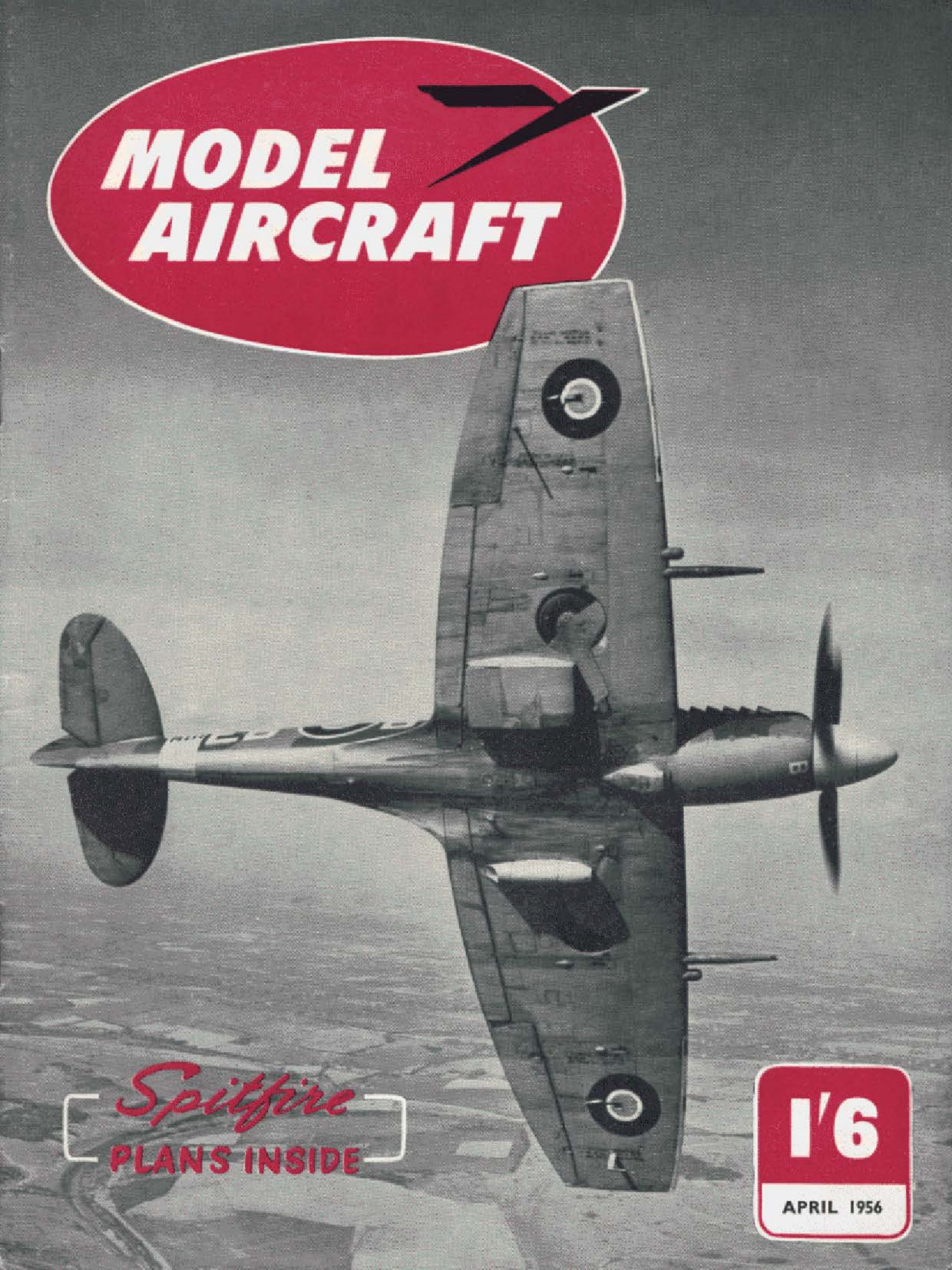
MODEL AIRCRAFT



Spitfire
PLANS INSIDE

1'6

APRIL 1956


NEW!
The Skyleada
Husky
36 in. Span
Rubber-powered
duration model
Designed by
Ron Warring
It's EASY
TO BUILD
TO TRIM
TO FLY
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PERFORMANCE
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which with special features of top quality balsa wood
step-by-step drawings and a ready-carved 14 inch
balsa propeller ensures a successful model which will give real flying fun.
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SKYLEADA KITS OF CONTROL LINE MODELS
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CLASS "A" TEAM RACER
AND SPORTS MODEL
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11/- inc. P.T.
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90% Prefabricated For .5 and .75 c.c. Engines
9/- inc. P.T.
27" Span AUSTER
For 1 c.c. engines
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180 LONDON ROAD
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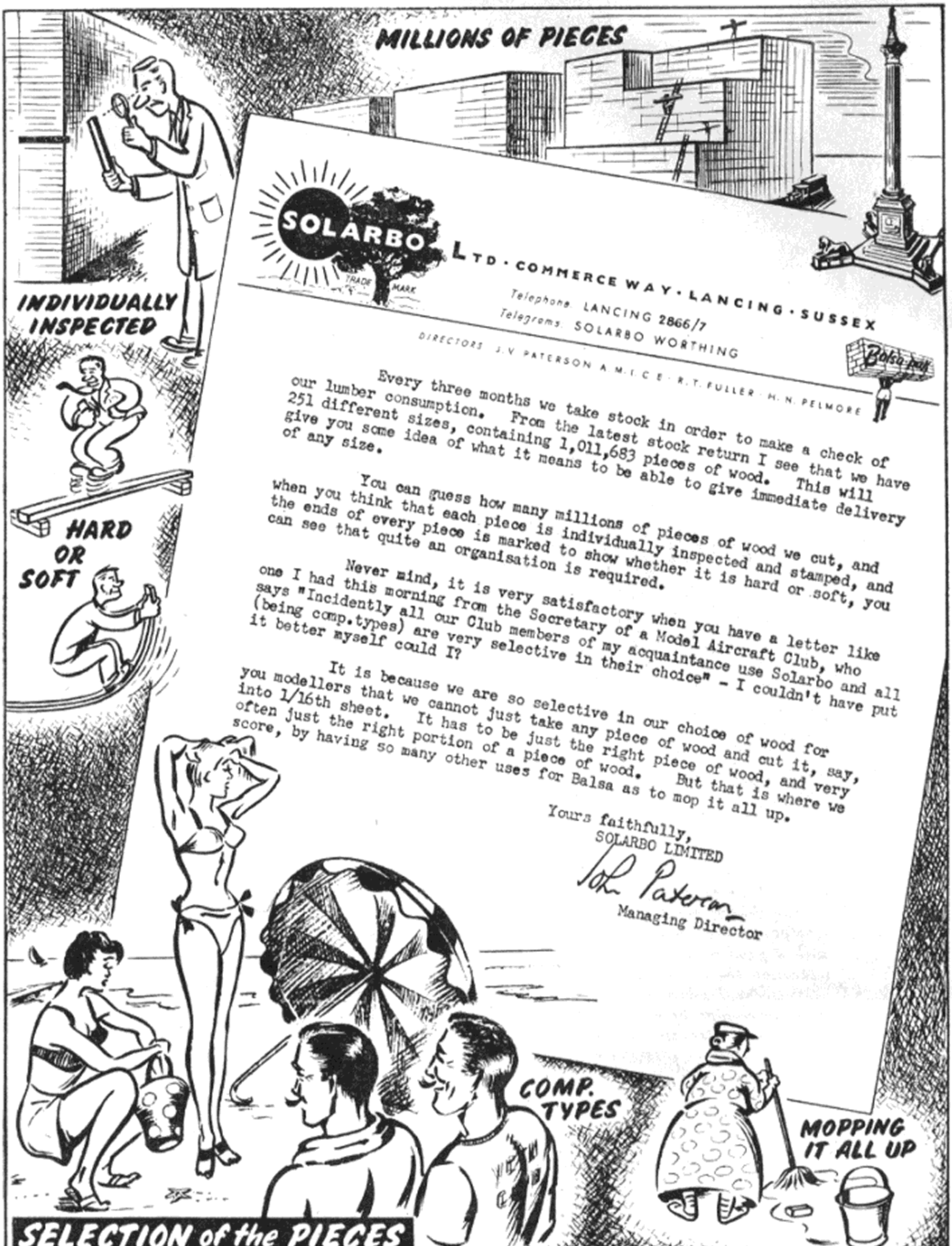
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Every three months we take stock in order to make a check of our lumber consumption. From the latest stock return I see that we have 251 different sizes, containing 1,011,683 pieces of wood. This will give you some idea of what it means to be able to give immediate delivery of any size.
You can guess how many millions of pieces of wood we cut, and when you think that each piece is individually inspected and stamped, and the ends of every piece is marked to show whether it is hard or soft, you can see that quite an organisation is required.
Never mind, it is very satisfactory when you have a letter like one I had this morning from the Secretary of a Model Aircraft Club, who says "Incidently all our Club members of my acquaintance use Solarbo and all (being comp.types) are very selective in their choice" - I couldn't have put it better myself could I?
It is because we are so selective in our choice of wood for you modellers that we cannot just take any piece of wood and cut it, say, into 1/16th sheet. It has to be just the right piece of wood, and very often just the right portion of a piece of wood. But that is where we score, by having so many other uses for Balsa as to mop it all up.
Yours faithfully,
SOLARBO LIMITED
Managing Director
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27½ in. Control Line Kit incorporating combined flap and elevator control. For 1 to 3.5 c.c. motors.
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THE TERRIFIC "TORPEDO"
6 V. TAYCOL Electric Motor. Ideal for "Titan" Tugboat. Consumption approx. 6,450 r.p.m.—0.6 amps. (free running), 4,200 r.p.m.—1.0 amps. (Max. efficiency)
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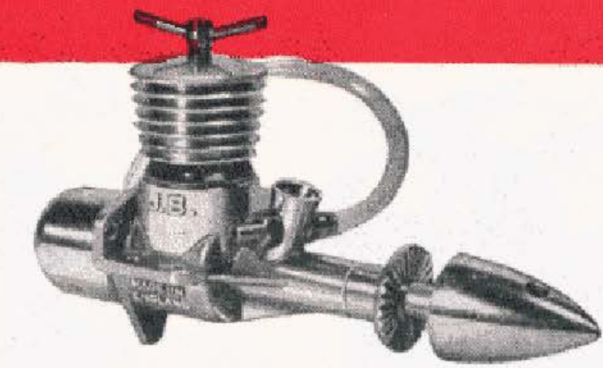
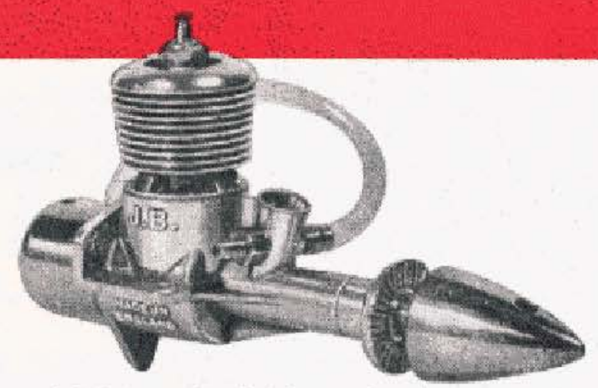


J-B "Atom" 1.5 c.c. diesel engine

50/- *plus P.T. 9/7d.*



J-B "Atomglow" 1.5 c.c. glowplug engine

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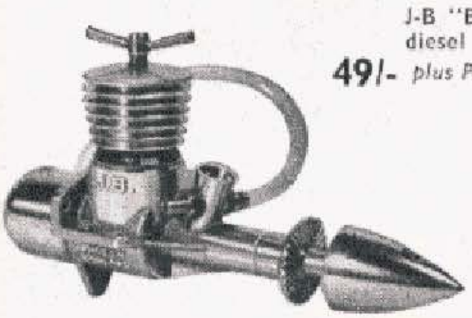
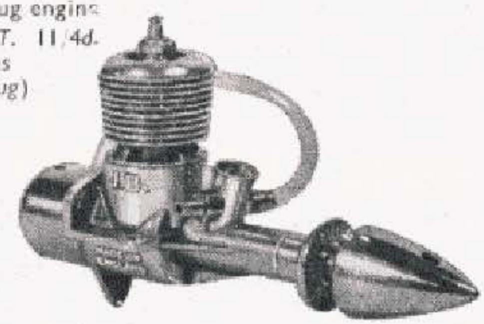


J-B "Bombglow" 1 c.c. glow-plug engine

59/- *plus P.T. 11/4d. (includes glow-plug)*



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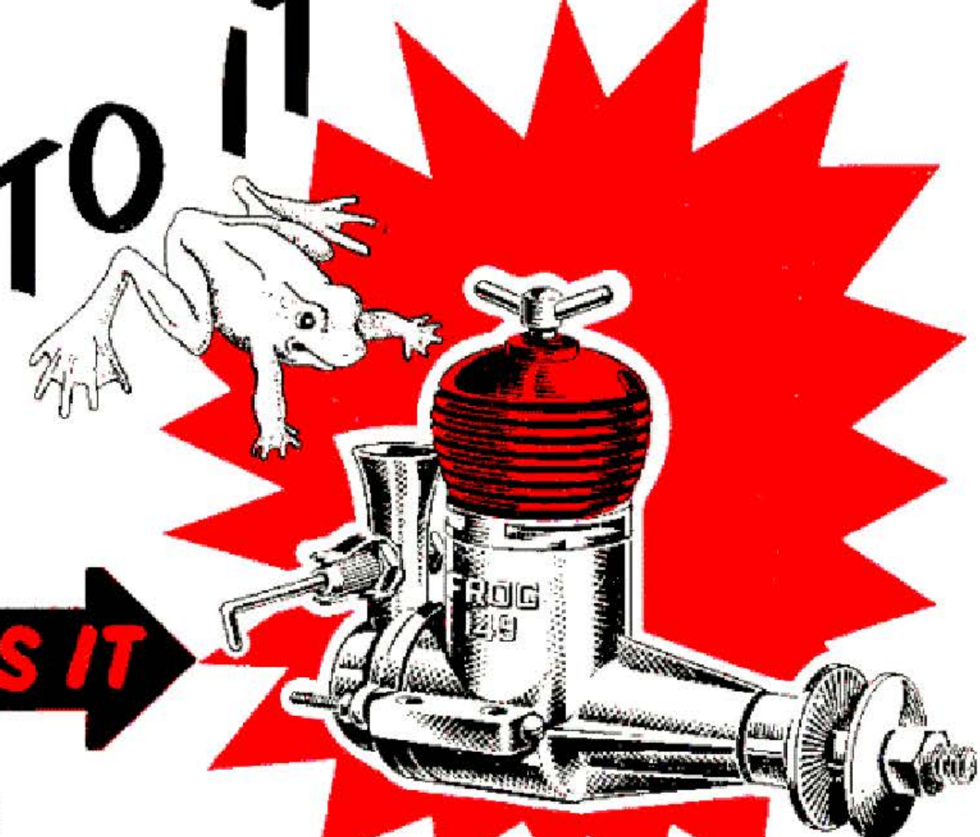

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- SPEED RANGE 2,500 TO 15,000 R.P.M.
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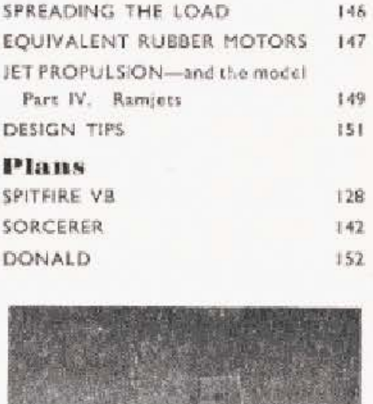
APRIL 1956 No. 178. VOL. 15

Contents

Cover Story

Flashing across our cover this month is, without doubt, the world's most famous fighter—the Supermarine "Spitfire." Reaching its zenith during the last war, the "Spitfire" still rates high in popularity with modellers everywhere, and this month we present on p. 128 a fine C/L scale model of the mark VB. With slight structural modifications it can, of course, be "converted" to almost any mark of "Spitfire," and there is a wealth of detail that can be added for those who would like something in the super-scale class.



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THE JOURNAL OF THE SOCIETY OF MODEL AERONAUTICAL ENGINEERS

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Letters TO THE EDITOR

A point of scale . . .

DEAR SIR,—With reference to P. L. Gray's article on the Hawker *Nimrod* which appeared in your February issue there are one or two points upon which I should like to comment.

The major point is that Mr. Gray advocates omitting the upper wing dihedral and decreasing that of the lower wing. Some licence is allowable in 1/72 modelling with small details, mainly cockpit details, but I think that the suggestion that we should amend a known factor is deplorable.

As to the method of reproduction of ribbed effect for fabric covered surfaces, if by the "usual method with cotton" Mr. Gray means merely attaching a length of cotton over each rib position, then I think that the "poster colour method" is probably the better of the two for those types of surfaces which have close rib spacing. But for types with a wider rib spacing, where fabric sag is very apparent, I do not think that either method is particularly realistic. An extremely good representation can be made by the old method of attaching cotton over each rib (and riblet) and then very carefully covering the surface with tissue—water sprayed and then doped. This method is generally thought to be a tedious one, but when the right technique is evolved it becomes quite a simple operation. In any case I do not feel that the phrases "less trouble" and "and quicker" have any place in 1/72 scale modelling.

Finally I do not think that any F.A.A. fighter pilot would have been too keen to fly the *Nimrod* as the drawing shows it,

a...because it appears to be unarmed,
b...because it appears to have no deck arrester hook.

Yours faithfully,
London, S.W.12. S. D. STOCK.

. . . is answered

DEAR SIR,—I would like to thank Mr. Stock for his interest, and comment upon his remarks as follows:—

1. I did not strictly advocate omitting dihedral, in fact I explained how to incorporate it; my own model has it, but it is not an easy job with such a small angle. Mention of omitting this was for the benefit of younger or less experienced modellers—by simplifying, one hopes to encourage "would be"

(*Continued on page 135*)

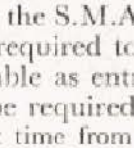
INT. CONTEST FUND

Poor Response to S.M.A.E. Appeal

THE recent appeal by the S.M.A.E. for funds to meet the cost of running the World Power Championships at Cranfield on August 4th-6th, has so far met with very poor response—the total donations received at the time of writing being £20 17s. The sum of £1,000 mentioned in the S.M.A.E. appeal is the total amount which it is estimated will be required to run this meeting, but a proportion of this will be recoverable as entry fees, etc. Nevertheless, considerably more funds will be required than the S.M.A.E. is in a position to provide at the present time from its own resources.

As a little from every member would be preferable to a lot from a few, a " bob a nob " suggestion put forward by the Northern Area seems to us to be very commendable. Affiliated clubs would be asked to collect a shilling from each of their members and to send them *en bloc* to the Society. We hope that this idea will " catch on " and that the donations will soon be rolling in. The Editor would welcome other ideas from our readers.

UPS and DOWNS



RECENT news from Yugoslavia is that Emil Fresl, well-known international model flier, has been adjudged Yugoslavia's best modeller for 1955. He has also, for the second year running, placed second in the parachute jumping section of the Yugoslavian Annual Aeronautical contests. We are sure all modellers in this country will wish to congratulate him on his achievements.

Another Squeeze Coming ?

WHEN the new S.M.A.E. membership scheme was introduced two (?) years ago it was claimed that it would enable the Society to support International events without having recourse to outside sources to provide the necessary funds.

We now know that this has not proved to be the case. Why then, did the Council not recommend at the last annual general meeting an increase in the present fees when it was obvious that the Society's income would be insufficient to meet its commitments ?

In common with other periodicals MODEL AIRCRAFT is affected by the present dispute in a section of the printing trade.

Every effort is being made to overcome the difficulties with which we are at present faced and we apologise to our readers and advertisers for any inconvenience caused to them.

OBITUARY

IT is with great regret that we report the sudden death on February 25th of Arthur Mullett, internationally known for his model shop at 16, Meetinghouse Lane, Brighton.

Arthur first started dealing in models before the war, and he reopened the business upon his discharge from the Army in 1943. He claimed that his shop was as near as the nearest pillar box, and backed this claim with a " by return post " mail order service. The writer remembers many years ago 'phoning from 30 miles away in the morning for some goods, and having them arrive on the afternoon bus.

It was by personal attention to every order that this world wide business was built up. Hundreds of people sent their first orders as customers—and stayed as friends.

We understand that the business will continue under Ray Spence, who has been the manager for several years.

Arthur was in his forty-seventh year and we offer our sincere condolences to his family in their bereavement.

Shooting a Line ?

A RECENT enquiry from the Enfield Club, regarding line diameters and rules for speed record attempts, at their C/L rally, brought the following Solomon-like judgment from the S.M.A.E. " That where such record attempts are made at meetings to which the public are admitted, the existing competition rules, with emphasis on those appertaining to safety, must apply, but for private record attempts models may be flown with no restriction on the line diameter used."

WHERE CAN IT BE ?

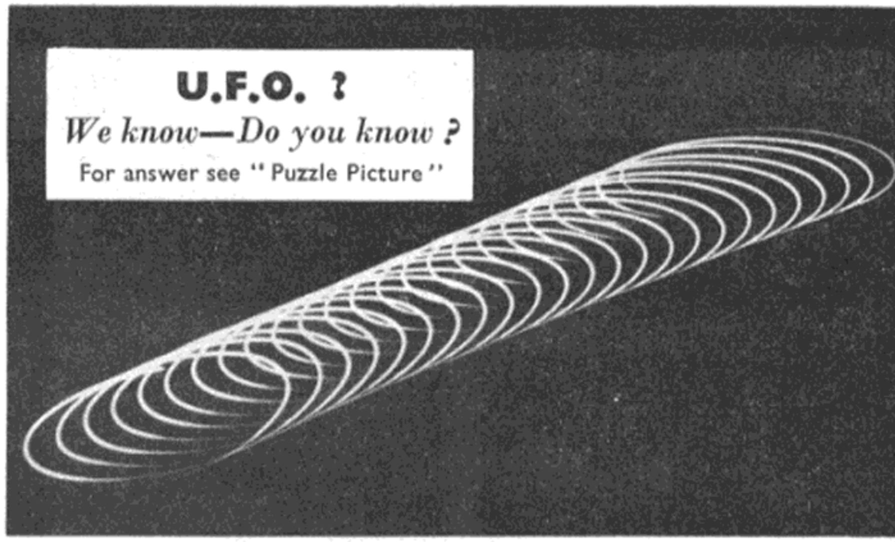
OH where, oh where is the Whitney Straight Trophy ? This was presented at the 1954 S.M.A.E. prize-giving and dinner but, sad to relate, no record was made of the recipient. To avoid unnecessary detective work will the person holding this trophy please get in touch with the S.M.A.E. at once.

SLIDE, RULE, SLIDE

THIS is a problem for the slide rule experts, concerning speed records. Only free flight model speed records are timed as the average of two runs in opposite directions, but such averages are widely used for full size aircraft, boat and car records, etc.

Now to take a simple and rather extreme example: suppose the course is one mile and the timed speeds are 120 m.p.h. and 60 m.p.h. for two runs. The average speed would obviously be 90 m.p.h.

But now look at it this way. On the first run, travelling at 120 m.p.h., time for the run was obviously 30 seconds. Similarly, on the 60 m.p.h. run, time to complete the mile was 60 seconds. In other words, a total of 90 seconds to complete a total distance of *two* miles. And that works out at an average speed of only 80 m.p.h.



PUZZLE PICTURE

WHEN this picture arrived at the " M.A." office, we passed it round for identification—and guesses ranged from a white hot coil spring to a flying saucer formation on night manoeuvres !

Actually it is a time exposure of a helicopter flying at night with rotor tip lights, which it is hoped will prove an aid to immediate identification of the 'copters and also to helicopter formation flying. At present it is all too easy to formate too closely—especially in poor visibility—and discover at first hand why the Americans call helicopters "choppers" !

Farewell Fairlop !

IT would appear that at long last the fate of Fairlop Aerodrome has been decided. Test borings by the Ilford Borough Council have revealed that large deposits of sand and gravel lie beneath its surface. This discovery has inevitably ended visions of its becoming an " open space," or park, under which circumstances, some model flying might still have been possible.

FINNISH WINTER COMPETITION

OUR Finnish correspondent Carl Schlucking has sent the following details of the tenth winter competition held at Helsinki recently. The fact that the contest was held at all speaks highly for the enthusiasm of these modellers. There was a heavy snow fall, a wind force of 5-6 Beauforts, and the thermometer was steady at—17 degrees centigrade. With snow walls against the wind and a heated tent for the recorders, the flying site closely resembled an Arctic camp. In spite of the conditions several competitors completed their three flights, aggregate times of the winners being :—

A/1 Gliders:		
1st:	R. Hyvarinen	194.4 sec.
2nd:	E. Lamberg	177.0 sec.
3rd:	B. Storgards	157.0 sec.
A/2 Gliders:		
1st:	H. Spring	220.7 sec.
2nd:	L. Santala	198.9 sec.
3rd:	Vaisanen	168.8 sec.
D/1 Power:		
1st:	S. Nurminen	203.2 sec.

Private Enterprise—but !

AS in recent years, the S.M.A.E. will endeavour to finance teams for the four World Championship Events. There are, however, a number of other international contests included in the F.A.I. Calendar and the S.M.A.E., through whom all entries must be made, will be prepared to accept private entries subject to the following considerations :—

(a) That the entrants are prepared to pay all travelling expenses, entry fees, etc., themselves.

(b) That their entries are received by the S.M.A.E. at least six weeks before the date of contests.

In the event of more entries being received by the S.M.A.E. than are permitted by the regulations, they will, if possible, arrange for an elimination contest to be held. Failing this, the applicants' past contest records will be taken into consideration in selecting a team.

There is a strong feeling amongst members of the S.M.A.E. Council at the present time that, in deciding whether to sponsor entries for these contests, the main consideration should be, *not* the willingness of the applicant to meet his own expenses, but whether he has proved that he is capable of putting up a performance of true international standard.

Indoor Nationals

EFFORTS to again obtain the use of one of the hangars at Cardington Aerodrome for indoor flying have failed and the C.O. of this R.A.F. station has informed the S.M.A.E. that there is no likelihood of providing facilities there for indoor flying in the future.

The N.W. Area have ascertained that the cost of hiring the Corn Exchange, Manchester, would be £30 for one day and £40 for two days. It has been suggested that if sufficient support were assured the meeting might be held in December 1956. Those who would be prepared to attend such a meeting and to contribute towards its cost are asked to communicate with the S.M.A.E. as soon as possible.

STOP PRESS

Notification has just been received from the S.M.A.E. that the NATS will NOT be held at R.A.F. Waterbeach, as the aerodrome is required for operational flying.

The Supermarine

SPITFIRE Mk. Vb

A 25 in. SPAN CONTROL LINE MODEL FOR 1.5 c.c. ENGINES DESIGNED BY S. BRUCE

In the years that have passed since the war, the name *Spitfire* has become legendary. Scale enthusiasts will, we are sure, welcome this C/L model of what has been described as the greatest fighter ever produced.

Fuselage

Build crutch on plan and add formers in required positions. Add hardwood engine bearers, and cement plywood nose former in place. Cement bellcrank assembly in position shown.

The fuselage is covered with soft $\frac{1}{16}$ sheet. Cover top of fuselage leaving aperture for cockpit. Cut slot at rear for fin. Place push rod in position, then cover bottom half taking care to have the correct aerofoil section at wing root.

Lightly cement or pin top nose block in place and sandpaper to correct shape, then remove and hollow out. Repeat with bottom nose block, drilling to clear engine cylinder. Cement lower block in position. Add four small dowels in top nose block for fixing. Drill engine bearers to suit motor used and add any internal cockpit details required.

Wings

Pin centre spar to plan and cement plywood centre section in position. Position the wing ribs, and then cement. Remove from board and join other centre spar to plywood centre piece making sure dihedral is the same. Pin to board and cement ribs in place. Cement L.E. (first section) into place on half of wing. When dry cement second section to first and leave to dry. Repeat with other half of wing. Sandpaper L.E. to correct shape. Bind undercarriage in position and add gussets ; cement well.

Sheet bottom of wings with $\frac{1}{16}$ balsa. Leave ample overlap at T.E. and when dry sandpaper to conform to aerofoil. Repeat with top surfaces by starting at L.E. and working back. Allow overlap at T.E. Cement T.E. and hold together with spring clothes pegs. Trim ends and cement wing tip blocks into place. Add line guides in port wing. Sandpaper to section, cement radiator and oil cooling ducts in place.

Tail Unit

Make fin from hard grade balsa, and sandpaper to aerofoil section. After shaping cut down rudder line as shown. Reset rudder 2-3 deg. starboard, and cement well. Cut out notch on bottom of fin to allow complete tailplane movement. Do not cement into position until tailplane has been assembled.

Make the tailplane from hard grade balsa, and sandpaper to aerofoil section. Cut out elevator shape and add fabric hinges. Allow free movement up and down. Add sheet tin horn to elevator section.

Assembly and Finish

Connect push rod to elevator horn and cement tailplane in position, making sure of free elevator movement. Cement fin into position so as not to foul elevator movement. Add small scrap balsa between fin, tailplane and rear of fuselage. Cement cardboard fillet in position at rear of wings, after mating to the fuselage.

Add wheel covers, made of sheet tin soldered to undercarriage wire. Cement section of bubble canopy in place after painting inside of cockpit. Cement forward windscreen in position. Add wireless mast at rear of cockpit and dummy mirror above windscreen.

After sanding smooth all over, brush on six coats of sealing compound, sandpapering lightly between each coat after drying. Draw line from end of fillet, to bottom rear of fuselage, and from T.E. to nose. Paint from this line downwards and all undersurfaces, sea grey medium.

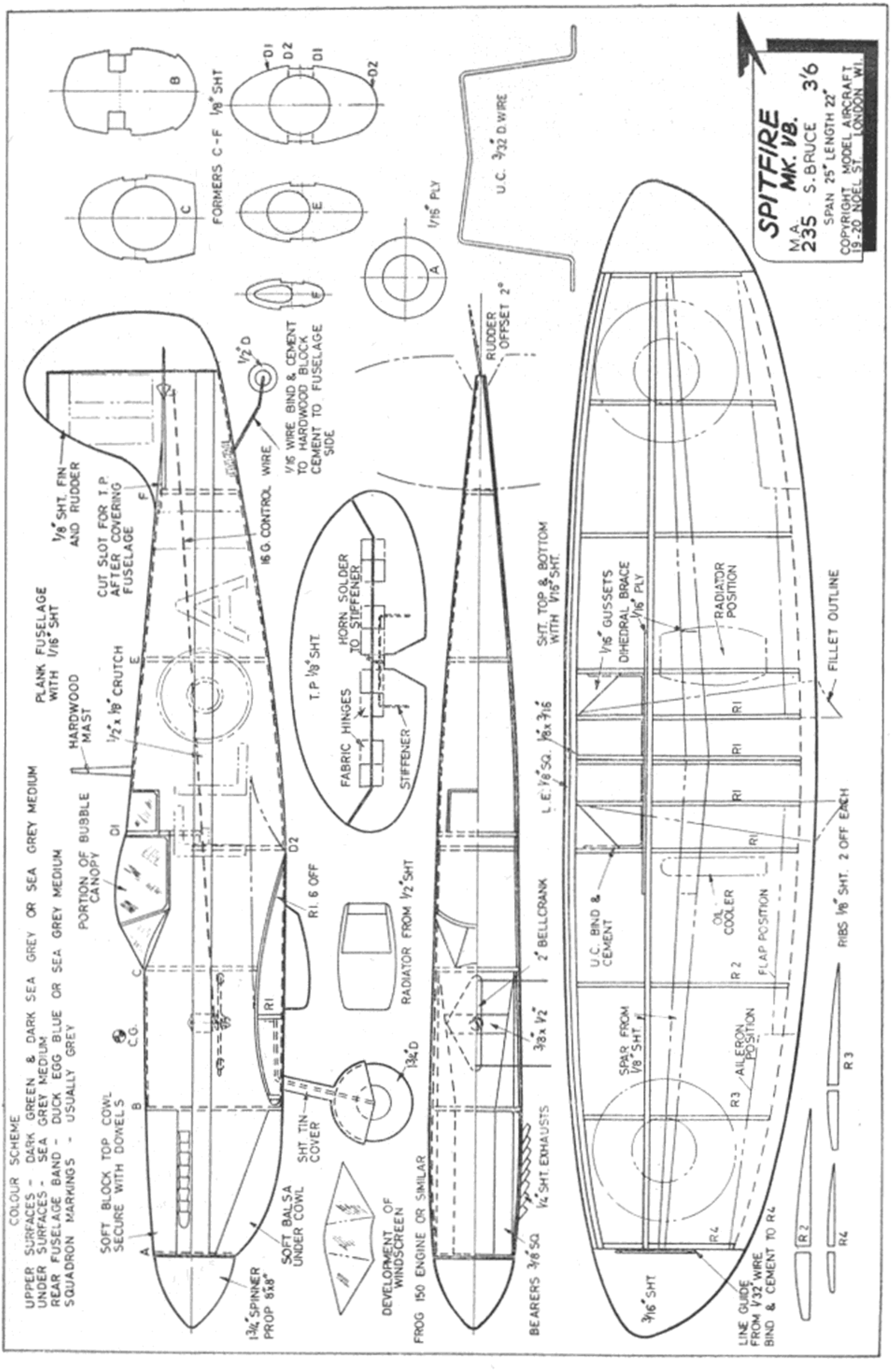
Paint top surfaces dark green and dark sea grey. Authentic markings can be obtained from wartime photographs.

Add transfers on fuselage and wings and leave to dry; then give coat of banana oil. If a " hot " engine is used, give two coats of fuel proofer and leave to dry.

Flying

Before any test flights are made check for balance. Do NOT have the model tail heavy.

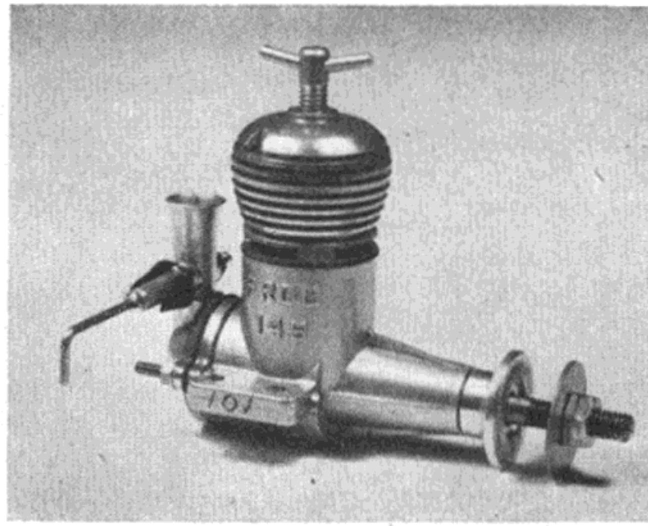
If desired, attach a piece of metal to the outside wing with tape ; this holds the model tight on the end of the lines for testing. This weight can be removed after the feel of the model is obtained.



FULL SIZE WORKING DRAWINGS ARE OBTAINABLE FROM YOUR LOCAL DEALER, OR BY POST FROM THE "MODEL AIRCRAFT" PLANS DEPARTMENT 19-20, NOEL STREET, LONDON, W.1, 3s. 6d., POST FREE

Engine Tests

No. 84. THE NEW FROG 149

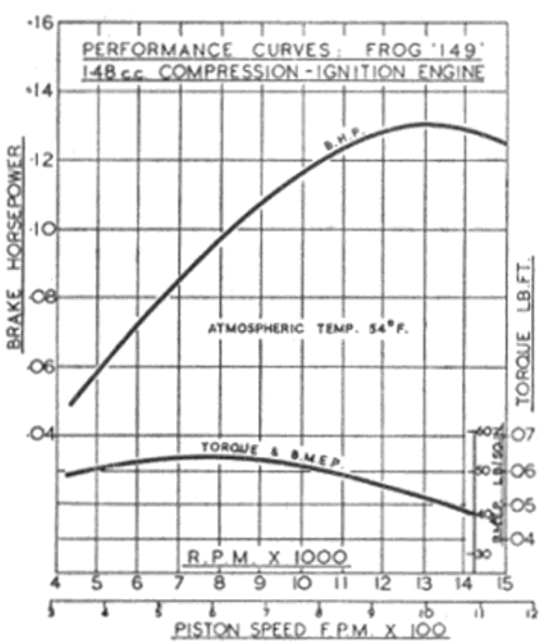


THE Frog 149 is the second new model aircraft engine to appear recently from International Model Aircraft.

Unlike the 249 model (see January 1956 M.A.), which was an entirely new engine, interesting by virtue of original treatment of details, although otherwise of conventional layout, the new 149 is based on the well-established Frog 150 model but embodies something completely new in the system of induction employed.

This is " Vibra-matic " induction, the name under which a new Frog system of automatic intake valving is to be known. Fundamentally, the system is similar to the reed valve in so far as the valve is automatically opened and closed by crankcase depression and compression. Instead of a flexible copper-beryllium or spring brass reed, however, a shim steel disc backed by a coil spring is used. The idea is not exactly new and a similar scheme, in principle (albeit to supplement a conventional shaft rotary valve and not to replace it), is standardised on certain small McCoy engines, but the Frog is, at present, the only engine in production with this type of induction valve, and the design of the "Vibra-matic" valve unit is most interesting.

The unit consists essentially of four parts, which can best be described as follows: (a) a carburettor unit with downdraught intake opening into a large volume induction chamber, the rim of which is ground flat and is covered by (b) the valve disc, of 21/64 in. dia., which is held in contact by (c) a coil spring of similar diameter. The latter two components are housed within (d) a deeply recessed crankcase backplate which has sections cut away top and bottom to allow gas entry into the crankcase.



That the unit has certain advantages to offer over the conventional shaft valve 150 was soon made apparent in the course of our tests. Maximum power output was increased by nearly 10 per cent. over that of the 150, which has identical cylinder dimensions and porting, while fuel consumption was noticeably reduced. The more convenient and safer position of the needle-valve at the rear of the engine was also appreciated.

Compared with the earlier type 150s, the new 149 scores on appearance. Apart from the more interesting shape occasioned by the use of the new rear induction unit, the engine is better finished, the castings being tumbled (in sawdust) to a smooth satin surface, while the cylinder barrel is colour-anodised to an attractive copper colour.

Specification

Type: Single-cylinder, air-cooled, two-stroke cycle, compression ignition. " Vibra-matic " clapper-valve induction via the rear crankcase unit. No sub-piston supplementary air induction. Circumferential exhaust and transfer porting with flat top piston.

Swept Volume: 1.480 c.c. (0.0903 cu. in.).

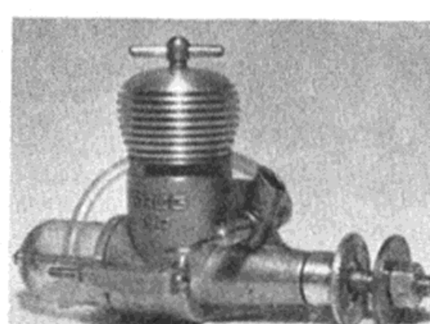
Bore: 0.500 in. Stroke: 0.460 in.

Compression Ratio: Variable.

Weight: 3.3 oz.

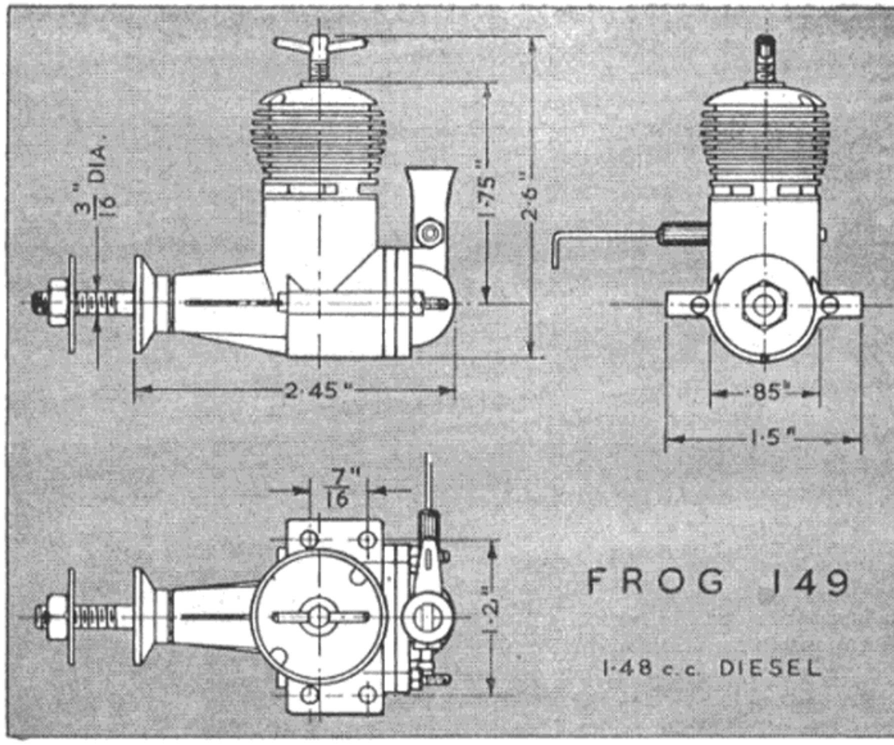
General Structural Data

Pressure die-cast LAC.112A alloy crankcase and induction unit housing. Cylinder sleeve of case-hardening mild steel with three radial exhaust



The old 150: compare with heading photo for main differences between the two models.

ports and three inclined transfer ports. Piston and contra-piston of "Brico" centrifugal cast iron. Drop-forged RR.56 alloy connecting-rod. One piece crankshaft of case-hardening mild steel with splined hub fitting and steel-backed sintered-bronze main bearing. Induction valve disc of 0.005 in. shim steel. Spraybar type needle-valve assembly with positive spring ratchet. Beam mounting lugs.



Test Engine Data

Running time prior to test: 1 hour.

Fuel used: 37 per cent. technical ether BSS.579, 30 per cent. Shell "Royal Standard" kerosene, 30 per cent. Castrol "M," 3 per cent. amyl-nitrate.

Performance

Initial tests on our test 149 were carried out during somewhat severe weather, outside temperature being 7 deg. below freezing point. The first start was attempted before the test-house had warmed up when the air temperature was only about 35 deg. The 149, however, started readily after a generous prime. The engine does seem to prefer fairly generous priming (especially into the rear intake) for an initial start. There is no great danger of flooding the engine, since excess fuel can be worked off quite easily with the compression reduced.

The engine has similar running characteristics to the rotary valve model, but for two exceptions. Firstly, there is a noticeable time lag (due to the long intake and large volume induction accumulator chamber) between the moment of making an adjustment to the mixture strength and its effect on the running of the engine. Therefore, needle-valve readjustments should be made gradually and one should be ready, when weakening the mixture, to open up again quickly at the first sign of starvation, to avoid stopping the motor. The second point concerns all auto-ignition engines without timed induction; namely, the ability of such motors to run in either direction and their habit of sometimes starting in the reverse direction. On the Frog, this only happened when starting on small, light propellers (allowing speeds of over 11,000 r.p.m.) and when the mixture was a little too rich. Stopping the engine and restarting was generally a first-time cure.

Actually, the general behaviour of the engine was more pleasing than that of the 150. Over a wide range of speeds (8,000-12,000 r.p.m.) it was particularly noticeable how the 149 would hold extremely steady readings. Equally obvious was the fact that "Vibra-matic" induction on this particular engine gives considerably reduced fuel consumption.

There was no tendency for the contra-piston to seize, but the tommy-bar on the compression lever would seem to be a trifle too short for comfortable manipulation by youngsters. There is a tendency to "bite" when starting on very small props intended for shaft speeds of 12,000 r.p.m. and above, but this is not of any great importance as such speeds are, in any case, outside the most commonly used r.p.m. range.

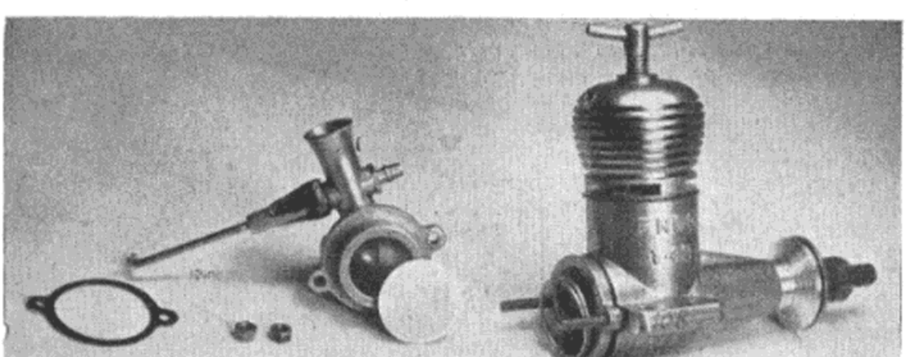
The peak output reached on our torque-reaction dynamometer test of 0.13 b.h.p. at 13,000 r.p.m. is, of course, very good. Maximum torque was reached at around 8,000 r.p.m. where the equivalent of 53-54 lb./sq. in. b.m.e.p. was registered.

The only bother experienced during tests was the unscrewing of the cylinder from the crankcase when the revolutions had reached about 10,500 r.p.m. This is a not uncommon occurrence with screw-in cylinders during bench tests. It is less likely to happen when the engine is installed in a model and, in any case, a permanent cure was effected on the 149 by retightening the cylinder while the engine was still hot.

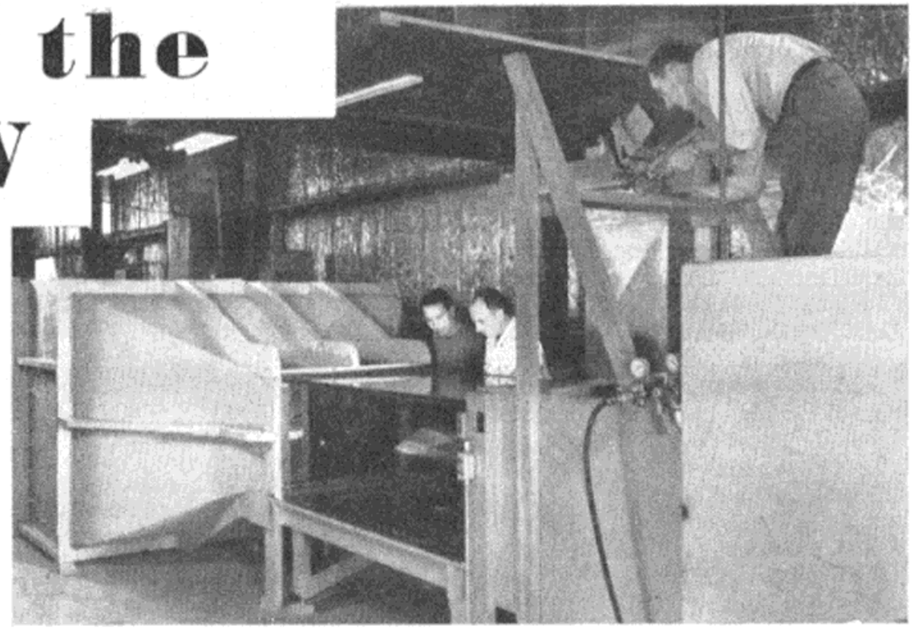
Power/Weight Ratio (as tested): 0.612 b.h.p./lb.

Specific Output (as tested): 88 b.h.p./litre.

The component parts of the "Vibra-matic" induction are clearly shown in this exploded photograph. The shim steel disc valve is against the backplate, while the coil spring can be seen protruding from the rear of the crankcase.



SEEING the AIRFLOW



The heading photo shows a general view of the wind tunnel with a model actually undergoing test.

Details of the Lippisch Wind Tunnel with photos of aerofoils under test

IT is the dream of every designer of aircraft—model or full size—to be able to *see* the airflow instead of having to visualise in his mind's eye, or guess, what is going on in flight. Disrupted airflow means high drag and loss of performance. Breakaway of the airflow from a wing produces a stall and loss of lift. Even in normal wind tunnels these effects can only be estimated by measurement of the changing forces acting on the test model.

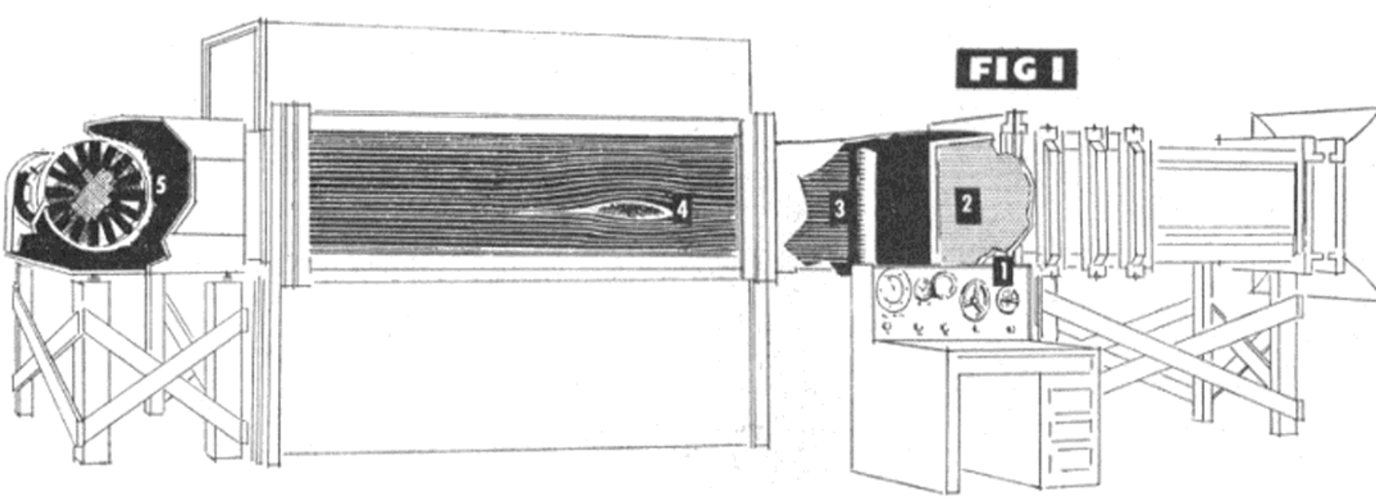
The smoke tunnel brings airflow into sharp visibility. It is similar in construction to any other wind tunnel, but with the airflow pattern made to show up by feeding smoke filaments into the airstream through rows of small tubes. These smoke filaments then trace out the streamlines and curl up into vortices and eddies in the turbulent regions.

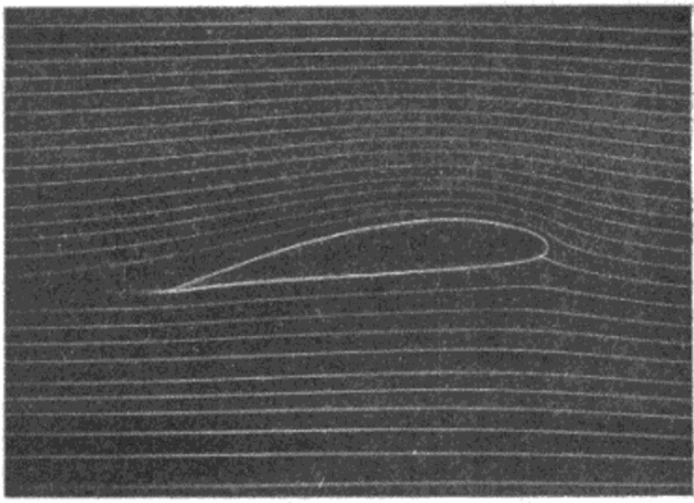
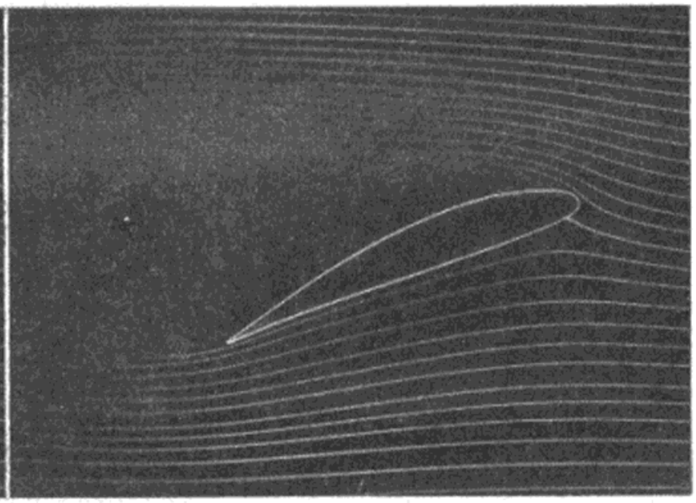
One of the main secrets of a successful smoke tunnel—or any wind tunnel, for that matter—is to get a very low turbulence in the airstream. In the normal process of drawing air through a tunnel with a fan, or blowing it through, considerable turbulence is created and the flow within the tunnel is quite unlike normal F/F airflow. The tunnel design recently created for the Collins Radio Company of America by ex-German aircraft designer, Dr. Lippisch, gets over this trouble by introducing a tranquilising chamber before the actual test section of the tunnel, in which wire mesh screens break up the turbulent stream and smooth it out. Any remaining turbulence is smoothed on flowing through the high-contraction nozzle leading into the test section.

A general view of the tunnel is shown in Fig. 1. The airflow is from right to left, i.e., the fan or blower (5) sucks air through the system. The tranquilising screens are shown at (2) and the model position in the test section at (4). The smoke nozzles are at (3) and the controls for the wind tunnel mounted on the console (1).

A feature of smoke patterns in a low turbulence wind tunnel is that they are smooth and steady, and so, readily photographed. The actual photographs reproduced here were obtained on typical model sections at speeds of up to 80 ft. per sec. and do, roughly parallel the sort of airflow behaviour one would expect on normal F/F models. The way in which airflow accelerates is shown by injecting pulses of smoke into the tunnel, instead of a steady stream. Thus the behaviour of a set of smoke "pulses," equivalent to an advancing front of air particles, can be examined on reaching a body—showing, for instance, which sections of the airstream are accelerated and which retarded.

FIG I



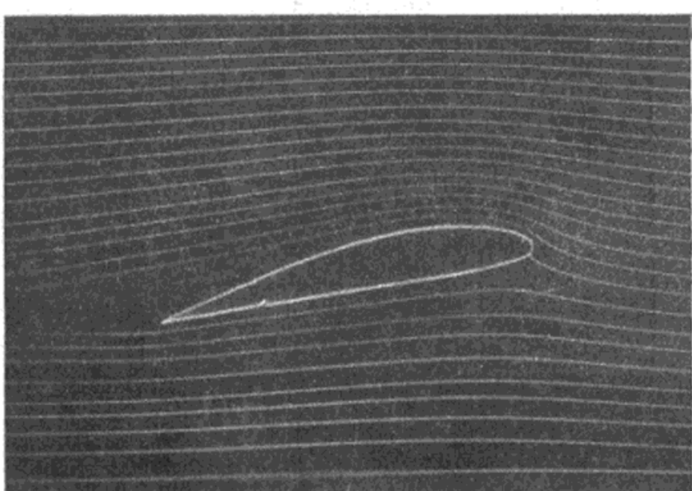
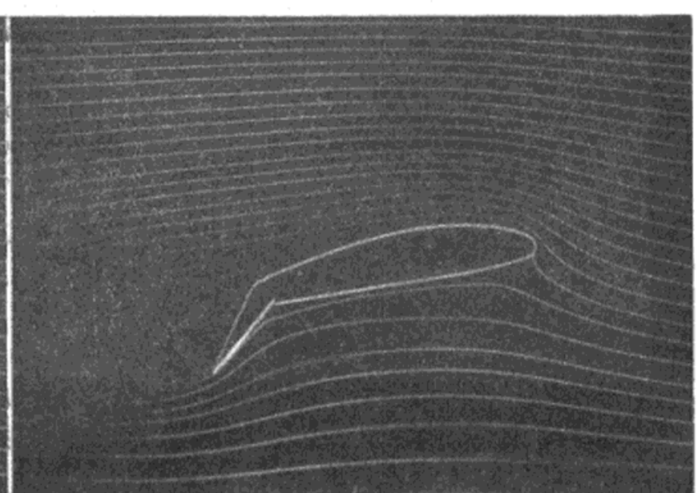
The following sequence of photographs, which are reproduced by kind permission of the Collins Radio Company of America, show various wing sections and plan shapes under visual airflow test in their wind tunnel.

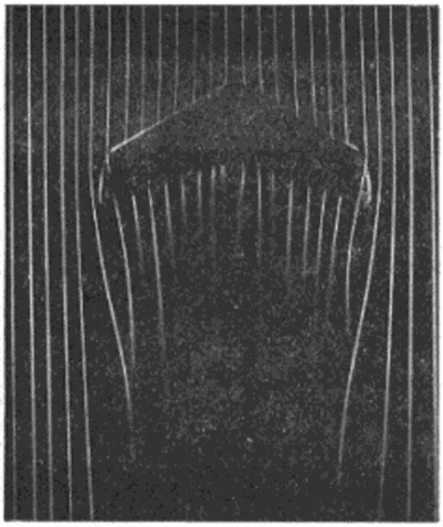
These two photographs show a typical airflow pattern around an aerofoil, first at a low angle of attack (left) and then at a very high angle of attack (right). In the left-hand photograph the airflow follows over the top curvature of the section smoothly, leaving it just about mid-section, but still curving downwards. The squeezing together of the streamlines at the top indicates a reduction of pressure, which is the main source of lift. A further, much smaller, amount of lift is produced by downward deflection of the airflow by the bottom surface. In the right-hand photograph the aerofoil has been inclined at such a high angle of attack that the airflow breaks away from the top surface right from the leading edge. The aerofoil is completely stalled and the dark region behind it consists of highly turbulent air, creating considerable drag.

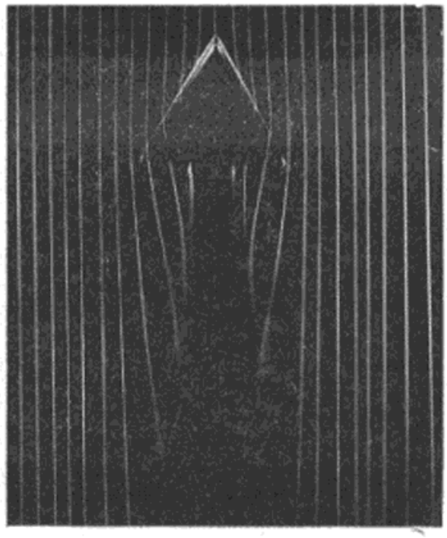
The conditions shown are a little more favourable than with normal sizes of model aerofoils in F/F. The separation point at low angles of attack is a little further forward than in the left-hand photograph and the actual stall occurs at 8-12 degrees. At normal model speeds the airflow would turn up around the trailing edge of the wing more strongly at the angle of attack corresponding to the right-hand photograph.

In the left-hand photograph below a similar section is shown at a slightly higher angle of attack. Note that the airflow is breaking away a little nearer the leading edge and also the point at which the airflow is crowding together is more forward. This means that the centre of lift (centre of pressure) has also moved forward, which is a normal characteristic with cambered aerofoils.

Actually this particular section is fitted with a flapped trailing edge. Lowering this flap to a high angle without changing the angle of attack modifies the airflow to the extent shown. Upper surface flow is not greatly affected, but the flow over the bottom surface of the flap is deflected downwards strongly. This increases lift but also greatly increases drag, as indicated by the far wider dark zone (turbulent air) behind the wing. On models, a flapped trailing edge is used only at moderate angles—i.e. with a flap angle of not more than 10 degrees—in order to minimise this drag increase and so obtain benefits from the extra lift. Extra lift *and* drag are beneficial to aircraft when landing, in reducing forward speed and increasing the angle of approach.





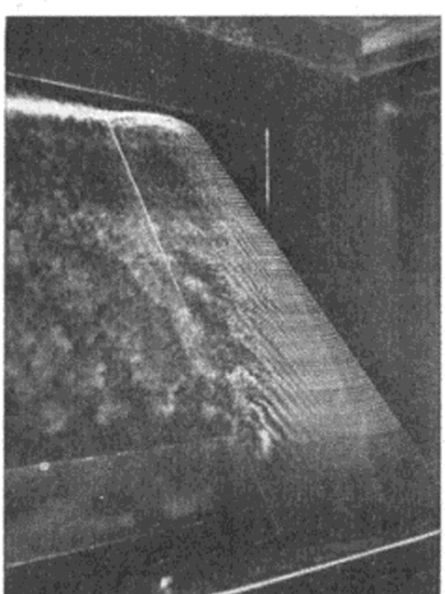
In these two photographs, airflow over two wings is shown in plan form. On the left is a typical swept wing with raked tips. The angle of attack is quite moderate and the special points of interest are the twisting of the airflow past the tips (actually the air is trying to roll up into a vortex trailing from each tip) and the deformation of the airflow over the wing itself. The position of individual filaments reaching the leading edge and leaving the trailing edge show that they are being inclined *inwards*. This view is looking down on top of the wing.

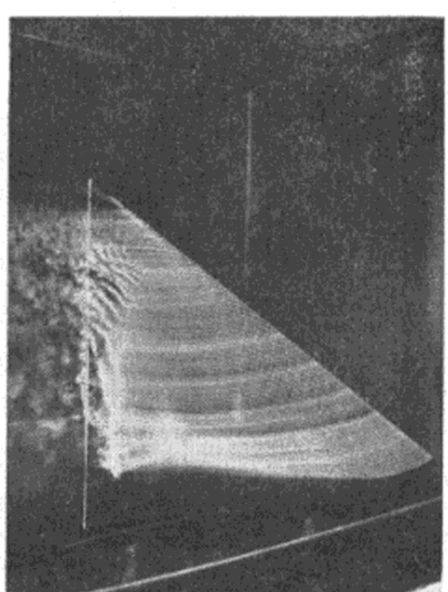
The flow with the delta wing shows these characteristics even more clearly. The tip vortex is much stronger, but here the angle of attack is also probably higher. One characteristic of delta wings (including models) is that they do not stall until a very high angle of attack—somewhere in the region of 40 deg.—is reached.

Compare these two photographs with the ones just described. These were obtained in a three-dimensional flow tunnel investigating boundary layer flow conditions. The smoke filaments are ejected into the airflow at the leading edge of the model, which was actually mounted horizontally in the tunnel.

Separation and break-up of the boundary layer on the swept wing is clearly seen by the disruption of the smoke filaments, it being particularly interesting to note how the transition point moves forward from root to tip. The smooth filaments denote that the boundary layer flow in this region is laminar, changing to turbulent flow soon after.

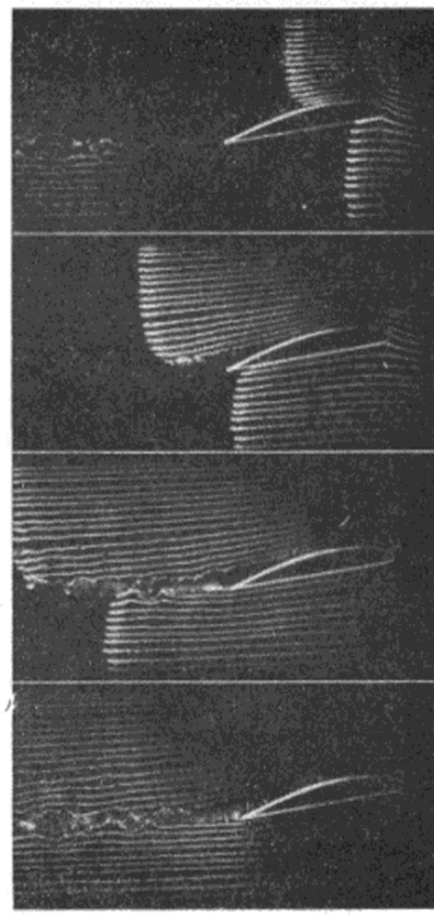
The flow over the delta wing pattern is even more interesting because of the characteristic curved flow pattern, known as Schlichting waves. The airflow is actually turned from its head-on path to sweep across the wing in an arc.





Aerofoil Sequence

The sequence of photographs below was obtained with smoke pulses. All the smoke particles started off together, i.e. in a vertical line, from the right-hand side. Having met the wing and been parted by the leading edge, flow over the lower surface is retarded and that over the upper surface speeded up. Just how strong this effect is, is seen in the first photograph, the upper surface flow having passed the mid-point of the aerofoil by the time the lower surface flow has really only just got started. Note, too, how the air next to the wing is being slowed down relative to the main stream by friction. This is the cause of profile drag.



In the second photograph the bottom airflow is just reaching the trailing edge but the top airflow has advanced well past it. The two eventually join, as in the third photograph, with an area of turbulence between. This is the wake drag, largely dependent in value on the difference in the two stream velocities, and hence the lift. The complete wake does, of course, also embrace the profile drag. The drag produced as a result of lift generation is known as induced drag. With no lift there is no induced drag—only profile drag. Note in the fourth photograph how the turbulent wake extends well downstream. A tailplane placed in this region would be operating in very disturbed air.

Letters

Continued from page 125

modellers—the experienced ones usually know it all anyway.

2. The ribbing method recommended by Mr. Stock would, it seems to me, be an extremely delicate operation in 1/72 scale. Although he says it is simple when the right technique is evolved, he neglects to explain just how simple it is.

3. To say the phrases " and quicker " and " less trouble " have no place in modelling is absurd : a method which achieves the same end with less trouble would be adopted by most folk. Some 1/72 scale models I entered in M.E. Exhibitions in 1951 and '52 were good enough to win H.C. and V.H.C. Diplomas.

4. It is not always possible to be both explicit and concise; it is easy enough to write at length, but editors are apt to axe such MSS., and, in fact, did so to quite a lot of my *Nimrod* text.

5. At the time of drawing, no details of arrestor hook and installation were to hand and such gen as I had accumulated had taken a considerable time to compile. The general outlines are accurate and when one has that much to go on, extra detail can usually be incorporated from photographs; one of the *Nimrod* was submitted but not printed. [Owing to copyright difficulties—Ed.]

6. The omission of the gun troughs was an oversight. They were simply channels of part-circular section impressed in the top metal panelling, running parallel to the centre line and approximately 6 in. either side of it. They commenced at the station of the rear centre section struts and extended forward (about 5 ft.) until they " blended out " in the downward curvature of the cowl.

7. I do not think any pilot would have declined to fly the *Nimrod* simply because it had no armament or hook—indeed it would probably have been much more pleasant to fly!

Yours faithfully,

Luton, Beds. P. L. GRAY.

" AEROMODELLER "

We are asked by the proprietors of " Aeromodeller " to announce that, owing to the dispute in a section of the printing industry, publication of the " Aeromodeller," in common with other periodicals printed in the London area, has been seriously delayed. The proprietors of the " Aeromodeller " wish to express their regret to readers and advertisers for the inconvenience and disappointment caused by this unavoidable delay. Publication will be resumed immediately the printing dispute is settled.

THOSE RULE CHANGES!

. . . the F.A.I. should be made to realise that although aero clubs in certain countries may have autocratic control over modellers, such is not the case here.

W. ANSTRUTHER, Manchester, 10.

. . . . . . I very definitely do not like the reduction in rubber weight, and increase in power loading, and feel that the proposals and decisions were made on the basis of the results of the 1955 World Champs, without due allowance being made for the phenomenal weather conditions. The abolition of the R.O.G. rule is more than welcome, and is a long overdue simplification of contest requirements.

J. O'DONNELL, Whitefield.

. . . The fly-off system of determining contest winners is not satisfactory. Let those with a perfect score at the end of a contest continue to fly to the 3 minute limit until a result is achieved.

A. LEEDS, Liverpool, 15.

. . . Scrub round individual winners and fly as a National team, the chance of teams tying with maximum scores is very unlikely.

G. WALKER, Chester.

. . . . . . the blame (for the changes) can hardly be laid upon that remote, almost mythical, body, the F.A.I.; it must rest squarely upon the member countries thereof. Entries at the last championships totalled 21; votes cast on the proposals totalled 8. This can hardly be called a true majority decision.

P. MULLER, London, S.E.25.

. . . . . . the F.A.I. have made a great mistake in altering the power loading to such an extent. It would have been far better to leave matters as they were and make changes in the actual flying to try to stop fly-offs. This could easily have been done as follows: Engine run 10 sec.; maximum flight 4 min. In this way our present models would still serve us, and everyone would have been happy.

K. B. WHYTE, Comp. Sec., Scottish N.E. Area, Montrose, Angus.

The following letter has been received from Carl Goldberg, the internationally famous modeller.

DEAR SIR,—May I add my thoughts on the new rules established for international gas model free flight competition in 1957?

My initial reaction is that the committee was wise in looking ahead in the attempt to foresee the result of model, and particularly engine, improvements. I believe it was a good move also to increase the power loading, because this tends to increase the importance of aerodynamic design and workmanship, and decrease the importance of the engine. We can all buy the same powerful engines, but the workmanship and aerodynamic design are up to the individual.

Nevertheless, it seems to me that the committee was inconsistent in that for Wakefields it decreased the weight of the rubber motor permitted, and for free flight gas, it doubled the weight of the model.

I have heard no complaints about the method of limiting Wakefield performance, perhaps because it takes for granted that the size and other general characteristics of the type are of the essence, and should not be disturbed.

On the other hand, doubling the weight of the gas model throws out all generally accepted ideas as to a convenient size, and merely retains the engine. With a 2.5 as the most powerful engine in the class, one should use a minimum of 600 sq. in. in the wing and more likely 700 to 900 sq. in. to gain the most duration with 35 oz. weight. Such sizes are too large to be popular, and the idea of F.A.I. free flight may suffer.

If the maximum engine size were limited to $1\frac{1}{2}$ c.c., along with the new rule of 400 grams per c.c., it would enable us substantially to retain our present planes, and would, I believe, be more readily accepted as limiting performance without creating unnecessary problems.

One final word on removal of take-off requirements. The take-off of a contest model is an exciting moment, and its quality is usually regarded as a mark of the skill of the modeller. If some do not like such a requirement, let them hand-launch using a slightly shorter engine run. This system has been in use in the United States for a number of years, now, and it is my impression that it is generally accepted as a fair solution.

Yours faithfully,

Chicago, U.S.A. CARL GOLDBERG.

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.

" Now just think Pringlethorpe—haven't you forgotten something ? "

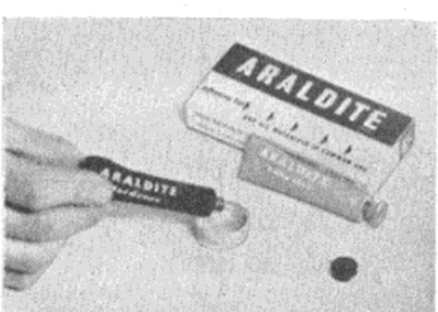
OVER THE COUNTER

It can now be announced officially that the Jetex side of Wilmot Mansour and Company has been acquired by D. Sebel and Company, better known as manufacturers of Mobo toys. Headquarters of Jetex is now established at Erith, Kent, but with the changeover go also Mr. Mansour himself, Bert Judge and Mike Ingram, and two of the technical staff to the new headquarters.

As far as modellers are concerned, the Jetex range will continue as before, with a number of new kits scheduled to go into production this year. During the changeover, existing orders and repairs have been dealt with without any undue delay, but as stocks of a number of kits have run very low—particularly the *Gnat*—future deliveries may be affected slightly. First job of the new factory will be to build up stocks of current lines so a certain delay in production of new kits will be inevitable.

* * *

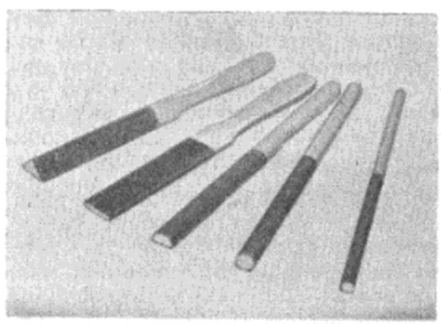
Araldite adhesive, which really does bond metals and other hard-to-stick materials, has up to now only been available to industry. To meet individual demands for this adhesive,



Aero Research have packaged a special form in two tubes—one containing resin and the other hardener—at a price of 6s. The adhesive is made up ready for use by mixing equal quantities of resin and hardener and can be either cold cured (left to set in air) or heat-cured in a matter of 30 min. at 300 deg. F. (about Regulo 1 on most gas stoves). Distributors to the model aircraft trade are Ripmax Ltd.

* * *

Garnafiles, distributed by A. A. Hales, are just the job for intricate sanding, particularly on cut-outs, etc. They consist of wooden holders



shaped like flat, triangular and round files and coated with garnet abrasive. Abrasive grade is selected as most suitable for balsa, although they can also be used on ply, etc. Use them just like a file, but if you want them to last reserve them for those special jobs where ordinary sandpaper will not go. Price is 6d. each, five different shapes available. From your local model shop.

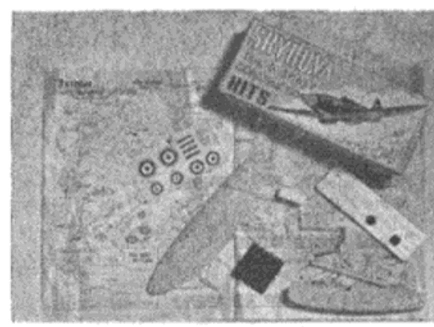
* * *

Designed with the emphasis on *flying*, the new Mercury range of semi-scale duration models feature a plastic airscrew and a pre-fabricated undercarriage: they will retail at 4s. 9d. each.

From the same stable we hear that a series of scale C/L models will be appearing soon. Designed for engines up to 2.5 c.c. and to the Class A team race specification, they are also suitable for sport or combat flying. The range will include the *Mustang* (already in production), *Spitfire*, Me 109, *Zero* and *Tomahawk*. Following the established Mercury tradition the kits will be completely prefabricated and the solid balsa wing will have a ready shaped aerofoil section.

* * *

Of interest to solid fans is the new 1/64 scale *Spitfire* produced by British Model Aircraft (Skyleada). The kit contains a wing, spindle moulded to aerofoil section, and a bandsawn body; the tail surfaces are printed on balsa sheet. Transfers, propeller, wheels, etc., are included, and the only other items



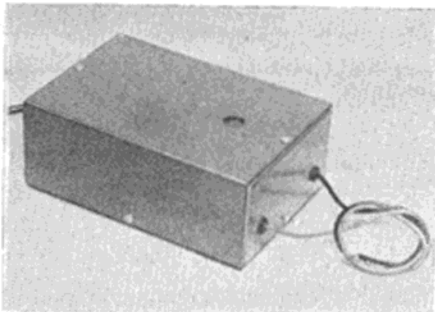
required are those usual "extras," cement and dope. We particularly liked the plan; on one side was printed the usual three view drawings and on the reverse, step by step constructional illustrations. Selling at 2s. 11d. and with its foolproof plan and larger than usual size, this kit represents good value.

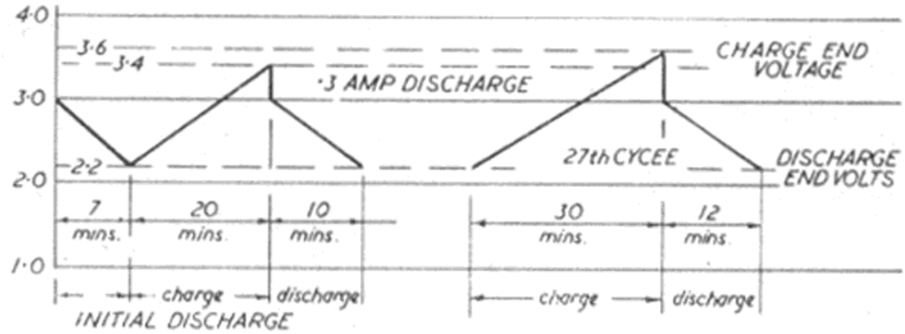
* * *

A feature of many small rubber kits these days is a plastic propeller, generally of 4 or 5 in. dia. Based on the general rule that the larger the propeller the better the performance, Mercury Models have put into production a 6 in. dia. plastic propeller which will be available through the model shops at 11d. Moulded in acetate, the design is very good and the aerofoil section efficient. Just the job, we would say, for those small rubber models up to 20 in. span.

* * *

News for R/C fans is a dry battery charger which really seems to do its stuff. Employing a new "pulsating" charge technique, dissolved zinc is replated back on to the case of the cell, the carbon depolarised, and the electrolyte reactivated. Most spectacular results are achieved with low-





capacity batteries which are used at high current drain (e.g. pen cells for actuators, etc.) where capacity is actually increased with recharging and the battery given up to two dozen or more "lives." Graph shows the result of tests cycling a 3 volt pen battery discharged at 0.3 amp. rate.

The charger is designed to recharge any type of dry battery of from 1.5 to 4.5 volts nominal size, and is self-adjusting as far as charge rate is concerned. Recharging a pen battery takes about 30 min., up to 5 hours for the largest sizes. Cost of operating the charger, which plugs into the mains, is about 1d. for 200 hours' charging time.

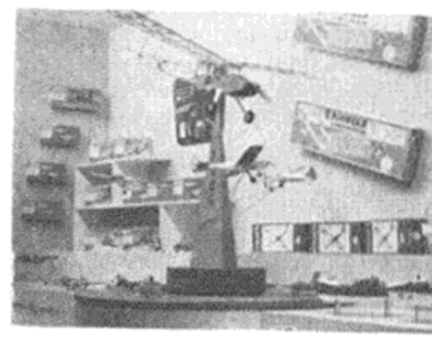
Optimum results depend on catching the battery in time—when the "on load" voltage has dropped to 1.1 volts per cell. It will not recharge completely dead dry batteries, nor will it give satisfactory results with batteries which have been discharged at low rates over a long period.

The unit is being made by a new company of specialist electronic manufacturers, Wardebrooke Electronics, and is available to modellers through the model shops. Trade distributor is H. J. Nicholls Ltd. Price is 35s.

* * *

We hear from Minikscale, manufacturers of the Avian 1/48 solids, that the Hawker *Fury* kit announced some time ago is now ready for delivery and should be in your local model shop by the time you read this issue.

Photo below shows a corner of the model aircraft section at the Triang Trade Fair held last month. Completely new were the attractive 1/72 scale plastic kits, of which the *Hunter* and *Whirlwind* are now in the shops. Appearing soon will be the *Canberra*, *Javelin*, and F-86 E *Sabre*, in that order. Prices range from 5s. 3d. to 8s. 6d.



OVER THE COUNTER KIT REVIEW

DAVIES CHARLTON

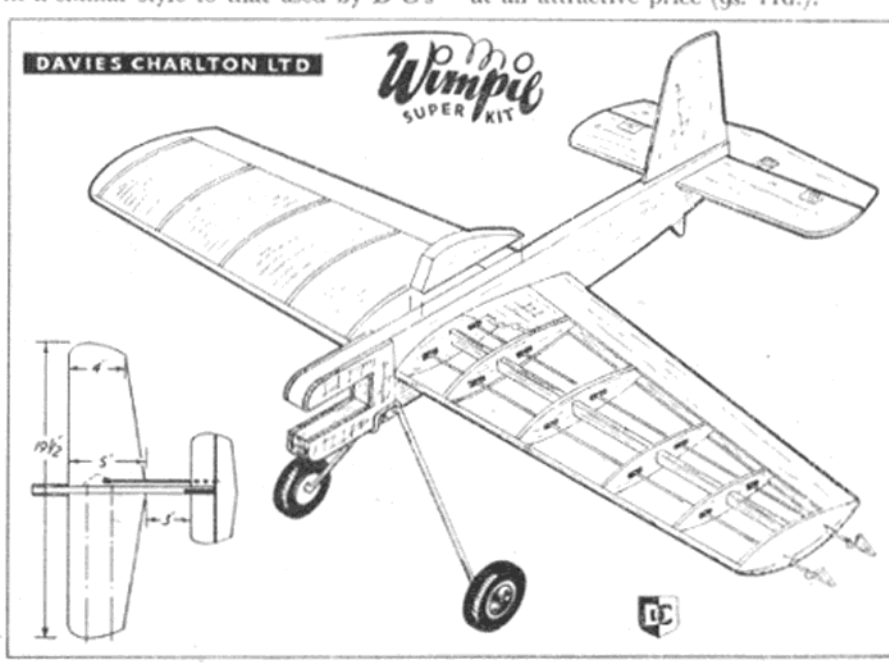
WIMPIE

TO quote Davies Charlton . . ." The kit side is progressing quite well and we have one or two interesting kits coming along during the next few months." Here is the third of their productions, a 19½ in. span profile control-liner.

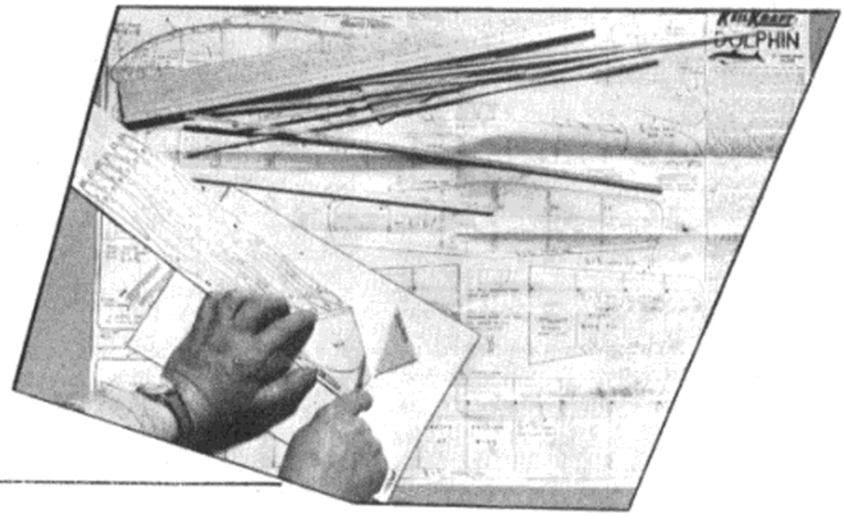
The kit is very complete and includes shaped fuselage parts and fin, die-cut tail and wing ribs. Standard of the die-cutting is excellent and the wood is just the right grade throughout. The envelope of "hardware" includes *all* those little extra items such as wheels, aluminium tubes for the lead-out wires and an adequate supply of nuts and washers.

Essentially this is a model for the novice builder and pilot, and is obviously designed around the Dart or Merlin. It has plenty of wing area and could be aerobatic on the larger engine, although the section is a little on the thin side for stunting. It looks, however, one of those more or less foolproof models which anyone could fly—or learn *how* to fly C/L. But the instructions on flying could get a beginner into a lot of trouble. Fishing line, as recommended, is quite adequate, but the average youngster would probably be tempted to buy nylon or some similar "elastic" line which will cause him nothing but headaches. If you do use fishing line—and how much easier it is to bundle up after the flying session! —it *must* be the non-stretch variety.

As a beginner's model we would have preferred to see the *Wimpie* plan laid out in a similar style to that used by D-C's with their *Chipmunk*. It would have made it a lot easier for the chap attempting perhaps his first model and not even knowing what a built-up trailing edge is; and it would also have been a lot easier if the wing slot and tail slot had been pre-cut in the fuselage, or even if the plan had *shown* how best to go about this job. An attractive kit, nevertheless, at an attractive price (9s. 11d.).



Making a Start



ALL model aeroplanes are built with the aid of full-size drawings or plans. These are a tremendous help. In most cases, the components of the models—fuselage, wing and tail-unit—are built directly over the plan. That is to say, the various strips of wood are pinned down over the plan and the glued joints allowed to set before each assembly is removed.

This system almost eliminates the need for measuring and marking the numerous wood strips, and greatly speeds and simplifies assembly work. It is also far more accurate and can be compared to the " jig " system of construction used in full-size aircraft manufacture.

The NEW M.A. BEGINNERS' COURSE PART II

The first requirement, therefore, is a full-size working plan of the model you wish to make. These can be obtained in three different ways. Firstly, you can buy a kit of materials and parts which will also include the required drawing. Secondly, you may build the model from a magazine plan (although this may require enlarging to full-size unless the model is quite a small one) or you can buy a full-size print from the publishers. Thirdly, you can design and draw up your own model.

Obviously, the latter course cannot be undertaken without a thorough knowledge of model aeroplane design and construction. Therefore, we need concern ourselves only with the first two and, of these, the kit model usually offers the greatest advantage to the newcomer.

Building from a manufacturer's kit is usually no more expensive, and, for a first model, is invariably a good deal cheaper than buying one's own materials. This is because balsa wood, etc., is sold only in standard lengths (usually 3 ft.) and, if a large number of short lengths of different widths and thicknesses is called for, it may be necessary to buy more wood than is strictly necessary.

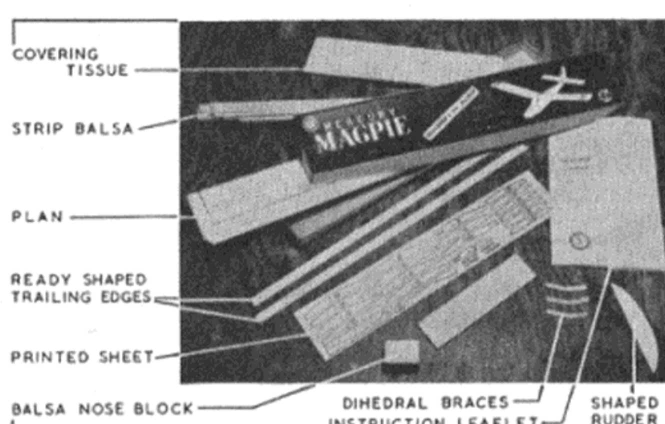
Another point in favour of a kit is that it eliminates some of the more repetitive work which the beginner may, at first, find a little tedious. For example, whereas, when building from bare materials, it is necessary to transfer patterns from the drawings or to make templates of sheet wood parts, these parts, in a kit, are usually printed direct on to the appropriate sheets of wood or are even ready cut out.

When buying your first kit, however, do not make the rather common error of choosing something advanced and complicated merely because the appearance of the finished model appeals to you.

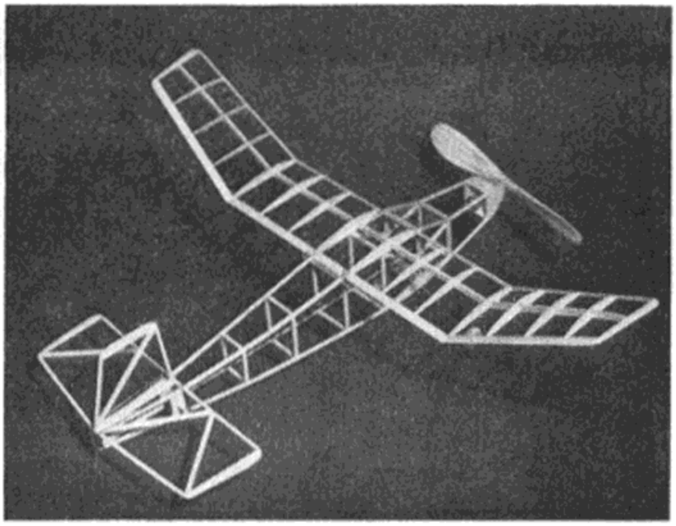
All model aircraft construction is really quite simple. All you need is a little patience and some practice. Therefore, build one or two simple and cheap models to start with. This advice may seem to be rather superfluous, but it is a fact that many beginners are apt to overlook the necessity for learning the simple techniques of model construction and, in doing so, to attempt something which would stand a much better chance of being successfully completed if left until some experience has been gained.

The type of model suggested for a first attempt is a simple built-up glider of 24-30 in. span. It is, of course, possible to make something even simpler, such as an all-sheet balsa glider, but only when you have built up a framework and covered it can you really be said to have acquired some knowledge of model aircraft construction. There are on the market a number of built-up glider kits suitable for the beginner and new kits are being introduced by manufacturers continuously.

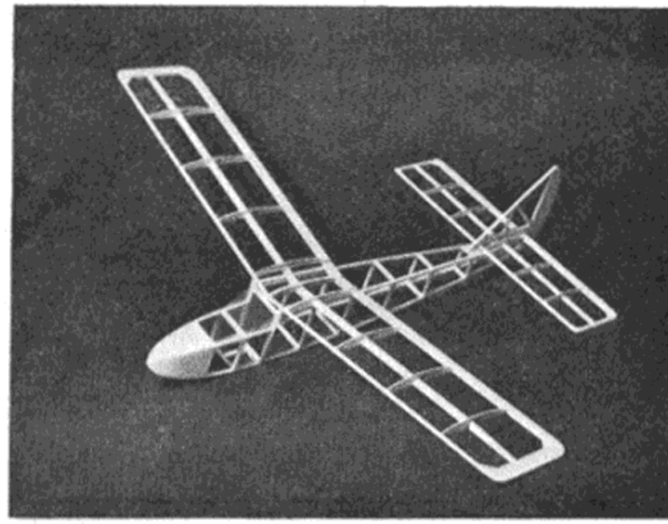
A word now about the basic materials used in model aircraft. The most important of all, of course, is balsa wood. Balsa is wonderful material, it is very light and



TYPICAL BEGINNER'S BUILT-UP GLIDER KIT



Rubber-driven model with built up fuselage. (Skyleada Fledgeling.)



Beginner's glider with built-up fuselage. (Mercury Magpie kit.)

quite soft, so that we rarely need anything more than a razor blade to cut it. Yet it is strong and rigid enough for our purpose because, where necessary, quite thick sectioned balsa can be employed without risk of making the model too heavy, and impairing its flying qualities.

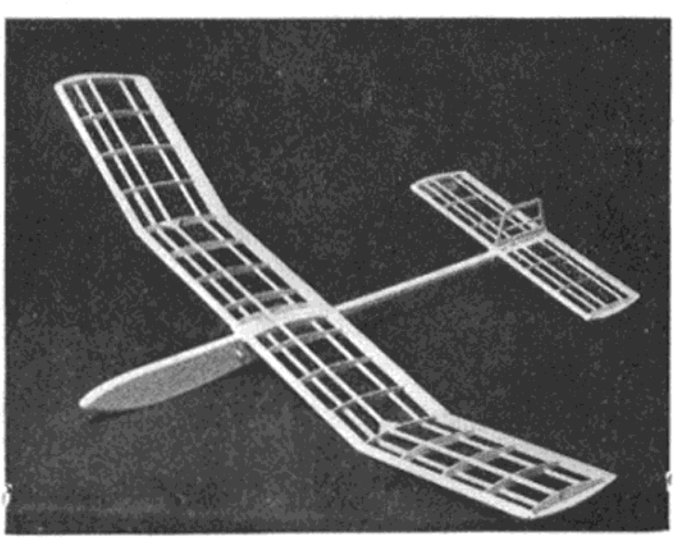
Balsa is sold in so many different sizes that it is very seldom that we even need to plane or saw it. The most popular strip sizes are the 1/16 in., 3/32 in., 1/8 in., 3/16 in. and 1/4 in. square sections. Flat sections, such as 1/16 in. × 1/4 in. and 1/8 in. × 1/2 in. are also obtainable. Larger sizes are also available, but, when more than 1 in. square, are usually classified as "block," rather than strip, balsa. "Sheet" balsa, usually 2 in. or 3 in. wide and 3 ft. long, is also very widely employed and is available in various thicknesses, 1/32 in., 1/16 in., 3/32 in., 1/8 in., 3/16 in. and 1/4 in. being popular.

Balsa for model use is also sometimes graded into various "weights" and "cuts." Balsa wood grows in tropical climates, much of it being imported from Ecuador and it varies a good deal in density and also (depending on the direction in which the logs are sawn to produce different grain formations) in the rigidity or flexibility of sheet stock. However, this is of no immediate importance to the beginner: hard balsa is heavy and soft balsa is light and, at this stage, we need concern ourselves only with the choice of "hard," "medium," or "soft" wood, as and when specified in the plans or instructions.

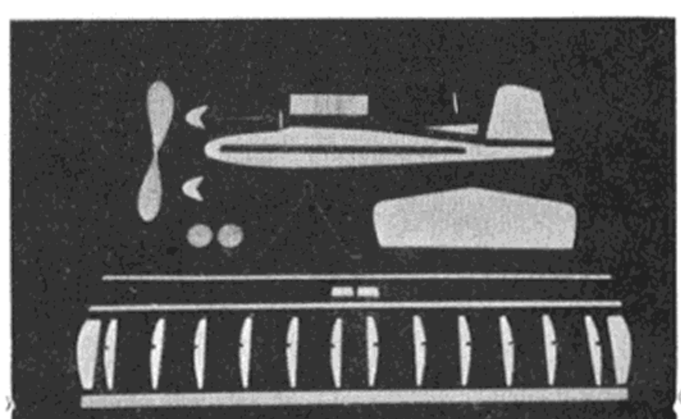
Thin, high-quality bonded plywood (known as "aircraft ply") has certain uses, particularly with larger models and power driven types. It is generally sold, at model shops, in small panels and in thicknesses of 1/32 in. upwards.

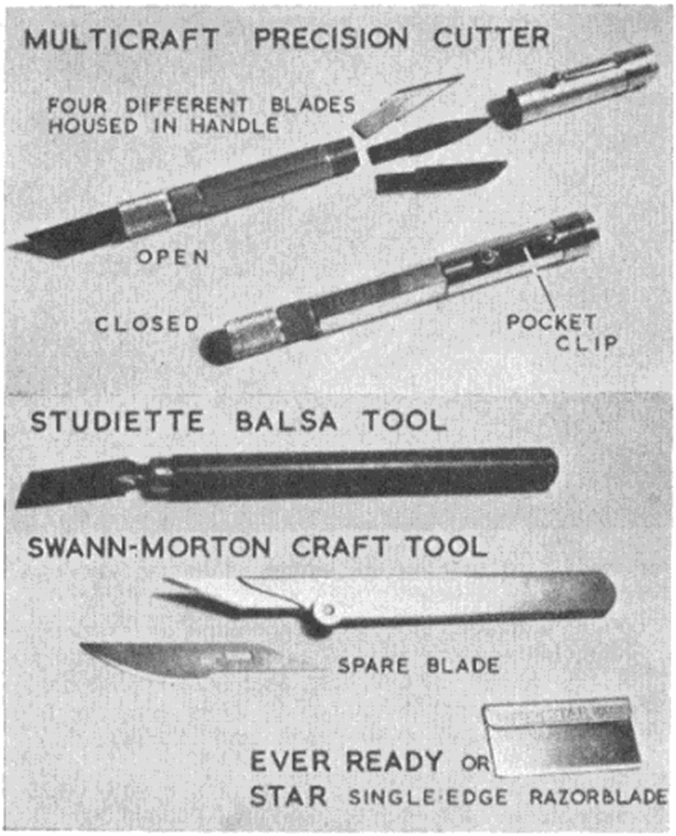
Other woods have only very limited uses in model aircraft work. Obeche is occasionally used by some designers, being available, like balsa, in strips and sheets, but its usefulness is limited, as it is two to three times the weight of balsa. Spruce and birch, much stronger in small sections than balsa, are used by some Continental modellers for wing spars in the thin sectioned wings of high performance competition gliders. Ash and beech are often used for engine bearers and the latter wood is also widely employed, by manufacturers, for power model propellers.

Thick spring-steel wire of 1/16 in. to 1/8 in. diameter is often employed for undercarriage structures and for rubber model propeller shafts. Medium wire (1/32 in. to 1/16 in.) is used for rubber models and for control-line model control systems. Very thin wire, down to .006 in. diameter, is used for control-lines and for small springs, etc. Other metals, mainly brass, aluminium and duralumin in sheet, strip and tubular form, have useful applications, particularly in power models.



Left: Beginner's glider with profile fuselage. (Mercury Gnome kit.)
Below: Beginner's rubber-driven model with profile fuselage. ("Model Airplane News" magazine plan.)



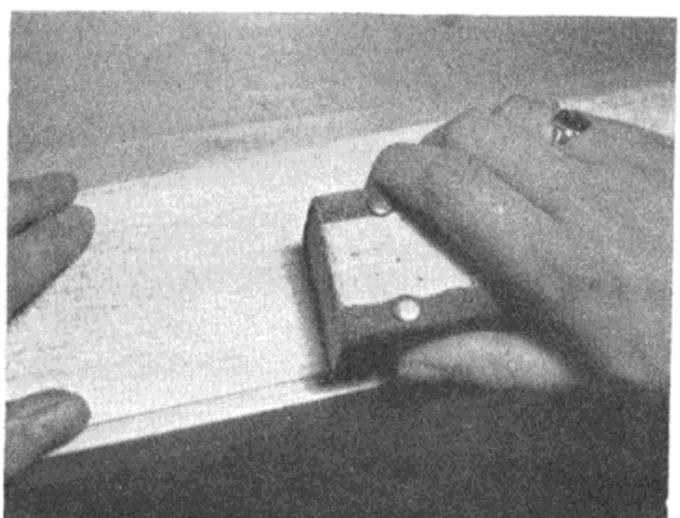


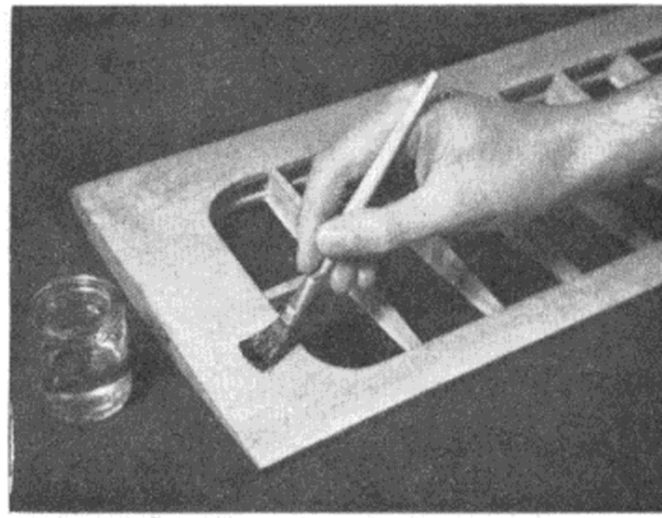
Various types of model knives and the ubiquitous razor-blade.

Second only in importance to balsa in helping us to make models quickly, cleanly and accurately, is the type of "glue" used—actually an extremely quick-drying cellulose cement. A simple butt-joint made with balsa cement is dry in a matter of a minute or two and hardens rapidly. Because of this, assembly can be carried out more or less continuously, there being no occasion to "wait for the glue to dry."

Covering materials consist of lightweight (Japanese) silk, nylon and various types of tissue papers, including the special tissues for model work, such as "Modelspan" (British) and "Silkspan" (American). These latter are available in special "heavyweight" grades for the larger types of power models.

Second in importance to the razor-blade, the sandpaper block.





Brushes. Buy good quality for doping the covering, but a cheaper variety is good enough for bare wood.

Silk is not generally employed in F/F models weighing less than 2 lb., but can be used profitably (being stronger than the tissues) on C/L models of 20 oz. weight and upwards, and also on radio-controlled models. Nylon has the greatest strength and can be employed to great advantage on large R/C models.

These covering materials are attached to the framework with various types of adhesives, which will be described later. After covering, the material is water shrunk and is also "doped" to give it a smooth drum-like surface which, incidentally, also greatly strengthens and stiffens the structure, and renders it airproof.

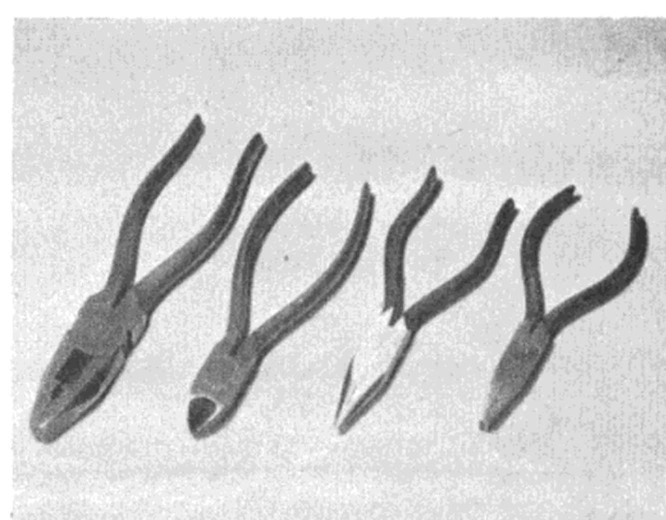
The model aircraft builder is fortunate in that his hobby requires the use of only a very modest tool kit.

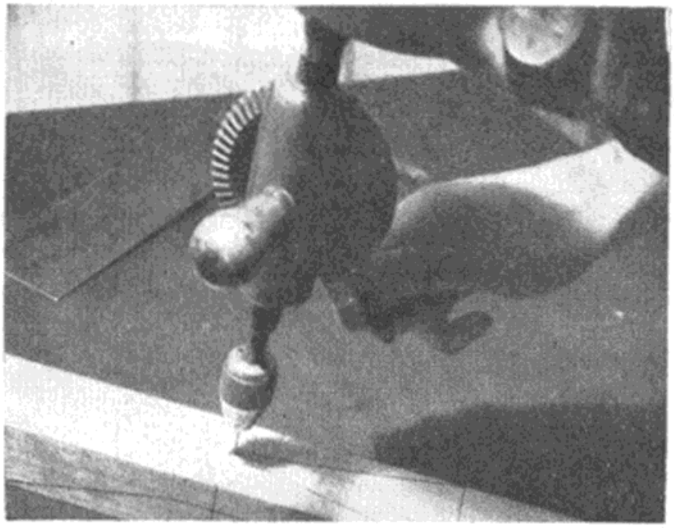
To build an elementary kit model, for example, will require an old razor-blade or modelling knife, a small piece of sandpaper (sometimes included in the kit) and a brush for applying the dope. The use of a pair of pliers may be required if there are any small wire parts—such as towhooks—to be bent to shape.

However, as the modeller progresses, especially if he begins to specialise in power models, a few simple tools will be found useful.

We have mentioned the razor-blade. This is, in fact,

Comb. pliers, side-cutting nippers, round-nose and flat-nose pliers.





A small hand-drill will be found useful.

still one of the most commonly used tools. Even if one possesses a most comprehensive range of modelling knives, the steel-backed single edged razor-blade is still one of the most useful items. However, for getting into corners and rounding sharp curves, a pointed blade is sometimes required, and here one of the wide selection of modelling knives, such as the "X-acto" series, "Studiette," "Ragg," "Multicraft" and "Swann-Morton" will be found very handy. Saws are seldom needed, but a useful tool for making straight, smooth cuts in block balsa or for cutting plywood and other harder materials is the "X-acto" razor-saw. Uses for a fretsaw or coping saw may occasionally be found.

A small supply of sandpaper of the finer grades is invaluable. In most cases, the sandpaper should be pinned around small blocks or strips of wood. For use on balsa, sandpaper blocks will usually take the place of files and rasps, although one or two small files will come in handy for use on metal parts.

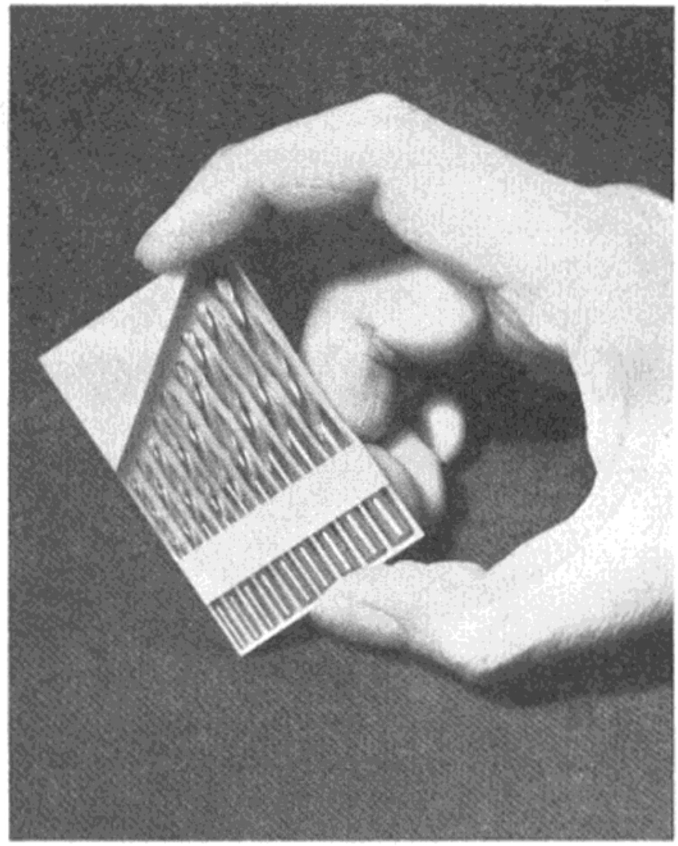
A small hand-drill, having a 1/4 in. chuck, is a worth-while addition to one's tool kit. Drills should be of the smaller sizes, the most useful being 1/16 in., 5/64 in., 3/32 in., 7/64 in., 1/8 in., 5/32 in. and 3/16 in. Instead of buying these separately, it is possible to purchase, much more cheaply, a set of "short" modeller's drills.

Brushes for finishing should invariably be of the soft sable or camel hair mop type, but a cheaper kind can be employed for applying dope and grain filler to wood surfaces. One or two small artists' brushes are handy for applying decorative trim.

A bench vice is a useful item and, except for bending very heavy steel wire (such as for large power model undercarriages), one of the "universal" pattern, in which small parts can be held in almost any position for cutting, filing or bending, is a pleasing addition to one's gear.

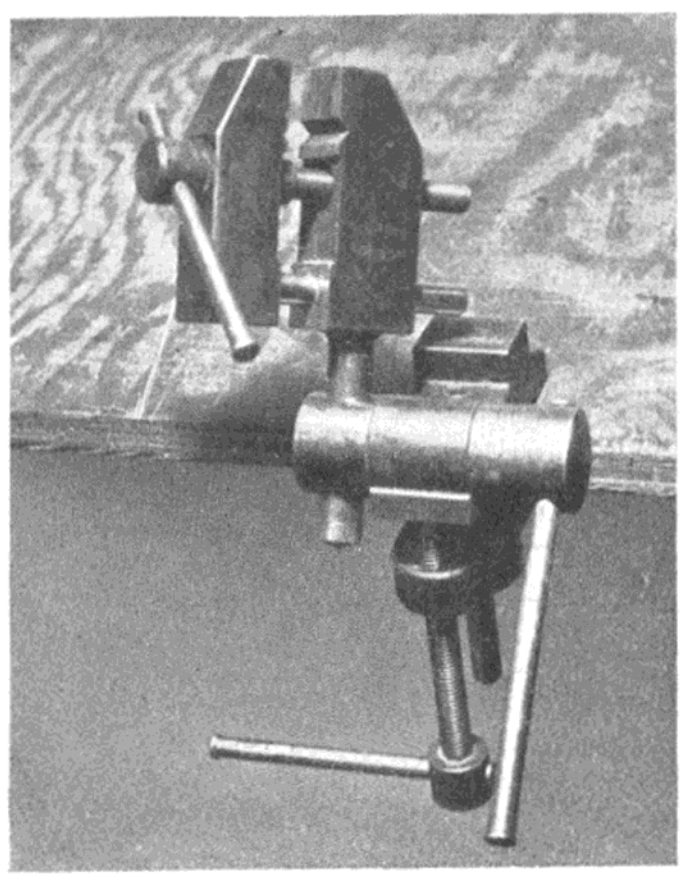
A good strong pair of combination pliers can generally be found in most households. Beyond these, a pair of round-nosed, or "radio," pliers are of great help in forming small wire fitments, and a worth-while luxury is a pair of really good side-cutting nippers which will bite through medium and thin wire cleanly.

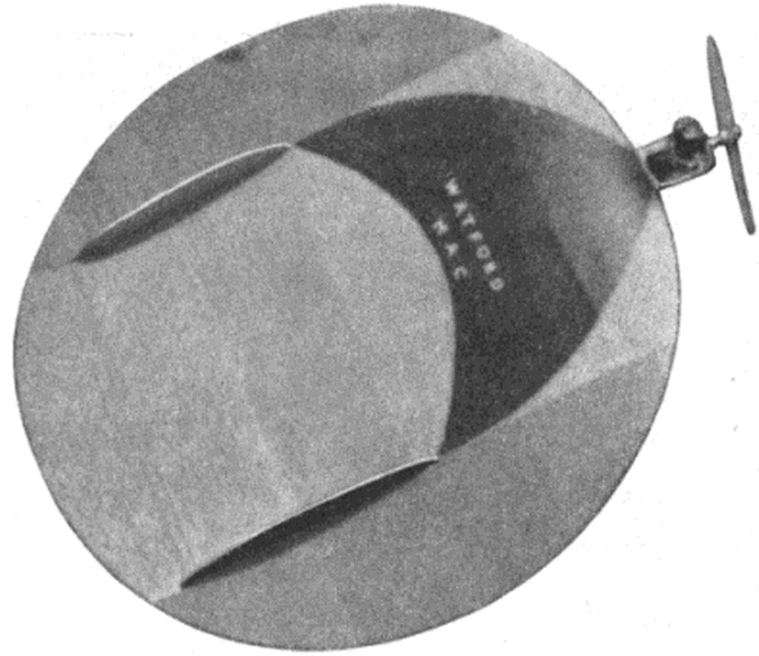
If one later specialises in power driven models, one or two simple tools will be required for work on engine installations, etc., namely a small screwdriver and one or two small spanners (usually B.A. sizes in Britain) for engine mounting bolts, etc.



Above: A set of inexpensive short twist-drills suitable for model use.

Below: If a vice is to be obtained, the universal type shown is well suited to the model-maker's requirements.





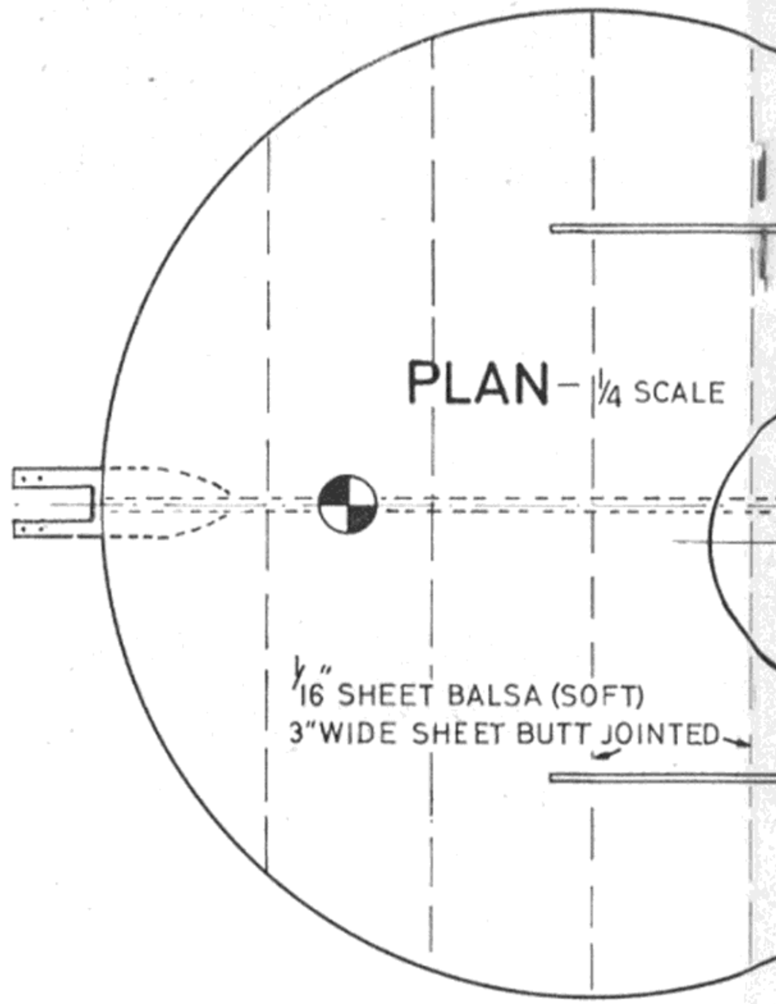
SORCE

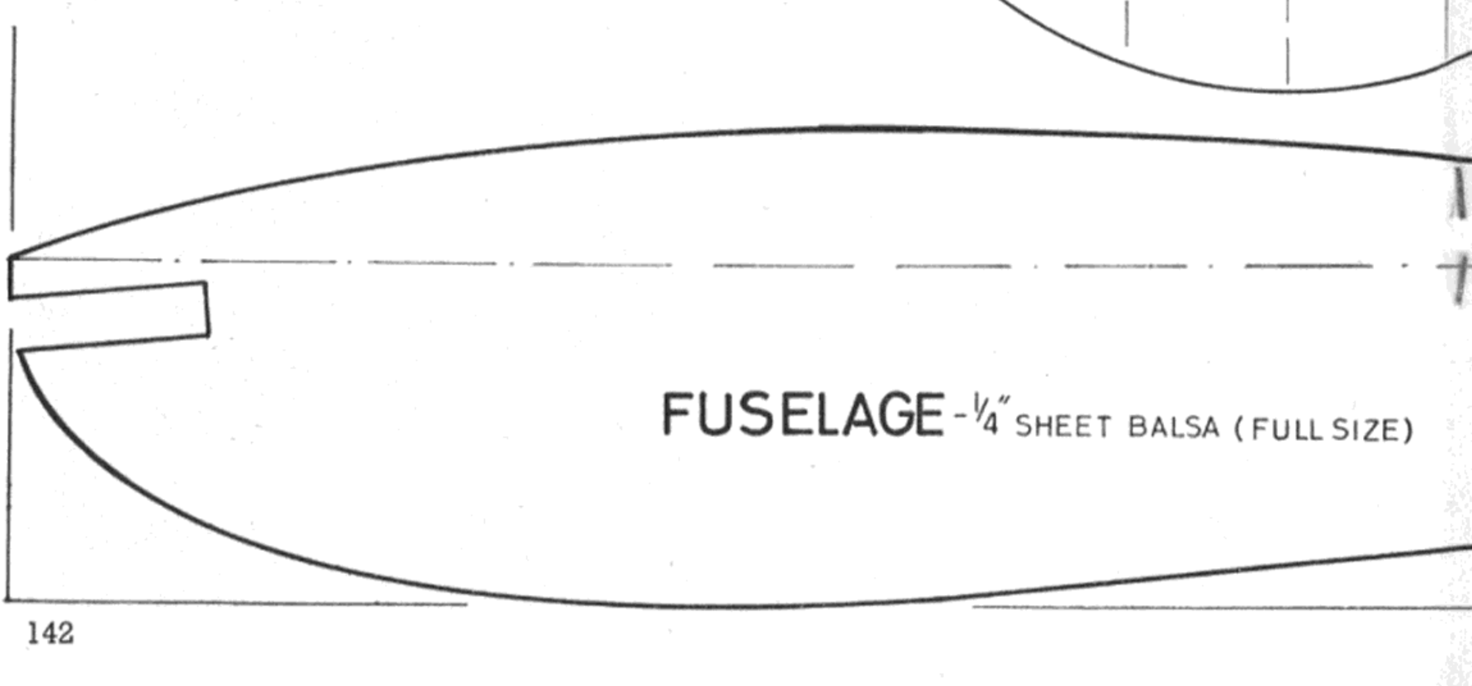
A FREE FLIGHT FLYIN

BUILDING and FLYING NOTES

1. Cement soft sheet for disc together.
2. Cut fuselage to shape shown on plan.
3. Cut and sand disc to shape and cut slots for fins.
4. Cement disc to body; ensure fin slots are square fore and aft.
5. Securely glue engine mount in position.
6. Cement fins in position.
7. Cover with lightweight tissue doped on, and fuel proof.

Check balance point and if necessary add plasticine to bring this to the indicated position. Test glide and make any further adjustments by altering the reflex of the trailing edge. On full power with a 6 × 4 prop a near vertical climb should result, followed by a slow flat glide. Model will turn safely either way. Best flight 4 min. 40 sec. o.o.s. from 8 sec. run. Distance covered 7 miles.





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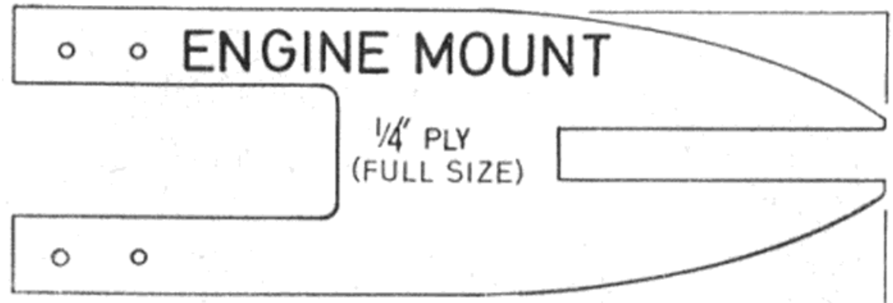
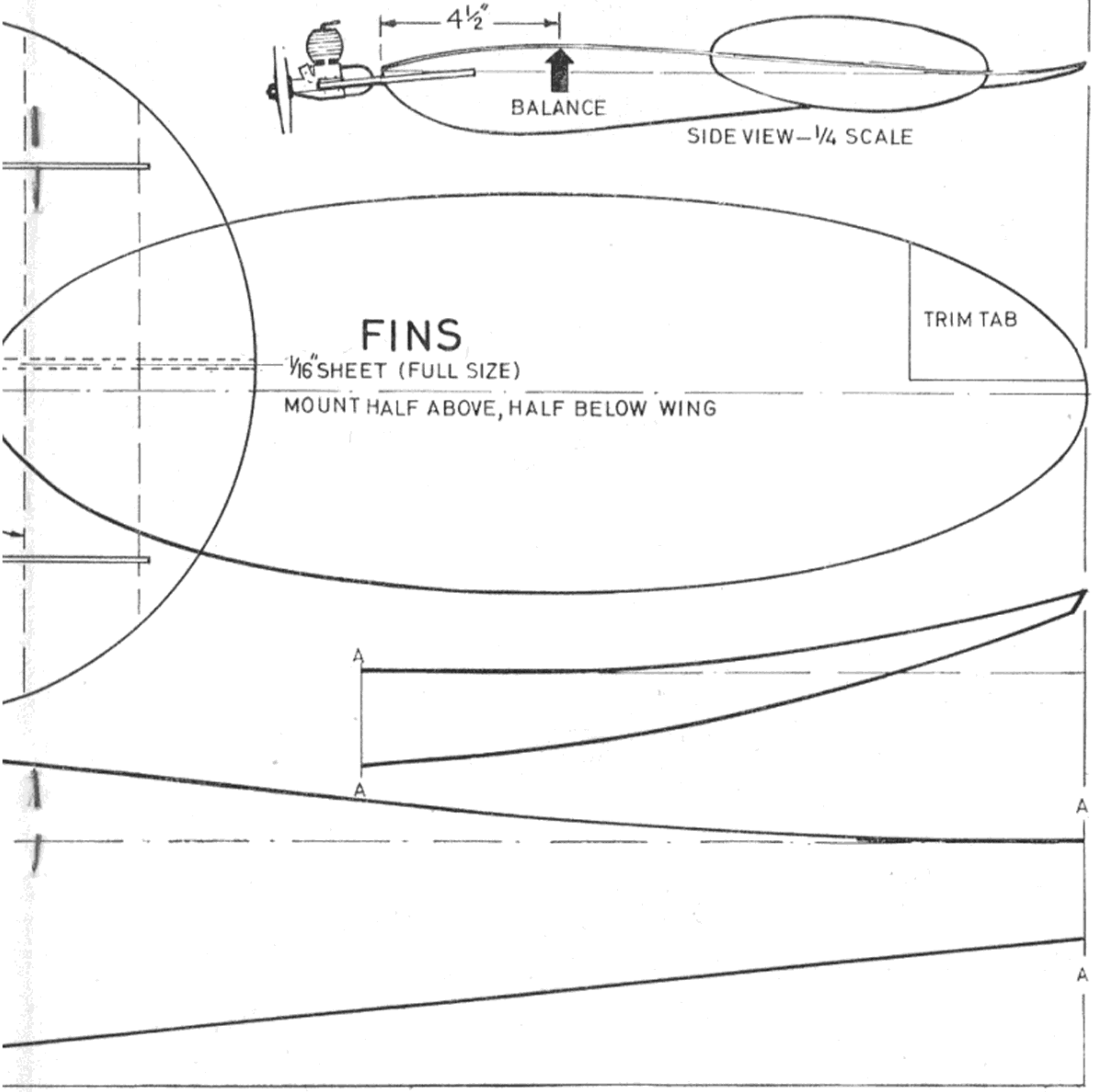




The **REBIRTH OF THE COMET 2** has been almost overlooked in all the excitement following vast orders for U.S. jet-liners and the round-the-world trip by its big sister, the *Series* 3 prototype. Yet, provided it runs into no more trouble when it enters service with Transport Command, the *Comet* 2 will give Britain valuable operating experience at a time when there are no other production jet transports on this side of the Iron Curtain.

It is expected that the R.A.F. will get about a dozen *Comets*, including two or three of the 44-seat airframes which once flew in B.O.A.C. colours. The others will be built from components that were on the assembly line when civil development was stopped. Main externally-visible changes are the new cambered wing leading edge and jet intakes, and replacement of the strip of skin on each side of the cabin which contained the old square windows by a new section with nine circular windows. The modified *Comet* 2s, which have Avon 117/118 turbojets, will be flown on the courier service between the U.K. and the Woomera Rocket Range in Australia by No. 216 Squadron, formerly equipped with *Valettas*.

* * *

The **GREEN OF OLD OIRELAND** is very much in evidence in the new paint scheme adopted by Aer Lingus—or is it? Not a word to the IRA, but the whole of the cabin top and fin are painted in "Winchester" green, with darker "English" green over the pilot's cabin on the company's *Viscounts*. The name "Aer Lingus" appears in white on the green top, and in green on the zig-zag white paint line containing the windows. The aircraft's individual names also appear in green Gaelic script on the white bands, and the rudder is white.

Aer Lingus chose their unusual dark tops not merely to be different, but because aircraft operating into industrial areas such as Manchester and Birmingham often returned so dirty that it cost around £60 in man-hours to clean a *Viscount*. It seemed less costly to incur the 35 lb. weight penalty imposed by the paint.

* * *

SUPER DROP-TANKS, being fitted by Lockheed to the U.S.A.F.'s great fleet of Boeing B-47 *Stratojets*, have an 8-ft. parachute in their tail cone to yank them clear of the wing and lower them for salvage, after their fuel has replenished the bombers' internal tanks.

Up to seven *B-47s* a day are being fitted with the tanks at Lockheed's Georgia factory. The job takes only a few hours, the tanks being mounted on pylons between the inboard and outboard engine pods.

* * *

FIRST POST-WAR JAPANESE JET-PLANE, a licence-built T-33 *Shooting Star* two-seat trainer, made its first test flight on January 16th, and was delivered to the Japanese Government by the Kawasaki Aircraft Company six days later. It was two months ahead of schedule.

* * *

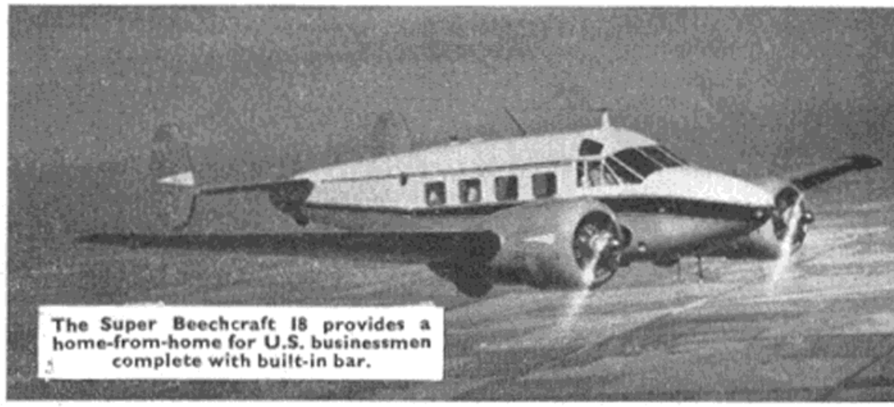
HARD TO RECOGNISE as the latest development of our old friend the *Expeditor* is the gleaming, glamor-

Top: The "Pilatus P-2" Swiss Air Force trainer was designed for operation from high altitude airfields. Below: The new paint scheme for Aer Lingus aircraft, seen here on a DC-3.

ous Beechcraft *Super* 18. Tailored to provide a mobile home-from-home for U.S. businessmen, its cabin is complete with reclining seats, air conditioning, big curtained windows, built-in refreshment bar, twin-thermos to keep the black coffee hot, and folding card tables.

Recognitionally, the *Super* 18 has a longer, more pointed nose, and unusual square wing tips, which do not follow the leading edge line, but have parallel chord and increased camber. Two 450 h.p. R-985-14 Wasp Juniors enable it to cruise for 1,455 miles at 215 m.p.h., and to fly above the weather at 23,000 ft. Span is 49 ft. 8 in. and loaded weight 9,300 lb.

Altogether, nearly 10,000 of the *Expeditor-Super* 18 family have been built, and are in service throughout the world. A few *Super* 18s are used by the French Air Force.



The Super Beechcraft 18 provides a home-from-home for U.S. businessmen complete with built-in bar.

★ ★ ★

RARA AVIS (below) is a Temco GC-1B *Swift* fitted by its U.S. owner with tip-tanks. The "mod" necessitated a few changes down the back end, to preserve the 'plane's ladylike handling qualities, and it finished up with a large dorsal fin.

★ ★ ★

Another not-too-well-known aircraft is the **PILATUS P-2** advanced trainer used by the Swiss Air Force. It is a tandem two-seater, of fairly orthodox appearance, with Czech-built 465 h.p. Argus As.410A-2 engine, span of 36 ft. and A.U.W. of 3,970 lb. Fully aerobatic and designed for operation from high-altitude airfields, it is used also for armament training, carrying rockets and light bombs under its wings. Top speed is 211 m.p.h.

★ ★ ★

The Fleet Air Arm's **LATEST FIGHTER BOMBER,** the single-seat Supermarine *N.*113, made its first flight at Boscombe Down on January 20th, piloted by Mike Lithgow. Powered by two laterally-mounted Avons, apparently minus reheat, it is the end product of the Supermarine 508-525 development programme, differing from the latter in its lengthened, pointed nose, bigger air intakes, all-moving tailplane and neat air intake at the forward end of its dorsal fin.

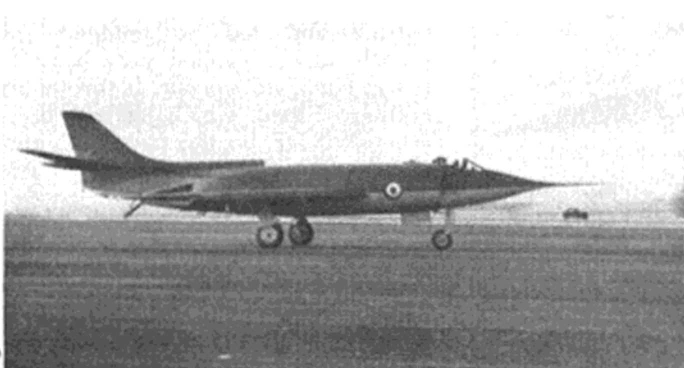
The *N.*113's swept wings have saw-tooth leading edges and will feature "super-circulation," in which air is ducted from the Avons and blown over the top surfaces of the flaps to accelerate the airflow and improve lift, to reduce the landing speed. It has been stated in the House of Commons that the *N.*113 will be able to carry tactical atom-bombs, in addition to its normal armament of 30 mm. cannon, and possibly under-wing missiles. It has been ordered in large numbers to replace the *Sea Hawk*.

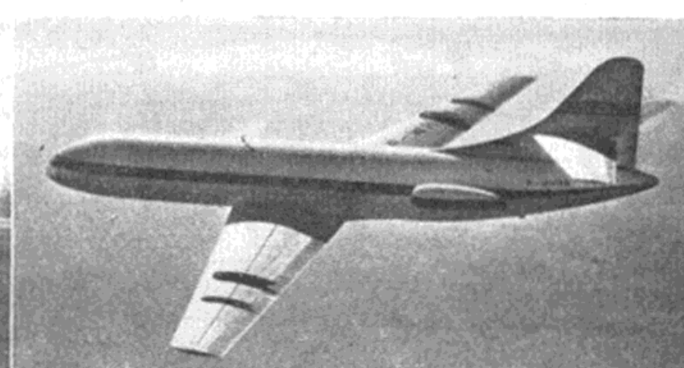
★ ★ ★

FRANCE'S JET-LINER, the interesting *S.E.*-210 *Caravelle*, had completed 225 hours' flying in 105 flights by mid-January, which is an impressive total in only eight months. They included a series of tests at the official flight test centre, the C.E.V., at Brétigny.

The new photo (right) shows well the unique positioning of the two 10,000 lb. thrust Avon RA.26 turbojets on the sides of the rear fuselage, and the 20 deg. swept wings, each of which now has two fences. So far, Air France have ordered 12 *Caravelles* and Air Algerie are reported to be getting three. Stage length with full payload of 70 passengers is about 1,500 miles at a cruising speed of 460 m.p.h.

Left: The Supermarine N.113 which in a later mark will perhaps be able to carry guided missiles. Right: France's jet liner, the "Caravelle."





S-P-R-E-A-D-I-N-G THE LOAD

E. R. WELBOURNE

tells how correct spar distribution makes for an accurate model

" And that concludes today's demonstration on the effects of centrifugal force and gravity —and the strength of materials ! "

THE basic principle of balanced wing and tail structure is based on the fact that balsa has strength in two directions only—tension and compression, the latter being the more useful for our purpose. It both bends and breaks (shears) easily, so it is quite useless employing a wing structure dependent on the bending resistance of the wood. A wing with its spars on one surface only, top or bottom, will warp or curve away from that surface, since there is nothing but the low bending resistance of the spars to oppose the tension of the covering on the other. Alternatively, if we have a sparless wing it will *tend* to bow upwards because of the effect of covering tension on the greater curvature of the upper surface of the aerofoil. I say *tend,* since if we make the L.E. and T.E. sections sufficiently deep, they will resist this.

From these considerations, it is clear that spars are needed on both surfaces, and that the structures shown in Figs. 1 and 2 approach the ideal. The spars are arranged two in the top and one in the bottom for these reasons. The greatest flight load, i.e. lift (and on a glider, the towing load), puts the top two spars into compression as the wing tries to bend, while the rear spar also helps to prevent T.E. distortion. The bottom spar is there to prevent the wing curving into anhedral due to the tension of the covering, and to absorb the landing shocks, especially those occurring after a dethermalised descent. It also partially supports the weight of the wing. All these loads subject the spar to a compressive stress.

The equal spacing of the spars as shown in Fig. 2 is done for two reasons—it keeps the cut-outs for the spars in the ribs, as far away from each other as possible and thus increases the rib strength. It also gives the covering maximum support consistent with the other requirements. (The reason for the change in spar size from '55 to '56 (Fig. 1 and 2) was to reduce the depth of the spar slots since it produced some distortion of the profile and weakened the ribs.

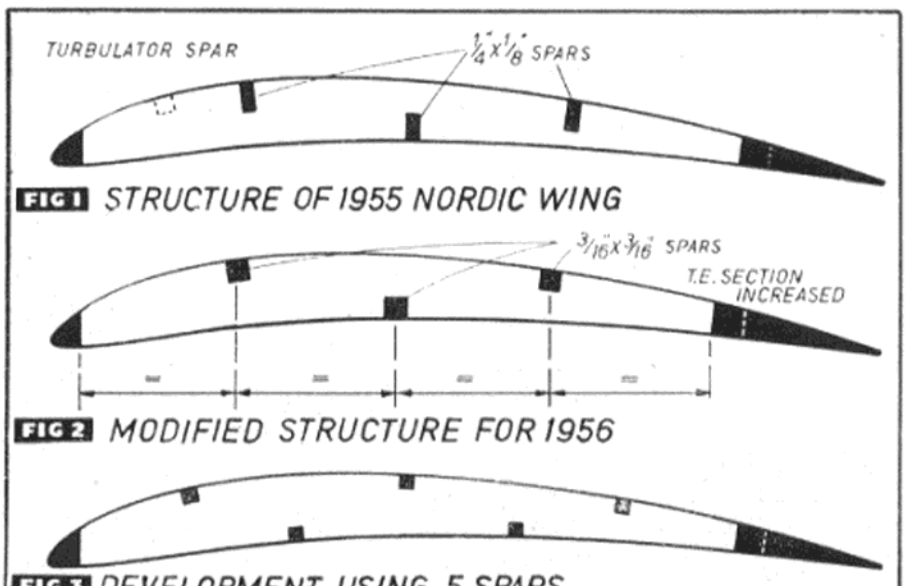


FIG 1 STRUCTURE OF 1955 NORDIC WING

FIG 2 MODIFIED STRUCTURE FOR 1956

FIG 3 DEVELOPMENT USING 5 SPARS

The result of all this is, that providing we have no un-accounted for loads such as are induced by uneven covering and doping, the wing will be much less prone to warping and distortion generally. A sure way to damn the effort from the start is, however, to sandpaper the trailing edge lengthwise. As you probably know, this produces an upward curve, due to the sandpaper not cutting properly but sinking into the grain and just squashing the wood. If the sandpaper is used across the grain, it cannot avoid cutting and has no tendency to squash, unless applied very heavily. If this curve does occur, it throws an additional load, which has not been accounted for, on the rear spar, and may result in an undesirably wavy T.E.

This form of wing structure is not applicable to all types of wing and tail, however. For large glider wings, two full depth spars, as in full-size aircraft practice, may reasonably be preferred. In small, lightweight models, if the spars were of sufficient

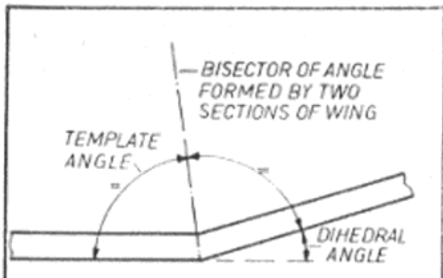


FIG 4 TEMPLATE ANGLE OBTAINED FROM DIHEDRAL

section for strength, the wing would be too heavy, while if it were light enough, the strength would be insufficient. It would be better to use one spar of sufficient dimensions located in the top surface, at the point of maximum thickness where it can do most good.

This structure was developed low, to keep the weight within reasonable bounds, although warp resistance should be good.

. . . and designed dihedral joints

The main idea of the template shown in Fig. 5 is to eliminate inaccuracies in the construction of dihedral joints. The only requirement is that the template itself should be accurately cut, in the first place, unless we are to have some variation from the intended amount of dihedral.

The method of use is shown in Fig. 5. The template is placed against the back of the L.E., with the point touching the dihedral joint line on the plan, and the bottom flat on the plan. All that is necessary then, is to cut square across the L.E., following the template to give the angle. The process is repeated for all the spars, which will be cut to the

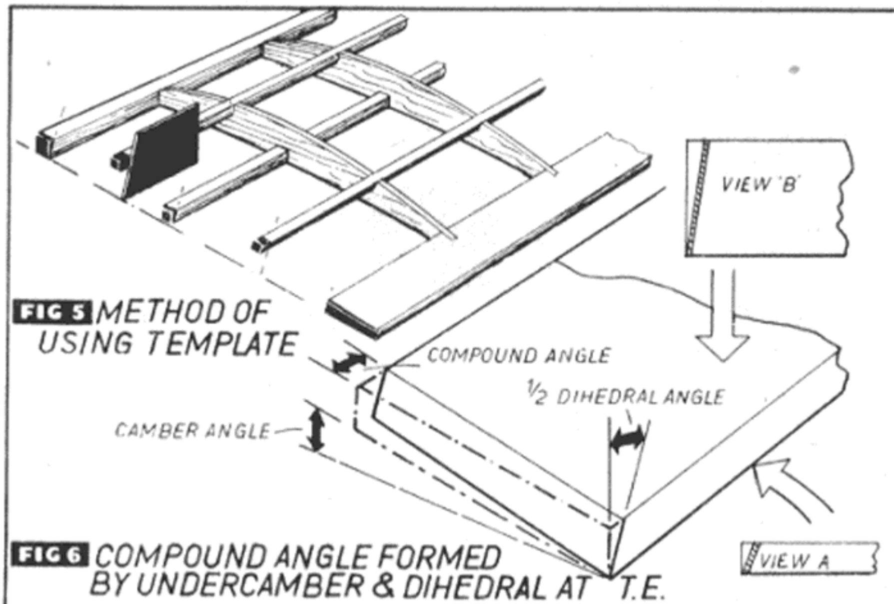


FIG 5 METHOD OF USING TEMPLATE

FIG 6 COMPOUND ANGLE FORMED BY UNDERCAMBER & DIHEDRAL AT T.E.

chiefly for Nordic gliders, but has been applied to other models quite successfully. The approximate limits for its use would seem to be 40 to 80 in. span with normal wing loadings, depending, of course, on aspect ratio. It can also provide strong, warp-resistant tailplanes of almost any size, though again, they will not be suitable for lightweight models.

During 1955, a turbulator spar was incorporated as shown in Fig. 1. Any advantage this may have given was not discernable, and, as they say on the flyleaf of thrillers, " . . . exists only in the imagination of the author." A further development of the idea is shown in Fig. 3. Again, the difficulty with this would be that local strength would have to be

correct length and angle at the same time.

The trailing edge needs separate consideration. A common reason for bad joints at the T.E. is a lack of appreciation of the facts demonstrated in Fig. 6, i.e. that the T.E. cannot be cut off square to the span of the wing.

By using the template at the front and the back of the T.E., to *mark* only, the compound angle is automatically obtained. The marks made should be joined by pencil lines across the top and bottom and these lines used as a guide for cutting.

Five minutes careful marking out with this template can save half an hour of trim-it and try, and give a better and stronger joint.

EQUIVALENT RUBBER MOTORS

SOMETIMES it is necessary to make up a rubber motor from a different size of strip to that specified on a plan. The table gives number of strands for " equivalent " motors in different standard rubber sizes. A (+) sign signifies that a motor made up to these number of strands will be slightly more powerful, and a (—) sign, that the motor will be slightly less powerful.

This table, of course, cannot take into account differences in the *quality* of different brands or different sizes of rubbers.

Example: Motor size specified for a model is 12 strands of ¼ × 24th strip. How many strands should an equivalent motor have in ¼ × 30th strip?

Ans.: From table, a ¼ × 30th motor of 15 strands will have a similar cross section, and therefore similar power. Since this is rather an odd size to make up (especially for cording), 16 strands of 3/16 × 24th would probably be a better solution.

Example: Motor size specified is 10 strands ¼ × 30th. Is there a better motor size for pre-tensioning by cording?

Ans.: For " cording " or " roping " a motor to pre-tension, the job is easiest if the number of strands in the motor are divisible by 4. In this case the table shows 8 strands of ¼ × 24th as equivalent motor, which would be easier to cord than 10 strands of the thinner strip.

RUBBER STRIP SIZE				
1/8 x 30	3/16 x 30	3/16 x 24	1/4 x 30	1/4 x 24
8	—	4	4	3
10	—	5 −	5	4
11	—	6	6(+)	5(+)
12	8	6(−)	6	5.
15	10	8	—	6
16	11(+)	8(−)	8	6(−)
18	12	10(+)	9	7(−)
20	13(−)	11(+)	10	8
22	15(+)	12(+)	11	9(+)
24	16	13(+)	12	10(+)
25	17(+)	13(−)	—	10
28	19(+)	15	14	11
30	20	16	15	12
32	21	17	16	13(+)
35	23(−)	19(+)	—	14
36	24	19	18	14(−)
40	27(+)	21(−)	20	16

Topical Twists

Where We Came In . . .

A speaker at a recent model binge deplored the lack of government support given to the hobby.

Now what sort of support he envisages I just can't imagine, but, as a common or garden aeromodeller (preferring, of course, the common to the garden, as flying in the latter often evokes criticism from neighbours), all I ask of the Westminster boys is the import of the odd plank of balsa, and a bit of stiff legislation against the johnnies who try to boot us off the flying fields. I shudder to think of the disastrous consequences of any government intervention beyond these simple requirements.

Let us, however, suppose the worst, and, sometime in the future a question is raised in the House, asking what has happened to the model plane, which now appears to have become almost extinct (loud cheers), and what measures are being taken for its preservation under the Wild Life Act. The hon. member putting the question would probably be a farmer, who, since the extermination of the rabbit, has found the straying model a mild but welcome outlet for his twelve bore sportiveness.

The reply would most likely be published in the form of a White Paper; extracts from which might read as follows:

" Investigations into the model retail trade by officials of the National Scheme for Subsidised Model Flying revealed the incredible figure of 234,308.5 model fliers resident in the United Kingdom. In view of this the Minister felt constrained to exercise some form of control over the limited flying spaces available in the British Isles in order to relieve the congestion evident in these statistics. It was therefore decided to restrict such flying areas to exclusive use by accredited Subsidised Kit Builders. Though he regretted this unfortunate ban on private model flying, the Minister. . . .

. . . the total influx of Subsidised Kit Modellers into the aforementioned flying areas during the initial six month period was officially estimated at 0.5. This figure comprising a Master J. Bloggs. However, this total was later amended to the round figure of 0 when enquiries revealed that the glider model of the said Master J. Bloggs was a completely factorised commodity outside the scope of the subsidy benefits. . . .

. . . the findings proved that there was a definite case for private model flying. Consequently it was considered setting up a small experimental flying area on Chobham Common. . . .

The Pioneer Spirit

An eminent authority has recently drawn attention to the tremendous possibilities for making discoveries with the aid of models.

I can vouch for the truth of this from my own personal experience. For instance I have often made the discovery that the sinking speed into a concealed ditch is relative to the visual angle of the model to the horizon. Again, I have discovered the time taken for the c.g. to contact the datum line depends on the rate of slip, the latter factor being variable to the unhygienic habits of the bovine ruminant. This animal, incidentally, can be distinguished from its male counterpart by calculating the speed at which the modeller in front disappears through the nearest hedge. Investigations into the textile rending qualities of barbed wire can also be most revealing—sometimes to an embarrassing extreme.

The only discovery I never make is the lost model.

Comedy of Manners

I am mystified by certain cryptic references in Scottish Club News to " Dyspeptic Ayshire Individuals." This gag, like the individuals in question is frequently repeating, and, admirer though I am of pawky Scottish humour, I do wish they would put me (and, perhaps, the Dyspeptic Individuals) out of my misery by explaining the ingurgitatory reason for this outbreak of Ayrshire flatulance.

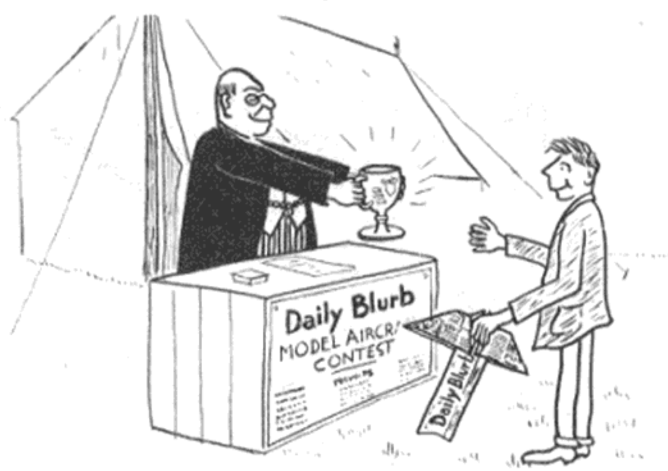
My conjecture is that the morbid condition resulted from an ill-digested Stag Supper. In which I can but stress the desirability of chewing each mouthful of antler at least 25 times. Again, a mid-field picnic of overripe haggis could cause the internal bagpipe system to come into violent and windy operation. But, perhaps, they merely made the common mistake of drinking diesel fuel in mistake for pop. If this be so, I beg their dyspeptic pardons, as I hope they too have been well mannered enough to do during their indisposition.

Off the Record

Whenever the International Records List crops up I see red—not one solitary British name in the lot. Plenty of 'vitches and 'ovs, but a complete and dismal absence of Browns, Jones or McTavishes. And to think that this country has been called the cradle of model flying (at least it's always referred to as kid's stuff here).

Casting about for some patriotic excuse, I notice that some of the records were established way back in the pre-D/t era, when only a select few intelligentsia knew what Km meant. Since that time this vital knowledge has spread to the moronic masses, but we, with true British reserve, steadfastly ignor it—not one linear inch will we yield to these fancy foreign measurements.

Even so, the chances of setting up a new record in this country are slimmer than an A/2 fuzz. Given a calm day (and who knows but this leap year will not bring one?) you would have to suffer a D/t failure at a time when two official timekeepers happened to be in attendance. Although, if the average contest flier was suddenly confronted with two timekeepers he would probably suffer heart failure instead. We must therefore



presume that timekeepers are in more plentiful supply on the other side of the Curtain, where perhaps the duty is optional to going down a salt mine. Also D/t failures must be more common in that part of the world, or perhaps for reasons of national prestige they are left off altogether.

Another factor against us is the way these models of inscrutable eastern design put up such colossal feats of endurance; clearly showing the superiority of the collectivised thermal over our own exploited form of disunified puff. So, altogether it would seem advisable for us to forget about such international honours and concentrate on our own quite formidable list of British Native Records. I, for one, will continue to submit my claims under the name of Gunga Dim.

I am asked by the Foresters Club to point out that the Ganston Streamer Slashers are not, as you may imagine, a group of carnival saboteurs, but a sapling offspring under the leafy patronage of the Foresters. Though youthfully addicted to Combat Flying, their ability to decorate each other with such gracious titles as 'Pit-Boot' and 'Jimpy,' suggests that they are backwood rather than backward boys.

Pylonius

JET PROPULSION——and the MODEL

This photograph shows a Ramjet Test Vehicle just after launching, with the tandem booster rocket motors accelerating the vehicle to supersonic speeds. At the end of the boost phase, the rocket motors are automatically jettisoned.

PART FOUR

RAMJETS

Last month rockets, both liquid and solid fuel burning were discussed, now we explore the possibilities of the ramjet. Today with numerous experiments being conducted by many large aircraft companies, both here and in America this subject is of especial interest.

THE ramjet is the simplest of the "air-breathing" jet engines since it contains no moving parts. Basically, it consists of just an open tube so shaped that the front or entry end acts as a diffuser to increase static pressure of the air. Fuel is then ejected into this air and burned, the energy released through burning causing the gases to expand and escape at high velocity through the rear—Fig. 1. The length/diameter ratio and the actual shape of the tube, particularly that of the diffuser section, depend on the speed at which the ramjet is designed to work. High pressures can only be achieved at very high speeds and most large scale ramjets will not work satisfactorily at speeds of less than about 300 m.p.h. It is not commonly realised, however, that high speed is not *necessarily* a feature of ramjet operation and one can, in fact, be made to run statically. Its thrust under such conditions would be very low indeed. It would, in fact, be operating just like a conventional blowpipe.

Thus a ramjet designed to operate at model speeds is quite a practical proposition. Almost inevitably, however, it will be large and heavy for the amount of thrust it is capable of producing, and it will also consume fuel at a high rate. Figures quoted by one authority indicate a length of 3 ft. and a diameter of 18 in. for a ramjet capable of giving 5 lb. thrust at 50 m.p.h. Fuel consumption would then be at the rate of something like 11 pints per minute. Also its thrust would fall off rapidly at speeds below 50 m.p.h., calling for some method of launching at speed. Whether or not the ramjet would actually burn statically is largely a matter of design arrangement.

Whilst most people have little difficulty in appreciating that ram air is readily built up in a properly shaped tube, there are two features of the ramjet which are often puzzling—why the flame does not expand forwards as well as aft, and why the flame does not blow out. The former is explained by the fact that the ram air entering the tube presents a cold front at some high pressure acting as a barrier to forward progress of the flame. The greater the ram air effect the more constrained the flame and, generally, the more efficient the unit becomes as a thrust producer. That is one reason why ramjets tend to become more efficient with increase of operating speed. At the same time the *shape* of the ramjet depends on speed. Low speed ramjets are usually short and fat, high speed ramjets long and slender. High speed ramjets will not burn at all at low speeds and so must be brought up to a certain minimum speed, giving the required minimum ram pressure, before they can be fired.

As to the second question, maintaining a stable flame is a very real problem. The flame may well blow out in an open tube and, quite frequently, it is necessary to introduce flame holders, which may be in the form of specially shaped nozzles or a form of grille, against which the flame impinges. These holders then stabilise the flame and prevent it from being blown out—Fig. 2.

Fig. 3 shows a small ramjet unit which has actually been put on the market as a commercial item in America as the M.E.W. (Minnesota Engine Works) 601. The tube or tailpipe is only 3 in. long and ⅞ in. dia., being made of thin walled steel tubing. The fuel tank is an empty CO_2 cartridge fitted with an

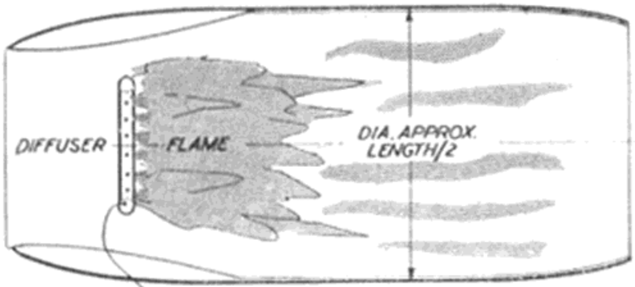


FIG 1

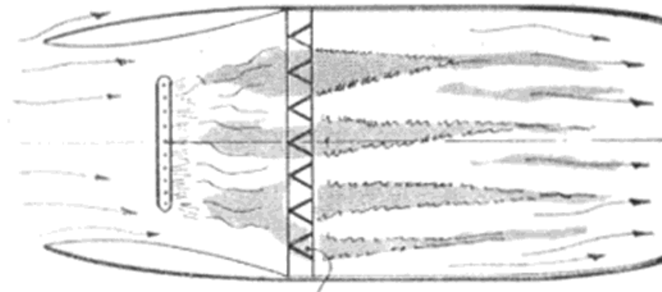


FIG 2

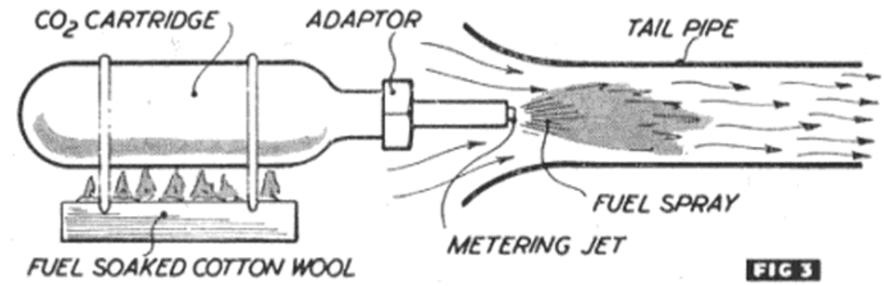


FIG 3

elongated nozzle incorporating a brass metering valve. The open end of the nozzle is forced into a steel flange welded to the combustion tube. The front end of the tube is flared to provide a bellmouth entry for air, the airflow being over the fuel tank (cartridge) and thence through the tube.

The tank is pressurised by the simple method of heating it directly, e.g. from a tray of cotton wool soaked in petrol or paraffin, causing fuel to be ejected from the cartridge in the form of a fine spray into the combustion tube. This spray of fuel is ignited and continues to burn as long as pressure is maintained. A certain amount of static thrust is developed, too small to be of any practical use, but this thrust builds up with increasing airspeed. In effect, the unit starts operation under rocket principles (static) and builds up to a combined rocket-ramjet effect at speed. It is not really a true ramjet in the proper sense although the majority of thrust at speed is derived from ramjet operation.

The method of pressurisation explains the use of a CO_2 capsule. These steel cartridges are designed to withstand high pressures and thus are readily capable of withstanding the build-up of pressure when directly heated. The fuel used may be petrol or paraffin, the latter generally being preferred as having a higher calorific value of heat energy content per volume, which is also the reason why paraffin, or rather aviation kerosene (similar to domestic paraffin but closely controlled with regard to cleanliness and the presence of impurities), is preferred for full size jet engines of all types.

As a matter of interest, petrol is permitted as an alternative fuel on most military turbine engines, the main difference being that the fuel consumption rate with petrol would be higher for a given b.h.p. at given r.p.m. It is unlikely that petrol will ever be cleared as an alternative fuel for civil aircraft engines owing to the greater fire risk and this factor also makes paraffin a more desirable fuel for model jet engines, where applicable.

The reduced fire risk is also a limitation, however, for liquid paraffin is very difficult to ignite unless vaporised or atomised and so a more efficient vaporising system is necessary than with petrol fuel. Hence, the invariable choice of petrol for the model pulse jet previously described, although the ramjet engine of Fig. 3 would work quite well on paraffin.

Pressurisation of the fuel can also be achieved by blowing up the tank as in the model ramjet unit shown in Fig. 4. This is based on a series of model ramjets produced by G. A. Henwood in this country some ten years ago. These were all low speed ramjets and worked at between 15 and 20 m.p.h., although what thrusts were achieved are not known All running tests, as far as we can gather, were conducted on rotating arms and not under actual flight conditions.

The design differs from the M.E.W. 601 in being a true ramjet with the pressurised fuel fed to the combustion chamber via a coil located in the rear end of the unit. This coil is, in effect, a preheating unit so that the fuel reaching the combustion chamber is both hot and under pressure and thus readily atomised and ignited. The spray head consists simply of very fine holes drilled in the tubing.

Again, this is a unit capable of running statically and the purpose of the fairing in front of the fuel spray position is to arrest flashback since, with no airflow through the tube, there is no reason why the flame should not flash forwards out on the intake as well as backwards through the combustion chamber itself. At speed, ram air would hold the flame back and so the flashback arrester is essentially a starting device, becoming merely a streamlined fairing once there is airflow through the tube.

Starting in this case is accomplished by opening the needle valve and thus introducing a spray of fuel into the combustion chamber, which is ignited from the rear end by a blowlamp. The blowlamp may also have to be used on the sides of the tube for initial preheating in the case of paraffin fuel. The needle valve is then adjusted to give the optimum burning rate.

An elementary form of flame holder which might be used to advantage with this type of ramjet is sketched in Fig. 5. This consists of bent strips of steel placed across the tube immediately behind the

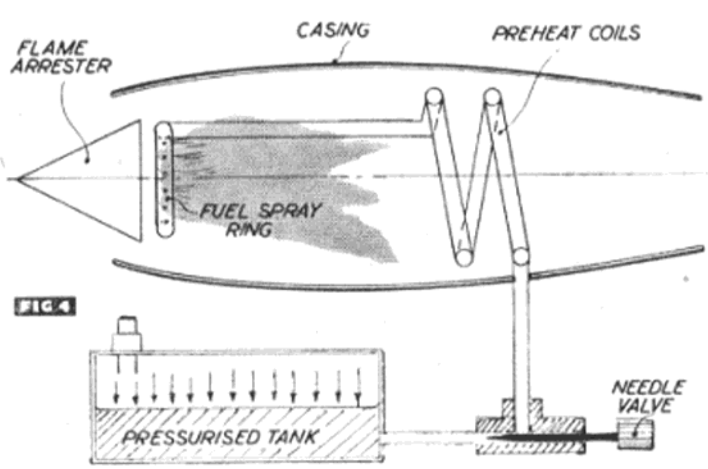
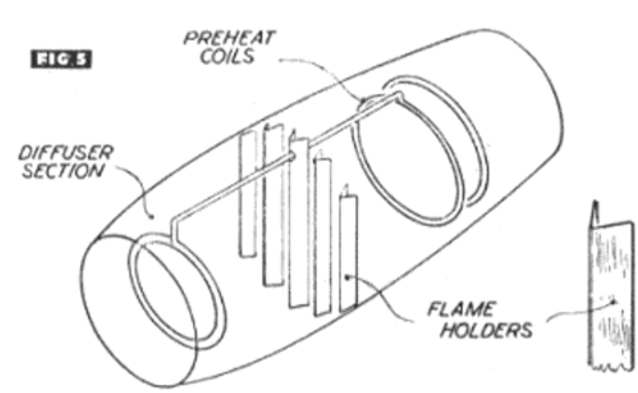


FIG 4

FIG 5



combustion chamber, a series of these strips giving a sort of venetian blind effect with vertical slots between them. Spacing and positioning for optimum effect would have to be determined by cut-and-try methods.

Whilst the shape and form of low speed ramjets may differ appreciably, nearly all require a pressurised fuel system for satisfactory operation, and usually preheating of the fuel is advantageous, or even necessary. A pressurised fuel system is about the only method of getting the unit to jets, again using stainless steel or nickel alloy with all welded joints. Some advanced model units intended for high speed work, designed and constructed by W. Ball, are shown in Fig. 6, ignition being accomplished when the unit has been brought up to operating speed—e.g. 50-80 m.p.h.; or with initial pressure feed to promote burning, changing over to automatic combustion at high speed, (i.e. ram air pressure taking over from the pressurised starting system). Ignition

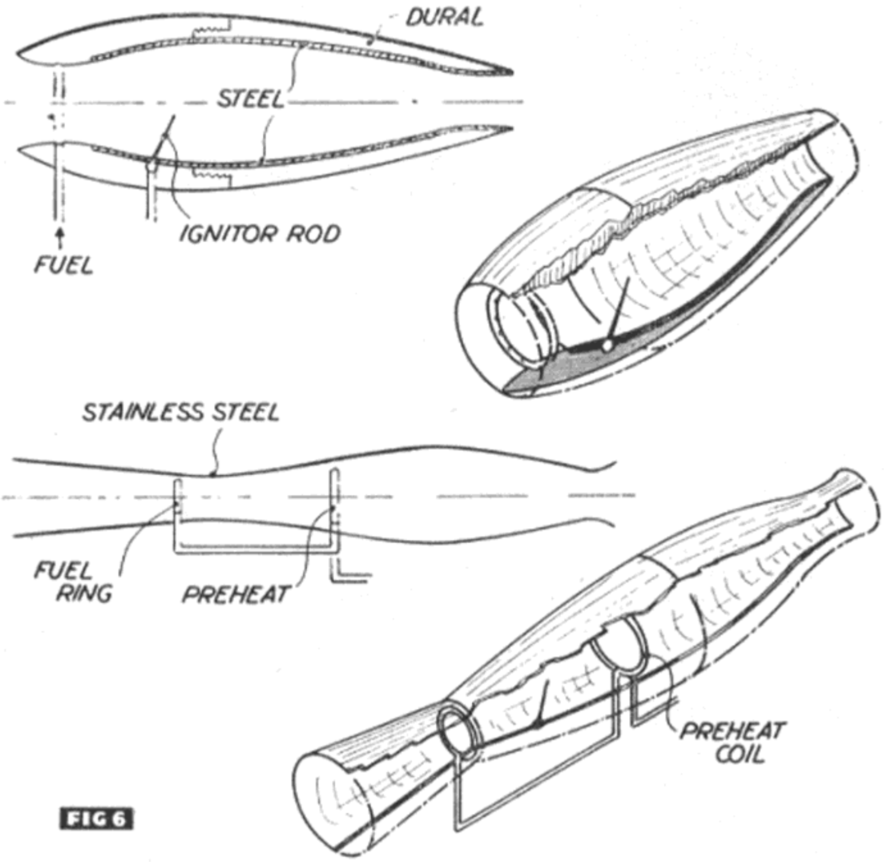


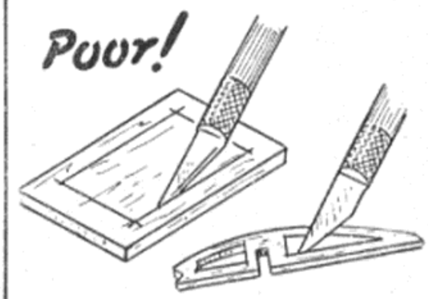
FIG 6

run statically so that it can be started up on the ground, but all will then call for some method of assisted launching, as the static thrust will inevitably be quite low—almost negligible, in fact, for the size and weight of the unit. Thus, although the ramjet can be made to work statically, it still really remains a unit which only works as a thrust producer when it has a definite forward speed. A method of bench testing ramjets "at speed," incidentally, would be to feed compressed air into the intake, regulated to correspond to the volume of air which would be encountered in flight at various speeds.

Construction of the ramjet tube can follow the method described in a previous article dealing with pulse in these units is accomplished by means of an igniter rod located in the combustion chamber, or a spark plug. In the latter case alcohol fuel, contained in a small auxiliary pressure tank, must be used for starting. The main fuel in all the units is paraffin.

In next month's article we will explore the various methods of ducted fan propulsion. With the larger sizes of flying scale jet models, this is perhaps the most practical and realistic form of propulsion, possessing as it does the advantages of using standard diesel engines, with their low running cost, and the almost total absence of fire risk.

DESIGN TIPS



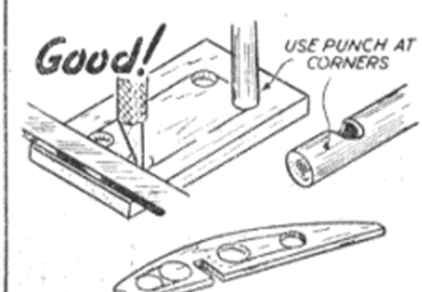
Cut-outs in ribs and formers can seriously weaken these parts, if badly made. Avoid cutting to 'square' corners with a knife or razor blade—almost certainly you will go past the line and notch the remaining wood. This means that when the cut-out portion is removed the remainder of the frame will be weak and prone to split.

By far the best practice is to punch circular holes at each corner first (bottom diagram) and then make the straight cuts with a knife guided by a metal straight edge. A suitable punch can be made in a jiffy from a scrap length of thin walled brass tubing. You can sharpen the *inside* with a small round file, or the *outside* on a grinding wheel. Either method of sharpening will work quite well, but *keep* the punch sharp.

The small circles of wood removed each time the punch cuts a hole will collect inside the tube. File or grind a cut-out in the wall of the tube about half an inch up from the cutting edge and these pieces will automatically clear themselves. Otherwise, using a plain tube, you will have to clear the punch after every two or three cuts by picking out the wood with a pin.

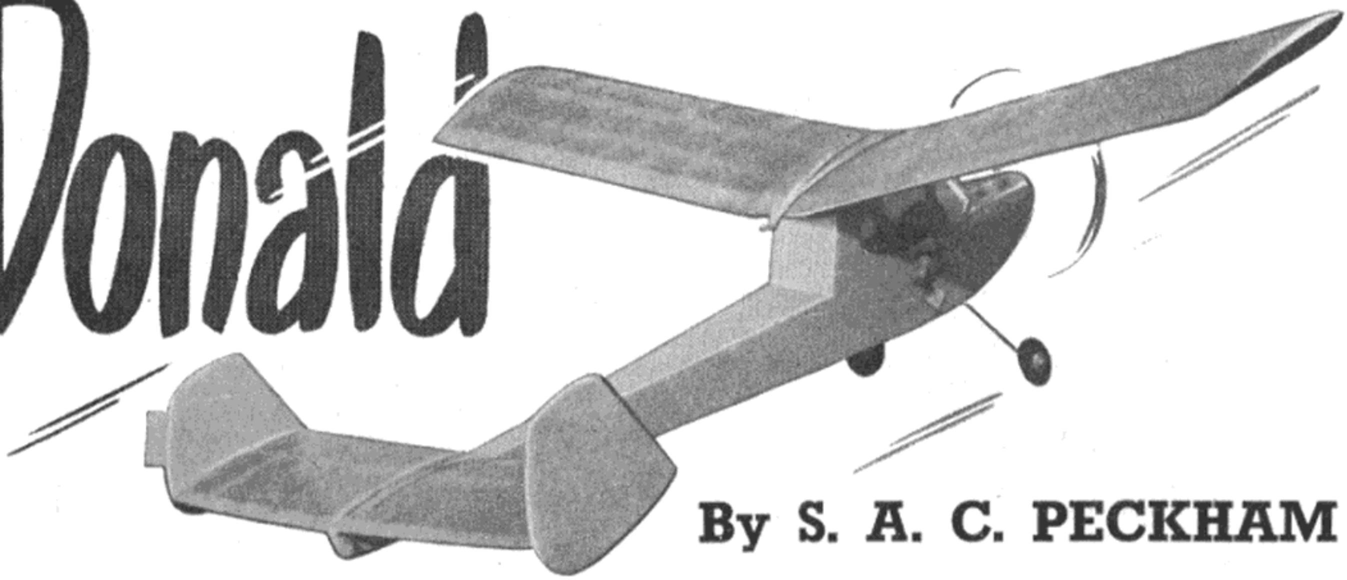
Make up a number of small punches while you are about it, starting with 14 s.w.g. tube up to about $\frac{1}{2}$ inch diameter. They will all come in useful. Brass tube is all right for cutting balsa, but for punching holes in ply the tube must be of steel.

Remember, if you are using cut-outs to save weight, the weight saving will be negligible unless you remove a substantial portion of the wood. You need to remove nearly one half of the total amount of wood to show any real results.



A SPORTS MODEL FOR ·75 c.c. ENGINES

Donald



By S. A. C. PECKHAM

THIS sports job is the ideal transition model for anyone progressing from rubber or glider designs to their first power model.

Fuselage

Cut the fuselage sides from medium hard $\frac{1}{16}$ sheet; former 1, from $\frac{3}{16}$ hard balsa, formers F2, F3, F4, from medium hard $\frac{1}{8}$ sheet, and F5, F6, F7 and F8 from medium 3/32 sheet. Join the fuselage sides with F3 and F4, and when dry add rest of formers, working towards rear, leaving F1 until last.

Bend undercarriage from 14 g. piano wire and bind to $\frac{1}{16}$ ply former F3B, then sandwich between F3 and the $\frac{1}{8}$ balsa former F3A. Cement engine bearers in position.

Cut out $\frac{1}{8}$ sheet wing platform and cement in position. Now add rear fuselage decking, making sure that it extends up to F4. Trim surplus and add rear of cabin. Cement bottom sheet from F1 to F4 with grain running crosswise, and from F4 to rear, grain lengthwise.

Plank between F1 and F2 with $\frac{1}{16}$ sheet, then cut and fit from $\frac{3}{16}$ sheet the cowl sides and front. Add top and bottom of cowl built up from layers of $\frac{3}{16}$ soft sheet. When dry sand fuselage, rounding off all corners and shaping cowl. Then remove cowl top and bottom and hollow out. Drill engine bearers, bolt engine in position, and drill hole for needle valve. Thoroughly fuel proof inside of cowl and add tank.

Cover complete fuselage with tissue doped on, then apply two coats of sanding sealer.

Finally, add wing and tailplane dowels, and also windscreen. Sorbo wheels of $1\frac{1}{2}$ in. dia. are recommended and are kept in place by soldering a washer either side of wheel.

Wings

The wings are perfectly straightforward. Trailing edge and rear spar ($\frac{1}{8} \times \frac{1}{4}$ hard) are pinned to plan and ribs added. Main spar is now cemented in position, trim end for tip, and allow at least $1\frac{1}{2}$ in. overlap at root end. Add leading edge and when whole is dry remove from plan and build the opposite wing panel—don't build two the same! When the other panel is dry, remove and pin both root ribs to plan at correct distance apart. The main spar will need trimming to allow tips to be packed up for correct dihedral. Now add $\frac{1}{2} \times \frac{1}{8}$ in. braces either side of main spar, and leading and trailing edge to centre section. Fit all gussets, and when dry remove from board, add tips, and finally sand smooth. Cover with lightweight Modelspan, colour to choice, and give three coats of dope.

Tailplane and Fins

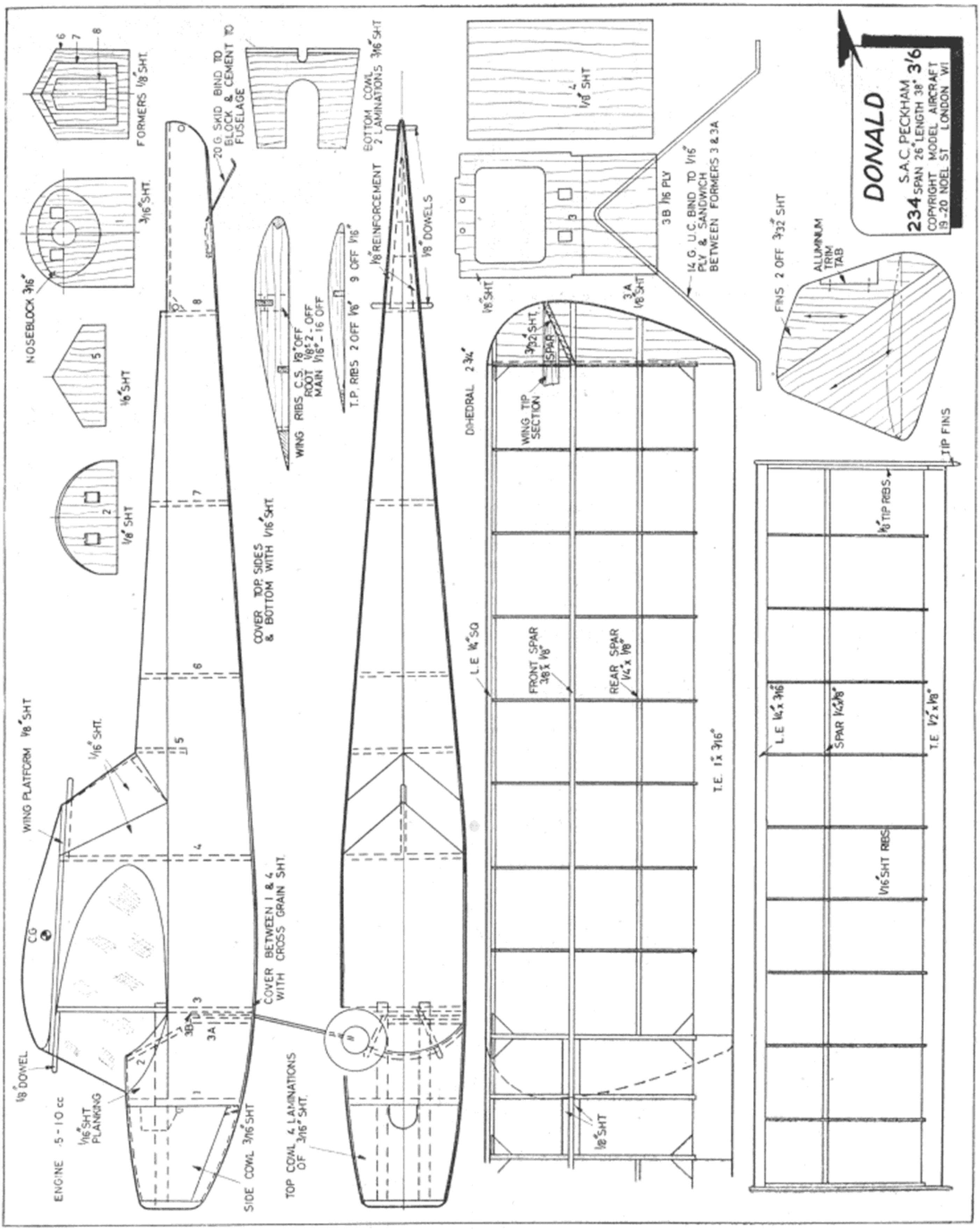
The tailplane should not need any instructions, but for the sake of beginners, pin leading edge ($\frac{1}{4} \times \frac{1}{4}$ in.) to plan also trailing edge ($\frac{1}{8} \times \frac{1}{2}$ in.) and spar ($\frac{1}{8} \times \frac{1}{4}$ in.); add all ribs, the tip ribs being of $\frac{1}{8}$ sheet. Sand smooth, cover with lightweight Modelspan and apply two coats of dope.

The fins, each two pieces of 3/32 medium sheet (note grain), are sanded to streamline shape, covered with tissue, and cemented to tailplane after it has been covered and doped. Add trim tabs made from thin sheet aluminium.

Flying

The model should balance at a point $\frac{5}{8}$ in. forward of rear spar. Test glide: this should be slow and flat; if not, add packing as necessary but not ballast.

The prop I recommend is a Frog 6 × 4 nylon. With power at about half revs, and trim tab 5-6 deg. to port, launch gently into wind, not fast as it is fairly slow flying. This trim should produce a gentle left turn under power and glide.



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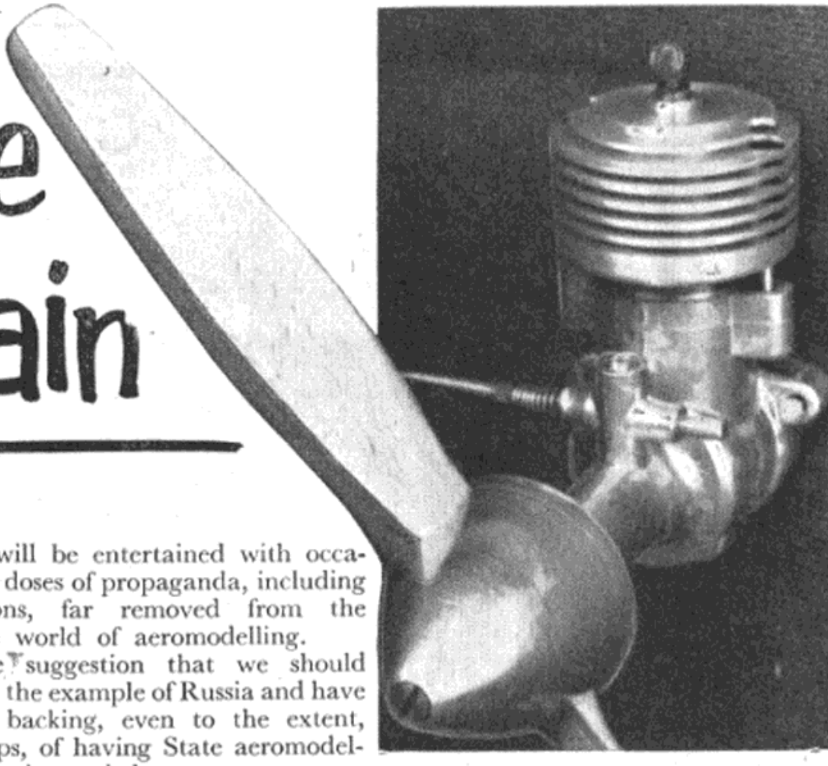
East of the Iron Curtain



CZECHOSLOVAKIA. *A good example of amateur construction is this typical diesel by Vladimir Kohout of Prague.*

A MINOR spot of excitement appears to have been caused by recent references in (a) the September, 1954, "Accent on Power" and (b) editorial comment in the same issue, concerning engines and modelling in East European countries. A couple of readers took exception to the use of such terms as "Iron Curtain" and "Communist bloc" countries and somehow managed to develop their arguments into accusations, among other things, of "bamboozling the common people." . . . Elsewhere, we find admiration for the Soviet idea of spending vast sums of money in official support of the model movement in the interests of national prestige. This, of course, has a parallel in the recent controversy over representation in the Olympic Games.

Now, although we are not averse to poking modest fun, it seems to us that mountains are being made from molehills, for we have kept remarkably free, in MODEL AIRCRAFT, from reference to political side-issues. As an interesting comparison, we would suggest that our critics take a look at certain hobby publications from some countries of Eastern Europe, wherein they will be entertained with occasional doses of propaganda, including cartoons, far removed from the gentle world of aeromodelling.

The suggestion that we should follow the example of Russia and have State backing, even to the extent, perhaps, of having State aeromodelling institutes, is by no means a new one. Germany and Italy pursued a similar policy before the war. Usually, however, there are strings attached to

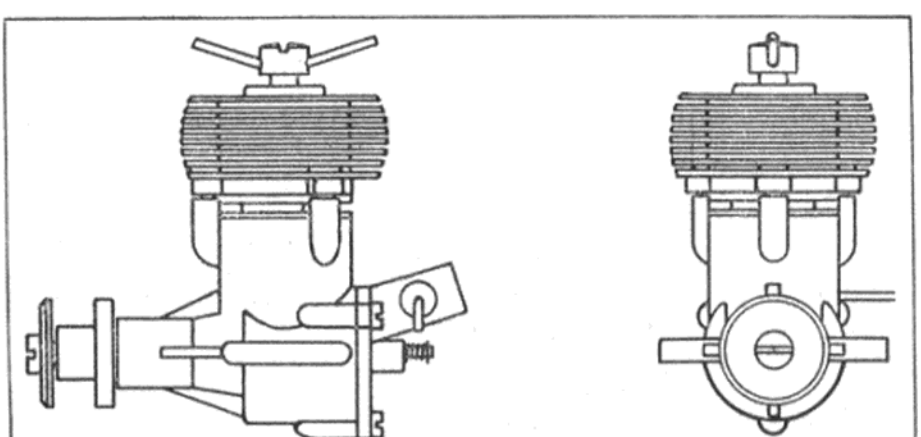
ACCENT ON POWER
by
P. G. F. CHINN

such schemes and, in the eyes of higher authority, the hobby of aeromodelling often becomes merely a stepping-stone to other things: gliding, full-size aircraft and military training in one form or another. Personally, we have nothing very much against this, although many will not be in agreement. In this country we already have the A.T.C. as an intermediate step towards an air force career.

Where the big difference lies is that, in the west, we have the finest selection of model engines, kits and modelling materials in the world, at extremely moderate prices, and which can be bought over the counter by anyone.

Consider the very different state of affairs in most of the Soviet countries. Engine production to date has been negligible compared with that of western countries. Many of their engines are the work of individuals and, commendable as some of these efforts have been, such small production does not help the average modeller very much, nor does it encourage expansion of the hobby. When an engine is put into factory production, it appears that this is done primarily to equip members of the official Government-sponsored aeromodelling institutes, rather than for free sale, such as we know in England. A similar situation exists in regard to most modelling supplies.

This is not to say that large scale quantity production and extensive distribution will not be attempted in Eastern Europe. There is every reason to believe that the Communist countries will, in fact, endeavour to



EAST GERMANY. *The controversial Zeiss Aktivist in its standard plain bearing, disc valve version. Five different models of this 2.5 c.c. engine have appeared.*

export model engines, perhaps even to western countries. Indeed, this has already started with the new Hungarian "Aquila" engines. Possibly, the lack of quantity produced model engines capable of competing with commercially made western products has, up to the present, deterred these countries from such a course. We see no reason why the East Germans and Czechs, in particular, should not be in a position to put highly competitive model engines on the world market. These notes, for example, are being typed on an extremely good Czechoslovakian built typewriter that is now available in Britain.

Where State sponsored organisation comes in useful is, undoubtedly, in promoting international competitions and record breaking. As an example of the scale on which these can be undertaken, we give below the substance of a report, sent to us from East Germany, of the 1954 Moscow international meeting at which eight Communist states were represented. It will be an eye-opener to many.

The East German contingent flew to Moscow in a Russian IL-12 aircraft (the standard twin-engined, medium range transport in use in these countries). On arrival, they were first taken on a conducted tour to show them the wonders of the city, then to their "lodging," which appears to have been a sort of castle, in extensive grounds, now a rest-centre for workers. . . . The Germans were hungry, our reporter tells us, but it appears that they were quite unprepared for the feast laid before them. When they tried to down tools, after numerous courses, the cook came running to ask what was wrong with his food.

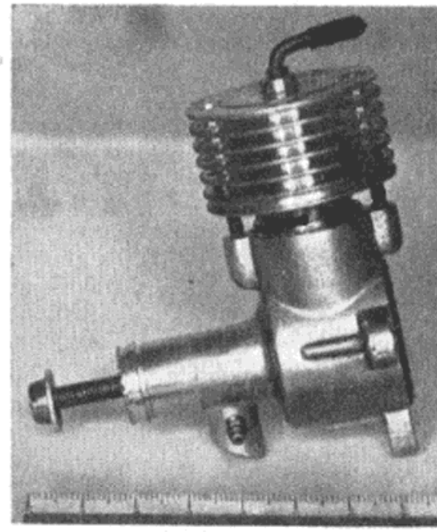
This annual event is no two or three day affair. The 1954 meeting lasted from August 25th until September 12th. In addition, most of the competitors had previously had a training course (!) of two or three weeks, i.e. a total of five or six weeks all told. (Undoubtedly, the international contestant is quite a V.I.P.—how else could he get so much time off?) The first five days in Moscow were occupied with processing (to F.A.I. rules), sightseeing and a discussion between the organising commission and participants.

In the contest proper, which was held at Tushino airport, helicopters and Yak 18 two-seater trainers stood by to follow, "at 20 seconds' notice," any model which passed over the airfield boundary. Another service was the provision of field repair boxes, engine test blocks and a technical advice and help team of Russian experts.

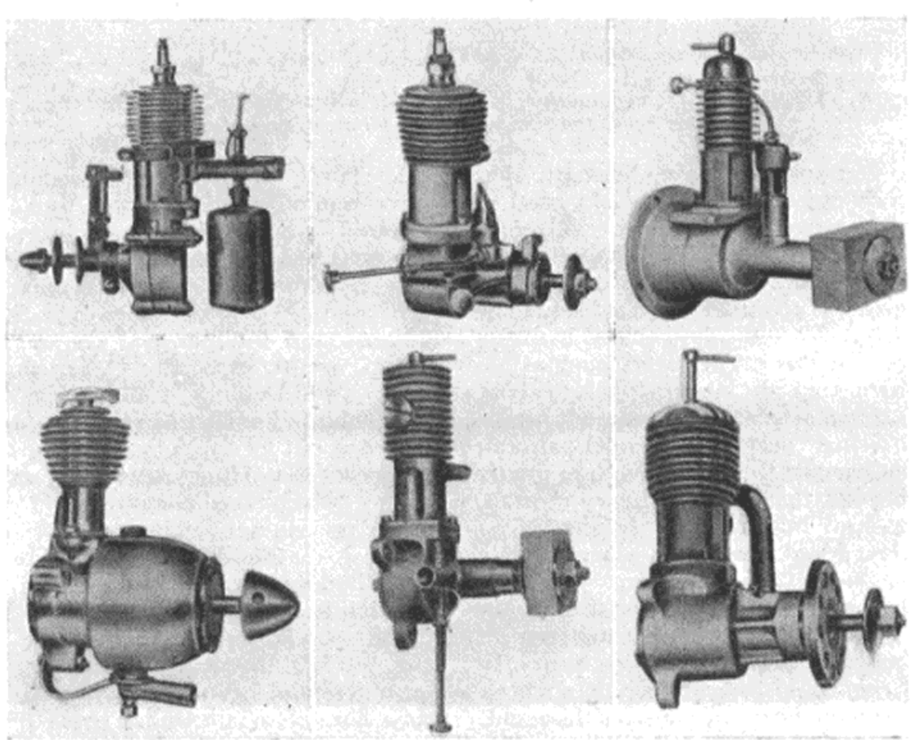
All this sort of thing would cost thousands of pounds if privately organised and paid for. The provision of a helicopter directed recovery service makes an amusing item to read alongside a recent report that the hourly operating cost of B.E.A.'s helicopter service between London Airport and Waterloo Air Terminal is as great as that of operating a *Viscount* four-engined airliner, and the service is therefore run at a loss. It is also one very good reason why the Russians have figured so prominently in model aircraft height and distance records.

To many of us, this will seem to be needless extravagance, but it is, perhaps, something we cannot afford to ignore. The Russians and their neighbours have lately shown some interest in competing, as we have always hoped they would, in the official F.A.I. World Championship model meetings. This being so, it seems that we may well be forced to endeavour to obtain some official assistance for these events, if only to keep our end up.

There are people who, rightly, will remind us that it is a somewhat worn-out notion that assumes international competition in games, athletics and other sports to be a sure means of promoting goodwill between nations, and, on this score, to warrant the sponsorship of governments. Of course, it is perfectly true that, when national prestige is so

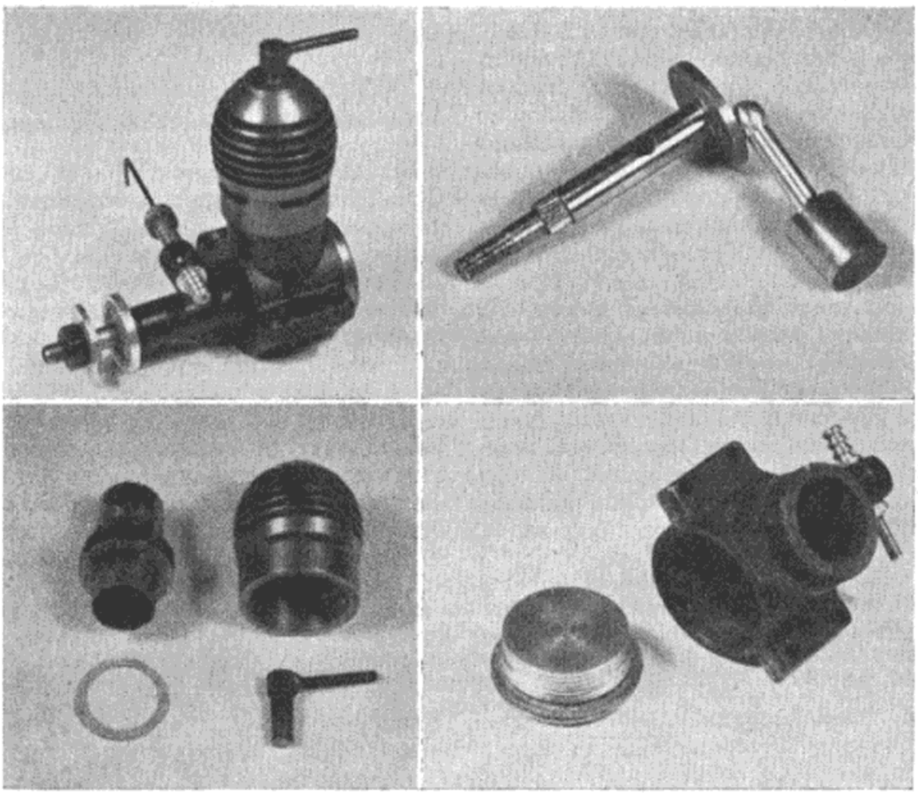


CZECHOSLOVAKIA. Most commonly encountered engines in Czechoslovakia are AMA series made by A. Machacek of Prague. Shown is 2.46 c.c. diesel model.



RUSSIA. A selection of 1946-51 Russian engines. Left to right, they are (top row): AMM-5 petrol engine of 9.5 c.c. which was produced in moderate quantities, MB-05 petrol engine of 9.96 c.c. and of more advanced design and the large MK-03 diesel of 7.44 c.c. Bottom row: KMK-1 diesel of 4.28 c.c. with unusual carburettor design, MKB-01 diesel of 4.4 c.c. and the 6.9 c.c. MK-09 diesel with non-standard drive disc and intake and compression-lever extensions.

much at stake, rivalry often seems to get the better of sportsmanship (at least so far as the supporters and spectators are concerned, if not the actual competitors) and goodwill goes out of the window. Nothing is more sure of getting the national dander up, than to read in one's morning paper, of ignominious treatment meted out to British sportsmen at the hands of a foreign crowd. "These Bustians are insufferable," we rage. "About time we taught 'em a lesson." And, no doubt, the same happens elsewhere.



HUNGARY. A bid for foreign markets is being made with this 1 c.c. diesel, the "Aquila Baby," sold complete with English instruction leaflet.

It is quite certain, however, that such objections do not hold good in the case of the model aircraft movement. In our hobby, happily, the competitors of any one country, or group of countries, are not likely to be subjected to displays of bad manners on the part of spectators, such as has happened in international football, for example. Fortunately, the obscure antics of model aircraft enthusiasts the world over are mostly beyond the ken of ordinary mortals, so no international incidents endangering world peace seem likely to stem from spectator reactions. Let us not pretend that the establishment of friendship and respect between modelling types from different countries will have the slightest effect on the future course of the world, but it might be as well to remember that, if we are to meet the Russians and their neighbours on the contest field, and especially if they are to visit this country, no good will be done to the British cause if we fail to put up a decent show of amenities and hospitality.

Since this discussion has stemmed from comment on East European model engines, it seems apposite to conclude with a few quick notes on some of the examples illustrated on these pages.

The latest "Iron Curtain" product to come into our hands is the Aquila "Baby" diesel from Hungary. Hungary has, up to now, been the only Communist country to make wide use of Western engines in both national and international contests. In C/L events, especially, American McCoys and Doolings, Italian Super-Tigres and French Microns have battled it out for top honours. Now it appears that Hungary is going to try to return the compliment by exporting engines. Thus, two examples of the Aquila Baby reached us from Budapest complete with instruction leaflet printed in English.

The Aquila Baby is a medium-long stroke, shaft-valve unit with circumferential cylinder porting. It has a bore of 10 mm. and a stroke of 13 mm., giving a displacement of 1.02 c.c. We shall not describe the engine in detail here as it is intended to give a more complete report, with performance data, shortly, but, in general, while the motor is a little rough in places, it is of quite neat appearance, light weight (2.1 oz.) and should sell if the price is right.

Other Aquila engines are being produced, including three 2.5 c.c. class diesels and a 5 c.c. glowplug ignition, disc-valve, twin-ball-bearing racing engine.

In East Germany, the 2.5 c.c., short-stroke Zeiss Aktivist engine is now well under way and, to date, has appeared in no less than five different versions. The standard Aktivist is shown. The Aktivist II is the same but for a revised crankcase and twin ball-bearing mounted crankshaft. The Aktivist III is a further development having a reed valve in place of the standard disc. In all these models the cylinder barrel is attached to the crankcase with three screws into lugs cast on the upper section of the crankcase. In the Aktivist IV (disc valve), however, the arrangement has been replaced by a screw-on cylinder barrel, the lugs now being omitted from the crankcase casting. The cooling fins on the new barrel are of much smaller diameter. The Aktivist V is the same as the IV, except for reed-valve induction.

A number of references to the Russian MK-12 engine designed by O. K. Gajevski have been made in East European countries lately. This is a 2.47 c.c. disc valve diesel with the crankshaft carried in two ball journal bearings in a flange fitting front housing. The engine is of the circumferential port type and uses the popular 15 mm. × 14 mm. bore and stroke combination. The unit was nominally rated at 0.22 b.h.p. at 9,000 r.p.m. A recent development has been the adoption, in the MK-12k, of a 0.8 mm. spring between the compression screw and the contra-piston, on the lines of the American Herkimer Cub diesels, plus a small anti-detonation chamber formed in the centre of the coned undersurface of the contra-piston. The model has been variously credited with outputs *circa* 0.35/0.36 b.h.p., which figures seem just a trifle optimistic.

The MVVS 2.5 c.c. racing engine, as used by Sladky in winning the individual World C/L Speed Championship, will become available to Czech modellers in limited numbers in May.

MODEL AERODYNAMICS No. 15

Both for design and trimming purposes the balance of an aeroplane is related to the centre of gravity position, relative to the wings. Since results with models are nearly always achieved on a purely practical basis, only the C.G. position relative to the leading edge of the wing is normally considered, i.e., the fore and aft C.G. position. The *vertical* position of the C.G. also has a marked effect on stability and trim and the designer should be conversant with its significance.

The practical wing (on all free flight models) has a dihedral and thus the true reference chord (known usually as the mean chord) is not the centre rib of the wing. In the case of a parallel chord wing the mean chord occurs at half span—Fig. 1. On a taper wing the approximate mean chord position is given by the geometric average, where A and B are equal to the ratio tip chord/root chord. In the case of a biplane, the mean chord in the vertical direction can be taken as a similar geometric average of the upper and lower mean chords, i.e. where C and D are in the ratio lower wing chord/upper wing chord. Actually stagger or declaage on a biplane layout modifies this position, both tending to move the virtual mean chord slightly forward of the geometric position.

Centre of gravity position is then defined with reference to the zero lift line of the mean chord—Fig. 2. The zero lift line of any section can be drawn as a line through the trailing edge and a point on the mean camber line one quarter (25 per cent) of the chord from the leading edge. Reference distances are then measured parallel and perpendicular to the zero lift chord (line). The fore and aft C.G. position (X) is measured from the leading edge of the section and the vertical height (H) from the zero lift line. H is positive if the C.G. is *above* the zero lift line and negative if *below* the zero lift line.

Without going into the basis of the theory of stability it can be said that the stability (or lack of stability) of a wing can be represented by its moment or turning effect about the centre of gravity. This effect will depend on the fore and aft position of the C.G. and the angle of attack of the wing, as is well known; and also the *manner* in which such changes take place will depend on whether H is positive or negative, or zero.

For example, in the case of a high wing aeroplane where the centre of gravity is invariably below the mean chord, i.e. H is negative, the moment curves corresponding to various fore and aft C.G. positions all take the same form—Fig. 3. They all tend to fall off with increasing incidence. This means, quite simply, that at high angles of attack such a combination has better stability than at low angles of attack. In terms of model performance, this is just what we require for duration glide performance, where trim corresponds to a high angle of attack. The layout loses in stability if made to fly fast, i.e. at a low angle of attack.

Locating the mean chord on the C.G.—Fig. 4—results in straight line wing moment curves, implying that the stability is the same at low speeds as at high speeds. This is therefore a most useful arrangement for any aeroplane which is to be operated over a wide speed range since longitudinal stability requirements remain substantially the same throughout.

Put the mean chord below the centre of gravity, i.e. with H positive—Fig. 5— and we have the reverse of the high wing layout. This design is most stable at high speeds but suffers a fall off in stability at low speeds (high angles of attack). It is not, therefore, a very satisfactory layout for duration work, but certainly the best for speed.

The biplane arrangement offers a ready method of 'placing' the mean chord where it is most wanted—above the C.G. for a duration layout, below for speed work, or on it for a control line stunt model, say, to retain similar stability throughout a range of manoeuvres.

In all fairness it must be pointed out that any adverse effects resulting in a badly placed vertical C.G. position can usually be overcome, e.g., by increasing the margin of stability in the overall design. But it should also be borne in mind that stability requirements and overall efficiency are often diametrically opposed. Thus balancing the layout for maximum stability for a start can lead to an improvement in overall efficiency.

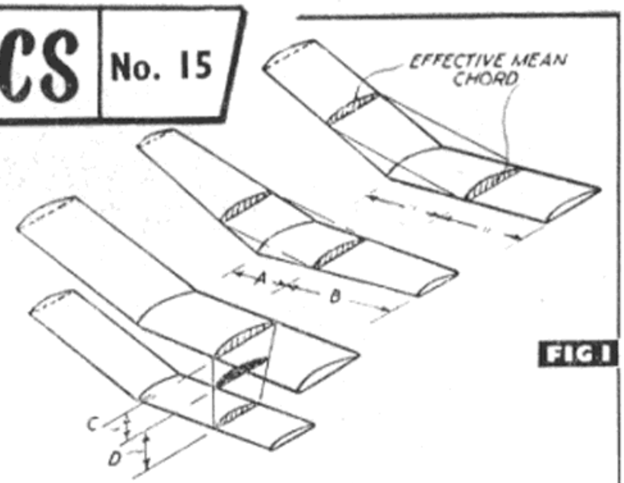


FIG 1

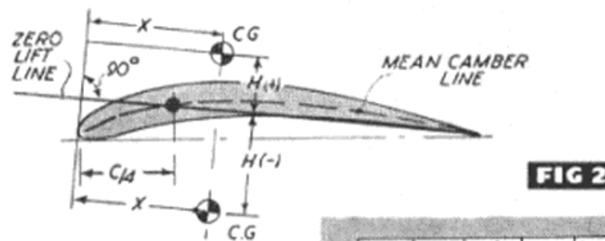


FIG 2

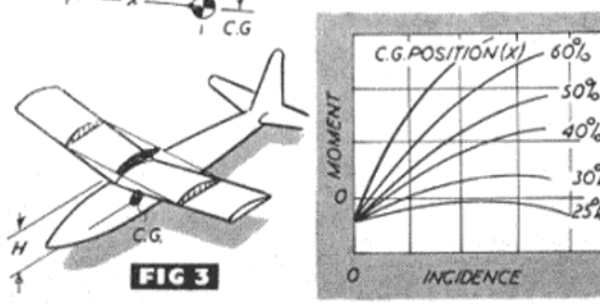


FIG 3

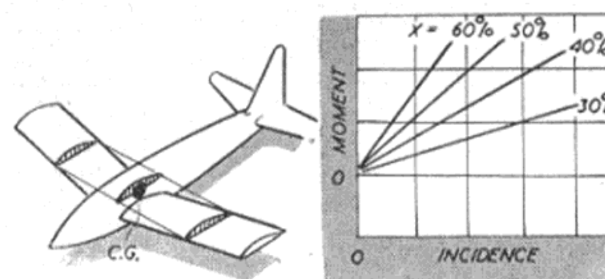


FIG 4

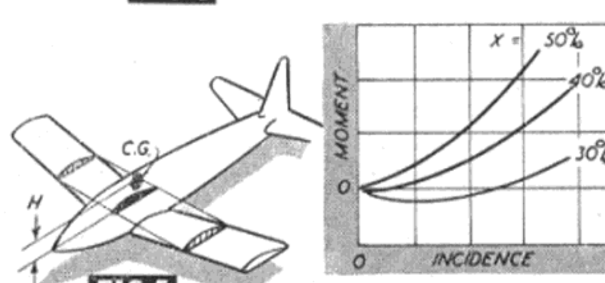


FIG 5

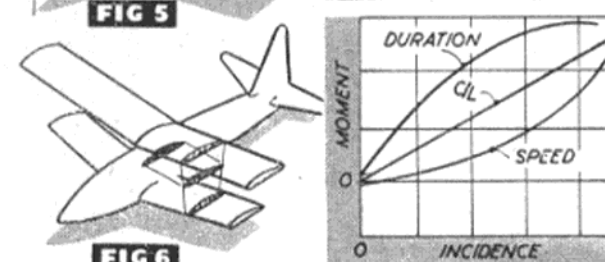


FIG 6

Club News

AND NEWS FROM THE S.M.A.E.

SOUTHERN AREA

The results of the Area Challenge Bowl have now been finalised and the results are as follows.

1st Bournemouth with 210 points.
2nd Southampton with 131 points.
3rd West Hants with 98 points.

Therefore the Bournemouth club will hold the cup for the next year.

The individual champions in the Area for 1955 were as follows.

Power: J. Manville, Bournemouth, average, 2:14.
Glider: J. Manville, Bournemouth, average, 2:16.
Rubber: S. Taylor, West Hants, average, 2:27.

The A.G.M. was held at Winchester but was poorly supported, only ten members from three clubs turning up.

After the election of the 1956 committee it was agreed that an Area Chuck Glider comp. should be held in the near future.

The rules for the event were as stated here.

Two entries to each member, best three out of five flights to count, and the event to be a decentralised, all the times being forwarded to the Area. Comp. Secretary.

To increase the interest in such a competiton in the Area the prize money is as follows:

1st £1, 2nd 15s., 3rd 10s., 4th 5s.

WEST OF SCOTLAND AREA

Plans are forward to ensure the attendance of a strong Scottish contingent at the Northern Gala, Nationals, and Trials, so look out down there; we've got four "Dormobiles," hired for the Nationals. An indoor C/L rally to be run in the Kelvin Hall Glasgow, should produce some exciting flying. Can you imagine an F.A.I. Racer on 30-ft. lines? It will be interesting to count the stunt jobs which have an argument with the rafters. Glasgow S.A. recently entertained a visiting American, Karl Spielmaker of Grand Rapids Club, and obtained some interesting insights into American Modelling.

First on our comp. calendar are team race eliminators for Davis Trophy teams and we are hoping there will be no repetition of one of last year's heats, when 3 in. of snow had to be brushed off the runway.

THORNABY PATHFINDERS M.F.C.

The power and glider men got off to a good start last year but came a cropper when beaten by near neighbours Stockton in a threefold contest for rubber, power and glider. However 1956 should see them recover. . . . We take this opportunity of wishing all aeromodellers all the best for 1956 and would like to hear from secretaries with a regard to postal matches between our clubs. We would also welcome information regarding rallies, flying meetings, etc. that many clubs hold which are open to visitors, incidently we are holding a meeting of local club secretaries with a view to arranging fixture lists between the local aeromodelling gentry, so 1956 should see us pretty busy up here in the wilds.

ANGUS & DISTRICT AERO LEAGUE

The *Bucksburn Air Team* has been regrouped. Their secretary is Roy Yule who recently burnt all his old models, unfortunately most of the top half of 499, Great North Road, Woodside, Aberdeen was burnt with them, but anyone in the Inversnecky district keen on the hobby will be most welcome. The Aberdeen Model Engineering Society, who are not a model areo club, have taken them in as members and given them adequate building space.

Forfar and Kirriemuir have amalgamated to make a new club 20 strong. They are interested in both F/F and C/L and we believe they have premises. Secretary is A. McCallum of Kirriemuir who is also league vice-president.

Arbroath, a very exhibition conscious club, has a construction/finish type exhibition in January. Ten juniors competed while a few models were contributed by the seniors to set a good example, although old men over 21 were not eligible for the prizes. Winner was 14-year-old David Porteous with a carefully made Mercury "Teal." Mercury really stole the show because 2nd and 3rd. A. Ramsay and A. Roberts had a "Monarch" and a "Maurader" respectively. One of the seniors who had returned after several years from the fold had a beautiful K.K. "Ladybird." which displayed its most interesting scalish construction with a commendable lack of colour-dope. Judges, Messrs. Whyte, Petrie and Campbell of Montrose, lamented the lack of sandpapering on certain leading edges and were able to assure at least one of the young competitors—(who surprisingly asked their advice)—that six coats of strong dope were definitely the reason for a badly warped tailplane. President's wife, Mrs. Paterson, presented the prizes.

At the league's A.G.M. held at Arbroath in December, Mr. D. Inglis of Dundee retired after several years in office, his position as president being taken by Mr. K. B. Whyte of Montrose. Comp. fixtures to be held at "Condor" are as follows:— May 6th, A/2; June 3rd, Scale and Open Power; July 1st, Open Glider; August 5th, F.A.I. Power. Final comps. for '56 will be at Montrose on September 2nd, Open Rubber and Scale.

FARNBOROUGH M.A.C.

The A.G.M. of the club was held on January 12th, when the following officers were elected. Chairman, J. Whiting; Secretary, J. Webster; Treasurer and Competition Secretary, D. Gordon.

Among items discussed was the proposal to change over from the Southern area to the London area.

The club's financial status was said to be satisfactory, and the increase in members will no doubt help.

The future programme owing to the increased membership looks like being a good one. It now includes a C/L stunt monthly contest, the cup annually going to the best on points awarded on each contest.

ASHTON M.A.C.

The main highlight of the A.G.M. was the presentation of the club championship trophy to Joe Chadwick.

Congratulations were given to Charlie Girling on his "Gutteridge Trophy" win, and the rubber champ was once again C. B. Jackson. The club championship rules were altered slightly—for the better we hope—and if any club wishes to copy, here they are. All club competitions and rallies, where transport is provided are to count. Seconds flown to count as points in rubber, power and glider. The total of all these three to count in the overall championship.

BRADFORD M.A.C. & LEEDS M.F.C.

First combined dinner and prizegiving since the clubs joined forces was held at Silvio's cafe in Huddersfield on February 4th.

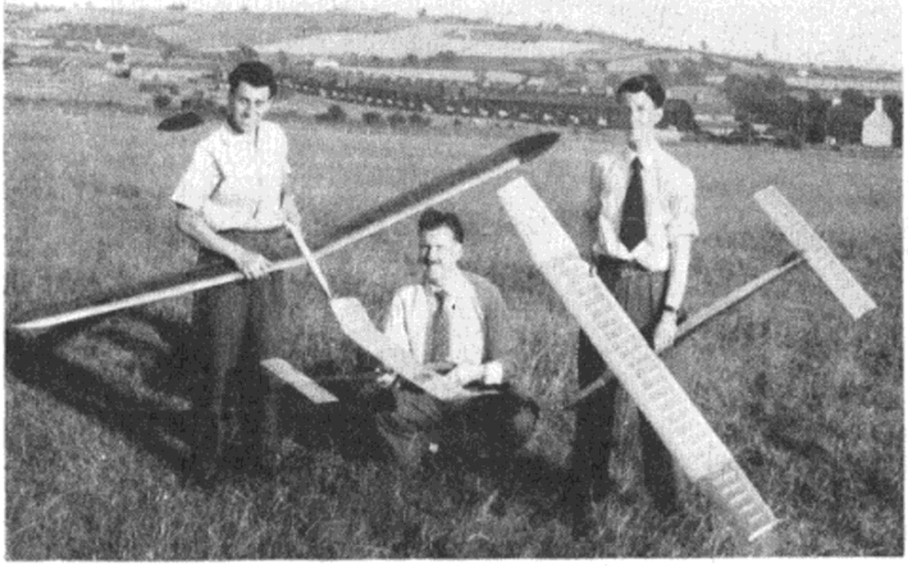
A good time was had by all, despite the somewhat doubtful dishes offered on the menu such as Weak Anti-climb Mixture, Fowl Pieces of new F.A.I. Rulings, not to mention that mysterious brew served in the bar, Murky Baildon Rainwater.

Several distinguished guests were present, including Messrs. Copland and Gosling, and Mrs. Landfranchi presented the prizes before the evening ended with a film show. That man Rutter staggered out with no fewer than five trophies. The Coultas and Anderton Championship trophies, Silvio Cup for gliders, and the Driver and Archer Cups for rubber!—whilst Arthur Collinson collected both power

MODEL—BUILDING CONTEST

Commendable initiative is shown by Messrs. Dees of Wallington in the organising of an annual model building competition. This year, the fourth time this event has been held, the standard of workmanship displayed on the models shows a marked improvement over that of previous years. The preponderance of entries were built from kits, but own-design and plans-built models had a special section. No entry fee is charged to exhibitors. In addition to the challenge shield presented by the organisers, won this year by J. W. Stacey with a fine model of a *Cutlass*, built from a flying scale kit, other prizes were donated by the trade.

A few of the models on display in the power section.



Tynemouth M.A.C. team which flew in the N.E. Area knockout competition. Left to Right : G. Oswell, R. Nicholls, R. Pallant.

"pots." Other "doubles" were Frank McNulty—chuck glider and H.L. glider—and Les Hey—A/1 and A/2 gliders. Bradford's Senior Championship Trophy went to J. A. B. Pannett, and best juniors were J. B. Creak (Bradford) and P. Lawson (Leeds). Henry Tubbs won the club's "Wakefield" Cup and Stan Eckersley the remaining open glider trophy.

MERSEYSIDE M.A.C.

This new club has been formed with a strong core of senior members from the old Merseyside M.A.S. Anyone in the area interested in joining should get in touch with R. Thomson, 62a, Ashbourne Road, Aigburth, Liverpool 17.

MID-SOMERSET M.A.C.

This club has recently been formed with a nucleus of 10 members. Application for affiliation to the S.M.A.E. has been made, and any modellers in the neighbourhood are cordially invited to get in touch with the Secretary, F. T. Turner, 34, Hound Wood Grove, Street, Somerset.

WALLASEY M.A.C.

We recently attended the N.W. Area Winter Rally and although the conditions were somewhat cold and breezy we managed to obtain a few placings. Pete Nicholson was second in the Power Duration with a total of 7 : 27, and in the team race the team of R. Banks, C. Bryan and J. Clarke were second and R. Booth and J. and R. Macleod were third.

HYDE M.A.C.

Secretary R. P. Wilson invites applications from any clubs or individuals in the area to share their excellent flying ground. Those interested should write to Mr. Wilson, 21, Harding Street, Newton, Hyde, Cheshire, for details.

CHINGFORD M.F.C.

On club nights Jetex R.T.P. continues to send everyone choking to the canteen to carry on their conversations about anything but aeromodelling.

The majority of club members seem to be concentrating on class "A" and "B" team racers, PAA load and F/F for the coming year, but John Hall is continuing the successful "Cornball" series of speed models.

Three of the boys have been overheard muttering about grid leaks, anode current, relays and other unknown words (in this club) so we are expecting a radio model to appear one future Sunday afternoon.

COWLEY (MIDDX.) M.F.C.

At the second annual dinner, Mr. R. Hill of Arcade Model Supplies, Uxbridge, presented the cups to 1955 prizewinners. The Senior Championship and Rubber cups were won by A. W. F. Alexander, the Junior Championship cup by J. Taylor, and the Glider cup by A. J. Benson. Mr. Hill then surprised everyone by presenting a magnificent trophy to the club on behalf of Arcade Model Supplies. A suitable contest for the new trophy provided a main item on the agenda of the 5th A.G.M. the following week. After a lengthy discussion it was decided to hold a single competition in which both seniors and juniors could compete with rubber, glider or power models, and for even competition, juniors would receive a bonus of 50 per cent. to their flight times with a 2 min. max., seniors having a 3 min. max.

The club meets every Monday evening at 7.30 above the saloon bar of the Fox Inn, Cowley and prospective members or visitors are always welcome. Flying takes place on Sundays at Hounslow Heath (weather permitting). The club also has a club building room 20 ft. × 20 ft. at Hillingdon Heath with plenty of room available on the building tables.

ENFIELD AND DISTRICT M.A.C.

Preparations are well in hand for the 1956 C/L Rally and it will probably be run on much the same lines as last year—that is two classes of team racing, combat and handicap speed.

It would be of considerable assistance if anyone with any ideas for improvements, or comments on our previous rallies, would write to 79, Birbeck Road, Enfield.

No date has yet been fixed, but it is anticipated that it will once again be about the middle of July.

Recent club interest has focused on electric R.T.P. for use at exhibitions, to supplement the compressed air which we have used to good effect at previous exhibitions. After our experiences at the last attempt, and with new knowledge, we feel that it should be quite successful. Work has commenced on it, as a club project, but the main difficulty so far has not been the motor or model, but suitable power supply.

ST. ALBANS M.A.C.

At the A.G.M. it was noteworthy that there were more juniors than seniors present. At the moment there is a majority of juniors in the club.

The chairman opened the meeting by saying that the club had had a fair success this year. Two members, Digby Woods and Pete Wright, had been in the International Speed Team, and a number of people were fairly high up in the S.M.A.E. competitions.

It is rather disheartening news to hear that the club is swinging on a very doubtful financial balance, and we note the treasurer's statement that subs. for last year are a bit behind. Could be that some of the old familiar faces may no longer be with us in the near future.

SECRETARIAL CHANGES

SOUTHERN AREA. P. Giggle, 18, Mayflower Road, Shirley Southampton.
BUCKSBURN AEROMODELLING TEAM. R. Yule, 499, Gt. Northern Road, Woodside, Aberdeen.
SOUTHPORT M. & E.C. D. Sephton, 149, Guildford Road, Birkdale, Southport.
YORK M.A.S. J. W. C. Bell, 13, Wycliffe Avenue, Tang Hall Lane, York.
LEEDS M.F.C. W. Lakeland, 21, Bedford Mount, Tinshill, Leeds, 16.
MILL MILL & D.M.A.C. P. H. White, 10, Holders Hill Crescent, Hendon, London, N.W.4.
WIGAN M.A.C. W. Wood, 66, Enfield Street, Pemberton, Wigan, Lancs.
HASTINGS & BEXHILL A. J. A. Heskett, 392, Bexhill Road, St. Leonards-on-Sea, Sussex.
GRANGE M.A.C. J. B. Hargrave, R.A.E. Apps. Hostel, Farnborough Road, S. Farnborough, Hants.
LONDON AREA S.M.A.E. E. Bennett, 37, Shirley Park Road, Croydon, Surrey.
CAMBRIDGE M.A.C. C. King, Red Roofs, Ely Road, Waterbeach.
CROYDON & D.M.A.C. E. Bennett, 37, Shirley Park Road, Croydon, Surrey.

NEW CLUBS

MID-SOMERSET M.A.C. F. J. Turner, 34, Hound Wood Grove, Street, Somerset.
MERSEYSIDE M.A.C. R. Thomson, 62a, Ashbourne Road, Aigburth, Liverpool 17.

CONTEST CALENDAR

March 25th	GAMAGE CUP. U/R Rubber. Decentralised.
	PILCHER CUP U/R Glider. Decentralised.
April 8th	S.M.A.E. CUP. 2nd Glider Elim.
	*FARROW SHIELD. Team Rubber.
	WOMEN'S CHALLENGE CUP. U/R Rubber/Glider. Area.
	JETEX CUP. Jetex.
,, 15th	AEROMODELLER TROPHY. Radio Control. Cent.
,, 22nd	*WESTON CUP. 2nd Wakefield Elim.
	ASTRAL TROPHY. 2nd Power Elim. Area.
April 29th —May 2nd	CRITERIUM D'EUROPE. C/L. Brussels.
May 6th	HAMLEY TROPHY. U/R Power. Decentralised.
	High Wycombe C/L Rally. Speed. T/R. Combat. Kings Mead Recreation Ground.
,, 20-21st	**THE NATIONALS**
,, 20th	†THURSTON CUP. Glider.
	DAVIES TROPHY. Team Race. "A."
	SHORT CUP. 2.5 PAA-Load.
	GOLD TROPHY. C/L Stunt.
	S.M.A.E. TROPHY. Radio Control.
,, 21st	†SIR JOHN SHELLEY CUP. Power.
	†MODEL AIRCRAFT TROPHY. Rubber.
	DAVIES TROPHY. Team Race. "B."
	BOWDEN TROPHY. Precision Power.
	SUPER SCALE TROPHY. Power Scale.
	TAPLIN TROPHY. Radio Control.
	LADY SHELLEY CUP. Tailless.
Aug. 4-6th	**WORLD POWER CHAMPIONSHIP**—Cranfield.

* Plugge Cup events.

† These events will decide the Area Championship.

Aeromodeller Trophy will be used as an Eliminator for any competitors wishing to take part at their own expense in the contest for the King of the Belgians' Cup on 15-18th June at Antwerp.

It is hoped the Trials will take place not later than June 10th.

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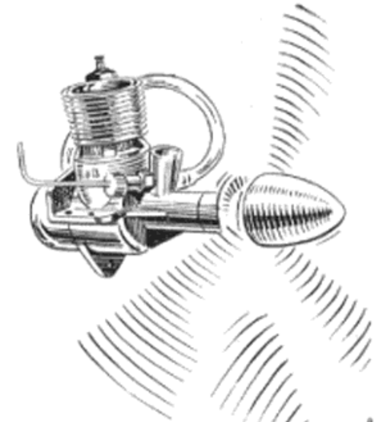

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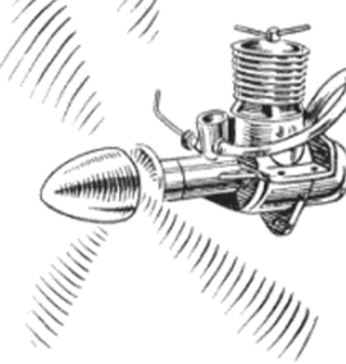

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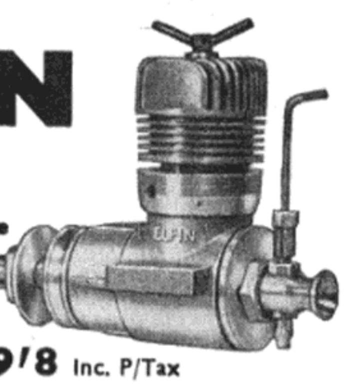

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