelframe.

A pair of pram wheels with axle and two coiled springs are required. These should be bolted to the wheel frame, which should be made of timber about ⅜" to ½" in thickness.

Main Frame.

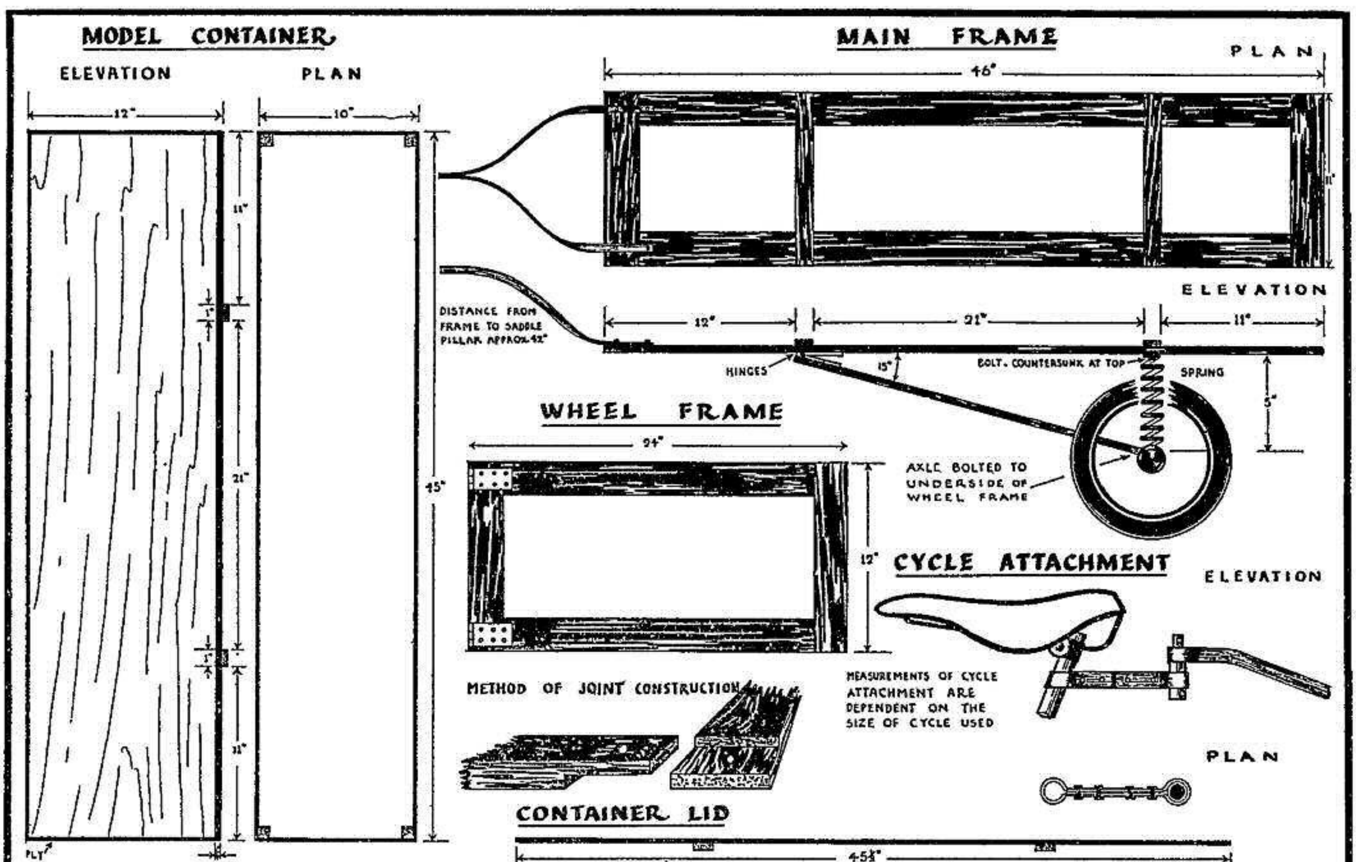
Construction and size of timber is the same as for the wheel frame, which should be attached to it by flap type hinges of 1½" to 2" size.

Model Container.

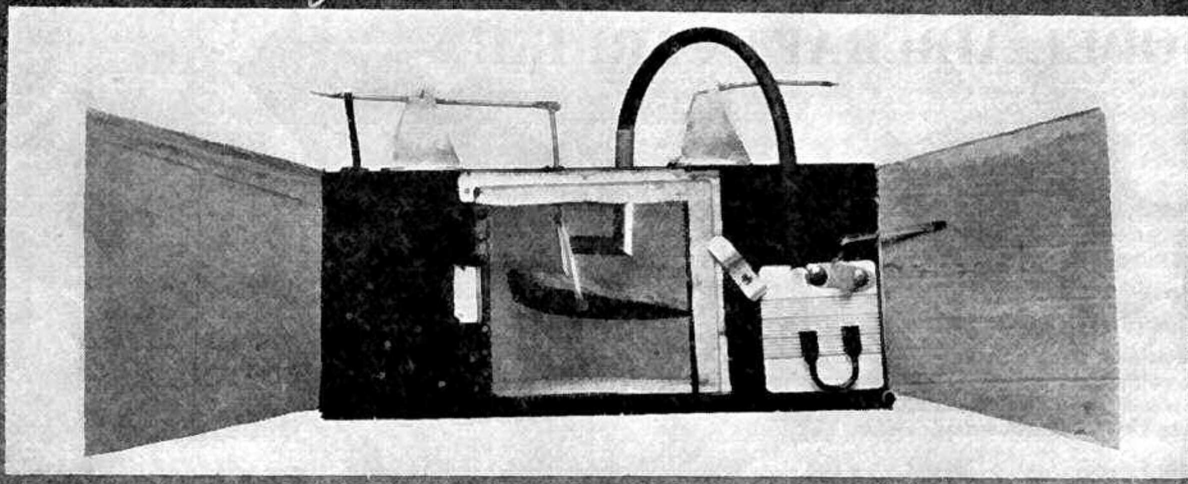
This should be kept as light as possible. Three-ply was used in the original. Strips of wood are screwed to the underside of the box, to fit with similar strips screwed to the main frame. This is to prevent the box slipping when it is strapped to the frame for use.

Fitting to Bicycle.

This may present a little difficulty, but if the aid of a blacksmith can be obtained he will probably supply the material and make the bracket for a small charge.



Build your own Wind Tunnel



T. E. G. Bowden Grad.R.Ae.S. M.I.E.T.

FOR the model maker who desires to experiment with new wing sections or to confirm the different properties of various existing sections, a small wind tunnel such as described in this article will be found invaluable.

When I was studying aerodynamics I did not have the opportunity of observing the actual results obtained in wind tunnels. Many other keen enthusiasts are in the same position, and by constructing a wind tunnel the basic principles of aerodynamics may be illustrated with clarity. If desired, experiments may be carried out for further interest, and extremely interesting results obtained.

The materials used for constructing the tunnel illustrated, may be varied according to the supplies available. The first essential is a good stout base board, approximately 36 in. by 18 in., on which to mount the actual tunnel and the electric motor.

Either plywood or cardboard may be used for the inlet and outlet portions. A square hole cut in the front face gives access to the model being tested and a small hinged window is provided for observation. A square piece of celluloid (6 in. by 6 in.) approximately ⅛ in. thick will be found suitable. Two hinges attached to the window with light alloy rivets allow the model to be fitted to the suspension arms. A catch such as fitted to cupboards should be fitted to ensure that the window is kept closed when the model is being tested. To ensure airtightness, strips of felt can be glued or tacked to the window frame and, if this is done, no air leaks will occur.

The honeycomb required to straighten out the airflow passing over the model is of simple construction. As shown in the diagram, a small framework is packed with lengths of glass tubing or drinking straws cut in 2 in. lengths. It will be found that if straws are used they will retain themselves in position without glueing if a sufficient number are used so that they are jammed tight. A useful tip for mass-producing these lengths is to insert a rod inside the length of drinking straw and cut the required number with a razor blade. This prevents undue buckling.

The construction of the balances is clearly shown in the accompanying sketches and no difficulty should be experienced in manufacturing them. Four small brackets are required, secured to the top of the tunnel by means of wood screws.

The connecting rods may be made of strips of metal approximately 20 s.w.g. or wire of slightly heavier gauge. If wire is used the bearing surfaces may be obtained by hammering a flat as shown.

The model aerofoil being tested should be made with approximately 6 in. span and 4 in. chord, although these figures may be varied to suit individual tastes. Either a built-up section or one carved from a solid block may be used and great care must be exercised to ensure that the correct profile is obtained. If this precaution is not adhered to, the results obtained will obviously be inaccurate. By using cardboard templates accurate readings will be obtained.

A couple of drawing pins are used to attach the model section to the connecting rods, the angle of incidence being gauged by comparing with lines drawn on the rear inside face of the tunnel. For greater accuracy the model may be mounted on a spindle attached to an indicating gauge outside the tunnel, the spindle being rotated until the correct angle of incidence is gained. The attachment to the drag arm is self explanatory.

The motor used in my case was one taken from an old vacuum cleaner, but a more powerful D.C. type would give better results. If the motor is D.C. a resistance may be incorporated so that the velocity of the airflow may be varied.

The fan used to suck the air through the tunnel may be constructed either from wood or metal, with the blades twisted after assembly. The motor mounting will vary for different types but the method illustrated is as simple as anything. Two metal straps are screwed to the wooden supports, giving a good tight support.

For the measurement of the airspeed past the model being tested, a simple pitot tube is suitable. If desired, the system shown in the accompanying diagrams can be utilised. A U-tube such as used for chemistry experiments is mounted on the side of the tunnel and partly filled with coloured water. One end is left open and forms the static head. The other outlet is connected via a flexible rubber tube to the pressure head inside the tunnel. This consists of a glass tube, bent to a L-shape and fitted in a slot cut in the wind tunnel top piece. To avoid air turbulence over the model such as would be caused with this tube in the position shown, the pressure head should be raised or "retracted" into the top piece after a reading has been taken. By making the glass tube a tight fit in the slot this may easily be done.

To obtain the airspeed, the difference in level of the liquid in the two arms of the U-tube is required. By fitting a graduated card behind the tube this height may be measured quite easily.

The formula required to obtain the airspeed from the difference in height is as follows :—

$$V \text{ f.p.s.} = 66{\cdot}24\sqrt{H}$$

where H is the distance measured on the graduated card in inches. For example, if the measurement were .25 in, then $V = 66{\cdot}24 \times {\cdot}5 = 33{\cdot}12$ f.p.s.

If desired, the graduations, instead of being marked out in fractions of an inch, may be marked in feet per second so that direct readings may be taken.

The actual airspeed obtained will, of course, be determined by the motor used; the more powerful the motor the greater the air velocity.

The inside of the tunnel should be painted white for ease of observation and/or a small electric bulb may be incorporated in the roof. The possibilities for ingenious devices are unlimited and as the normal model maker is generally bursting with ideas, the construction of a wind tunnel will allow plenty of scope for "gadgets."

If the model aerofoil section be made to the dimensions illustrated and the airspeed be measured as 30 f.p.s., then taking a lift coefficient of $Cl = 0{\cdot}1$ the lift should be :—

$$L = Cl\frac{\rho}{2} SV^2 = {\cdot}1 \times \frac{{\cdot}00238}{2} \times \frac{6 \times 4}{144} \times 30 \times 30$$
$$= {\cdot}0178 \text{ lb.}$$

The weight required to balance this lift, if the arms are of equal length, i.e. 4 in., is the same. From this it will be seen that for accurate results, due to the small weight involved, care must be taken to ensure that the lever arms move as easily as possible. The type of weight such as used in school laboratories are suitable and if these are available the lift will be read in grams. Note that 1 ounce equals 28·35 grams.

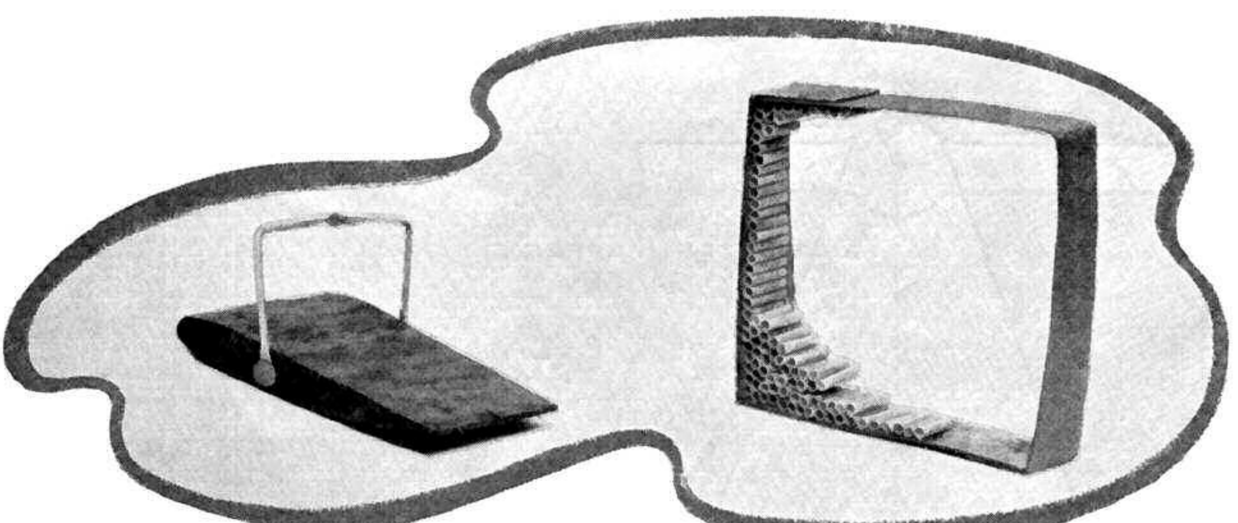
The drag coefficient values may be obtained from the usual formula :—

$C_D = \frac{2D}{\rho SV^2}$, where D is the value of the drag as measured. If the arms connecting the model to the drag pan are unequal, as shown in the diagram, then it will be necessary to ratio the measured load according to the ratio of the lengths. For example, if the horizontal arm is 4 in., the vertical arm is 6 in. and the load on the drag pan is ·01 lb., then the correct figure to use in the formula is $\cdot01 \times 4/6 \times \cdot00667$ lb.

As an alternative to using weights to balance the lift and drag, the horizontal arms may be screwed at the ends and a movable weight fitted. By screwing this weight along the arm, the amount of drag and lift can easily be calculated.

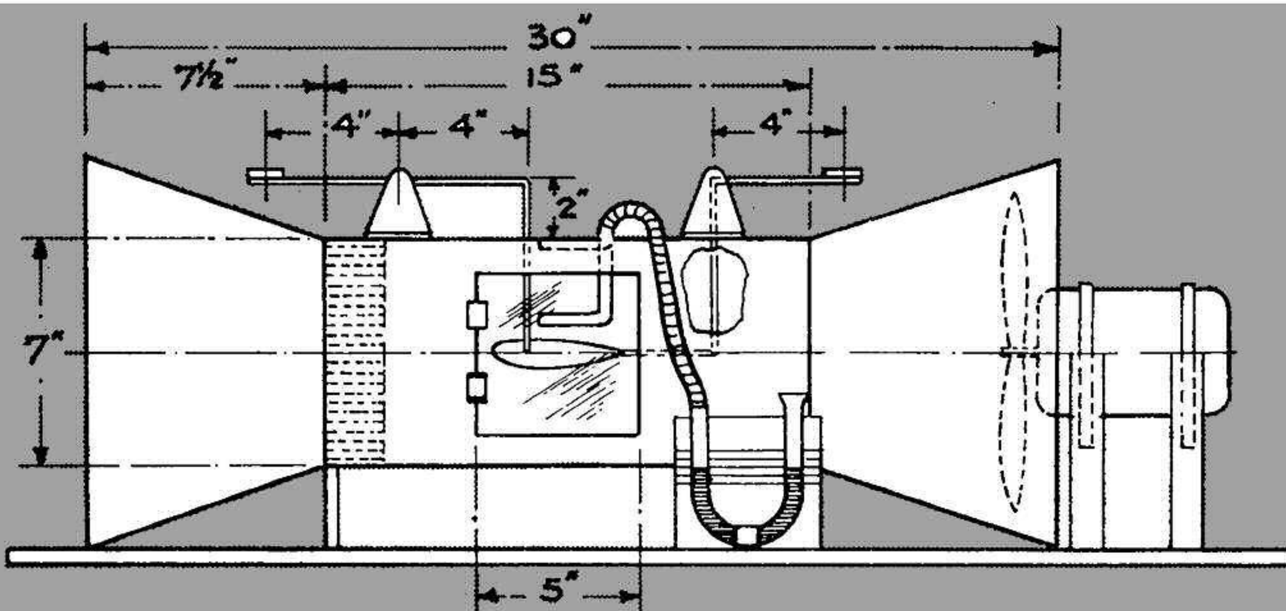
In order to reduce friction to a minimum in the bearings, the knife-edge type are probably the most efficient. This design is used in most laboratory scales and a simple copy is easy to construct.

From the above description of a model wind tunnel it will be seen that there are endless opportunities for experiments full of interest to the enthusiastic aeromodeller. No doubt, many improvements can be evolved from the design described and I do not claim that the tunnel is an ideal. The effect of the closeness of the walls has a marked effect on the results obtained, and it is wise to construct a model aerofoil with a profile of a standard type and compare the results gained with the actual correct figures as quoted in official tables.

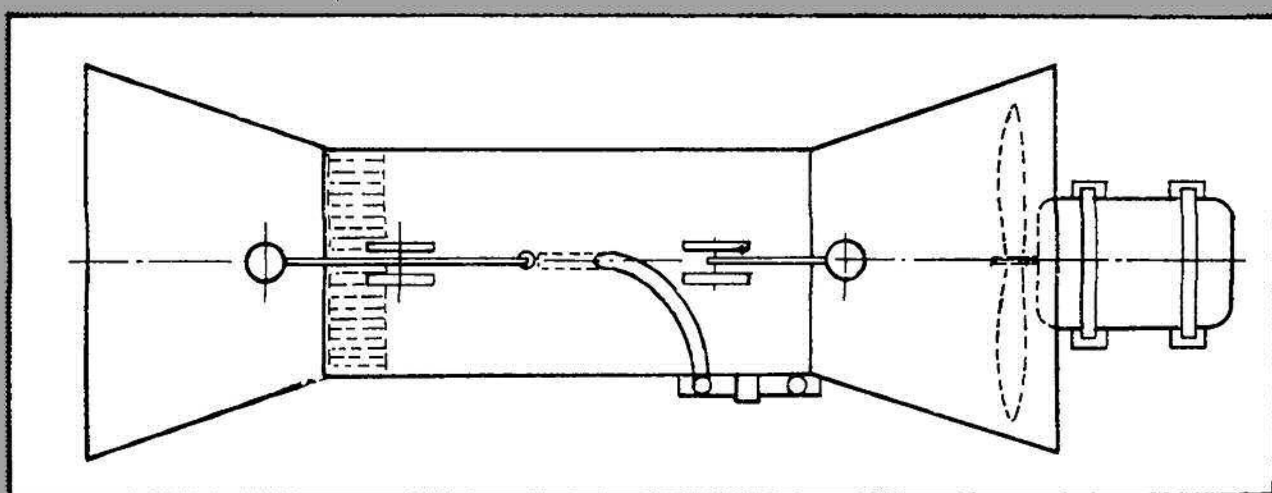


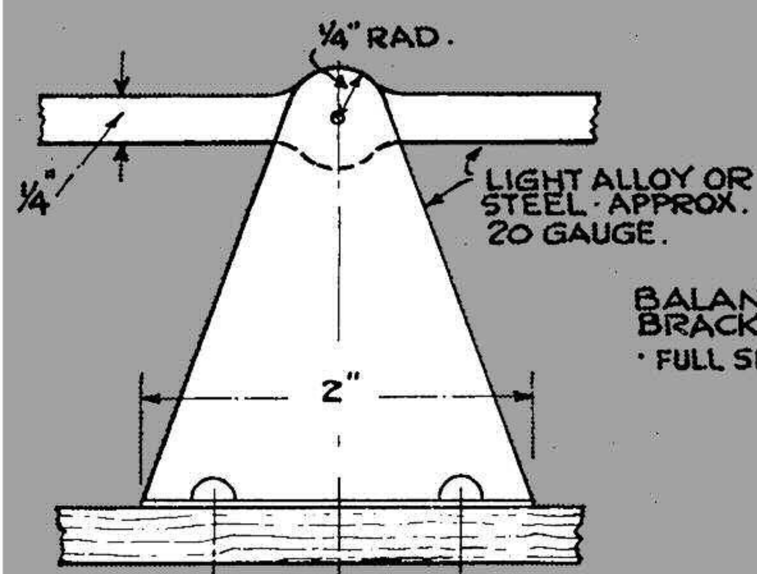
MODEL AEROFOIL AND CONNECTING RODS.

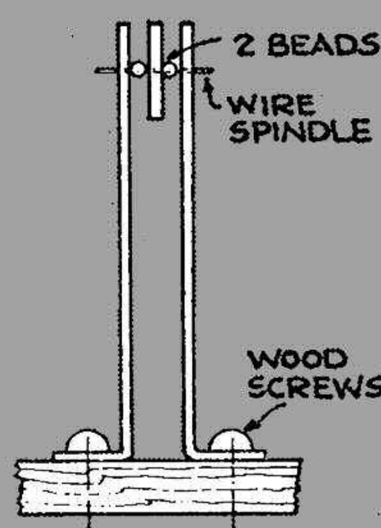
HONEYCOMB.



WIND TUNNEL - SCALE 1/6" = 1".







BALANCE
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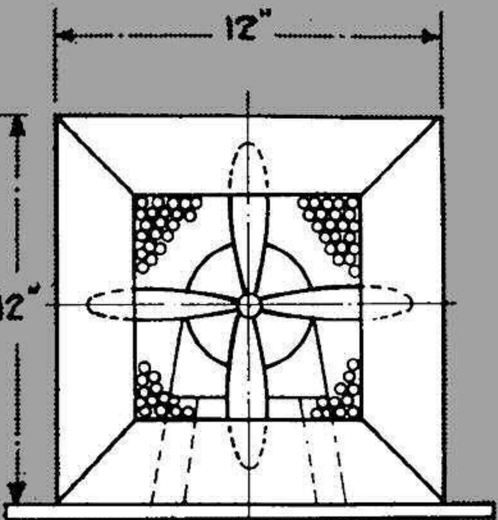
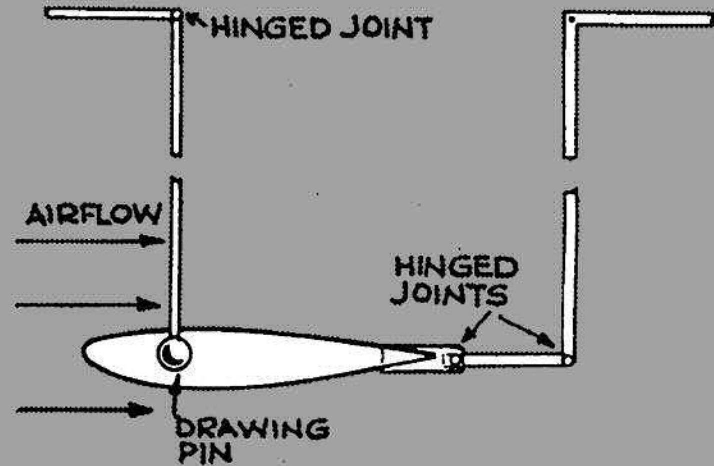
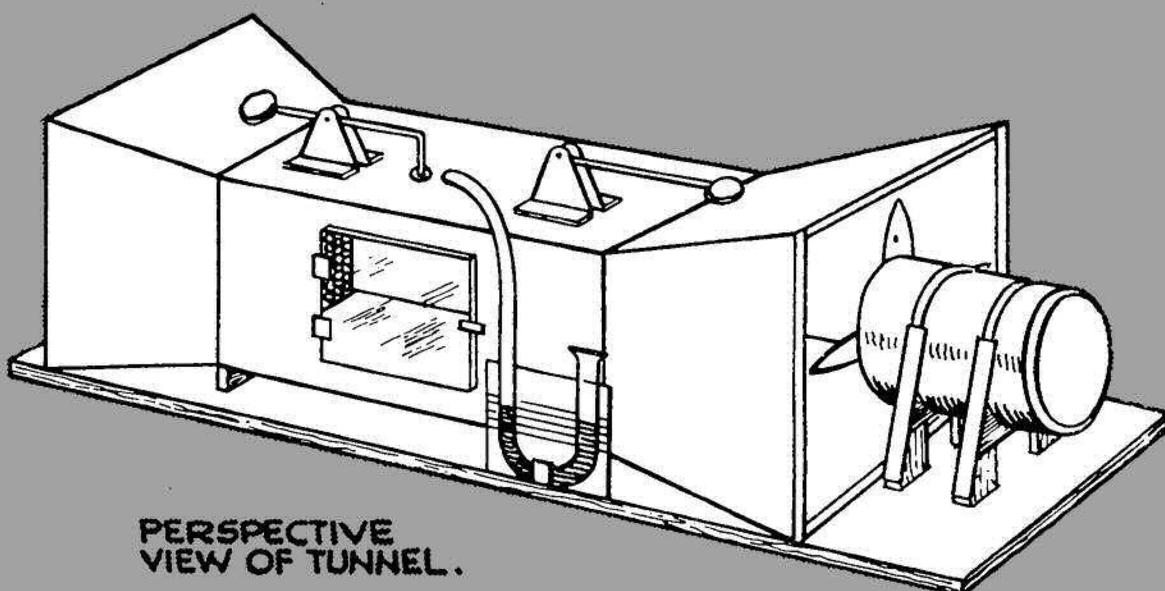
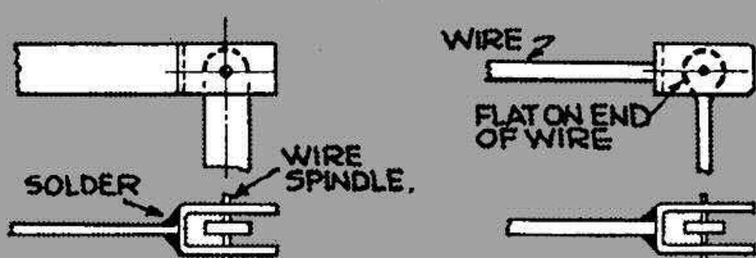
· FULL SIZE ·



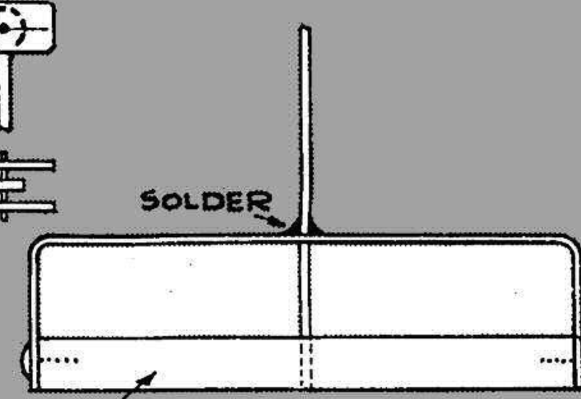




PERSPECTIVE VIEW OF TUNNEL.



SUGGESTED ALTERNATIVE JOINTS.



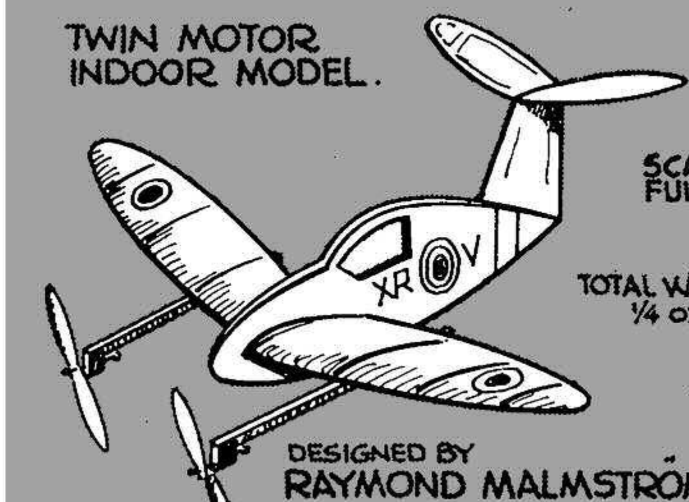
DETAIL OF MODEL ATTACHMENT.

The AVENGER

TWIN MOTOR INDOOR MODEL.

SCALE FULL SIZE

TOTAL WEIGHT 1/4 OZ.



DESIGNED BY RAYMOND MALMSTROM

Fuselage.
The fuselage shape is drawn on $\frac{1}{8}$ in. sheet balsa and sanded to the sections indicated. The cockpit and rear of the fuselage are cut away, the former being covered with cellophane, and the latter with two pieces of thin notepaper.

Wings.
These are quite straightforward, the plan furnishing all details. The blocks shown at A on the plan, are cemented under rib No. 2. Cement completed wings to fuselage at correct dihedral angle and give one coat of banana oil No. 2.

Motor Sticks.
Shape from hard $\frac{1}{8}$ in. square balsa. Small wire hooks are bound to the rear of each and cemented. To these sticks the propeller bearing blocks, suitably drilled (noting downthrust angle), are cemented, and secured by two thicknesses of tissue. A brake is fitted to the starboard motor, details at B on the plan. The motor sticks are then cemented to the blocks under each wing.

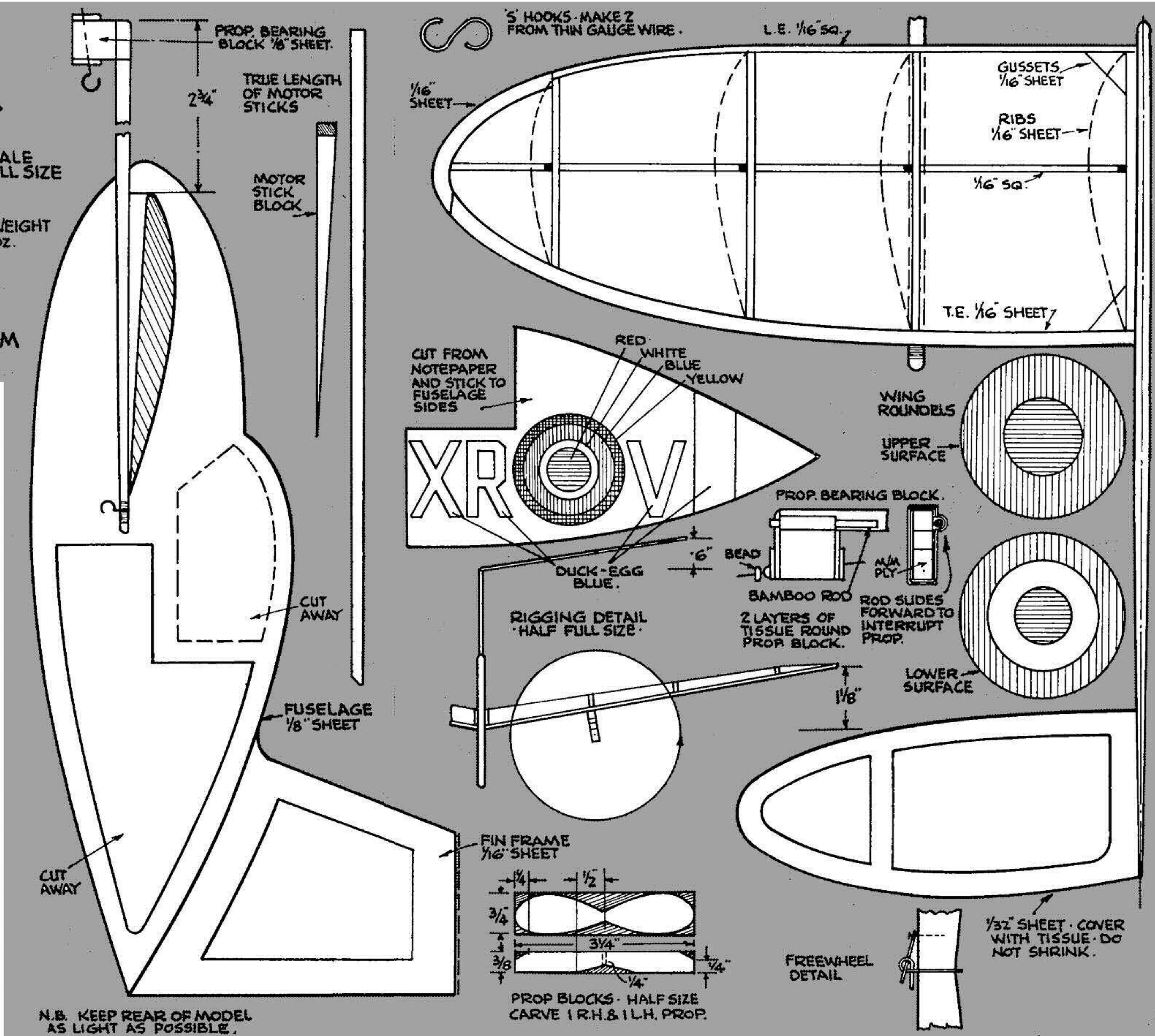
Tail Plane and Fin.
These are from 1/32 in. and 1/16 in. sheet, covered with tissue on one side only. Leave the tissue unstretched.

Propellers.
Dimensions for the propeller blocks are given on the plan. One must be a left-hand and the other a right-hand propeller. These must be the same pitch, and as near the same weight as possible. A simple free-wheel may be fitted. Without this refinement, as it were, the glide suffers accordingly.

Power.
Excellent motors can be made from $\frac{1}{8}$ in. by 1/32 in. strip, which has been cut carefully down the centre. Loops are then made approximately 9 in. long (one loop to each motor).

Flying.
Wind from the rear by means of the little "S" hooks shown at Fig. C. The starboard motor is arrested by the brake until the port is wound. Launching is a matter of practice. One hand prevents the two propellers from turning, and the model is thrust gently forward with the other.

The Avenger with both motors in action presents a pleasing picture in the air, and may be relied upon to enliven any indoor meeting.

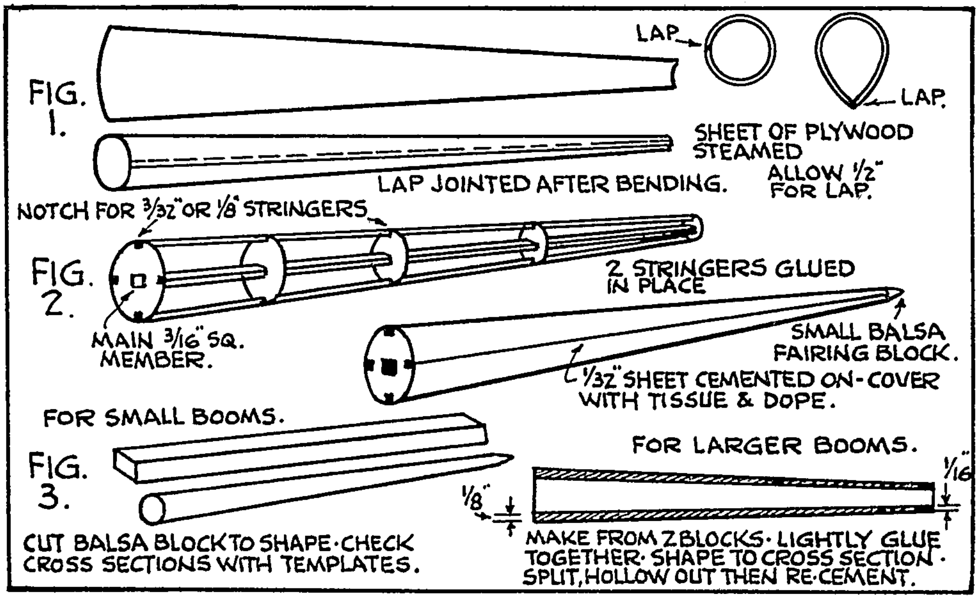


SAILPLANE BOOM DESIGN & CONSTRUCTION

by

D · NEWMAN

This article was written primarily to help the modeller who may have trouble constructing a boom for the "pod and boom" type of sailplane.



The requirements of a boom are as follows :—

1. The boom must be rigid and must not bend or flex in flight.

2. Must be fairly light, as these parts are usually long and large.

3. Must be strong enough to take the impact of a head-on collision or a crash into the ground and, in doing so, *not* snap off the pod.

This "snapping off" is noticeable in the small all-balsa gliders, when they strike a solid obstruction.

A boom can of course be made using almost any cross-section, even so far as a rectangular section. The most satisfactory is the round or "peardrop" form.

There are several methods of making a boom. The first method I shall describe is that used by Mr. R. H. Warring on his sailplane "Aeolus." This boom is formed out of a single sheet of ·8 mm. or 1/32 in. birch plywood. The sheet is steamed or watered until it is pliable and then bent into the section required. The boom is then wound round with aerostrip and left to dry. The edges of the ply are then lap jointed along its entire length. $\frac{3}{8}$ in. to $\frac{1}{2}$ in. is usually sufficient lap. The join should then be well glued, preferably with a glue such as "Croid." When the glue is dry the lap should be sanded smooth and the boom covered with either silk of a heavy grade tissue. The covered boom is then given several coats of dope or banana oil. Fig. 1 will fully explain the procedure.

I built the "Aeolus" from AERO MODELLER plans, but the above method of boom construction was not used as, firstly, a sheet of plywood of the required dimensions could not be procured in my district, and secondly, I was rather sceptical as to the results of getting a circular cross-section, when the end diameter of the boom was only $\frac{3}{8}$ in. This method of construction may be deterring many modellers from building the "Aeolus" and similar types.

I will now describe the method used by myself on the above sailplane. First of all several circular formers were cut out of 1/16 in. sheet balsa. These formers were positioned at the most critical points of the boom, i.e. the front of the boom, one near the mainspar of the centre-section, and one at the trailing edges, etc.

A 3/16 in. square hole was then cut in the centre of the formers to enable the main longitudinal member, 3/16 in. square hardwood or balsa, to be installed. See Fig. 2. This member serves as a jig on which the structure is lined up. The formers are then cemented on to the 3/16 in. square member in their respective positions. Four main stringers, 3/32 in. or $\frac{1}{8}$ in. square balsa, are then added, equispaced on the formers. A small balsa block can be glued on to the 3/16 in. square at the tapered end to finish off the shape.

It is now covered with four pieces of 1/32 in. sheet, cut and steamed to shape. On larger models 1/16 in. sheet may be used. The sheet should be well cemented to the four stringers and to the formers. The whole assembly should then be carefully sanded smooth and then covered with heavy grade tissue and doped or banana-oiled several times. Where the wing centre-section goes through the boom it would be advisable to strengthen it with pieces of $\frac{1}{4}$ in. by $\frac{1}{4}$ in. balsa firmly cemented to the formers and stringers. The resultant structure is very strong and very light.

If an auto rudder control is used, holes will have to be drilled in the formers to accommodate the control line. These holes could be bushed with short lengths of aluminium tube with the ends flared. This will prevent the control line from fraying on the formers.

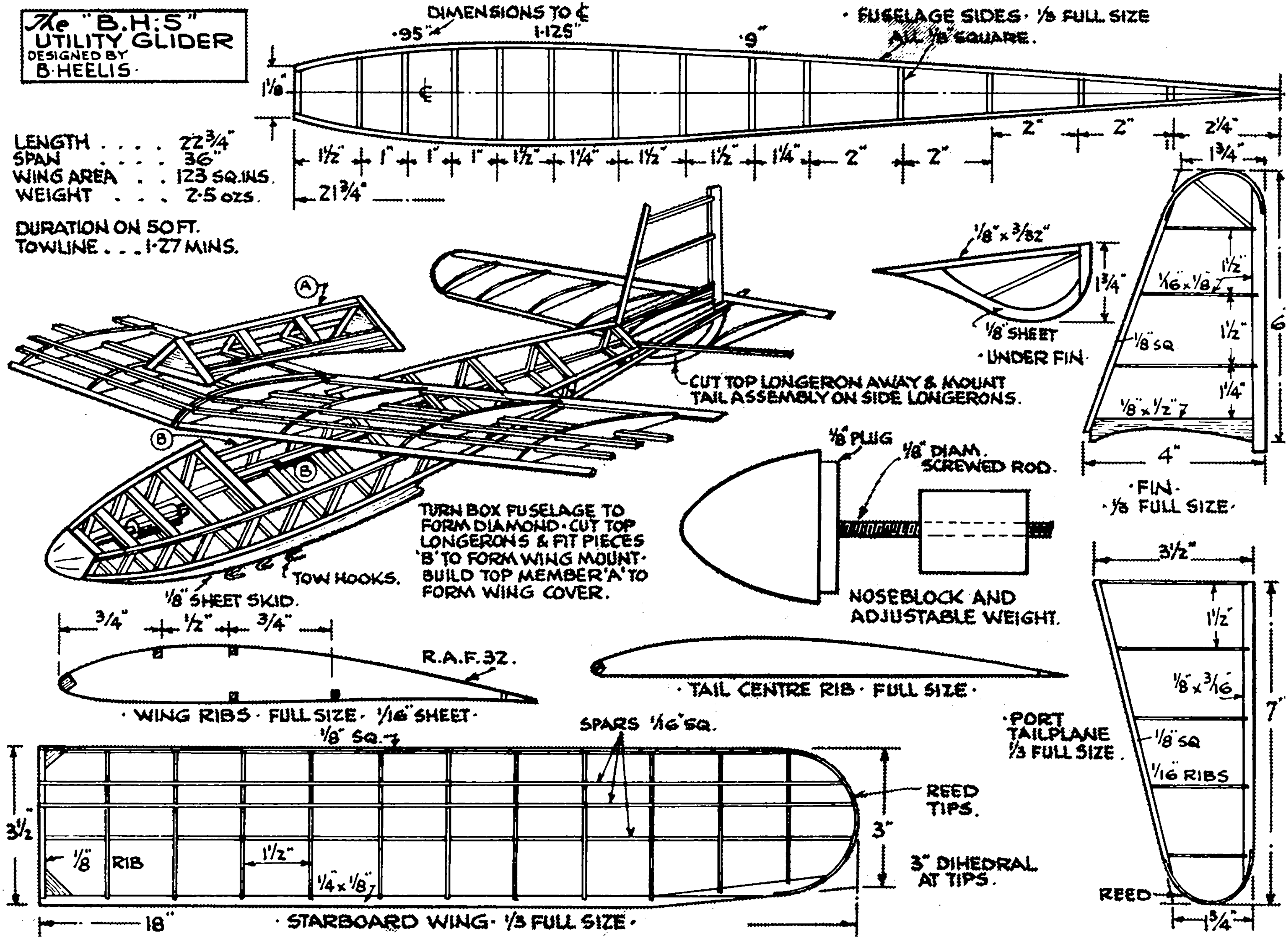
Another possible method of building a boom is the usual former and stringer construction, covered with tissue. This type is not the best as it has the disadvantage that the tissue covering is liable to damage at an early date in the life of the model.

The last method is to make the boom from a piece of medium hard balsa block, Fig. 3. The boom can be reduced in cross-section using this method but, as mentioned before, is prone to "snapping off" as on the small all-balsa gliders. If this method is used on a model of any size, it must necessarily be hollowed out to reduce weight. This method is out of the question, at least, until the war is over, as balsa (if any) can be put to a more useful purpose.

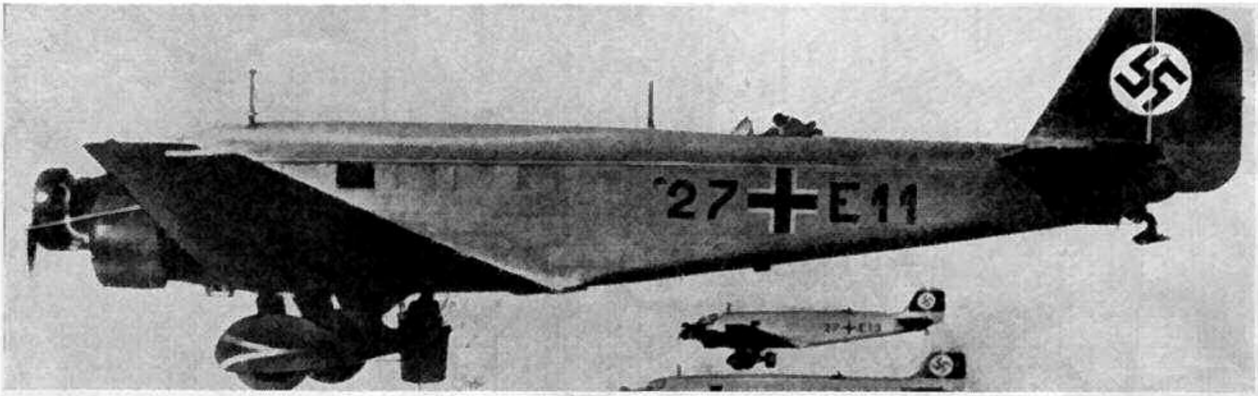
The "B.H.5" UTILITY GLIDER
DESIGNED BY B. HEELIS

LENGTH . . . . 22 3/4"
SPAN . . . . 36"
WING AREA . . 123 SQ. INS.
WEIGHT . . . 2·5 ozs.

DURATION ON 50 FT. TOWLINE . . . 1·27 MINS.



1/72 Scale JUNKERS JU 52



By D. GOODCHILD

NOW that the Wings for Victory exhibitions are on, a model of a machine that is being used in large numbers on the Russian and Tunisian fronts should prove of interest. Despite its age, the JU.52 is still the most widely used German troop-carrier, and many hundreds have been destroyed at Stalingrad.

This model is constructed from the three-view drawings contained in "Aircraft of the Fighting Powers," Volume I, and except for the fuselage is built in the usual manner.

The following method of construction results in a model hollowed out, fitted with seats, instruments panel, celluloid windows, and opening doors; yet it can be made by a beginner to aero-modelling, as it obviates the difficult task of hollowing out a solid block of wood. It can be made out of hardwood (the author's model was constructed from a box begged from the local grocer), so conserving valuable stocks of balsa.

The Fuselage.

This is constructed from five blocks and two side panels, as shown in the drawing.

The side panels are cut from m.m. ply (scissors are quite satisfactory for this job).

The blocks forming the floor are squared, whilst the roof is rounded off as in the plan.

A section is cut from the floor to take the centre section of the wings.

Lines are etched on the sides, floor and roof to represent the corrugated metal covering.

The sides are then cemented to the floor.

The nose is made in two blocks which are lightly cemented together, shaped, and then split apart and hollowed out, and then finally cemented together.

The centre section is then shaped as shown to fit the fuselage, carved to airfoil section, cemented to fuselage and faired with plastic wood. Two holes are then drilled to take ⅙ in. dowels.

The pilot's cockpit is then mocked up with dummy controls, etc., and the nose fitted on.

Benches are then put in on each side of the main cabin and a sheet of celluloid stuck inside across the windows (do *not* use balsa cement).

The doors are fitted on with paper hinges.

The inside should then be painted.

A hole is made in the roof for the gun position, and the roof is then carefully cemented in place.

A small bulkhead is cut from m.m. ply and cemented on the pilot's cockpit as shown in sketch. This is then carefully covered with celluloid (a good thin quality can be obtained by soaking discarded negatives in hot soda water until it is possible to rub off the gelatine).

The Wings.

These are cut out with a fretsaw according to the plan, excluding the flaps and ailerons. They are then tapered and cambered, and holes drilled to take the dowels. Then glue them firmly to the centre section.

It was found impossible to etch lines on the wings to represent the corrugated metal, owing to the grain in the wood, so they should be bound with smooth thread and given two coats of thick banana oil.

The flaps are cut from ⅛ in. balsa substitute, cambered to airfoil section and bound with thread. They are hinged with pins at the roots and tips.

Sections should be cut out of the leading edge of the wings to take the engine nacelles, as shown in the sketch.

The Tail Unit.

This is cut from ⅛ in. balsa substitute, the fin, rudder, elevators and tail plane being made separately. Lines are etched on, and the control surfaces are hinged in a similar manner to the flaps on the wings. It is important to make the edges of the tail unit knife sharp, as nothing spoils the appearance of a model more than a clumsy tail unit.

The Engine Nacelles.

The engine nacelles should be made as shown in sketch, the cowlings being made separately. The easiest way to make them is to round off a broomstick to the required diameter and bore out the end with a brace and bit (½ in.). The length of the cowling is then marked off and carefully cut off with a small tenon saw.

The engines should be cut from 1/16 in. sheet balsa and rounded off.

The air screws are carved from ⅛ in. dowelling. (Do not forget that the pitch of German air screws is opposite to that of British.) Be sure to make a good job of this, as it is a point that the judges always note.

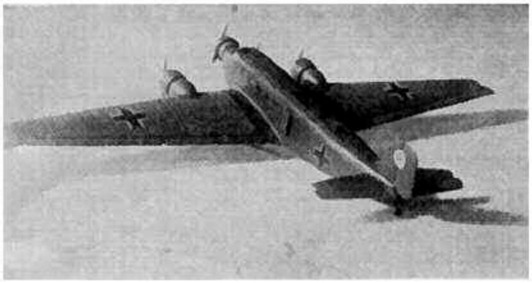
The Undercarriage.

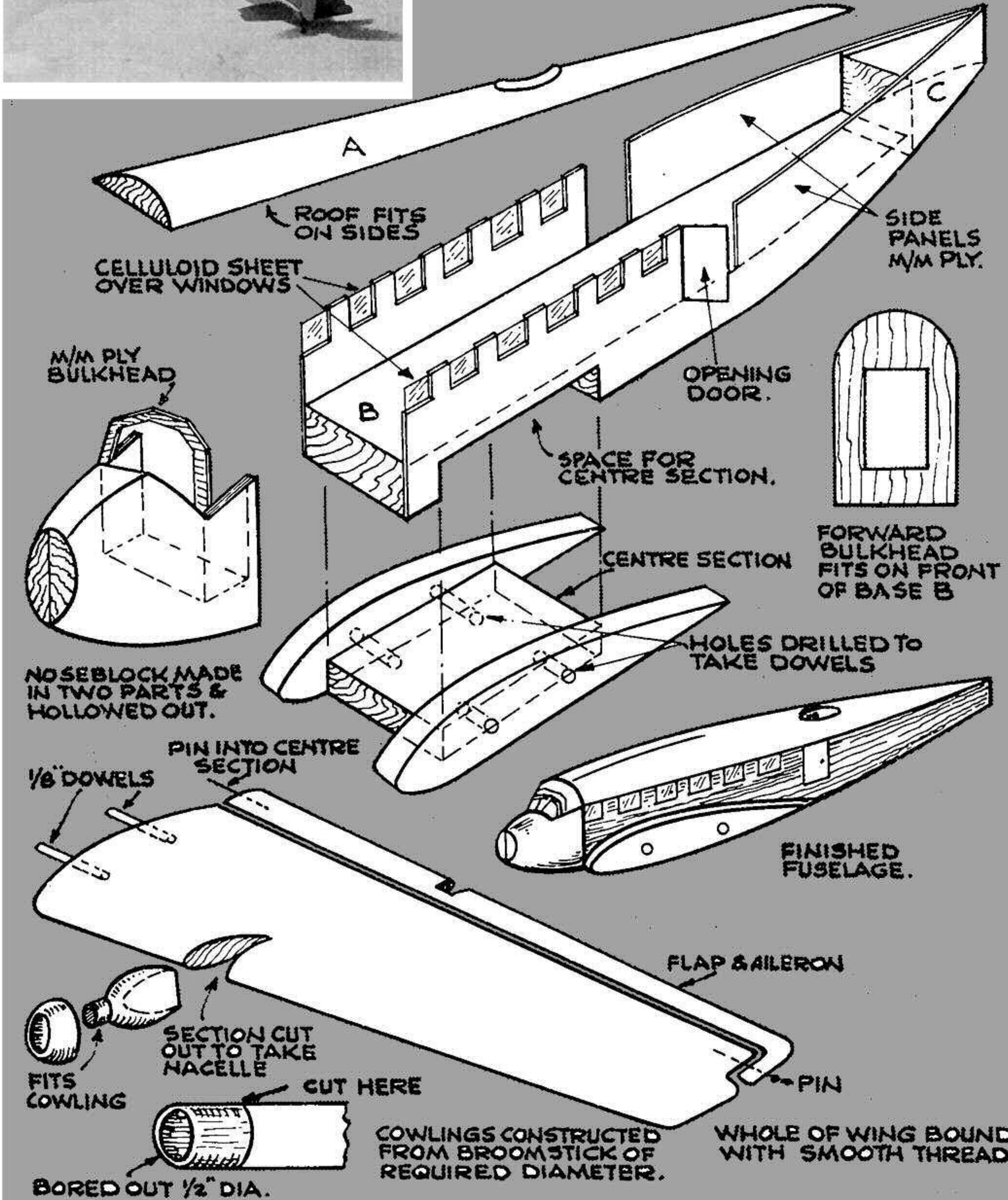
The construction of this is obvious from the plan.

The whole model is given two coats of banana oil, care being taken not to clog up the lines which have been etched on fuselage and tail.

After applying two coats of olive green dope to upper surfaces give two coats of pale blue to the under surfaces, the minor details such as pitot tubes, aerial masts, etc.

Finally, transfer insignia should be applied.





A
B
C
A
C
ROOF FITS ON SIDES
SIDE PANELS M/M PLY.
CELLULOID SHEET OVER WINDOWS
M/M PLY BULKHEAD
B
OPENING DOOR.
SPACE FOR CENTRE SECTION.
FORWARD BULKHEAD FITS ON FRONT OF BASE B
CENTRE SECTION
HOLES DRILLED TO TAKE DOWELS
NOSEBLOCK MADE IN TWO PARTS & HOLLOWED OUT.
PIN INTO CENTRE SECTION
1/8" DOWELS
FINISHED FUSELAGE.
FLAP & AILERON
SECTION CUT OUT TO TAKE NACELLE
FITS COWLING
PIN
CUT HERE
BORED OUT 1/2" DIA.
COWLINGS CONSTRUCTED FROM BROOMSTICK OF REQUIRED DIAMETER.
WHOLE OF WING BOUND WITH SMOOTH THREAD.

A CONTRA-ROTATING PROPELLER

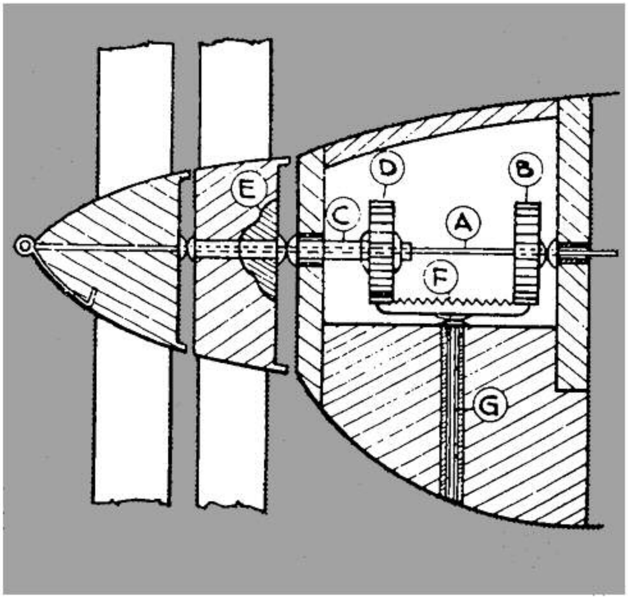
By PATRICK O'KEEFFE

THE use of contra-rotating propellers on our fighters obviously shows their usefulness in regard to reducing the torque of powerful motors. Why not, then, fit contra-rotating propellers on high-powered duration 'planes ? The diagram opposite shows how to do this.

A 16 s.w.g. spindle A is fitted with a ½ in. brass gear B. On to the spindle is slipped a length of brass tubing C, which will turn freely on A. The hole in another ½ in. brass gear D is enlarged, and then soldered on C. A strong lug E is soldered on C, in order to turn the rear propeller. At F is a ⅞ in. Meccano contrate gear wheel, which will engage the ½ in. gears. The centre hole in it is reduced to take 16 s.w.g. wire by means of soldering suitable brass tubing into it. The gear is then soldered to the top of a length of wire, which turns freely in bushing G.

It is apparent from the diagram that when the front propeller is wound, the rear one turns in the reverse direction, as the drive is transmitted to D, via gear F, from gear wheel B. It would be an asset to use ballraces instead of cup washers in the mechanism, especially between the front and rear propellers, and between the rear propeller and the nose-block. If necessary, of course, gears can be fitted behind the rear of this gearbox, in order to have three or four motors.

It is obvious that the front propeller must be a normal anti-clockwise one, but that the rear one must have the blades cut so as to be effective when spinning in a clockwise direction.



UNDERCARRIAGE UNMASKED

By J. TOWNSEND

The mechanism works as follows :—

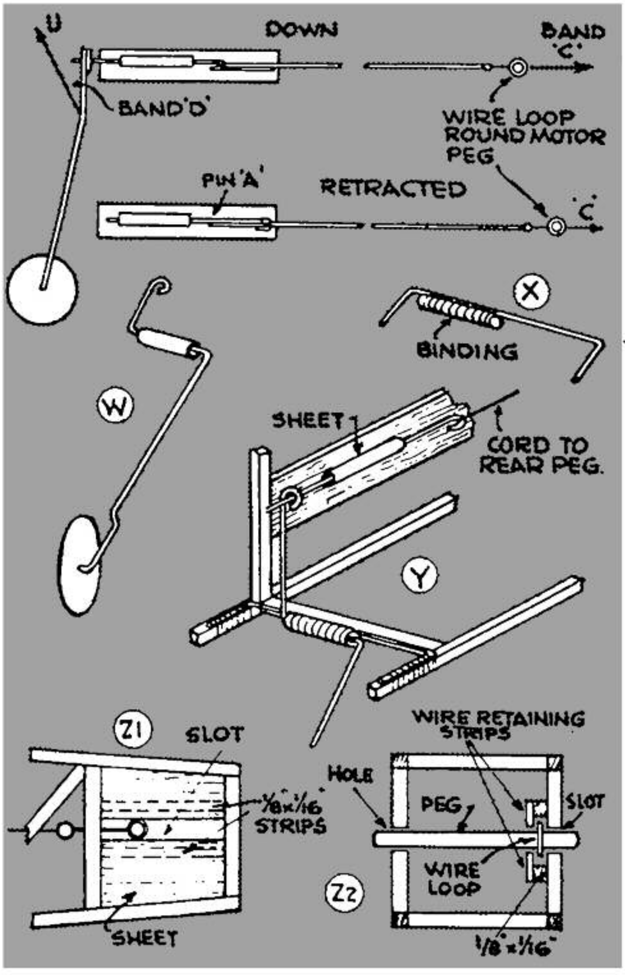
The motor is wound up and pulls the motor peg forwards in its slot. This allows the pin A to be pushed forward into the loop at the top of the undercarriage leg. When the model is placed on the R.O.G. board, its weight tends to fold the undercarriage up forwards, but the pin A prevents this, being through the loop. After the motor has unwound a little, the band C pulls the motor peg backwards. This is connected by a cord to pin A, which is therefore pulled out of the loop in the undercarriage leg. This leaves the undercarriage leg free to retract forwards, pulled by band D. The crux of the whole matter lies in the band C.

Construction is as follows :—

Bend the undercarriage leg from 14 s.w.g. wire, piano wire to the shape shown (W), remembering to slip on the tubing before completing the bending. This tubing should now be bound with thin wire to a elngth of 16 s.w.g. piano wire, shaped as shown (X). The ends of this wire, bent at 90°, are bound to the longerons.

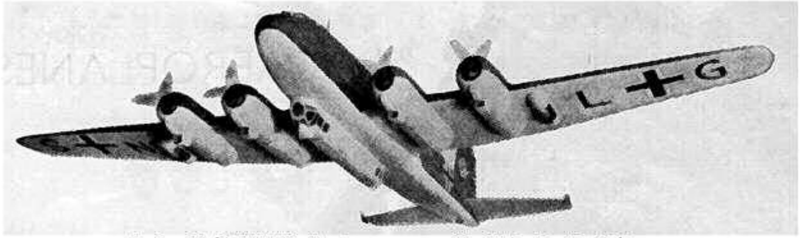
DON'T bind the tubing to a crossbrace or former.

To fix pin A, slip it through tubing bound and cemented to a length of sheet balsa (½ in. by ⅛ in.) cemented between uprights or formers (Y). The rear end projects ⅛ in. outside the fuselage through a slot in the sheet balsa, to enable the pin to be worked from the outside. At the rear of the fuselage, connected to A by a cord, is a wire ring in a slot, through which passes the motor peg (Z1). A cross section of the rear end of the fuselage shows the method of retaining this wire loop (Z2).



MONTHLY MEMORANDA

By O · G · THETFORD



Focke Wulf FW200k Kurier. *Model by R. H. Haltam.*

Seafires replace the Fulmar.

The Vickers-Armstrong's Seafire in its various differing versions has now replaced most of the Fulmar two-seat fighters on board the operational aircraft-carriers of the Royal Navy. A Seafire on one carrier carries the marking "6G" in pale grey at either side of the fuselage ahead of the cockade—a marking formerly observed on the Fairey Fulmar. A special insignia is painted aft of the cockade, consisting of a pale grey square with a further strip painted diagonally from the lower left to the upper right corner. The duck-egg band is painted around the rear fuselage as on land fighters and on it appear in black letters the words "Royal Navy." One Seafire on a carrier is serially numbered MA 975.

U.S. Navy News.

A new camouflage scheme has been introduced by the U.S. Navy Department and is now carried by all heavier-than-air machines of the U.S. Navy, apart from training types. The scheme first became common at the beginning of 1943 and consists of azure blue upper surfaces and pale grey undersurfaces. Concurrently with the introduction of the new colour the original insignia locations were restored. The white star is now carried above and below both starboard and port wings. The red and white alternate horizontal stripes on rudder are now only painted on U.S. Coast Guard aircraft.

Amongst the first types to go into service bearing the new colour scheme were the Vought-Sikorsky Corsair fighter, the Grumman Avenger torpedo-bomber and the Glenn Martin Mariner patrol-bomber flying-boat. Avengers first in service bore the squadron code markings "4T" (Torpedo Squadron Four) and "29GS" on the fuselage sides together with an individual recognition number. Mariners serve with the 55th, 56th and 74th Patrol Squadrons, U.S.N. It is believed that the famous Fighting Squadron Three (Grumman Wildcats) is to receive the new Corsairs.

Training aeroplanes and seaplanes do not adhere to camouflage rules and several combinations of markings are in vogue. Vought-Sikorsky Kingfisher catapult seaplane trainers have camouflaged fuselage and tail assembly with yellow ochre wings. Vultee SNV-1 trainers (known in the U.S. Army as the BT-15 Valiant), used by the Navy at Corpus Christi Field, Texas, have natural Alclad fuselage, yellow ochre wings and red tail assembly. A red band encircles the fuselage aft of the rear cockpit and a similarly coloured band is painted chord-wise along the wings mid-way between the star insignia and the roots. The school number of the machine is painted in white against the red fuselage band. SNV-1 with factory serial number 03107 is 'plane "71" at Corpus Christi School.

Several landplanes which have proven their worth with the U.S. Army and R.A.F. Coastal Command have now been adapted by the U.S. Navy as patrol-bombers. Hitherto all U.S. Navy patrol-bombers have been flying-boats. The new landplane patrol-bombers in use so far are the Liberator which is known in this guise as the PB4Y-1 and the Hudson which is called the PBO-1. Both of these are being flown in the new colours.

The first of the U.S. Navy's deck-landing training carriers has been delivered—the "Wolverine." It is equipped with North American SNJ-3 trainers (a variation of the Harvard). These SNJ-3s are natural Alclad all over with the exception of the upper surface of the wings inboard of the ailerons which is chrome yellow. Training markings on the fuselage sides consist of the letter and number "J-1" to "J-9." No stars are carried on the fuselage.

Squadron Letters in U.S.A.A.F.

Most operational squadrons of the United States Army Air Forces have now been issued with two code identification letters indicative of their squadron identity. They are painted on the fuselage sides in yellow in a similar manner to that adopted for Royal Air Force aeroplanes. The two-letter code system for indicating squadrons was introduced in the Royal Air Force about the time of the Munich crisis in 1938 and has remained fundamentally the same since (unlike other items covered by markings regulations!) The success of the system under operational conditions is confirmed by the American authorities.

A P-39D Airacobra unit stationed in North Africa carries the code letters "OU" on the sides of the fuselage just beneath and slightly ahead of the pilot's cockpit. Boeing B-17F Fortresses stationed in this country carry the letters "BN" in yellow on the fuselage just level with the trailing edge of the wings. A further individual identification letter is painted on the fin. When identification letters are carried on the fin of U.S.A.A.F. machines the serial number is reproduced in smaller figures higher up the tail member in order to leave the necessary space. On big bombers the letter is painted on the fin the same size as those on the fuselage.

A Naval Ventura.

The Vega-built Lockheed Ventura medium bomber landplane is now serving with the U.S. Navy as an anti-submarine patrol aeroplane. It is the first landplane to be used in the U.S. Navy Department category "VP." It is designated the Lockheed Vega PV-1. The "V" is indicative of the manufacturers, Vega Factory.

The PV-1 differs from the B-34 of the U.S.A.A.F. and the Ventura I of the R.A.F. Bomber Command in having auxiliary fuel tanks slung beneath the wing outboard of the motor nacelles on streamlined supports. This increases the range to that required for over-sea patrol at the expense of little performance.

Lockheed PV-1s of the U.S. Navy are painted in the new azure blue finish now standard in the Navy and described in last month's Monthly Memoranda. A distinctive point about their markings is that the national star insignia is painted *twice* on each side of the fuselage, once on the nose and once in the usual location amidships. The star on the nose is equal in diameter to that aft. Until the introduction of twin and multi-motor types for Naval work the practice of carrying the national marking on the nose was restricted to patrol-bomber flying-boats.

AEROPLANES DESCRIBED—V

Henschel Hs 123

by H · J · COOPER

Next Month:
The Hawker Typhoon I.

Photo: Fox Photos, Ltd.

TO Henschel-Flugzeugwerke, A.-G., of Schönefeld, near Berlin, goes the credit of producing the first dive-bomber, or *stuka*, for the *Luftwaffe*. The Henschel aircraft plant was established in 1933 as a subsidiary of the old-established locomotive firm of Henschel & Sohn, and their third design, the Hs 123, appeared late in 1936. It was used in the Polish campaign and during the battle for France.

The Hs 123 was a single-seat sesquiplane powered by a 550–650 h.p. B.M.W. 132 air-cooled nine-cylinder radial motor. The first prototype had a maximum speed of 220 m.p.h. A second prototype (registered D-ILUA as a civilian aircraft because at the time the *Luftwaffe* was not recognised as a military arm) had a helmeted cowling and was fitted with a three-bladed airscrew. This machine, shown in the lower photograph and in the general arrangement drawing, was coloured silver, with the registration letters in black above the upper wing and on the sides of the fuselage. A black swastika on a white disc imposed upon a horizontal red band was carried across the fin and rudder.

The first production model, the Hs 123a (see upper photograph), differed in having a 880 h.p. B.M.W. 132 Dc motor driving a two-bladed airscrew with a spinner, and modified undercarriage fairings. It was armed with two fixed machine-guns above the motor cowling, and had a maximum speed of 248 m.p.h. at 9,200 ft. and an operating speed of 223 m.p.h. The service ceiling was 29,500 ft. and the climb 3,000 ft./min. The range at operating speed was 530 miles.

Empty, the Hs 123a weighed 3,312 lb., and the gross weight was 4,884 lb.

Offensive armament took the form of a single large bomb between the undercarriage legs, and there were racks for a few smaller bombs below the lower wings. The Hs 123 was not fitted with dive-brakes; it was intended initially for dive-bombing and was designed for a diving speed up to 350 m.p.h.

The Hs 123b was a later version fitted with a 1,000 h.p. Bramo Fafnir radial motor. It had a maximum speed of 262 m.p.h. at 12,300 ft. and, apart from a fairing behind the pilot's cockpit, differed little from the Hs 123a.

A further version, known as the Hs 123c, has been reported on the Russian front. It differs only from the previous model in having a totally enclosed cockpit cover. This version may still be in production.

The fuselage of the Hs 123 is a metal monocoque of oval section.

The upper wing is of metal construction on two spars, and the lower wing on one. Both are covered above with a metal skin and underneath with fabric. Ailerons and flaps are of metal framework with fabric covering.

Particulars of the Hs 123 are:—Span (upper), 34 ft. 5 in.; (lower), 26 ft. 3 in.; length, 28 ft. 2 in.; height, 11 ft. 2 in.; wing area, 267·3 sq. ft.; wing loading, 18·25 lb./sq. ft.; power loading (600 h.p.), 7·5 lb./h.p.

German dive-bombers are coloured dark green or light blue with a darker blue mottle on the upper surfaces and the undersurfaces are a very light blue-grey.

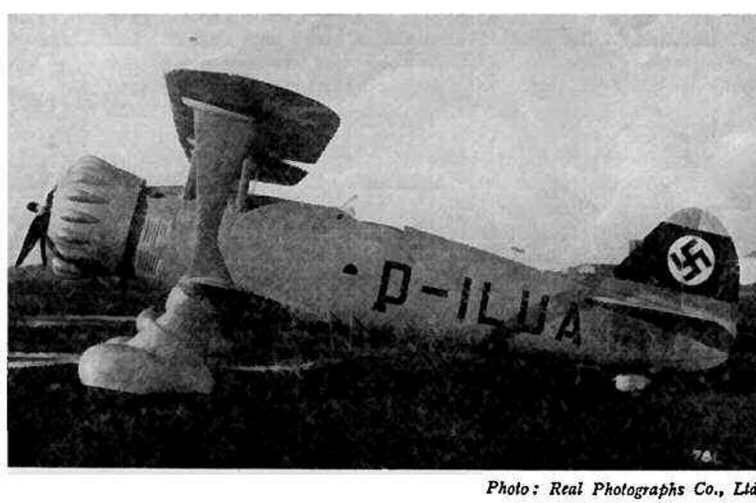
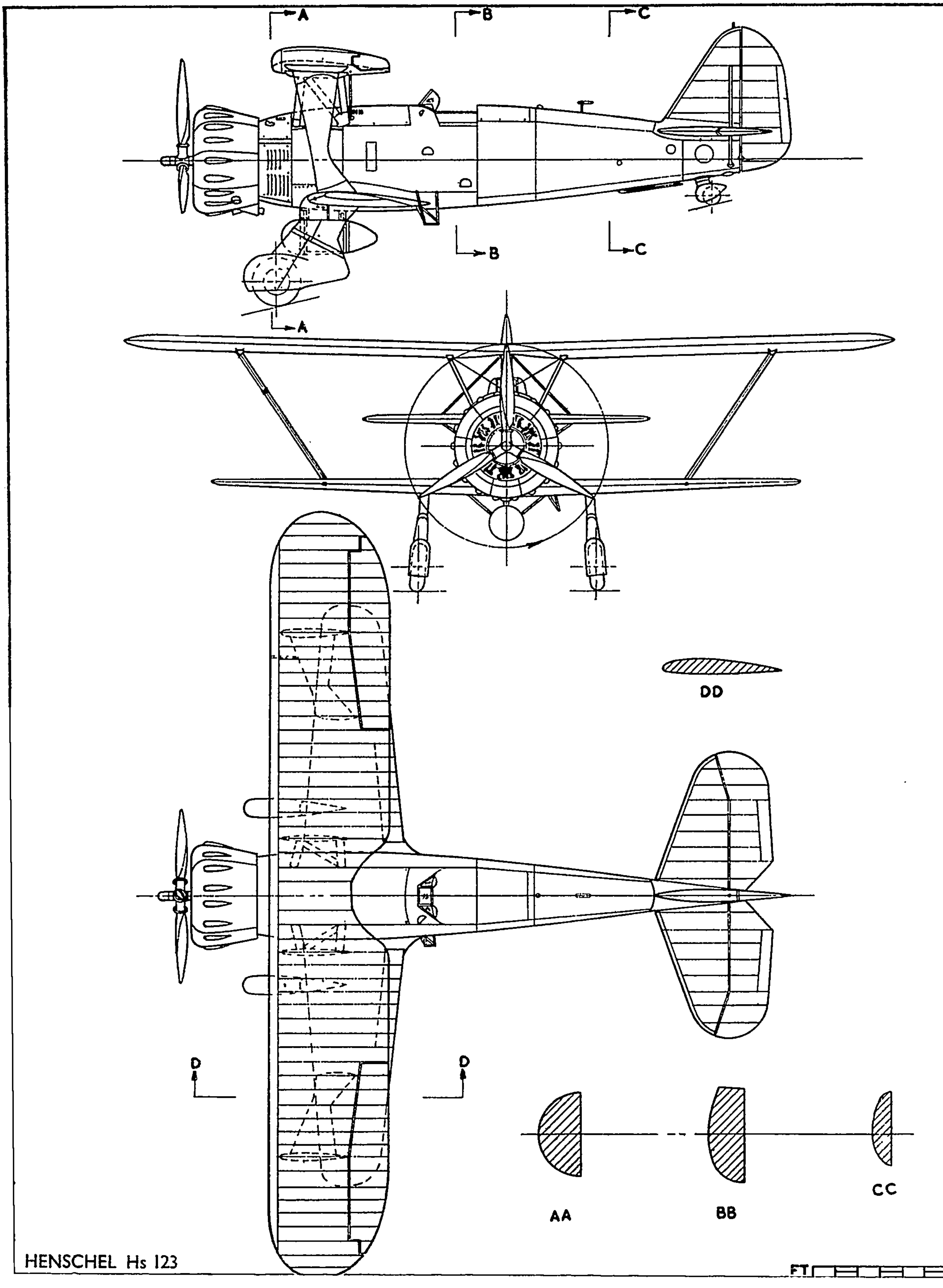


Photo: Real Photographs Co., Ltd.



HENSCHEL Hs 123

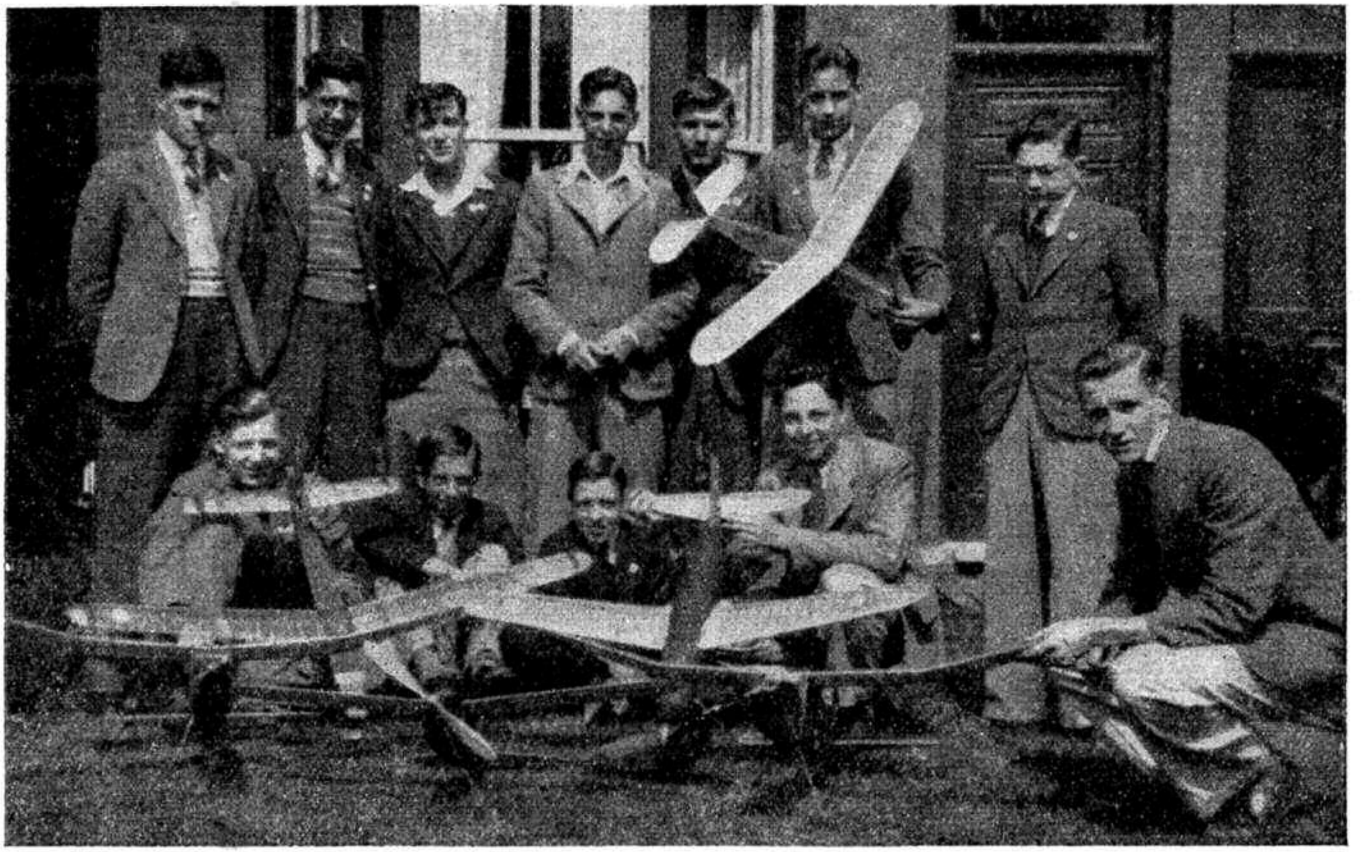
continued from page 899

Plugs was walking slowly home, mentally kicking himself for being such a mug as to neglect the Wakefield when it was still capable of such a good performance, and swearing never to use a retracting undercart again. Still, it had been a first-class flight, and maybe a record. Cheered by the thought, he hardly noticed the rising crescendo of hate as the Hurricane shot from the clouds; for he was already planning a new model. But suddenly he heard a strange twittering noise. At first he put it down to some insect, but looking up, he noticed some weird thing plummeting through the air . . . a lump of something, trailing a string behind it. Curious, Plugs watched it strike the ground in the next field, and walked over to it.

It was the prop. and rubber of his old Wakefield!

Flabbergasted, Plugs looked round for the rest of the machine, but although he scoured the surrounding fields, he never found it, and when he returned to the flying ground, his story was heard rather sceptically by the club members. But Plugs was too preoccupied to be annoyed, for he was thinking of that last grand flight; and he decided there and then that he would build a replica of that model as a tribute.

But he need not have wasted any sympathy on the Wakefield, for it was really happy; after all, it had tasted the joy of a last grand flight, and it could not have wished for a better ending. And as the tattered pieces of balsa and tissue fluttered earthwards, a mechanic on an aerodrome eighty miles away absentmindedly picked a piece of tissue paper from the barrel of a Hurricane's cannon, while the pilot rushed for his car; he had a date. . . .



Members of the Stratford-on-Avon M.A.C.

CLUB NEWS . . . . BY CLUBMAN

THE high spot of news this month is the result of the Gamage Cup, held this year under generally better conditions than for years past. The really fine spell of weather experienced prior to the event gave rise to optimism in many quarters, but unfortunately the Chief Gremlin (WIND) waved his breezy wand, and there were strong zephyrs from one end of the country to the other.

This was a great pity, as apart from the wind, general conditions were better than they have ever been, with a strong, hot sun, and conditions conducive to thermals. Naturally the strength varied here and there, but the majority of reports indicate that what wind there was, was far too strong for comfort.

Merseyside, this year's winners, report conditions as "good," and two members had flyaways of 7 and 5 minutes. The machine that clocked 7 minutes was a "Percy III," though it is not indicated that this was the machine that won the Cup. The list given on this page shows the first twelve placemen, Merseyside bagging three places in this top dozen. This gives a good impetus to the season, and I look forward to seeing this club very high in the final Plugge Cup placings. With so much emphasis on gliding this year, they have every chance of remaining on top, numbering many glider experts among their members. Anyway, congratulations on a fine start.

Our old friend Mick Farthing presumably flew one of his extra special featherweights to second place, while old-stager A. H. Lee of Bristol upholds the West Country prestige. Altogether, 149 entries were received for this year's event, against 162 for 1942. This drop is rather surprising in some respects, but is due I believe to the great difficulty some clubs have in obtaining the necessary rubber for this type of competition.

The drop in total number of competitors is balanced to some extent by the fact that 25 clubs competed, as against 13 last year. Incidentally, what happened to Oxford this year?—they are usually well in evidence on Gamage Day.

1943 GAMAGE CUP.

		Aggregate
Davison, M. E.	Merseyside	539
Farthing, M.	Croydon	484·9
Cameron, I. S.	Merseyside	403·5
Lee, A. H.	Bristol	382·05
Taylor, D. R.	Streatham	343·1
Finch, J.	Eastbourne	330·2
Sylvester, R.	Bushy Park	326
Davies, N. E.	Merseyside	324·5
Atkinson, A.	Bristol	307·9
Cocane, R.	Birmingham	299·7
Saunders, C. H.	Blackheath	274·8
Taylor, A. T.	Bushy Park	274·5

(25 clubs competed, with total of 149 competitors.)

It is strange to find how few clubs bother to compete in the S.M.A.E. indoor competitions. The greatly stimulated interest in pole flying should have brought about a much better support for these National events, and I am at a loss to understand the poor response to what must be a popular type of event. Is it that too many clubs still suffer from an inferiority complex—or, like one I know of, do not like the little extra bit of trouble required to r.o.g. a model instead of the easy hand launch. Results for the past two months are :—

		Aggregate
Club Result :—		
(February) :	Leeds M.F.C.	301·3
	Pharos M.A.C.	244·3
	Blackheath M.F.C.	242
(March) :	Leeds M.F.C.	232·8
	Pharos M.A.C.	201
	Cheam M.A.C.	189·1
Best Individual Flight :—		
(February) :	M. W. White (Blackheath)	124
(March) :	C. Furse (Leeds)	97·6

Further to my recent complaints of lack of reports from clubs, I have had one or two rather potent letters from disappointed Press Secretaries! Their main contention is that I've got a darn nerve complaining about lack of reports wnen their report of such and such a date was not printed, etc., etc.

Let me modify my request by stating that I want both greater numbers—and most important, *better quality*. In each and every case where I have received a complaint I have checked back on the unprinted reports, and practically the same condition obtains in every instance. Said reports consist of generalisations about " members called into the Forces," "difficulty in obtaining materials," and the fact that " members are building a number of new models." Now I ask you, how can I keep repeating such statements in these columns, and how interesting would you readers find them ? Obviously such conditions obtain with nearly every club.

Reports to be of any use must contain interesting FACTS, and competition times must be given, together with the times of outstanding flights. A club in the South of England is not interested in the fact that X. Pert won the last competition in the North Lancastrian M.F.C.—they want to know—and are interested in—the times set up in winning said competition. Comparison with local times can be made, and useful information extracted from such details, but I must insist that generalisations as indicated above are useless, and I have no recourse but to ignore reports that contain no " news value."

Also, for the benefit of new Press Secretaries—and the many old ones who still cannot seem to remember the date !—I repeat that reports must reach THE AERO MODELLER offices by the 20th of the month preceding publication. Remember also that by the time your report appears in print it is at least the 22nd of the following month, so it is no use notifying events that are past history by the time tnis magazine is in your hands. Got it ? O.K. Then let's get on to this month's batch.

The STRATFORD-ON-AVON M.A.C. are optimistic enough to request any readers who have stop-watches for disposal to get in touch with them ! I will not venture to give an opinion as to whether they are lucky or not, but wish them luck. G. Hooke won a special prize for being the first junior member to clock over the minute, his time being 1 : 04.

The HEYWOOD M.A.C., after a period of heart-breaking setbacks, have grouped themselves with the local Youth Movement, and now have better facilities for progress. After the loss of their clubroom, a few stalwarts kept things going by the use of a private air-raid shelter, but with the new link-up, a good room is available, so the members are asked to rally round once more, and put the club back on its feet.

G. Wilde of the NEWTON ABBOT & D.M.A.C. has raised the club record to 6 : 10 with his " Ajax." This club supplied 50 solid model " Spitfires " for the town's Wings for Victory Week.

The LEICESTER M.A.C. got together during the winter session and designed a standard model for the club. This machine has now passed its tests, in half a gale, and put up flights of 70–80 sec. B. Germany has again pushed the r.t.p. record, this time up to 2 : 05 with the same model that earlier set the figure of 1 : 38. The new club flying field should prove fine for gliding, the western slope being fairly steep.

A new club, using an old name, is the STOCKPORT & D.M.A.C. and according to reports facilities are good. Two good attics are available, and those wishing to join should get in touch with B. Couch at 38, Tatton Road South, Heaton Moor, Stockport. One member is building an ambitious undertaking, namely a " Manchester " of 68 in. span, fitted with special twin drive, and retracting undercart. He hopes to use this as a test model for twin petrol engines after the war.

The LEEDS M.F.C. had two real gales for the Gamage Cup event and a meeting with the Harrogate Club, and many—in fact most—models were wrecked in consequence. C. Furse has raised the club record to 2 : 36·6 r.o.g. with a " Gutteridge Trophy Winner." Results of the Harrogate meeting were :—

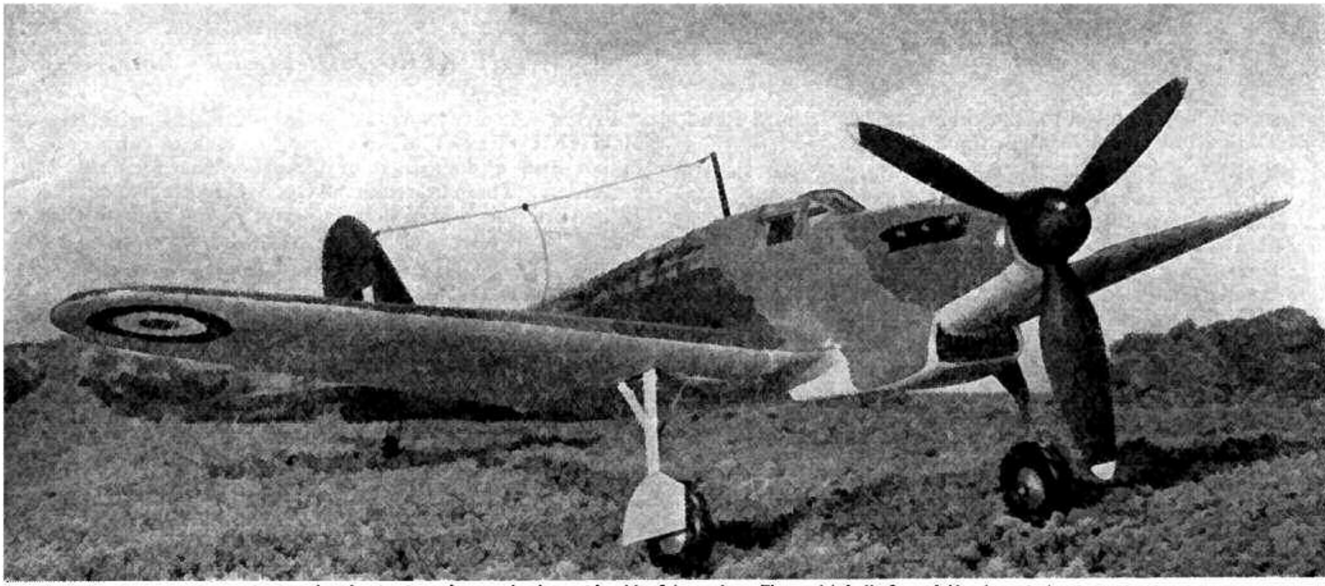
		Aggregate
Open Duration :	B. Crocker (Leeds)	1 : 03·4
	H. Tubbs (Leeds)	53
Glider :	H. Pollard (Leeds)	38·3
	H. Tubbs (Leeds)	33
Wakefield :	P. Holt (Leeds)	1 : 20·7
Under 30 in. Span :	H. Speight (Highgate)	52
	E. Jackson (Leeds)	44

Records are getting a walloping in the RHYL & PRESTATYN M.F.C., the duration figure being broken twice by J. M. Hardman. First figure was 4 : 02·5, later going up to 5 : 17·3 o.o.s. J. Lawrence pushed the glider time up to 2 : 31·4.

The BRADFORD M.A.C. held their annual meeting recently, some forty members being present for the usual prizegiving, etc. G. Adcock carried off the " Brown Muff " trophy for the third year, also the " Stott & Lees " cup for the best flight of the season, time 1 : 40. Other cup winners were H. M. Scarth (Cripps Cup for gliders), D. Porter (Adcock and Driver Cups for juniors), another junior, A. Coupland winning the Zenith Cup.

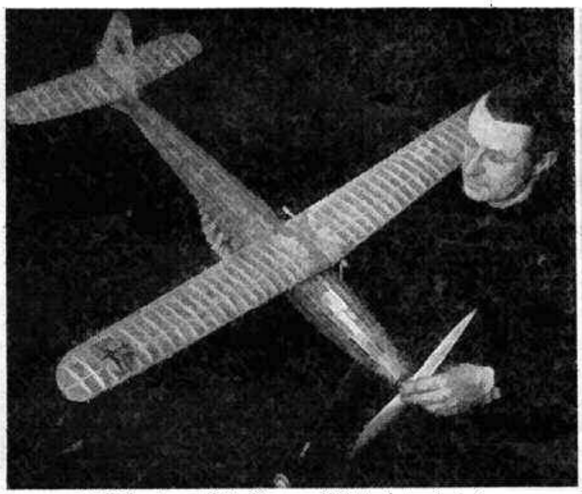
The BRENTWOOD SCHOOL M.A.C. is now affiliated to the S.M.A.E. A successful exhibition was held for the Wings for Victory Week, a great feature being r.t.p. flying, best time being set up by J. Ridgewell. D. E. Chandler won the prize for flying type models, while A. Triggs carried off the " solids " prize with his " Whirlwind."

An open event is to be staged on the 4th July by the DARLINGTON M.A.C. when the following events will be held : Glider, Flying Scale, and two classes of Duration. Entry fee is 1s. 0d. per model, and enquiries



An example of table-top photography, showing just what can be done with a bit of ingenuity. The model, built from A.M. plans, is by E. H. Keable of Liverpool.

H. Hayes, of Leeds, shows his "Temple Tribute." A good idea of the construction and size of this design can be obtained from this view.



W. S. Saunders, of the Torquay M.A.C., looks lovingly at his first attempt at a Wakefield model—the popular "Flying Minutes."

N. Money, of the Coventry M.A.C., hand-launches his "Wattie" built from A.M. plans. The elliptical surfaces and peg-leg show up well in this view.

(Below.) This "Spitfire IX" (?) is the work of E. W. Johnson of Monkseaton, and evidences a good eye for detail.

should be addressed to E. Canham at 24, Orchard Road, Darlington, not later than the 20th June.

I have already remarked on the success of the MERSEYSIDE M.A.S. in the Gamage Cup, but their efforts did not start or finish with that event. Plenty of flying has been going on, and R. F. L. Gosling has been doing well with his glider " Poodie," a pod-and boom type of 47 in. span. A flight of 1 : 47 was made with this model in poor weather. N. E. Davies made three very consistent flights of 1 : 45, 1 : 29 and 1 : 34 with his " Zipper."

The EASTBOURNE M.F.C. is to stage an extra special gala day in honour of their Wings for Victory Week on Saturday, June 12th, commencing at noon. The star turn of the day will be the National Cup, held on this day by special arrangement with the S.M.A.E. Events are being kept few in number because of transport, but if folk bring enough models, further events will be staged to accommodate them. The flying ground, on the Marshes, is opposite Rodmill Farm in Kings Drive. There is (so far) no ban on entry to the district, but it is advisable to let Mr. Towner know of intended attendance, so that in the event of a sudden restriction he can get in touch with competitors and save them a needless journey.

This club made a good showing in the Gamage, and put in 14 of the 15 possible flights in this event, only one model being unfit to complete its three flights. J. Finch won an earlier contest with a total of 3 : 55·7, L. Downer placing second with 2 : 26·8. H. J. Towner won the nearest to 45 seconds (not very !) with a time of 37·7. This chap has been seen recently flying his ten-year-old " Brisfit " r.t.p., while his well-known " Hornet Moth " (now five years old) flew a nice 23 seconds on half turns after a long period of retirement.

The BIRMINGHAM M.A.C. has nearly trebled its membership during the past year, numbering approximately one hundred enthusiasts. Mr. Hassall, in conjunction with " Rip," arranged a special demonstration before the French Chamber of Commerce, under the direction of Sir Robert Bird. Incidentally, congratulations to junior member " MacMillan " for his effort in the London Wings for Victory Week. The Birmingham Club have a unique system in operation, by which members can qualify for various types of certificate, each carrying points which are totalled at the end of the season, the high point man winning a special cup. This certainly stimulates interest throughout the season.

The BLACKHEATH M.F.C. had strong sunshine but a very strong wind for the Gamage Cup, and though thermals were present, models were very quickly blown out of them. Over twenty members with about thirty models turned up, but owing to the high damage rate, only ten were able to compete. C. H. Saunders was top man, his lightweight model flying like a blown leaf! This club is going all out for an extra special Gala Day this year—the date is July 18th—the place—Epsom Downs. Full details will be announced later.

BUSHY PARK M.F.C. carried out a full winter programme, including a dance in aid of the Red Cross which raised £15. 10s. 0d. Their Wings for Victory Exhibition was not a great success, mainly owing to the lack of advertisement and the separation of the model and R.A.F. sections. Furthermore the show was not properly supervised, resulting in four valuable solid models being stolen, and a dozen damaged structurally!

Flying of any sort is at a standstill with the MOTHERWELL Y.M.A.C. owing to lack of rubber for indoor stuff, and shortage of decent weather for outdoor activities. Their first official Open Day staged on the 18th April was a complete washout owing to a terrific gale. 'Twas ever thus!

Some of last season's survivors were patched up by the STEWARTON M.A.C. for the Gamage event (models, of course, not members!), but after one Wakefield model had been blown over a quarter of a mile in 37 sec. the lads gave it up as a bad job. Clubs in the Ayrshire district have got together and formed the Ayrshire Aero-Modellers' Association, and any clubs not yet in this group are asked to get in touch with J. S. McChesney, H. G. School, Dalmellington. Seems like an offspring of the pre-war Area Scheme that was doing so much for the Provincial clubs. Shall be pleased to hear more of this project.

The TOLLCROSS & D.M.F.C. are organising an inter-club stunt on the 20th June, when four types of competition will be held, consisting of Open Duration, Open Sailplane, Nomination, and Glider Spot Landing. All intending competitors should apply for entry forms to F. Ellis, 24, Eversley Street, Tollcross, Glasgow, " enclosing a 2½d. stamp for reply." I likes that last bit I do!

W. Louch won the cup for best flight of 1942 in the SOUTH BIRMINGHAM M.A.C. with a time of 8 : 22 o.o.s., this standing as the club record. The cup for glider flying went to R. H. Greaves for a flip of 1 : 12 winch launch. This club, which now numbers over 30 members, has applied for S.M.A.E. affiliation.

The model lost by Mr. Jones of the AYLESTONE M.F.C., mentioned in last month's news, has been found some 7 miles from point of launching, estimated time in the air being 1¾ hours.

The DALMELLINGTON YOUTH WELFARE M.A.C. has now reached its record membership of 35. Club record of 1 : 50 is held by J. S. McChesney.

The PENN M.A.C. has been reformed, and has ideal facilities at St. Oswald's Church Hall, Wynchcombe Avenue, Penn, Wolverhampton. There is plenty of room for r.t.p. flying, and there is access to a much larger hall if necessary. A meeting will be held on the 18th May to which all interested are invited.

Another club to stage an Open Day is the WEST YORKSHIRE M.A.S., who are holding their stunt at their ground at Thornhill, Dewsbury, on the 6th June, commencing at 2 p.m. R.O.G. boards and glider winches are to be provided, and there will be h.l. and r.o.g. Duration events, winch launch Gliders, and a Nomination contest. Two interesting models to make their appearance are Farrence's " Diasphere," fitted with slots and flaps, and which gives a really phenomenal climb, and Oldroyd's " Georgette " (streamlined version of " George ") which is also putting in some good flights. Did you hear of the member who, after flying his model all day in a howling gale was congratulating himself on having sustained no damage, when an over-interested spectator trod on it! Oh death, where is thy sting!

The North Coventry Club has decided to drop the " North " from its title, and from now on will be known as the COVENTRY M.A.C. Miss Betty Rose is the new Secretary ; address : 93, Bell Green Road, Coventry.

K. Upton has raised the DOWNHAM & D.M.A.C. indoor record to 1 : 18 with a model of his own design. This club has changed its meeting place, new address being Goldsmith's Community Centre, Castillion Road, Downham, and meeting time 7.30 p.m.

News still comes in of newly formed clubs, and this month's list is quite widespread. A. F. Penn, of 36, Crowther Road, Stockland Green, Erdington, Birmingham, notifies the formation of the NORTH BIRMINGHAM M.A.C., meetings Friday evenings at Marsh Hill Schools, and Sundays at Sutton Park.

Another is the AINTREE M.A.C., meetings every Tuesday and Thursday evenings. Interested chaps are asked to contact the secretary, A. Dyer, at "Forest How," Field Lane, Liverpool, 10.

Those interested in the formation of clubs in the Forest Gate or Plaistow districts are asked to get in touch with W. Graves, 53, Henderson Road, Forest Gate, or R. W. Roberts, 70, Howards Road, Plaistow.

E. Mitchell, of 16, Sunray Avenue, Tolworth, Surrey, has two bound volumes of "World Wonders of Aviation," and ten volumes of Hutchinson's "Pictorial History of the War" (total value £10) to swap for a 6 or 9 c.c. engine complete. Any offers?

Another type of swap is offered by L. P. Spink, of 46, Babington Road, Dagenham, Essex, who wishes to exchange a 10 c.c. Hallam engine for a 3 c.c. job.

And that, I think, is the lot for this time. Let's hope that the weather improves for the competitions to come, and that models are spared to fly more than once! One cannot afford to bust too many efforts nowadays, so here's hoping. And to all those competing from now onwards, the slogan to address all models is the Western Brothers fruity "Get up them stairs!"

The CLUBMAN.

NEW CLUBS.

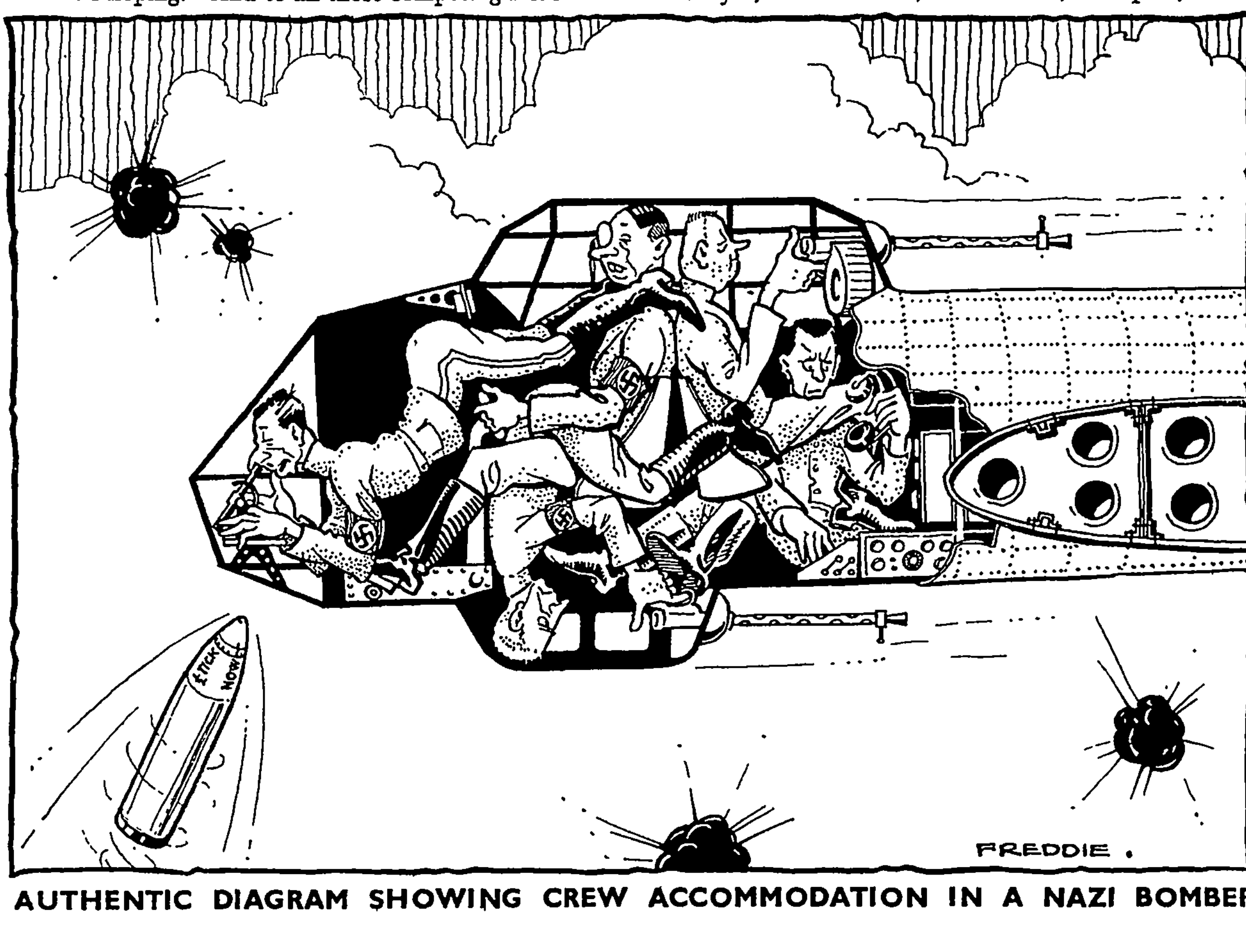
STOCKPORT & D.M.A.C.
B. Couch, 38, Tatton Road South, Heaton Moor, Stockport.

PENN M.A.C.
D. Newman, 33, Fancourt Avenue, Penn, Wolverhampton.

CARLISLE PARK M.A.C.
D. C. Beeks, 105, Priory Road, Hampton, Middlesex.

NORTH BIRMINGHAM M.A.C.
A. F. Penn, 36, Crowther Road, Stockland Green, Erdington, Birmingham.

AINTREE M.A.C.
A. Dyer, "Forest How," Field Lane, Liverpool, 10.



AUTHENTIC DIAGRAM SHOWING CREW ACCOMMODATION IN A NAZI BOMBER

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