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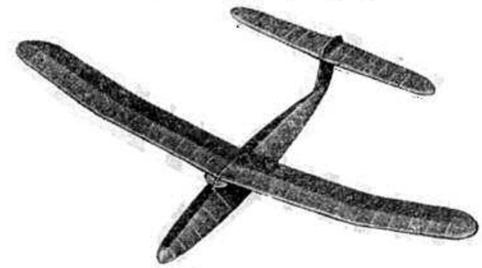

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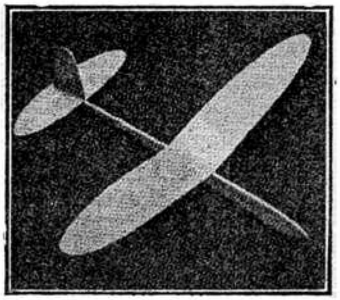

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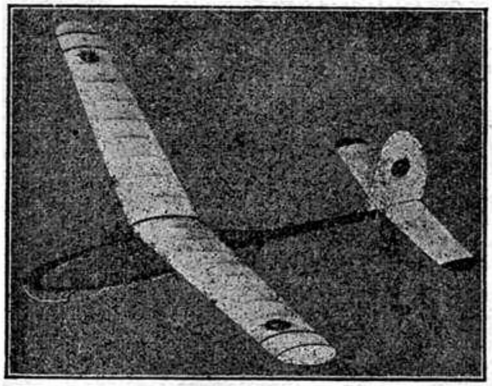

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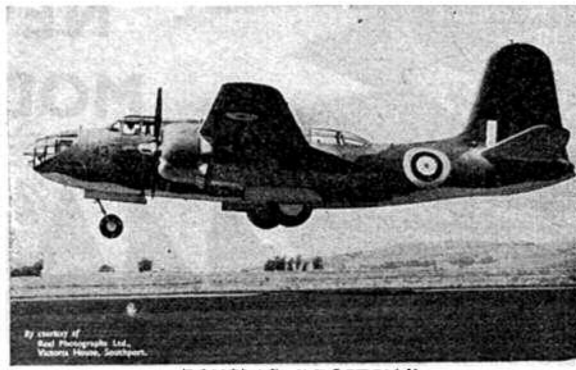

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EDITORIAL

NEWS from occupied countries is scarce and little has been heard during recent years of what has happened in such countries as Holland, Denmark, France, Sweden, Jugoslavia and so on. However, we are able to complete the series of articles on Continental Model Sailplanes with an article on conditions in Norway and Sweden, by a Norwegian aero-modeller who recently arrived in this country. We print it in exactly the words and style in which he sent it to us, and feel that despite its grammatical shortcomings it is a remarkably good effort in view of his short residence in this country and time he has had to learn our language.

An apology.

To those readers who sent in orders for plans of the Typhoon as illustrated in the centre pages of the last issue, we offer our sincere apologies for the delay in despatching their plans. The series of incidents and delays were not wholly our responsibility, but were due mainly to war-time conditions and priority work preventing the completion of the printing and distribution, which we greatly regret.

Despatches against all orders were recently made, and we trust that readers will forgive us on this occasion. In regard to the Tiger-Moth illustration in this issue, we are able to say that ample supplies of the plans are *already in stock* as this Editorial is written, and therefore readers may rely on immediate attention to the orders.

"Moore Drive."

Owing to a drop in a line of type it was not made clear in the paragraph published in our last issue in connection with the "Moore" Drive, that it was permissible for any individual reader to manufacture for his own use units of the Drive, *only* with the permission of the patentee, Mr. Moore. As it stands, the paragraph conveys the impression that any reader may construct, for his own use, any patented article, but he must not produce quantities for sale. That statement is incorrect. The whole purpose of patents is to reserve to the patentee the *sole* manufacturing rights. In the case of the invention referred to, Mr. Moore has authorised us to say that he gave his permission for readers to construct units for their own personal use; but as noted above, this line was omitted from our Editorial.

A.F.P. Volume III and IV.

On behalf of our associates, the Harborough Publishing Co., Ltd., we are pleased to announce that ample stocks of Volume III of "Aircraft of the Fighting Powers" are now available at local model shops and our office at Leicester. It is much regretted that in the early part of this year such slow deliveries were made, and the explanation of this is that the firms who had undertaken the binding of this book were swamped with Government Priority Orders which resulted in a very small part of their labour being available for the binding of outside work.

The Harborough Publishing Co., Ltd., has remedied this by starting its own Binding Works, which, during the last two or three months has pulled up with arrears and enabled stocks to be distributed.

On the back outside cover of this issue appears an announcement in regard to Volume IV, together with a list of contents, stating that this volume will be published on Monday, 29th November. Preparation of this volume is well up to schedule, and now that it has its own binding facilities, the Harborough Publishing Company is confident that, barring an earthquake, it will be able to give good deliveries on the publishing date. It is now ready to accept orders, which will, of course, be dealt with in strict rotation.

On the two pages following this Editorial are reproduced a 1/72 scale plan and the appropriate photograph and text matter, descriptive of one of the aircraft which will be described in Volume IV. This will give readers who are not yet familiar with the book a clear idea as to its make up.

D. A. R.

CONTENTS OF THIS ISSUE

FLEETWINGS BT-12

Manufacturers.—Fleetwings, Inc., Bristol, Pennsylvania.

Purpose.—Two-seat basic training monoplane for the U.S. Army.

Power plant.—One Pratt and Whitney Wasp Junior R-985-25 air-cooled radial motor. Maximum level power: 450 h.p. at 2,300 r.p.m. at sea level; cruising output: 300 h.p. at 2,000 r.p.m. at 6,500 ft.

Construction.—Wings: Constructed entirely from spot-welded stainless steel except wing tips, which are of moulded wooden construction and removable. Stainless steel covering over the first 40 per cent. of the wing forming a torque box, aft of this point being covered with fabric over stainless steel ribs. Stainless steel ailerons with fabric covering. Slotted trailing-edge flaps in four sections between the ailerons and the fuselage of spot-welded stainless steel with fabric covering. NACA 23016 aerofoil section at root tapering to NACA 4408 section at the tips. Fuselage: Semi-monocoque structure built up of electrically spot-welded and arc-welded stainless steel and chrome-molybdenum steel tubes with monocoque upper and lower decks aft of the cockpits. Covered with removable moulded wooden panels and fabric. Tail unit: Stainless steel structure of cantilever design with stainless steel sheet covered fixed surfaces and fabric-covered movable surfaces. Tailplane aerofoil section: NACA 0009. Undercarriage: Fixed, cantilever type with faired Cleveland oleo-pneumatic shock-absorbers. Hydraulic wheel brakes. Fixed tail wheel. Hamilton-Standard two-blade controllable-pitch airscrew.

Dimensions.—Span: 40 ft. 0 in. Length: 29 ft. 2 in. Height: 8 ft. 8 in.

Areas.—Wings: 240.42 sq. ft.

Weights.—Empty: 3,480 lb. Loaded: 4,690 lb.

Loadings.—Wing: 18.5 lb./sq. ft. Power: 9.9 lb./h.p.

Tankage.—Petrol: 120 U.S. gallons. Oil: 13 U.S. gallons.

Performance.—Maximum level speed: 173 m.p.h. at rated altitude; operating speed: 150 m.p.h.; landing speed: 61 m.p.h. Climb: 1,600 ft./minute. Service ceiling: 18,000 ft. Range at operating speed: 990 miles.

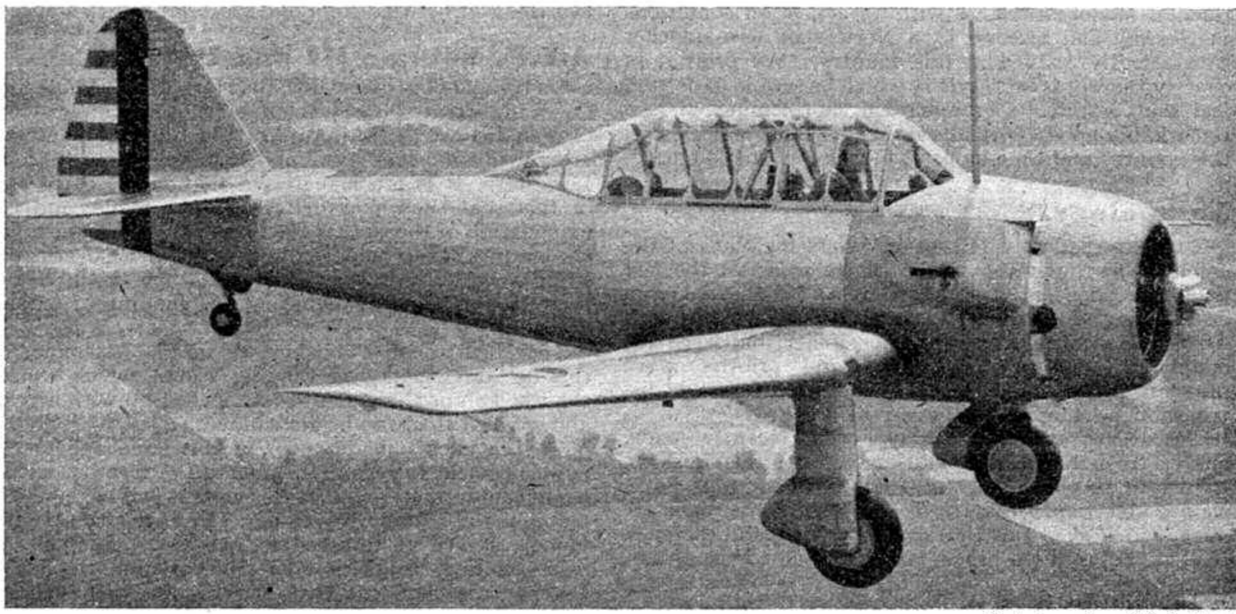


Photo by courtesy of Rudy Arnold.

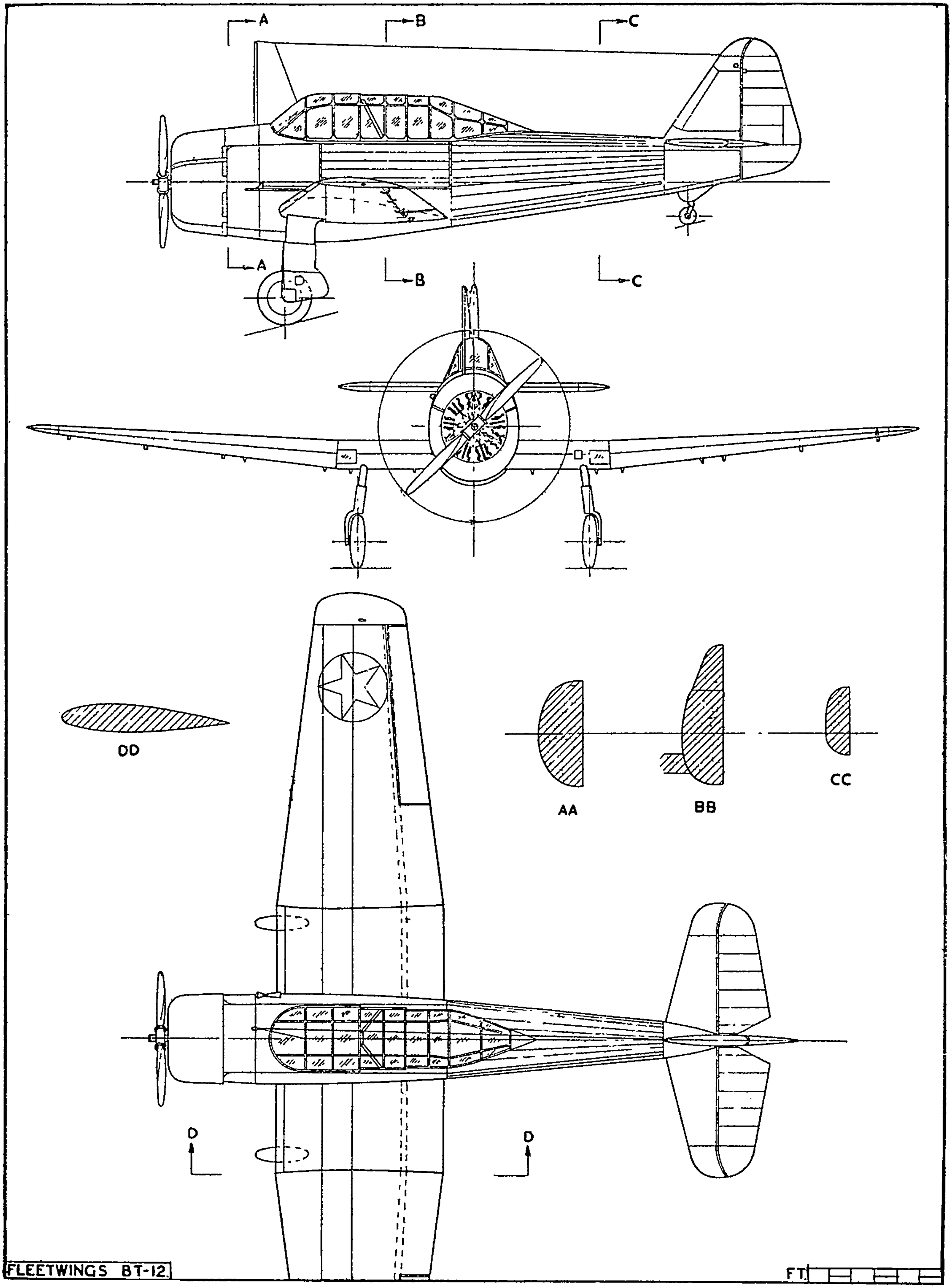
MANY pilots consider the Fleetwings BT-12 basic training monoplane to be the best all-round aeroplane in that category and comment most favourably on its handling qualities. The method employed in the construction of the BT-12 is distinctly unusual and calls for comment. The BT-12, as will be seen in the specification above, is built of stainless steel and it is the first welded stainless steel aeroplane to be used in quantity by any air force in the world.

Until 1939 the Fleetwings concern occupied itself almost exclusively in research work, and has a greater experience of stainless steel construction than any other factory in the world. They carried out much sub-contract work for other aircraft factories in which they gained experience in the stainless steel technique by manufacturing components in this material to outside drawings. Fleetwings manufactured the stainless steel spot-welded ailerons for the Vultee Vigilant liaison monoplanes used by the U.S.A.A.F. and the R.A.F. Army Co-operation Command. Other sub-contract work was carried out for the Seversky (now Republic) concern, and stainless steel wing panels for P-35 pursuit monoplanes were produced.

All the fruits of the foregoing experience have been embodied in the BT-12, which first appeared in 1941 as the XBT-12 or Model 23. Concurrently, a primary trainer, also employing stainless steel, the Model 33, was built. The basic trainer was awarded large Army contracts but the primary was rejected.

The Fleetwings BT-12 bears a superficial resemblance to the North American Texan (Harvard) basic training and basic combat monoplanes. It is rather smaller than the North American and a good deal lighter despite the steel construction. The speed is lower but the climb is better. In flight the Fleetwings BT-12 may be distinguished from the North Americans by the shape of the wing panels. Whereas all the taper is on the leading edge of the North Americans the Fleetwings has equal taper on leading and trailing edges outboard of the centre-section.

Fleetwings BT-12s in service are all silver, and carry the usual regulation markings.



FLEETWINGS BT-12.

ATTACHMENT TO SOLDERING IRON

By W · E · MARREY

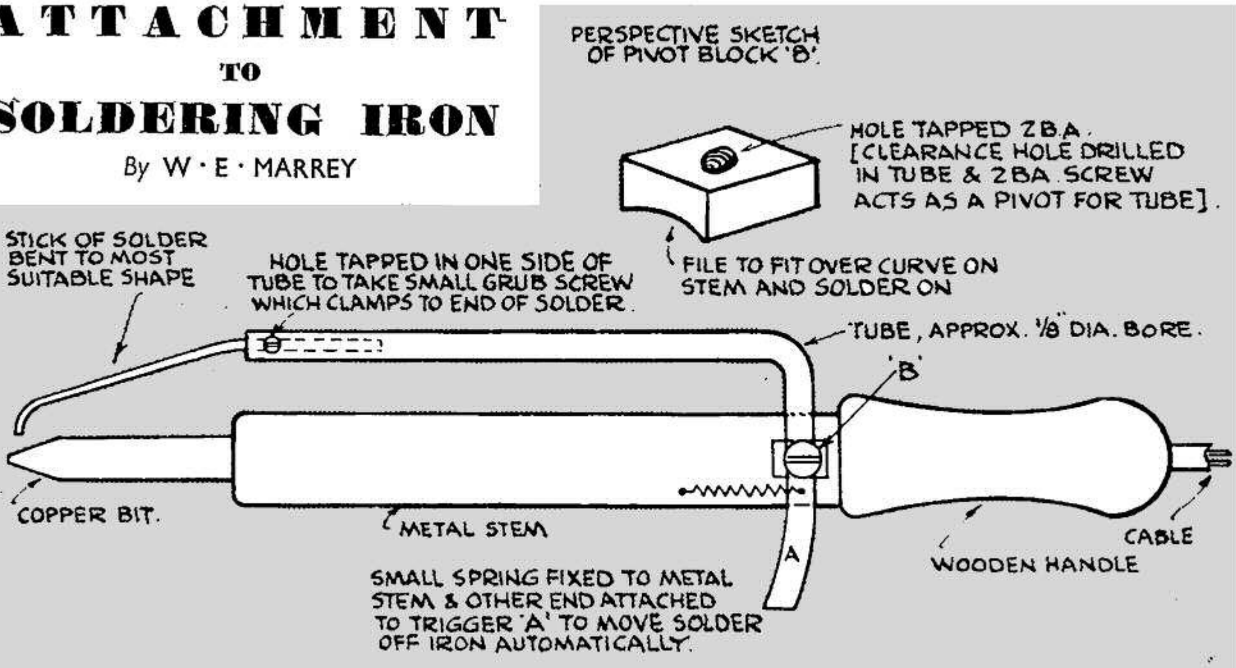


DIAGRAM SHOWING HOW TO MAKE A VERY USEFUL ATTACHMENT FOR AN ELECTRIC SOLDERING IRON. IT IS OFFERED AS A SOLUTION TO THE PROBLEM OF HOLDING ELUSIVE WIRE PARTS AT THEIR CORRECT ANGLE WITH ONE HAND & PUTTING SOLDER ON TO THE IRON WITH THE OTHER HAND WITHOUT UPSETTING THE ANGLE OF THE WIRE TO BE JOINED.

BALSA SUBSTITUTE

By J · D · SIBLEY

In these days when 1/64 in. sheet balsa is about as easy to come by as a pound out of the till, so to speak, plain glazed paper about 1/200 in. to 1/250 in. thick may be used as a substitute with quite satisfactory results. Naturally this paper, when doped, will turn out heavier than balsa, but in the case of gliders, which can often afford to be heavier, size for size, than the duration type model, the extra weight will not come amiss.

For normal duration type models and gliders, the leading edge may be covered top and bottom back as far as the main spar in the usual way. Capping strips may be used with very thin ribs. On the lighter duration model only capping strips are needed, and they should be kept fairly narrow.

When the glue has set, two coats of dope are applied fairly thickly and during the second coat the tissue is applied.

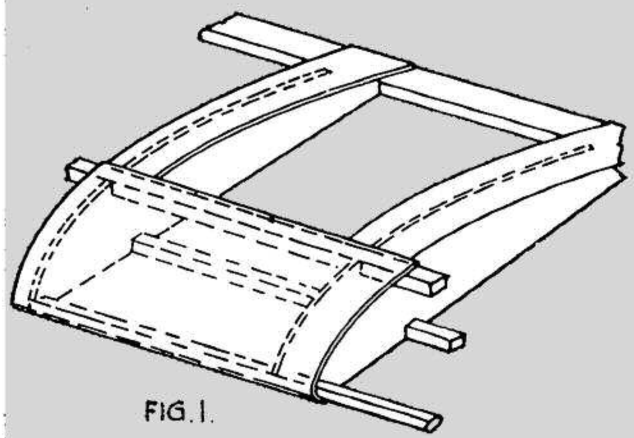


FIG. 1.

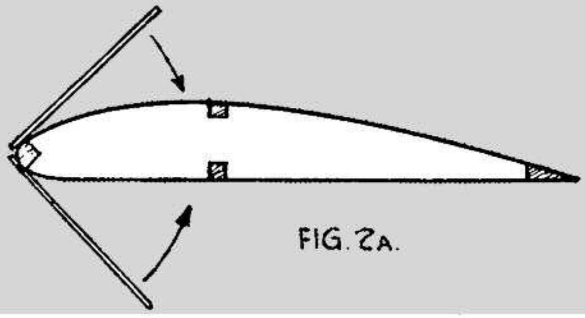


FIG. 2A.

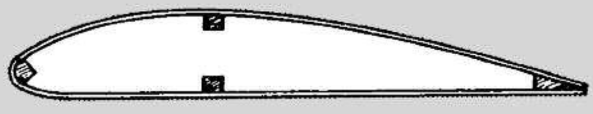


FIG. 2B.

NATURE'S SAILPLANES

BY FRANK W. LANE

Silver gulls in flight. They are amongst the most graceful of seabirds as can be seen from the various attitudes of flight captured above. Photographed by R. K. Monro, Victoria, Australia.

"THERE is no doubt that bird flight has in the past acted as a great stimulant. Almost without exception, the early pioneers have paid tributes to the knowledge they have gained in this way."—J. L. Nayler, F.R.Ae.S., Secretary of the Aeronautical Research Committee.

The ability to travel through air is found among a wide variety of animals. There are "flying" snakes which, by pushing their ribs outwards to their full extent and drawing in their bellies until they present a concave surface to the air, can glide safely to earth from a considerable height.

Then there are "flying" lizards which have a parachute-like web on each side of the body, supported on mobile ribs. When the lizard is at rest the webs are folded against its sides, but when it makes a long leap these membranes are spread out and look like short rounded wings, although they cannot be flapped. Although their bodies are less than five inches long these lizards can glide ten yards at a time.

"Flying" frogs, squirrels and opossums are also found but perhaps the most interesting of the mammalian gliders is the cobego. This little animal is equipped with an expanding membrane that runs from elbow to knee and when, with hands and feet outspread, it takes off from a high tree it can travel a long way through the air. Sometimes a cobego sails through the air with one of its young on its back.

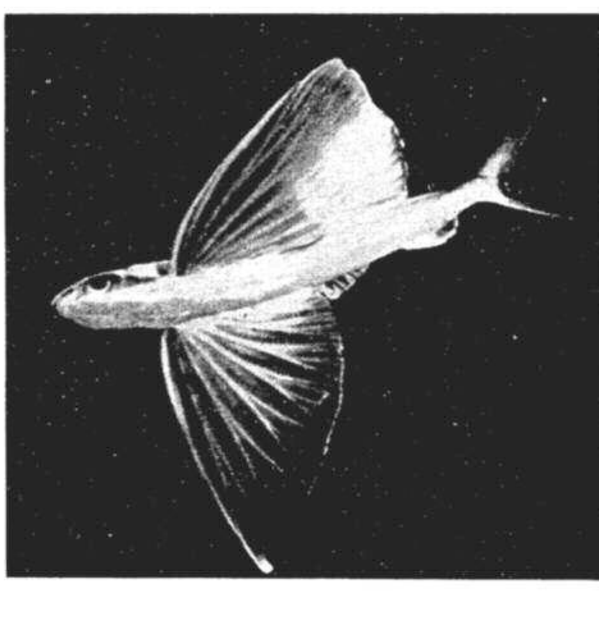
In gliding from tree to tree the cobego can cover a distance of 70 yards and descend only 35 feet in the process. It probably has some power of guiding its flight as otherwise it would have little chance over such a distance of alighting exactly upon a tree trunk. In fact one observer says he has seen it give a flap when changing direction, so that it comes very near to true flight.

It is surprising to learn that no less an authority on soaring flight than Dr. Hankin says of the flying fish, "It is by far the most efficient of existing soaring animals in respect of power of carrying weight in a horizontal direction." The flying fish gets its initial impetus from a rapid sculling movement of the lower lobe of the tail. The fish can reach a height of over 20 feet, travel a distance of a quarter of a mile and attain a speed, under favourable conditions, of some 50 miles an hour.

A flying gurnard, which is heavily built and whose large conical head is cuirassed with heavy plates, once hit a sailor a head-on blow between the eyes as the man stood at the wheel of a schooner and knocked him senseless!

Dr. Hankin has examined flying fish from an aerodynamical point of view and has reported the following points. A fish weighing some 45 grammes was found to have a wing-loading, including the hind wings, of 1·57 lb. per sq. ft. The wings of the flying fish consist of a thin membrane supported on fin rays. As in the case of soaring birds the flying fish possesses a number of ridges, transverse to the line of flight, on the under-surface of the wing.

Probably the best photograph of a flying fish ever taken. It was shot at 1/10,000th of a second by Dr. H. E. Edgerton, well-known exponent of high speed photography.



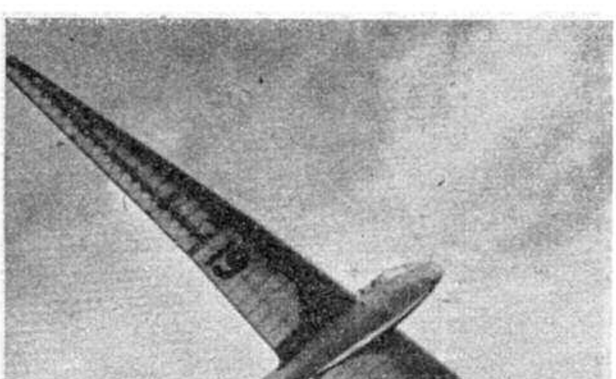
Photograph by A. E. Slater

Dr. Hankin writes of these ridges : " Such transverse ridges are present on the wings of all the more efficient soaring animals. It is of interest to notice that they are more numerous in the case of the flying fish than with other soaring animals."

Dr. Hankin adds that an inherently stable model airplane which was made had an arrangement of the supporting and rudder surfaces which was similar to those found in the flying fish. Perhaps enough attention has not been paid to the aerodynamics of the flying fish by those concerned with the problems of mechanical flight.

Before dealing with the greatest natural sailplanes of all, the birds, there are two members of the vegetable kingdom which deserve mention. When the seeds of a maple tree fall to the ground they are attached to a remarkable natural parachute—the shape and ribbing of the seedpod cause it to spiral as it begins to fall.

It is of interest to note that this natural parachute has been followed almost exactly by an American inventor in designing a revolving parachute to be used for dropping letters and small packages from airplanes. The advantage of this type of parachute is that the harder it is thrown into the air the sooner it starts to whirl, and it can therefore be dropped from low altitudes that would not give the standard parachute time to open. The inventor admits that he got the idea for this parachute from watching maple tree seedpods spiral gently to earth.



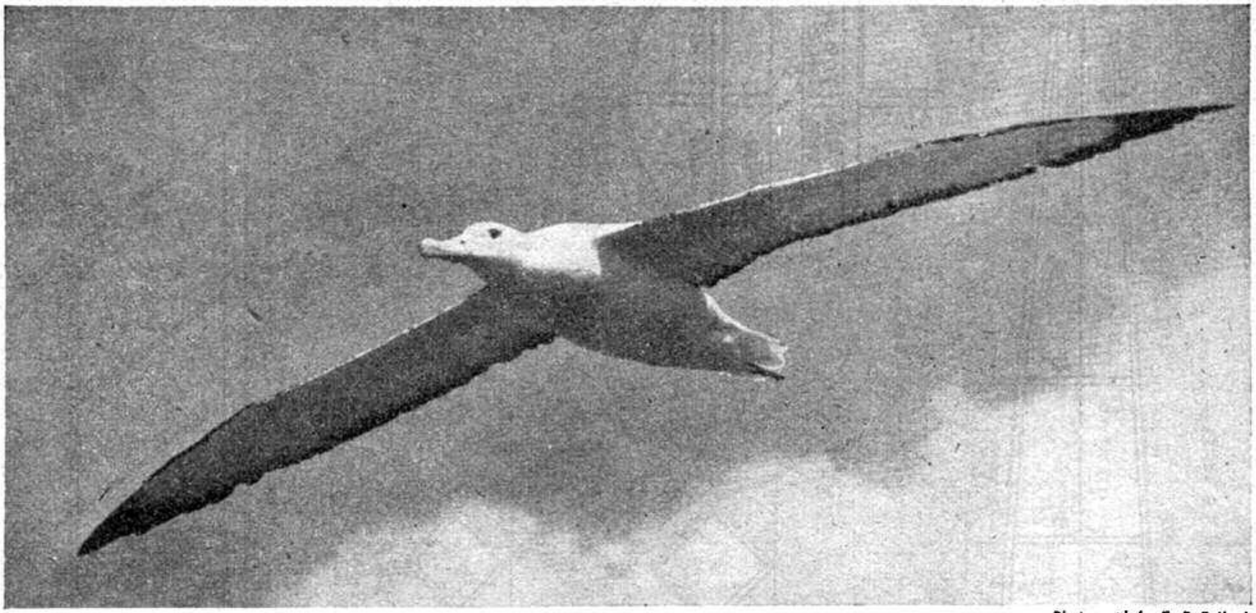
Photograph by A E. Slater.

The other soarer of the vegetable kingdom is the zanonia seed. It is able to soar aloft in suitable winds for a long time. It is so well designed with its membraneous lobes and so well balanced and stable in soaring that it was taken as a model by a German airplane designer in order to develop a very stable wing. Some of the older types of Focke Wulf airplanes were constructed with this type of wing.

The greatest natural sailplanes are, of course, the birds. Before dealing with their actual soaring technique it might be well to recall a few facts about the medium in which they travel. Although in popular parlance we talk of things being as " light as air " it should be remembered that a large mass of air has considerable weight and therefore supporting and carrying power. The air in a tank measuring 50 ft. by 30 ft. by 18 ft. weighs about a ton !*

But in spite of its appreciable weight air is practically non-compressible, in fact its density can be regarded as constant for all velocities up to that of sound. On this point Alan E. Slater, who has had considerable experience of gliding, writes to me : " Normally, an object moving through air does not compress it appreciably, because the molecules of air can get out of the way owing to their great velocity. This velocity is comparable with the speed of sound ; so that, if an object moves through air with the speed of sound, it compresses the air in front of it, as the molecules cannot get out of the way fast enough ; this adds greatly to the resistance to

* The great strength of high-speed winds can be gathered from the fact that long dirigibles have been literally sheared apart when straddling strong opposing currents.



Photograph by E. F. Pollack

the object's movement." It was ignorance of this quality of air which was responsible for some of the misleading theories about flight held by Leonardo da Vinci and other early pioneers. (Perhaps the theorist who said a swallow had to develop 40 horse-power in order to fly was overlooking this quality of air !)

These facts, of course, have an important bearing upon the subject of streamlining and airflow around any body designed to travel through air. One of the most startling examples of the importance of these facts was provided when the U.S. Navy's new dirigible, the *Akron*, was launched some years ago. All the minute hairs on the ship's body had to be slicked down before maximum speed could be reached. The nap of the covering fabric was painted by hand in brush strokes from fore to aft so that all the fibres were laid flat. Otherwise the air resistance would have cut down the speed to an appreciable extent.

All the aerodynamics involved in sailplaning, whether by men or birds, are not known, but certain principles appear to be generally accepted by students of the art.

Soaring is possible in several kinds of air currents. High ground causes winds blowing against it to be deflected upwards. Prof. D. Brunt says : " When the wind blows up the side of a hill the horizontal flow of the air is disturbed up to a height of about three times the height of the hill." The upward currents thus created can be used for soaring.

Some investigators have asserted that the air naturally has a tendency to blow upward at an angle of three or four degrees.

The sun, by heating the atmosphere, causes many rising air currents or thermals. The upward force of these currents is sometimes very strong. Pilots have reported that when flying over an area where heat-radiation is intense their machines have risen several hundred feet in a few minutes without the controls being altered at all.

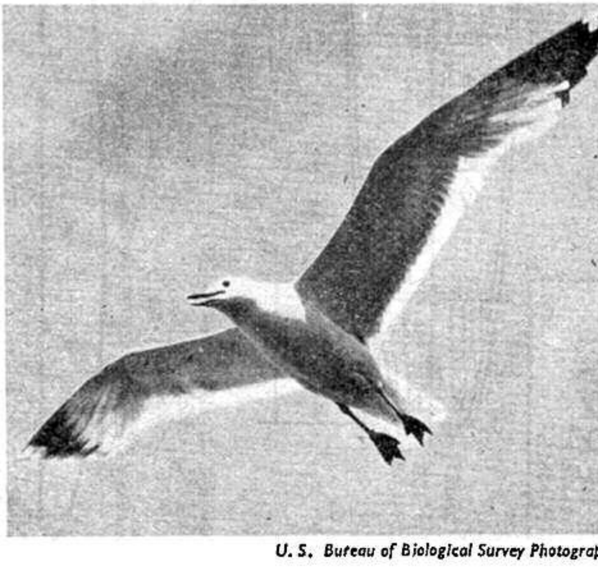
There are several other wind factors making for soarability. Over the sea air turbulence caused by the movements of the water enables that superb soarer the albatross to travel for miles only a few feet above the wave tops.*

TO BE CONTINUED NEXT MONTH

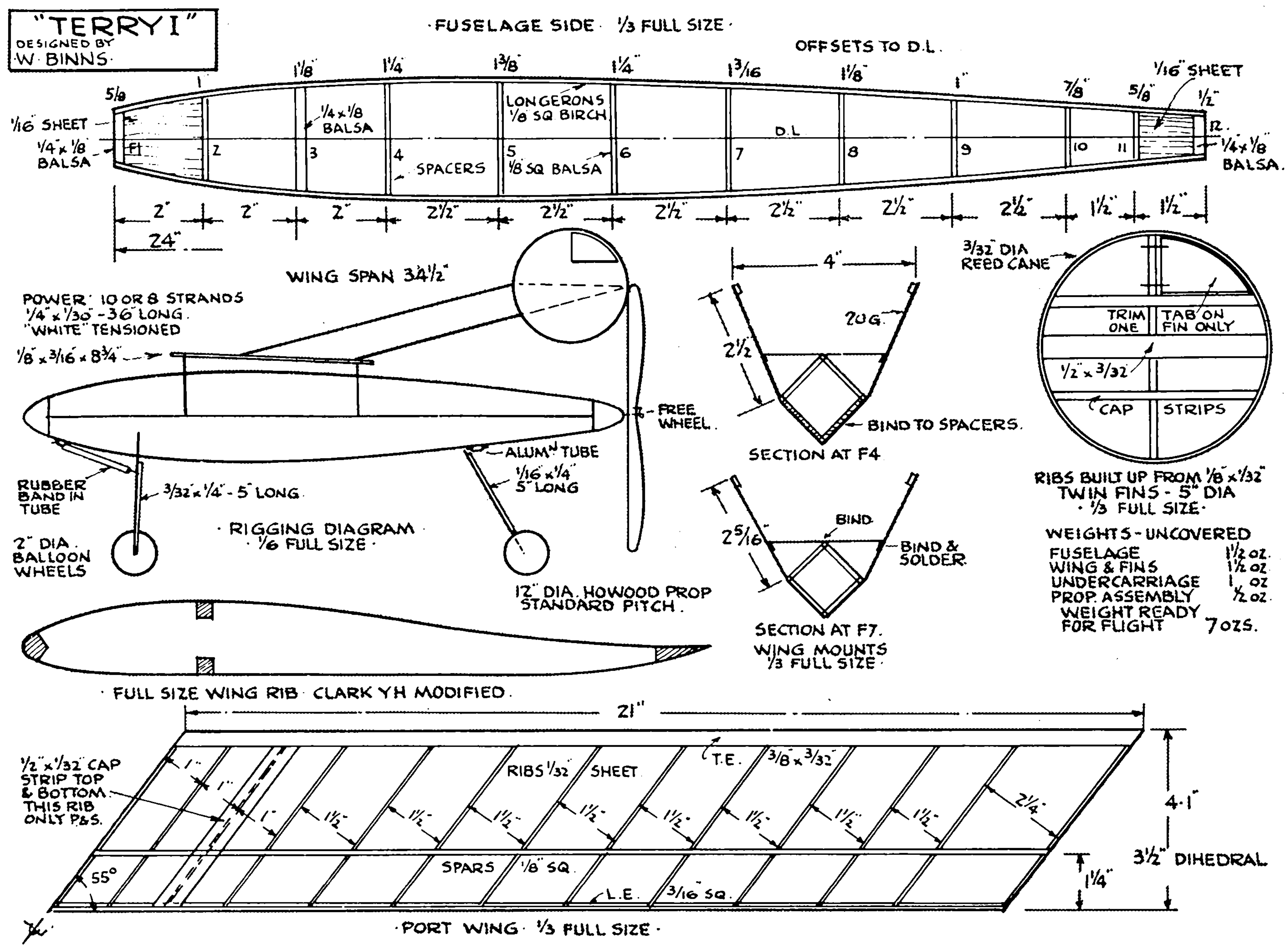
* Pelicans can sometimes be seen racing along just above the crest of a long rolling swell before it breaks on the shore.

PHOTOGRAPHS.

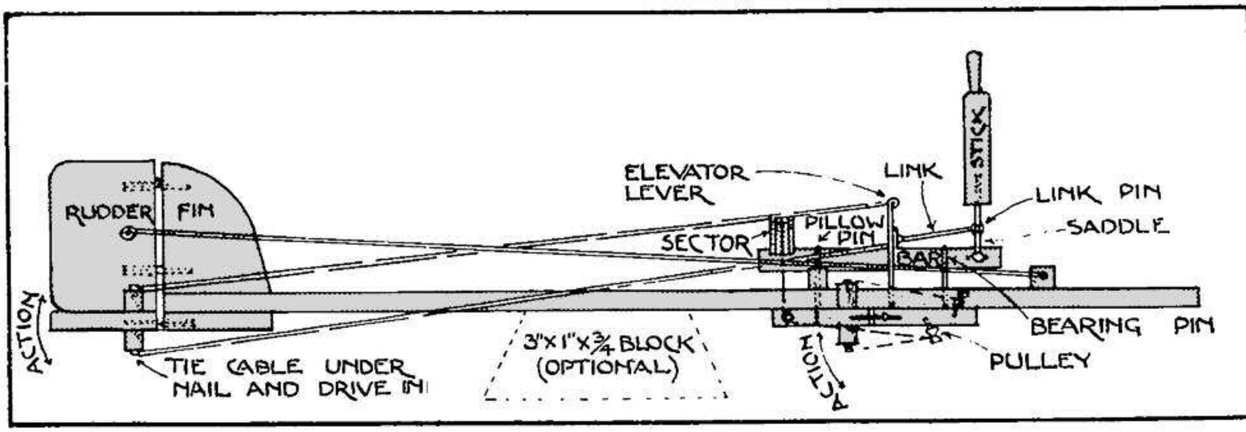
Photo' top left is of the " Gull " Sailplane. This machine made the first soaring flight across the English Channel on 22nd April, 1939, between Dunstable and Boulogne piloted by G. H. Stephenson. Compare it with the photograph of the albatross shown top right. Here the strength and superb grace of this magnificent sea bird is fully portrayed. One of these birds has been known to follow the same ship for 3,000 miles ! Dr. William Beebe puts the maximum speed of an albatross at 100 m.p.h. Bottom left is the British Sailplane " Petrel " being launched by winch cable. Once again compare it with a Californian gull shown bottom right. The similarity between plane and bird is truly remarkable. For sheer beauty of form and flight though, Mother Nature far exceeds any man-made contrivance.



U. S. Bureau of Biological Survey Photograph



"TERRY I"
DESIGNED BY W. BINNS.
FUSELAGE SIDE 1/3 FULL SIZE
OFFSETS TO D.L.
5/8" 1" 1 1/8" 1 1/4" 1 3/8" 1 1/4" 1 3/16" 1 1/8" 1" 7/8" 5/8" 1/2"
1/16" SHEET
1/4 x 1/8 BALSA
1/4 x 1/8 BALSA
LONGERONS 1/8 SQ BIRCH
1/8 SQ BALSA
SPACERS
D.L
F1 2 3 4 5 6 7 8 9 10 11 12
1/16" SHEET
1/4 x 1/8 BALSA.
2" 2" 2" 2 1/2" 2 1/2" 2 1/2" 2 1/2" 2 1/2" 2 1/2" 1 1/2" 1 1/2"
24"
WING SPAN 34 1/2"
POWER: 10 OR 8 STRANDS 1/4" x 1/30" - 36" LONG. "WHITE" TENSIONED
1/8" x 3/16" x 8 3/4"
FREE WHEEL.
ALUM^N TUBE
1/16" x 1/4" 5" LONG
RUBBER BAND IN TUBE
3/32" x 1/4" - 5" LONG.
2" DIA BALLOON WHEELS
RIGGING DIAGRAM 1/6 FULL SIZE
12" DIA. HOWOOD PROP STANDARD PITCH.
4"
2 1/2
20G.
BIND TO SPACERS.
SECTION AT F4
2 5/16"
BIND
BIND & SOLDER.
SECTION AT F7.
WING MOUNTS 1/3 FULL SIZE
3/32" DIA REED CANE
TRIM ONE
TAB ON FIN ONLY
1/2" x 3/32"
CAP
STRIPS
RIBS BUILT UP FROM 1/8" x 1/32"
TWIN FINS - 5" DIA
1/3 FULL SIZE
WEIGHTS - UNCOVERED
FUSELAGE 1 1/2 oz.
WING & FINS 1 1/2 oz.
UNDERCARRIAGE 1 oz
PROP. ASSEMBLY 1/2 oz.
WEIGHT READY FOR FLIGHT 7 ozs.
FULL SIZE WING RIB CLARK YH MODIFIED.
21"
1/2" x 1/32" CAP STRIP TOP & BOTTOM THIS RIB ONLY P&S.
1" 1" 1" 1 1/2" 1 1/2" 1 1/2" 1 1/2" 1 1/2" 1 1/2" 1 1/2" 1 1/2" 2 1/4"
RIBS 1/32" SHEET
T.E. 3/8 x 3/32"
SPARS 1/8" SQ.
L.E. 3/16" SQ.
55°
4.1"
3 1/2" DIHEDRAL
1 1/4"
PORT WING 1/3 FULL SIZE



Making a MODEL to show AIRPLANE FLIGHT CONTROL

By JOHN · Y · DUNLOP

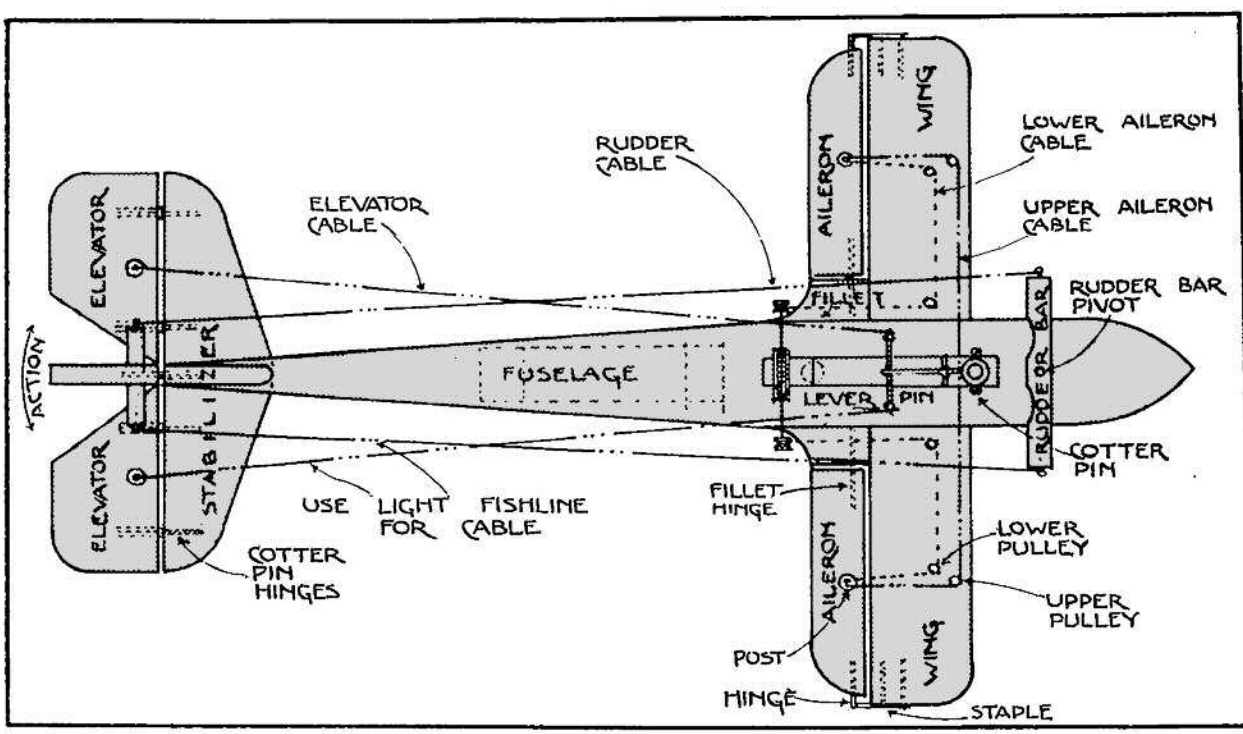
TO those who are interested in the fundamental theory of flight of the airplane this model presents the movements of the principal parts. A few strips of ¼ in. or 3/16 in. thin wood, several paper clips, a couple of common pins, some fishline cord are about all the needed materials.

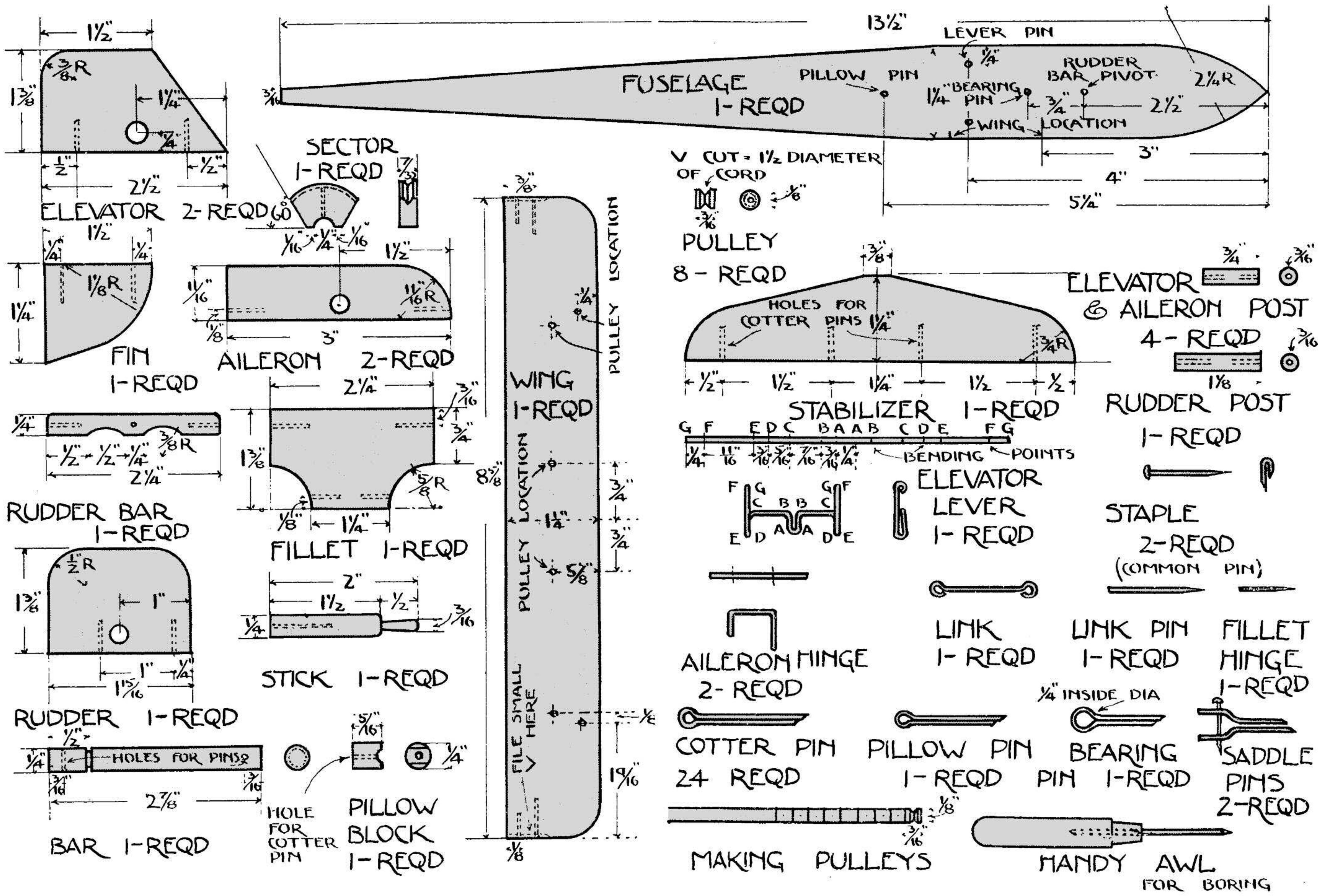
The model lends itself to mass production of parts, if a band or jig saw is available. The pulleys, probably the most difficult of the parts, could be made by the hundred on a speed lathe.

In so far as possible all necessary details, including some operations and a list of the tools, have been placed on the drawing. All the parts should be drawn out to the sizes shown then cut out with the coping saw, finished with a spokeshave and sandpapered up. Of course, drawing out the shapes embodies many principles and features usually used in machine drawing. The only extreme care necessary to bring about the proper motion of the parts is the centering of the holes, and the boring of these in true position. Care in hanging has also to be observed, most of the levers, pins and hinges are shown in the drawings. The elevator lever is made from paper clip wire. Drawings show the straight wire marked out ready to bend and a sketch of the bent up fitting. The saddle pins are really two cotter pins as shown, bent and placed together then pushed into the control column. These joints require careful boring and a good plan is to make up several handy awls of varying sizes as shown in the sketch.

Extreme care is also necessary to prevent play in the link and saddle assembly of the stick and bar. The cables must be kept taut and the pulleys well centred and free moving to prevent wear of the cords.

To operate the model push forward on the stick, depress the elevators and the plane should nose down or dive. A pull back on the stick raises the elevators and the plane would climb. To make a turn ease the control stick to the left or right simultaneously with the rudder. This raises one aileron and lowers the opposite one to provide bank in the direction of the turn. Full details of construction are shown overleaf.




FUSELAGE 1-REQD
13½"
LEVER PIN
PILLOW PIN
RUDDER BAR PIVOT
BEARING PIN
WING LOCATION
2¼R
2½"
3"
4"
5¼"
V CUT = 1½ DIAMETER OF CORD
PULLEY 8 - REQD
ELEVATOR 2-REQD
SECTOR 1-REQD
FIN 1-REQD
AILERON 2-REQD
RUDDER BAR 1-REQD
FILLET 1-REQD
WING 1-REQD
PULLEY LOCATION
FILE SMALL HERE
STABILIZER 1-REQD
HOLES FOR COTTER PINS
ELEVATOR & AILERON POST 4-REQD
RUDDER POST 1-REQD
BENDING POINTS
ELEVATOR LEVER 1-REQD
STAPLE 2-REQD (COMMON PIN)
AILERON HINGE 2-REQD
LINK 1-REQD
LINK PIN 1-REQD
FILLET HINGE 1-REQD
RUDDER 1-REQD
STICK 1-REQD
COTTER PIN 24 REQD
PILLOW PIN 1-REQD
¼" INSIDE DIA
BEARING PIN 1-REQD
SADDLE PINS 2-REQD
HOLES FOR PINS
BAR 1-REQD
HOLE FOR COTTER PIN
PILLOW BLOCK 1-REQD
MAKING PULLEYS
HANDY AWL FOR BORING

By J · L · ROBERTS

General.

The " Brisfit " went into service in 1917 and became, along with the D.H.9, the standard fighting reconnaissance and medium day bombing aircraft of the British Forces in France and the Middle East up to the Armistice. It had a Rolls " Falcon " engine of 250 h.p. which gave it a top speed around 120 m.p.h. and it could climb to 20,000 !

Eight small bombs were carried below the lower mainplanes, and the pilot was armed with a fixed Vickers gun mounted between the cylinder banks and firing through the radiator ; the observer had sight or twin Lewis guns on a standard Scarff ring mounting.

The " Brisfit " was well liked and a good crew could take on any pair of Fokkers with confidence of victory.

The Model.

Tail areas have been increased for stability, as had the dihedral. Rigging angles have been altered for a stable flying performance. I do *not* recommend this model as a beginner's type, as trimming and rigging are both tricky, and details are liable to break under rough handling. Fly on a calm day.

Fuselage.

First build two flat sides as per side elevation on plan, of 3/32 sq. in. *DO NOT* separate longerons at the tail yet. Assemble basic box structure by cementing in the frames F 3 and F 2 and the cross spacers in between the cockpits, top and bottom. True up and allow to set. Fit all the remaining cross spacers to the tail unit end, top and bottom. Fit and cement frames F 5, F 4, and F 1 into place. Next cement in the top centre stringer from the radiator to the pilot's cockpit. The remaining stringers and the exhaust pipe chamber lining of 1/32 in. sheet can now be cemented in place.

Note.—No spacers across the top longerons at A, B, C. The nose of the fuselage may now be covered with 1/32 in. sheet from the rear of the radiator back to the pilot's cockpit. Cement the sheet covering to the sloping top longerons and trim ; it ends at the vertical bracing member at A, *i.e.*, above the front undercarriage leg position. The underneath of the nose is covered with 1/32 in. sheet back to A from F 1. Cut away the covering over the exhaust chambers, and to shape at the pilot's cockpit. Cover the fuselage aft of the sheet covering with strong tissue, spray, shrink dope, and give two coats of olive green dope. The underside is covered with natural tissue (not white) and left with two coats of clear dope. Addition of windscreen, scoops, louvres, Aldis sight, bead and ring sight, blisters on cowling, steps marked in Indian ink, dashboard and tail skid, complete the fuselages.

Tail Unit.

Great care must be taken to ensure that this is assembled true and flat, as it cannot be built on the drawing. The fin and rudder is so made that it divides horizontally, if a good fit is made, this cannot be seen when the model is flying. Mount the fuselage in its rigging plates. Cement FR 4A, FR 5, and the twin spars of the lower fin, in position adding the sheet FO 4 when you are sure this lower fin is true along the fuselage. Push in the upper fin spars to ensure that the fin is upright. True up, add FR 4, FR 3, FR 2, FR 1, and outlines FO 1, FO 2, FO 3, (note that FR 3 and the two fin spars are cemented to the *top* of the rear fuselage). This may now be cut away as shown by the dividing line on the drawing. The entire tail unit will now lift off, being a push fit, with the fin spars pushing down into the boxes in the lower fin. Cement the tail plane spars into position, add ribs, L.E., T.E., and true up. Cover the fin and tail plane with fine tissue, spray and dope, and give the top of the tail plane two coats of olive green dope. The underside is natural tissue, as per fuselage. The fixed fin is doped chrome yellow ; the rudder blue, white and red stripes, blue to the fin. The serial number F2426 is marked in Indian ink on each side of the rudder and " Bristol F2B4 " written at 45 degrees across the fin in Indian ink on each side, at the base. Top bracing wires of thin cane are cemented in position, and painted light grey, to complete the tail unit. The cockades have a narrow outer ring of white.

Mainplanes.

These are quite straightforward. Make two of each as per drawing, and two centre sections. Do not on any account omit the spar stiffeners at the outboard strut positions. Make and fit the strut supports. Cover with natural superfine tissue, spray, dope and give two coats of olive green on top. Paint on the cockades.

Rigging.

If the model is to fly correctly, this operation must be accurate. Therefore, go slow, take care, and be accurate. The results are worth it. First mark out the rigging boards on 1/16 in. ply. You will need two for the fuselage, at F 2 and the tail. Dimensions are given on the drawing. When glued on to the assembly board in their positions, the fuselage can be rested in them in rigging position. Two more are needed for the centre sections, which are assembled first. Glue them in position each side of the fuselage, on the assembly board; slide in the centre sections into position; cut, fit and cement struts, (which include undercarriage struts), and cross bracing of thin cane. When all these are set (they should be left overnight) the centre section rigging boards can be carefully removed. All struts and bracing are now painted, struts black, bracing grey. Now four rigging boards will be needed to hold the wings. The centre section boards can be used inboard by opening up the slots to the full section. When marking out the boards at the outer strut positions, don't forget to add dihedral on to the vertical measurement. Now slide the main planes into the rigging boards and try the struts; cut them to fit and lightly cement them into position. The pairs of wings complete with struts are now brought up to the centre sections, the root end ribs of which have been thickly and well coated with Durofix. Quickly cement the rigging boards into position on the assembly board; press up the wings into position on the centre sections, scrape off all the exuded Durofix and use to well cement in the struts. Bracing wires of thin cane are now added. Varnish the struts, paint the wires grey, add balsa fairings to the undercarriage struts; to complete the undercarriage, make and fix wheels as shown on drawing. Leave the whole assembly overnight to set. The outer rigging boards can be taken up and slid off the wings, but the inner ones will need cutting away. Great care must be taken when cutting these away. A slot cut beforehand would ease this operation. Then add the aileron wires, controls, and touch up with paint. The wing tip skids are bent of 20 s.w.g. wire and cemented in place beneath the outer struts. The radiator nose block is carved in mahogany and 3 degrees downthrust incorporated when drilling for the bearing. If the shutters are made neatly and painted light grey, a really good job results. Exhaust pipes of ⅛ in. diameter balsa are fitted and painted black. The movable Lewis gun and Scarff ring are easily made with a little care, and look well when fitted.

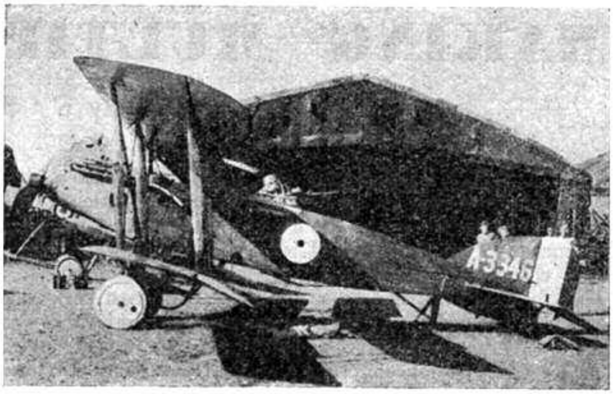


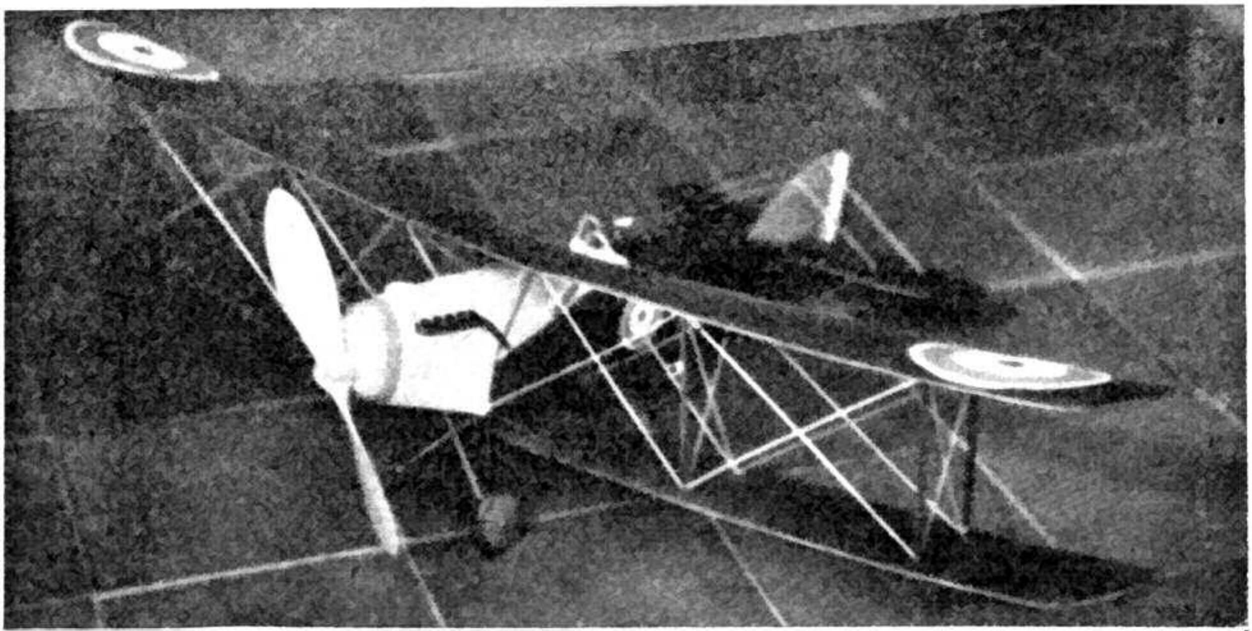
Photo by courtesy of Real Photographs Ltd., Southport

The Genuine Article! A "Brisfit" in service with the R.F.C. "somewhere in France" during the last Great War.

Flying.

The original model had no downthrust and stalled badly under power. Add a little nose weight if necessary by pushing .177 calibre air gun slugs between F 1 and F 2, securing with cement until a flat slow glide is obtained. Do not fly in a wind, as the machine is delicate and not very powerful. A 7 in. diameter prop with wide blades 9 in. pitch, driven by four strands of ¼ in. by 20 in. Catons aero strip rubber gives a steady, slow flight remarkably like the full size machine. Durations of 20–30 seconds are easily obtained, and the glide is very flat when the model is trimmed correctly. The original model has been much admired among the local modellers, but I cannot stress too much that all the detail incorporated makes it a "fair weather flyer."

In conclusion, I shall be glad to answer any queries upon construction or flying of the model, sent to me c/o of the Editor.



MAKING MULTIPROP AIRSCREWS

By S · E · CAPPS

MOST full-size aircraft to-day are fitted with multi-blade airscrews, and consequently as scale models of these machines are made a multi-blade airscrew must be included in the finished job. Multi-blade airscrews, like the two-bladed, can be troublesome to make. This trouble does not exist for those who can carve an airscrew as easily as sharpening a pencil, but there are many who find the greatest difficulty in making even the slightest resemblance of one, and now that three or four blades are the order this difficulty is considerably increased.

The method of making three-bladed airscrews shown here has been used by the writer for a long while and has proved the easiest and quickest of the many ways tried. As will be seen in the accompanying sketches this method employs three separate blanks which are secured together in the centre by plywood discs, and is equally suitable for scale or duration type machines.

It is proposed in describing this method to take each operation separately in order to make it as clear as possible.

Blanks.

Starting with the blanks, it should be understood that these must be cut exactly the same as each other. To make certain of these being alike a metal template should be cut from a piece of zinc, thin tin or hard cardboard. This is used by laying on the wood and carefully marking round it with a soft lead pencil. The blades may now be fretted out with a very fine saw. Most multi-blade airscrews have a large centre hub which in model work is used as a help in constructing the blank as in this method.

Now having cut the blanks the centres should be made to fit up tight to each other. This is important, as any bad fitting will spoil the jointing and will result in early fracture.

Next cut the slots to take the plywood discs. These should all be carefully marked out and then cut with a saw the cut of which will just fit the thickness of the discs. Do not cut further up the blanks than is absolutely necessary. To ensure all the slots being in the right position their location can best be obtained by marking all the ends with a pair of compasses. Use a fine saw slowly for this part.

Assembling.

Fret out two discs as stated before from plywood of suitable thickness for the size of airscrew. The size of these should be kept within the outside size of the hub and the forward one should be smaller diameter than the rear. This point is appreciated when one carves the taper on the hub. Remove all the rough edges from the discs and give them and the slots in the ends of the blanks a coat of cement, and leave to dry. If the parts are pushed together immediately the cement would be squeezed from the sides and a good joint would not be obtained. To ensure the cement being evenly deposited over the slots, spread it round with a piece of thin wood.

When dry give both a further coat of cement and press the discs into the slots and the three blades together. The actual assembly is shown in Fig. 1. Now pass round the outside on the tips one or two strong rubber bands. These will make certain that the whole assembly will be held tightly together until the cement is set hard. The writer leaves airscrews of this description two days for the cement to dry.

Fig. 2 shows this clearly. It is not of much importance to cement the ends of the blanks as these are end grain of the wood and no real grip can be obtained. This brings the construction to the carving stage.

Carving.

Now this is the part that most fight shy of, but in this case if the instructions are followed and the sketches studied carefully no difficulty should be encountered. Take the blank and mark as shown in Fig. 3. These lines are about 1/16 in. from the edges on the back of the blank. Note how the line continues over the tip of the blade and along the side up to the hub.

When this is done correctly shade in the part shown with a soft pencil. Fig. 4 makes this point clear. This shaded portion is the part to be carved away. The question of the most suitable tool for this work is best left to the builder, who will want to use one with which he is most skilful at this work. The writer uses a good, sharp chisel, but keen penknives are equally good and probably more comfortable to hold. Carve away the surplus wood in small pieces and do not try to carve the whole shaded part off in one or two cuts as this will result in a spoilt airscrew or fingers or both. The more experience gained in this part of the process the more efficient will be the finished job. When all the backs of the blades are carved they should be smoothed with a sanding stick. These are most useful and are easily made from a piece of thin spruce about ½ in. to 1 in. wide to one side of which a strip of sandpaper has been glued. Use a fine and very fine paper for this work. Anything coarser will leave too rough finish.

Mark the lines as shown on the blade edges and note that the line on the leading edge is drawn further in than those on the sides. This is done to make the leading edge thicker than the trailing edge, and gives an aerofoil shape to the blade when finished. Mark out the face of the hub at the same time. Next shade in completely the part in between the lines and over the hub. Fig. 6 shows the front marked out and Fig. 7 the part shaded. Now carve these parts away just as carefully as the back, avoid carving past the lines. In this way a roughed out airscrew can be secured without much trouble. When all the shaded parts, including the hub sides, are removed, look over the three blades and see that they are reasonably equal in shape and thickness Smooth over the whole front with the sanding strip and round off the line on the front of the blades. Finish the front as near to the shape in cross-section as shown in the sketch. The back, too, can now be sanded again and should be slightly hollow as shown. Finally drill the hole for the shaft through the centre and make sure that this is square. This completes the airscrew which is now ready for balancing.

Balancing and Finishing.

A multi-blade requires to be balanced equally as

Continued on page 1102

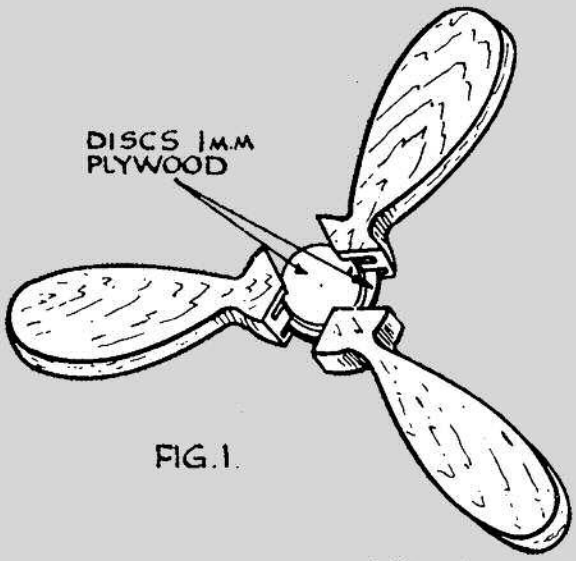


FIG. 1.

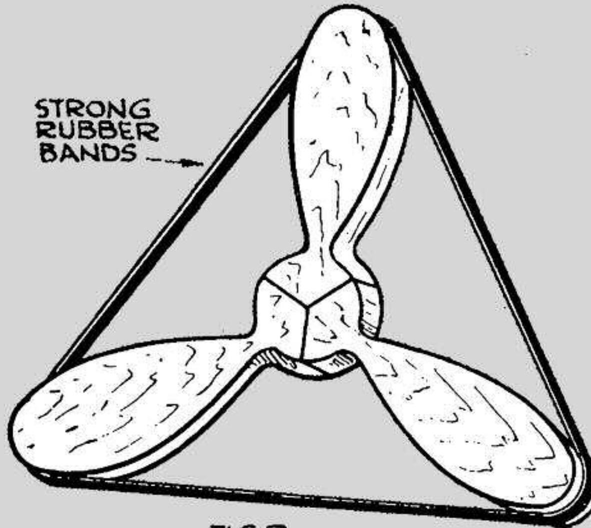


FIG. 2.

ASSEMBLING THREE-BLADE AIRSCREW.

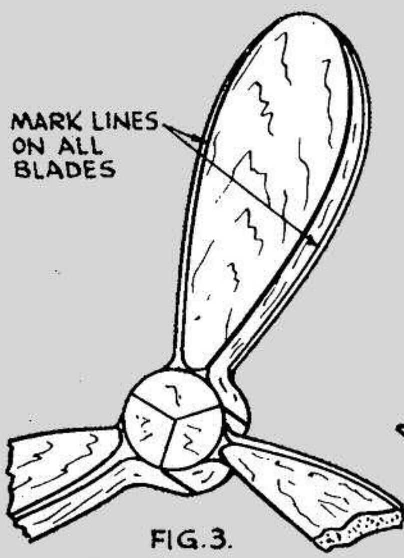


FIG. 3.

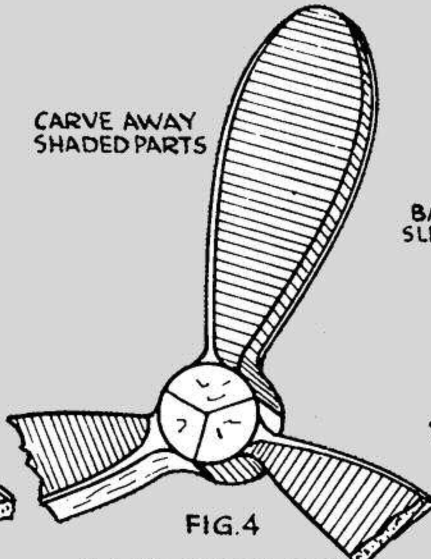


FIG. 4

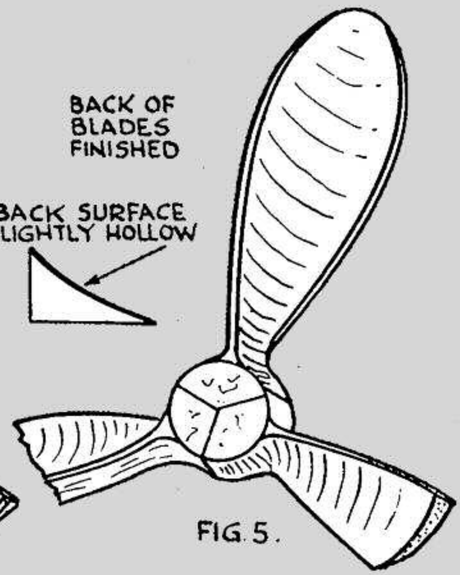


FIG. 5.

BACK OF BLADES

FIG. 6.

FIG. 7.

FIG. 8.

CARVING A THREE-BLADE MODEL AIRSCREW.

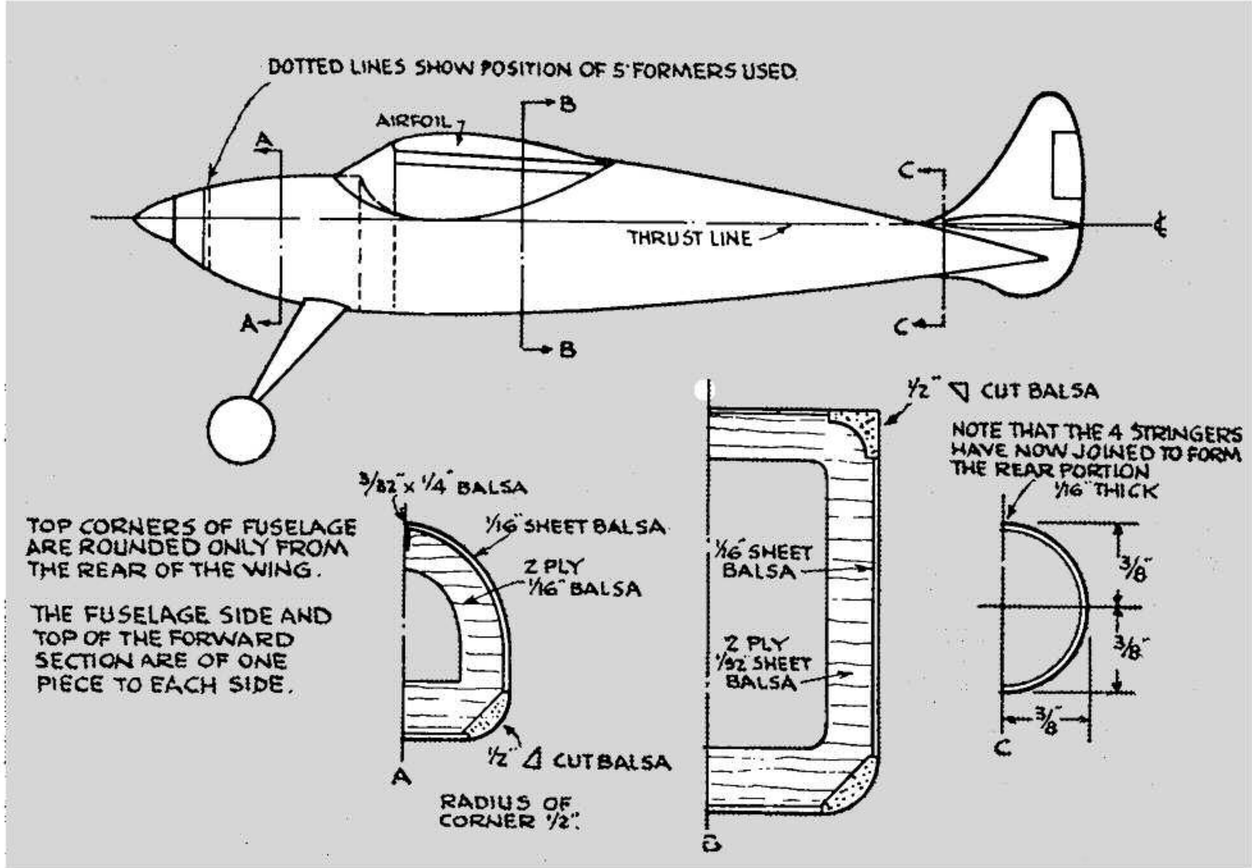
WAKEFIELD FUSELAGES

By R · J · ROGERSON

OF the many and varied types and construction advocated and used by model builders the monocoque fuselage seems to offer the greater advantages except in the matter of construction. It is at this point that the modeller sometimes comes unstuck and also, to a great number of us, time is a limiting factor.

Methods have been published from time to time, whereby the construction of a circular or oval monocoque fuselage is considerably simplified and which ensures the builder of certain success. Whereas the slabsides, although not so well streamlined, do not present the same constructional difficulties.

The accompanying diagrams show how a rectangular fuselage may be quite simply converted to an oval or round cross sectional shape. In effect the corners have been rounded off and the rectangular fuselage converted to a finer streamline shape.



MAKING MULTIPROP AIRSCREWS—*Continued from page 1100.*
well as a two-blade airscrew and this is accomplished in the same way. Drive into the side of the bench a straight true spindle which will pass through the shaft hole in blank and on which it can revolve freely. Next number the blades 1, 2, 3. Revolve airscrew on spindle and note which blade sinks or stops at the bottom. This blade is heavier than the others and its weight must be decreased to equal that of the lighter blades. This is done by sanding the blade at any point on the back or front where it can be done without weakening it in any way or altering the general shape. It may be that two blades stop at the bottom. These two are heavier than the other one and these must be lightened to match the weight of lighter one in the same way by sanding. The airscrew is only properly balanced when any blade will stop in any position. When this has been achieved the airscrew can be smoothed with No. 00 sandpaper all over and given a thin coat of cellulose lacquer. The spinner, so much in evidence these days, is made separately and attached after the airscrew has been fitted to the model.

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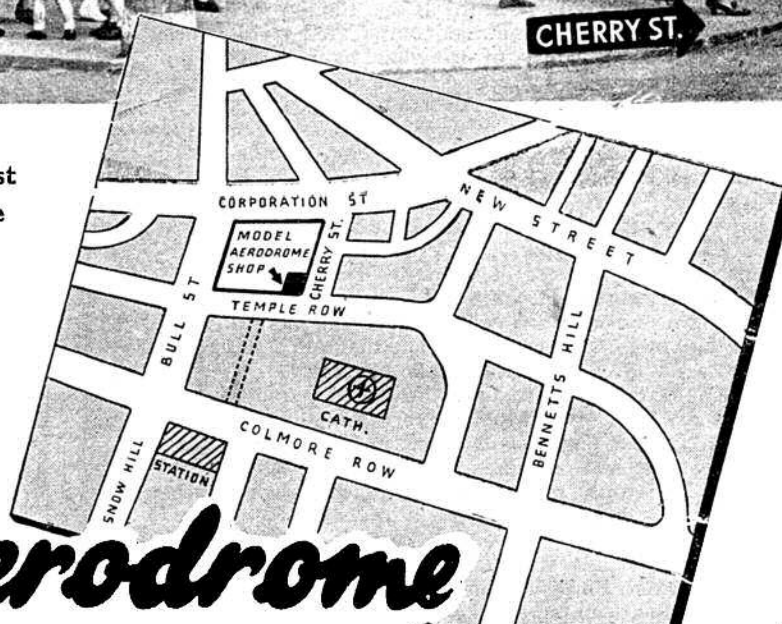


Model Aerodrome

• BIRMINGHAM •

WING, PROPELLER BLADE & RUDDER AREAS

By R · S · WELFORD

DO you design your own models, Mr. Modeller? Do you think and ponder and manfully wade through mazes of figures to find, amongst other things, propeller areas to umpteem decimal places and . . . . and then wonder how on earth you are to draw out a plan of such an oddly shaped thing as a propeller blade exactly to the area required by your calculations? Or it may be that you have decided on elliptic wings *à la* Spitfire or a rudder of a certain plan form compounded of marvellous curves and find them difficult to draw exactly to the areas calculated for them. Does this happen to you, Mr. Modeller? I confess it has happened to me.

Of course, one can approximate to the area required by drawing the wing, propeller or rudder on squared paper (such as graph paper, which is ruled in 1 in. squares) then counting up the full squares and portions of squares contained in the drawing, finally amending the drawing if it is originally drawn too large or small. But you know what happens if one does. One is left with the feeling that the resulting area found this way may be a bit out on the low side and so a little *more* area is added for the sake of safety. Thus one's probably incorrect estimate of the area in the first place is put further out still and the final result may contain quite a large percentage of error.

Now it seems to me to be a pity that careful technical calculations should be frustrated by poor practical application, so here are descriptions of two methods of finding the area of irregular figures which can be applied to wings, rudders, etc. Admittedly, neither method will show you how to draw the required plan to the necessary size but, like so many of the aerodynamic formulæ, each works " in reverse " and will prove only whether your plan, which you must first draw, is correct to your calculated requirements or not. But what more do you want in these days of strict rationing? Surely not a spreading of strawberry conserve?

Most modellers have heard at one time or another of Simpson's Rule, a somewhat complicated method used for finding the areas of irregular figures. The first method I intend to describe is much simpler to apply than Simpson's Rule and not less exact.

Now refer to the diagram. You will see that I have chosen a single-bladed propeller for demonstration purposes. The blade is drawn out full size as a preliminary. Next erect perpendiculars touching either extremity of the blade. These are marked XY and VW on the diagram. Join X to V and divide this line XV into an *even* number of parts by an odd number of divisional points. Here let me digress to point out that the more divisional points you make the more accurate will be your final answer. In the diagram I have only used a few divisions for the sake of clarity.

The next step is to draw ordinates parallel to the lines XY and VW through every *odd* division point. When this has been done you will note that the distance between the first ordinate and XY and the last ordinate and VW is only half the distance between any other adjacent ordinates. This is in order and just as it should be.

Having turned the house upside down and found your dividers, measure off the lengths of the part of each ordinate intercepted by the propeller outlines, i.e. the lengths of AB, CD, EF, etc. Jot them down on paper and find their total. This total is then multiplied by the length of the line XV and the resultant divided by the number of ordinates. The answer will be the area of the blade in square units.

Of course, if the plan as drawn proves to be too large or small it must be " mucked abaht a bit " until it is the right size.

I mentioned Simpson's Rule earlier. Here is the method of applying it to the case in question.

The blade area is first bounded by *four* parallel lines which each touch an extremity of the blade plan outline and at the same time form a rectangle. Thus, in addition to the lines XY and VW we must draw the lines QS and RT touching the blade outline. These two new lines are shown dotted on the diagram.

Ordinates are now drawn as previously described except that they are ruled through *every* division point, whether odd or even.

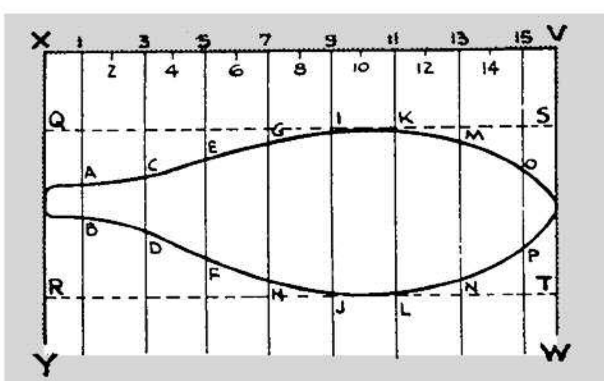
Now the fun starts. Measure all the intercepts as before and find: Four times the sum of the even intercepts. Twice the sum of the odd intercepts, omitting the first and last, i.e. lines QR and ST.

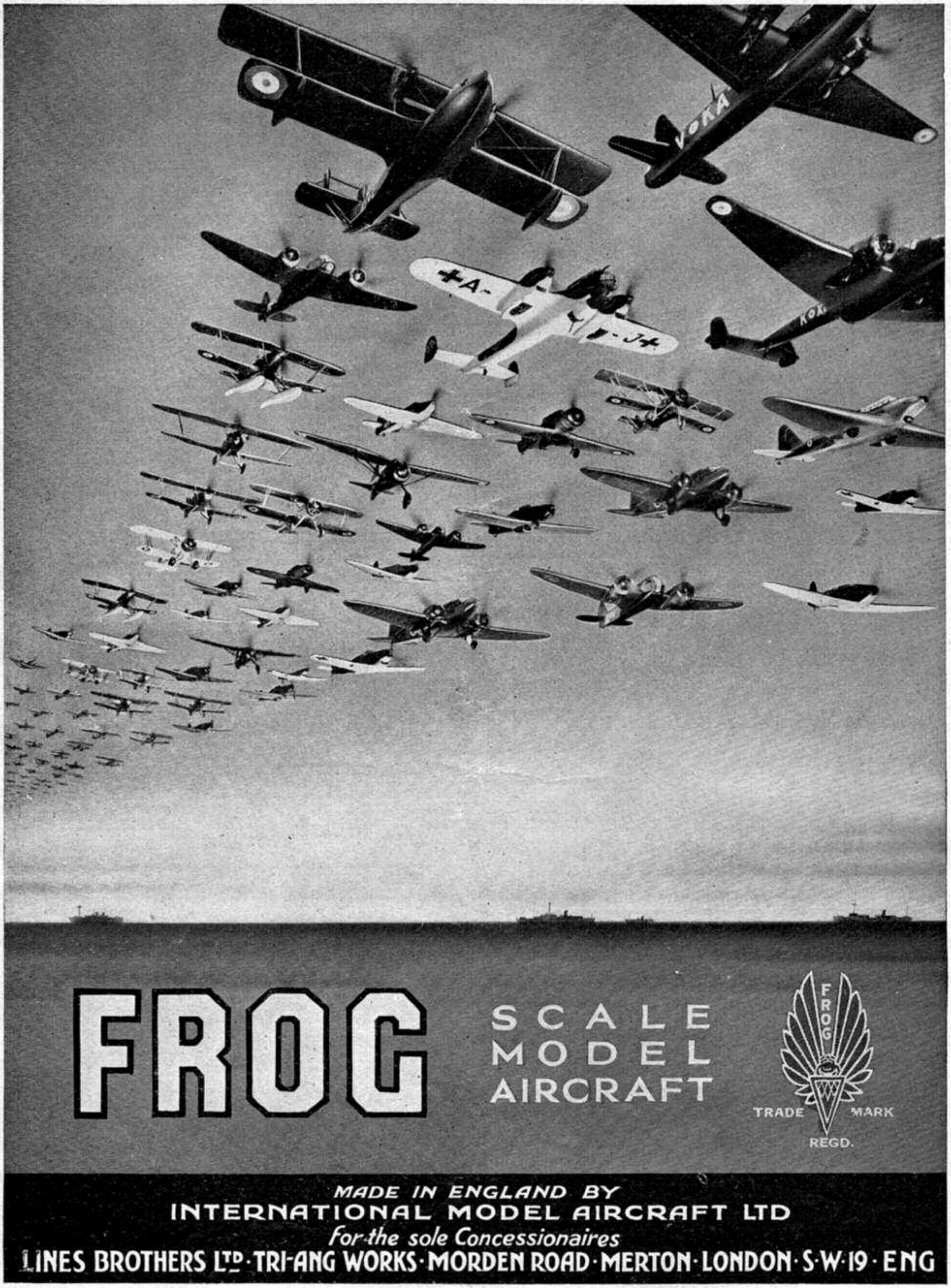
Add them together and also add to the result so far achieved the lengths of the lines QR and ST. Now multiply this total by one third of the distance between consecutive ordinates. This will give you the area in square units.

As regards propeller blade areas, I suggest that about one quarter to one third of the blade length at the root end should be excluded from treatment when using either method outlined above. Owing to the very coarse angles of attack at the blade root practically no useful work in producing thrust is done by the first quarter or third of the blade area measured from the bearing shaft. Therefore, if this portion of the blade is not excluded from treatment approximately only 66 per cent. to 75 per cent. of the area of the blade will be effective in producing thrust and will not comply with your requirements as calculated from the usual formula for finding propeller blade areas.

Graph paper is very suitable for use with either of the above methods because it is already ruled with lines only one tenth of an inch apart and it only remains for you to select those you require as your ordinates, thus saving much laborious ruling.

In conclusion, I hope modellers will find the methods outlined above useful in obtaining more exact results in their work.





+A-
-J+
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SCALE
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FROG
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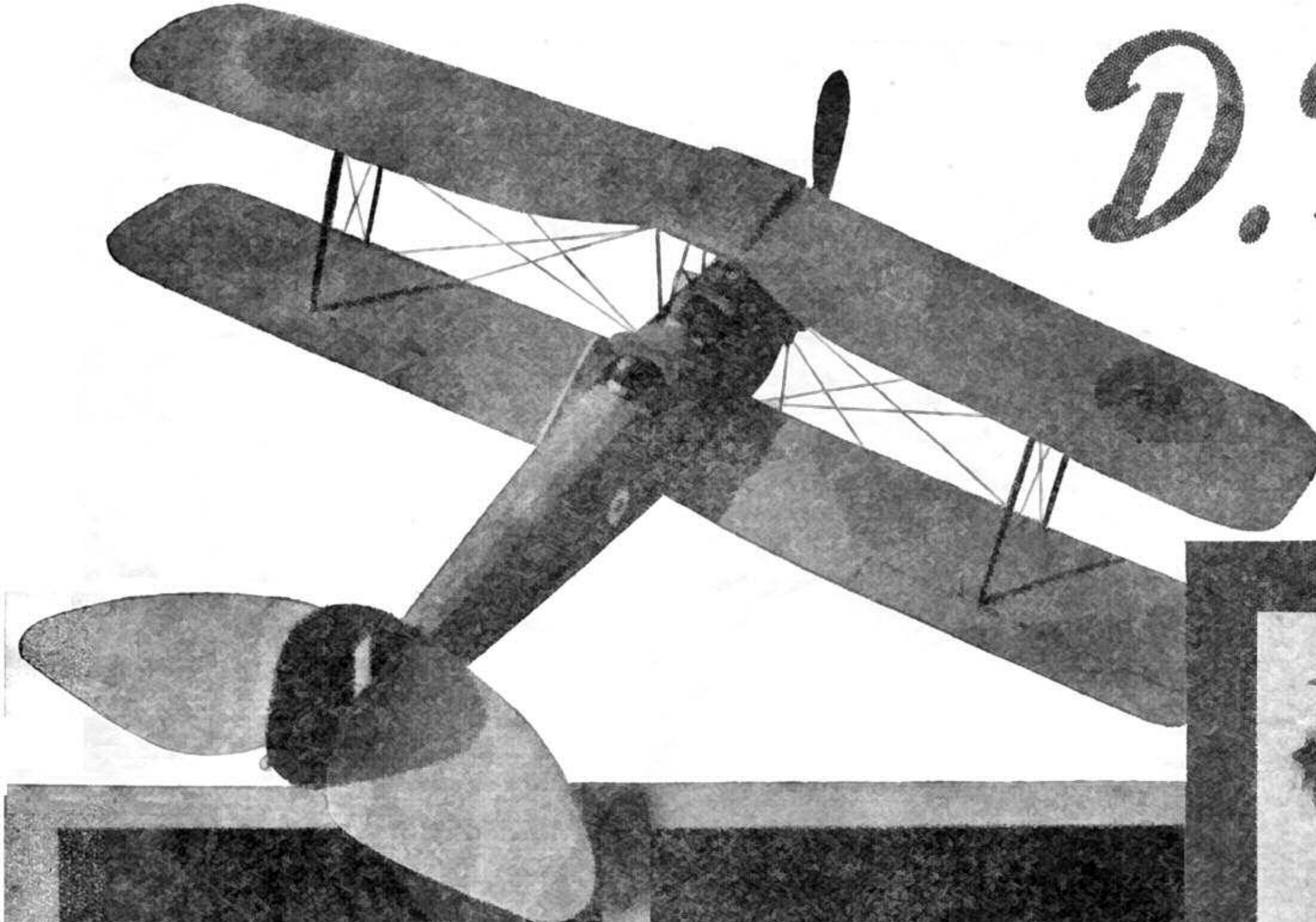
D.H. Tiger Moth

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



Here is a model with a flying performance of 35 to 45 secs. which has been designed with an eye to detail.

Compare it yourself with photographs of the full sized aircraft in the panel below. These are shown bottom left and right respectively.

The model, which is 1/8th full size with a span of 44 ins., has "knock-offable" wings, a sprung undercarriage, and is well worth building. The uncovered views give you an idea of its excellent construction, which incidentally is nearly all hardwood.

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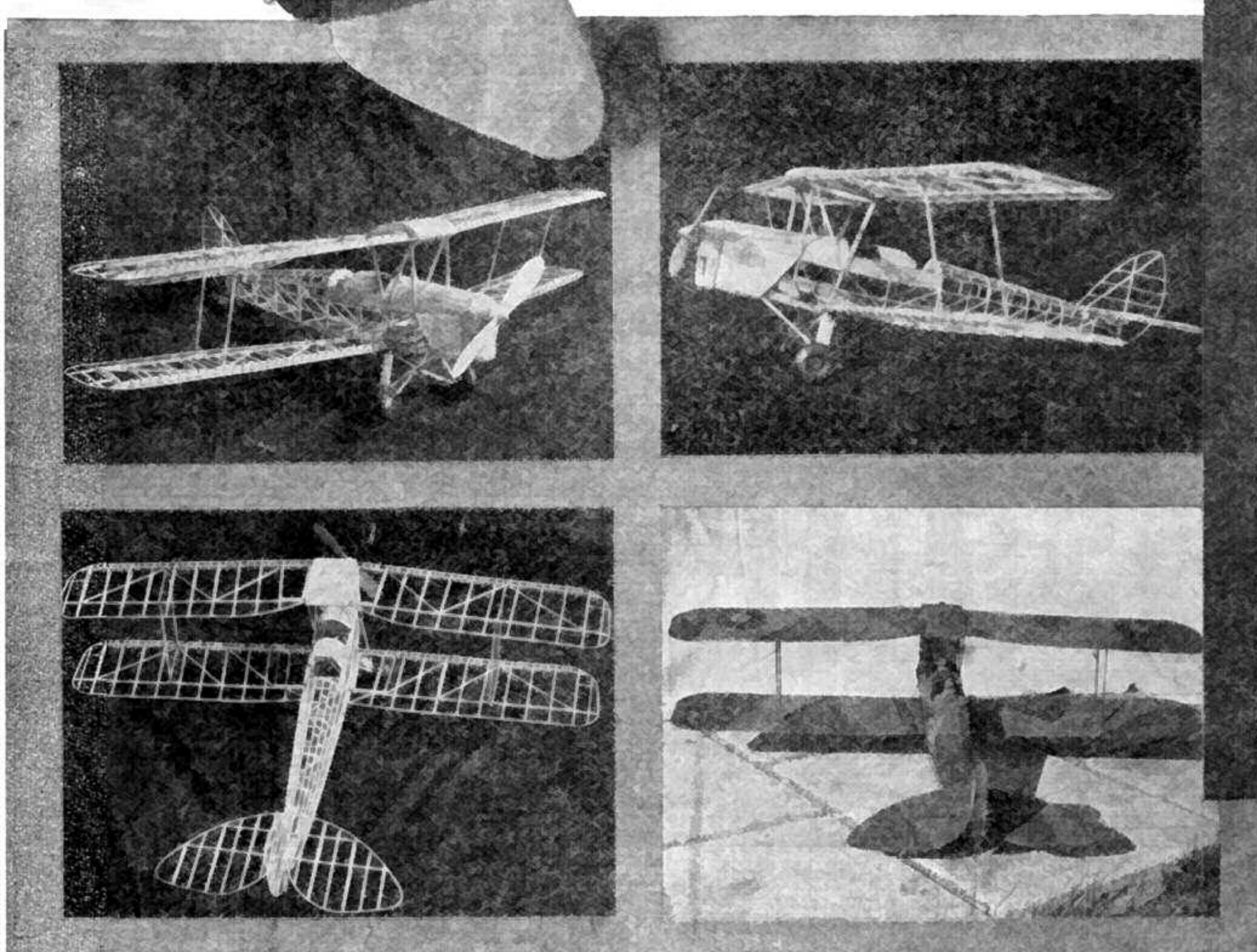

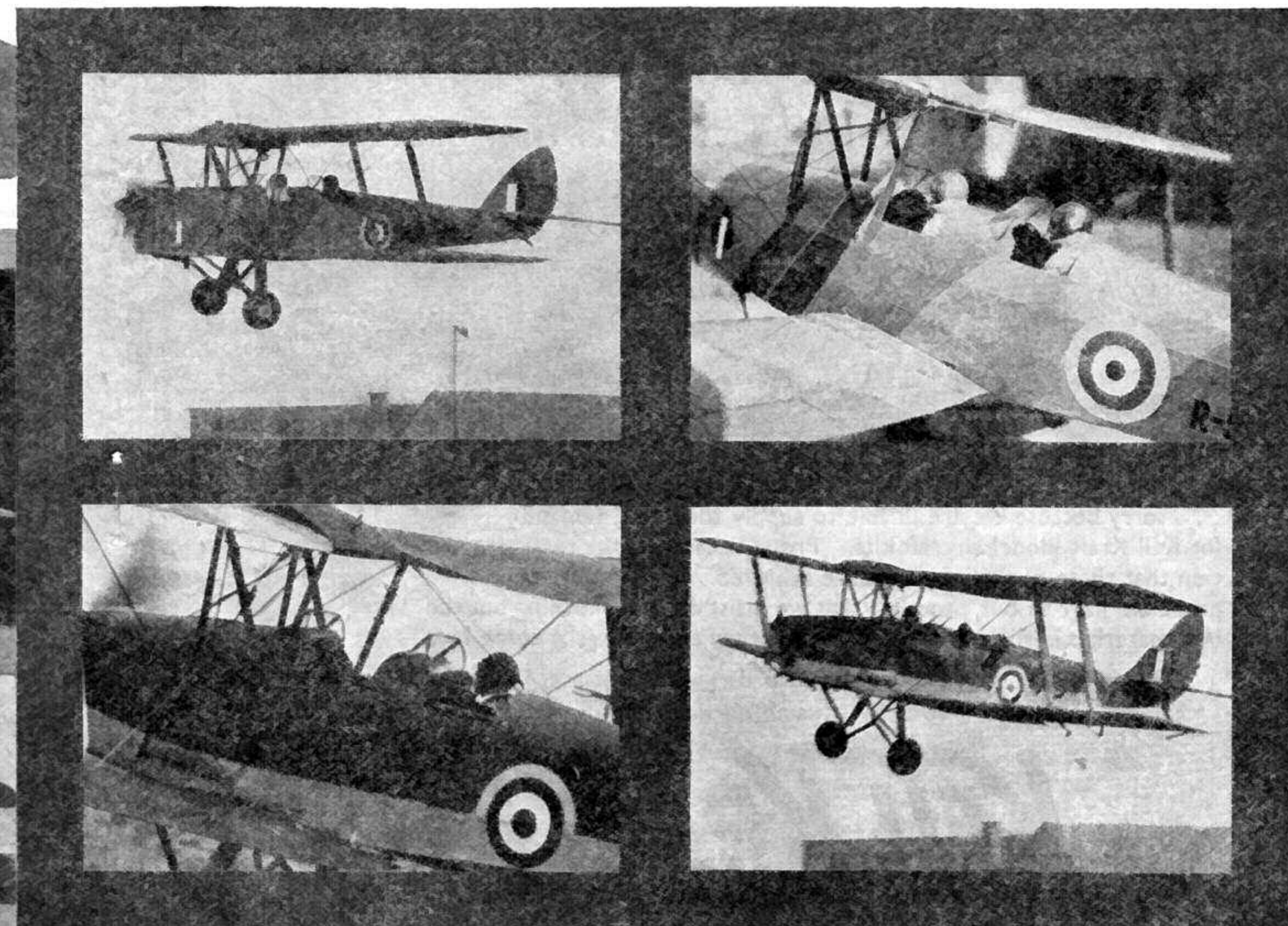

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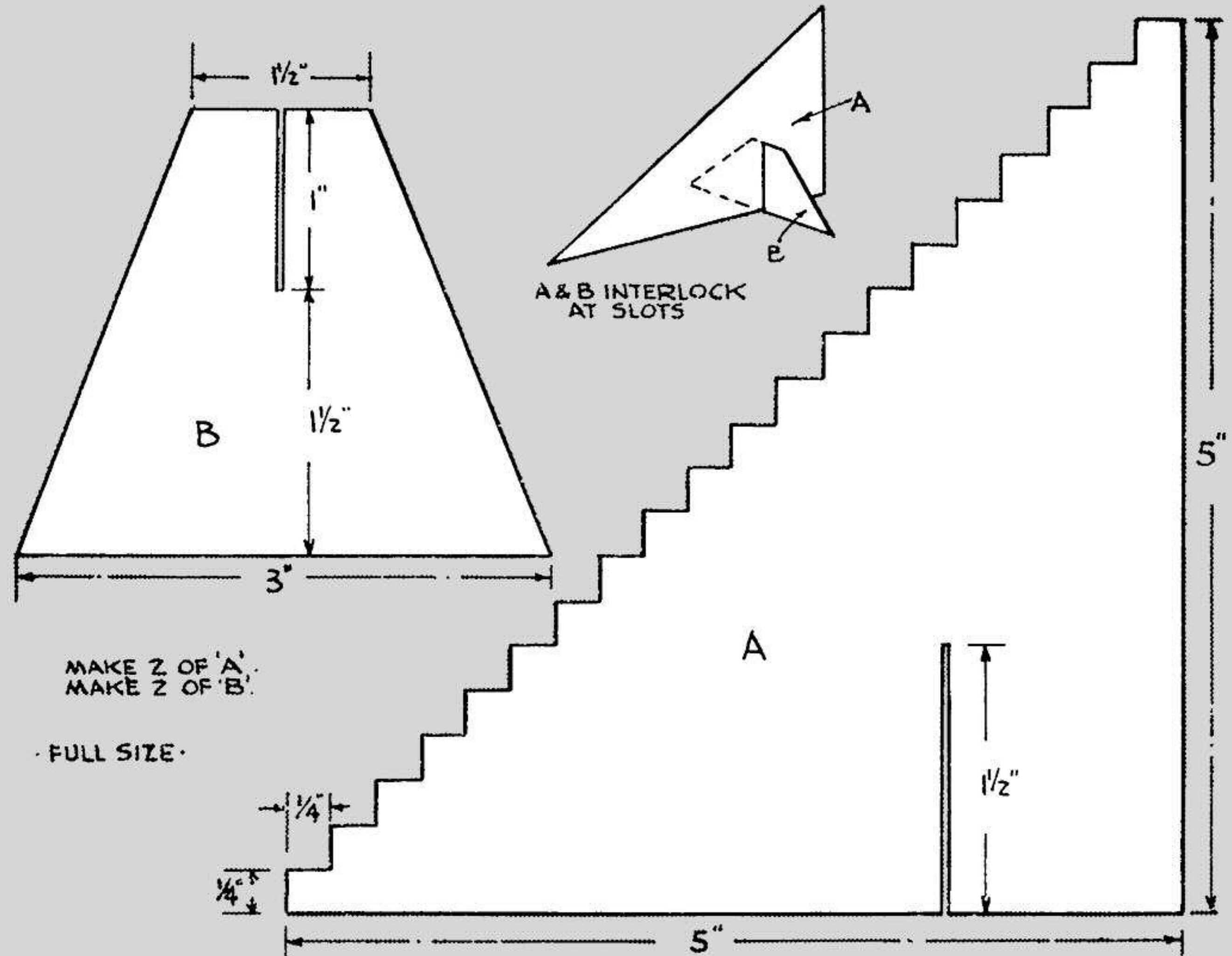


DIHEDRAL ANGLE JIG.

DIAGRAM SHOWING USE OF JIGS.

DIHEDRAL ANGLE INCREASED BY WING TIPS BEING PLACED ON HIGHER 'STEPS'.

DIHEDRAL JIGS

By W · H · CUBITT

CONSTRUCTION of these useful jigs should be quite simple if reference is made to the diagrams. The material used may be either card or wood. Care should be taken to ensure that the slots in A and B are a good fit otherwise the jigs will be unsteady.

Wing tips may be raised from ¼ in. to 5 in. by placing on the required step. The centre section, should, of course, be secured firmly while the dihedral is set.

CONTINENTAL MODEL SAILPLANES

ARTICLE 4

NORWAY & SWEDEN

Arne H. Smith

The glider above is typical of present-day Swedish design.

NORWAY.

WHEN the Germans invaded Norway prohibitions were published, as in other occupied territories. In the beginning we could still go on working in our clubs, building models, and holding contests. After a while the large clubs were dissolved, and then the small clubs were dissolved too, but the boys went on working alone, even if there were difficulties both in obtaining material and making contact with the others.

Especially concerning the material the boys were worried. Before the war, we in Norway were very dependent on imported materials, and then these suddenly stopped. There were a few shops, but the stocks were small, and after a few months they were sold out. Only one thing could be done, we had to get the material from our own country. Rubber was under all circumstances quite impossible to obtain, and therefore we had to change over to gliding planes. Plywood and paper we could obtain, cement too, and of stringers all sizes were obtainable.

Before the war some of us had tried different designs of gliding planes, both American and German, but now we started constructing our own types. Some boys came together and discussed what type could be constructed, and then everyone started on his own designing. Models were about 1 metre to 1·5 metres, and satisfied the F.A.I. rules. We tried to make the models as streamlined as possible, which was not easy, because of the hardwood materials.

The fuselages were varied in construction. Some of them triangular, with half-circle formers on the top to make them better in appearance and get the wing joints more streamlined. Others flew five-sided, with the wing on top, but the majority of the models were more or less elliptical cross-sections. The fuselages were about 70–75 per cent. of the wing span, and usually thin in the tail. A fin, about 25 per cent. of the total rudder area, was built on the tail underside. The moment arms were about 1 : 2. The fuselage was always built with full bulkheads and two longerons, one on each side, and were always horizontal in line with the centre line. The dimensions of the longerons were usually 3×5, 3×3 and 2×2 mm. In the nose was a little hollow for lead weight, which was used as balance.

The rudder's size varied from 12–18 per cent., depending on the model. The rudder was always built together with the stabilizer, and was usually fitted with a little trimming rudder. Construction was very simple, and streamlined airfoils were often used.

The stabilizer area was around 25 per cent. of total wing area. Always streamlined outlines, and airfoils. The stabilizer and rudder were usually fastened to the fuselage with rubber bands, but later we tried mechanical joints, which showed very good results.

The wing shape was either tapered, rectangular, elliptical, or else with elliptical tips. The aspect ratios were 1 : 8, 1 : 10, 1 : 12. The wing was built with airfoils of 1 mm. plywood, which were hollowed out, one main stringer, 5×8 mm. or 5×10 mm. in the middle, or two 3×3 mm. or 2×5 mm. in front and, usually 3×10 mm., tapered down, for the trailing edge. Some of the wings were paper covered along the leading edge to one-third of the chord back. The wings were always in one piece, with the streamlined fuselage built in centre of the wing. The joints were filleted with streamlined fairings. The covering was either crossed Jap-tissue, or single German-tissue. If we were able to get silk, it was preferred. The wing loading varied. Some of us used *15–16 gr/dm, others †20 gr/dm, and some ‡22–28 gr/dm. The wing position varied from 1½° to 3½°, depending on the wing-loading and airfoils. We used R.A.F. 32, Göttingen 400, Grant×8, and a combination of Clark Y and R.A.F. 32 (Clark overcamber, R.A.F. undercamber) : the ribs were spaced from 25 mm. up to 35 mm.

The wings were fastened with small rubber bands, and

*Approx. 4·9 ozs./sq. ft. †Approx. 6·6 ozs./sq. ft. ‡Approx. 7·5 ozs./sq. ft.

mechanical fastenings were also used to make the fuselage and joints as streamlined as possible. Dihedral was used and also V form polyhedral. The dihedral angle was usually about 7–10°.

Some of the models were hand-launched from the top of hills, while the majority were started by a 100-metre line. The average time on the line varied from 3–5 minutes without thermals, but if thermals were obtainable, they flew O.O.S. very often. The best time on only 25 metre line was 15 minutes, and this model was one which was not yet finished.

About the models it can be said that they had a very high standard of construction, flying and performance. The boys tried to make them as original as possible, and there was not much copying of other designs. The aerodynamics were learned from foreign magazines, and most of the designers had quite a good knowledge of same.

Even now, under this war, when most of the model-builders are busy fighting for freedom, those boys who are still building will go on, in spite of all difficulties, and will try to be on the same footing as their other friends when the contests can once again be held.

SWEDEN.

In Sweden there is for the moment an increasing interest in aero-modelling, K.S.A.K. have started a new campaign for all builders to try to take their "Aero-modelling marks" in iron, bronze, silver or gold. There, too, all clubs which are connected with K.S.A.K. are helped economically, and through courses in aero-dynamics, construction or design training and organisation. Model kits are obtainable for beginners, which are especially easy to build, and are good flyers.

At the moment there is political discussion going on about aeromodelling in schools, to decide if the clubs, especially the Youth Clubs, are to be given support. The boys are busy building models and learning theory with instructors, and in the holidays testing and flying of the models is carried out.

Sweden is much better equipped with all kinds of materials than Norway. There are still many people who are building with balsa only. The clubs have turned almost completely over to gliding planes, because of rubber shortage. Even if there were some large stocks, these are now being used and only some clubs have rubber.

As we already know, the Swedish pre-war model builders were very good, and the Swedish models, too. These things were achieved by training and experiments. Now that they have turned over to gliding planes, surely they will try to get the same position in that branch too, which should not be difficult with all the help the clubs are able to obtain—Sweden being still neutral.

In Sweden they have six classes in use: they separate the boys in two parts—one, if they are "Elite" flyers, and two, usual flyers. The "Elite" boys have to take all the K.S.A.K. aero-modelling marks, and the test for gold is not so easy to take. There are no more than about 30–35 "elite" flyers in Sweden, and that is not so many, besides, most of them have taken the marks before the average time was almost *doubled*.

The classes are:

Ie. 0–100 free cross-section.
IIe. 100–150 F.A.I. Rules.
IIIe. 150–300 F.A.I. Rules.

For the other:

I. 0–100 free.
II. 100–150 free.
III. 150–300 F.A.I. $\frac{L2}{200}$ and 15 gr/dm.

The models are very beautifully built, are streamlined and well constructed, especially those after F.A.I. rules. The fuselages vary. Nearly all kinds of cross-sections can be seen, but the polysided are preferred by the majority. Most of the "Elite" models have elliptical, five- or four-sided fuselages, a triangular undercarriage, and a vee or half circle top. If the fuselage is built of balsa, they build them in two halves, and join them together afterwards. Two or three stringers are of fir or other hardwoods, and also the nose block—which is hollowed out—containing the weight. In classes II and III, plywood bulkheads are preferred. The fuselage length varies about 70–75 per cent. of wing span.

Rudders are usually large, in fact, most of them use twin rudders, one at each end of the stabiliser, which is about 15–20 per cent. of total wing area. If the model has only one rudder, it is usually integral with the fuselage structure.

The wing is usually rectangular, elliptical or ot tapered form. The rectangular shape would often be seen with tabs (something the Swedes use very often), otherwise it is of the same construction and using the same airfoils as mentioned concerning the Norwegian model. They also use many of the Göttingen airfoils. The wings are usually fastened by rubber, inside, or the wings are in two parts, fastened with hooks and rubber to the fuselage.

In all fillets, balsa is used, or else plastic wood. The dihedral varies about 7 per cent. of the wing-span, and the most usual are V form dihedral and polyhedral.

Just before I left Sweden some very interesting experiments with the rudder and stabiliser were going on. It was found that if the rudder was supported with thick neutral airfoils about 1 : 6 and placed before the stabiliser, the model was much better and more stable under the line launch. If also the side area in the front of the model was large, the model behaved much better during the start.

Also putting 75 per cent. Clark Y airfoils in the stabiliser, and increasing the stabiliser area up to 33⅓ per cent., and the rubber up to 20 per cent. or more, the model obtained about 20–30 per cent. more altitude.

The Swedish boys tried to make the models as light as possible, and the construction—especially in the larger models—was often far away from solid, and the wings often broke when the model was towed up.

Another thing they tried were airbrakes. The Swedish rules say that the model is only allowed six minutes, even if it is visible for over half an hour, or flies O.O.S. after fifteen minutes. Therefore, the airbrakes were very popular, and usually they were built on the fuselage, either in the nose, or the tail. After six minutes they went into action. A small clock was just inside, but some few used the Austin timer, now impossible to obtain. Winches were preferred, while in Norway we towed the gliders up into the wind by running. The winches were geared from 1 : 4 up to 1 : 7.

On the whole, the models are very good flyers, give good performance, and with a little more experimenting and training it will not be difficult for them to take the same position in the gliding classes as in the rubber classes.

There is a big difference in the number of active model builders in Sweden and Norway. Sweden can count theirs in thousands, whereas those in Norway number only some few hundreds.

AN ARNOLD WORTHEN TYPE SCALE

FOR DETERMINING THE CG POSITION

BY G · K · GATES

THE determination of the position of the centre of gravity may be carried out in a simpler manner to that outlined in a recent article by T. Bowden, by means of the method and scale about to be described.

The Balance.

Four uprights (1) and (2) are secured to a solid base (3). A horizontal platform (4) is attached at the level of the shortened posts (2) and has a slot cut in it at (a) to take the balance platform (5) at a gap of about 1/20 in. should be left for clearance. The balance mechanism is self-explanatory and should need no description here. The arm is marked in inch/ounces and has a movable weight (b) suspended upon it. A short length of threaded rod (c) with nut is secured in position shown for fractional adjustment.

The platform (5) should be about 2–4 in. long and of sufficient width to take the main wheel track of a fairly large model.

A cross-piece (6) is screwed to the top of the larger posts and to this is attached a length of II section curtain rail with runner.

Method.

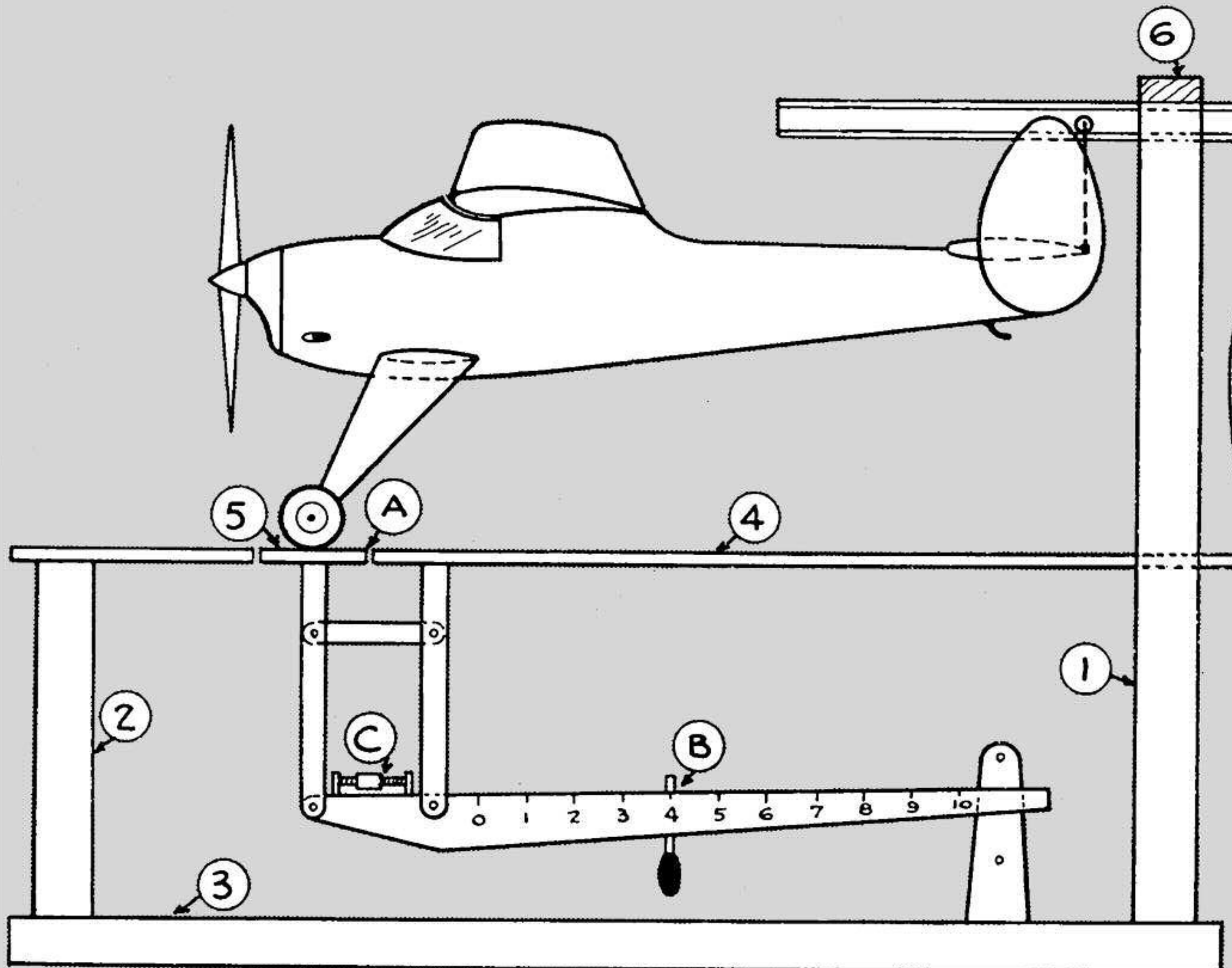
To find the model's C.G. position using the balance, proceed as follows :—

First the total weight of the model must be found. With the main wheels on the platform and the tailwheel at platform level read off the weight on the scale. Repeat this performance with the tailwheel on the platform. Addition of the two readings will give the total weight (Fig. 1).

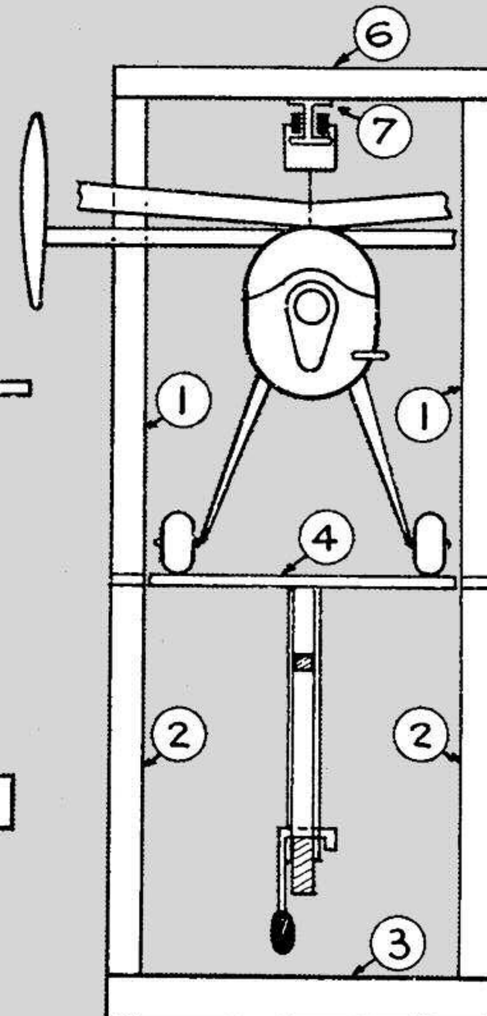
Now with the main wheels on the platform and the tail suspended from the I-shaped rail, the weight on the front wheels is read off, and this subtracted from the total weight gives the weight on the suspending thread.

Taking a convenient datum point, say the airscrew boss, multiply the weight on the main wheels and the weight on the thread by their respective distances from the datum projected on to the datum line of the model. Add these two moments together and divide by the weight of the model. This will give the distance from the datum point along the datum line of a perpendicular upon which the C.G. lies.

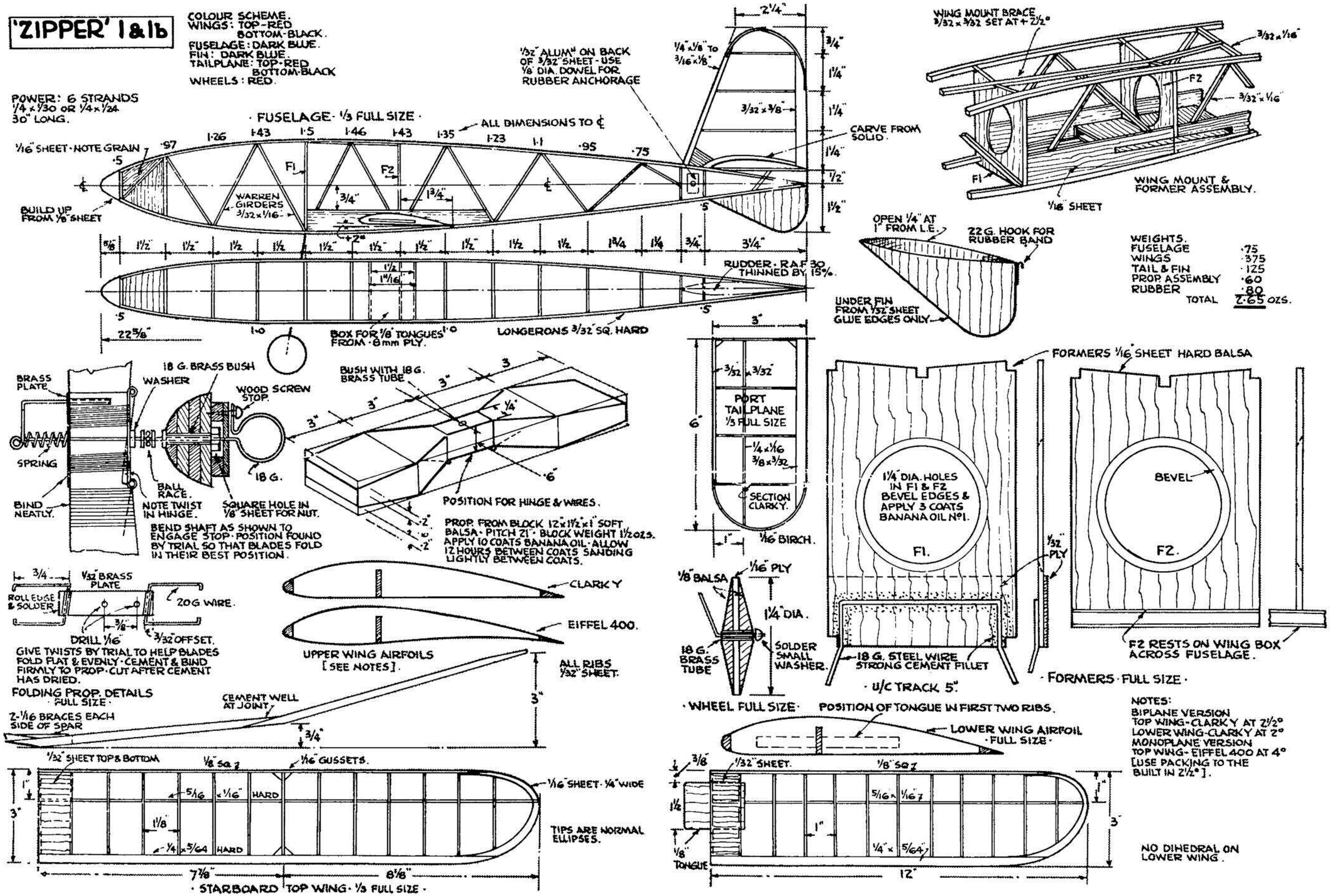
Finally, all the above performance should be repeated with the tail of the model held higher. A new perpendicular will thus be found and the C.G. lies on the point of bisection of the two perpendiculars. In all but assymetrical models the C.G. may be assumed to be on the centre line.



·SIDE VIEW·



·FRONT VIEW·


'ZIPPER' 1&1b
COLOUR SCHEME.
WINGS: TOP-RED
BOTTOM-BLACK.
FUSELAGE: DARK BLUE.
FIN: DARK BLUE.
TAILPLANE: TOP-RED
BOTTOM-BLACK
WHEELS: RED.
POWER: 6 STRANDS
1/4 x 1/30 OR 1/4 x 1/24
30" LONG.
FUSELAGE · 1/3 FULL SIZE ·
ALL DIMENSIONS TO ℄
1/16" SHEET · NOTE GRAIN
BUILD UP FROM 1/8" SHEET
WARREN GIRDERS 3/32 x 1/16
F1
F2
1/32" ALUM^M ON BACK OF 3/32" SHEET · USE 1/8 DIA. DOWEL FOR RUBBER ANCHORAGE
1/4 x 1/8 TO 3/16 x 1/8
3/32 x 3/8
CARVE FROM SOLID.
RUDDER · R.A.F. 30 THINNED BY 15%.
BOX FOR 1/8" TONGUES FROM ·8mm PLY.
LONGERONS 3/32" SQ. HARD
WING MOUNT BRACE 3/32 x 3/32 SET AT + 2 1/2°
3/32 x 1/16
WING MOUNT & FORMER ASSEMBLY.
1/16" SHEET
OPEN 1/4" AT 1" FROM L.E.
22 G. HOOK FOR RUBBER BAND
UNDER FIN FROM 1/32" SHEET GLUE EDGES ONLY.
WEIGHTS.
FUSELAGE ·75
WINGS ·375
TAIL & FIN ·125
PROP. ASSEMBLY ·60
RUBBER ·80
TOTAL 2·65 OZS.
18 G. BRASS BUSH
BRASS PLATE
WASHER
WOOD SCREW STOP.
SPRING
BALL RACE.
BIND NEATLY.
NOTE TWIST IN HINGE.
SQUARE HOLE IN 1/8" SHEET FOR NUT.
18 G.
BEND SHAFT AS SHOWN TO ENGAGE STOP · POSITION FOUND BY TRIAL SO THAT BLADES FOLD IN THEIR BEST POSITION.
BUSH WITH 18 G. BRASS TUBE
POSITION FOR HINGE & WIRES.
PROP. FROM BLOCK 12 x 1 1/2 x 1" SOFT BALSA · PITCH 21" · BLOCK WEIGHT 1 1/2 OZS. APPLY 10 COATS BANANA OIL · ALLOW 12 HOURS BETWEEN COATS SANDING LIGHTLY BETWEEN COATS.
PORT TAILPLANE 1/3 FULL SIZE
1/4 x 1/16
3/8 x 3/32
SECTION CLARKY.
1/16 BIRCH.
FORMERS 1/16" SHEET HARD BALSA
1 1/4" DIA. HOLES IN F1 & F2 BEVEL EDGES & APPLY 3 COATS BANANA OIL No 1.
BEVEL
1/32" PLY
18 G. STEEL WIRE STRONG CEMENT FILLET
F2 RESTS ON WING BOX ACROSS FUSELAGE.
· FORMERS · FULL SIZE ·
1/32 BRASS PLATE
ROLL EDGE & SOLDER
20 G WIRE.
DRILL 1/16"
3/32" OFFSET.
GIVE TWISTS BY TRIAL TO HELP BLADES FOLD FLAT & EVENLY · CEMENT & BIND FIRMLY TO PROP · CUT AFTER CEMENT HAS DRIED.
FOLDING PROP. DETAILS · FULL SIZE ·
CLARK Y
EIFFEL 400.
UPPER WING AIRFOILS [SEE NOTES].
ALL RIBS 1/32" SHEET.
1/8" BALSA
1/16" PLY
1 1/4" DIA.
18 G. BRASS TUBE
SOLDER SMALL WASHER.
U/C TRACK 5".
· WHEEL FULL SIZE ·
POSITION OF TONGUE IN FIRST TWO RIBS.
LOWER WING AIRFOIL · FULL SIZE ·
CEMENT WELL AT JOINT
2 - 1/16 BRACES EACH SIDE OF SPAR
1/32" SHEET TOP & BOTTOM
1/8" SQ.
1/16" GUSSETS.
5/16 x 1/16" HARD
1/4 x 5/64 HARD
1/16" SHEET · 1/4" WIDE
TIPS ARE NORMAL ELLIPSES.
· STARBOARD TOP WING · 1/3 FULL SIZE ·
1/32" SHEET.
TONGUE
NOTES:
BIPLANE VERSION
TOP WING - CLARK Y AT 2 1/2°
LOWER WING - CLARK Y AT 2°
MONOPLANE VERSION
TOP WING - EIFFEL 400 AT 4°
[USE PACKING TO THE BUILT IN 2 1/2°].
NO DIHEDRAL ON LOWER WING.

Winning Weather

BY D. J. LAIDLAW-DIXON

A PROPER appreciation of weather conditions is essential to get the best out of your models. Decentralised competitions render it impossible to pick your day, or to do anything about it on that particular day, but only a slight knowledge of, say, cloud formations, will enable you to choose, at any rate, the best time to make your flights.

All clouds are formed by up-currents, so that generally, the presence of cloud should encourage the hope of thermals, but, if accompanied by strong wind it is unlikely that the model will stay up long enough to profit by them. High clouds indicate high thermals, and a rocket-like climb is your main hope. In this event it is best to rely on ground thermals to get you up initially—a cornfield, tarmac road, or chalk heap may do the trick—and once you really get in the up-draught of a cloud O.O.S. is your lot.

When the whole of the sky is covered with cloud, and no sun is grinning through it is hopeless to expect anything. But after a shower when the sun begins to dry the grass and you can see the vapour rising, that is the moment to make your flight.

It is very useful also to know the speed of the wind. You *should* know the speed of your model and by deducting one from the other you will know if you have any forward "way." Thus with an average model, flying at, say, 12 m.p.h. and a light breeze of up to 7 m.p.h., you will have *forward* speed of 5 m.p.h. and a good prospect of a long flight as model can fly into wind, gaining height all the time. If on the other hand, there is a moderate breeze of 18 m.p.h. blowing then you have "negative way" of 6 m.p.h., *and the model will tear off down wind, wasting its power trying to keep up, and not gaining height.* The best you can hope for is a "blown-out-of-sight" in about two minutes—with a long and perhaps profitless chase before you. It is on such occasions that the fast streamlined model can prove its superiority over the slabsider. With speeds up to 30 m.p.h. (which incidentally is the approximate top speed of Bob Copland's famous G.B.3), the super streamliner is designed to make its mark in spite of adverse conditions.

It is for this reason perhaps that North Country experts like Lees and Stott have concentrated so successfully on the development of this type—while our American friends have clung longer to the slow slabsider. North of England conditions cried out for something to beat the weather, while American sunshine encouraged "lazy designing." If drag figures for round and slab-sided fuselages are compared from K figures given in D. A. Russell's book (Slabsider K equals ·0009 : Streamline K equals ·00025, or a ratio of nearly four to one) and considered in terms not of drag but of the more easily understood "wind resistance," it will be seen what a buffeting the slabsider is in for compared with the streamliner.

Two tables of great value to the aero-modeller conclude this article. Table No. 1—The Beaufort Scale—hardly needs introduction. Invented by Admiral Beaufort to classify wind strength, its application is obvious. All too often one loosely speaks of storms or gales, and guesses wildly at some impossible wind speed. This table sets it out in black and white. Feet per second speeds will enable you to compare with model speeds to ascertain your safety factor in windy weather. In this connection it is important to note that, in estimating speed of models, that they are flying at the *sum* of the wind speed and their own forward speed in still air *in relation to the air through which they are passing*. Thus with a gentle breeze it is often possible to achieve R.O.Gs. with a model normally sluggish and unwilling to take off under its own power.

Table No. 2 is hardly less helpful. Nearly everyone knows the names of some clouds, but can seldom remember which is which. This table gives you your thermal prospects from each. High cloud is not likely to be helpful to the flyer as it takes too much power to get up there. Riding before a thunder-cloud is dangerous but highly profitable flying to the venturesome. It is truly amazing to see a model sucked up in advance of a nimbo-stratus, like the proverbial "sky-hook" reaching down to catch an aerial fish!

Anyone who can thoroughly memorise these tables, or even take them along with them to the flying field, is at an immense advantage over the man who merely "thinks it'll be all right for flying."

Go to it—and may better times reward your introduction to meteorology.

BEAUFORT WIND TABLE

No.	*Name*	*Description*	*Speed in M.P.H.*	*Speed in F.P.S.*
0	Calm	Smoke rises vertically.	0–1	0–1·5
1	Light Air	Direction shown by smoke.	1–3	1·5–4·4
2	Light Breeze	Wind felt on face; rustling leaves, wind vane moves.	4–7	5·9–10·25
3	Gentle Breeze	Leaves and small twigs moving constantly, small flag extends.	8–12	11·75–17·5
4	Moderate Breeze	Dust and paper lifted; small branches moving.	13–18	19–26 5
5	Fresh Breeze	Small leafy trees sway, small waves on lakes.	19–24	28 35
6	Strong Breeze	Large branches moving, singing in telegraph wires, umbrellas hard.	25–31	36·5–45 5
7	Moderate Gale	Trees in motion, hard to walk against.	32–38	47–55·5
8	Fresh Gale	Twigs breaking off trees, movement difficult.	39–46	57–67·5
9	Strong Gale	Chimney pots, tiles, etc., blown off.	47-54	69–79
10	Whole Gale	Trees blown down, much damage.	55–63	—
11	Storm	Considerable damage (rare).	64–75	—
12	Hurricane	Unknown in England.	over 75	—

Continued on opposite page.

DOWNTHRUST
THE TRUTH AT LAST

By J · H · MAXWELL

THE subject of downthrust has puzzled aero-modellers right from the dim ages of the sport, and it continues to produce as many headaches as ever. Perhaps this is due to the fact that it is essentially a model problem not encountered to any great extent in full-scale practice, so that none of the theorists could look up their aerodynamics books and give us the answer.

Many suggested solutions have been advanced, and, at various times, writers have advised us that if only we would make the thrust line pass through the centre of gravity, the centre of drag, the centre of resistance, or even the centre of lateral area, all our troubles would be over. Then, of course, we cannot ignore the diehards who still insist that downthrust should not be required at all in a well-designed model.

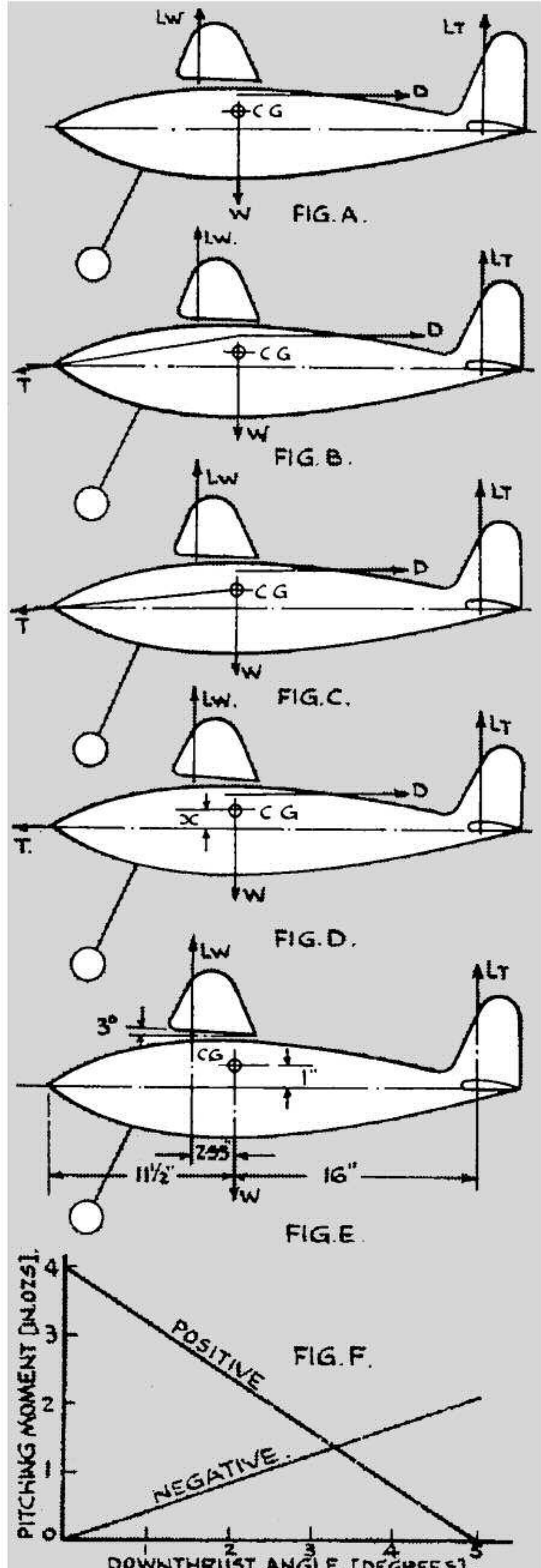
Apart from anything else, all this is a good indication of the confusion existing in the minds of enthusiasts with regard to the subject, and practical modellers have had to pin their faith on the old cut and try method of adjusting the thrust line. Maybe our consciences pricked us occasionally, because we do not like making adjustments which we do not understand, but, at any rate, the models did fly, and that was a good defence behind which to hide our ignorance.

Continued on page 1118

CLOUD TABLE

No.	Name	Description	Tendency
1	CIRRUS	Light feathers. High.	Need to get up very high to enjoy up-currents.
2	Cirro-Stratus	Light thin sheet covers sky. Sun shows through with halo.	As No. 1. Up-currents at slightly lower level.
3	Cirro-Cumulus	Flaky or round cloudlets, often in lines like sands at low tide.	Low level up-currents.
4	STRATUS	Uniform layer like a fog, low up to 4,000 feet.	Thermals unlikely.
5	Alto-Stratus	Grey or bluey. Low. Sun shows through only faintly (no halo) or not at all.	Ditto.
6	Strato-Cumulus	Soft grey, frequently in waves, sky mainly covered by large masses.	Only moderate chances of thermals.
7	CUMULUS	Fleecy. Top round, bottom flat. Often in long lines. From 1,500 feet.	Low level up-currents. The modeller's best friend.
8	Alto-Cumulus	Like No. 3, but cloudlets larger and often shaded with colour.	Fair chance of thermals.
9	Cumulo-Nimbus	Heavy cloud. Light at top, heavy and dark at base.	Low level up-currents.
10	NIMBO-STRATUS	Dark, no shape, accompanied by rain or snow.	Strong up-currents in *front* of cloud.

Generally.—Clouds of cumulus or sub-cumulus groups best for up-currents. Without clouds only ground-produced thermals are possible.



DOWNTHRUST —*Continued from page 1117*

Now I have formulated a theory which, I believe, covers every point, and which, if it is not completely practical at present, is only waiting for accurate low speed data to make it so. However, knowing my fellow modellers, I realise that, if I am to be believed, it is first of all necessary to disprove the other theories, and then prove my own beyond any doubt.

With this in view let us examine the more popular of the existing theories.

The general " Centre of Drag Theory " is that provided the thrust line passes through the point at which the drag seems to be concentrated, the model is balanced. Well then, take the model in Fig. A. The moments of the forces shown are in equilibrium and therefore the model is balanced for glide. If thrust is applied as shown in Fig. B., one force exerting a negative pitching moment about the C.G. has been added with nothing to counteract it, and a dive must be the result.

Actually, this theory is correct only in a single exceptional case; that is when the C.G. and drag lie on the thrust line and the latter is parallel to the direction of flight, which must be the same for gliding and powered flight.

Nor is it any better to suggest the old theory that because the drag is high on the model, the thrust tends to pull the nose up round it. Certainly the drag does increase with the speed, but the forces which counteract it at lower speeds also increase, and in proportion, so that the balance is maintained.

Even Mr. Houlberg slipped up on this point in his article " Daylight on Downthrust " (December, AERO MODELLER), which, I am afraid, was more of a grey dawn than full daylight. The model shown in his Fig. 2, assuming it to be trimmed to glide in the same attitude, is, in fact, balanced under power, whereas Fig. 5 is unbalanced.

As it happens, Fig. 2 is an illustration of the only case where the " C.G. Theory " is correct, as detailed below.

At first sight the " Centre of Gravity Theory " appears to be more watertight, since, according to the laws of mechanics, if the moments shown in Fig. A are balanced about the C.G., then, another force passing through this point (Fig. C) will not upset the balance, but merely move the whole system of forces in the direction of arrow T. Unfortunately we are not dealing with simple mechanics, and the argument breaks down because immediately the model starts to move along the thrust line, the wing and tail moments are no longer balanced, and, in Fig. C, the result would be a negative pitching moment. This is simply the principle of longitudinal stability. If the nose rises in relation to the direction of flight, the wing and tail angles of attack increase by an equal amount, and thus the tail moment becomes the more powerful, giving a negative pitching moment tending to push the nose down again.

The " C.G. Theory " holds good only for the isolated case in which the thrust line not only passes through the C.G., but also lies parallel to the direction of flight, which must be the same for gliding and powered flight.

Now to deal with the " No Downthrust Necessary Theory." Taking the model in Fig. A, and applying the thrust along the datum as in Fig. D, we find that there is no negative pitching moment as in the previous case, because the angles of attack are unaltered, but the thrust exerts a positive moment equal to Tx.

Thus we see that in Fig. C there is a negative pitching moment, but no positive; whereas in Fig. D the opposite is the case. It would therefore appear that the correct thrust angle lies somewhere between the two, in the position where the positive and negative moments balance one another. This is my theory, which may be stated as follows.

The direction of the thrust line should be such that its pitching moment about the C.G. is counteracted by an equal and opposite pitching moment caused by the difference between (1) the moments of the lift and drag forces about the lateral axis when the aircraft's attitude to the direction of flight is as desired, and (2) the moments of the lift and drag forces about the lateral axis when the flight path is parallel to the thrust line.

To clarify this, let us take an example in which, in order to avoid confusion, only the thrust, lift and gravity forces will be considered.

The model is as in Fig. E and the thrust, we shall say, is 4 oz.

First of all the thrust is along the datum, so that it exerts a positive pitching moment of 1 in. by 4 oz., equal to 4 in./oz. The angles of attack are, wing 3 degrees, tail 0 degrees; the lifts are 4·46 oz. and 0·82 oz.; and therefore the moments are (2·95 by 4·46) = 13·3 in./oz. and (16 by 0·82) = 13·3 in./oz. Thus the wing and tail moments balance and we can put the negative pitching moment down as zero.

Now take the case where the thrust line passes through the C.G. and, consequently, the downthrust is 5 degrees. This time the thrust has no moment, and the positive pitching is zero. However, adding the downthrust angle to the rigging angle, we find that the angles of attack are now 8 degrees and 5 degrees, giving moments (2·95 by 6·46) = 19 in./oz. and (16 by 1·32) = 21·1 in./oz. for wing and tail respectively. By subtraction, we find that the tail is exerting a negative pitching moment of 2·1 in./oz.

If values are calculated for other angles of downthrust, and a pair of graphs drawn—one for negative, and one for positive pitching moments—the result is Fig. F. From the crossing point it is obvious that the moments balance when the downthrust angle is approximately 3½ degrees.

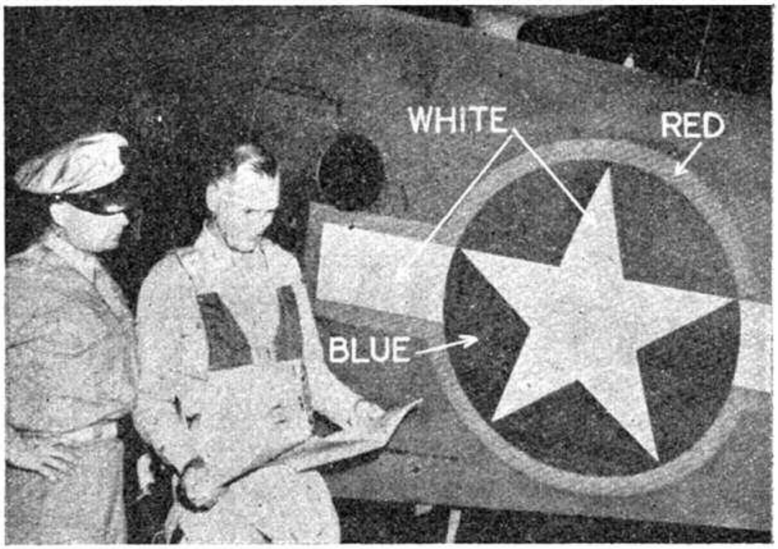
In actual practice several other factors such as slip-stream, variation of thrust, etc., would, of course, have to be taken into consideration.

It will be noticed that my theory mentions the " desired " angle to the direction of flight. This is because it is neither necessary nor desirable that the model's attitude to the airflow should be the same under power as when gliding. The optimum angle for climb is usually slightly less than that for glide. To achieve this it is only necessary to arrange the moments so that the model will not balance unless its attitude is as desired.

In conclusion I should like to point out that the foregoing does not claim to be a practical means of finding the angle of downthrust—there are too many unknowns, at present—but it is a theory which, if understood, will solve many of the hitherto unsolved model mysteries. Furthermore, although the cases illustrated here have all been orthodox high-wing models, the theory is equally applicable to any type of model.

MONTHLY MEMORANDA

By O · G · THETFORD



Associated Press Photo.

Modified U.S.A.A.F. Insignia.

The precise nature of the alterations to the U.S.A.A.F. insignia (the decision to change it was announced in last month's Monthly Memoranda) have now been revealed. Two white rectangles are added to the sides of the original blue disc with white five-pointed star and the whole is surrounded with a narrow red band. (See illustration on right.)

Japanese Markings.

Pale tints of grey and green are used in irregular patches on the upper surfaces of Japanese aeroplanes whilst the lower surfaces are pale grey. The Japanese national insignia, used on both Army and Navy aeroplanes, is a red disc symbolical of the rising sun, and this is painted above and below the wing tips and on the sides of the fuselage. On camouflaged aeroplanes the red disc is outlined with a thin white circle.

Other Japanese machines have been observed painted a pale grey or pale green on both upper and lower surfaces. On pale grey machines the white outline is not necessary on the national insignia.

Unit markings on Japanese aeroplanes take the form of white horizontal bands of varying thickness painted across the fin and rudder and vertical bands around the rear fuselage. Civil aeroplanes still flying in Japan or on transport duties in occupied territories carry the civil registration letters on wings and fuselage. The initial letter is also carried on the rudder. Japanese civil registrations all begin with " J " and are followed after an hyphen by four other letters, the first letter of which in types now flying is usually " B " or " D ". The civil letters are painted alone on the upper surfaces of the wings but are accompanied by the military red disc beneath each wing tip on the under surfaces. The prototype version of the Mitsubishi Navy B-96-1 Otori medium bomber was registered J-BAAE.

Lease-Lend Aircraft in Russia.

Hundreds of British and American aeroplanes are now flying on the Eastern Front with the Red Air Fleet and many more are being delivered by way of reception aerodromes in Persia, where they are delivered by R.A.F. and U.S.A.A.F. pilots and collected by Russian air crews.

Among the types now used in Russian squadrons are the Hurricane II, Spitfire V, Airacobra and Kittyhawk for fighting; Mitchell and Boston III for medium bombing, and the North American N. A. 16-3 Texan for advanced flight training. Until they are handed over to Russian pilots the aircraft have British and U.S. insignia, but after delivery these are painted out and replaced by the five-pointed red star. The red star is painted on the fuselage sides and below each wing-tip but not above the wings. On the Mitchells the stars are painted on the outer sides of both fins and rudders and on the fin and rudder of single-motor types and the Bostons.

Russian camouflage schemes vary according to the sector and natural vegetation over which the machines are flying, but in winter months the white camouflage is almost universal. Fighters are all white apart from the wing panels, which are painted some bright colour such as red to enable machines forced down in the snow to be located if possible by friendly rescue machines.

Upper surface camouflage for the summer months ranges from various tints of green and purple to a dark grey, and under surfaces are either a palish grey or a greyish-blue.

The number of the unit is sometimes painted in pale grey on the fuselage sides ahead of the red star.

Air-Sea Rescue Spits.

Superannuated Spitfire Mk. IICs are now used by the Air-Sea Rescue Squadron of the R.A.F. which rescues airmen shot down in the waters around the British Isles. Formerly the unit has had only Lysanders, Walruses and Ansons for this duty, the latter two are used for longer flights and the Spitfires for dropping supplies of food and rescue equipment. The Spitfire IIC is a converted Mk. IIB with twin shell-guns and four machine-guns and has the Merlin XX motor. Spitfire IIC serially numbered P 8131 with the squadron has the code lettering " AQ-C."

Civil Mosquitoes.

Since the early summer of 1943 a number of Mosquitoes in civil guise have been operated on special freight and mail routes by British Overseas Airways. One of them is a Mosquito Mk. IV, whereas the others are converted Mk. III advanced trainers. The British Airways Mosquitoes carry service camouflage on the upper surfaces and are painted silver on the under surfaces. The Mosquitoes carry the usual civil registration letters on the wings and fuselage. On the wings they are underlined by red and blue bands and on the fuselage by red, white and blue bands six inches thick. Red, white and blue fin " flashes " are carried. The registration letters are black beneath the wings and black on the upper surfaces outlined with a silver trimming.

THE FOCKE WULF Fw 56 STÖSSER

By H · J · COOPER

Next Month:

THE VICKERS VILDEBEEST IV

THE Stösser (pronounced "Sterser" and meaning "Falcon") is a single-seat advanced training monoplane used extensively by the *Luftwaffe*, and as such has no counterpart in this country. The Royal Air Force has never used a single-seat training aeroplane designed originally as such and has relied upon superseded single-seat fighters for instructional purposes. In Germany the single-seat trainer holds a prominent position, and in this category are the Bücker Jungmeister and the Gotha Go 149 and various Arado designs.

The Stösser first appeared in 1935 and is still in production. Many hundreds have been built.

The high elliptical wing and clean undercarriage of the Stösser give the machine very pleasing lines, and in more peaceful days aircraft of this type have given impressive flying spectacles at the various International Flying Meetings.

The wing of the Stösser is built up on two spruce and plywood spars with spruce ribs, and is covered with stressed plywood back to the rear spar and the remainder with fabric. The ailerons are of metal and have fabric covering. The fuselage is of welded steel tube construction and is covered forward with detachable metal panels and aft with fabric. The tail unit is of wooden framework, the fixed surfaces being covered with plywood and the rudder and elevators with fabric. The fin is of steel tube and is built integral with the fuselage.

The undercarriage consists of two legs which attach to both upper and lower longerons, and the radius rods and shock absorption units are neatly faired by light metal casings. The early versions were fitted with spats over the wheels, but these were abandoned on later models.

Power is supplied by a 240 h.p. Argus As 10C eight-cylinder inverted Vee air-cooled motor, which drives a two-bladed wooden airscrew.

The Stösser has a span of 34 ft. 5 in., and is 24 ft. 11 in. long. The tare weight is 1,529 lbs. and the loaded weight 2,191 lbs. The wing loading is 13·75 lbs/sq. ft. and the power loading 9.02 lbs./h.p.

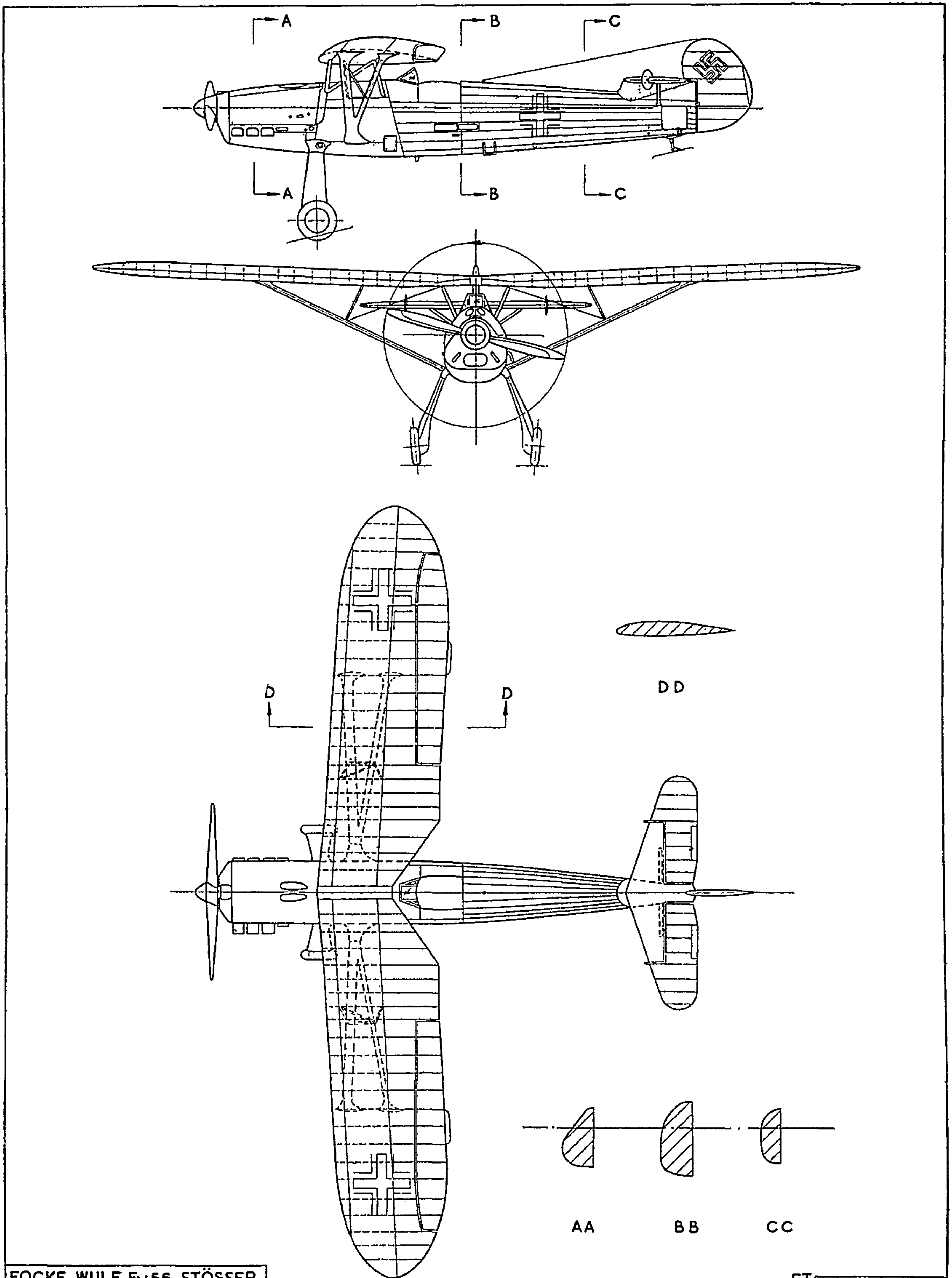
Performance figures are as under:

Max. speed at sea level: 172.6 m.p.h.; speed at 6,500 ft.: 168 m.p.h.; speed at 13,000 ft.: 160 m.p.h.; landing speed: 56 m.p.h.; climb to 3,280 ft.: 2.2 minutes; climb to 16,400 ft.: 17.9 minutes; service ceiling: 20,340 ft.; range at 160 m.p.h.: 286 miles.

Before September, 1939, Stössers in service with the *Luftwaffe* were coloured all silver and carried black registration letters on wings and fuselage. The familiar black swastika on a white disc across a red band was painted on the rudder. Stössers were often seen in this country, and that shown on this page was photographed at the International Meeting at Lympne, in September, 1937. It also was coloured silver with black letters. Other Stössers were registered D-IIZE, D-ITAU, D-IIKA, D-IXLO, D-IFQO and D-IPQV. The prototype was registered D-JSOT.

Contemporary German trainers are camouflaged a dark green on the sides and upper surface, and are either silver or light grey underneath. The usual black crosses and swastika are carried. Many Stössers retain their original "civil" letters on the fuselage, and the black cross appears after the D-I.

Photos by "Flight" and A. J. Jackson.



FOCKE WULF Fw56 STÖSSER

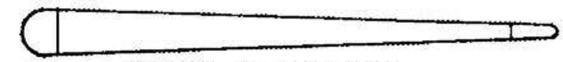
"KIRBY CADET"

DESIGNED BY B. COSGROVE

SCALE 1" TO 1 FT.

THE CONSTRUCTION IS QUITE STRAIGHT-FORWARD - THE FUSELAGE IS MADE AS A NORMAL SLABSIDER OF 1/8" SQ & FORMERS & STRINGERS ADDED. THE SKID, OF BAMBOO STRIP, IS STEAMED TO SHAPE & WELL CEMENTED. THE BALANCE WEIGHT IS ACCOMMODATED IN A RECESS IN THE NOSE BLOCK.

THE MODEL WAS ORIGINALLY TEST FLOWN ON A SUNNY DAY WITH A SLIGHT BREEZE, USING ABOUT 50 FT. OF ORDINARY COTTON & 3 FT. OF RUBBER STRIP. 100 FT. WAS EASILY OBTAINED & THE FLIGHT LASTED ABOUT 50 SECS. THIS IS THE AVERAGE FOR THIS PARTICULARLY CONSISTENT FLYER.



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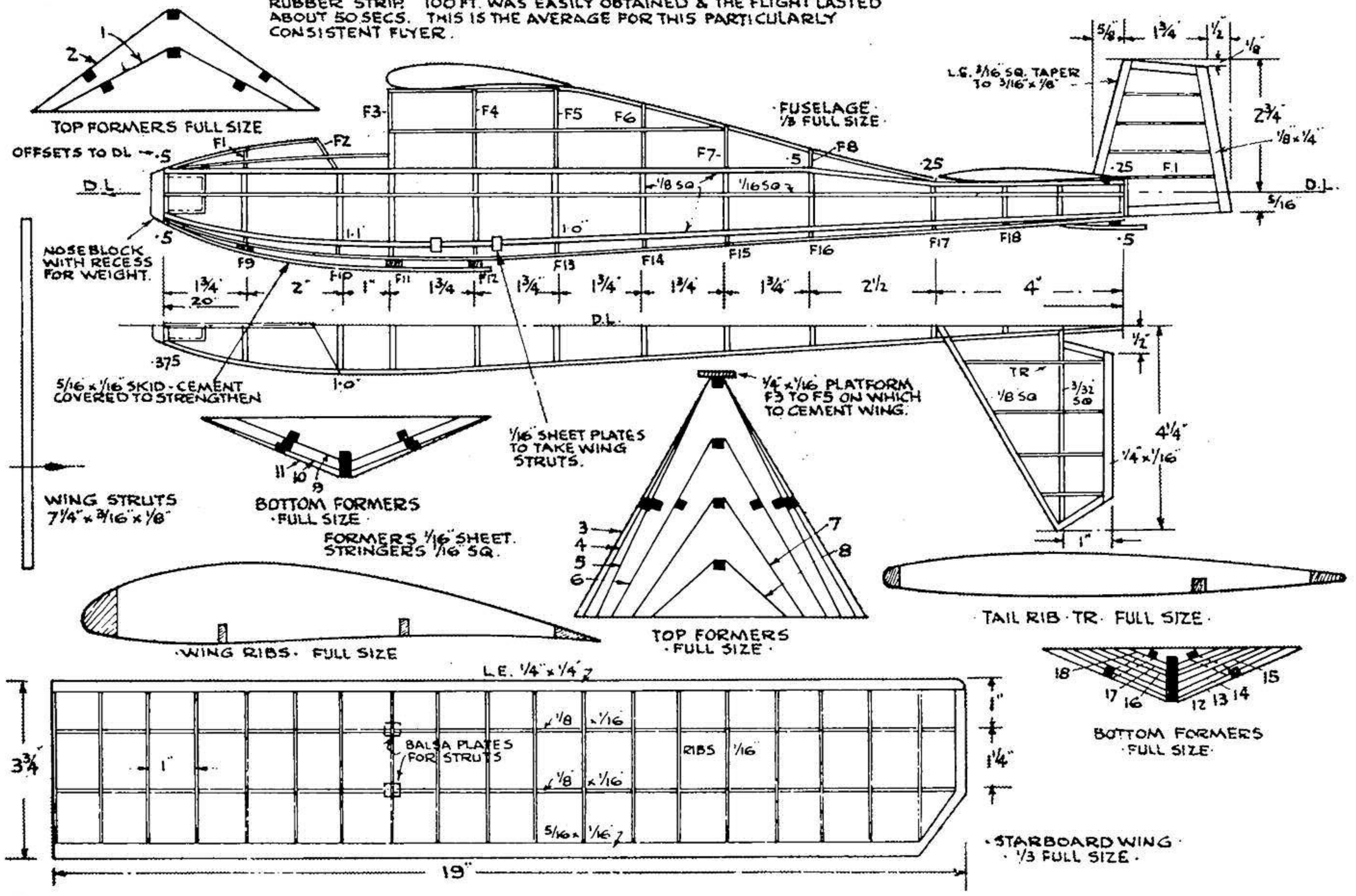


Club News

Members of the Ripon M.F.C. at their successful meet held at Littlethorpe on Sunday, August 1st.

THE weather has certainly altered for the worse just lately, and we seem to be getting back to the usual rotten conditions when a competition day comes along! High winds have again put in an appearance, and have spoilt many a comp. and models, the latter perhaps the most annoying factor owing to lack of materials and time these days. The senior members of most clubs are hard put to it at present keeping one model on the go for competition work, and to get that either busted or lost is no joke—not that it was at any time, war or peace!!!

The Pharos club seem to have gone all out for the Flight Cup event, and got five members placed in the first twelve. This competition only attracted 50 entries, which is somewhat surprising in view of the class of model required. Rubber shortage as now being experienced should have brought about more thought to the design of models able to fly on a minimum of power, but far too many cannot rid themselves of the habit of overpowering their models with loads of rubber, and nearly ripping the wings off the model in consequence.

S. A. Taylor of Bushy Park is coming into the limelight again now that the season is advancing, and put up a very good show in the Gutteridge Trophy event with nearly a 300-point lead over the runner-up. His total aggregate of 1144·3 seconds included one flight of 16 : 23·6, which is some going in any language. Other big flights were put in by R. Jefferies (Northern Heights) 11 : 49; Bob Copland (N. Heights) 9 : 23, and A. Wilson (Hayes) 7 : 18·6. This augurs well for the continued advancement of the Wakefield type of model, and must be very encouraging to the donor of the Cup. The popularity of this type of model is reflected in the entry—81 competitiors from 22 clubs.

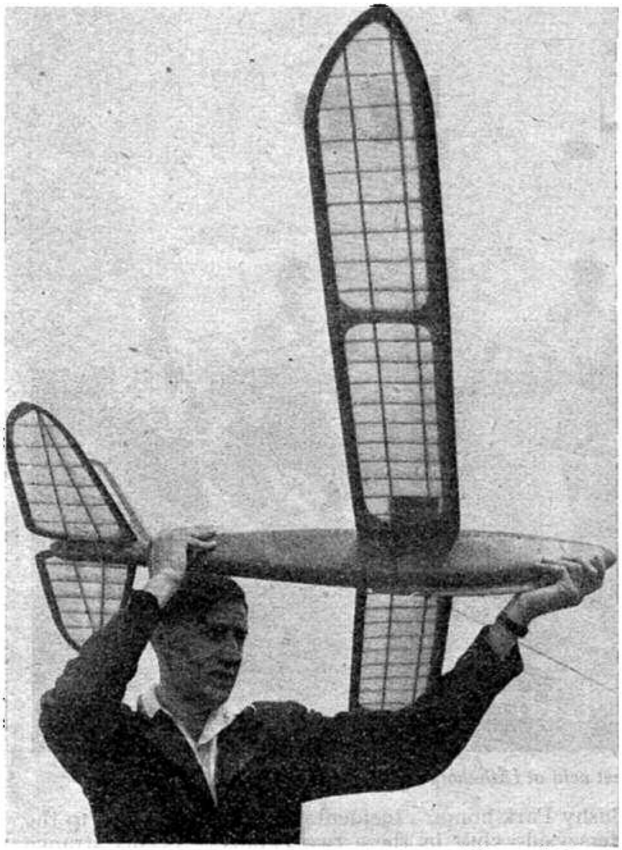
Pharos again shone in the M.E. No. 1 Cup event, their team scoring 1015·3 points, and well leading Bushy Park home. Incidentally, what happened to the Merseyside club in these two comps? Seems strange not to see one of their entries in the first twelve, particularly in view of their meteoric start to the season.

The weather for the latter comp. was generally bad, and is presumably the reason, for the general poor showing. Oh, when will we get a season when at least half the contests can really be run in comfort! All we seem to do is duck into shelter from wind and rain, and every flight is made in fear and trepidation.

Incidentally I hear that the results for the Flight Cup event were delayed owing to one club having a model, box and result sheet stolen. Limit, isn't it! The S.M.A.E. Competition Secretary had the unthankful task of getting the confirmation of timekeepers, etc., but I bet this club keeps its contest records under lock and key in future.

The BUSHY PARK M.F.C. report great doing by A. H. Taylor in various open days, placing third at the Croydon affair after losing his model early in the day, and winning the Glider event at the Blackheath meeting with two excellent soaring flights of 1 : 54·4 and 1 : 45·2. In the club's team effort for the M.E. No. 1 Cup, M. W. Wright totalled 3 : 48·7 with a heavy-weight model with a wing loading of 10 ounces per sq. ft. The club Gala Day was marred by high wind and occasional rain, which seriously affected the times of the 46 entrants. Results were :

Open Duration ;	M. Farthing	4 : 12·3
	A. Brown	3 : 32
	— Jackson	3 : 01·9
Open Glider :	A. H. Taylor	2 : 18·3
	J. Marshall	1 : 57·6
	— Wassall	1 : 16·3



"Illustrated Photo"

"Get winding down there!" A. T. Taylor with his winning glider at Blackheath's Open Day.

F. Davies of the LEICESTER M.A.C. still seems to have the legs of the rest of the members, and won the Everard Cup for duration with a time of 2 : 45, while J. Scattergood won the Junior event with his "Percy" with a time of 2 : 18. An enjoyable visit to the Birmingham ground brought about 5th, 6th and 7th places in the glider event, and a return match was arranged for the 22nd of August.

Juniors in the STREATHAM AEROMODELLERS are doing their stuff this season, one in particular, by name Bleeker, losing his glider from Epsom Downs, recovery being made from Limpsfield, some 12 miles away. L. Pribyl has been losing models regularly, his latest effort being the chase for miles of his glider converted "Tse-tse Fly"

Sailplanes are all the rage with the PENN M.A.C., and these showed to good advantage at a recent meeting with the Birmingham lads. Sid Ward won the glider event, and placed second in the Nomination contest. On a test flight before the comps. he clocked 9 : 40 o.o.s. with his glider, and was fortunate to recover it in time to win the contest. He also holds all the club records but three, full list being as follows:

H.L. Duration	S. Ward	14 : 30 o.o.s.
Glider (Run launch)	,,	9 : 40 o.o.s.
,, (Winch ,,)	,,	6 : 30 o.o.s.
R.T.P. (R.O.G.)	,,	1 : 7
,, (H.L.)	,,	: 55

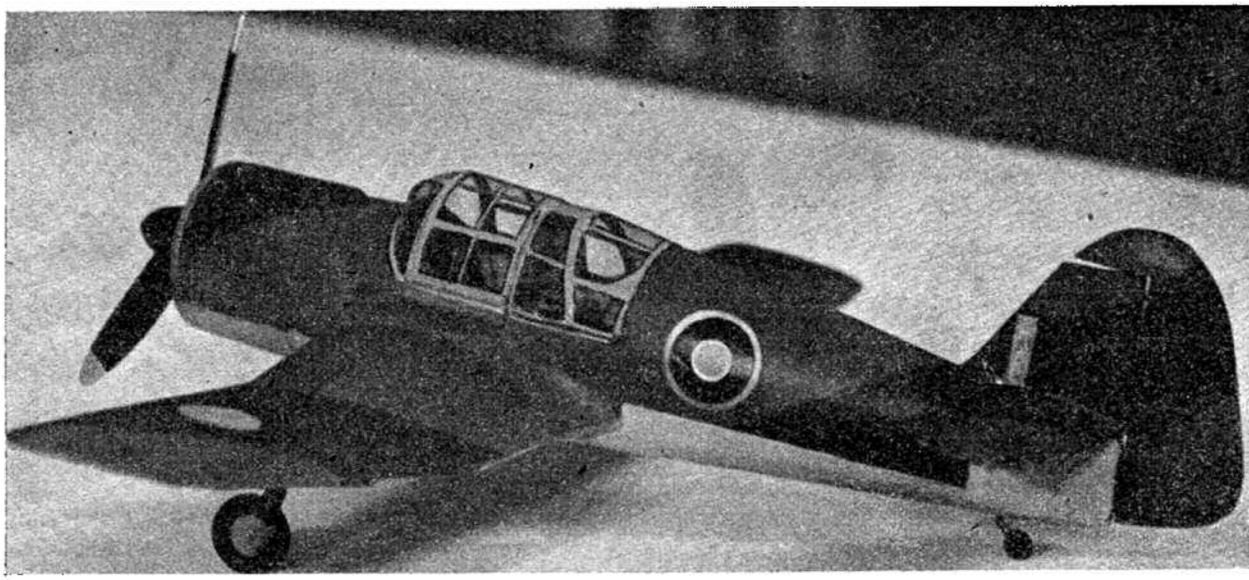
J. Townsend of the ILKLEY M.A.C. has raised the club glider record to 3 : 25, hand-launched, also the winch-launch record to 4 : 14 in the Pilcher Cup. His Wakefield model has been putting in some good flights recently, notable being two of 5 : 31 and 8 : 35·6 respectively.

The BLACKHEATH M.F.C. have decided to follow up their successful rally at Epsom with an indoor Rally in early January. Various halls are under review and a multi-pole r.t.p. is certain, while if a large enough venue can be found, free flying events will also be scheduled. J. W. Jackson, whose designs have appeared from time to time in THE AERO MODELLER, made best time of the day at Bushy Park's open day on August 1st, flying a two year old "stick-fuselage-parasol" mainly built of hard woods, clocking 153·4 seconds in a high wind.

The HEDNESFORD M.A.C. have a fine ground—the common—about one by three-quarters of a mile in extent. Some good times have been put up, as the following records list will show;

Under 30 in. class	J. Craner	5 : 16
30 in.–36 in. class	F. B. Adams	12 : 26 o.o.s.
Over 36 in. class	B. Goodwin	5 : 46 o.o.s.

G. R. Wollett's 1/20 scale Bristol Beaufighter I. A very nice job, if we may say so.



A 24/th scale "Master" built by Mr. Attridge of the Perth M.A.C. It incorporates hollow fuselage, retracting undercarriage, and all controls are movable.

Since last year's single success when Mrs. Buckeridge won the Ladies' Challenge Cup, the PHAROS M.A.C. have really got down to it, and in spite of the fact that they have only nineteen members who can really be called working members, and most of these juniors, an imposing list is being built up, including many placings in national competitions, as will be seen from the lists published in these columns from time to time. P. O. Hume has raised the glider record to 4 : 20·5, while F. T. Houchin broke the club biplane record with 1 : 30. Ten biplanes are ready for the K. & M.A.A. Cup. (It's surprising to me how many modellers fight shy of biplanes. I have had some really good fun flying with this type of model, and can honestly say that there is very little, if any, greater difficulty in trimming such models, and the glide is usually extraordinary.)

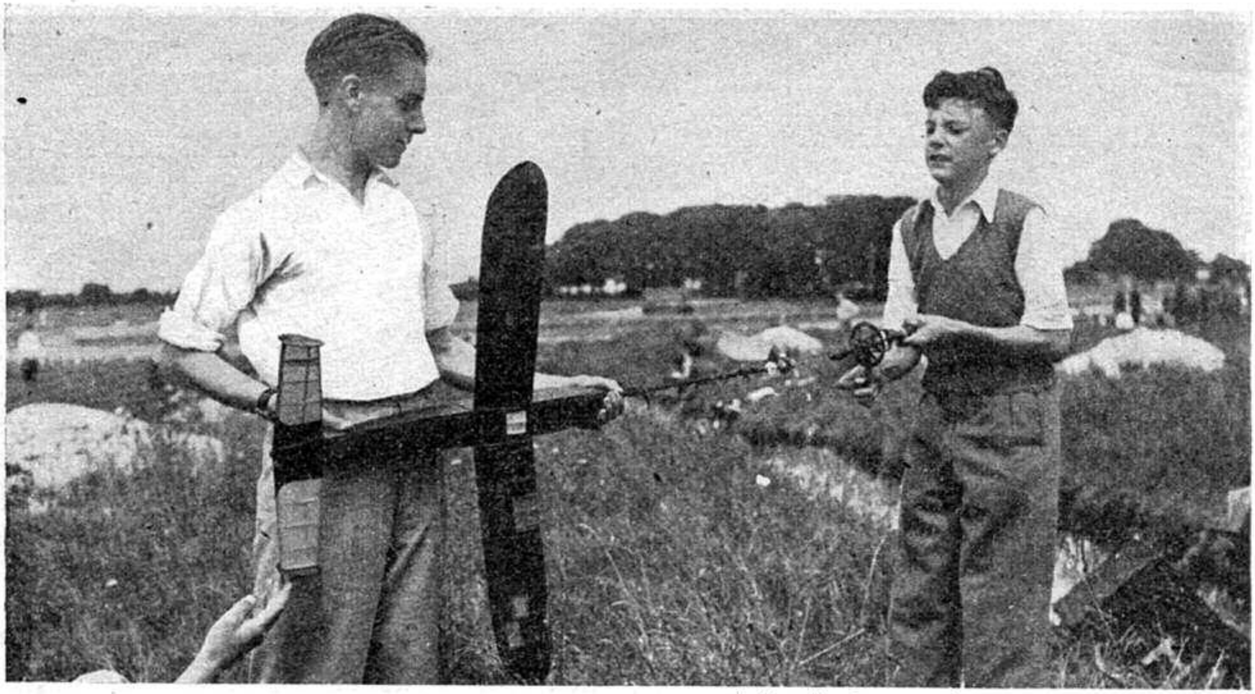
The BIRMINGHAM M.A.C. were pleasantly surprised at the support received for their inter-club "do", competitors coming from Leicester, Penn, South, East and North Birmingham, and the King's Heath club. Ninety-seven entries were recorded for the various comps., and the weather (and thermals) were perfect. Full results :

		Aggregate.
Open Duration :	D. Jennings (E. Birmingham)	708·4
	E. Hubbard (Birmingham)	288·4
	E. Hansell (Birmingham)	287·0
Open Glider :	S. Ward (Penn)	159·6
	D. Blair (Birmingham)	104·6
	R. Monks (Birmingham)	69·8
		Error.
Nomination :	N. Lancashire (Birmingham)	·2
	S. Ward (Penn)	
	S. Ward (Penn)	·3
	D. Harrison (Birmingham)	·6
		Points.
Team :	East Birmingham	853·6
	Birmingham	490.7
	Leicester	377·7
	Penn	265·3
	South Birmingham	186·7

W. Jones won the "Smythe Cup" for Wakefield models, run in conjunction with the Gutteridge event. Entries were disappointing, 40 models being tied up at local Wings for Victory exhibitions, ten being "Wakes". On June 20th the WALTHAMSTOW M.A.S. entertained the Pharos and Blackheath clubs in an inter-club comp., when unfortunately the wind was well in evidence, and several models were cracked up. Results :

		Secs.
Open duration :	R. L. Galbreath (Blackheath)	110·2
	J. Buckeridge (Pharos)	110·2
	Mrs. Buckeridge (Pharos)	51·2

"If I do you'll knock your silly head off with the tailplane!"



Knot another turn! Agonising moment at Blackheath's Open Day!

Open Glider :	W. White (Blackheath)	38·0
	J. Trusler (Blackheath)	34·0

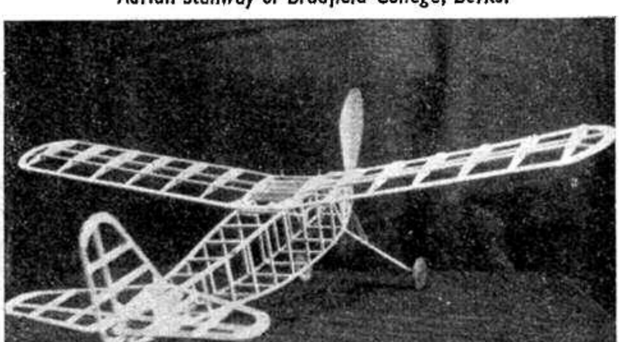
Pharos won the Team event, while W. White made the longest flight of the day with 75·6 secs. S. Sutherland has lost five models of the same type in five consecutive weeks—but still persists in building more from BALSA! Where does he get it?

H. Tubbs of the LEEDS M.F.C., whose lost model was reported in last month's issue, has found the missing job at a spot 8 miles from the starting point. Best flight of the past month was by G. Dennison's 36 in. span glider which made an unofficially timed flip of 10 minutes o.o.s., and recovered the following morning from 5 miles away. B. Crocker broke his own glider (H.L.) record, pushing the time up to 48·5.

Strong wind and a downpour of rain spoilt the rally staged by the RIPON M.F.C., this accounting for the generally low times:

		Average.
Duration :	D. Dale (Harrogate)	59·2
	W. S. Elliot (Ripon)	41·9
Under 30 in.	J. Vandevelde (Ripon)	53·7
	W. S. Elliot (Ripon)	42·5
	H. Speight (Harrogate)	41·3
Glider :	J. Binks (Knaresborough)	37·3
	H. Speight (Harrogate)	33·5

Duration job, built and photographed by Adrian Stanway of Bradfield College, Berks.



The WORCESTER M.A.C. held a rally on August 1st in connection with the city's Holidays-at-Home programme, the full range of contests resulting as follows:

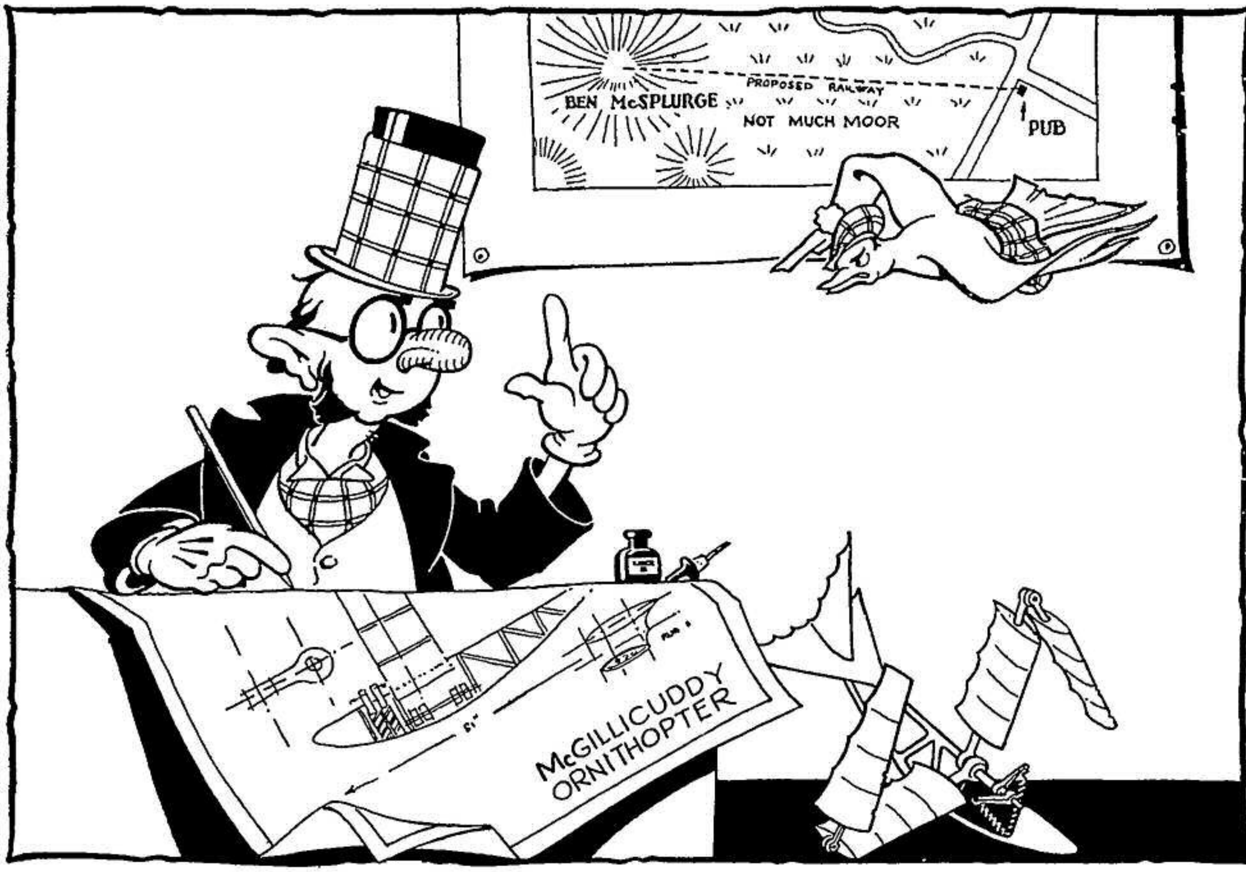
Open Duration for the Worcester Corporation Challenge Cup :	C. G. Grimley
	G. A. Jeffery
Open Duration (30 in. span)	R. Mezzone
Open Duration (over 30 in. span)	S. Frost
Gliders :	R. Hughes
Junior :	J. McGill
Nomination :	R. Mezzone

Junior members are flocking into the CHEAM M.A.C., and are satisfactorily making up for lost seniors. A big indoor season is anticipated and new members will be gladly welcomed.

Adverse weather conditions have greatly restricted the flying of the PERTH M.A.C., though some glider flying has brought about a new record by Mr. Attridge's "Stothers Glider" with a time of 2 minutes H.L. Over 150 solid models have been built since the club was re-formed, 80 models being constructed by one member for the Wings for Victory Week.

J. Ivory of the AYLESTONE M.F.C. had bad luck in the Flight Cup contest, one flight of 10 : 30 not being officially timed! W. Jones put up a nice total of 3 : 35·9 with his biplane in the K. & M.A.A. event, Ivory following with 2 : 50. Club records to date are:

Senior Duration :	W. Jones	3 : 51 o.o.s.
Junior Duration :	J. Bones	1 : 36
Gliders :	F. Ivory	2 : 34
Biplane :	W. Jones	1 : 23
R.T.P. (Class B)	W. Jones	1 : 28



"NOW DRAMBUIE TRY AN OVER-ARM STROKE"

Members of the Perth M.A.C. "Hard at it" in their new club room.

S.M.A.E. COMPETITION RESULTS.

Flight Cup, July 11th, 1943

		Secs.
I. S. Cameron	Merseyside	372.8
F. H. Briggs	Cheam	270.
R. Holderness	Pharos	266.8
J. P. Buckeridge	Pharos	261.9
R. Copland	N. Heights	204.5
J. Hill	Thames Valley	197.6
W. T. Coe	Pharos	194.5
Mrs. Buckeridge	Pharos	188.
A. Armes	Pharos	183.5
P. Jones	Aylestone	180.
R. Shingler	Sale	173.8
F. Ivory	Aylestone	172.2

(50 entries ; 17 clubs)

Gutteridge Trophy, July 25th, 1943

		Secs.
S. A. Taylor	Bushy Park	1144.3
R. Jefferies	N. Heights	871.
R. Copland	N. Heights	856.
G. Wilson	Hayes	837.6
D. Lofts	N. Heights	618.
J. P. Buckeridge	Pharos	555.1
F. T. Houchin	Pharos	449.3
R. H. Double	Stratford	435.7
A. H. Lee	Bristol	432.1
N. Lees	N. Heights	417.75
J. Marshall	Hayes	407.2
W. Jones	Birmingham	375.5

(81 entries ; 22 clubs)

M. E. No. 1 Cup, August 8th, 1943

	Points.
Pharos	1015.3
Bushy Park	704.4
Hayes	633.
Surbiton	405.6
Harrow	350.2
Birmingham	281.4
Sale	257.4
Cheam	241.
Streatham	240.9
Leeds	216.5
Blackpool	169.
Croydon	137.95

LONDON DISTRICT INTER-CLUB CHALLENGE CUP

The First Round of the London District Inter-Club Challenge Cup took place on Sunday, August 15th, with twelve clubs competing. Reports show that the weather was universally sunny, though with an unpleasant degree of wind spoiling the times of some of the clubs.

Results are as follows (H indicates Home Team : A Away Team):—

Harrow M.A.C. (H) 220.6 secs. beat Brentwood School M.A.C. (A) 9 secs.

General Aircraft M.A.C. (H) 353.4 secs. beat Surbiton & District M.A.C. (A) 214.8 secs.

Cheam M.A.C. (A) 472 secs. beat Brentford & Chiswick M.F.C. (H) 265 secs.

Pharos M.A.C. (H) 671.5 beat Chingford M.F.C. (A) 275.1 secs.

Northern Heights M.F.C. (A) 769.75 secs. beat Walthamstow M.A.S. (H) 629.5 secs.

Blackheath M.F.C. (H) 975.7 secs. beat Bushy Park M.F.C. (A) 821.7 secs.

Blackheath M.F.C. thus win the Round-by-Round Prize for Best Team Aggregate. Perusal of times shows how different placings would have been if contested on normal decentralised lines, and justifies the organisers belief that straight knock-out contests would produce very different results from those usually obtaining.

Some notable times were put up in nearly every match—local conditions being responsible for the great variation in winning times. Best glider flight of the round was put up by Mr. P. D. Hume of Pharos, who clocked 204 secs. on his third effort ; while Ron Galbreath of Blackheath followed closely on his heels with 191.2 secs. o.o.s. Good rubber-driven times were also obtained by A. T. Taylor of Bushy Park clocking 194 and 192.9 secs. ; in the former flight his model unluckily went o.o.s. behind some trees and was clocked off—later it reappeared to make about 8 minutes. D. Lofts of Northern Heights was another to make strong flights with 165 secs. and 101 secs.; while F. H. Briggs of Cheam put up his club's best time with 92.5 secs.

Six clubs now remain in the contest, and byes will be arranged so that four out of the six go forward in the Semi-finals. The competition should be finally decided by the end of September.

The AYRSHIRE AEROMODELLERS ASSOCIATION is building up well, now numbering 120 members. The Kilmarnock group is reorganising, and invites any Kilmarnock aeromodeller to get in touch with R. Caldwell at the Y.M.C.A. Debate has been held regarding the scale to which solid models should be built—and the argument still continues ! A glider event was spoilt by wind and rain, but the Stewarton group managed to bag the kitty with a score of 334 points over Garnock M.A.C., 211·2 points.

R. Double of the STRATFORD-ON-AVON M.A.C. has raised the club tow-launch glider record to 1 : 22·5 with a shoulder-wing streamline model. It is intended to make a mass attack on the R.O.W. figures in the near future, which should be interesting—even if wet.

Mr. J. R. Boardman, President of the Runcorn A.F.C. wishes to contact the member of the Leeds M.F.C. whom he met on holiday at Blackpool. Contact can be made through Mr. S. T. Green, 11, Halebank Road, Halebank, near Widnes, Lancs.

Interest is still booming in our hobby, and this month brings the usual crop of offers to start clubs in various places. Three chaps have sent in from such widely separated places as Smethwick, Bolton and Lymington, and I trust readers will contact them and get healthy clubs going. Addresses, etc., are : F. E. Smith, 196, Church Lane, Smethwick, 41, Staffs ; R. H. Robinson, 366, Lever Edge Lane, Bolton, Lancs ; F. Pearce, 62, Gosport Street Lymington, Hants.

L. Bridge, of 2a, The Drive, Edgware, Middlesex, wants to buy a ¼ in. miniature sparking plug—" in working condition ". Any offers ?

SALES : AERO MODELLER, December, 1940–August 1943, from E. Hind, 2, Armstrong Place, Alnwick, Northumberland. Complete ready built " Viper " II with rubber motors, air wheels and gearbox. Perfect condition from A. J. Mugleston, 24, Woodville Road, Overseal, near Burton-on-Trent. Incomplete 50 in. span semi-scale petrol model, with 2·5 c.c. engine, minus coil and condenser. Nearest offer to £6, from W. A. Williams, 7, Estcourt Road, Lidget Green, Bradford, Yorks.

J. Fleming of 2, Cadogan Road, Marlborough Lines, Aldersholt, Hants. wishes to obtain any copies of Ziac's Year Books available.

And so for another few weeks, that's the lot. Let's hope the weather improves and gives us poor aeromodellers just a bit of recompense for a patchy season. Still, I suppose it could be worse—we can still fly a bit anyway, and we are lucky to be able to do that in these days after four years of conflict. Seems a lot longer than that, doesn't it? Still, it can't last for ever—or can it?

The Mk. III, this season, placed 6th in the Weston, incidentally its first time out, without any exhaustive trimming, put up an aggregate of 405.9 secs. in a stiff breeze. During the National Team event, it had one flight only of 226.0 secs. o.o.s. the best time of the day for any single flight in the Club. When modified to comply with the Flight Cup rules, the job again secured a sixth place with *an aggregate* of 372.8 secs.

THE CLUBMAN.

READERS' NOTES

Contributor D. M. Hatch informs us that his name was mis-spelt to read Hald in his article "A 1/72 scale Manchester III" in the September issue. Since building this model Mr. Hatch has built two more models by the same method, these being a 1/48th scale F.W. 190 and a Fortress IIe.

Contributors should make a special point of writing their name and address very clearly on all M.S.S., photographs, and drawings submitted. The number of articles that either lack the writer's name and/or address, or else leave us to decipher unreadable signatures, are truly amazing.

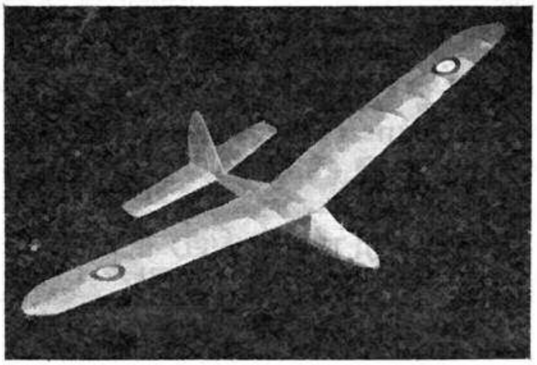
J. H. Gotch, designer of the "G.L.1. Glider" featured in the August AERO MODELLER, wishes to point out a few constructional details concerning the tailplane of this particular model that are not shown in the drawing.

1. The tailplane leading-edge of hardwood is continued right down to the bottom of the lower fin.
2. The trailing-edge of the tailplane, forward of the rudder is also hardwood, and again should be taken right down to the bottom edge of the lower fin.

These points are important as owing to the high position of the tailplane construction might otherwise be weak.

J. S. Cameron, designer of "The Zipper I & Ib" published on pages 1114 & 1115, sends us a stop-press concerning this model. Here it is: "The Zipper on its second flight H/L clocked 3 minutes dead. The model has to its credit a win in a junior competition, April 1942. 5th place '42 R.C.M.A.A. Biplane Cup, with an aggregate of 314 secs.

BRISTOL
"BEAU-GLIDER" KITS



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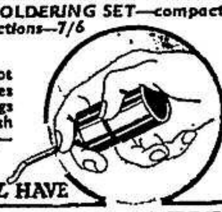

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