MODEL AIRCRAFT

1/-

MARCH. 1946
VOL. V. Nº 3

THE JOURNAL OF THE S.M.A.E.

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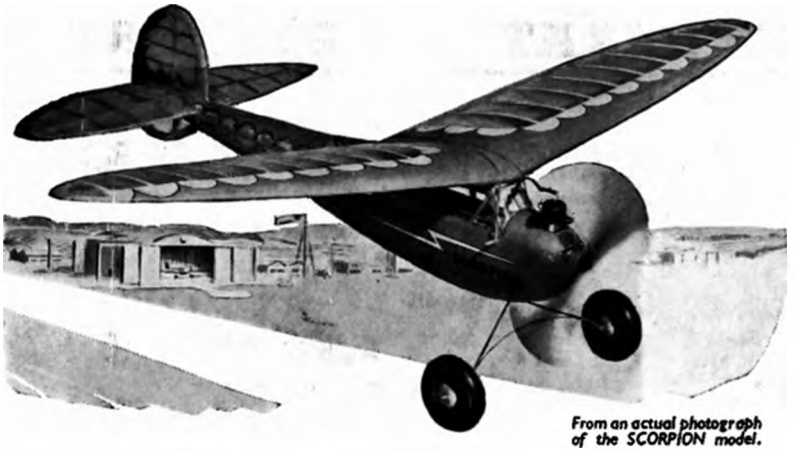

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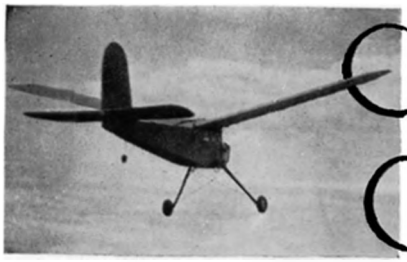

MODEL AIRCRAFT

The Journal of the Society of Model Aeronautical Engineers

MARCH 1946
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Edited by
A. F. HOULBERG, A.F.R.Ae.S.

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The Editor presents

A PERCIVAL MARSHALL PUBLICATION

PETROL MODELS

Top Photo.—*A fine fleet of petrol models equipped with engines designed and manufactured by Mr. G. Court, of the North Kent Model Aircraft Club. These engines are as small as 1.5 c.c., and have proved exceptionally reliable and easy starting. On the right is Mr. Cedric Wren (flight-engineer, Short Bros.), holding a free-lance model and a "Lysander."*

Bottom Photo.—*Considerable activity is being shown by members of the Brentford Club with petrol models. The above group shows a recent gathering of these enthusiasts on Hounslow Heath.*

News Review

Cover Story

One of the most pleasant aspects of post-war aeromodelling is the revival of Rallies and the past season has seen a number of successful events of this type organised by clubs throughout the country. These events provide the opportunity for pleasant intercourse with other model aircraft enthusiasts who would otherwise be known to one only by name, and they also offer the opportunity for the exchange of ideas and the observation of the field technique of other flyers.

Their popularity is well deserved and we look forward to seeing many more organised during the 1946 season.

Our cover picture this month is of a typical Rally scene and shows Mr. D. Whittaker launching his F.A.I. glider at the Second Northern Area Rally, held on Baildon Moor.

The photograph was taken by Mr. E. D. Evans of Blackpool.

Rocket Propulsion Units

We learn from Mr. Howard Boys that a few rocket propulsion units for model aeroplanes will soon be available for about ten experimenters. These units will be made by Brocks, and it is their desire that the units shall be sold through model aeroplane clubs so that the small supplies will be used to the best advantage.

Will club secretaries please send Mr. Howard Boys, 89, Catesby Road, Rugby, particulars of any members who have seriously carried out experiments with rocket models, giving rough dimensions, weight and type of model used. These first few rocket units may be a bit expensive, and the persons using them should be prepared to send Mr. Boys a report on the results of their experiments so that possible improvements can be made.

Jet Plus Propeller

Recent information shows that the "Meteor" has appeared in a new form with two propellers in addition to the jet units. These propellers are driven from the turbo-jet unit by reduction gearing and from the information so far released it would seem that the combination results in an appreciable gain in fuel efficiency.

This is what might logically be expected as it is well known by now that propulsion by jet alone does not compare favourably with propulsion by propeller until speeds of over 350 m.p.h. and relatively high altitudes are reached.

A combination of jet and propeller propulsion should provide economical operation over a much wider speed and altitude range with a consequent improvement in fuel efficiency. The primary difficulty is the provision of suitable reduction gearing between the high-revving shaft of the turbo unit (in the neighbourhood of 16,000) and the relatively low rotational speed of the propeller shaft.

While this undoubtedly presents the designers with a tough mechanical problem, it is no more insurmountable than the other problems which have faced the pioneers of jet-propulsion, and there would appear to be no reason why it should not be solved fairly quickly.

The addition of propellers will undoubtedly affect the maximum top speed, but for commercial purposes where absolute maximum is not essential, this is a price well worth paying.

Provincial Shows

Several very successful exhibitions have been held in the provinces recently in which model aircraft clubs have joined forces with their local "power boat" and "model railway" clubs in staging a combined display.

Such shows can do nothing but help to develop the membership of the clubs participating and bring their members into contact with other interested persons which they would not otherwise meet. Publicity of this nature has too often been overlooked by the clubs in the past, and it is hoped that they will now avail themselves of every opportunity which presents itself of organising exhibitions in their localities and let everyone interested examine their work.

Two such exhibitions, which are reported in our pages, were held recently at Whitefield, Manchester and at Bristol. Both exhibitions were highly successful, and in the case of the Bristol show long queues were formed by the public awaiting admission, in spite of the fact that visitors were kept on the move all the time. It is estimated that at least 50,000 people visited the show during the two weeks for which it was open.

"The Model Engineer" Exhibition

The date of the 1946 *Model Engineer* Exhibition has now been fixed, and, as we announced in our last issue, the S.M.A.E. has accepted the offer made by Messrs. Percival Marshall for participation in this event.

This popular exhibition will open on August 22nd and close on August 31st, and it will be run jointly this year by the S.M.E.E. and S.M.A.E. in conjunction with Percival Marshall & Co. Ltd.

It will be held in the New Horticultural Hall, Vincent Square, Westminster, an attractive modern exhibition hall, which is considerably larger and more attractive than the old hall where the *Model Engineer* Exhibitions were held previously.

Arrangements are being made for model aircraft classes covering all the more popular types of models, and club members should make a start on their show models without delay. Full details of the competitions will be published in our next issue.

German Gliders

Reports which are coming in from Germany indicate that there was no apparent shortage of gliders or sailplanes for training at the termination of hostilities. Indeed photographs of the glider schools display quantities of spare wings, in addition to what would be considered lavish equipment in the way of machines, judged by our pre-war standard.

It is a pity that some of this equipment cannot be shipped to this country for use by the gliding clubs and A.T.C., who are badly in need of up-to-date machines.

We learn that the building of 200 "primary training" machines has just been sanctioned for A.T.C. use, but they will take time to build and the surplus German machines could be used effectively in the meantine, particularly as we learn, on good authority, that large numbers of German sailplanes are being rendered useless by careless handling on the part of Allied transport who have not been instructed in the correct handling of this type of craft.

Compression-Ignition Engines

Information concerning the various compression-ignition engines, which have made their appearance on the continent, continue to filter through to this country, and in this issue Lt.-Col. C. E. Bowden gives us the benefit of some information he has gleaned during a recent visit to Germany, particularly on the subject of fuels and stopping the engine.

The fact that compression-ignition engines have no ignition equipment somewhat complicates the control of the running time, since the usual time switch in the electrical circuit cannot be employed. One machine in this country has already flown away from this cause to our knowledge, and the evolution of a sound stopping scheme is not the least pressing of the problems concerned with the use of these engines.

The advent of these engines has produced considerable interest in their possibilities in this country, and experiments in this type of engine are being carried out in a number of quarters. We know of two successful engines which are already being tooled up for production and sale.

The S.M.A.E. Area Scheme

The Area Scheme which was evolved by the S.M.A.E. just before the outbreak of the war, for the purpose of widening the scope of the Society, and at the same time to give provincial clubs a measure of self-government, has been developing healthily during the last two years, and at a recent meeting of the Special Committee, formed to investigate possible further developments, it was agreed to recommend certain steps to the A.G.M. which will have the effect of broadening the activities of the Society.

At the same time it has been agreed, as a result of the E.G.M., that each area in active operation will be entrusted with running one of the petrol contests, and that the only competitions counting for Plugge Points will be those run by the Areas as centralised contests—one in each of the Areas. These will be *The Model Engineer* No. 2 Cup, the Pilcher Cup, the Weston Cup, and the Thurston Cup.

This will overcome some of the objections raised against the fully decentralised contests and form an intermediate step to the fully centralised contest.

Radio Control

As we go to press we learn that the negotiations which have been in progress between the S.M.A.E. and the Post Office, for the allocation of a definite wavelength for use in connection with radio controlled models, have been successful, and that the Post Office is arranging that the wavelength of 460.5 m/cs will be available for this purpose with a band spread of .5 m/cs on each side of this figure. The power the Post Office is allowing us to use is 5 kW.

VICKERS SUPERMARINE "Spiteful"

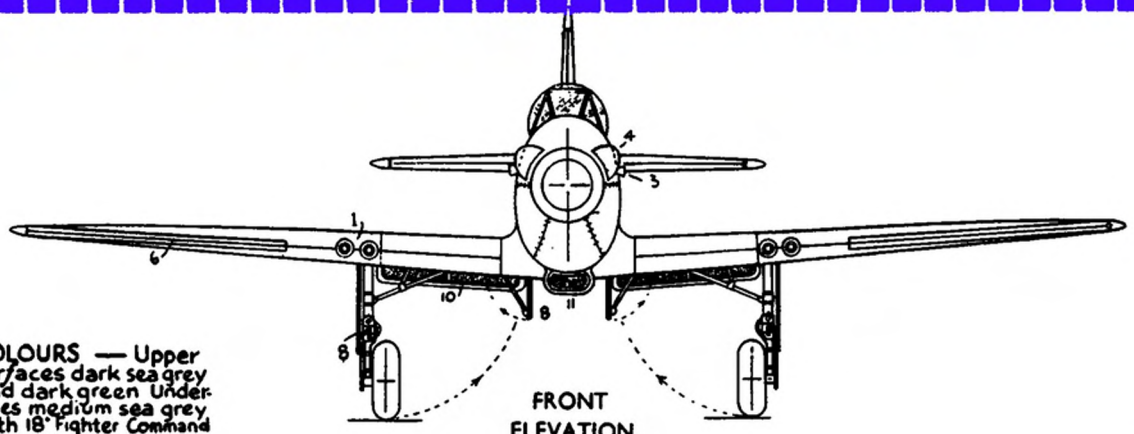
The long line of "Spitfire" aircraft, which has extended to over twenty models, has now come to an end with the introduction of the supermarine "Spiteful."

Although this new Vickers design bears a distinct family resemblance to the "Spitfire," an examination reveals many changes of design and construction, chief among which is the inwardly retracting undercarriage and redesigned wing.

The new wing not only employs a new section developed by the designers for operation at speeds in the neighbourhood of that of sound but a new constructional technique which enables an accuracy of construction within the limit of five thousandths of an inch to be maintained. This high accuracy, coupled with a superfine finish on all external surfaces and the elimination of external excrescences, has been largely responsible for the high performance.

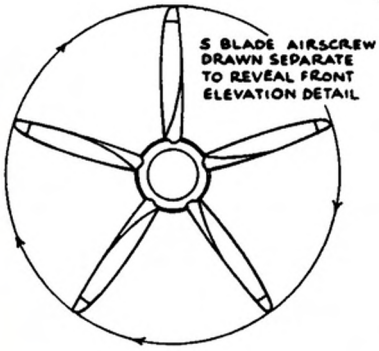
A Rolls Royce "Griffon" engine with two stage two speed supercharger, coupled to a five-bladed Rotol propeller, supplies the motive power, and in spite of its increased speed and wing loading this new design possesses all the manoeuvrability and "niceness" of control which has been an outstanding feature of supermarine production.

Photos by Courtesy of
VICKERS-ARMSTRONGS LTD. (Aircraft Section)

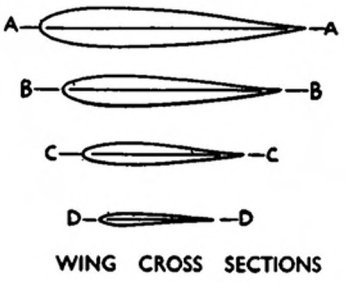


FRONT ELEVATION

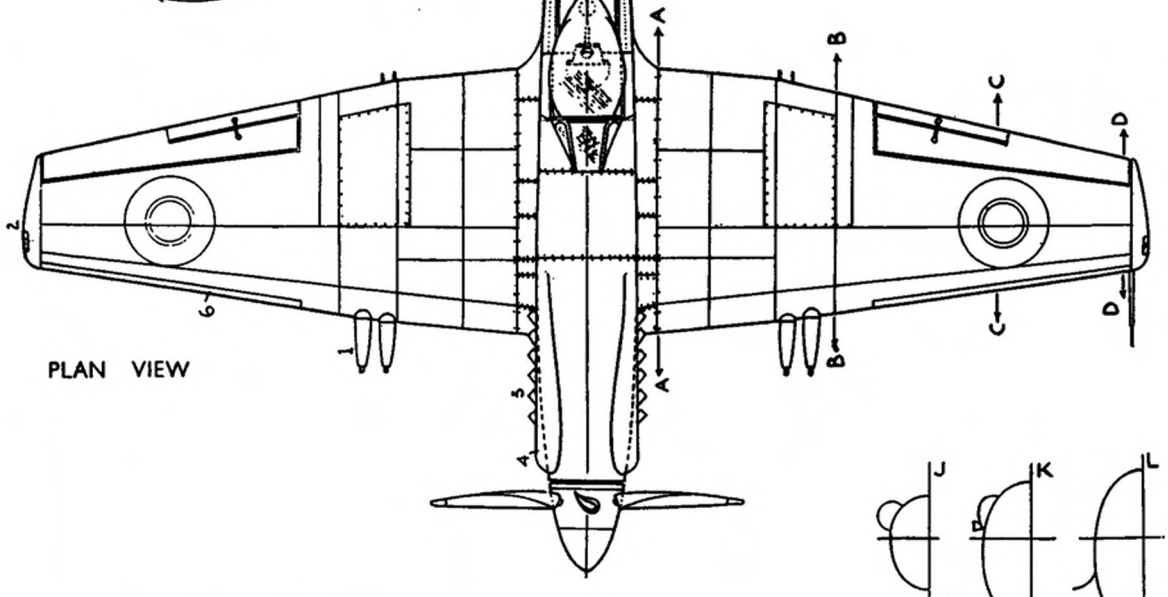
COLOURS — Upper surfaces dark sea grey and dark green Undersides medium sea grey with 18" Fighter Command band around fuselage forward of tailplane. Yellow strip on leading outside edges



5 BLADE AIRSCREW DRAWN SEPARATE TO REVEAL FRONT ELEVATION DETAIL

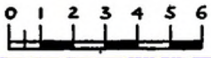


WING CROSS SECTIONS



PLAN VIEW

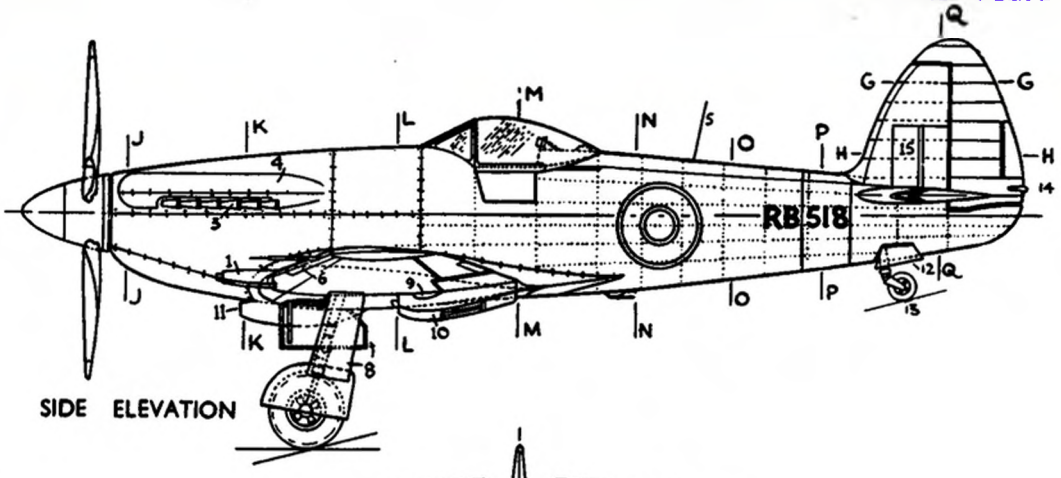
FUSELAGE CROSS SECTIONS



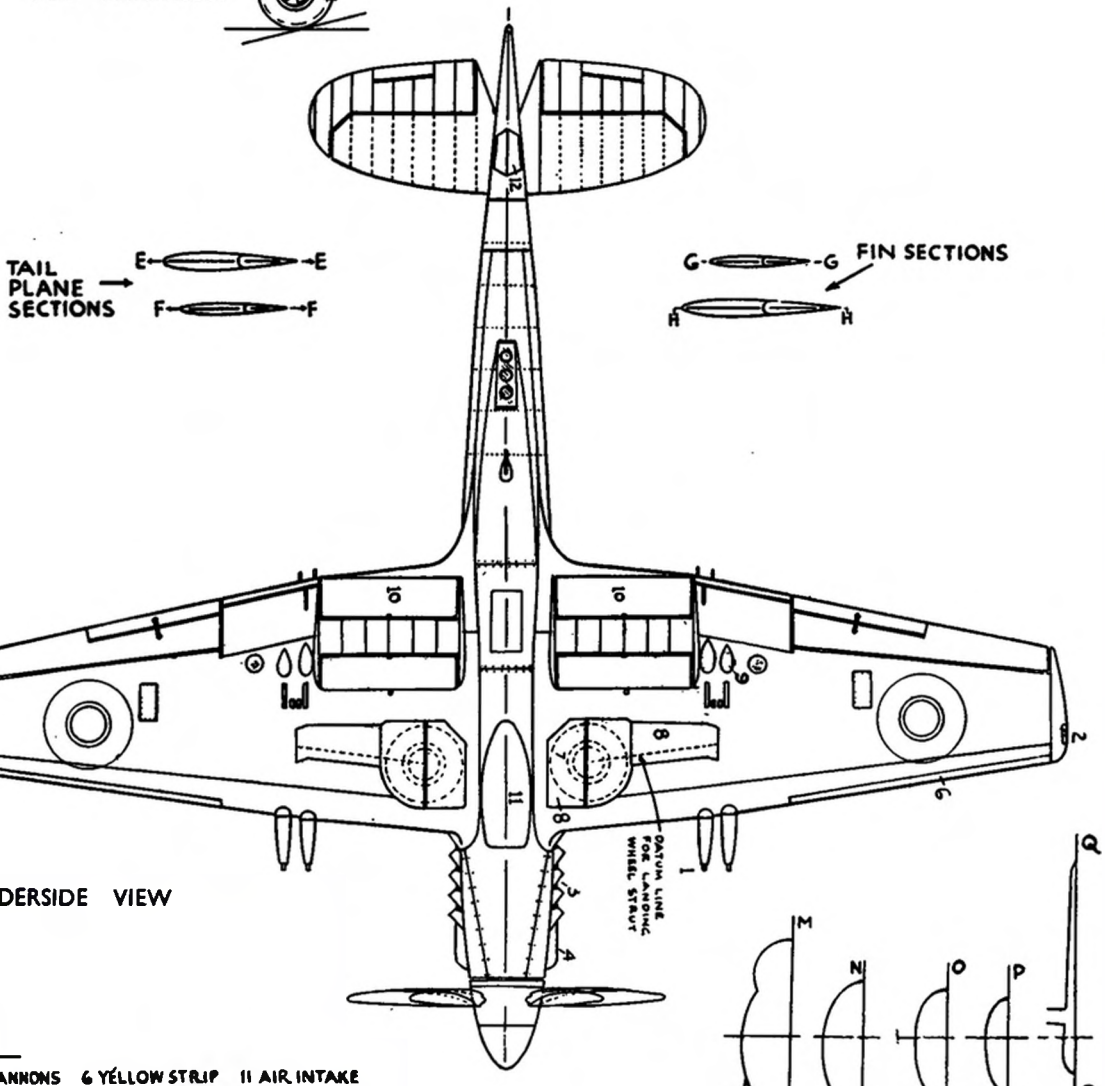
Scale 6 feet to 1 inch

Span, 35 ft. Length, 32 ft. 7½ in. Powered by a Rolls-Royce
The wing section is laminar-flow and made to very fine limits
a "Veri-Tru" drawing compiled from

"SPITEFUL" MARK XIV SINGLE SEAT FIGHTER



SIDE ELEVATION



TAIL PLANE SECTIONS

FIN SECTIONS

UNDERSIDE VIEW

FUSELAGE CROSS SECTIONS

DRAWN BY H.T. BARRY 1944

KEY—

1 4·20M. CANNONS
2 NAVIGATION LIGHT
3 EXHAUST MANIFOLDS
4 CYLINDER BLOCK FAIRG
5 WHIP AERIAL
6 YELLOW STRIP
7 RETRACTED L/WHEEL
8 L/WHEEL COVERS
9 DRUM-FEED FAIRG
10 RADIATORS
11 AIR INTAKE
12 TAIL WHEEL COVERS
13 RETRACT. TAILWHEEL
14 TAIL LIGHT
15 R/W/B FLASH

" Griffon " 61 motor of 2,050 h.p. Armament, four 20 mm. cannon. hitherto unobtainable in manufacture. This plan is reproduced from material supplied by Messrs. Vickers-Armstrongs.

Lieut.-Colonel C. E. Bowden writes this month about some interesting points concerning diesels seen in Germany.

DURING a tour of duty in Germany and on the Continent, I found a great deal of interesting material for thought in regard to models.

I always think that one of the great attractions of model aeronautics is that wherever one goes in this world there are interesting and exciting clues to be followed up that all help to broaden one's model outlook. I suppose most model aeroplane people know me as a "petrol fiend." Well, I plead guilty, but at the same time I experiment a great deal with rubber models, sailplanes of all sizes, also model and full-sized boats. It is therefore not surprising that when I saw windmills in Holland rotating with great vigour, equipped with "planes" fitted with built-up leading edges of air-foil shape complete with under camber, I shouted to my surprised driver to stop, whilst I leapt from my W.D. car and dashed through several gardens armed with my Leica camera to take a few pictures of one of these intriguing windmills of ancient build, but modern design.

My driver naturally had learnt to understand my strange habits, but the owner of the windmill, and his wife and daughter, came out and goggled at the lunatic British officer gazing upwards whilst making sketches and taking photographs of the wing sections of his windmill. In order to ease their minds, I asked them to pose for a family group and we parted great friends—in fact, they seemed to forget all about my strange antics around the source of their livelihood. These windmills demonstrated several things, and could well form the subject of an article, but I have other material that I think may interest my readers more. The heading photograph shows clearly the aerofoil section of the windmill sweep. In reasonable winds the mill will operate on the built-up leading edge only, without the extra fabric sail area on the trailing edge. Note the undercamber.

The Miniature Compression-Ignition Engine

We have heard a great deal recently about the little "foreign diesels". The Italians, the French, the Swiss, and the Germans have been busy on them during the war and they range from about 2 c.c. to 10 c.c., and they work very well, too. I have a German 6 c.c. diesel to experiment with which Brigadier Parham, a fellow enthusiast, procured just after the collapse of Germany. It is a commercial job and is very well made, like most German mechanical things. This little engine was used to train Nazi youth. It will now be used for better and brighter things! The engine has several interesting points that I feel sure will intrigue those who see in the diesel a useful model engine of the future, chiefly because it is so simple and eliminates the electrical ignition complications of the baby petrol engine.

As far as I am concerned, I shall still use petrol engines, as there are many advantages; but there will also be diesels in my stable, too! I can well see their particular advantages for the powered model flying-boat and float-plane, two types that I have experimented with a great deal. As everyone knows, the ignition electrical gear on a petrol model is an infernal nuisance when there is water about. This is particularly true when there is sea-water around one, and also when attempting to launch a model flying-boat from a full-sized boat with booster batteries and long plug-in leads festooning around the operator.

One of the troubles of a model diesel is how to stop it after a given time in the air, because we have no convenient electrical ignition to cut by means of a timer and switch. The German that I have has solved this problem in a very simple and ingenious manner. A glance at

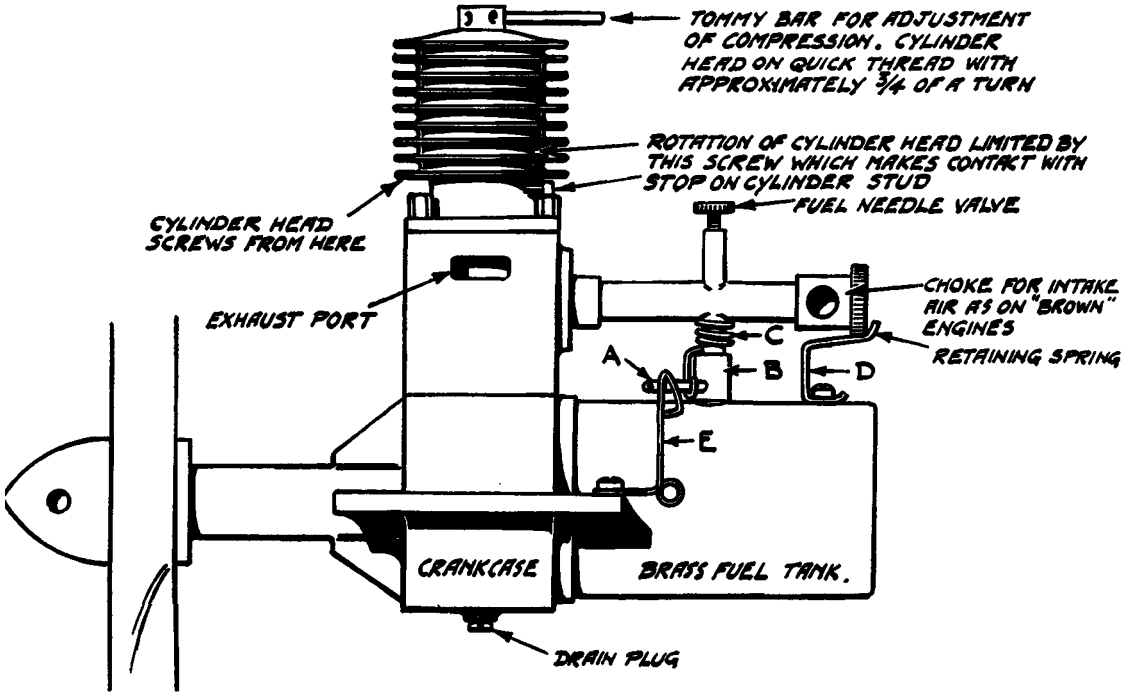
Fig. 1 will explain the idea pictorially. The scheme is to get an ordinary " timer " to operate the simple gadget shown. A small hole is opened below the normal model-type of fuel needle-valve ; air is then sucked in and destroys the suction on the fuel. The engine stops. My readers will find it more simple to study Fig. 1 than to read through a long-winded explanation. The idea, or an adaptation of it as shown, can be applied to any model diesel, and we need not worry any more about how to stop the engine at any predetermined time.

I make rather a song about this matter, as I notice that there is no provision to stop by " timer " most of the French, Swiss, and Italian engines, and it is obvious that in this densely-populated country we aeromodelists will soon become very unpopular if we fly our powered models away into strange gardens. An Englishman's house is his castle, etc. and he does not like strange appliances, aerial or otherwise, arriving uninvited. Neither can the rambling pedestrian, who does not happen to be a happy modeller, be expected to appreciate a screaming diesel-engined model whizzing by his ear, when going about his lawful occasions.

These *model* C.I. engines cut out all the bother about injection of fuel. They " cheat " by using ether in the fuel to lower the " flash point." They are in the form of strengthened-up model two-strokes with ordinary porting. The reason for their strengthening up is that a compression ratio of about 16 to 1 is used, which is, of course, far more hefty than the average petrol two-stroke compression of about 5 or 6 to 1. If a petrol compression ratio of only 6 to 1 were to be used, the mixture would not be heated up sufficiently to create spontaneous combustion without an electrical spark.

As the model diesel (I am going to call them diesels, as it is a more convenient term than C.I. engine) does not obtain its timing by injecting fuel at a predetermined moment, it will be appreciated that the *mixture* must be just in the right proportions so that it explodes when the piston is at the top of the cylinder and the compression is greatest. We therefore have to be very careful about this mixture of fuel and the compression ratio.

Overleaf I give the proportions of the mixture



A diagrammatic drawing of the German Eisfeld compression-ignition engine of 6 c.c. capacity. E = Spring wire catch holding back horizontal tube "A" mounted on sleeve "B" which rotates on fuel pipe. When timer releases "E." Tube "A" with "B" are rotated to stop "D" by coil spring "C," which causes the inner end of the tube "A" to register with a corresponding hole in the fuel pipe, which is normally covered by " B," thus allowing admission of air and thereby destroying the suction.

used on the German diesel I am describing. Do not blame me if it does not suit some other design with a different compression ratio. But it should be a basis for experiment. There are two mixtures that will operate the German diesel. Both are successful, but have to be correct, and must be mixed up so that they are fresh, because as everyone knows, ether is very volatile and will evaporate and leave the lazy modellist with too great a proportion of the other constituents, unless carefully bottled.

You begin to see some of the snags of these diesels now? However, do not let me put you off, because they are good in other ways and are a coming thing. I merely want to make the reader realise that there *are* snags, and that the baby petrol engine is by no means dead, any more than a two-stroke motor-cycle is dead because a four-stroke wins the T.T.

One can mix up a " petroil " mixture and leave it for a deuce of a time, and yet it will function quite well. There was an authentic case of a two-stroke motor-cycle during the war that had a " petroil " mixture left in its tank for several years, and yet it started up and ran perfectly at the end of the period. I have often left my model " petroil " mixture for months in the back of the car in its container and then used it with no trouble.

The model diesel engine may kick back seriously if started when warm due to the lack of precise mechanical injection and people should be wary of them on this point. It is quite a good plan to fit a spinner in front of the propeller with a groove in it to take a starting-up cord—one can then start the engine in the same way as one does a model boat engine or model race car. Alternatively, one should wear a nice fat glove on the starting hand.

Since the correct mixture of fuels is so important, let us look at the German diesel's favourite beverages. Either of the two given may be used, but *A* is the superior :—

Fuel Mixture A.

Turpentine...	23 per cent.
Lubricating oil (motor-car winter grade)	15 ,,
Paraffin	25 ,,
Liquid paraffin (medicinal sort) ...	25 ,,
Ether	12 ,,

Fuel Mixture B.

Diesel oil	70 per cent.
Lubricating oil (winter grade) ...	17 ,,
Ether	13 ,,

N.B.—Fuel must be made up for each flying day owing to the volatility of ether, and carefully bottled.

Starting Drill for the German Eisfeld Diesel (German Instructions)

(*a*) Turn on needle-valve three turns.
(*b*) Suck in with air closed and compression reduced to minimum. (By means of top tommy-bar, see Fig. 1.) It will be noticed that the cylinder-head can be screwed up and down within limits dictated by stops, so that the compression can be slightly altered. When the head is screwed up the compression is lowered and when the head is screwed down the compression is raised.
(*c*) Open air.
(*d*) Swing propeller smartly and engine should fire.
(*e*) Adjust the air, the needle-valve, and the compression by means of the tommy-bar (see Fig. 1) to obtain best results. When engine is fully warmed up release the 'plane, *after operating the " timer."*

We shall hear a lot more about model diesel engines in the future, I feel sure, but there is one more point I want to make.

It is well worth understanding what " diesel-knock " is, because if we know the cause we shall treat our engines with greater sympathy and common sense. It is too easy to obtain this knock if the compression is raised too much.

Mr. Ricardo, who, of course, is one of the leading authorities on combustion-head design, found quite early in his researches, that diesel-knock was dependent on the rate of pressure rise per degree of crankshaft movement. If the pressure rise, for the sake of example, starts to take place on the first one degree of movement of the crankshaft, there comes a period when the rate of pressure rise is too great for the structure of the engine. *The knock then comes from the whole structure of the engine,* which is taking the strain.

This is not what is known as " pinking." It it is a noise of *shock* from the whole engine structure. That is why the diesel has to be built so heavily for its c.c. An amateur constructor of model C.I. engines should build robustly, and not attempt to use the same construction as in the model petrol engine of similar capacity and far lower compression ratio.

Incidentally, the 6-c.c. engine described in this article, weighs approximately 12¾ ozs., which is about the same weight as a 6-c.c. petrol engine with all its ignition gear.

It will be evident also that a model diesel must have a good fit between piston and cylinder to keep the gas seal at the high compression ratio necessary to cause ignition.

By BRIAN J. S. FOSTER

DURING the 1944 outdoor flying season it was decided to design a new sailplane which would incorporate the following features : (1) Ease of construction enabling the model to be built within the shortest possible time. (2) Simplicity of design, permitting repairs to be effected easily and quickly. (3) Favourable strength-weight ratio. (4) Smallest possible amount of material, owing to the shortage of balsa. (5) To consider performance before appearance. The result was the " Firefly," which has exceeded my highest expectations.

So far as item (1) is concerned, I built my first " Firefly " in three days, and have built two further models, none of which has sustained any serious damage, although flown at every possible opportunity, and in spite of roof-top landings ! From the first glide of the first model, the " Firefly " distinguished itself by its very low sinking speed, which I calculate to be well under one foot per second. It is very steady on the tow line, and climbs at a very steep angle at little more than walking speed, enabling it to be released when almost overhead. In flight, the model has a graceful appearance in spite of my statement under (5) above.

The " Firefly " has made many notable flights, the most outstanding to date being its flight from Wallasey, in Cheshire, to a point beyond Crank Village in Lancaster, called Shaley Brow. The distance between the two places is 15¼ miles, and since the model was set for circling, its flying distance must have been considerable. P. Hipkiss, a member of the Wallasey Club, built a " Firefly " and had many excellent flights. At one time he achieved three flights in succession around the five-minute mark, and without the aid of thermals.

The Wings

The leading edge is the one part of the model which needs careful building. It is a " girder " of " L " section, and is composed of two strips of balsa, 25 in. × ⅛ in. × ½ in. and 25 in. × ⅛ in. × 3/10 in. These are cemented together almost at right angles as shown on the drawing, and it is most important that the strip ½ in. wide shall be the upper part of the leading edge. (See section of leading edge on drawing.) The " girder " should now be laid on the plan of the dihedral and polyhedral angles and these angles should now be very carefully made, afterwards reinforcing them with three-ply wood.

Next, make the trailing edge, building in its dihedral and polyhedral angles, and also reinforcing them with plywood.

The wing may now be assembled by first pinning the trailing edge to the plan, and then inserting the ribs into the notches. The leading edge is now fitted, using plenty of cement where the ribs are inserted. Take care that the leading and trailing edges are both flat on the plan so that the wing will not be warped. The best way of ensuring that the connecting dowels are in alignment is to pin the six centre ribs together, having numbered them one to six, and then drill or burn out the holes, which will accommodate the paper tubes, together.

The six ribs are then taken apart and cemented into the wing in the order that they were pinned together. Each hole will now be in exact alignment. The dowel tubes are made of drawing paper rolled tightly round the actual dowel to be used, then glued, so that the latter is a good sliding fit. The tubes are passed through the ribs and cemented in position after the wing is assembled.

When the construction of the wing is complete, the leading edge should be rounded-off to conform to the airfoil section. This is most important, as the leading edge left in its original, pointed section, would spoil the whole airfoil. The wings may now be covered, taking care that the paper adheres to the concave undercamber. Either Jap or British tissue may be used.

The Fuselage

This is simplicity itself. Build two sides as shown on the plan, then stand them on their

THE "FIREFLY" SAILPLANE

DESIGNED BY B.J.S. FOSTER. AVERAGE DURATION 5 MINS.

AN SMAE DRAWING

BUILD TWO FRAMES TO THIS PLAN. INSERT STRUTS FORMING SQUARE FUSELAGE
TURN ON EDGE TO GIVE DIAMOND CROSS SECTION

BEFORE FLYING SEE THAT THE WING RESTS ARE PARALLEL WHEN VIEWED FROM THE SIDE AND PARALLEL TO FUSELAGE DATUM LINE.

DETAIL OF LEADING EDGE BEFORE ATTACHMENT TO WING RIBS.

SCRAP VIEW SHOWING NOTCHING OF UNDERSIDE TO SUIT BTM. LONGERON

SKETCH SHOWING METHOD OF FIXING L.E. RIBS BEFORE PROFILING TO CORRECT SECTION

MAKE SIX CENTRE SECTION RIBS FROM 1/8 SHEET. PIN TOGETHER & DRILL OR BURN HOLES TO SUIT PAPER TUBES THUS ENSURING CORRECT ALIGNMENT

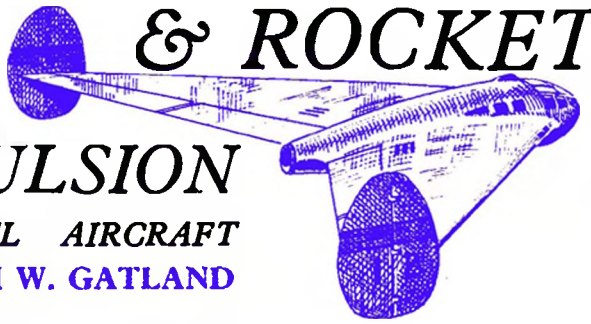
TOTAL WEIGHT = 6½ OUNCES (INCLUDING NOSE WEIGHT)

ALL BALSA CONSTRUCTION

JET & ROCKET PROPULSION

FOR MODEL AIRCRAFT

By KENNETH W. GATLAND



In this second article, the author defines the various jet systems, and indicates some interesting methods by which the dynamic thrust of the simple powder charge may be increased

IN these articles, it is not the intention to dwell too greatly upon the simple rocket charge. This, incidentally, is known as the "fuel-store" rocket system, because the propellant container and combustion chamber are one and the same.

It has remained unaltered for centuries and, in fact, its origin has been traced as far back as the year 1220 A.D. In that year, the Chinese made great use of arrows fired by crude rockets, which appear to have been administered with effect upon the Mongols during the battle of Pieping. They were apparently developed from the "fire-arrows," which are known to have been employed in battle long before this.

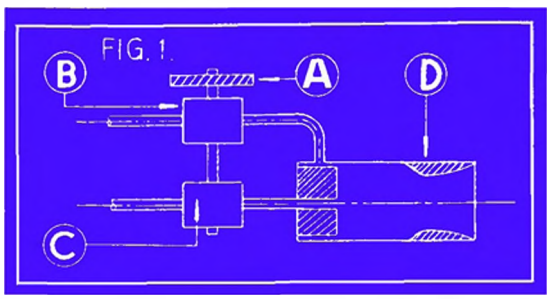
The fire-arrow was simply a bow propelled arrow to which had been attached a bamboo or hide container filled with a crude incendiary composition. This mixture was known as "Chinese Fire," and comprised, crude saltpetre, partially burnt wood, resins, fats, and possibly brimstone. The story of the rocket and the origin of pyrotechnic compounds, however, has already been related elsewhere,* and these few facts are mentioned only in passing.

It will be appreciated that the fuel-store rocket has limited possibilities. The principal disadvantages are (*a*) the constantly changing chamber volume, and (*b*) the small period of reactive thrust.

It is the simplest type of thermodynamic engine, and is generally a simple tube, closed at one end and constricted to form a narrow orifice at the other. This is filled with a "solid" propellant which, when ignited, burns rapidly without exploding, thereby exerting considerable pressure within the chamber before its final ejection as a high velocity exhaust. It is the reactive pressure of this ejection acting on the chamber that forces the rocket in the opposite direction. This is a point that must be made perperfectly clear and it should be stressed that, contrary to a widespread belief, reaction propulsion *does not* depend upon the reaction of the exhaust with the *atmosphere*. It works just as well in a vacuum.

We have now reviewed the merits of the simple "fuel-store" rocket. Of far greater significance, however, is the "constant-volume" rocket system, in which the combustion chamber is remote from the fuel. The propellant is generally a liquid hydrocarbon with liquid oxygen, although promising experiments have been made with rocket motors which employ solid-fuel "cartridges" successively loaded under the action of recoil.

The liquid-fuelled motor is the more convenient, because it can be throttled at a controllable rate, thus permitting a *constant volume* in the combustion chamber. A simple liquid-fuel rocket system is shown in Fig. 1.



A = H_2O_2 Turbine. B = Fuel Pump. C = Oxygen Pump. D = "Concentric-feed" combustion chamber. Oxydation of the chamber is overcome by isolating the oxygen with a fuel spray until propellant is adequately mixed.

Although it conforms to the same principle of motion, the thermal-jet reaction system should not be confused with the rocket. The jet-engine has three distinct development possibilities for aircraft propulsion.

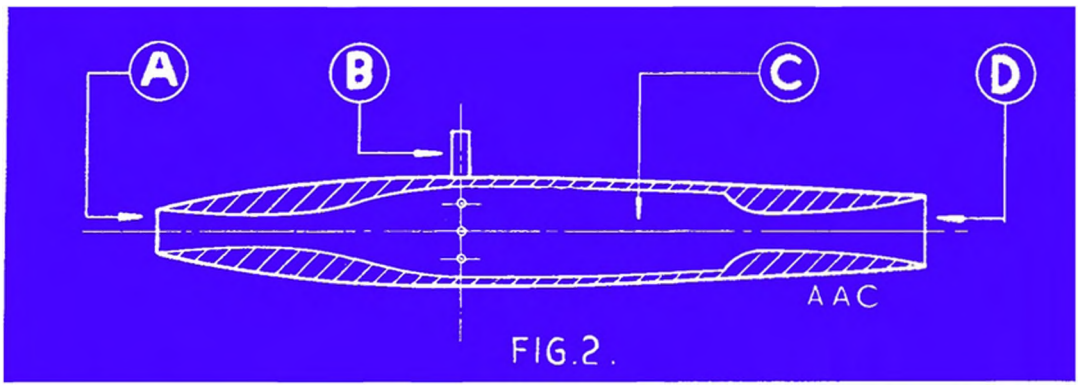
Undoubtedly the most well known (*a*) the turbo-compressor jet-propulsor, the engine of the present jet-fighters. This system employs a liquid or solid fuel burnt in a medium of mechanically compressed air inducted from the atmosphere.

The second arrangement (*b*), a compromise

* "Rocket Propulsion," by K. W. Gatland, *Practical Mechanics*, July, 1944, to current issues.

between normal propeller propulsion and (*a*), is the turbine-jet/propeller system, in which the kinetic energy of the combustion gases is absorbed largely in driving a turbine from which is geared a propeller, the surplus being utilised as a reactive jet. At the present stage of jet development, this system absorbs the available energy at a higher all-round efficiency than any other, and it is this type of power unit that is likely to be the first used in large passenger and freight aircraft.

Thirdly, there is the compressorless jet-engine (*c*), and out of the three, this system is likely to be of most interest to the aeromodeller. Under this category come the " impulse-duct engine " of the V-1 ; the " athodyd," and a variety of similar arrangements. These systems are devoid of mechanical compression, and normally depend for propulsion upon being first raised to a sufficient speed for air to compress into the intake by " ram " action. A catapult launcher, rockets, or both, serve this purpose.



René Luduc's early Athodyd (1913). *A = Air-intake. B = Fuel injectors. C = Combustion Chamber. D = Diffuser.*

Although the V-1 " flap-valve " motor is now well known, the athodyd (Fig. 2) may require further elaboration. First and foremost, there is no system of valving. It comprises simply a venturi-shaped tube, having no moving parts and fitted solely with fuel burners and means of ignition.

Once the athodyd is moving at a sufficient velocity, air is rammed into the divergent intake at high pressure, whereupon it expands directly into a combustion chamber. Here, fuel is injected to expand the air still further before its final ejection as the reactive jet. The greater its speed, the higher is the efficiency.

The jet-motor which appears to be generally favoured by modellers is also of this type. It consists of a divergent-convergent venturi, with internal fuel burners, fuel and feed tanks. The fuel is normally introduced under pressure from a compressed air tank, and the usual procedure is to pre-heat it prior to injection by placing coiled feed lines in the jet stream. This ensures that the fuel is fully vaporised at the moment of ignition, with the result that heating is even and there is no undue wastage in jets of flame shooting out through the mouth of the venturi. Once outside the motor, of course, the heat is dissipated in the atmosphere and is no further assistance in propulsion. The most efficient reaction motor is not the one that emits a spectacular stream of flame, as some modellers appear to imagine.

Many experimenters, too, seem to be in the dark as to just how the motor functions.

Propulsion is, of course, initiated by a jet of combusting fuel which tends to create an area of semi-vacuum within the firing chamber, thereby causing a rush of air through the venturi. The oncoming air is thereafter heated and expanded by the burner jets, and the resultant high-velocity stream of air and gas drives the system by reaction. In addition to the thrust produced by repulse, a supplementary force is obtained through forward suction arising from the induced flow.

The compressor-less motors appear to be most useful from the model point of view, because of their simplicity and relatively light weight, despite the fact that they operate at a low thermal efficiency.

The rocket operates with maximum efficiency at high speed and in vacuum. Under these conditions, the jet escapes at high velocity, whereas in the jet engine every effort is made to raise efficiency by reducing the jet velocity and increasing the mass flow.

It is with the same object that attempts have been made to increase the efficiency of the rocket, when operating in atmosphere, by the

use of "*thrust-augmenters*," which serve to direct air into the efflux stream with similar effect.

Having briefly defined the main propulsive systems, it is opportune to relate the development of model reaction units.

Pioneer British Rocket Models

It is highly creditable that, despite the prevailing difficulties, British experimenters should be the first to produce successful rocket driven model aircraft. The earliest tests, in fact, took place as long past as 1920, when a small group of young technicians, G. Aldred Roberts, J. J. Smith, and J. Dennis, first engaged upon a programme of research which was only brought to a close by the war of 1939.

The first model which this enterprising trio produced (Fig. 3) was a simple tail-first aeroplane, propelled by a single gunpowder charge. It flew for a distance of nearly three miles in the phenomenal time of *one minute*—180 m.p.h.

The fuselage was simply a 4 in. diameter cardboard tube, 3 ft. long. Supported inside the aft end was a steel-cased propellant charge, so placed that air, entering at the nose, flowed around it to augment the rocket exhaust. The special nozzle, which was incorporated in the propellant container, had a jet discharge of 40 grains per second.

A mainplane of lifting section—4 ft. span, with no dihedral—was fitted at the rear, while the horizontal stabiliser was similarly attached at the nose. Both aerofoils were "parasol" mounted, their mounts acting as vertical stabilisers.

Other models were produced later by which even greater speeds were achieved, some of which, fitted with floats, were tested out across Loch Lomond and flew for over five miles.

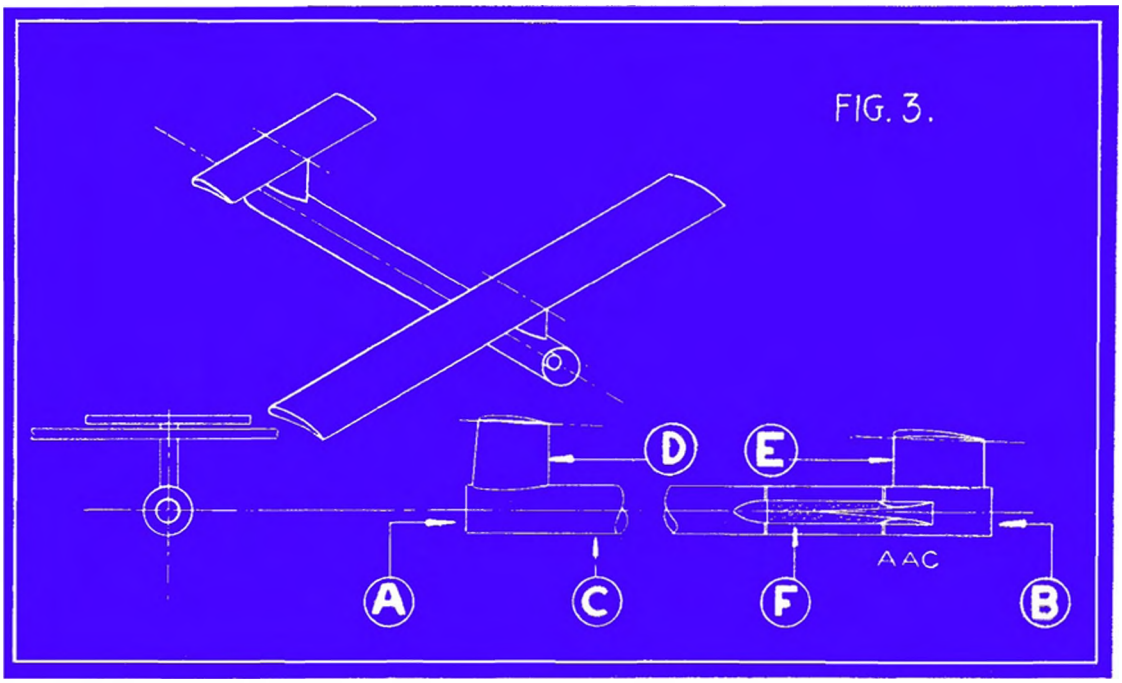
This same group also produced a winged sea-rescue line-carrier, which proved capable of taking a 1-in. circumference rope for a distance of half-a-mile. It travelled at a speed of 350 to 400 ft. per sec., trailing its heavy line.

The success of this, and other rocket models, is attributed to the use of "thrust augmenters," and a special de Laval-type nozzle.

Augmented Rocket Units

The possibilities of supplementing the thrust of a rocket charge by inducing air into the jet stream were realised from the flight of the first tail-first model. How else, it was argued, could the phenomenal performance be explained?

From such crude beginnings, a survey was commenced in which the augmenter theory was put to exhaustive test. The result of this further experiment was a complete verification, and proved beyond doubt the utility of the system.



The 1920 model which flew at 180 m.p.h.
A = Air-intake. B = Flame Baffle (fitted inside fuselage tube). C = Fuselage Tube. D = Horizontal and vertical stabiliser. E = Main plane and vertical stabiliser. F = Rocket motor (supported on streamline webs).

III—The Streamlined Fuselage

THE completely streamlined model has been popular in this country for several years. Its merits have been, and indeed still are, the subject of much controversy in the aeromodelling world. However, it is not our purpose here to add fuel to the burning argument; suffice it to say that a machine embodying fully-streamlined features looks beautiful and can, with practice, be made to perform very well.

There are, nevertheless, two drawbacks to be faced by the modeller who wishes to put his own "streamlined visions" into material form. The first is the actual drawing out of streamlined forms, curves, etc., peculiar to such endeavours, while the second is that of doing it without increasing the structural weight of the design beyond a figure which would defeat the very purpose of the project—that of increased efficiency.

Our purpose here then is to remove both of these obstacles; and so to the drawing board.

First, let us consider the layout of a fuselage with a circular cross-section throughout. This type incidentally, is the easiest to design, for as in the case of a "diamond" fuselage, a side view is all that is required from which to build the component.

As shown in Stage 1, the usual datum line is drawn across the paper and points P.T. and E.R. are marked on it. The distance apart of these points, as we now know, corresponds to the overall length of the model. Various depths, indicated by thin vertical lines intersecting the datum, are marked off, starting from P.T., which represent the overall spinner length, the bearing length, and noseblock length. These lengths can suit the designer's individual requirements.

At one-third the overall length of the model from P.T. a thin vertical line is drawn upon which "A" and "B" must be fixed; points which are positioned on the extreme edges of the fuselage.

Before this can be done it will be necessary to ascertain the diameter of a circle the area of which will give us an adequate maximum fuselage cross-section.

In our case we know that the cross-sectional area required by S.M.A.E. ruling for a model of 22½ in. overall length (still dealing with a 30-in. span model for illustrative purposes), is 5 1/16 sq. in., which we have previously taken to be 5¼ sq. in. to be on the safe side. Therefore, it is our job to find a circle whose area is as near as possible to 5.25 sq. in.

Original

If you have a good handbook, such as "Machinery's Handbook" handy, you can look up the nearest diameter to give the required area in the tables provided, otherwise this will have to be done purely by trial and error. Trying a diameter of 2½ in. and using the usual area formula πR^2 results in an area of just under 5 sq. in. Being just too small for our particular purpose, we try a diameter of 2⅝ in. and obtain a result of 5.41 sq. in. Rather than split hairs over an extra .16 sq. in. we can take 2⅝ in. as being the diameter of the circle (and thus the maximum depth of the fuselage) we require.

As we are dealing with a fuselage of circular section throughout, we will find it easier, with respect to jigging up and stringer positioning, if its shape in side view is symmetrical about the datum line. A symmetrical shape also ensures the highest possible aerodynamical efficiency.

Therefore points "A" and "B" will be positioned 2⅝ in. apart, *each being* 1 5/16 *in. from the datum line.*

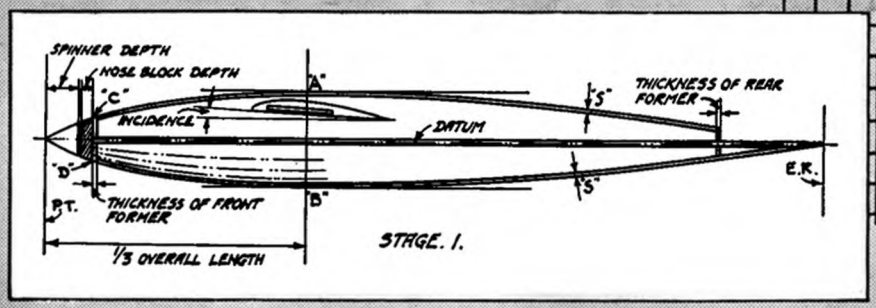
The next thing to decide before any contours can be drawn is the depth of the nose-former. This must be of sufficient diameter to take a cut-out (to accommodate the noseblock plug) and yet still maintain rigidity. The cut-out must also allow ample clearance for the knotted rubber motor. Having thus decided on a suitable diameter, the dimension is distributed equidistant about the datum line and on the thin vertical line previously drawn, representing the front face of the fuselage. This results in the plotting of points "C" and "D" (Stage 1).

We can now draw the contours of the fuselage.

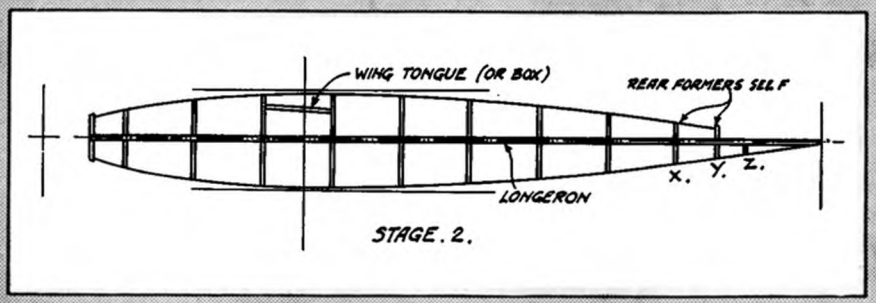
Starting from P.T. a continuous, smooth, and fine curve is drawn, which must pass through points "C" and "A" and finish at E.R. As described in the first article, this can be accomplished mainly by the use of a thin, springy spline, held in place either by a second person or, preferably, by the use of weights (rectangular blocks of lead). However, it may be found impossible to scribe the extreme nose contour (from P.T. to C.) by this method, so a french curve or a small piece of thin perspex or celluloid

Designing

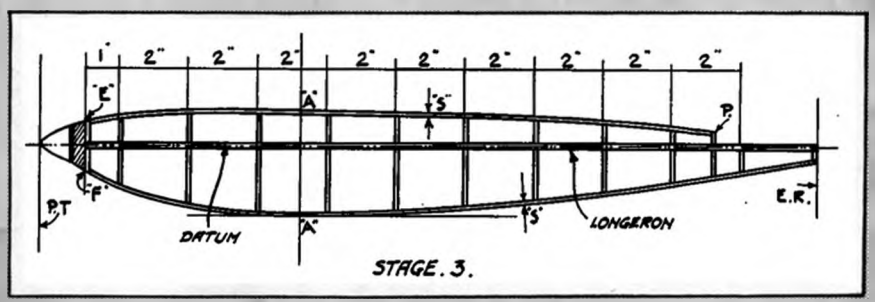
by Gordon Allen



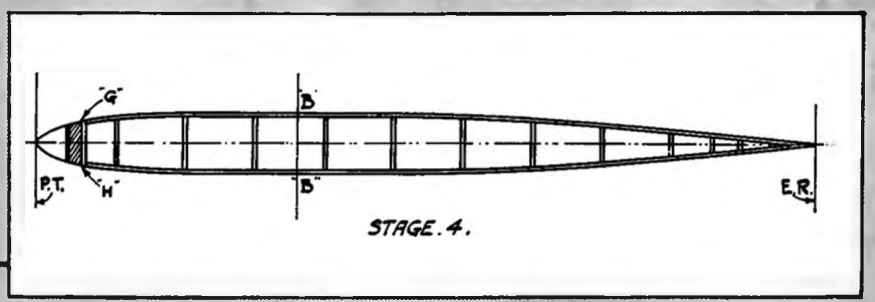
STAGE. 1.



STAGE. 2.



STAGE. 3.



STAGE. 4.

can be employed, using the latter in the same way as the larger spline. The curve from P.T. to E.R. apart from having to pass through "C" and "A" (*the horizontal line through "A" being tangential to it*) has no limits placed upon it. Care must be taken, however, to see that the line thus drawn leaves sufficient clearance for the rubber motor, at the rear fixing, when the curve is duplicated on the opposite side of the datum line. The depths of the former faces (at the rear) must be taken into consideration here for these govern the true internal space.

Duplicating the Contour

There are two methods whereby the curve can be duplicated *below* the datum line and in the same relation to it.

Dealing with the first. Using a sharp H.B. pencil, a tracing is made of the upper curve in its correct relation to the datum, which must also be traced. The paper is then inverted and fixed down over the original until the datum lines and points E.R. and "D" coincide. By the use of a hard pencil the lower curve can be traced through to the original, or alternatively, it can be transferred to the paper by rubbing the back of the paper with the back edge of a penknife. Finally, on removal of the tracing paper, the traced line is more sharply defined with an H-grade pencil.

The second method involves the use of faint vertical ordinates drawn (by using the T-square and set-square) at intervals of about ½ in., starting from P.T. These must intersect the upper curve and the datum line and must extend below the datum for a distance of not less than the width between the datum and the upper curve at the ordinates location.

By placing the compass point on the intersection of one of the ordinates and the datum line and setting the instrument so that the sharp pencil end exactly coincides with the point made by the intersection of the ordinate and the upper curve, this latter point can be transferred to the extended ordinate *below* the datum merely by swinging the compass round and making a minute arc. This is done on all ordinates, after which the resulting points are connected by a smooth curve, with a spline.

To obtain sufficient rigidity in the finished job as well as to provide a convenient seating for the tailplane, it is necessary to incorporate at least two longerons in the fuselage structure. As these will have a direct bearing upon the tailplane position and therefore the consequent positioning of the fuselage formers at the rear, it is important that these be shown on the drawing.

Therefore a longeron section must be chosen for the design (3/32-in. square section to be used in our "sample" model) and its depth distributed equidistant about the datum. This results in two horizontal lines 3/32 in. apart, running from the forward face of the fuselage to the extreme rear with the datum line midway between them.

Locating the Rear Formers

The chord length of the proposed tailplane at its centre section is then measured along the datum starting from E.R. and a thin vertical line drawn through the point thus obtained. This represents the rear face of the rear former (full former). The thicknesses of both the nose and rear formers can then be marked as shown in Stage 1.

Following this the depth of the top and bottom stringers are indicated. This is important, for it is these that govern the overall dimensions of the formers (excluding the nose former). The stringers are represented by drawing a line on the inside of the top and bottom fuselage contour and parallel to it; starting on the rear face of the nose former and finishing on the forward face of the rear former in the case of the upper stringer, and starting on the rear face of the nose former and finishing at the extreme rear in the case of the lower stringer.

Former Positioning

Stage 2 involves the positioning of all the formers. They are denoted by vertical, parallel lines (indicating their thicknesses) drawn between the *two lines representing the bases of the stringers*. The distance between the nose former and the one immediately behind it will vary according to the designer's wishes, for it is between these two formers that sheet filling should be incorporated for stiffening purposes, being a highly-stressed part of the fuselage. From the second former rearwards the spacing must be no greater than 2 in., if ⅛-in. square-sectioned stringers are to be used; otherwise the latter will have a tendency to sag between the formers when dope is applied to the final skinning. Two specially strengthened formers will have to be located appropriately to take the wing tongue or box, in the case of a shoulder-wing machine; or to take the wing-saddle uprights in the case of a parasol-type machine. It is essential, therefore, to show the desired position of the wing by drawing in the aerofoil section at the *wing root, and at its correct angle of incidence*. This will be dealt with in a future article of this series.

PURELY PETROL

R. V. BENTLEY

deals this month with propeller sizes and aerofoil sections

AS a guide to propeller sizes which will be found satisfactory with various engines, use the following table, which, I must emphasise, shows *my* suggestions and therefore does not necessarily correspond with other people's ideas.

When selecting a propeller for a new motor about which you have no information at hand, choose a general purpose propeller of medium diameter for the particular capacity of your motor and make the pitch as suggested by the table, using the lower pitch if the capacity is on the low limit and the higher pitch if capacity is on the high limit. For duration flying you should start at the largest diameter and smallest pitch which is arranged to allow your motor to deliver the maximum revs. per minute normally required. Further propellers should then be made of steadily increasing pitch and tested on the motor until you reach a stage when you can detect that the revving is being held down ever so slightly—in other words, your motor is being "loaded" up to the point where it cannot deliver any more power. The first propeller which begins to do this is the one you should use and you should not worry about not being able to get absolute maximum revs. while running it on the ground, as immediately it commences moving the revs. will increase until they are at maximum with the model flying.

Normally, with the pure duration type model with minimum weight, this method will not result in any deterioration of take-off ability, but if by some chance you cannot get a quick enough acceleration for take-off, you will have to reduce the pitch gradually until you find it suits your requirements, but this will be at the cost of ultimate performance.

For the general purpose model, the pitch is purposely kept low so that you will have as good take-off conditions as can be reasonably expected.

Control-line speed models are different again, as their size, weight, and trimming give them entirely different take-off characteristics. The propeller should be chosen which has a very definite retarding effect on the motor when running stationary. The take-off under such conditions will be fairly reasonable, while as soon as the model is in the air, the speed will increase until you can hear your motor "hitting the high spots" again. If you think that you and your model could safely manage poorer take-off performance you can increase pitch still further with a consequent increase of ultimate speed—carry on increasing pitch until you reach the poorest take-off conditions, or until you can detect that your motor is not hitting maximum while in flight.

Increase of pitch on any propeller of given diameter should be accompanied by a decrease of blade area (i.e. blade width), and as a guide from which you may estimate for your own propellers, it has been found that when a 10-in. propeller of 6-in. pitch is increased to 8-in. pitch the blade width should be reduced from an inch and one sixteenth to nine-tenths of an inch to give satisfactory results.

	General Purpose.				Control Line (Speed).				Duration Type.			
	Minimum		Maximum		Minimum		Maximum		Minimum		Maximum	
Engine Capacity	Dia.	Pitch	Dia.	Pitch	Dia.	Pitch	Dia.	Pitch	Dia.	Pitch	Dia.	Pitch
c.c.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
2-3½	9½	3-6	10½	3-5	8½	8-12	10	6-10	9	5-7	10	4-6
3½-5	10½	4-7	12	3-5	9½	8-14	10½	8-12	10	6-7	11	5-7
5-7½	11	5-8	13	5-7	10	9-14	11	8-14	11	6-8	12	6-8
7½-10	12	6-8	15	6-7	11	10-16	12	9-16	12	7-8	14	7-8

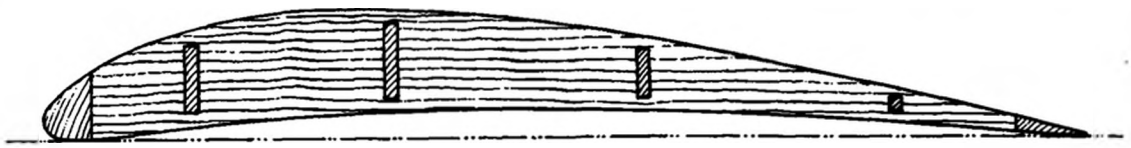
Any figures or suggestions which I have set down in the foregoing are dictated as a result of practical experience and experiment and are not based on any theory. I can therefore recommend them to you as a sound basis on which to work.

Whys and Wherefores About Aerofoil Sections

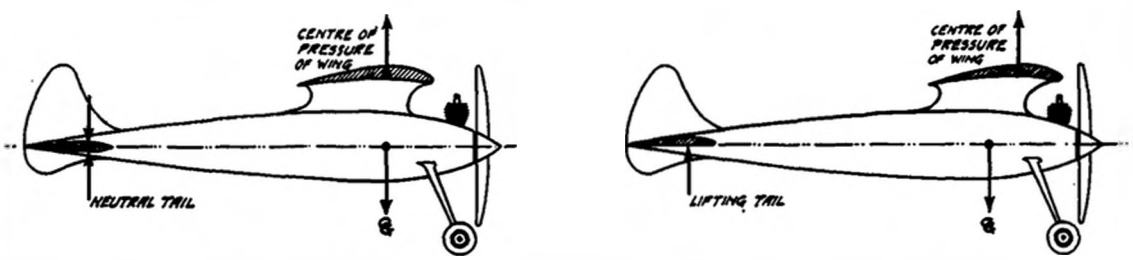
Usually the first thing anyone asks about a new model is, "What wing section have you used?" Nothing better then, than to start off by considering the aerofoil section. Very little is known about aerofoil performance characteristics in small sizes and at comparatively slow speeds, so I have turned to reports of practical tests in the selection of this section. Here, I must mention that it seems a waste of useful time for each progressive modeller to carry out his own individual tests

every time he wants some information when, in many cases, the tests he proposes to carry out have already been made by another person equally reliable, or even more so, than himself. Let me suggest that, if you want to progress in your hobby, whenever you pick up a magazine to read, note particularly any article of a practical research nature written by any well-known, reliable modeller, and take the results as correct for your own use until you have some definite reason for doubting them—then, make your own tests to prove your doubts. In the case of this aerofoil section problem, I made use, in my latest machine, the " Cloud Dozer," of the results of some tests carried out by Carl Goldberg, the sage of high-climbing power models, and reported in *Model Airplane News* for February, 1945, in which it was shown that out of six different sections tested, ranging from a bird-like, highly-cambered and highly-reflexed section, to a very thin, flat-bottomed section, and including our old friend Clark Y, there was very little difference in sinking speed (and therefore, duration), but whilst N.A.C.A. M6 travelled the greatest distance, the bird-like section travelled the shortest. One of Goldberg's own sections, G5, actually showed minimum sinking speed by a very short head (it may sound like good advertising, but I am prepared to take his figures !) and for this reason, it was chosen as the best section to use. Whether my choice was correct or otherwise, I intend to find out at a later date by building one or two more wings of a different section and and testing them out in actual contest conditions. Goldberg's tests were carried out on a glider in still air.

Poly-dihedral is incorporated, because it has been proved in practice to be an essential factor of stability in almost all models of this type making use of the fast, tight spiral climb to high altitude. Wash-out has also been proved in practice to be a beneficial design factor in maintaining spiral stability on practically all types, rubber-powered and sailplanes included. The wing is placed very high and far forward on the fuselage, not merely because so many American models have it so, but because there is a very good reason for having it there. It is fairly well known that there are two distinct methods of designing or trimming a model aeroplane ; one with the tailplane neutral (i.e. neither lift, nor depression) and the machine's centre of gravity directly below the wing's centre of lift ; the other with the tailplane carrying some proportion of the total weight (i.e. lifting tail) and the centre of gravity at some point rearwards of the wing's centre of lift. The latter is obviously the more efficient way of making use of the tailplane on a pure duration model, but if it is tried out on the normal type of shoulder wing, or high-wing cabin model, quite a lot of difficulty may be experienced in obtaining ample stability in flight. In fact, nine times out of ten the model will finish up with the centre of gravity forward —neutral tail condition—before being passed as satisfactory. In practice, the secret of ample stability with a lifting tail lies in the rule—" The farther back the centre of gravity goes, the higher the wing and the shorter the nose." Theory can prove just what it likes, but it cannot over-ride what actual practice indicates.



The Goldberg G.5 section, which is being used on Mr. R. V. Bentley's " Cloud Dozer," full constructional details of which will shortly be published.



The effect of lifting and non-lifting tails on the layout of the machine can easily be followed from these illustrations and the text.

S.M.A.E. 1946 COMPETITIONS

D	APRIL	14th—GAMAGE CUP (OPEN) (DECENTRALISED).
	,,	28th—"M.E." No. 2 CUP (RUBBER) (PLUGGE POINTS).
	MAY	5th—SIR JOHN SHELLEY CUP (PETROL) MIDLAND AREA.
D	,,	12th—"M.E." No. 1 CUP (GLIDER) (F.A.I.) (TEAM).
	,,	26th—PILCHER CUP (GLIDER) (S.M.A.E. FORMULA) (PLUGGE POINTS).
	JUNE	9th—HAMLEY TROPHY (PETROL) NORTHERN AREA.
	,,	16th—WESTON CUP (WAKEFIELD) (PLUGGE POINTS).
D	,,	30th—FROG JUNIOR CUP AND NATIONAL CUP (TEAM CONTEST).
	JULY	14th—THURSTON CUP (GLIDER) (F.A.I.) (PLUGGE POINTS).
	AUGUST	4th—BOWDEN TROPHY (PETROL) INTERNATIONAL, LONDON AREA.
D	,,	11th—FLIGHT CUP (RESTRICTED) WOMEN'S CHALLENGE CUP.
D	,,	25th—K. & M.A.A. CUP (BIPLANE) AND CIVIL SERVICE CUP (PAYLOAD).
	SEPTEMBER	1st—GUTTERIDGE TROPHY (WAKEFIELD) FROG SENIOR (INTERNATIONAL) CUP (FLYING SCALE).
D	,,	8th—WHITE CUP (FLYING-BOAT) AND LADY SHELLEY CUP (SEAPLANES).
	,,	15th—PETROL CONTEST (DURATION ON LIMITED RUN).
D	,,	22nd—S.M.A.E. (OPEN RUBBER AND GLIDER).

D = DECENTRALISED COMPETITIONS.

PLUGGE CUP CONTESTS WILL BE FLOWN AS AREA CENTRALISED EVENTS.

THE COUNCIL MEETING

Held at The Royal Aero Club, Sunday, December 30th, 1945. In the chair, Mr. A. F. Houlberg.

Minutes

The minutes of the previous Council meeting were read by the Hon. Secretary. The motion for "adoption as read," was moved by Mr. F. E. Wilson, seconded by Mr. R. Copland and carried.

Correspondence

The hon. chairman informed the Council that he had written to the editor of *Everybody's* protesting at an article recently published in that periodical on the model aeronautical movement. The editor had replied apologising, and intimated that matter connected with the movement would in future be submitted to the S.M.A.E. The Council recorded their appreciation of the chairman's action in this matter.

The 1946 Model Engineer Exhibition

The Council was informed of the invitation from Percival Marshall & Co. Ltd. to the S.M.A.E. to co-operate in an exhibition to be held during 1946. The Society was offered a percentage of any profit accruing from the venture. The Council unanimously accepted the invitation. The hon. secretary was requested by Council to organise the Society's effort at the exhibition. When preliminary details had been settled, full publicity would be given to all members so that they may have the fullest opportunity to co-operate.

The S.M.A.E. Film

The Council discussed a proposal that a film be made covering the model aeronautical movement through S.M.A.E. activities. The Council heartily approved of the suggestion and offers of existing films were forthcoming from members present. The leaders of the London and Northern Areas, Mr. R. Jeffreys and Mr. R. Lawton, were present at the meeting at the invitation of the Council. These gentlemen offered the fullest co-operation of their Areas in support of the Exhibition and film efforts. It was regretted that the Midland Area had not accepted the Council's invitation to be represented at the meeting.

Propaganda Film

The S.M.A.E. are also co-operating with a filming unit in the preparation of a film which will be used on the normal film circuits to popularise model aircraft construction. The script prepared by Mr. Houlberg has been accepted, and filming has commenced. During January "shots" of indoor flying and close-ups have been made at the Northern Heights M.F.C. club-room and outdoor shots on Hounslow Heath on February 10th.

British Indoor Record

Mr. R. Rock's application for the indoor biplane record was granted. His time was 1 min. 7 secs.

Affiliations

The following six clubs were granted affiliation to the Society :—Bargoed M.F.C., Carshalton M.A.C., Mexborough and District Aeromodellers Club, Preston and District M.A.C., Wythenshaw M.A.C., and Zombies.

Blackpool Council Meeting

The Council favoured Blackpool as the venue for their next meeting and requested the Hon. Secretary to make the necessary arrangements. The "vote of thanks for the Chair" was moved by Mr. A. G. Bell, seconded by Mr. F. E. Wilson, carried, and brought the meeting to a close at 4.30 p.m.

BRISTOL MODEL EXHIBITION

An extremely successful model exhibition was held in the Bristol Municipal Art Gallery and Museum recently, at which the model aeroplane section was organised by the Bristol and West Model Aero Club.

The exhibition was very well attended, over 60,000 people passing through during the 14 days it was open.

One of the most attractive of the aero-models exhibited was the high-pylon petrol model built by Mr. G. M. Garnett, possessing sleek lines and powered with a 9 c.c. two-stroke engine built by Mr. G. Kington.

An interesting exhibit was the push-pull twin screw tailless model built by H. T. Howse which won the Western Area eliminating trials for the Handley-Page contest.

Mr. R. T. Howse also showed a 6 ft. 6 in. span cabin petrol model using a Brown Junior engine and weighing 3¼ lb. all up.

Mr. R. A. Foster exhibited in skeleton form the framework of a helicopter which showed excellent workmanship and much thought in its design, which is based on the experiences gained with a previous model which flew with some success. He also displayed a nicely-built indoor model with a triangular section fuselage of unusual design in which the flat bottom is cross-strutted in the usual way, but the two upper sloping sides are warren girders.

A nice example of flying scale aircraft was the 12-oz. cabin machine with strutted wings shown by Mr. Moon, who also displayed a large glider of 6 ft. span with polyhedral wings mounted on a low pylon.

The most remarkable exhibit was the indoor stick model by Mr. H. A. Lee, which raised the record for this type of model at the Albert Hall before the war. The model was still covered by the original microfilm.

A low-wing scale model of a "Cornell" monoplane was exhibited by R. T. Howse.

A "Flight Cup" formula model, which is capable of 2 minute flights, was shown by Mr. A. H. Lee, and a tailless glider with a large central fin was shown by Mr. A. W. Pollard.

NORTHERN AREA CLUB NEWS
By "Northerner"

I had hoped that this second edition of Northern Club News would have been larger and more interesting than the first, but I have received so few reports since the last edition that I feel I must once again point out to you that if you wish this section to continue in its present form, then you must send me your club reports in good time, otherwise the idea will have to be dropped. Remember that reports should reach me not later than the *twentieth* of each month.

Many of the Manchester and District clubs appear to be concentrating on R.T.P. work at the moment in preparation for the Houldsworth Hall Rally, on Sunday, March 17th, and the Manchester and District R.T.P. Team Contest, fixed for Saturday, February 23rd. Teams for the latter event are to consist of two duration models and two speed models. Mr. B. N. Holmes, of the Sale Aeronautical Society, has been appointed official competition organiser.

From the *Doncaster and District Model Flying Club* comes news of their A.G.M. and a change of Secretary, which other clubs are asked to note. All correspondence for this club should now be sent to Mr. M. Hetherington, 19, Imperial Crescent, Off Town Moor Avenue, Doncaster, Yorks. Mr. D. Hellewell, the Press Secretary of this club, is now serving with the R.A.F., and it is interesting to note that he was the winner of the Club's Championship Cup last year. Mr. F. Gearing took the second place and Mr. M. Hetherington, third. Jet propulsion seems to have reached a milestone in the history of this club, for Flt. Lieut. Long claims a flight of two minutes with a jet-propelled model, the unit being designed by himself. Is this the first successful flight by a model of this type? Radio-control is also receiving attention, and Mr. E. Bassett hopes to have a model ready by the Spring (if any).

The Whitefield Youth Movement Model Aircraft Club are spending a lot of time with R.T.P. models this winter. Speed models have suddenly made an appearance, and Mr. N. Wakefield recently produced something which really did the trick well. The first Club R.T.P. Duration Contest for the "Gilbert Prize" has been won by Mr. K. Bennett and the recent Whitefield, Prestwich, Radcliffe, Bury and District R.T.P. Duration Contest for the "Whalley Cup" was won by club member Frank Heaton for the second year in succession.

That is all for this month; keep flying and reporting.

MIDLAND AREA NEWS

The second Indoor Rally was held on February 2nd, and was also a great success, being attended by seven Midland Clubs.

The R.T.P. contest was won by K. Thomas, of East Birmingham, whose model featured the usual microfilm-covered wings and tail, while the speed contest saw G. Bradwell, of Birmingham, the winner. His model was a monocoque fuselage, streamlined pusher.

The free-flying class was won by P. M. Winter, of East Birmingham, with a microfilm-covered model.

Results

R.T.P. (1-2 ozs.; aggregate two flights)—K. Thomas (East Birmingham), 309 sec. P. M. Winter (East Birmingham), 261 sec. A. J. Barr (Coventry), 214.8 sec.

Open Speed (11 laps, 4 ft. line)—G. Bradwell (Birmingham), 27.2 m.p.h. R. Parham (Worcester), 23.1 m.p.h. L. Watts (Coventry), 20.1 m.p.h.

Free-Flying (aggregate two flights)—P. H. Winter (East Birmingham), 272 sec. R. Oliver (Kings Heath), 263.6 sec. K. Monks (Birmingham), 237.5 sec.

LONDON AREA NEWS

Notes on a meeting of the London Area Council held on Saturday, February 2nd, 1946.

There was a discussion concerning the *Model Engineer* Exhibition (in which the S.M.A.E. are participating), and club members are requested to note that the period during which the exhibition is open will not coincide with any S.M.A.E. competition dates.

In view of the gradual easing of travel restrictions, a suggestion was put before the meeting that the Council should investigate the possibility of arranging a London *v.* Paris contest. This suggestion received approval.

It was decided that a special delegate meeting should be convened for presenting the prizes in the London Inter-District Challenge Cup, the R.T.P. Duration, and R.T.P. Speed Contests of 1945.

AYLESTONE MODEL FLYING CLUB

After a period of inactivity, the club is now being reorganised for the coming season. We are sorry to announce that two more members, M. Franklin and D. Eames, have been called up, and our late Secretary, A. H. Spikings, is about to be. New members are coming in, however, and our numbers are increasing.

D. Chapman has turned out some beautifully finished scale jobs, among them being a Mustang, a Kestrel, and a Tiger Moth, all of which fly very realistically, a nice change from the stereotyped duration model.

Indoor flying is carried out every Saturday evening from 7 p.m. onwards at Granby Road School.

BRENTFORD AND CHISWICK M.F.C.

Despite the very cold spell we have experienced of late, a few stalwarts have paid regular visits to the Heath. On one visit, Bob Connor had to de-ice his model after every flight. I wonder who de-iced Bob after that day's flying?

R. Connor is still concentrating on the tailless-type model. With experience gained from last year's Radlet job, he has turned out an entirely new design which is flying very well.

More petrol models are coming along, and at least one member will have a pusher-type this season.

The Club's annual exhibition will take place on March 2nd and 3rd at Hogarth School, Duke Road, Chiswick. There will be the usual solid model competition open to all aeromodellers.

The Club also hopes to stage another Rally this year on Hounslow Heath. It will follow the lines of last season's most successful Gala.

The annual general meeting, held on January 6th, was attended by a record number of members, and Mr. Hoyle can be congratulated on his handling of a very lively meeting. The Treasurer revealed that although £51 had been spent on Rallies, etc., the Club had made a handsome profit from the season's work.

Mr. A. A. Baker and Mr. R. E. Connor were elected Life Members for their services to the Club.

BURY AND DISTRICT M.A.C.

After a short "winter hibernation" by several members the results of their disappearance are beginning to appear. Tailless models are still popular and several members are building a successful 6-ft. design by E. Hargreaves, whilst he himself is designing a 10-ft. model.

Our first competition of the year was held on January 27th, and we were favoured with a perfect day. There was a good turn-up, and results were:—

1. K. Marsden, average 94 sec. 2. D. Helm, average 83 sec. 3. J. McCartney, average 83 sec.

K. Marsden was flying a 5-ft. glider of his own design, embodying elliptical wings and tailplane.

Indoor flying takes place each Monday at the local Youth Centre, with speed models proving very popular.

BUSHY PARK M.F.C. GALA DAY (May 5th)
Petrol Competition

Start 2.30 sharp. Hounslow Heath. Entrance Fee 2s. 6d.

Rules

1. Each plane shall make three flights. Total duration of 135 secs. Each second, or part of a second, above or below this time will be counted as 1 pt. error.
2. Three mins. shall be allowed to get the machine airborne. (To be timed from point of release.) Failure, means disqualification of that flight.
3. All competitors, as their names are called, must report for timekeepers at the judges' table. Failure to report in three mins. disqualifies that flight.
4. Engine running and test flying is strictly forbidden except with judges' permission. Any breach of this rule means disqualification from the competition.
5. No persons except competitor, helper, and timekeepers shall be allowed within 5 yards of the take-off board or tarmac.
6. All intending competitors to report to judges before 2.15 p.m. Allowances for distant travellers.
7. Judges' decisions shall be final.

Prizes. 1st, £2 and trophy. 2nd, £1. 3rd, 10s. An enclosure will be provided.

Open Duration Rubber Competition

Start 11 o'clock sharp.

1. **S.M.A.E. Rules.**
2. Three flights must R.O.G. wing tip and prop. launch.
3. Three attempt to launch for each flight, 5 secs. and under not counted, etc.

Entrance Fees. Seniors, 1s.; Juniors, 6d. (under 16 years).

Prizes. 1st, Balsa sheet to value £1 and trophy. 2nd, Balsa sheet to value £1. 3rd, 10s.

CHINGFORD M.F.C.

The Chingford Model Flying Club have now obtained the use (under the auspices of the local youth movement) of a hall in the Wellington Avenue Senior School, which has proved eminently suitable for indoor flying. A programme of winter flying has, therefore, been made possible, and meetings are now being held at the school on Tuesdays for construction of models and discussions, and on Fridays for pole- and free flying. The Club is now planning for the coming season of competition flying, and will extend a hearty welcome to any aeromodellers, both novices and "old hands," in the area, who wish to join. Intending new members should attend at Wellington Avenue School on Friday evenings after 7 p.m., when club officials will be pleased to give further information.

COVENTRY M.A.C.

We still hold weekly indoor meetings, and the Club Class A record has been raised no fewer than four times this season. R. Tours twice with 102 sec., then 123.2 sec. and now A. S. Barr has increased it to 129 sec.

The Club is holding a Social and Dance shortly.

We are expecting to obtain the use of a new field for the coming outdoor season. It is in the same district, but not surrounded by so many trees. We have also made application for the use of a local aerodrome, and are hoping for a favourable reply.

THE ESTON AREA MODEL AERO CLUB

The A.G.M. which took place on December 20th, 1945, resulted in Mr. T. A. Brewer being re-elected, unopposed, as Chairman. He was also elected in like fashion to carry on his task of Treasurer, which place he has filled since Mr. J. Martin became a "Bevin Boy." Incidentally, considering the expenses we have incurred, putting into good repair our present quarters, Mr. Brewer's report was most encouraging. Gen. Sec., Mr. N. Brunton was returned unopposed to carry on. The only real change was the election of Mr. L. Sturt as Competition Secretary.

So we are all looking forward to 1946 and its competitions, and sincerely hope we may find another Mr. Langley. In conclusion, may I add that a North Eastern Area is on the threshold of being formed, and that if there are any clubs within that definition I would be pleased to hear from them.

ST. GEORGE'S HEIGHTS MODEL CLUB

During the year two outings have been made, one to Hounslow Heath and the other to Epsom Downs, which set the Club funds back a little, but were well worth it.

Two competitions were also flown against the Surbiton Club, resulting in a win for them on both occasions, but we don't have to win to keep smiling. When we meet them next year, we hope to have the pleasure of making them think how much we have improved.

The two challenge cups given by the President for the best senior and junior, were won by Mr. Rogers and Graham Jessop. In this connection, Mr. Rogers refused the cup, wanting the next best to have it, and he said, "No, I'll win it off you next year"—so, you see, the Club makes sportsmen of them as well as aeromodellers.

Ed. Roger's petrol model was given its trial on a recent Sunday and is now having its final modifications. The trials were very promising and the modifications are undercarriage farther forward and wing-tip slots.

Our indoor meetings will be held in future at St. Alban's Hall, Portmore Park, Weybridge, every Friday evening, from 7.30 until 10, and an open invitation is now given to any club to come along in force to visit us.

KINGSBURY M.F.C.

On January 6th Ray Monk raised the Club F.A.I. glider record to 2 min. 18 sec. with his 1½ scale "Thermic 50."

On January 27th M. Hansen and Ray Miles were home on leave, and Ray Miles took the opportunity to raise the rubber record to 2 min. 10 sec. with his "Northern Arrow."

Our first impromptu glider competition of the year was won by P. Haley with 3 min. 12 sec. and 2 min 9 sec.

On January 9th the Club R.T.P. record was raised to 1 min. 2 sec. by J. Boverman. This figure is by no means high, but it must be remembered that this was only our second attempt at indoor flying.

NORTH KENT MODEL AIRCRAFT SOCIETY

Mr. Malcolm Wickens recently offered 10/- in prizes for a novices R.T.P. competition.

Result :—J. Norman, 37 sec., 51.5 sec., 98.2 sec. Total, 186.7 sec. D. Creed, 63 sec., 48 sec., 47.5 sec. Total, 158.5 sec. B. Cassells, 43 sec., 35.2 sec., 42.5 sec. Total, 120.7 sec. Norman's last flight was a club record, as the machine was unorthodox, being a tailless pusher; a very creditable performance for a junior.

Result of L.A.C. R.T.P. Contest fly-off with Streatham. Streatham.

R. Rock, 220 sec., 236 sec. Total, 456 sec. J. Wingate, 225 sec., 212.8 sec. Total, 437.8 sec.

North Kent.

A. D. Hall, 151.8 sec., 160 sec. Total, 311.8 sec. J. Knight, 110.5 sec., 124 sec. Total, 234.5 sec. Grand totals: Streatham, 893.8 sec.; North Kent, 546.3 sec. Nice work Streatham! We also want to congratulate you on your draught excluders!

At the last committee meeting the rules for the Club Championship were decided upon, and it was also agreed that an Exhibition should be organised in aid of S.M.A.E. funds.

The following rule was added to the existing rules for the C. H. Roberts Cup.

"The judges reserve the right to disqualify any entry that does not conform with the rules or spirit of the competition."

This addition is due to the express desire of the donor of the cup that machines should resemble *full-size flying-boats*. Competitors wishing to have machines flown by proxy should write to the Hon. Competition Secretary, Mr. T. Newell, 32, Veroan Road, Welling, Kent.

Seen at the last R.T.P. meeting :—A fuselage flying round the pole less wings and tail, prop. at the rear.

Disgraceful, but very amusing!

LEEDS MODEL FLYING CLUB

On January 17th the annual general meeting was held. The previous secretary and treasurer were back after six years in the R.A.F., and were re-elected to those offices. A full committee was chosen, also time-keepers, and the following week a meeting of the committee was held. At this the forthcoming season was planned, and it is hoped to run, apart from S.M.A.E. competitions, at least one monthly club competition for gliders or rubber jobs. The season to commence in April—weather permitting. In addition there will be—we hope—three club petrol contests. (There are two scale jobs being built—a "Tempest" and an "Owlet"). For the S.M.A.E. fund it is hoped to arrange a dance.

LUTON AND DISTRICT M.A.S.

On December 3rd the Luton Model Engineer Exhibition, organised by Vauxhall Motors Ltd., was opened. This exhibition was a grand advantage for publicity for the club, which was made use of.

There were some forty models on show, flying and solid. Of these the majority were sailplanes. Great attention was paid to G. Williams's latest sailplane, wing-span being 8 ft. 9 in. and weight 48 ozs. This model is expected to be up to the usual Williams standard in the air. In the flying scale, S. Millar took most attention with two fine models of the "Thunderbolt" and the Taylor-craft "Auster," although Sam Barret's "Heston Phoenix" was a close second—a fine effort by the active members.

In the club itself we are pleased to see another old member back with us, L. Capper. From all reports it would appear that there will be quite a few Wakefield models out this year, so let's hope for rubber.

MERSEYSIDE MODEL AIRCRAFT SOCIETY

There was again a cheerful gathering for the Society's second indoor meeting of the current season, held on Saturday evening, December 15th, 1945. R.T.P. duration flying was the main item on the agenda, but no spectacular times were made, the best being :—A. O. Sutcliffe, 125.6, 133.0, and 133.8 secs.; R. F. L. Gosling, 60.0, 43.0, and 76.5 secs.; D. C. Davies, 51.0, 42.0, and 59.0 secs. D. C. Davies won a prize, generously presented by Mr. Edwards. for the best performance by a junior member. C. Harrop and W. A. Jackson produced some very natty free-flying models which made some remarkably good flights for their size, Mr. Jackson's smallest one being only 3-in. wing-span!

The Society's much depleted Committee met at the Central Hotel, Birkenhead, on January 11th, and many important topics were discussed. The revival of the old Mersey M.A.C. has cost the Society several of its members, but the Merseyside M.A.S. is determined to remain the foremost club.

PHAROS M.A.C.

The annual dinner of the Pharos M.A.C. was held on Saturday, January 5th. The event was a great success.

Unfortunately, many of the older members are still in the Forces and were therefore unable to attend, although Jim Buckeridge was able to get time for the occasion and so carried out the duty of host.

Mr. R. Askew took this opportunity to say that although he had been away with the R.A.F. in India, he had been able to keep informed of the activities of the Club.

The evening went with a real swing, during which games and other competitions were held, for which there were prizes. Music was supplied by Ron Askew.

The whole evening's entertainment was brought to a very satisfactory conclusion with three cheers for the organiser, Mrs. Buckeridge, whose hard work had made this dinner possible.

TUNBRIDGE WELLS M.A.C.

The Club has received a setback in that the previous Secretary is suffering from an illness which is likely to be prolonged, and this has necessitated some reorganisation; Mr. C. Faircloth has been appointed Press Secretary and Mr. C. Churcher will act as General Secretary.

The Club was very active during 1945, when a very successful exhibition was held at the Town Hall in aid of the Kent and Sussex Hospital; and flying meetings were held regularly each week-end when weather permitted. The Club also entered several inter-club competitions and half a dozen members attended the Rally arranged by the Brentford and Chiswick Club. The Club's sailplane record, tow-line launched, now stands at 8.55 min. o.o.s.

TORQUAY MODEL AERO CLUB

New club records recently broken are *Winch launched glider*, J. Higgins, flying his "Trooper" for 9 min. 44.5 secs. o.o.s. (Wall Hill record); R.T.P. (Class A) G. Wilde, 1 min. 58 sec. We hope to get the use of Home-lands School before long. Result of R.T.P. contest for Club Eagle Trophy (Open), three flights, E. J. Taylor, 219 sec.; G. Wilde, 195.5; R. Drew, 193.5.

WALLASEY MODEL AERO CLUB

The Club is now holding a series of lectures, given by members, the first being given by Mr. Molyneux.

Mr. D. Hill has won the W.M.A.C. points cup for 1945. Mr. Molyneux came a very close second, Mr. G. Pemberton being third.

Indoor flying is in full swing, both R.T.P. and Free Flying. An R.T.P. competition has been arranged, and will be held in the near future.

CHANGE OF TITLE

Grantham Aeronauts. Hon. Secretary: P. Spalding, 99, Walton Gardens, Grantham, Lincs. (Previously The Grantham M.A.C.).

CHANGES OF ADDRESS AND SECRETARYSHIPS

Blackpool and Fylde M.A.S.: Secretary, E. D. Evans, 6, Winton Avenue, S.S., Blackpool.

Doncaster and District M.A.C.: Hon. Sec., M. A. Hetherington, 12, Imperial Crescent, Doncaster.

Harrow M.A.C.: Hon. Sec., D. V. Spence, 4, Welbeck Road, West Harrow.

Luton and District M.F.C.: Hon. Sec., E. C. W. Clark, 194, North Street, Luton, Beds.

Merseyside M.A.S.: Until a new permanent Hon. Secretary is elected, all correspondence should be addressed to the Acting Secretary :—A. O. Sutcliffe, 15, Brook Lane, Chester.

Salford M.A.C.: Hon. Sec., N. Middlemiss, 65, Cholmondeley Street, Salford, Lancs.

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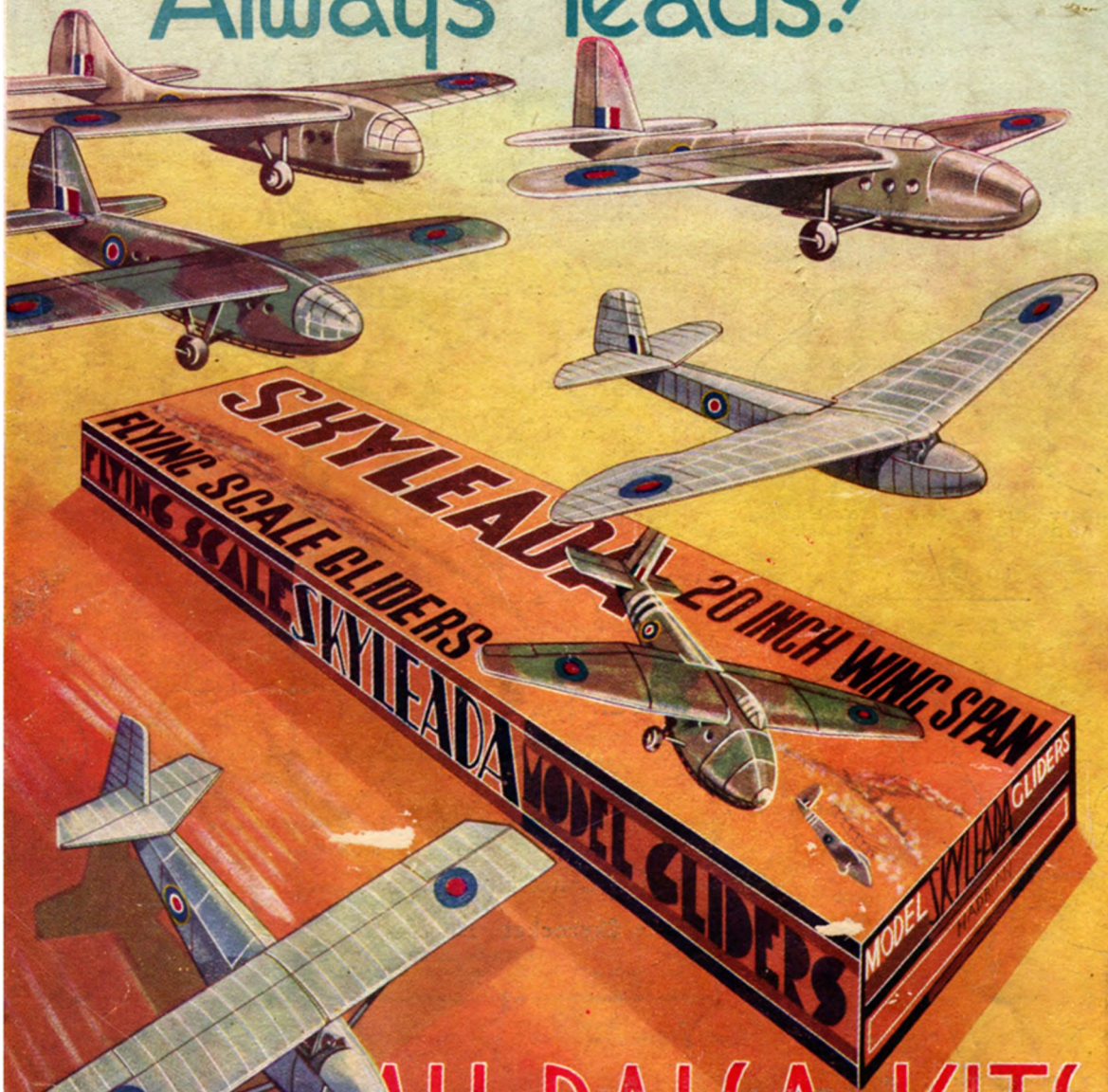

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