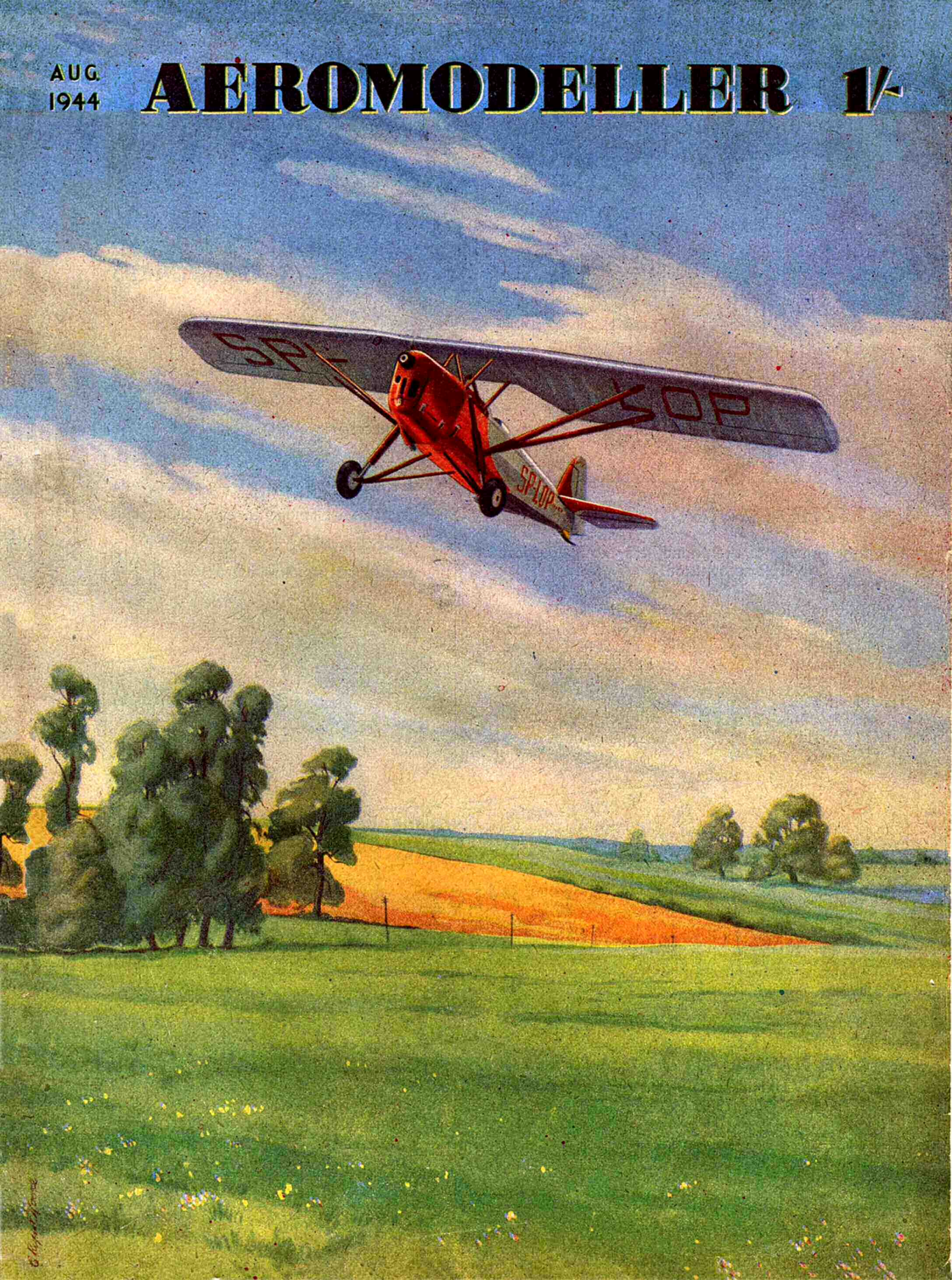
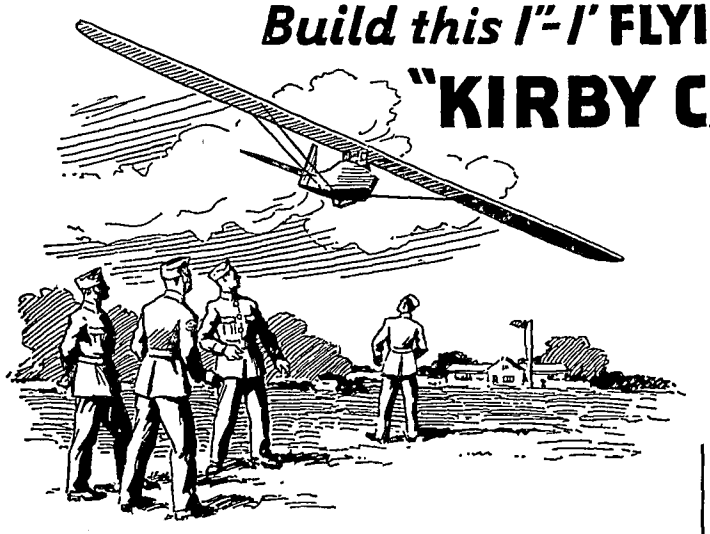
AUG
1944

AEROMODELLER

1/-



Build this 1"-1' FLYING SCALE MODEL "KIRBY CADET" GLIDER



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List of model kits not illustrated

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Pfalz D. 12	4/11
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Bristol Fighter F.2b	5/3
Russian Rata L.16	5/3
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Thunderbolt	6/9
Fokker G.I	8/11

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1/72 Solid Model Kits

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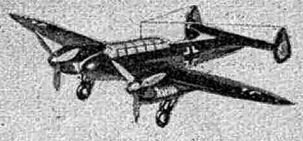
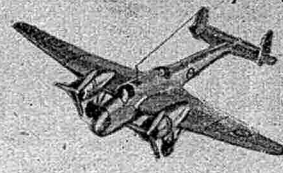
AMERICAN AIR FORCE
and GERMAN WAR PLANES

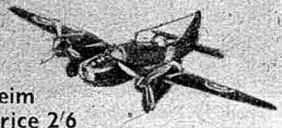


Messerschmitt 110
Price 2/6

Westland Lysander
Price 2/6

Handley Page Hampden
Price 3/1





Blenheim
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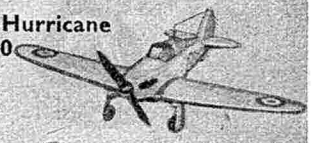
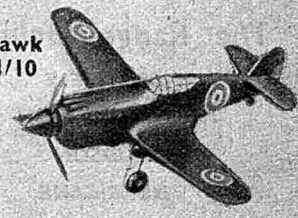


ALL KITS contain fuselage cut to outline shape, wings cut to shape, tail-plane, rudder, and where necessary nacelles printed on balsa, hardwood cowls and wheels, metal propellers, transfer insignia, cement. Also full-size detailed plan.

Messerschmitt 109
Price 1/10

Tomahawk
Price 1/10

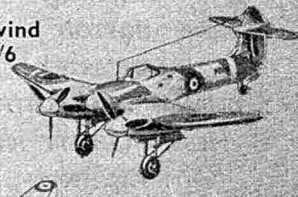


SUNDRIES

2"	3 Bladed Propellers ...	2½d. each
1½"	3 ,, ,, ...	2d. ,,
2"	2 ,, ,, ...	2d. ,,
¾"	Cowls	1d. ,,
7/16" and ½"	Wheels	1d. pair

Heinkel H.E.111K
Price 3/1

Whirlwind
Price 2/6



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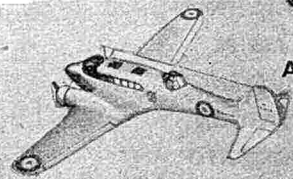
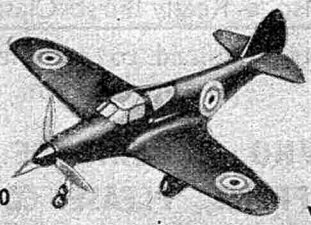
American ... ... 3d. ,,
German ... ... 3d. ,,

Buffalo Price 1/10



Avro Anson
Price 2/6



Airacobra Price 1/10

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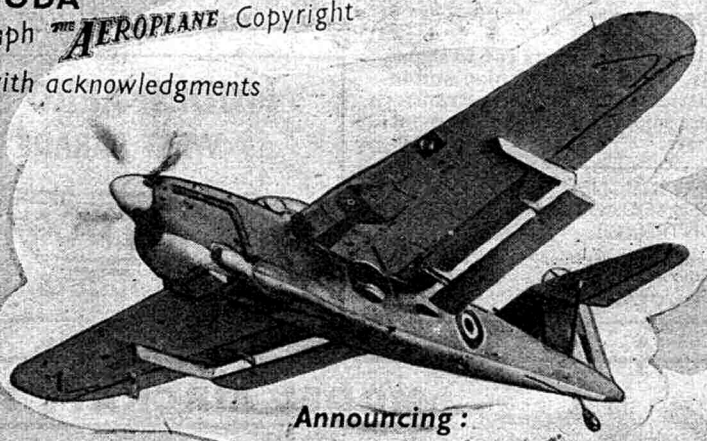
ADD 2½d. Postage on all Sundry Prices.

ASTRAL Aero Model Co.

BARRACUDA

Photograph THE AEROPLANE *Copyright with acknowledgments*



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AEROMODELLER

(INCORPORATING "THE MODEL AEROPLANE CONSTRUCTOR")

The Model Aeronautical Journal of the British Empire

Established 1936

VOL. IX No. 105 JULY 25th, 1944

PROPRIETORS: MODEL AERONAUTICAL PRESS, LIMITED

Managing Editor D. A. RUSSELL, M.I.Mech.E.

Editor C. S. RUSHBROOKE.

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NEWARKE STREET
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Tel. LEICESTER 65322

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The Flying of Petrol Planes

JUST as the July issue of the AEROMODELLER went to press, we received two letters from the Air Ministry, under the date of June 22nd, in which were set out revised regulations for the flying of petrol-engine driven model aircraft, *north* of a line drawn Southwold—Bury St. Edmunds—Bedford—Gloucester—Bristol Channel. (Flying of petrol-engine driven model aircraft *south* of this line continues to be strictly forbidden !)

AIR MINISTRY.
Department of Civil Aviation,
Ariel House, Strand, W.C.2.
22nd June, 1944.

Sir,

I am directed to refer to your letters of the 8th, 19th and 31st May and 7th June regarding restrictions on the flying of model aircraft, and to inform you that, in view of the considerations you have put forward, it has been decided to modify the restrictions previously imposed on the flying of these craft.

2. The restrictions which will now apply to all model aircraft, including gliders, are set out in a letter under to-day's date addressed to the Secretary of the Royal Aero Club, a copy of which is attached for your information.

3. The Department is anxious on security grounds that these regulations should be strictly observed, and any assistance in drawing public attention to them you can give will be appreciated.

4. I am to express regret that it has been impracticable to reply earlier to your letters.

I am, Sir,
Your obedient Servant,
A. H. WILSON,
for Director-General of Civil Aviation.

D. A. Russell, Esq.,
Managing Director,
Model Aeronautical Press, Ltd.,
Wilmary House, Merton Lane, Highgate, N.6.

With the co-operation of our printers we were able to arrange for the latter part of the printing "run" to carry a "Stop Press" notice giving the text of the Air Ministry letters, but as the first part of the "run" did not do so, we reprint herewith the two letters above referred to :—

AIR MINISTRY.
Department of Civil Aviation,
Ariel House, Strand, W.C.2.
22nd June, 1944.

Sir,

I am directed to refer to Air Ministry letter C.S.22713/S.6 of 10th May, 1944, concerning restrictions on the flying of model aircraft and to inform you that the Department has no objections on security grounds to these restrictions being modified slightly.

2. The revised restrictions on the flying of all model aircraft (including gliders) will now be as follows :—

(a) Such aircraft are not to be flown South of a line Southwold—Bury St. Edmunds—Bedford—Gloucester—Bristol Channel.
(b) There is to be no flying between the hours of sunset and sunrise.
(c) There is to be no flying in officially prohibited areas or within two miles of any Royal Air Force Station.
(d) Models are to be set to fly in a closed circuit only.
(e) Wing span in all cases is not to exceed 10 ft.
(f) Maximum engine running time is to be 45 seconds.
(g) Maximum time airborne is to be 2 minutes.

3. Copies of this letter have been sent to the Society of Model Aeronautical Engineers and to the Association of British Aeromodellers.

I am, Sir,
Your obedient Servant,
A. H. WILSON,
for Director-General of Civil Aviation.

The Secretary,
Royal Aero Club, 119, Piccadilly, W.1.

The effect of this latest Air Ministry announcement is therefore that the flying of all types of model aircraft may now be carried out by any person, provided that the rules (a) to (g) inclusive as set out in the Air Ministry's letter of 22nd June, 1944, are strictly adhered to; and there is no limitation on the flying of petrol-engine driven model aircraft to members of the S.M.A.E. *only*, neither is it necessary for timing devices to be approved by *that Society*.

It will be noted that the Air Ministry is anxious that the regulations should be strictly observed, and now that, in the northern half of England "flying for all" has been made available, we earnestly request all aeromodellers to carefully study the Air Ministry regulations and abide by them most strictly, both on security grounds and in the interest of the aeromodelling movement as a whole.

In securing the removal of the unfair and inequitable limitation of the privilege of flying, as restricted to members of the S.M.A.E., we had the support of the Association of British Aeromodellers and the Model Aircraft Trade Association; and undoubtedly the Air Ministry was influenced by the standing of these bodies when considering the memorandum submitted by this Journal. We are glad to have rendered this service to aeromodellers, and wish to express our appreciation of the

many letters of congratulation and approval of our action, which we have received from all parts of the country.

The N.G.A. Third Party Insurance for petrol planes has, of course, been reinstated; and once again we urge all aeromodellers who fly petrol-engine driven model aircraft to register for this essential insurance. Full particulars of the scheme were published on page 413 of the July issue of the AEROMODELLER: they may also be obtained, together with registration forms, from the Hon. Sec., N.G.A., Allen House, Newarke Street, Leicester, on receipt of postcard with sender's name and address thereon.

Association of British Aeromodellers

We are informed from 28, Hanover Street, W.1 (offices of the Association), that Mr. Arthur Lodge has been appointed Secretary—and he should have taken up his duties by the time this issue is on sale. Mr. Lodge, whose appointment is of course full-time, has many years' experience of Association work, and may be expected speedily to get his office organisation built up. We understand that a considerable number of technical books have already been purchased for the Library—and a list circulated to the members.

An indication of the interest shown in the formation of the A.B.A. is given by the information that enquiries for particulars have been coming in at a steady rate of some 60 to 80 a day, and whilst the Association is still barely "launched," a goodly proportion of these "enquiries" have already developed into "members."

Other news is that a small pamphlet, descriptive of the aims and objects of the A.B.A., together with a complete set of rules printed and bound in booklet form, are now available; also black and silver transfers for affixing to model aircraft. One dozen transfers are issued free to each member on joining. Lastly, comes news of a range of National Competitions, of which full particulars are given on another page, and which will, we feel sure, interest all readers of this Journal. We commend the organisers of A.B.A. for their far-sightedness and sense of equity, by arranging such a splendid range of competitions; and have been pleased to provide the sum of fifty guineas for the purchase of two solid silver trophies for two of the competitions.

Child Spotters

In our May issue we referred to a young "spotter." A reader now sends us notice of a 3¾-year-old boy, Derek Locke, who, it is alleged, can identify anything up to 400 aircraft, gliders, etc. Even at the age of two he could identify machines by picking them out of a pack of aircraft cards. Our reader adds a P.S. to his letter sending the newspaper cutting, from which we have abstracted this information, and adds "I do not vouch for the story. It is just a newspaper report. . . ." (*Verb. sap.*)

The Book of Westland Aircraft

Few, if any, of the aircraft firms whose history dates back to the days before the last war, can have a story so full of interest as that of Westland Aircraft, Ltd. Compiled by Mr. A. H. Lukins, himself a native of Yeovil, and for a number of years on the Westland staff, this latest publication of the Harborough Publishing Co., Ltd., attains a standard comparable with the "Aircraft of the Fighting Powers" series. Following an "Introduction" in which the Westland history and organisation is described from the earliest days up to present times, there are 1/72 three-view scale drawings of 29 Westland designed and built aircraft. Included also are smaller three-view scale drawings of a further ten aircraft, which, although not Westland designed, were Westland built.

There are over 100 large half-tone photographic reproductions in this book—size 11 ins. by 8½ ins.—which contains over 100 pages, is cloth bound in stiff boards, and is provided with an attractively coloured dust cover. At the price of 12s. 6d., or 13s. post free, from our Leicester offices, this book is extremely good value, and of such instructive value that we have no hesitation in strongly recommending it. Ample supplies are available, and copies may be obtained from any model shop or bookseller.

Pilotless Planes

Whenever a "new" invention is announced, it seems that considerable efforts are made by all kinds of people to prove that there is nothing new in the invention, and that similar ideas have been thought of long ago.

For instance, when the "human torpedo" was announced, several articles appeared, informing the general public that as far back as before the last war, and, in one case, as far back as the Russo-Japanese war, human torpedoes were being experimented with, and in a number of cases were actually used, not all that dissimilar to the latest type recently announced.

Similarly, the same thing has occurred with the introduction by the Germans of their "pilotless planes." Several articles have already appeared, pointing out that pilotless planes were designed in this country, and were being successfully launched and flown, during the days of the last war.

Now we hear from America that a new type of pilotless plane, some 19½ ins. span and made of wood and plaster of Paris, is being turned out in a factory in Portland, Oregon, for the purpose of training A.A. gunners. It is said that the model will reach a height of 300 ft., and will then either glide in a straight course, dive steeply, or circle for position as if to attack. At the altitude of 300 ft. the model has the scale and effect of a real plane at a height of 1,500 ft., and even that is not new. . . . In this country small model planes launched by catapult have been used for some time in the training of A.A. gunners, and it is said that speeds of 300 to 400 m.p.h. can be reached.

CONTENTS OF THIS ISSUE

The "Taylorcraft" Competition

Interest in our competition for the longest flight by a "Taylorcraft IV" flying scale model built from A.P.S. plans (price 2s. post free from our Leicester office) continues unabated.

We would remind readers that the closing date for this competition is August 31st next, and that entries must be made on the "official" entry form provided with each plan. Whilst it is essential that competing models are built to the 1 in. scale, and follow accurately the overall dimensions given on the drawing, departures from same in the use of sections or materials other than those indicated on the drawing are, of course, allowed.

Vacancies

We announce further vacancies in several departments at our Head Office at Highgate. We require a junior photographic assistant, and also a junior to be trained in the operating of a blue-printing machine. We also have several vacancies in our Model Building Department for (*a*) strictly model building; and (*b*) in the turning and fitting department.

All these vacancies may be filled by youths straight from school, *i.e.*, 14/15, or by older youths in the 16/17 age group, in which case education to matriculation standard is expected.

Wages payable range from £1 10s. to £2 10s. per week, depending on age, previous experience, and general ability.

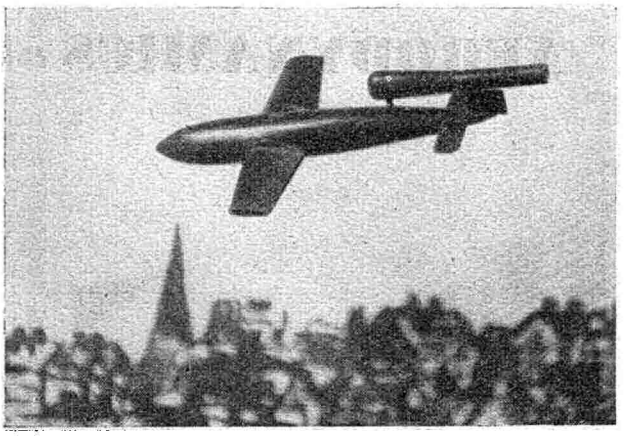
Applications should be made as soon as possible, addressed to the Managing Director, at our Leicester offices, Allen House, Newarke Street, Leicester, and should be marked "Personal" in the top left-hand corner of the envelope.

"Aviation in Miniature"

This booklet, recently announced, has caused considerable interest, and is attracting a good deal of attention. The first part, consisting of a number of chapters, is devoted to a description of the various aspects of aeromodelling, written in a simple yet attractive manner, and illustrated by "Freddie." The latter part of the booklet gives a complete list of every 1/72 three-view scale plan available (there are now nearly 400), together with the appropriate photograph; a list of well over 100 full-size scale drawings of all types of model aircraft; and a complete list of "Harborough" publications. Copies of this booklet may be obtained from any W. H. Smith bookstall, from any model shop or bookseller, or direct from our Leicester offices, price 1s. per copy, post free.

On page 457 we publish a notice referring to the "Aircraft of the Fighting Powers" series. We draw particular attention to this notice, firstly, to emphasize that copies of Vol. IV (1943 aircraft) are now in stock and immediate delivery can be given, and also to emphasize that, at the time of going to press, stocks exist also of copies of Vols. I, II and III (although the number of copies of Vol. II is extremely small—a bare 45 to 50 copies.)

Since this series of volumes was announced, we have had many hundreds of letters from readers expressing their regret that they could not get one or other of the volumes to make up a series. Now is their chance to remedy any omissions. We understand from the publishers that there are available several thousand copies each of Vols. I and III and IV, but those readers who need copies of Vol. II must order immediately, as the odd 40 to 50 copies which now remain will inevitably be quickly sold out. We understand from the publishers that work on Vol. V (descriptive of aircraft flown in 1944) is well under way, and that elaborate plans are being made to commence the printing earlier than in previous years, so that a really large stock of copies can be available on the publication date, which is announced as December 4th.



The first photograph of a model Flying Bomb to reach our Editorial Offices. Built and photographed by Mr. E. G. Hilton. Readers will note with amusement that another photograph of this model, published in a Sunday newspaper, stated that it was a photograph of an actual flying bomb taken "Somewhere in the South of England." Which is certainly a compliment to Mr. Hilton's photographic efforts, if nothing else!

"Run-True" Bobbins

In an article, page 394 of the July issue, entitled "Noseblocks, Propeller Shafts and other Devices," mention was made of a run-true bobbin. We wish to point out that the "Run-True" bobbin is a trade product of Premier Aeromodel Supplies, Ltd., and was, of course, introduced by our old friend Mr. C. A. Rippon.

WANTS——

(1) Copies of the AEROMODELLER, Vol. I, No. 1, December, 1939. Bound or loose, in good condition.—J. W. Reid, 187, Bushbury Road, Fallings Park, Wolverhampton, Staffs. (2) Plan of Elite "Skeeter."—R. W. Ford, 46, Dawlish Drive, Ilford, Essex. (3) Copies of the AEROMODELLER up to December, 1943.—Ray Belden, Top Bungalow, Cresswell Lane, Staincliffe, Dewsbury. (4) Petrol engine. Plans of Stinson Reliant S.R. 7D.—J. H. Quick, 38, Ashford Road, Brighton, 6. (5) Copies of the AEROMODELLER, October, November, 1942, January, October, November, 1943, 9d. each, if good condition.—J. D. Blackwell, School House, Aldenham School, Elstree, Herts. (6) AEROMODELLER, January, March, July, August, December, 1942. "The Aeroplane," January 1st to March 12th, 1943. "Aeroplane Spotter," Nos. 1–15, 101, 105–108, Index to Vol. I and Vol. II.P. D. Billington, Cross Hall, Ford, St. Neots, Hunts.

DISPOSALS——

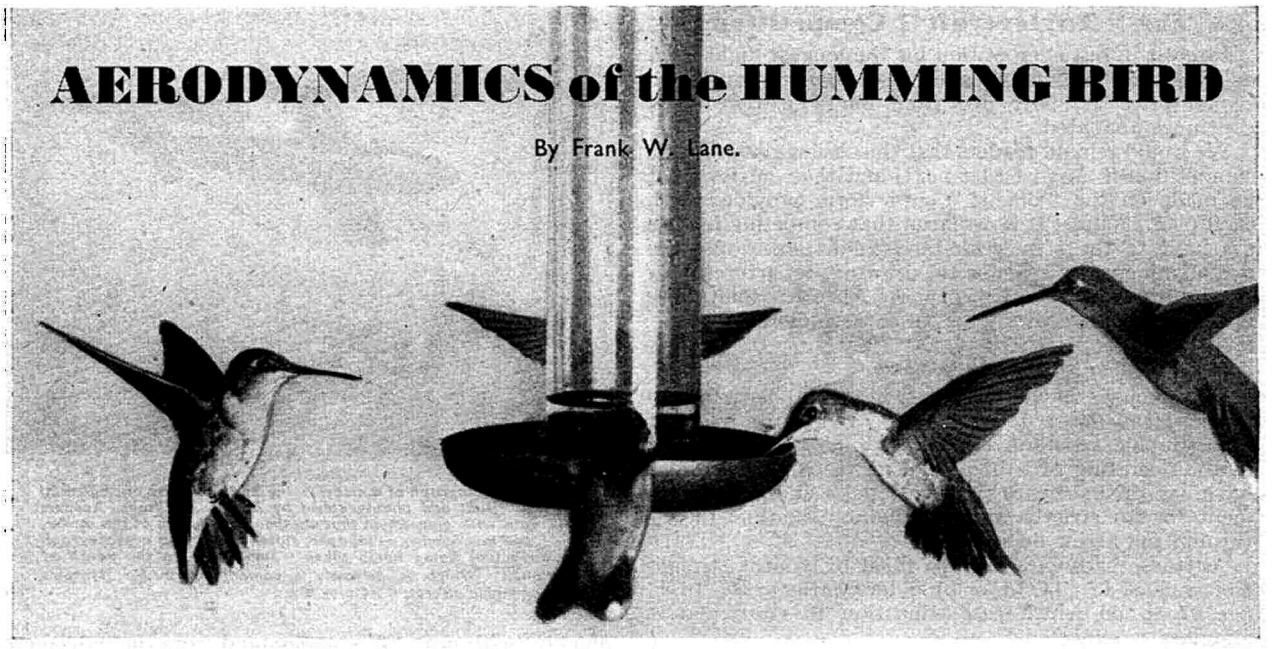
(1) Completed fuselage Elite No. 2 glider, with rest of kit. 6 ft. 4 ins. span glider; fin slightly damaged. 3 ft. span glider. 2 ft. semi-scale model with motor. AEROMODELLERS from 1941 and a few 1940. Callers only.—J. Penny, 161, Wave Avenue, Cranford, Hounslow, Middlesex. (2) Almost complete kit, "20-min. sailplane" with several sheets of balsa wood, blueprint; and blueprint of launching gear. Cost 20s. Good condition. 15s.—J. D. Blackwell, School House, Aldenham School, Elstree, Herts. (3) Pile of aviation books, or exchange for same.—D. Bradley, 73, Craig Street, Darlington. (4) 2·5 c.c. Hallam miniature petrol engine, complete with coil and condenser, less petrol tank. Offers marked "Please Forward" to . Joynes, A.C.1, c/o Westfield House, Holmer, Hereford. (5) Pair M. & M. (inflatable) 3 in. air wheels.—P. J. Ivens, Frances House, Blundells, Tiverton, Devon.

EXCHANGE——

(1) Large quantities of balsa strip and sheet (all sizes) and cash, for model petrol engine in good condition with coil and condenser. —J. H. Flaherty, 30, Park Avenue, Chadderton, Lancs. (2) Sheet and strip balsa for air gun or rifle.—L. Pulvermacher, 2, George Street, Reading, Bucks. (3) Prismatic Binoculars (6x) for miniature petrol engine, ¼ or ⅓ h.p. — D. Michael, 10, Rushton Road, Desborough, Northants.

AERODYNAMICS of the HUMMING BIRD

By Frank W. Lane.



HUMMING-BIRDS have long been of great interest to ornithologists. Their tiny size; brilliant colouring and fantastic feather adornments; strange feeding habits; and remarkable flight characteristics have evoked the wonder of man ever since the first humming-bird was seen, like a feathered jewel, darting through the air of which its race are such supreme masters.

Interest in humming-birds is not confined to bird-lovers. All who are interested in mastery of the air must admire, and endeavour to seek the reason for, the remarkable powers of flight possessed by these smallest of all birds.

Beside a humming-bird the highest creation of man's mechanical genius is made to look a clumsy make-shift lumbering about the sky without skill and with enormous waste of power. In the midst of our justifiable pride in the achievements of our aeronautical engineers it may be well if we pause for a moment to look at one of Nature's most expert flying machines.

There are some 650 kinds of humming-birds and they are scattered throughout the length of the Americas from Alaska to Tierra del Fuego. Wherever there are flowers to supply the necessary nectar and insects, humming-birds will be found, whether in steaming lowland jungles or just below the snow-line in the towering Andes.

The largest humming-bird is born from an egg the size of a pea laid in a nest no bigger than a plum. Within about a fortnight of hatching the young hummer is as big as its parents.

The young indulge in considerable wing-practice before they leave the nest. Standing at first in the nest itself and later on the rim, the youngster vibrates its wings until they are only a mist on either side of the tiny body.

William L. Finley says he has seen a young Anna's humming-bird make its wings buzz so fast that they almost lifted it off its feet and it had to hang on with its feet to prevent itself being lifted into the air. This bird practised many times during the day until it had mastered the art of balancing and rising in the air.

Sometimes the young bird will move its wings in slow motion and then suddenly switch into high gear. All this exercise develops and co-ordinates the wings so well that when the bird takes off for its first flight from the nest it exhibits at once that supreme mastery of the air for which humming-birds are famed.

The vital powers of humming-birds are at their zenith during the courting-season and it is then that their amazing powers of flight are demonstrated to the full. Two strikingly different modes of courtship are practised. One is the " static," in which the male takes his stand in a particular piece of territory and untiringly sends forth a rather melancholy love-note in the hope of attracting a passing female.

The second form of wooing is the " dynamic," in which the male, to dazzle and win a mate, gives aerial displays which are without parallel in the avian world.

In many of these courtship flights the male wins his mate by dive-bombing her. He towers to a height of sixty or seventy feet then shoots down in a breath-taking power-dive towards the perching female. The rapidly vibrating wings, combined with the terrific speed at which the tiny body hurtles downwards, causes a shrill whistle which reaches its peak as the feathered bullet flashes past the female and zooms upwards to complete an immense U around his would-be mate. He then repeats the whole thrilling display two or three times without a pause.

This is how Finley describes one of these displays. " I was standing on the hillside one May morning when I saw a Rufous humming-bird come down like the rush of a rocket. He turned and whirled up till I could see but the tiniest speck in the sky. Then he dropped headlong like a real meteor, his gorget puffed out and his tail spread wide. He veered just above the bushes with a sound like a whip drawn through the air and as the impetus carried him up, a high-pitched musical trill sounded above the whir of his wings. Again and again he swung back and forth, evidently in an effort to win the heart of some lady."

Some observers say the power-dive is made at such extreme speed that it is impossible to distinguish the bird

itself. Surely of few birds in the world can it be said that they can be heard but not seen !

Several factors are responsible for making the humming-bird such a marvellously efficient aeronaut. The compact, streamlined body, from rapier-like beak to short, powerful tail, is the perfect instrument for cleaving air with the minimum of resistance. The tail is capable of almost any adjustment, fanning, furling, raising, lowering, swivelling at will.

But the chief item in the humming-bird's flying equipment is its wings. To support them the bone and muscles of the breast are enormously developed—they are in fact colossal in proportion to the body. The flight muscles are largest in proportion to the size of the body of any flying animal.

The wings themselves are well shaped for fast movement. The aspect ratio is not very high, a fact which no doubt has some connection with the extreme rapidity of the wing-beat. In a Ruby-throated humming-bird, which weighed nearly three grams., the wing area was a little over twelve square centimetres. This gives a wing area per gram. of 4·16. The figure for another kind of hummer was 5·0.

The power necessary to drive such a tremendously high-geared engine is obviously enormous. It is supplied by the tiniest avian body working at white heat. The pulse rate of a humming-bird is 1,400 per minute, some twenty times faster than that of a human being. Small wonder that a humming-bird is constantly re-fuelling its tiny " engine."

Captive humming-birds feed, during daylight hours, at least once every ten minutes. But, and this is yet another of the miracles that is constantly met with in these amazing birds, some specimens are able to store enough fuel to make a 500-miles non-stop flight across the Gulf of Mexico.

With such splendid apparatus for flying, so powerful and supercharged an " engine " to drive it and such a constant supply of concentrated fuel, it is no wonder that the humming-bird is such a supreme master of flight.

It is only the remarkable developments which have taken place during recent years in high-speed cinematography which have enabled the wing-movements of humming-birds to be analysed. No ordinary cinematographic camera can " freeze " wings which beat seventy-five times per second, or six times faster than the wing-beats of an English sparrow. But by special high-speed cinematographic technique developed at the Massachusetts Institute of Technology and the Reichsstelle fur den Unterrichts-film even wings beating at this tremendous speed have been made to stand still and show their action in slow-motion.

To obtain the remarkable photographic results achieved at the Massachusetts Institute of Technology, Dr. Harold E. Edgerton used intermittent flashes in a low-pressure tube. The flash of light, brilliant as a miniature bolt of lightning, lasts for 1/100,000th of a second and the period of darkness between each flash lasts for 1/500th of a second.

A constantly moving film is geared so that a new piece of film comes opposite the camera lens at each flash. Over 500 pictures per second can thus be secured, although by increasing the number of flashes per second and the speed of the film, over ten times this number of pictures have been secured. I have seen one of Dr. Edgerton's films, taken at 6,000 pictures per second, in which the flight of a fly which in life took one-tenth of a second lasts for one minute on the screen.

By projecting the American and German films on the screen, ornithologists have been able to study in detail the humming-birds' whirring wings. Some remarkable facts have been discovered. The humming-bird flies like no other bird but has certain flight affinities with the most expert-flying insects.

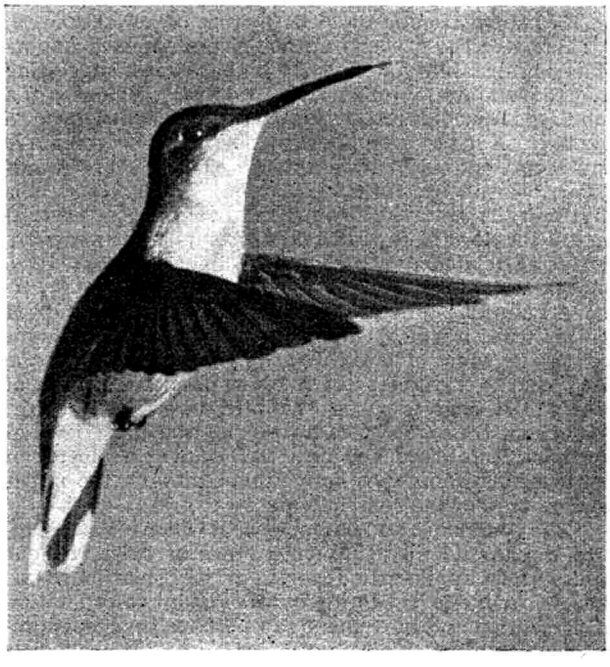
On each downward or backward stroke the wings turn completely, so that they are actually upside down. The following technical description taken from one of the " Biological Abstracts " of a report on some German films may be of interest.

" The wing tips describe a figure 8. In the down stroke, the wing rotates about 160 degrees so that its anterior edge is directed backwards, its ventral surface is turned dorsally. At the end of the upstroke, the wing rotates back to the original position. In this rotation the distal primaries of the wings play the chief role. The body axis is directed almost vertically downward and the proximal parts of the wings are kept close against the body so that the wing is strongly bent during vibratory motion, not stretched out as in ordinary flight and the hand region of the wing is chiefly responsible for the motion. The hand primaries open briefly during the turning points of the up and down strokes."

It has already been suggested that this remarkable twisting of the wing may be like the action of a variable pitch airscrew. I wonder if a closer study of the humming-bird's wing motion, say in a wind tunnel with apparatus to record the pattern of the air-flow about the wings, would reveal further facts of importance to the designers of airscrews.

Dr. Charles H. Blake, who examined Dr. Edgerton's films, found that the Ruby-throated humming-bird beats its wings fifty-five times (completed strokes) a second when hovering, sixty-one times a second when backing and as rapidly as seventy-five times a second in normal flight. It is thought that if the camera could

Nature's Helicopter I *Both of the remarkable photographs shown on these pages taken by Dr. Edgerton at a shutter speed of 1/100,000th of a second.*



keep the bird in focus an even higher figure would be obtained as the bird increases its speed in straightforward flight.

While hovering the Ruby-throat moves its wing tips at the rate of twenty miles an hour. When taking off, the bird is in flight before it leaves its perch (the take-off lasts 0·07 seconds) and pulls the perch after it a little way.

There is not much reliable information on the actual flying speeds reached by humming-birds. In view of the great difficulties of timing such flying atoms of living quicksilver the lack of information is not surprising. H. A. Allard, however, says that when he was making a fast car trip a Ruby-throat suddenly flew parallel to his course along the side of the road as if deliberately racing him. Judged by the car speedometer (admittedly not an ideal instrument for timing the speed of a bird) that tiny bird, weighing but a couple or so of grams and little over three inches in length, clocked between fifty-five and sixty miles an hour.

It is neither the speed of its wings nor the rate at which it can hurl its body through the air that is the most remarkable feature of the humming-bird's flight. It is the bird's amazing power of aerial control, which enables it apparently to defy all laws of aerodynamics and just fling its body in any desired direction or just hang on invisible wings motionless in space.

When feeding among flowers a humming-bird can be seen darting from one blossom to another—an inch or six feet away—pausing exactly in front of each one, starting and stopping almost with a jerk, turning at any angle with a sudden twist. It is one of the few birds that can rise straight up into the air.

Some naturalists have thought that the humming-bird cannot hover unless there is a wind to furnish a succession of unbroken columns of air under the wings. But this can hardly be so because hummers have been seen to hover in places completely sheltered. When hovering the body is dropped below the angle of normal flight and the down-stroke becomes an almost horizontal forward-stroke.

Robert S. Woods, a keen student and photographer of humming-birds, makes the following definite statements on the Anna's humming-birds powers of aerial control.

" Some of the earlier ornithologists expressed doubts of any bird's ability actually to fly backward, suggesting that the humming-bird's withdrawal from the depths of a tubular flower was accomplished by a forward flirt of the tail. A little careful observation would soon remove any scepticism as to its ability to easily fly backward, sidewise or in any other direction. While the tail is rhythmically vibrated forward and backward as the bird probes the flowers, it can be seen that its movements are not at all related to the backward flight, and that it is, in fact, seldom widely opened.

" A humming-bird's wings are in almost uninterrupted motion while it is in the air ; occasionally it will glide for an instant while in rapid flight. The amplitude of the wing beat is variable, but it often describes an arc of nearly 180 degrees when the bird poises in the air. Sometimes the wings seem not to rise above the level of the back, but when the bird hovers over a cluster of upturned blossoms they may travel through the upper portion only of the complete arc.

" The confidence and sureness with which a humming-bird threads its way through a maze of twigs without injury while apparently devoting all its attention to the flowers cause one to admire, but its instant co-ordination of perception and movement can perhaps best be appreciated by noting the ease and certainty with which it thrusts its bill into a small tubular flower blown by a gusty wind."

As sideways flight is such an aerodynamic miracle I wrote to Mr. Woods for confirmation of his statement. In a letter he kindly sent he says : " The most conspicuous example of lateral flight occurs in the courting demonstrations (mentioned earlier in this article, F.W.L.) used by certain species, in which the male shuttles back and forth in front of his mate, through a space of from one to several feet, always keeping his bill and body pointed towards her. This flight is quite brisk and has no appearance of difficulty. It would not be possible for anyone who has seen it to entertain any doubts as to the humming-bird's ability to fly sideways."

Perhaps I ought to add that Mr. Woods is far from being the only observer to state definitely that the humming-bird flies sideways.

As it may throw some light on the general question of the humming-bird's mechanism of flight I should like to quote the following from Dr. Blake's report on the M.I.T. films mentioned above.

" In backing away from a flower or feeding tube the humming-bird stands almost vertically in the air with its tail pointing downwards and a little forward. In this pose its wings beat horizontally, and what would be the downward half of each complete wing stroke if the bird's long axis were parallel to the ground forces the air forward, away from the bird's breast in its upright position, and drives the bird backward. Then, on the return half-stroke, the whole wing is rotated at the shoulder joint so that its upper surface strikes the air, and, driving it downward, balances the pull of gravity."

Dr. Blake also points out that the distribution of weight in the humming-bird's wing is evidently favourable to a very low inertia upon which the quick reversal of motion depends, the weight being concentrated close to the body by reason of the short, heavy humerus, i.e. the upper arm bone nearest to the body.

The white-eared humming-bird's mode of entering and leaving its nest provides a good illustration of flight control in action. Most birds on returning to their nest alight on the rim or branch and hop or walk on to the eggs. But the white-ear flies directly into the nest, settles naturally on the eggs and as the wings are folded the bird is immediately at rest.

Most birds when leaving the nest step off the eggs and take off from the rim. Not so the white-eared humming-bird. While still sitting on the eggs it spreads its wings, vibrates them rapidly and rises directly into the air. Sometimes it flies upward and backward until clear of the nest and then quickly reverses, shoots forward and in an instant is away.

W. L. Dawson has recorded the following incident of how a lightning aerial manœuvre extricated a black-chinned humming-bird from an awkward situation. Dawson writes :—

" Once a hummer, finding itself entrapped in a porch by a wall of ' chicken-wire ' netting with meshes only an inch and a half in diameter, first passed slowly before the face of the screen, searching whether there might be any exception in his favour. Finding none, he made up his mind and darted through. So swiftly was the passage effected that the eye could detect no change in the position of the bird's wings. Only the ear noted an infinitesimal pause in their rhythm. Yet to accomplish this, the bird had been obliged to suspend the propeller motion of its wings, to furl them, to halve their normal spread, and to resume again upon the other side of the screen."

GREMLINS

BY · H · SPEIGHT

BEFORE turning over the page the " A.M's " oldest reader will murmur to himself, "As I thought, the editorial staff can't be bothered to write an article, and so they reprint an article on Gremlins which was in a recent issue of the AEROMODELLER, and to disguise it there are no illustrations by ' Freddie ' "

Hurriedly intercepting the reader before he writes a letter of protest it must be pointed out to him that this article is about another species of Gremlin, the species known as " Gremlinicus Glidarici," or the brand which annoys glider fans.

Many of these little fellows are totally different from their opposite numbers in the " Anti-Rubber-Modeller-League." For example, the Gremlin which the rubber modeller loves is hated by the glider fan, I refer to the " Dead Calm Evening " Gremlin who makes it so calm that there is no hope of a good soaring flight, and to get the model to a decent height one must run like an express train with the line, or make the gears of the winch red hot.

There is a group of Gremlins who devote all their attentions to the winch. One little fellow makes his living by causing the tow-line to foul the spool spindle; another strips the gears of the winch; another cuts the line in two when the launcher has just released the model, and yet another rides on the tow hook and keeps the line securely fastened to the model no matter what happens.

The latter fellow usually works in conjunction with the " Side Slip " Gremlins, who cause the model to side-slip when on the tow-line and then attach a brick to its nose so that it has no hope of pulling out of the resulting dive. Then there is the Gremlin who fouls the line and makes the launcher walk yards to disentangle it from brambles, fences, helpers, etc.

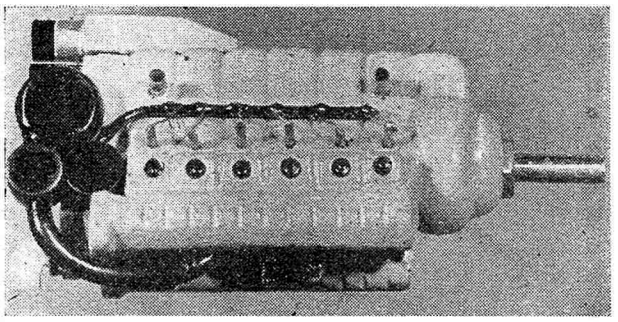
When a running launch is resorted to, another group endeavours to trip up the modeller by placing haystacks, ditches, fences or small trees right in the runner's path. In order that he shall not miss these objects, the largest of the whole species (the Bawler Gremlin) shouts to the runner, making him look round, and so not see the welcome that is being prepared for him.

The " Gusty " Gremlins are always in evidence when hand-launching a glider, just as one is about to release the model they send a gust of wind to tear the model out of one's hands and then wrap it round a tree or rock.

The " Substitute " Gremlin is a crafty fellow and is well paid by all dealers in model aero supplies. He cuts nearly through the hardwood longerons or wing spars so that on the slightest jolt the machine falls to bits and the owner has to rush to the model shop to buy fresh supplies.

Then there is the " Wind-Direction Changer " Gremlin who changes the wind direction as soon as one starts to tow up a model; this gives the " Side Slip " Gremlins their chance to do their work.

Another little fellow makes a habit of sawing through the wing dowels when the model is just about to come off the line. And a member of the " airborne " family is the Gremlin who sits astride the rudder and turns the trimming tab from side to side with " smashing " results.



1/48th SOLID SCALE MODEL MOTORS

ARTICLE VI

JUNKERS JUMO 211

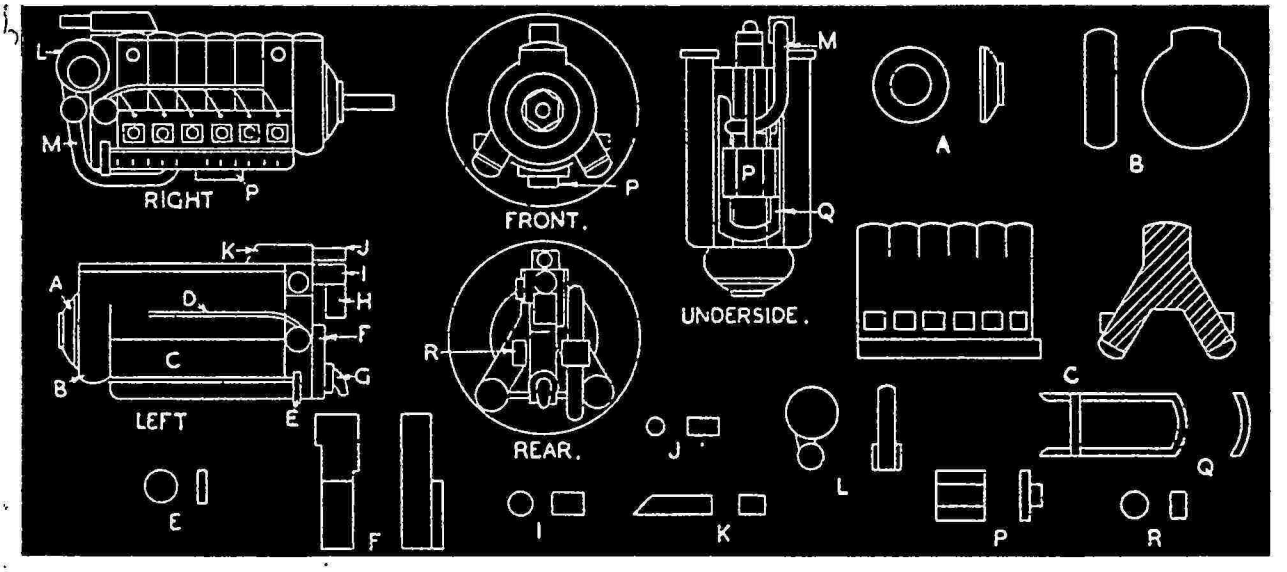
BY S · B · S

ANOTHER 12-cylinder in-line Vee, our subject this month is the German Junkers Jumo 211, typical applications of which are the Stuka and Ju. 88 bombers.

Five views of the model are shown ; and two views of each main part should make construction quite easy. The main piece, C, is the cylinder blocks and crankcase, and can be built up in various ways. In order to simplify the making of the recess between each cylinder and its portion of the crankcase, I made mine up from 6 separate pieces and built it up like a sandwich. The cylinder heads were made of a separate strip, glued on. In this latter, 12 tiny grooves were filed with a triangular file to simulate the fixing bolt positions : you will see them in the detailed side view. The prop. reduction gear housing, B, is a bulbous piece and should be nicely rounded off all round. The six little squares with tiny holes in them are the exhaust ports. They should be clearly defined with a pronounced groove between each, and the hole drilled with a 1/16 in. drill : it need not go deep. Between the exhaust ports and the cylinder heads will be seen a thin double line : this is the flange, and is made by fitting a strand of 28 gauge wire right round each head. The nose piece, A, should be quite easy, and is drilled to take the prop. shaft. A 6 B.A. hexagon nut slipped over the shaft and cemented to the nose finishes that part off. F, the auxiliary gearbox, comes next, and to this is fitted the supercharger, L. From this latter there runs a piece of 14 gauge wire, M, which curves under the engine and is soldered to the induction pipe, Q. This latter is made of 18 gauge wire and sits inside the Vee between the two cylinder blocks. It's a tricky bit of work, and I recommend you to build up L, M, and Q, together, and adjust the curve of M until the whole lot fits in nicely. K needs no comment, and P, which is the fuel injector pump, is also a simple piece : it is cemented between the blocks, and rests on Q. Of the various round pieces, E, is of 6 gauge needle ; J is 10 gauge ; I of 9 gauge ; and H of 8 gauge. The distributors, R, are of 6 gauge. The pump elbow, G, is carved out of another piece of needle or made from bent wire, and sits on a thin disc of 8 gauge needle.

D, the magneto conduits, are of 20 gauge wire, and I soldered very short lengths of 36 gauge wire from D to the spark plugs. These latter are also of 20 gauge wire and there is one just above each exhaust port.

The two small circles shown above cylinders 1 and 6 are the pins for the engine mounting bearers. So much for the construction. As to colouring, all photographs I have seen depict the engine in black, or some very dark colour, and with very little relief. In order to show the bits and pieces up better, therefore, I did mine in light grey with most of the auxiliaries in black, relieved here and there with a touch of silver. This may not be authentic, but I am hoping that it will show up better in the photographing.



A.B.A. NATIONAL COMPETITIONS

Over £300 in Cash Prizes!

With the addition of Silver Trophies and other awards

Already Solid Silver Trophies have been promised by Messrs. E. Keil & Co., Astral Aero Model Co., Premier Aeromodel Supplies Ltd., Super Scale Kits and the Proprietors of the "Aeromodeller."

COMPETITION NO. 1. RUBBER-DRIVEN DURATION MODELS.

CLASS A.—Duration—for models built to the "Wakefield" formula. **1st Prize £6; 2nd Prize £3; 3rd Prize £1.**

CLASS B.—Duration—for models built with a wing area not exceeding 160 square inches, and powered with a rubber motor not exceeding 2 ozs. weight. (No limit to the all-up weight of the model.) For members under 16 years of age. **1st Prize £6; 2nd Prize £3; 3rd Prize £1.**

CLASS C.—Duration—for models built with a wing area not exceeding 160 square inches, and powered with a rubber motor not exceeding 2 ozs. weight. (No limit to the all-up weight of the model.) For members over 16 years of age. **1st Prize £6; 2nd Prize £3; 3rd Prize £1.**

CLASS D.—Duration—indoor models. Maximum all-up weight 2 ozs. To be flown R.T.P. **1st Prize £6; 2nd Prize £3; 3rd Prize £1.**

CLASS E.—Duration—indoor speed. All-up weight not to exceed 8 ozs. R.T.P. **1st Prize £6; 2nd Prize £3; 3rd Prize £1.**

COMPETITION NO. 2. RUBBER-DRIVEN FLYING SCALE MODELS.

CLASS A.—Duration—for models up to and including ½ in. scale. **1st Prize £6; 2nd Prize £3; 3rd Prize £1.**

CLASS B.—Duration—for models above ½ in. and up to and including 1 in. scale. **1st Prize £6; 2nd Prize £3; 3rd Prize £1.** IN EACH CASE MODELS MUST RISE OFF GROUND.

COMPETITION NO. 3. NON-FLYING SCALE MODELS.

CLASS A.—1/72 scale. For members under 16 years of age. **1st Prize £6; 2nd Prize £3; 3rd Prize £1.**

CLASS B.—1/72 scale. For members over 16 years of age. **1st Prize £6; 2nd Prize £3; 3rd Prize £1.**

CLASS C.—1/48 scale. **1st Prize £6; 2nd Prize £3; 3rd Prize £1.**

CLASS D.—Above 1/48 scale. **1st Prize £6; 2nd Prize £3; 3rd Prize £1.**

COMPETITION NO. 4. POWER-DRIVEN MODELS.

CLASS A.—A design for a high wing petrol engine driven model aircraft, span not to exceed 10 ft., and model to be suitable for an engine between 10 to 20 c.c. The model to be suitable for radio control. **1st Prize £20; 2nd Prize £10; 3rd Prize £5.**

CLASS B.—A design for a flying scale model of any type, built to a scale of either 1 in. to the foot or 2 in. to the foot, and suitable for an engine not exceeding 7.5 c.c. capacity. **1st Prize £20; 2nd Prize £10; 3rd Prize £5.**

COMPETITION NO. 5. MOTIVE POWER PLANTS OF ANY TYPE OTHER THAN RUBBER,

CLASS A.—A design competition for an internal combustion 2 or 4 stroke engine, of any capacity up to 20 c.c. **1st Prize £20; 2nd Prize £10; 3rd Prize £5.**

CLASS B.—A design for any type motive power plant, other than as for class A (such as rocket, jet, steam, electrical, compressed air, etc.). In each case the design to be for a "general purpose" unit, suitable for a model, of between 5 ft. and 7 ft. span. **1st Prize £20; 2nd Prize £10; 3rd Prize £5.**

COMPETITION NO. 6. SAILPLANES.

CLASS A.—Duration—for a model built to F.A.I. rules, and not exceeding 10 ft. span. **1st Prize £6; 2nd Prize £3; 3rd Prize £1.**

CLASS B.—Duration—for a model of original design and span not exceeding 10 ft. **1st Prize £6; 2nd Prize £3; 3rd Prize £1.**

CLASS C.—For a design of a launching gear for a glider. **One Prize £5.**

COMPETITION NO. 7. RUBBER-DRIVEN SEAPLANES AND FLYING BOATS.

CLASS A.—Duration—for seaplanes of any size and type. **1st Prize £6; 2nd Prize £3; 3rd Prize £1.**

CLASS B.—Duration—for flying boats of any size and type. **1st Prize £6; 2nd Prize £3; 3rd Prize £1.**

IN EACH CASE MODELS MUST RISE OFF WATER AND LAND ON WATER.

COMPETITION NO. 8. EXPERIMENTAL MODELS.

CLASS A.—Open to any type of model or power unit of such a type that it does not qualify for inclusion in any of the above Competition categories, i.e., jet propelled aircraft, auto gyro, helicopter, etc. **1st Prize £20; 2nd Prize £10; 3rd Prize £5.**

All Duration Competitions will be flown decentralised, at any time and place to suit the entrant, and in accordance with the Association's standard rules for decentralised competitions.

All entries for Competition No. 3—Non-Flying Scale Models—will be sent to the Association's offices for judging.

All entries to be made on the standard entry form obtainable from the Association's offices.

Closing date for the Duration and Solid Scale Competitions, i.e., Nos. 1, 2, 6 and 7, is December 31st, 1944.

Closing date for the design and experimental model Competitions, i.e., Competitions Nos. 3, 4, 5 and 8, is March 31st, 1945.

All these Competitions are open to members of the A.B.A. only.

THE ASSOCIATION OF BRITISH AEROMODELLERS

28, HANOVER STREET • LONDON • W.1.

AN EXPLANATION OF DIHEDRAL EFFECT

BY A · H · BUTLER

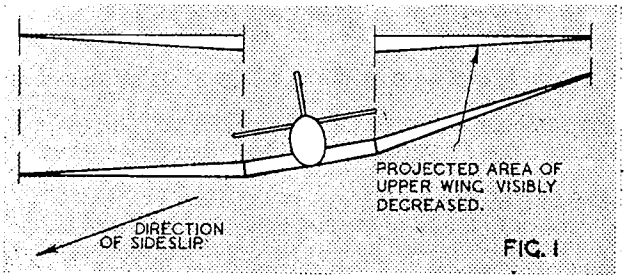


FIG. 1

MANY modellers have doubtless read the varied explanations of dihedral effect. The simplest of these is probably the one which considers the projected wing areas, viz., that the effective area of the wing in the raised position in a sideslip is decreased, while that of the lower wing remains the same. Thus the lower wing produces more lift and thus restores the model to its normal flight path (see Fig. 1).

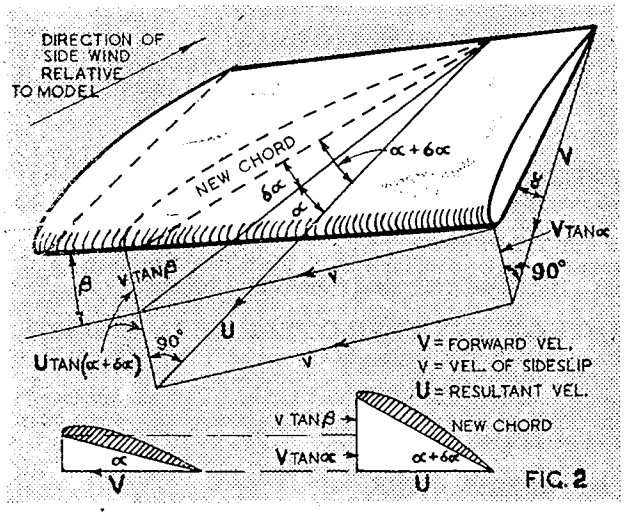


FIG. 2

However, for the more serious minded modeller, the following explanation involving elementary trig. should be of interest.

Let us consider the model flying horizontally at velocity when it is upset by a gust of wind and sideslips. A wind is now produced in the opposite direction to the sideslip (see Fig. 2). This new wind operates with the forward velocity to give a new resultant wind direction relative to the model of magnitude U. Thus we see from the diagram that a new chord has been produced (slightly longer than the actual chord), with its incidence increased.

It will be noticed also that our wing (set at dihedral angle β) at angle of incidence α has now had its incidence increased by $\delta\alpha$ to $\alpha + \delta\alpha$

By trig.

$U \tan(\alpha + \delta\alpha) = v \tan\beta + V \tan\alpha$ .....(1)

But $U^2 = V^2 + v^2$ (Pythagoras)

However $v \ll V$

So $U = V$ approx.

If α is considered in radius then :—

$$\tan(\alpha + \delta\alpha) = \alpha + \delta\alpha$$

From (1) $V(\alpha + \delta\alpha) = V\alpha + v\beta$

$$\therefore \alpha + \delta\alpha = \alpha + \frac{v\beta}{V} \quad \therefore \delta\alpha = \frac{v\beta}{V}$$

or more simply.

The L.E. of the new chord has been raised a small amount (v tan B), thus the incidence has been increased (from α to $(\alpha + \delta\alpha)$), with a corresponding increase of lift. Similarly it can be proved that the other wing suffers a decrease of incidence (from α to $(\alpha - \delta\alpha)$), resulting in a loss of lift. These two forces give a correcting couple acting on the model, so restoring it to its horizontal flight path.

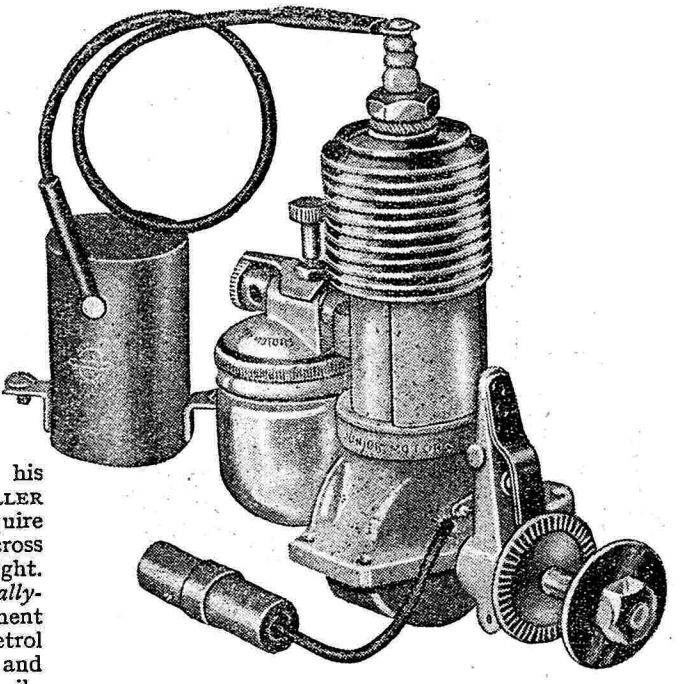
From the basic formulæ derived, i.e. change of incidence $= \delta\alpha = \frac{v\beta}{V}$

We see that for our model to easily correct a sideslip $\delta\alpha$ must be large, thus β must be large. Which means we must keep our dihedral angle large, but not too large or the wings will suffer a decrease in lift.

N.B.—This statement does not consider the position of the model's C.G.

"PETROL VAPOUR"

BY "C · E · B."



The "BROWN JUNIOR '39 B" as mentioned below. For many years one of the best known Class C American Engines.

MR. SPAREY'S remarks in connection with his engine in the May issue of the AEROMODELLER have brought out some further points that I feel require clearing up, for it is evident that we are still at cross purposes in a few details which I hope I can set aright.

Like Dr. Forster, I am very keen that the *commercially-produced engine* after the war shall be a real improvement and a success from the user's point of view. If the petrol movement is to be really popular, simple, reliable and cheap engines designed as aero engines must be easily obtainable.

Mr. Sparey, in the articles on his engine design, first of all used arguments that suited an engine for amateur construction. Later he said that his engine was for commercial production. The result has therefore become a little confusing, for some features, such as detachable heads, are more desirable when one considers an engine for amateur construction.

In my discussions I am only considering the *commercially obtainable* engine, which can be bought complete and ready to run, because I feel that if we are to attract large numbers to the hobby, it is the engine that can be bought "over the counter" that matters. There are comparatively few individuals who have the facilities or the experience to make an engine for themselves. I believe that Dr. Forster views the subject from the same angle.

Mr. Westbury for many years has studied and produced engines that suit the amateur constructor, and there is always a very sound practical reason for anything that he incorporates in his designs. His 5 c.c. "Kestrel" is an excellent example of this.

But let us get quite clear the different objects in view when we are contemplating an engine that the amateur is to construct as opposed to one that is going into quantity production. In the first case machining and other points crop up that must suit the very limited facilities that the average amateur possesses. These are of paramount importance, and a study of Mr. Westbury's designs are an education in this respect.

In the second case we can ask for slightly different features if the firm that intends to produce the engine is prepared to lay down a fair number of engines and the plant to produce them.

In the past many British commercially-produced engines have actually been made under amateur conditions of plant, etc., and have, therefore, been limited in scope of design.

Let us now take the points still not quite clear and raised by Mr. Sparey in the discussions that have taken place between himself, Dr. Forster and myself.

1. *The Disc Valve.*

I certainly do not condemn the disc valve. I have used engines with this fitting on record-holding models, both in the air and on the water. I merely state that the hollow crank shaft rotary valve *has been proved* very satisfactory by "The Baby Cyclone" and the "Phantom" (*i.e.*, the 6 c.c. and the 4 c.c. size). When one finds a "good thing" that has proved its value and is an easily manufactured item, it is worth considering for one's ideal design. This type of valve makes for a compact engine, too.

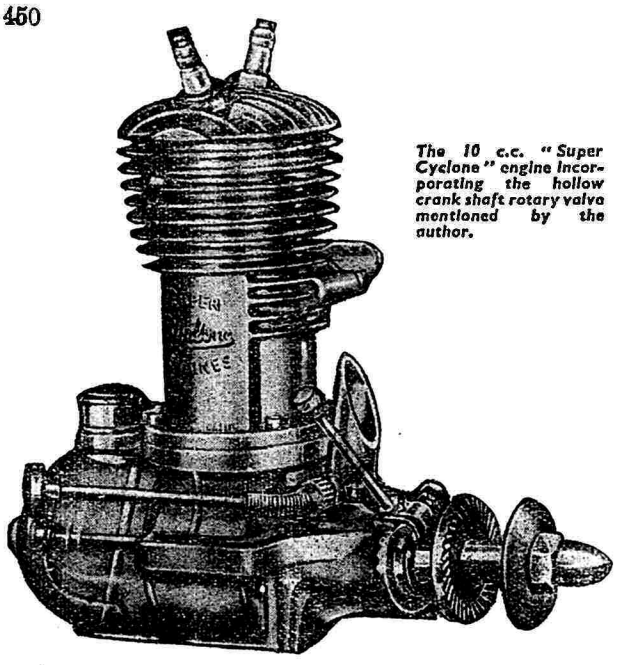
Mr. Sparey champions the disc valve because it suits amateur construction; but I have already explained that this is not what I am after, and I believe that he is now also after the commercially-produced engine. Nevertheless, I have a perfectly open mind about the use of a disc valve on a commercial engine, and there is absolutely no reason why it should not be a success, provided end-play through wear is looked after in the design, and losses through friction are not unduly permitted.

I am personally highly satisfied with the hollow crankshaft valve because of its practical results, and can see no advantage in changing it. It is efficient and stands up to wear if properly designed. It also makes for a compact engine layout, which helps in the matter of mounting the engine in the model. In practice we have to admit that "The Baby Cyclone" has been one of the best 6 c.c. engines, and it is well worth careful study. I had the first "Baby Cyclone" to reach this country some years ago (in 1934 or 1935, as far as I can remember) and that engine was not successful. The makers, however, very soon got over their troubles.

2. *Detachable Heads.*

From the commercially-constructed-engine-point-of-view, is the detachable head worth while? (Agreed, that for the amateur-constructed engine it is necessary.)

The "Brown Junior" has proved that the cylinder and head in one is most reliable. It saves a possible source of leakage, and it saves a number of small studs and the necessary screw cutting, and the novice has no



The 10 c.c. "Super Cyclone" engine incorporating the hollow crank shaft rotary valve mentioned by the author.

fitting troubles. For model aero engines a detachable head is certainly not required for de-coking, as I have already explained in my last discussion. The fewer joints we have on a two-stroke the better.

Let me clearly state that I do not "condemn" the detachable head, as Mr. Sparey states. I merely say that it is unnecessary, and I do not want it on my commercially-produced engine. I cannot see that it has any advantages. On the other hand, *it may* have disadvantages, such as leaks and fitting troubles for the mechanically ignorant. Therefore, why use it—unless the methods of construction by the firm making the engine find it desirable, or it helps to obtain some other feature of design that the designer feels is really worth incorporating, such as the fitting of a sleeve in an alloy-combined crankcase and cylinder casting.

Probably all readers sufficiently interested to discuss the design of a model engine are very well aware of the necessity of the correct method of tightening down a cylinder head, as detailed by Mr. Sparey. But is the complete novice? And if we are catering for the novice why trouble him with the difficulty if it can be avoided?

3. *Contact Breaker.*

I am very glad that Mr. Sparey has decided to change his contact breaker on the lines suggested. Incidentally, one might say here, apropos of contact breakers in general, that I have come to the conclusion that contact breakers with enclosed points look nice but are a very mixed blessing. *Even when we do at last get the points placed in a position away from oil that is flung from the main bearing by centrifugal force*, we shall still frequently want to examine and clean the points. Those that are open for inspection and cleaning save a lot of trouble. On one make of engine with very neatly enclosed points, one has to take off the propeller every time one wishes to service the points or check up on them. Besides appearance, the only good features about enclosed points on a model aero engine is that grit is often kept away from the contact breaker in the event of a crash. In actual practice give me points that I can see and get at quickly!

I do not like a long control lever bent back, as suggested by Mr. Sparey, because the weight of a long lever is inclined to upset adjustments and settings, through vibration; therefore, the bevel pinion and rack has certain advantages. If some other more simple arrangement can be devised to obtain the same result, then let us have it, but do let us keep away from long bent levers. We must, however, have controls well away from the propeller on our post-war engines.

4. *Simplicity.*

Mr. Sparey is hardly fair to me in assuming that I am so ill-informed as to think that "simplicity" merely means "the fewer number of parts there are, the less trouble there will be." All but the very uninformed know that there is more in it than that!

As we are trying to clarify misconceptions, let me say that what I mean by advocating simplicity is that when we have decided what is really necessary to produce the most suitable design for the job, we should then cast round in our minds for ways and means to simplify each component part so that it requires:

(1) As little machining as possible in order to reduce production costs.
(2) Be simple and easy for the novice to operate and maintain.
(3) Have as few working parts as is possible to produce the desired result, *i.e.*, an engine with the following features—easy starting, consistent running without variation in power output, freedom from damage, long life without wear and easy to mount.

He who adds any unnecessary complications to obtain these results is not likely to make much of a name for himself as a model aero engine manufacturer.

As a case in point, the little 98 c.c. two-stroke autocycle engines as fitted to the "airborne motor cycles," have a simple petrol lubrication system that in practice works very well, even under severe cross country conditions. It would be quite ridiculous to alter this simple system to a complicated system of dry sump lubrication involving two oil pumps, a separate oil tank and its oil pipes, when the present simple system does the job with a minimum of snags and weight. In the same way, if two parts will do the job as well as twelve parts, it is absurd to use twelve parts. However well designed and made those twelve parts are, the fact remains there are twelve possible chances of failure in this "chancy" world, and there are twelve parts to wear and eventually be replaced. There are also twelve parts to make.

I repeat, and I hope I shall not be misunderstood this time, the more simple we can make our model aero engines, *provided they do the job we require*, the cheaper and easier they will be for the unmechanically-minded novice to operate. The result will be increased sales through recommendations by satisfied owners.

Simplicity is an art and not easily acquired: it requires a lot of thought and experience, whether it be in public speaking, painting a picture, a golf swing, or preparing plans for an invasion of a continent!

5. *Upright or Inverted Engines.*

Although I personally like an inverted engine as it naturally fits into model design better, and Dr. Forster is quite adamant about it, I do not feel we can force the inverted engine on buyers. Different people want to install their engines in different ways.

An engine manufacturer would be wise to produce two versions I feel—an upright engine and an inverted one—but there is no doubt that *each version must be designed so that the fuel level alters as little as possible during flight, either due to change in attitude of the model*

or to the gradual exhaustion of fuel, and the engine must be compact in order to make mounting easy.

I think that a sort of Gallop Poll as suggested by Mr. Sparey might produce a misleading picture, because up to now the number of people in this country who have experience of model aero engines is comparatively small, and that we must also consider the great numbers of potential post war buyers, who would naturally not enter the poll now with any practical knowledge. No, I think the real answer is that we must offer a soundly designed upright engine as well as a soundly designed inverted engine.

If a clever designer can produce an engine incorporating all the ideals we require, that can be used upright or inverted, so much the better. But it is not an easy task, as Mr. Sparey rightly says, although I do not consider it at all impossible.

In conclusion, may I say that I wish Mr. Sparey every success in his engine venture, and may it prove what we modellers really want. It is excellent to see someone who is thinking of putting an engine on the market really taking the trouble to thrash out the debatable points. I was delighted to see the particulars, in the June issue, of his revised engine, and also that a résumé of the whole discussion is to be made by Mr. D. A. Russell in an early issue.

It is only through these discussions that we shall improve our model aero engine and so help to make the petrol movement really popular.

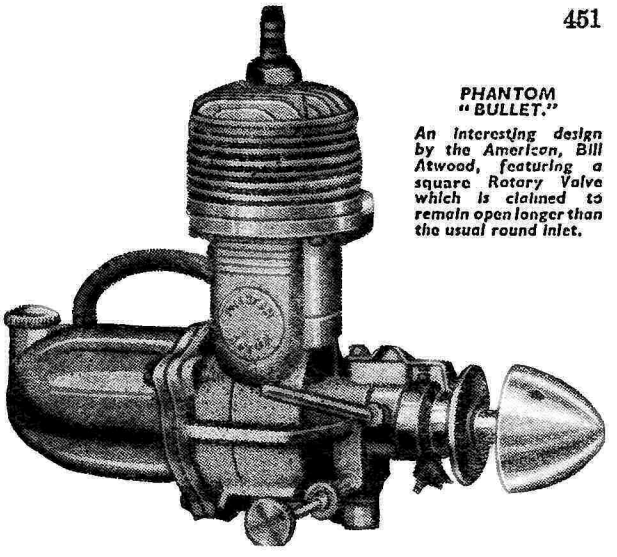
P.S.—Since writing the above reply to Mr. Sparey's article, description of his Horizontal Single-Cylinder Engine has appeared in the pages of the AEROMODELLER.

The general conception of his new design seems an answer to most of the aeromodellist's requirements.

I do not think that Mr. Sparey need worry about the change in weight of the petrol in actual practice or any reasonable sized model.

I hope that he will provide for the second sparking plug as suggested. It will balance the appearance of the engine, and can be carried as a spare for rapid test purposes on the field.

One feels a little doubtful about his sleeve-valve, but that should not discourage Mr. Sparey from trying it out. If it is a success it will be very neat; if it is not a success, it will not be difficult to incorporate the more usual hollow crankshaft type of valve into his design; actually it might make for checking production. I hope he will eventually include a ball-thrust race.



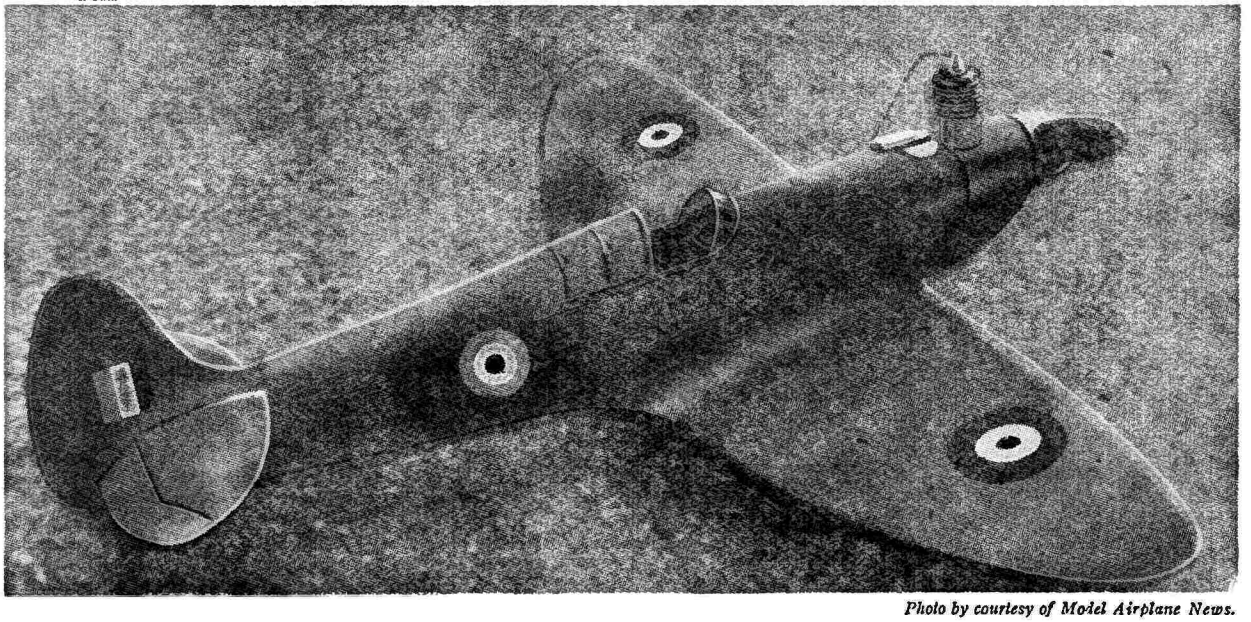
PHANTOM "BULLET."

An interesting design by the American, Bill Atwood, featuring a square Rotary Valve which is claimed to remain open longer than the usual round inlet.

It is excellent to see that at last an engine has been designed with its ignition points out of the way of the oil that is flung out from the main bearing by centrifugal force. Both Dr. Forster and I have been pegging away at this point for a long time. I can foresee a certain amount of oil being blown back by the propeller on to the points, but a small shield should avoid this trouble.

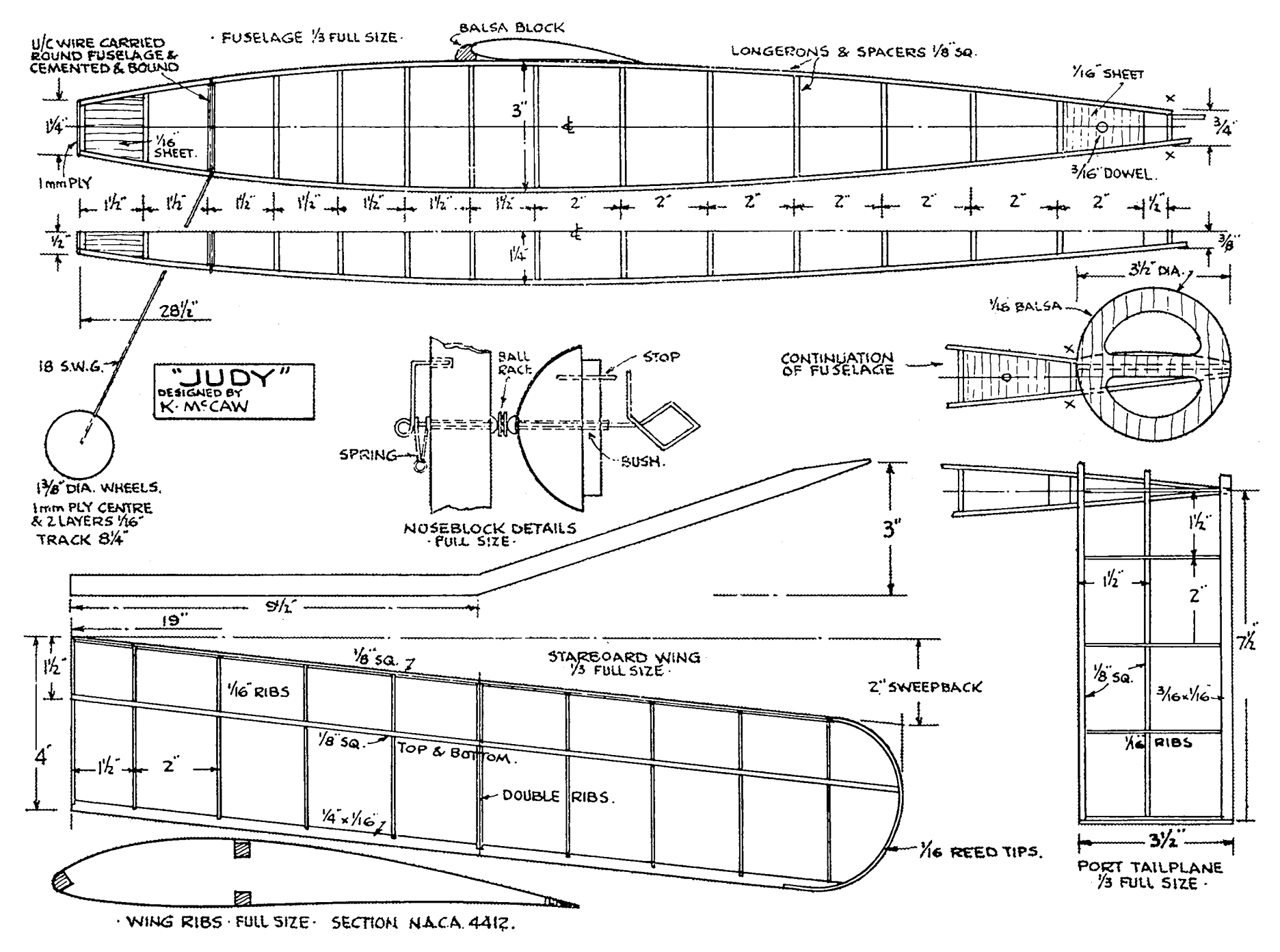
I am disappointed to see the long ignition lever. It is simple, but its weight will tend to vibrate and alter the adjustment. If it must be retained perhaps a retaining ratchet might be fitted.

Anyway, Mr. Sparey is to be congratulated on a very promising layout, and I hope he will let me try out one of the early production engines!



Shades of Dr. Forster!!! . . . It seems a pity that the sleek lines of this excellent scale model, by American modeller Bob Smurthwaite, are spoilt by the upright engine mounting.

Photo by courtesy of Model Airplane News.


U/C WIRE CARRIED ROUND FUSELAGE & CEMENTED & BOUND
· FUSELAGE 1/3 FULL SIZE ·
BALSA BLOCK
LONGERONS & SPACERS 1/8" SQ.
1/16" SHEET
3/4"
3/16" DOWEL
1/16" SHEET.
1mm PLY
1 1/2" 1 1/2" 1 1/2" 1 1/2" 1 1/2" 1 1/2" 1 1/2" 2" 2" 2" 2" 2" 2" 2" 1 1/2"
1/2"
1 1/4"
3/8"
3"
28 1/2"
18 S.W.G.
"JUDY"
DESIGNED BY
K. McCAW
1 3/8" DIA. WHEELS.
1mm PLY CENTRE
& 2 LAYERS 1/16"
TRACK 8 1/4"
BALL RACE
STOP
SPRING
BUSH.
NOSEBLOCK DETAILS
· FULL SIZE ·
3 1/2" DIA.
1/16 BALSA
CONTINUATION OF FUSELAGE
3"
9 1/2"
19"
1 1/2"
4"
1/8" SQ.
1/16" RIBS
STARBOARD WING
1/3 FULL SIZE ·
2" SWEEPBACK
1/8" SQ. TOP & BOTTOM.
1 1/2" 2"
DOUBLE RIBS.
1/4" x 1/16"
1/16 REED TIPS.
· WING RIBS · FULL SIZE · SECTION N.A.C.A. 4412.
1 1/2"
1 1/2"
2"
7 1/2"
1/8" SQ.
3/16 x 1/16"
1/16 RIBS
3 1/2"
PORT TAILPLANE
1/3 FULL SIZE ·

REMINISCENCES OF THE D.H. BIPLANES OF 1917–18

BY VICTOR A · WEBB

IN 1917, a biplane known as the De Havilland 4, fitted with a 220 h.p. R.A.F. motor, was sent overseas with the Royal Flying Corps. It was a lighter and rather more fragile machine than its successor, the D.H.9a, but was a fairly useful bomber with possibilities for improvement.

My particular squadron, No. 49, was equipped with this type. They were fitted with four-bladed wooden airscrews and the motors had hollow crankshafts.

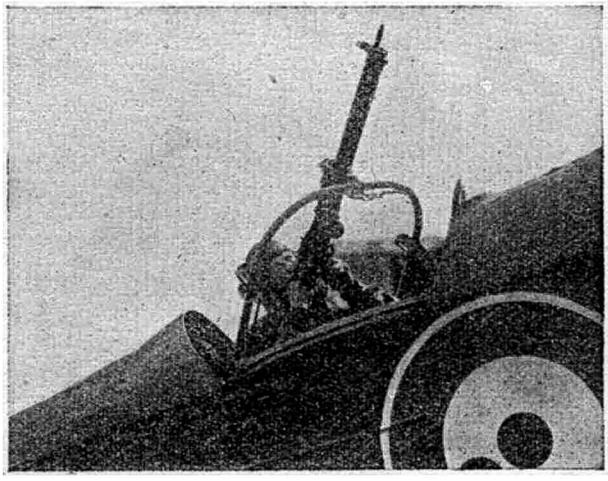
These R.A.F. motors had not been in service long before it became apparent that they were just not up to the job. One very bad habit they had was to shed the prop. in the air, due to the weakness and poor design of the crankshaft. When this happened the motor would race away through having no load, and would then dive to earth, leaving the unfortunate pilot and observer to get down as best they could, or crash.

Some of the R.A.F. motors would give only about 150 hours running, after which the output would fall off. Others would still maintain full revolutions after 250 hours, and would in fact improve their performance. This is a vagary common to all internal combustion engines, and often provides headaches for those responsible for their maintenance. All hours were entered in a log-book, so a good engine was kept in service and its extra hours booked against a faulty one!

It was strictly forbidden to loop a D.H.4, but one pilot, a Norwich boy (I forget his name, but his observer was Lt. Kelsore), frequently did so, much to the annoyance of the riggers, as it entailed a lot of extra labour in adjusting the controls. Everything was strained, and sometimes a longeron would be found to be fractured, which would mean a strip-down of the fuselage and the fitting of a new one.

Major Gould, the C.O. of No. 49 Squadron, was one of the few men at this period who had the courage to condemn these 220 R.A.F. motors. It was a government product, and Major Gould was called from France to make his report. In a few weeks the whole squadron was issued with new six-cylinder Fiat motors which drove two-bladed airscrews. The Fiat was a satisfactory motor, but rather too powerful for the D.H.4.

About this period the Hun was gaining ground on us. With his faster aircraft he could attack our own machines from the rear, and the observer, having only one Lewis gun on a Scarff mounting, had a blind spot of about 30 degrees rearward and below the fuselage. The Hun consequently attacked from below and usually was very successful. Our losses were getting serious until one day the armourer, 3rd A.M. Smith, a lad from Bolton, had a brainwave. He obtained permission to fit a third gun (the pilot had a fixed Vickers firing forward) in the floor of the observer's cockpit. Everyone became excited over this experiment, and after it was completed the D.H.4 went out with the definite intention of looking for trouble. In less than an hour it was back, and it had two Huns to its credit! Our successes continued, and



many months passed before the Hun discovered why his losses were mounting.

About this period 49 Squadron formed part of the famous Independent Wing, which was a mobile unit working directly under orders from Marshal Foch. While working from the outskirts of Dunkirk it had been found necessary to lock the throttle of our 4's so that only three-quarter throttle could be used. The Norwich sergeant-pilot, already mentioned, objected to this, so before taking the air he always adjusted his carburettor control so as to get full range.

Once, when returning from a raid, a Hun got on to his tail, and he could not shake him off. He put his 4 into a dive, but after a short burst of speed the Fiat motor left the fuselage. He flattened out and told his observer to climb over the front and hang on to the engine-bears, to improve the trim. This he did, and in this manner, with alternate dives and stalls the 4 was brought down. When still up at a fair height, however, the observer jumped, or fell off and broke a leg, but the pilot made a pancake landing and suffered only a broken nose, which was not so bad after losing an engine at 20,000 ft.

The D.H.4 was later replaced by the Puma-engined D.H.9.

Our technical sergeant-major raised the compression ratio of the Pumas, and fitted Claudel-Hobson carburettors in place of the former Zeniths. This improvement to the power, coupled with the tail gun, was instrumental in an important degree to the turning of the tide in our favour.

A few months before the end of the War the Liberty-powered D.H.9a arrived.

The photos (by courtesy of the Imperial War Museum) Show (above) the Lewis gun on Scarff mounting on a D.H. 4, and (below) a D.H.4 bombed and armed ready for a raid.

[Photo by E. J. Riding

THE AVRO AVIAN

BY E · J · RIDING

ORIGINALLY designed for the 1926 Light Aeroplane Competitions at Lympne, the Avro Avian developed into almost as many versions as did the D.H. Moth. The first Avian, G-EBOV, was registered in July, 1926, and was fitted with a 75 h.p. Armstrong-Siddeley " Genet " 5-cylinder radial engine. It was a two-seat dual control, wire-braced biplane of wooden construction. The fuselage was of the familiar spruce and plywood box pattern, the wings and tail surfaces being fabric covered. The prototype had the typical Avro circular rudder but later a fin was added. (Span 32 ft., wings square-cut at tips. Overall length 24 ft. 6 in.)

Although disqualified through minor engine trouble, G-EBOV, piloted by the late H. J. (" Bert ") Hinkler, attained second place in three of the six trials and finished first in the handicap race averaging 90 m.p.h.

During the following months, Hinkler used the same machine on a number of record-breaking flights, London to Riga non-stop, in September, 1927, and London to Port Darwin in 15½ days during February, 1928.

For these flights, the machine was fitted with a 30-80 h.p. A.D.C. Cirrus II 4-cylinder in-line engine. The second and third Avians to be built were registered G-EBQL and G-EBQN in March, 1927. Both were fitted with Cirrus II engines and differed only slightly from the original.

The Avian Mk. II appeared in the middle of 1927 and was fitted with an improved wide-track undercarriage, modified wingtips and a Cirrus II engine. One of the first Mk. IIs, G-EBSD, had an Avro Alpha engine of about 100 h.p. designed and built by the firm in 1926. The Mk. II was closely followed by the Avian III and IIIa, cleaned up and strengthened versions of the Mk. II, with streamlined steel tubular interplane and centre-section struts. One of these, G-EBTU, named " Red Rose," was used by Capt. W. N. Lancaster on his flight to Australia in 32 days, during February and March, 1928. Lady Heath's flight from Cape Town to London a month or so later was also accomplished in an Avian III, G-EBUG. G-EBVZ, a IIIa piloted by Miss W. S. Brown, won the King's Cup Race in 1930.

The Avian Mk. IV was structurally similar to the III. It had a split triangulated undercarriage, in which the shock legs were attached to the top longerons and the radius rods to a tube running down the centre of the fuselage floor. This version was metallised in 1930 and was known as the Type 594 Mk. IV M. The fuselage was made from welded steel tube with plywood decking and spruce stringers to support the fabric covering. The wings and tail surfaces remained as in the Mk. IV. Various engines were fitted, including the 105 h.p. Cirrus-Hermes, the 100 h.p. Armstrong-Siddeley Genet-Major 5-cylinder radial and D.H. Gipsies of various marks.

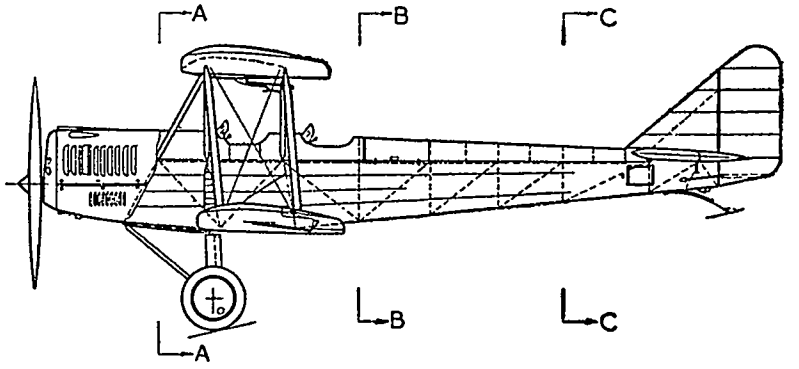
The Avian Monoplane, Long Range Avian and the Sports-Avian were other products of 1930. The former had a Gipsy II engine and was used by the late Sir Charles Kingsford-Smith on his record flight to Australia in 10 days during October of that year.

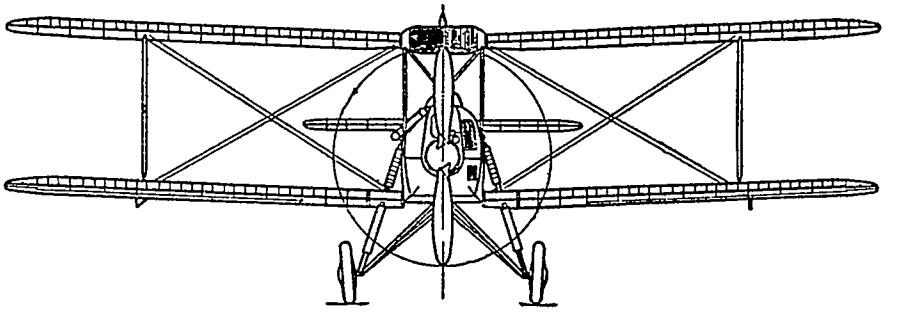
The Sports-Avian had faired-in cockpits, a non-split undercarriage and a Cirrus-Hermes engine. The Monoplane, Type 625, was fitted with either a Hermes or a Genet-Major engine and was a wire-braced low-wing monoplane. Only two were built—G-AAYV and G-AAYW. Both were entered for the 1930 King's Cup Race. 'YV was later converted into a standard Mk. IV M biplane but retained the Genet-Major engine.

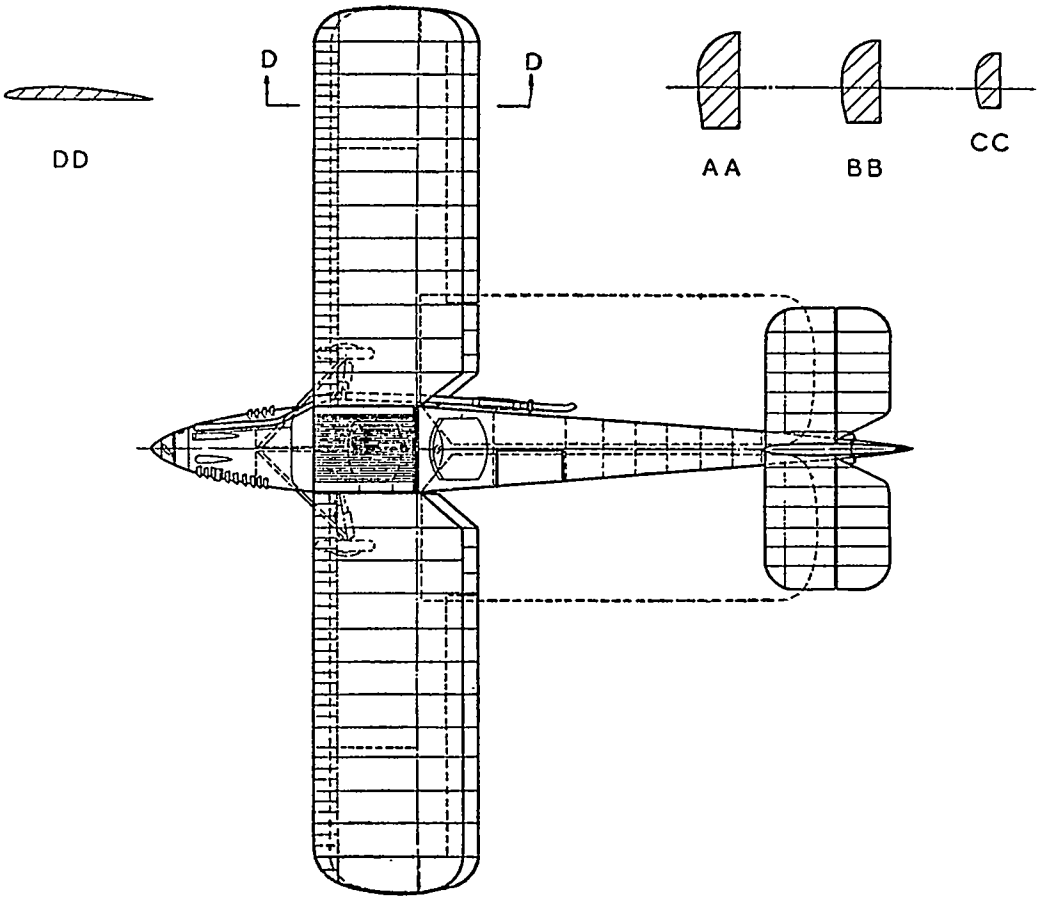
Avians were in production at the Newton Heath, Manchester, works of Messrs. A. V. Roe & Co., Ltd., until 1932 and a total of 99 were registered in this country. They were used by the following flying clubs: Bedford, Grimsby, Horton Kirby, Lancashire, Liverpool, Isle of Wight, Hampshire, Norfolk, Southend, R.Ae.E. and South Staffordshire.

The Avian shown on the G.A. drawing and photograph is a 594 Mk. IV M with a Hermes engine. G-ABCD was owned by the South Staffs. Aero Club at Walsall Municipal Airport, where the photo was taken in 1938. The colour scheme was aluminium all over with maroon deck, nose, letters and rudder stripes.

Specification: Span, 28 ft. 0 in.; length, 24 ft. 3 in.; height, 8 ft. 6 in.; width (folded), 9 ft. 6 in.; weight (empty), 1,005 lb.; (loaded), 1,523 lb.; wing area, 245 sq. ft.; max. speed, 105 m.p.h.; cruising speed, 90 m.p.h.; landing speed, 45 m.p.h.; duration, 4 hours (24 gallons of fuel in centre-section tank).





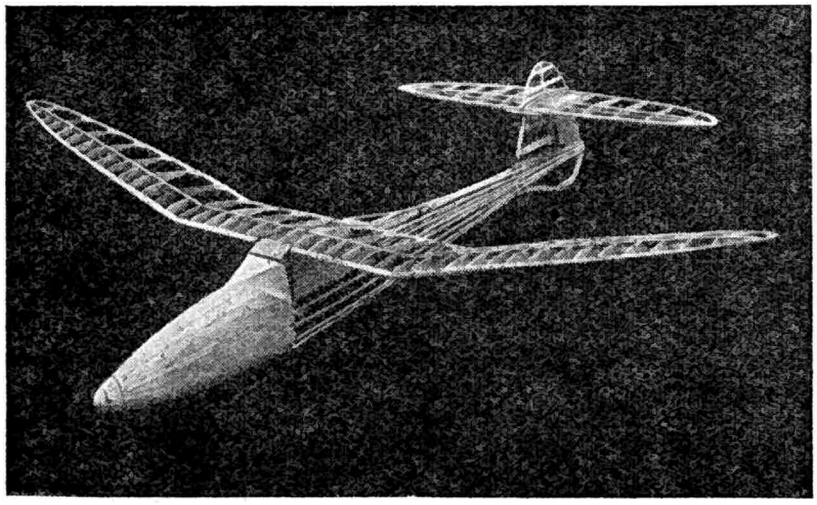


AVRO AVIAN MK.IV.M.

FT.

PHOTOGRAPHIC SECTION

BY J · A · HODGSON

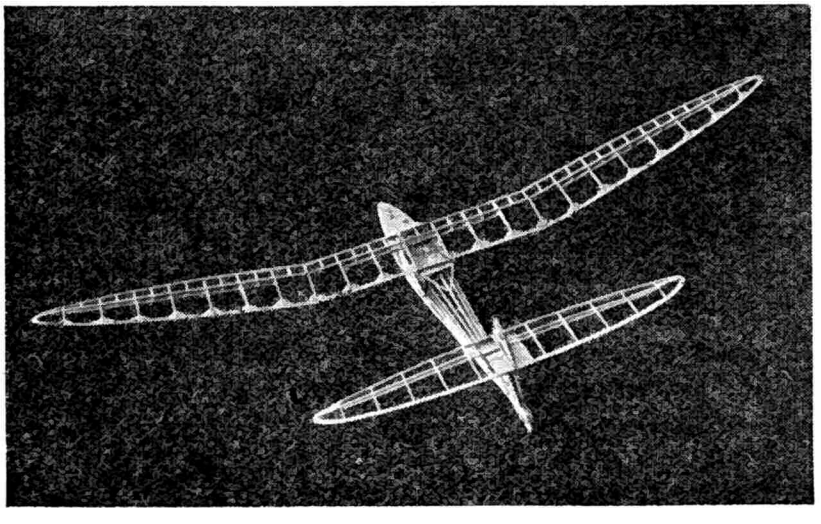


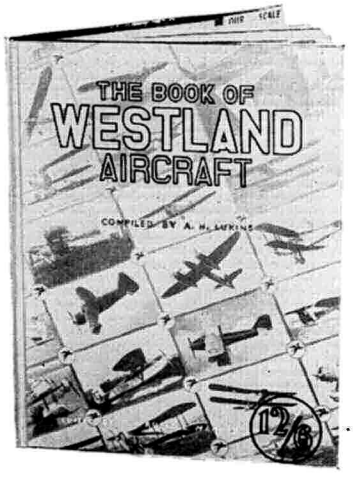
MOST of us who are interested in photography have noticed that photographic dealers are now undertaking to convert roll film cameras, so that 35 mm. films may be used in them. This should be of particular interest to aeromodellers, especially to those who build " solids." When the war ends and films are plentiful again, the majority of people who used a 35 mm. adaptor back during the emergency, will revert to full-sized films again. The solid modellers on the other hand will find it a great saving and could continue to use 35 mm. films, as the distance at which one has to use the camera when photographing small models enables one to conveniently fill a 35 mm. " frame."

If during your photographic experiments you come across any little point which could be passed on to other readers and would be of assistance, write to " AEROMODELLER Photographic Section." Don't keep it under your hat ! If you have any points to raise or suggestions to make, let us know.

From time to time amongst the negatives sent by the Editor to our process department for printing, are one or two worthy of comment. The two illustrations this month are of " The Turn," a sailplane built and photographed by J. K. Wagstaff who sent in the negatives. Exposures were both 1 sec. at F/22, 7 p.m., details were obtained and are printed as a guidance to other readers. A point worth bearing in mind when sending in pictures to the Editor is that such information as type of camera, distance from subject, type of film used, aperture, exposure, time of day and condition of light are always very useful, especially if the picture happens to be one of your good ones. The two negatives mentioned in this article were made on 3½ by 2½ plates.

People frequently ask what camera is best suited for the photography of models. Obviously, any high grade modern camera, either a miniature or one taking 120 roll films will be very suitable. Again, some of the older types of plate cameras can be bought for much less money and are also suitable. The particular make is purely a matter of opinion. The first consideration is how much to spend. If your camera is to be used for general photographic work spend as much as you can afford. The modern reflex is a good all-round job and exceedingly useful for model photography. If you intend to purchase an extra camera for the sole purpose of taking pictures of small solid models, still shots of scale models, or construction shots, spend as little as possible. Probably it is more satisfactory to buy a camera just for the one job. Let us consider this. Except for very few occasions we should require to use the camera on a stand or support, we should give a slow or time exposure and the lens would be well " stopped " down. Further, on few occasions shall we use the entire plate area. Summing this up, we should look round for a stand camera, cheap, but rigid and strong—an old type taper bellows wooden one preferred. The lens need have a small aperture only. F.8 will do. It does not matter if the lens is not an anastigmat, as we shall not be using the entire plate area. A shutter giving time and slow exposures should be fitted. It will help if we can secure a tripod with a tilting top, or we could make a tilting top providing the tripod is fairly rigid. For reasons of economy and because of the small size of our subjects, plates size 3½ by 2½ will be most suitable, although it may be cheaper and easier to purchase a quarter plate (size 4¼ by 3¼) camera and use adapters in the slides to take the smaller plates.





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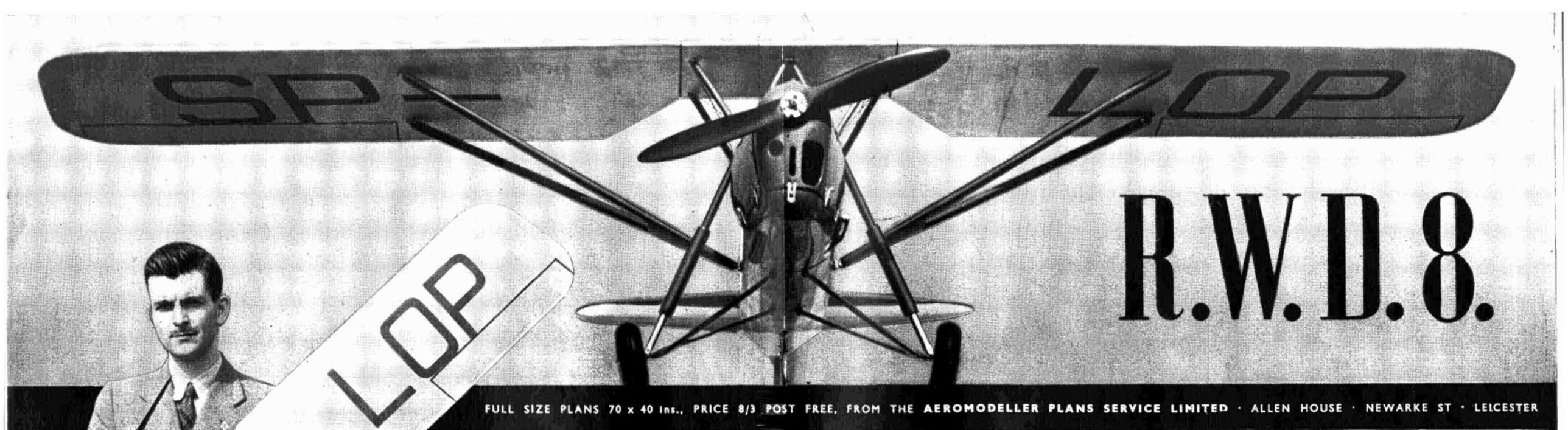

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1/7½th Scale POLISH TRAINER by Cpl. Welsberg

As a stable mate to his well known Lysander Cpl. Welsberg gives us this excellent flying scale model of the R.W.D.8, which incidentally is the subject for C. Rupert Moore's cover painting this month.

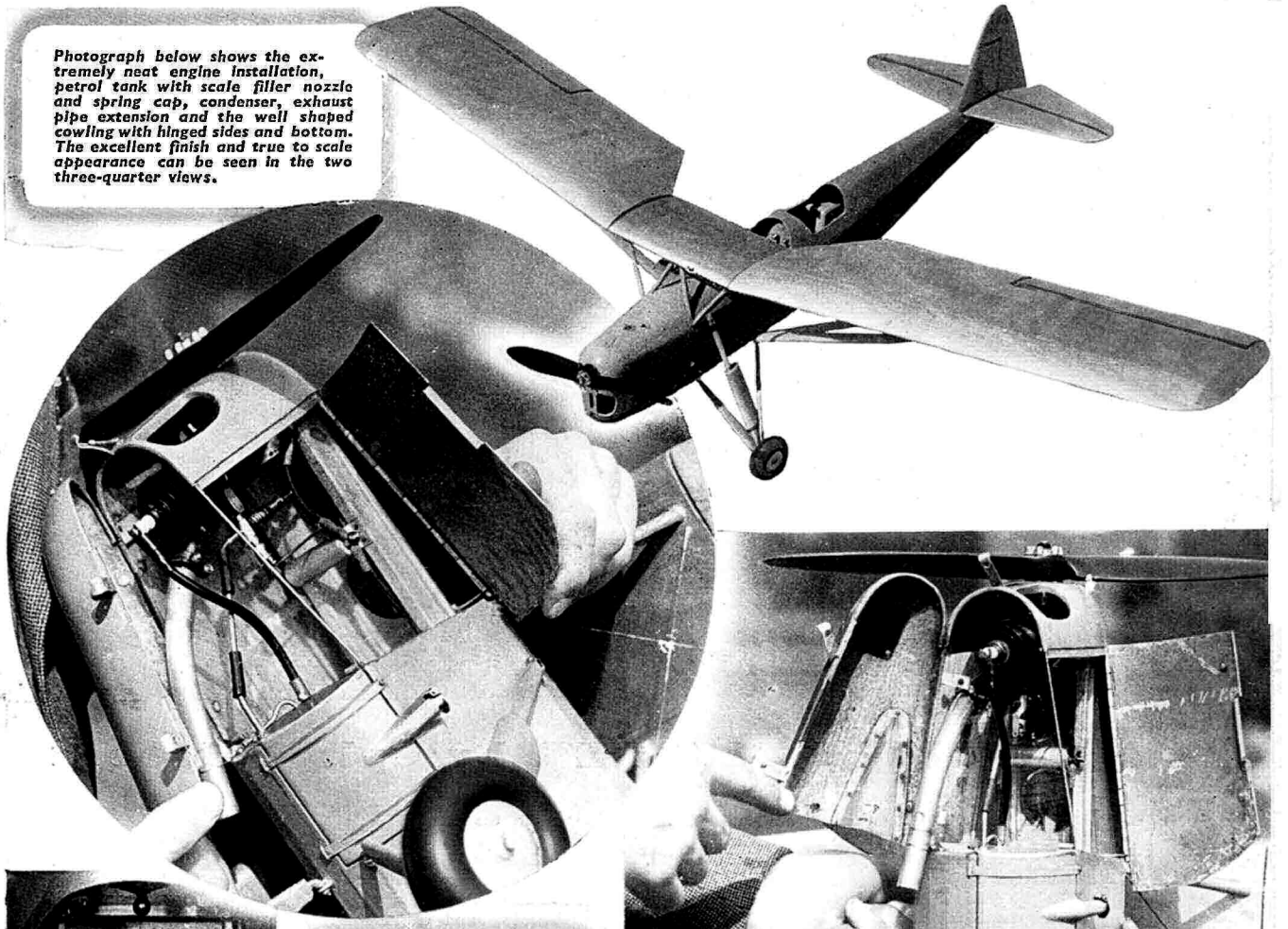
Some idea of the relative size of the model can be gathered from the photograph on the left, where the machine is held by a member of the "Aeromodeller" staff.

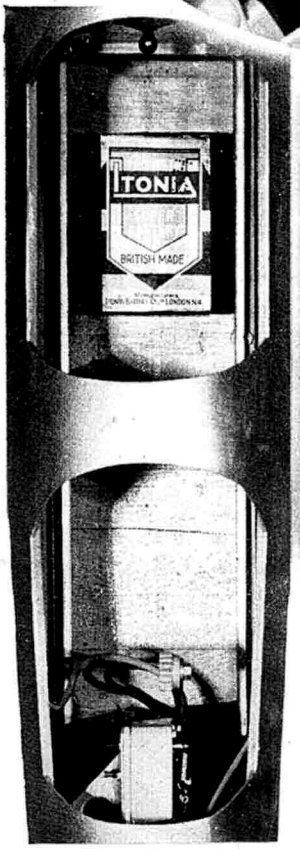
A few details of the full-sized machine may be of interest to readers at this stage. The R.W.D.8 is a two-seat parasol monoplane produced in 1933 in a Polish State factory. Designed as a private owners' or training aircraft it followed the usual orthodox methods of construction. Powered by 120 h.p. P.Z. Iwz Jnr. four-cylinder air-cooled motor the R.W.D.8 has a maximum speed of 109 m.p.h. and cruises at 90 m.p.h. Landing speed 46.5 m.p.h., service ceiling 16,400 ft., span 36 ft., length 26 ft. 3 ins., tare weight 1,056 lbs. and loaded weight 1,659 lbs. Other versions were fitted with either a 130 h.p. Walter Major or a D.H. Gipsy Major. Cpl. Welsberg's model is a replica of one of the two latter types.

To continue with the model — it is 3 ft. 11 ins. in length with a wing span of 5 ft. 7 ins. and the machine has an "all up" weight of 5 lbs. the wing loading being approximately ½ lb. per square foot. The R.W.D.8 is powered by a 10 c.c. Brown Jnr. and the simple but efficient layout of the power unit is one of the out-standing features of the machine. Throttle and choke controls are very accessible on the top of the cowling, whilst the ignition control is situated at the front starboard side.

Unlike so many scale models small details such as strut and undercarriage fittings, cowling clips and petrol tank filler cap, have all been beautifully detailed. The undercarriage, fully shock absorbing, by means of compression springs, is capable of taking the heaviest landings. Not that these are likely occurrences as with its parasol and swept-back wing the R.W.D.8 is an extraordinary stable flyer. Further detailed photographs are given overleaf.

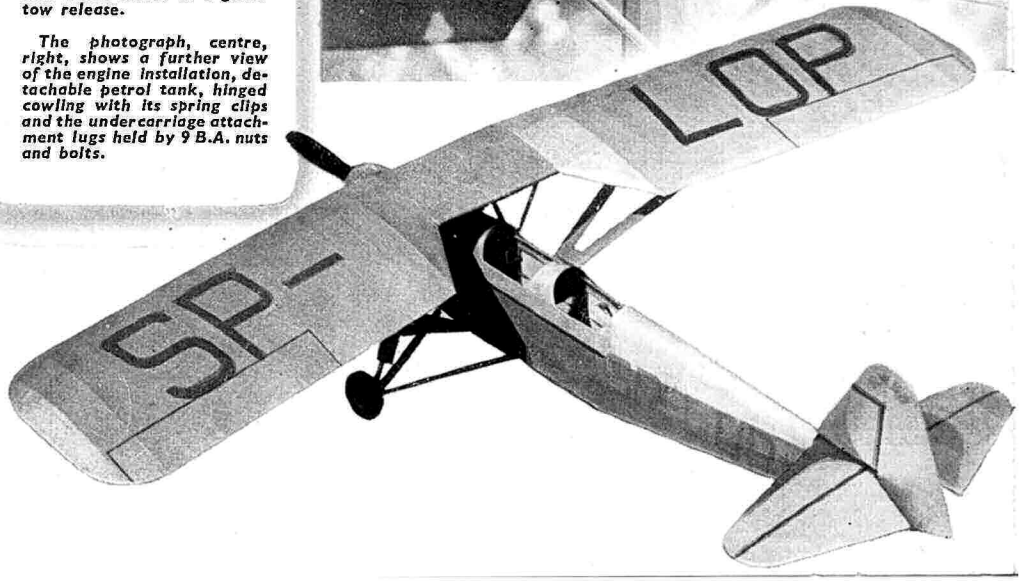
Photograph below shows the extremely neat engine installation, petrol tank with scale filler nozzle and spring cap, condenser, exhaust pipe extension and the well shaped cowling with hinged sides and bottom. The excellent finish and true to scale appearance can be seen in the two three-quarter views.



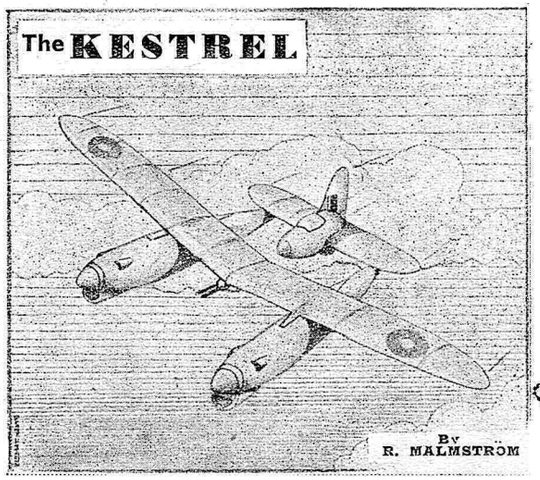


On the left are shown the two cockpits, housing, (front) the ignition switch and battery, which for C.G. adjustment, slides on dural rails which also act as electrical contacts. The rear cockpit contains the time switch—note the setting lever which is shown in the forward position. By means of a rod attached to the lower portion of the setting lever a catch is operated behind the tail skid which serves as a glider tow release.

The photograph, centre, right, shows a further view of the engine installation, detachable petrol tank, hinged cowling with its spring clips and the undercarriage attachment lugs held by 9 B.A. nuts and bolts.



The KESTREL



By R. MALMSTROM

BUILDING INSTRUCTIONS

By RAYMOND MALMSTRÖM A.T.D.(Lond.)

IN the design of the Kestrel, originality with simplicity of construction have been brought together to produce a twin motor model of the semi-scale type, with a modern fighter appearance. While obviously not intended for duration flying, the model's high speed flights of from 20 to 30 seconds are due reward for those who build the Kestrel.

Fuselage Units. Substitute is employed throughout. The two fuselage units are built up on the keel principle, and care should be taken to get them true. Special attention should be paid to the wing mounting platforms. Form the blocks with their inset paper tubes for the plug-in undercarriage legs, and cement firmly to former number 4 and to keel. Construct cylinders as indicated and cement in position. Build up nose pieces, and drill accurately for shafts. Bush the nose pieces, with aluminium tubing. The nose piece spigots should be a good push fit into the front of the fuselage units. Small rubber bands further secure the nose pieces and propeller assemblies in position. Add built-up radiators and rear rubber anchorages.

Mainplane. Build in two halves, with ribs at correct angles. Cement halves together, dihedral angle being automatically formed. From centre ribs to centre of fuselage units, leading and trailing edges are planked for rigidity. Type A ribs are to be noted. When the wing has been completed, the tabs on these ribs are fitted into the slots on the wing mounting platforms, and the wing firmly cemented to the fuselage units. Add cannon fairing and two 20 mm. cannons.

Cabin-cupola Tailplane Fin. The cupola is built in exactly the same way as the fuselage units, and when completed the main spars of the tailplane are cemented in position, *before* the leading and trailing edges are added. Finally the tips, which have been steam-bent, are cemented and bound in position. The locking pieces on the main spars are to be noticed. The top and bottom of the fin are built on the plan, and cemented squarely in place. Cement completed tail assembly firmly to the rear of the fuselage units, checking for accuracy and seeing that the tailplane is set at 0 degrees incidence. Give entire model two coats of banana oil No. 2, after covering and water shrinking, with the exception of the tail assembly, which should receive one coat.

Propellers. Carve one right and one left hand. Commercially obtained propellers may be used if desired. Spinners, built up from scraps and plastic wood (balsa if at all possible) greatly enhance the model's appearance and are strongly recommended.

It is of considerable importance to see that hand-carved propellers are alike in weight and pitch. Indifferent propellers cause a lot of otherwise avoidable trouble on twin motor models. Propeller shafts are bent to accommodate baby bobbins for the pre-wound motors.

It is preferable to *fly* the model without an undercarriage.

Flying. The power required is indicated on the plan. Always test over long grass. Tail trimming tabs, as indicated on the plan, should be added to give increased fore and aft control. Trimming weights, in the form of a small piece of plasticine, may be added to nose or tail. Obtain maximum glide before using power. Adjust when under power by downthrust packing only.

Launching. The Kestrel must be given quite a smart thrust forward at the moment of launch, the flying speed being considerably greater than that of a duration model of similar proportions.

Readers' ..... Letters

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

DEAR SIR,

In view of the recent correspondence concerning Mr. N. K. Walker's LD2W3, perhaps my experiences with the model will prove of interest.

Mr. N. K. Walker's article in the September, 1943, AEROMODELLER intrigued me greatly, and I straightaway set about the simple task of constructing the model described. My LD2W3 was carefully built exactly to specification, and I took special care over the airscrew.

I test flew the model in fine weather: it was a real modellers' day, with hot sun and slight breeze. Using two strands of ¼ by 1/30 30 inches long, and on about 600 turns, the model made a flight which could only be described as a slightly prolonged glide. I tried everything to make the model climb, the only result being to produce a sluggish sort of stall. On about full turns my LD2W3 managed to accomplish a flight of 30 secs. at a maximum height of 10 ft., and on picking the model up I found the wing fixing broken for the sixth time that afternoon.

There are only two possible explanations for these unsuccessful flights, either the model was too heavy or the airscrew was all wrong, and yet, as I said before, my model was built exactly to specification.

Like Mr. Maxwell, I do not doubt Mr. Walker's times, but I should like to know how he manages to make his model climb to 150 ft., where it can make use of rising currents of air, which Mr. Walker holds responsible for the high durations of his machine.

I intend to make another LD2W3 in the near future (the first one was trodden on), and have another go at this rather unusual sort of flying, and perhaps Mr. Walker would be good enough to give me some advice. I can certainly use it.

Lower Edmonton. R. A. PARKER.

DEAR SIR,

On looking through a *Strand Magazine* of September, 1897, Vol. 14, No. 81, I found an article on show "Cage Birds," illustrated by J. A. Shepherd, in which was depicted, much to my surprise, under the title of "Scotch Fancy (variegated)" a drawing of either "Drambuie" or one of his forefathers. Knowing that this might aid you in tracing his ancestry I delved amongst various plans, etc., dug out pencil and paper and made the enclosed sketch. (*Since embellished by Freddie.—Ed.*)

While I am about it, may I say how much I appreciate the publication of the clinching argument of McGillicuddy on such controversial subjects as slabside *versus* streamline and theory *versus* practice. This masterful avoidance of the crux of the matter shows indeed the hand of a man who knows more than he has learnt, who has bust so many models that no one knows whether he does it on purpose or through forgetfulness, and who has seen thousands of all types of models crash and a few of each type fly.

G. J. STEPHENSON.

Wirral.

DEAR SIR,

With reference to the article in the September issue of the AEROMODELLER on Control Line flying for petrol models. I have recently returned from South Africa after a spot of training and during a short stay in Durban I managed to contact the local modellers.

They had all dispensed with the flying of free models in favour of the controlled jobs. The most popular of these was the "A. J. Fireball," an American kit which was very novel in the fact that the fuselage was carved from two blocks of hard balsa in much the same manner as a solid model. They were later hollowed out and held together by rubber bands. The wing was merely sandwiched between them, the top half of the fuselage being cut out to conform to the contours of the centre section.

This little job, 36 in. wing span, had quite a startling performance, and was powered by a wide variety of engines, among which were Ohlson 23, Forster 29, Ohlson 60 and Super Cyclone.

The one powered by the Ohlson 60 clocked 57 m.p.h. on numerous occasions, and showed with remarkable ease the amount of control the chap actually had over it.

The Durban chaps were highly delighted over the success of these little kites and were deep in the throes of building all types of scale models, foremost among them being a 30 in. Hurricane and a 36 in. Republic "Lancer."

The engines were for the most part upright and uncowled, and in the case of the "Lancer," the engine was bolted to a mounting fixed to a bulkhead and was left entirely open.

They were also considering trying a Supermarine S.6B as a controlled job, so I should imagine they will have many hectic moments in the near future.

For my own part I consider it jolly good sport and an excellent method of flying a petrol model in a confined space.

I should be very grateful if you would make clear the position of flying these model aircraft under the existing Air Ministry regulations, as I am very keen to get started myself on the little jobs, having been lucky enough to pick up an Ohlson 60 whilst in Durban.

I will close now, hoping you will give this letter the fullest consideration, and if possible encourage others who already have engines in their possession, to try this new field of scale-type petrol model development. I can assure you that they will be well repaid for their efforts.

Scotland. SGT. J. MUIRHEAD, R.A.F.

LONGERON STRENGTH DATA

BY J · H · MAXWELL

THE mere mention of the word "stressing" is usually sufficient to bring to mind pictures of mighty brains, nimble slide-rules, sheets of calculations; whether or not these conceptions are entirely justified, the fact remains that stressing is very largely a matter of advanced mathematics. As such it does not constitute everybody's idea of an interesting hobby and, consequently, it is extremely unlikely that models will ever be stressed to an extent at all comparable with the stressing of man-carrying aircraft.

Nevertheless, as aeromodellers strive after greater efficiency, more attention is bound to be paid to such matters as strength/weight ratio; and a simplified form of stressing is inevitable. Probably the best line for endeavour lies in testing mechanically sample pieces of structure—a practice widely employed in the aircraft industry—and the results of these tests, used with common sense, can provide all the strength data likely to be required.

The following is a report of one such series of tests.

Object of Tests.

Before commencing the construction of a fairly normal four-longeron fuselage which was to carry a 2-oz. motor in 10 strands of ¼-in. rubber, it was decided to conduct a series of tests to determine the best material and section for the longerons.

After due consideration, it was decided that the greatest forces acting on a longeron of a rubber-driven model are those which tend to compress its length. Normally, these are applied by the tension of the motor, though they may be greatly increased during stretch winding, or in a head-on collision. In any case it seemed best to treat the longerons as struts, whose main purpose is to keep the motor hooks apart; and to test the samples accordingly.

Test Pieces.

The following samples were selected for test:—

(1) 1/16 in. × 1/16 in. " balsa substitute."

(2) 3/32 in. × 3/32 in. hard balsa.

(3) 9/64 in. outside dia. balsa tube, made from 3/8 in. × 1/32 in. strip steamed, bent into a tubular form and cemented along the seam.

(4) 3/16 in. × 3/16 in. " L " section, made from two strips of 1/32 in. balsa cemented together along one edge.

The samples were weighed and, as luck—plus a little care—would have it, each was exactly the same, namely, 0·00125 oz. per inch.

For test purposes the samples were cut into 3-in. lengths.

Test Procedure.

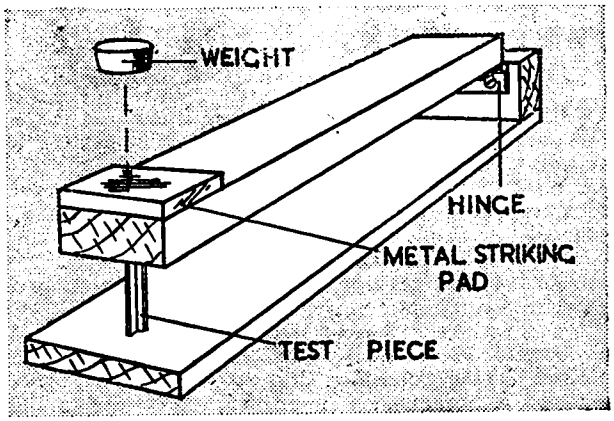
Each test piece was supported vertically between two horizontal blocks of wood, and then subjected to blows from a 4-oz. weight dropped from a height, which was gradually increased until the test piece broke. The accompanying sketch illustrates the test rig.

In order to get some idea of the actual force of the blows, test pieces of sample (1) were subjected to static load tests by gently placing weights on the striking pad.

In each case the average of the results was taken.

Results.

The heights from which it was necessary to drop the weight in order to break the test pieces were as follows:— (1) 2 in. (2) 4½ in. (3) 6 in. (4) 7½ in.



Test pieces of (1) also broke under a gradually applied load of 37 oz. This 37 oz. is accounted for as follows:—

Weight of striking pad, and parts of test rig supported by test piece	15 oz.
Weight of 4-oz. weight	4 oz.
Remainder of weights	18 oz.
	37 oz.

It follows that in dropping 2 in., the 4-oz. weight imparted a blow equal to 18 oz., and it may be assumed that the forces of the other blows were proportional to their heights; or, in other words, equal to 9 oz. for every inch of drop. In each case the 19 oz. must be added.

The breaking loads on the test pieces were therefore (1) 37 oz. (2) 59 oz. (3) 73 oz. (4) 86 oz.

Conclusions.

Apart from the fact that the " L " section is obviously the strongest, it is interesting to try to learn as much as possible from the results.

If the longerons are braced every 3 ins., it is not unreasonable to assume that the load which each will carry is equal to the breaking point of the test piece. The tension of the motor, when fully wound, is approximately 40 oz., so that each longeron carries 10 oz. From this it may be seen that while the safety factor (that is, permissible load/normal load) in the case of (4) is 8·6, it is only 3·7 for (1), and so on. Now, working on the basis of previous successful models, there is good reason to believe that this factor should be between 8 and 10, so that (1) and (2) are both well under strength.

Another noteworthy point is that of the two square sections, the balsa one was almost one and three-quarter times as strong as the " balsa substitute," due, of course, to the difference in cross-sectional area. Incidentally, the importance of cross-sectional area in structural members is not generally recognised. For example, an 1/8 in. square strut is approximately thirteen times as strong as one 1/16 in. square; which means that the strength/weight ratio of a multi-stringer fuselage is about one-third that of a corresponding four-longeron job.

Although the tests reported here were carefully conducted, the somewhat makeshift nature of the apparatus did not permit the high degree of precision which is desirable. However, it is hoped that this series will prove to be merely the forerunner of other more accurate and extensive experiments in the strength of model structures.

STREAMLINED SPEED

BY "A SURGEON - COMMANDER, R.N.V.R."

WHAT is the highest speed at which man can travel without harm? The answer is that he can travel at any speed provided that he is protected from the wind and that the speed is constant. An African nigger squatting in a palm hut on the Equator might be excused for imagining that he was at rest, whereas in fact he is spinning at 1,000 miles per hour round the earth's axis, and we all travel an odd 578 million miles a year through space in our journey round the sun.

But a sudden *change of speed or direction* can most profoundly affect the human body. This was first noticed in the Schneider Cup races when the pilots reported a phenomenon never before recorded in the history of the human race, in which they described a greying of vision and blacking-out in turning at speed round the pylons.

Change of speed is called acceleration and is most easily measured by using the pull of gravity as a yard-stick. If Newton's famous apple, a pound of feathers and a pound of lead were all dropped at the same time from the same height in a vacuum, they would all fall at the same acceleration of 32 ft. a second per second under the pull of gravity (1G.). If an aircraft is boosted off a catapult at 64 ft. per sec. per second we call this 2G, and so on.

In a hurry.

An assisted take-off by catapult is quite a normal event for the naval airman. One moment the blue flag is circling, you sit firmly back in your seat, head resting against the pad; the engine roars in to top boost, the pilot gives the "ready" sign, steadies his elbows into his side, and woof—you are in flight. In that second the sight blurs and the tummy feels like a pancake wrapped round the spine, but by the time you are airborne everything has caught up and feels normal. After a few such hurried starts you cease to notice anything unpleasant. Two to 3G is the maximum kick one gets out of this "human-cannon" act, fired by cordite or compressed air.

Landing on an airfield in the normal way and using brakes the de-acceleration is a mere ½G. Landing on a carrier into wires the tail hooks on and swings up. Down curves the nose and the aircraft is pulled up short with a force of 2G., but there is practically no sensation, provided one is strapped in.

Belly landings with the undercart up are more abrupt, and in the old glider days pilots sometimes broke their ankles against the crossbar of the rudder, so full-length footrests which spread the strain evenly were substituted.

Mind your head.

In a "prang" or crash-landing, stopping is even more curt. In preparing for such a landing you do not undo the safety straps. If you did you may shoot forward and damage government property and instruments with your head, and you won't make the quick getaway you expected because you will probably be knocked unconscious. So you rely on your straps. Always see that they are comfortably tight before taking off, and in a crash wait until the noise and excitement have stopped. You then pull the quick-release pin and can step out of the aircraft. And don't forget that water is just as unforgiving as dry land to hit hard.

Baling out.

In "baling out" you will be travelling at the same speed as the plane until the slipstream slows you down. So if there is adequate height count three before pulling the rip cord. If an absent-minded professor bales out, having misremembered his parachute, he will fall after a few seconds at a steady 118 m.p.h. because an air-cushion forms under a falling body. Even so, there is a brighter future in remembering one's parachute. Some who have baled out in a cloud without an horizon report that, on pulling the rip cord, the sudden deceleration when the parachute opened gave them a sensation of being suddenly dragged violently upwards. See that the chute harness is properly and snugly adjusted before every flight. It is no fun if the straps are loosely fitting and are suddenly pulled up into the groin with a force of four times your own weight. When landing keep both feet together, bend the knees slightly and prepare to roll over. It cushions the shock, which is equal to about an extra two and a half G., or two and a half persons of your own weight sitting on your shoulders.

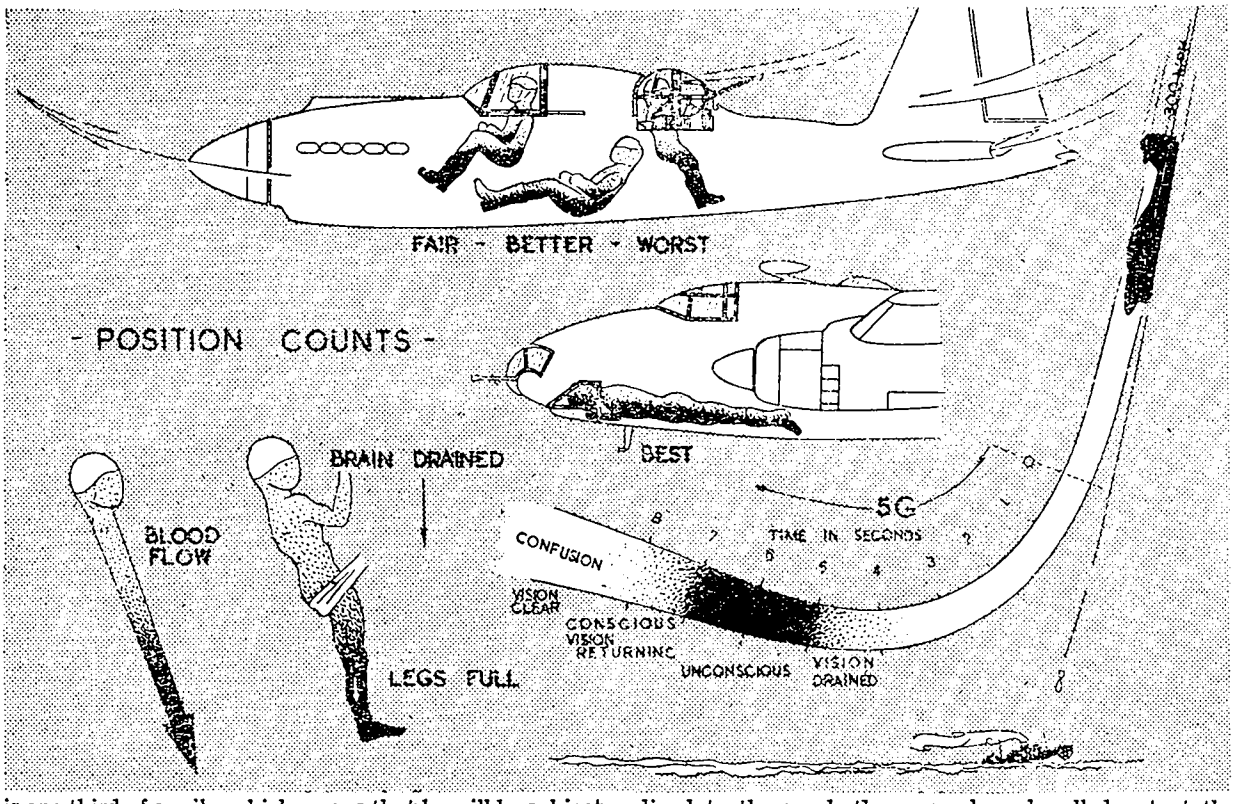
Gee! The Pilot weighed half a ton.

Now for a different form of acceleration, met with in tight turns and pulling out of bombing dives. If we swing a conker round on the end of a string and let go, it doesn't drop to the ground. It flies off at a tangent, for it has been trying all the time to travel in a straight line, and it is only the inward pull of the string which has been keeping it to the path of a circle. The force required constantly to change its direction can be considered as an acceleration and measured as units of G. Like the conker, a pilot in a plane tends normally to travel in a straight line. When he turns he banks his plane. The air under the wings and tail presses the plane round and the seat presses the pilot round. He will feel squashed down on to his seat, and in a tight turn will be unable to lift his head. Values of 8 G. have been recorded by fighter pilots, which means that a pilot whose normal weight (1G.) is twelve stone then weighs over half a ton. Far more important, his blood weighs as heavy as lead, and is flung outwards toward his feet and away from his head in such a hard turn as this.

Blacking-out.

The muscle walls of the blood vessels can resist this strain for four or five seconds, but if the turn is continued they relax and the blood pools in the vessels of the lower limbs and belly. The brain is drained of blood and the first result is a grey mist before the eyes and loss of vision, because the eyes are normally under tension. Only after death do they go soft and boggy like the eyes of a dead codfish. In life the blood supplied to the eyes has to work against pressure, and when the pressure to the brain fails the blood supply to the eyes is the first to be affected. Hence the "greying out." The moment the pilot eases the stick forward off comes the pressure and sight is restored, but if the tight turn is continued the brain itself will be deprived of blood and the pilot becomes unconscious, black-out goes slack, and the stick automatically eases forward and he comes to. A turn of 5G. for one second will have no effect; continued for five seconds the soft flesh of the face is drawn down, sight is drained from the eyes and the pilot will come to and only know that he's passed out by the fact that he has suddenly lost height.

It is the same in pulling out of a power dive. The escape radius for a dive bomber at 270 knots (300 m.p.h.)



is one third of a mile, which means that he will be subject to 5G. for some six seconds, and will certainly black-out for the last second or two.

A naval pilot was diving through cloud on to a target and suddenly came through the cloud base to find the sea terrifyingly close. He hauled back on the stick with all his strength. The observer was caught right off his guard and came to with a broken nose.

Position counts.

This blacking-out can be countered to a certain extent by position. It is worse in the standing position, as the blood is flung straight down towards the feet, whereas in a bomb aimer lying flat there is no blacking-out effect as the blood is surged away not from the brain, but from the back to the front of the body. A pilot cannot very well lie prone, and lying back as in an armchair at the club is not a position to give one an aggressive fighting spirit, and although the normal sitting position is not a good one, to avoid black-out it can be improved by crouching.

The Fighter-crouch.

If the thighs are raised blood will tend to flow back towards the heart rather than towards the feet. If at the same time the body is bent forward until it is almost horizontal the brain will be brought down to the level of the heart, which will have far less work in pumping the blood along to, rather than up to, the head. So two sets of footrests appeared on the rudder bars of fighter craft, and when crossing the Channel the pilot raises his feet to the top bar on passing over the enemy coast. On engaging the enemy he crouches forward, and in this position can raise his resistance to black-out by +1 or +2G.

How important this question of black-out is can be realised on hearing the stories of pilots who, having exhausted their ammunition, have led the Jerry a dance, dived to the sea hotly pursued, and pulled out at the last second. With a more manoeuverable plane and a higher resistance to G., they have zoomed from the jaws of death, and lost their pursuer in a column of water and spume as he hit the drink for the first and last time.

Medical research has enabled our airmen to make circles inside the Hun, and experimentally they have resisted the immense force of 15G. Man once more has outstripped his machine, for no plane can stand this strain but would break up in the air; but test pilots have come down with the metal wings of their planes bent back out of the true by the strain they have been able to put on them without blacking-out.

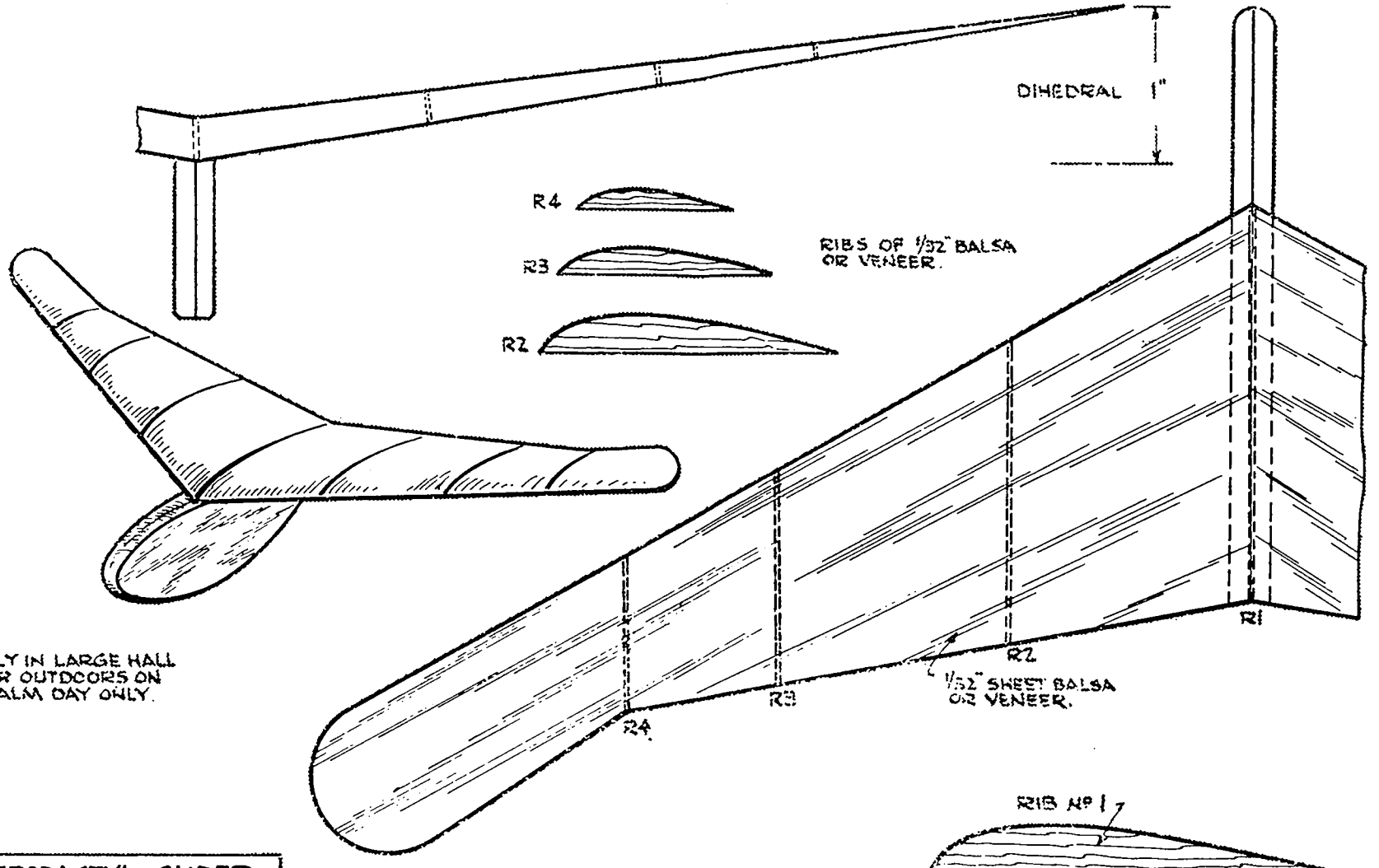
To ease the stress on pulling out of a dive bombing, air-brakes are now fitted to many specialised aircraft.

Redding-out.

In putting the nose down hard to start a dive not only is petrol flung into the cylinder-heads in some aircraft, but blood is flung to the pilot's head, and he himself would be flung out of the plane but for his shoulder straps. The brain-box is bony and unyielding, and 3G. (negative G. in this case) is as much as a man can stand, and in inverted loops and turns the blood forced up into the head causes not a greying but a "redding" of vision and finally a "redding-out" into unconsciousness of a black-out.

In any case negative G. is not only bad flying, but bad for the pilot and passengers and is to be avoided, as even after return of consciousness there may be mental confusion for several seconds after redding-out.

The threshold at which a person normally blacks out is dependent on that person's make-up. A long, thin slab of humanity with a low blood-pressure is likely to black-out before a short, bull-necked sturdy fellow with a higher blood-pressure. Even standing to attention for ten minutes causes some people to faint.



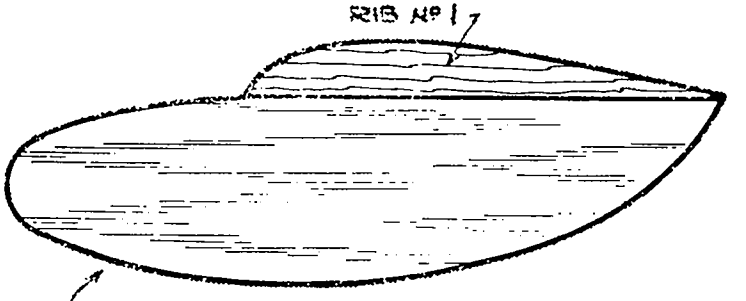
FLY IN LARGE HALL OR OUTDOORS ON CALM DAY ONLY.

PTERODACTYL GLIDER.

DESIGNED BY
·R·D· BREWER·

· SCALE : FULL SIZE

WING IS MADE IN TWO SECTIONS, WARPED TO CORRECT CAMBER AND RIBS CEMENTED TO THE UNDER SURFACE



· FUSELAGE TWO THICKNESSES OF 1/8" SHEET BALSA.

SPLIT FLAP EXPERIMENTS ON A 52 INS. SPAN MODEL

BY J · S · FORREST

THE aircraft on which these flaps were tested was of conventional high-wing design, with a total weight of 23 ounces. Due to lack of fuel, the engine was removed and a suitable weight substituted. The wing loading during the testing was about 9 ounces per square foot. The object of the experiment was to discover the change of trim effected by the flaps, at various degrees of depression, commencing at 20 degrees, this being the position for the best lift drag ratio.

The model was trimmed for gliding flight with the flaps raised and after fairly exhaustive tests the best glide was arrived at. The flaps were then depressed 20 degrees. After a few attempts the correct launch was discovered and some fifty glides were completed. There was no change in the trim, but glide was appreciably flattened and the speed reduced to 10 m.p.h., a reduction of 2 m.p.h. The attitude of the aircraft changed slightly, being now a little tail-down.

The flaps were now depressed to 70 degrees and the testing resumed. The gliding angle now became about the same as with no flaps, but the speed was reduced to 7 m.p.h., a reduction of 41 per cent. of the speed with no flaps. The tail-down attitude of the aircraft was now quite appreciable.

Effect on Stalling of Flaps.

The speeds at which the stall occurred are very approximate as no accurate way of measuring was available. Stalling with no flaps occurred at about 9 m.p.h., and was fairly vicious, but with no tendency to drop a wing. Some fifteen feet were lost before the glide was resumed. With the flaps depressed 20 degrees, the stall was vicious, about twenty to twenty-five feet of altitude being lost before control was regained. With the flaps depressed 70 degrees the stall became very gentle, only about five feet being lost before recovery.

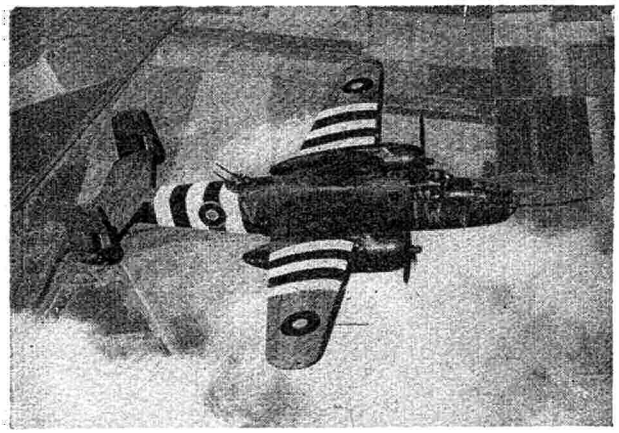
Specification of Aircraft.

Reynolds number, $\frac{v}{\nu}$ 40,000; wing area, 360 sq. in.; wing loading, 9 oz. sq. ft.; wing incidence, plus 2 degrees; aspect ratio, 8·3; tailplane area, 48 sq. in.; tailplane incidence, plus half a degree; flap area, 47 sq. in.; flap per cent. of chord, 26 per cent.; flap per cent. of span, 52 per cent.

Tabulated Results of Tests.

Degrees flap.	*Gliding speed.*	*Stall (Characteristics).*	*Stalling speed.*	*Height lost.*
0	12 m.p.h.	Moderate	9 m.p.h.	15 ft.
20	10 m.p.h.	Vicious	8 m.p.h.	20-25 ft.
70	7 m.p.h.	Very gentle	5-6 m.p.h.	5-6 ft.

Throughout the tests there was no change of trim in any direction.



"Invasion" Markings are carried on the North American Mitchell, and other types, as shown above. (*Photo: Planet News, Ltd.*)

MONTHLY • MEMORANDA •

BY O · G · THETFORD

D-Day Daubings.

Artificial aids to aircraft recognition, although stoutly opposed in some quarters, have slowly been gaining in popularity, and finally emerged triumphant during the operations carried out on D-Day, June 6th, 1944. Special instructions were issued to all British and American squadrons taking part in the invasion operations and recognition markings according to a previously arranged code were painted on all aircraft on the night of June 5th–6th. These markings took the form of three wide white bands painted chordwise across both wings, just inboard of the roundels and stars, and three further white bands encircling the rear fuselage. The wing markings appeared on both the upper and lower surfaces. On night-flying types the white bands sufficed, but on machines operating during the day the white bands were divided by further bands of blue, red or black, according to the particular duty of the aircraft in question. Day machines thus had three white and two blue; three white and two red or three white and two black bands on the wings and fuselage, the white bands occupying the centre and outer positions in each instance. On small types, such as fighters, the forward white fuselage band was broken to avoid obliterating the roundel.

Although there have been no official statements on the subject, it seems hardly likely that these markings will be retained for any length of time, now that they are familiar to the enemy and consequently in danger of being imitated. Such short cuts to recognition are doubtless useful during the short period in which the enemy is in ignorance of the new scheme. Nevertheless, the only safe method of recognition is still familiarity with an aeroplane's outline.

Whatever the aspects from the recognition point of view, however, the scheme is full of interest for the solid modeller. Those favouring additional touches to enliven a drab camouflage scheme have previously had to rest content with the striped lower centre-section of a Typhoon, the coloured cowling and striped tail surfaces of a Mustang or Thunderbolt or the checkered fins and rudders of Warhawks. Now the range of types open to this sort of treatment is almost unlimited, and a classified list, arranged in categories, follows. It is as comprehensive as censorship regulations will allow at the time of writing.

British Fighters and Fighter-Bombers.

Hawker Typhoon, Hawker Tempest; Vickers-Armstrongs Spitfire V (clipped), Spitfire IX and Spitfire XII; De Havilland Mosquito fighter-bomber.

British Glider-Tugs.

Armstrong-Whitworth Whitley and Albemarle, Avro Lancaster, Handley-Page Halifax III, Short Stirling III, Vickers-Armstrongs Wellington.

British Troop-carrying Gliders.

Airspeed Horsa I and II, General Aircraft Hamilcar.

American Fighters and Fighter-Bombers.

Lockheed Lightning (P-38J), North American Mustang III (P-51B), Republic Thunderbolt (P-47D).

American Light and Medium Bombers.

Douglas Havoc (A-20G), Martin Marauder (B-26C), North American Mitchell (B-25G).

American Glider Tugs.

Douglas Skytrain (C-47), Lockheed Lodestar (C-56).

American Troop-carrying Gliders.

Waco Haig (CG-4).

American Liaison Monoplane.

Piper Grasshopper (L-4).

Under Two Flags.

Many types of aircraft used in the D-Day assault were operating with both the R.A.F. and the U.S.A.A.F. and carried the national markings of the respective services. A British type used by the U.S.A.A.F. was the Airspeed Horsa, which was towed behind the Douglas Skytrain. American types in R.A.F. colours, and sometimes under a different name, included the P-51 fighter (as the Mustang III), the A-20 attack-bomber (as the Boston III), the B-25 bomber (as the Mitchell), the Skytrain glider-tug (as the Dakota) and the Haig glider (as the Hadrian).

Reverse Lease-Lend.

It is not generally realised that many British and Canadian-built aeroplanes have been supplied to the U.S.A.A.F. and carry American markings. Operational types include the Mosquito, which is used for photographic reconnaissance to supplement the F-5 version of the Lightning and the Horsa glider, mentioned above. British and Canadian trainers serving with the U.S. Army include the Avro Anson V, the De Havilland Dominie, the Miles Master III and the Noorduyn Norseman. Many of the Dominies and Masters carry American insignia on British-type camouflage and have yellow under-surfaces.

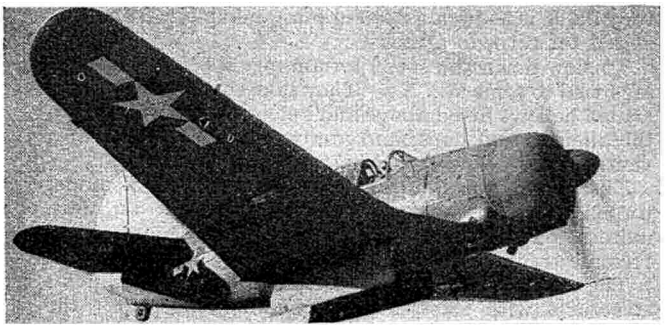
Spit Four.

Until recently a "missing link" in the Spitfire family, the Mark IV has now been revealed as a photographic reconnaissance version, similar in most respects to the Mark V, but carrying no guns in the wings, probably so that extra petrol tanks can be fitted, as on the latest Beaufighter torpedo-fighter. Many Spitfire IV photographic machines are being used in the Mediterranean Theatre where they are fitted with tropical intakes. They are painted cerulean blue all over, this now being standard for high-level photo types and high-level fighters. A Spitfire IV bearing the single identification letter "X" aft of the fuselage roundel carried the serial number BR 416.

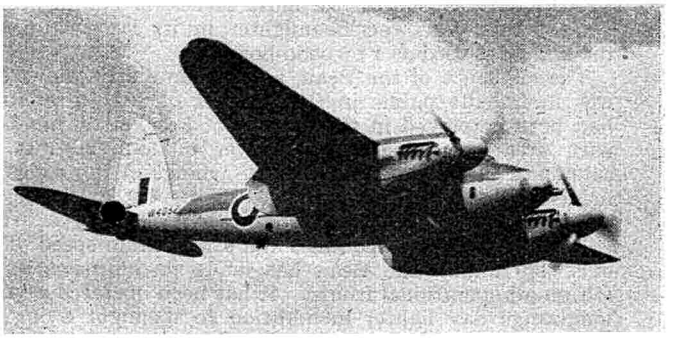
"PHOTONEWS"

The above photograph, by the AEROMODELLER photographer, shows the Percival Proctor IV four-seat Communications Monoplane.

A Mosquito II (below) camouflaged in sea grey medium and dark green. *(Photo: Planet News, Ltd.)*



The Curtiss A-25 (above) is the Army version of the SB2C-1 Helldiver. The bomb doors are open. *(Photo: Curtiss-Wright Corporation.)*



The Vultee L-5 Sentinel has a steep take-off angle. *(Photo: Consolidated Vultee Aircraft Corpn.)*

The Avro York Transport Monoplane. *(Photo: A. V. Roe & Co., Ltd.)*

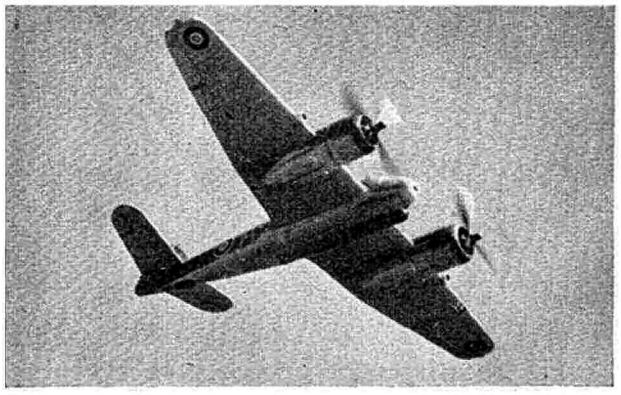
The latest P-47 Thunderbolts are fitted with wider-chord hollow-blade Curtiss electric airscrews. *(Photo: Curtiss-Wright Corporation.)*

AEROPLANES DESCRIBED — XIX

THE BRISTOL BEAUFIGHTER X

BY H · J · COOPER

Next Month : The Hawker Fury.



RANKING as one of the most successful aeroplanes of this War, the Beaufighter in its latest form, the Mk. X, is used as a torpedo-bomber.

The existence of the Beau, as it is familiarly known, was first made public in the summer of 1941 after it had been employed in the defence of London by night with great success. Its fire-power of four 20 mm. cannon in the nose and six ·303 Brownings in the wings made it the most heavily-armed fighter in existence, and it still holds this position today.

With a range of 1,500 miles and a maximum speed of over 330 m.p.h. the Beau has made its effectiveness felt on all operational fronts. It has been operated as a long-range day fighter in addition to its night flying, and as a fighter-bomber carrying 1,000 lbs. of bombs externally. It has operated to advantage in the Middle East (being especially destructive to Junkers 52s in formation!); and the Japanese have had reason for christening it "Whispering Death" because of its quiet flight when its sleeve-valve Hercules motors are running at cruising revs.

The art of torpedo-dropping is a delicate business, and one which must essentially be executed at a relatively low speed and height because of the possibility of damage to, and consequent ineffectiveness of, the "mouldie" if it hits the water at too high a speed.

Also, a torpedo-bomber must possess extreme manœuvrability if it is successfully to evade the A.A. fire from the ship it is attacking, and because of this many Coastal Command pilots prefer to fly single-motor biplane T.B.s.

The Beaufighter is, however, possessed of admirable flying qualities, and its maximum speed (which even in the Mk. X is as high as 300 m.p.h.), make it particularly suited for torpedo attacks.

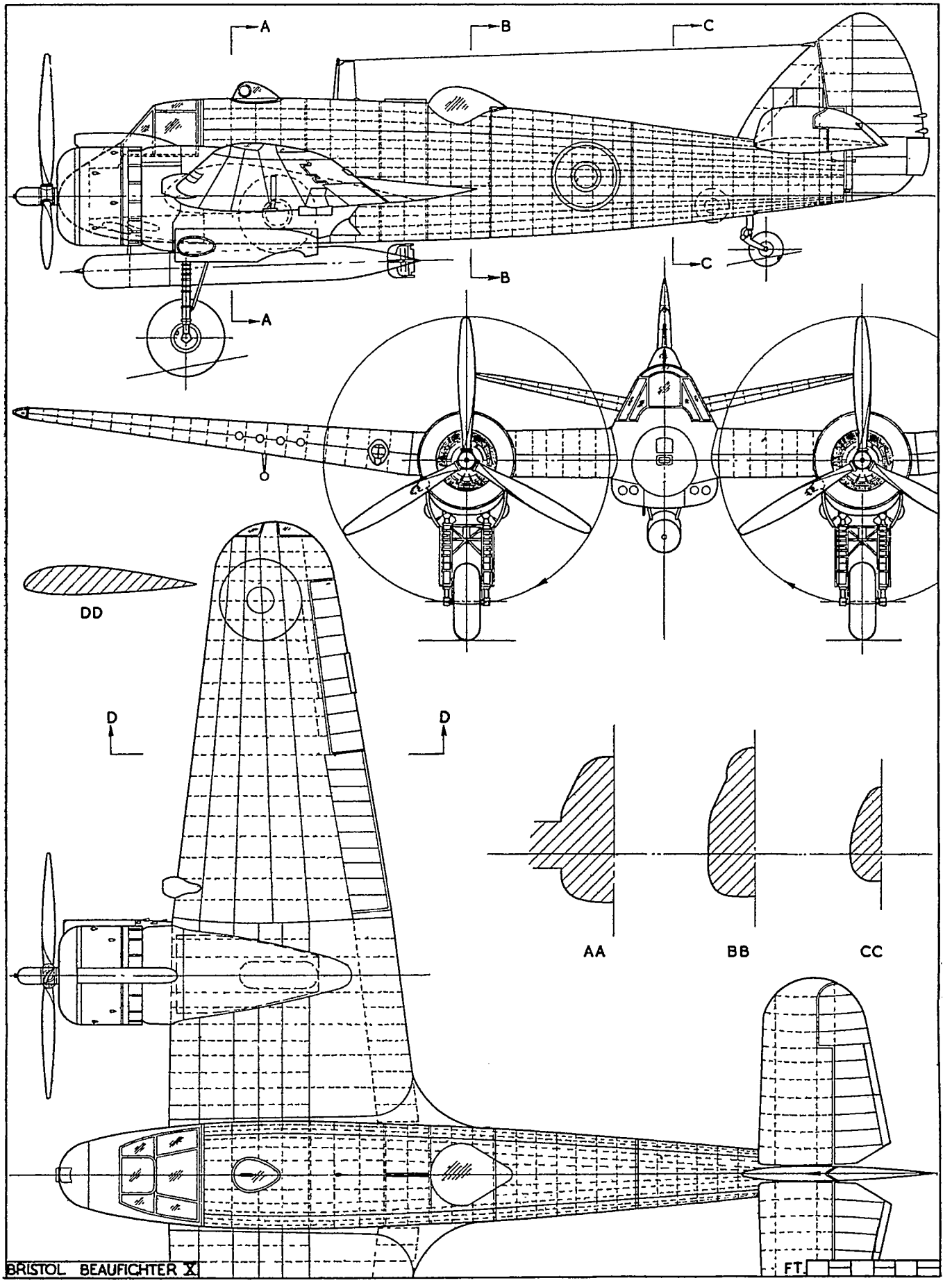
To slow down the speed for aiming, special air-brakes are fitted to some Mk. Xs. They take the form of spring-loaded bellows fitted above and below the wings between the ailerons and flaps, and are operated by means of a venturi tube below each wing.

The Beaufighter is a direct descendant of the Beaufort torpedo-bomber, and employs similar wings, tail-unit, motors and undercarriage units. The motors are Hercules radials of about 1,300 h.p.

The wing and tail-unit of the Beaufighter are all-metal structures with stressed skin covering except for the fabric covering on the ailerons, elevators and rudder. Most versions now flying are fitted with dihedral tailplanes, an improvement introduced in 1942 to counteract a certain tendency to yaw at take-off.

Leading particulars of the Beaufighter X are: Span, 57 ft. 10 in.; length, 41 ft. 4 in.; root chord, 11 ft. 3 in.; tip chord, 4 ft. 9 in.; tailplane span, 17 ft. 7 in.; track, 17 ft. 10 in.; wing area, 503 sq. ft.; tare weight, 13,600 lb.; loaded weight, 25,000 lb.; maximum speed, 300 m.p.h.; landing speed, 80 m.p.h.

Air Ministry Photos.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BRISTOL BEAUFIGHTER X
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CLUB NEWS

BY CLUBMAN

WHO said model flying weather! It's been the limit lately, hasn't it?—and everyone I meet is just about " browned off " with trying to get a decent spot of flying and taking the model home in one piece. The latest competition report to hand from the S.M.A.E. is for the Weston Cup (Gliders) held on the 14th May, when the weather was on the average windy. What it has been since then I leave to your imagination—or experience!

In spite of the wind on Weston day, some extraordinary times were put up, the best time of the day going to the winner, D. Butler of the Surbiton Club, who made one flight of 36 minutes, 19·2 seconds. Some sort of new record, I'm thinking. Next best time was by G. W. Harris of Croydon, who made 18 minutes, 49·4 seconds. Altogether 269 entries were received for this popular type of contest, from a total of 41 clubs, and Comp. Sec. H. J. Towner must have a fine bouncing headache working out the final figures. Who'd like the job of sorting out the Plugge Cup position?

There seems to be a lot of " political " activity at the moment, apart from the A.B.A., mentioned in the June issue. The Scottish clubs have at last got together and formed a Scottish Federation, the avowed objects of which are to organise Scottish Championships, both individual and club, and to recognise a Scottish record section. Close co-operation with the S.M.A.E. is aimed at, and I welcome this news on the part of the Scots to paddle their own canoe a bit. It has been proved in the past that only persons actually connected with a particular area can have a full knowledge of the requirements of modellers in that district, and the pre-war Area Scheme was proving highly successful from this viewpoint alone.

Congratulations to the instigators of this move, and best wishes for the success of this, the first really organised Scottish group.

PILCHER CUP RESULTS

		Aggregate	Club Points
Aylestone	W. Jones	579·3	179
Croydon	G. W. W. Harris	529·4	178
Brentford	S. Ford	469·4	177
Aylestone	G. Jones	442·6	176
Aylestone	P. Jones	440·0	175
Aylestone	J. Bones	415·0	174

ORDER OF CLUBS

Aylestone	530	Norwich	390
Pharos	507	Birmingham	384
Croydon	504	Northern Heights	371
Brentford	498	Cheam	346
Hayes	476	Whitefield	318
Walthamstow	475	Blackpool	277
Streatham	441	Agricola	272
Surbiton	434	Blackheath	247
Merseyside	423	Kingsheath	169
Bradford	398	Ripon	153
Leeds	393	Newton Abbot	72

22 Clubs. 118 Entries.

Average weather conditions, windy with rain.

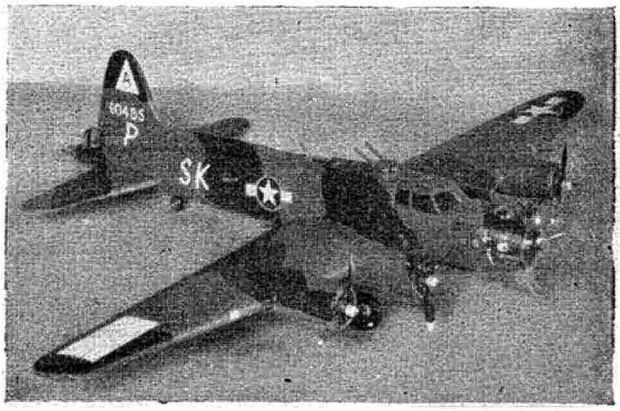
Best flight: G. W. W. Harris, 365·4 secs.

View of model aircraft stand at the Kodak Society of Experimental Engineers and Craftsmen's Annual Exhibition. There was a good display of models, including the following types:—Duration, Flying Scale, Petrol Driven, Compressed Air and Solid models.

More good news comes from not quite so far north—namely, from Lancashire. A Northern Area Council (offspring of the old North-western Area) has been formed under the secretaryship of R. V. Bentley of the Blackpool Club. A well attended meeting on the 6th May brought a good representation to Manchester, and the scheme was ratified. Clubs, both affiliated and unaffiliated, will appoint delegates, and proposals will be forwarded to the S.M.A.E. from the area as a whole rather than individual clubs. I am very pleased to see the revival of one of the best features of pre-war affairs, and trust that all clubs and individuals will give this Council their utmost support.

An interesting letter arrived last week from Signalman J. McLaren, now serving in Italy. He says: " *I attended quite a few model meetings outside Algiers when I was stationed there in* 1943. *All entries were gliders, and there were some really big jobs there too! I assembled a French cabin model kit which had lain in the corner of the clubroom since pre-war days.*

" *When I came to Italy I thought I had seen the last of aeromodels until the war is over. But no! One day when I was in —— I saw two kids with a* rubber-driven *job having great fun. I stood and watched them for about an hour. Seemingly, the object of the game was to try and break down a lamp-post which was in their line of flight! Unfortunately, they didn't succeed, and the last I saw of*



Latest model of John Clapham, of Hendon, a Fortress B17G.

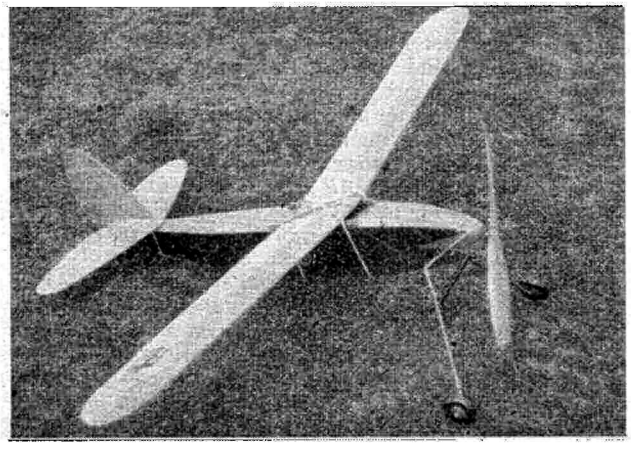
them they were walking home with the remains held tenderly in their arms. Made me feel very homesick!"

It is a long time since we heard from the ULSTER M.A.C., but at long last a report has come to hand. The Third Annual National Model Sailplane Contest, held on June 3rd, was the largest affair the Club has yet undertaken, and in spite of rain, the meeting was a great success, many fine flights being recorded. Permission was received to use the Newtownards aerodrome, and the entrants had the added thrill of seeing several full-size glider flights. T. H. Daulman won the event, collecting the Short & Harland Trophy and a fiver. A new young club member, Jim Dummigan, is to be congratulated on setting up a new club glider record of 6 : 29, the model being recovered from some 12 miles distant.

Mr. S. Ryde has had to resign from the secretaryship of the NORTHERN HEIGHTS M.F.C. owing to ill-health, and I wish him a speedy recovery. The times put up by members in the Weston Cup were not high due to adverse weather conditions, models soon being lost to sight over a ridge. Best flights were obtained by J. Davall, 3 : 16·5; K. Tansley, 2 : 46; D. Lofts, 2 : 21; F. E. Wilson, 2 : 04·5, and D. Flanagan, 1 : 42. A handicap contest arranged for Whit Sunday was won by N. Crawford (received 60 points) flying a glider for a total of 221·6 points, while R. Jeffreys won the Construction and Finish Contest with his lightweight duration model.

The BRENTFORD & CHISWICK M.F.C. members are not doing too well in national contests so far! Of the ten members who turned out for the Gamage Cup affair, only three were able to enter, poor rubber being the cause of most of the trouble. Thirty members turned up for the Weston Cup but were unable to get in any flights owing to the very high wind. However, some good flights have been witnessed, notably one of 5 : 01 by F. Young, and a new club glider record of 5 : 30 made with an "Ivory Gull." A. Baker got 4 : 20 with a model weighing 18 oz., the model landing almost at his feet. (Wish my models would behave like that—mine won't even leave my feet!)

Mr. P. Genner's Air Cadet, which consistently clocks up 80–120 secs.



The Weston Cup did not go down at all well with the BLACKPOOL & FYLDE M.A.S., the usual high winds and poor flying conditions prevailing holding down times to a maximum of 1½ minutes. C. Pendlebury put up the best showing with an aggregate of 2 : 53·2, followed by D. H. Whittaker 2 : 28·2, and R. V. Bentley 2 : 08·2. Whittaker put up the best show in the "Model Engineer No. 2" event, his aggregate being 2 : 05·2. He also leads in the club championship to date with 266·7 points.

The WALLASEY M.A.C. had a fine day out at the Clwydd Hills (Merseyside's haunt) when a number of fine flights were put up. Times were:—

J. Mackenzie	"Howard 58" ..	6 : 33
D. Hill	"Beau 3"	5 : 11
K. Litherland	"Thermic 50" ..	2 : 23
L. Woodward	"L.D. 1"	1 : 31
A. Molyneaux	"Beau 3"	1 : 05

Molyneaux also put up a time of 5 : 02 with a rubber-driven model.

The BLACKHEATH M.F.C. is holding its Annual Open Day on the 20th August, as usual on Epsom Downs.

Whit week-end was a field day for the GUILDFORD & D.M.A.C., with records going by the board right and left. R. Lovewell lost his "Puffin" after 2 : 10 from a 100 ft. towline; then N. K. Walker lost his further modified "L.D2 W3" after 4 : 22 o.o.s. To cap the lot, P. D. Westbrook lost his "Ajax" after 18 : 10·5, the model just climbing vertically on the prop!

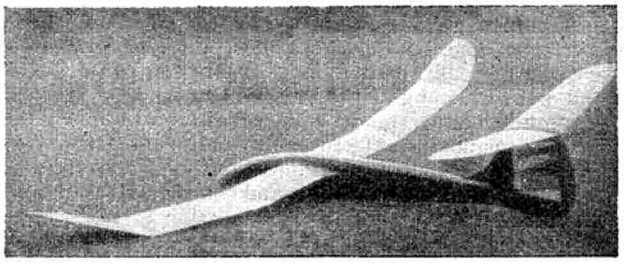
The BIRMINGHAM M.A.C. glider record has been raised by D. W. F. Harrison to over 11 minutes, and the biplane figure to 6 minutes by R. Monks. The Brummagem lads visited Leicester on the 11th June for the first leg of the Birmingham *v.* Leicester Cup and took first four places in the rubber-driven class, and first and second in the glider event.

Activity in the WALTHAMSTOW M.A.S. has been somewhat limited owing to the poor weather of late, but one fine flight is worthy of recording. On Whit Monday L. Massam launched his 36 in. span "pegleg" from Chingford Plain at 4.30 p.m., and the model was seen to land at Esher in Surrey at 8.30 p.m.

A change of secretaryship has taken place in the NEWBURY & D.M.A.C., the new "mug" being H. Cahen, of Thornhills, Speen, Newbury, Berks. In spite of some really difficult flying ground, two fine flights have been seen recently, one by C. Westrip being 7 : 30 o.o.s. Another model on the same day flew o.o.s., but was unfortunately untimed.

The DONCASTER & D.M.A.C. have been doing plenty of indoor flying while waiting for better outdoor conditions to put in an appearance. Scale models have been tried out with fair success, best times being 37·2 by a "Lightning," and 44·7 by a "Ryan." Best outdoor durations to date are 58·2 r.o.g. and 1 : 32 h.l.

J. Tomlinson of the AYLESTONE M.F.C. has been doing some great flying recently, breaking both the



45 in. span sailplane by I. S. Cameron, the "Tarpon," with an average duration of 2 mins. from a 150 ft. line. Photo by R. F. L. Gosling.

h.l. and r.o.g. records with his "Percy" model. The r.o.g. record went up to 6 : 07 when flying in the National Cup event, his aggregate in the comp. being 569·6 secs. When setting up a new h.l. figure of 11 : 32, the model landed at 11.30 p.m. after being launched at 4.30 p.m. Some flight, eh ?

Another unusual flight was made on the 13th May by a glider built by F. N. Potter of Nottingham. The model—a converted "Gutteridge Trophy Winner"—was launched from a 300-ft. line, and disappeared in a cumulus cloud. The model was found a month later at Groby in Leicestershire, a distance of 20 miles as the crow (or model) flies.

Poor weather has spoilt competition flying in the LEEDS M.F.C., thermals being almost non-existent. Their team totalled 865·6 secs. in the National Cup, all flying carried out in drizzling rain, best flight of the day being H. Tubbs 1 : 56·8. May 30th saw two club records broken when C. Furse's "Mick Farthing Duration" put the h.l. figure up to 3 : 52·4, and P. Holt's modified "Mick Farthing Glider" raised the tow-launch glider record to 5 : 53·6 o.o.s.

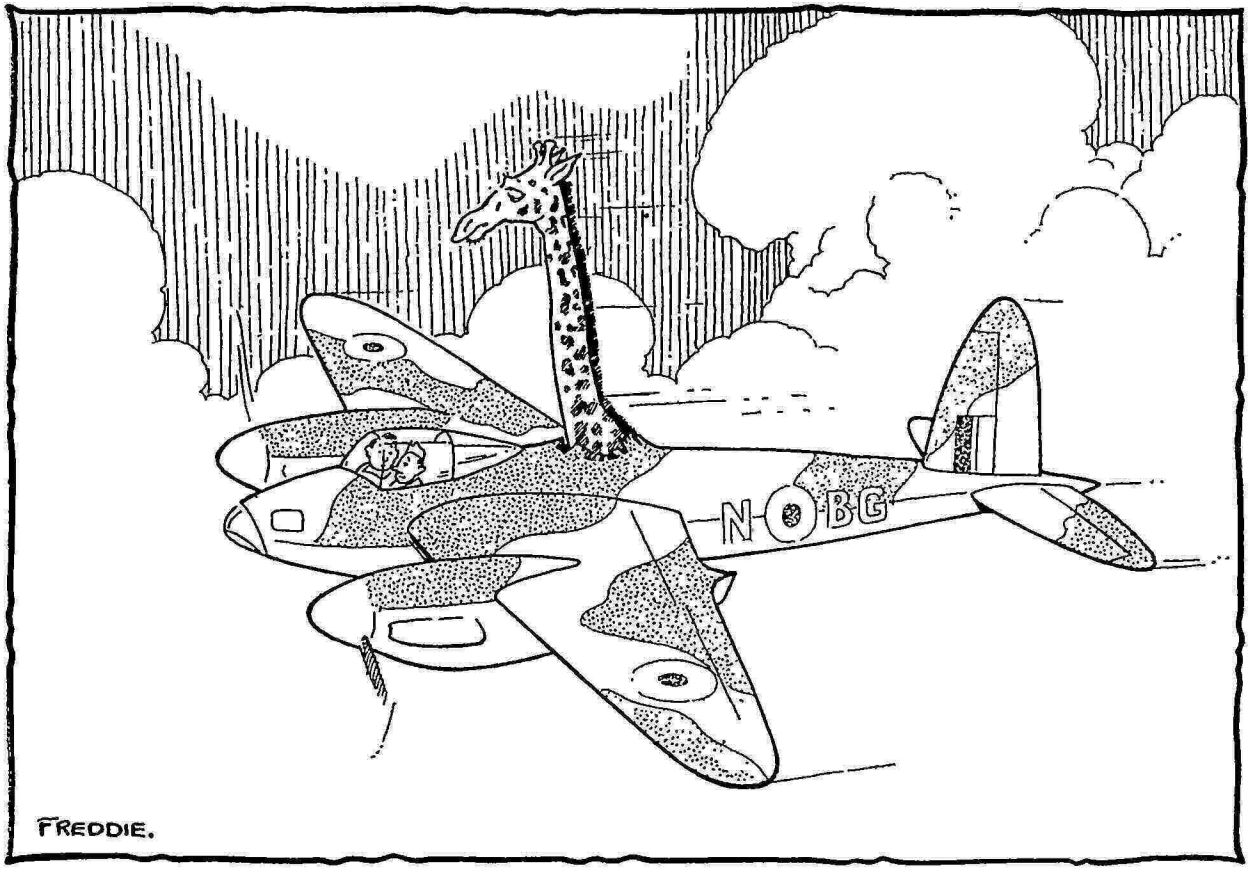
Another model of the same type broke the WEST YORKSHIRE M.A.S. record for tow-launch gliders, time 2 : 02·4. Modellers are reminded of this Club's Rally on August 20th.

The MERSEYSIDE M.A.S. paid another visit to the Clwyd Hills recently, but a rather strong wind took models o.o.s. too quickly for convenience, and the best times were :—

Osbourne	"Elite No. 2" ..	3 : 43 o.o.s.
Cameron	"Tarpon" ..	3 : 30 ,,
Gosling	"Ivory Gull" ..	3 : 02 ,,
Pearson	"Wakefield" ..	2 : 09 ,,

Prior to the arrival of the timekeepers, Gosling flew his "Judy" away unofficially timed for 7 minutes o.o.s., the model being found 14 days later at Balel, eight miles away.

The BRISTOL & WEST M.A.C. had reasonable weather in the Weston Cup, the day being warm and sunny, although marred by a strong breeze. This was the first contest at which the 300-ft. line was tried out, and the results were rather disappointing, only resulting in a slight increase in times. C. E. P. Smith's 6-ft. span glider made a grand first flight, clocking 121·9 secs. o.o.s., landing in a wood about a mile away, and being badly damaged when recovered, so that no further flights were possible. W. Gould and M. Garnett also contacted thermals, clocking 120·6 and 111·5 secs. respectively.



"OH WELL, I BROUGHT THE KIDS ORANGES AND BANANAS LAST TIME!"

Best club aggregates were by W. Gould, M. Garnett and A. H. Lee, who clocked 208·4, 186·7 and 186 secs. respectively, all three flying variants of A. H. Lee's well known Beauglider 3. J. Weber, whose 6-ft. span streamlined glider made a nice flight of 14 mins. the previous Sunday (unfortunately, only timed by one timekeeper, so that it could not stand for a club record), got out of trim in the contest and concertinaed the fuselage nose.

In the Me. No. 2 Cup, the weather reverted to typical Bristol, with a blustering gale and showers which developed into drifting rain before the end of the contest. Those enthusiasts who dared the elements soon had their hopes and their models dashed. Both lightweight and heavyweight models were tried, ranging up to Flight Cup size, the best result being by A. H. Lee with his high-powered model of almost pre-war vintage, and he managed two flights of about 50 secs. each, before the model became too waterlogged,

Apart from contests, K. Moon's 50-inch span Rearwin has been very promising, although best results have not been obtained yet, owing to the rubber shortage. C. S. Wilkin's Wakefield has been ticking around very nicely, clocking 90 secs. r.o.g. on half-turns. This model is remarkable chiefly for its enormous prop of 18 ins. dia., and blade with nearly 3 ins. remaining almost parallel width to within an inch or so of the hub. Power for this shovel is 3 oz. of 3/16th flat rubber in sixteen strands. In the glider line, M. Garnett's latest version of his 6-ft. span class is very promising on initial tests. With an all-up weight of 30 oz., the wing loading is over 10 oz. per sq. foot, resulting in a fast but very flat glide. So far, serious winch launches have not been attempted, but the model has demonstrated very effectively its ability to clear the ground of obstructive spectators. No petrol models have appeared as yet, although several club members have got them under construction, whilst engines are also being constructed.

BRADFORD M.A.C. included their junior " Zenith Cup " in the National Cup contest, winner being R. Gallagher for the second year running. Two welcome newcomers to the club are N. Lees and H. Austwick, and they showed their stuff by placing top two in the club's National Cup effort, best time of the day going to Lees with 2 : 49—final aggregate 7 : 05. Austwick's aggregate was 5 : 50.

More news of new clubs to hand this month. These are listed separately for readers' convenience, and I trust aeromodellers in the districts named will muck in and give their best support to these new groups. J. Battersby, of " Broomhill," Princes Drive, Colwyn Bay, would like to form a club in that area, and asks that local enthusiasts get in touch with him at the above address.

Well, enough is as good as a feast, they say, so let's hope this month's section is meaty if not abundant! Better weather should bring more news, so here's hoping that we see the last of this everlasting high wind, and good flying conditions for a change. Till next month, this is your old scribe signing off.

THE CLUBMAN.

NEW CLUBS

TOTTENHAM M.A.C.
V. Botta, 40, Westerfield Road, Tottenham, N.15.
LONGVIEW M.A.C.
G. E. Lewis, 16, Marton Road, Longview, Huyton, nr. Liverpool.
LEEK M.A.C.
A. W. Cooper, 10, Gladstone Street, Leek, Staffs.
SANDERSTEAD & D. M.A.C.
G. Lambourne, Hope Cove, Limpsfield Road, Sanderstead, Surrey.

COUNCIL MEETING, 11th JUNE

The meeting, with Mr. A. F. Houlberg in the chair, opened with the minutes of the previous meeting. The correspondence was then dealt with.

Mr. R. V. Bentley, the Hon. Sec. of the Northern Area Council, had written requesting the Council to consider allowing the officials of the N.A.C. using the Society's stationery for business connected with their activities. The resolution: " The Northern Area Council be permitted to use stationery carrying the Society's heading," was moved by Mr. H. W. Hills, seconded by Mrs. Buckeridge, and carried.

Following this Mr. G. L. Shiel's letter and the minutes of the recently formed Scottish Aeromodellers Federation were read by the Sec. The Council unanimously agreed that the S.A.F. is in every way desirable and should be of great service to the cause of aeromodelling. They wished them every success. The Hon. Sec. was instructed to inform Mr. Shiel that the principle of 1s. 0d. per member per annum for affiliation fees of S.A.F. members to the Society is recommended by the Council.

It was decided to hold on Sunday, 3rd September, the first petrol-driven model contest since the lifting of the ban and the Council instructed the Sec. to communicate with Mr. H. A. C. Hassell of the Birmingham M.A.C., inviting his Club to co-operate with the Society in arranging for the contest to take place on their ground. The contest will be for the Sir John Shelley Cup.

The attention of the Council was then drawn to the " Solid " Contests. In addition to the two splendid cups given by Mr. D. A. Russell of the AEROMODELLER for these contests, the Council discussed the allocation of monies for the remaining prizes. Mr. A. F. Houlberg and Mr. A. G. Bell made offers that ensure good money prize awards. These winners will be receiving cheques and certificates from the Hon. Treasurer shortly. The Council expressed their thanks to the Chairman and Sec. for their generosity.

In conclusion, the Shipley Youth Centre M.A.C. was granted affiliation to the Society.

The " Vote of thanks to the Chair " was moved by Mr. A. G. Bell, seconded by Mr. F. E. Wilson, carried, and the meeting adjourned at 1.52 p.m., until 25th June.

COUNCIL MEETING, 25th JUNE

The meeting opened with Mr. A. F. Houlberg in the Chair.

The Secretary read a letter from the Air Ministry outlining the modifications to the Petrol Restrictions, received by the Society on May 13th.

It was decided to adopt an insurance premium of 6d. per annum covering third party to the extent of £5,000 per individual member. All affiliated club members and country members flying rubber-driven models and sailplanes would be eligible. A petrol model insurance policy would also be looked into, and also a policy covering all rubber-driven models displayed at the S.M.A.E. Piccadilly Exhibition.

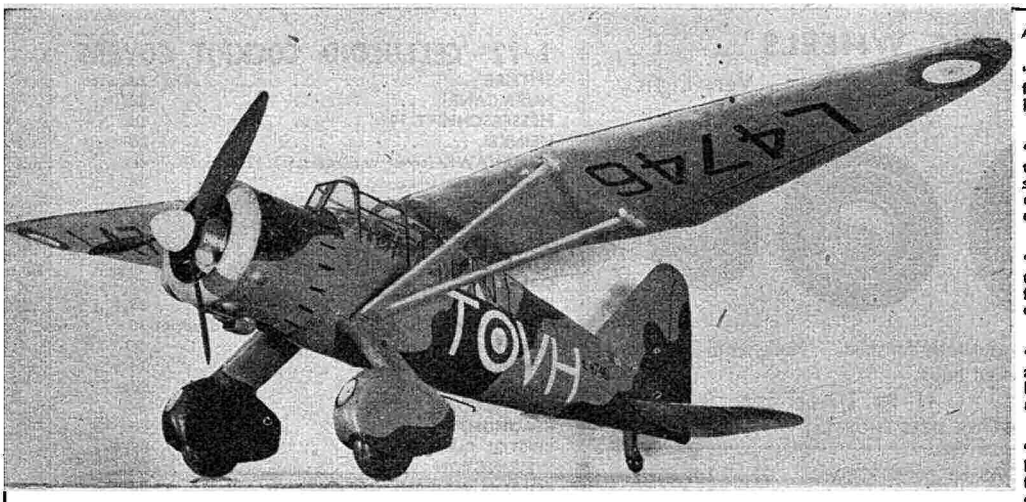
The future of the S.M.A.E. Journal was then discussed. It was decided to enlarge the issue, beginning with four extra pages in the August edition, and articles would be accepted for publication at standard rates. A Club News section would also be developed. Price would be 3d. per copy.

A Technical Committee was then elected, consisting of the following gentlemen: Mr. A. F. Houlberg (Chairman), Mr. R. H. Warring, Mr. R. F. L. Gosling, Mr. H. J. Towner and Mr. R. Copland. The duty of this Committee will be to write articles for the S.M.A.E. Journal, and make contacts with others willing to do so.

The Council decided that the models competing in the S.M.A.E. exhibition would be divided into five sections:— Petrol Driven, Duration, Sailplanes, Flying Scale and Solids.

A " Service Trophy " would be awarded to the member of His Majesty's Forces who records the highest time during the 1944 flying season. These flights are confined to Rubber Driven (R.O.G.), and Sailplanes launched from 300 ft. towline.

Hon. Sec., S.M.A.E.



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