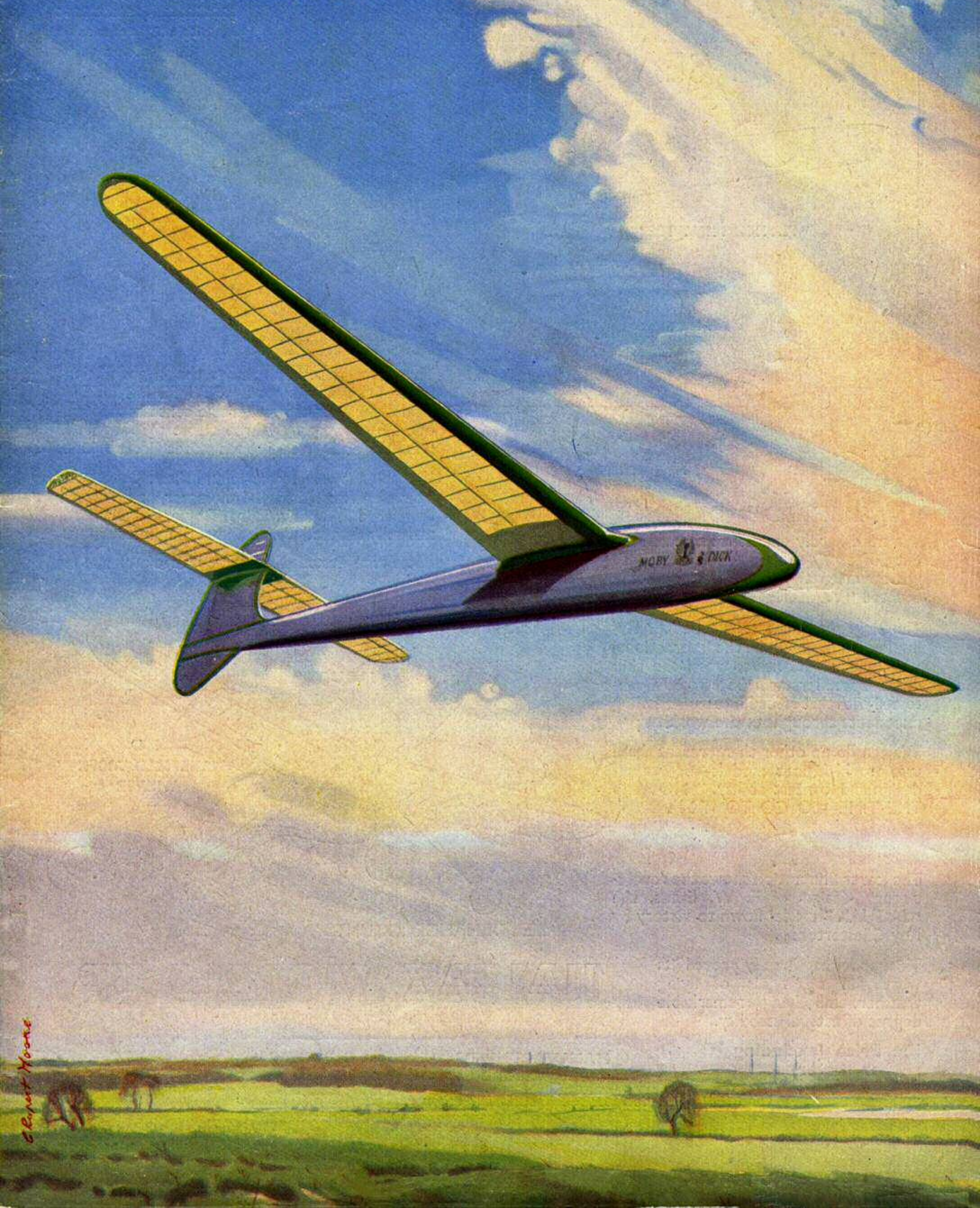
JAN.
1949

AEROMODELLER

1/3



"HERALDING THE 1949 FLYING SEASON"—

BRITISH
RECORD HOLDER
with a flight of over
33 mins. o.o.s.

PROVEN DESIGN

The above illustration shows the clean efficient lines of the now famous "FLYING MINUTES" model—winner of innumerable contests throughout the country and three times placed in the "WAKEFIELD" team to represent Great Britain.

Kit includes selected strip and sheet Balsa with printed Wing Ribs, 18″ diameter hand carved Spinnered Airscrew, Wire, Tissue, Cement, etc., and fully detailed plan with building instructions.

Kit Price (excluding rubber motor) 21/-

ACCENT ON "WAKEFIELD" DESIGN

We need hardly emphasise that it is the duty of every serious Aeromodeller to get down to the job of retaining the coveted "WAKEFIELD" Trophy.

The highlight of the 1949 S.M.A.E. Flying Programme will be the International "Wakefield" Contest, when the skill of our best fliers will be strongly contested with that of leading aeromodelling exponents throughout the world.

We can do no other than present these two world-famous models—of proven design and contest ability. NOW IS THE TIME—SO GO TO IT ! ! !

1949
"WAKEFIELD TROPHY"
WINNER

The lower illustration shows the revolutionary design of E. W. Evans, the "JAGUAR" model flown to victory by Roy Chesterton.

This model has already proved its worth in all types of flying weather, embodying a remarkable degree of natural stability.

Kit Price (excluding rubber motor) - - - 21/-

"PERFORMANCE COUNTS"

HALFAX MODELS LTD

GREEN MOUNT WORKS HALFAX PRODUCTS **HALIFAX YORKSHIRE**

MANUFACTURERS **IMPORTERS** **EXPORTERS**

'GRAMS: "AEROMODEL," HALIFAX 'PHONE: HALIFAX 2729

Ⓢ

MILLS diesel design

This series of articles spotlights features and details of design marking the superiority of Mills Diesels.

1. FUEL ATOMISATION

Easy and complete combustion depends upon intimate mixing of fuel in minute particles with the necessary quantity of air. In some full-size two-stroke engines this is accomplished by the most ingenious methods of controlled turbulence.

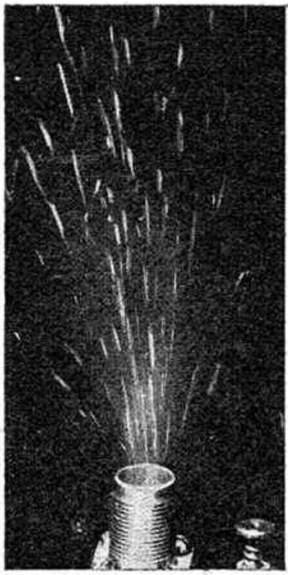
Model aircraft engines were generally considered too small for refinements of this kind to be a practical possibility. However Mills designers developed the patented Mills Transfer System★ which solves this problem simply and effectively

The Test:

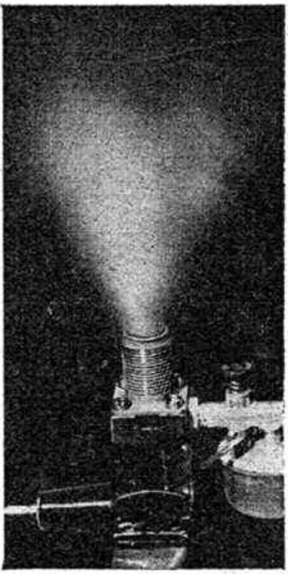
It is easy to ascertain the degree of atomisation achieved in a "Diesel." All that is necessary is to remove cylinder head and contra piston and to drive the engine by external power, say by inserting the nose of the crankshaft in the collet of a lathe. On filling the tank, the engine will run through its cycles with the only difference that combustion does not take place. Instead, the atomised fuel will, or should, rise gently from the open cylinder.

This simple test is illustrated here by two photographs. For the sake of comparison, the first engine has been fitted with a conventional flat type piston and the cylinder has a slot shaped transfer port. Fuel is being thrown up in heavy droplets. These droplets will not ignite readily and power is being wasted. The other photograph shows a standard Mills Diesel and the effect of the patented Mills Transfer System. The fully atomised fuel rises like a fog. Each minute particle is surrounded by the necessary air ready for instantaneous and complete combustion.

Mills Diesel engines are designed throughout on scientific principles proved in experimental research, and all materials are selected without compromise for suitability and quality in order to give lasting life to an engine of superior design.



Insufficient Atomisation affects starting & power



Mills patent Transfer atomises fuel completely

★ *The Patented Mills Transfer System*

In all Mills Diesels, the Air-Fuel mixture enters the combustion chamber in two separate streams. These streams impinge on one another and strike sharply against a flat wall machined in the piston crown. Any heavy droplets of fuel or oil are smashed up in the process and dispersed in the turbulence created. At the same time the charge is deflected upwards for good scavenging of the combustion chamber.

●

For best performance use Mills Blue Label Diesel Fuel now in the new 10 oz. container, Price 2/6

·75 c.c.	10 ozs. Thrust, 2 ozs. Weight, Max. Power at 9,000 RPM	£3 . 5 . 0
1·3 c.c.	18 ozs. Thrust, 3½ ozs. Weight, Max. Power at 10,000 RPM	£4 .15 . 0
2·4 c.c.	32 ozs. Thrust, 6 ozs. Weight, Max. Power at 9,500 RPM	£5 .10 . 0
1·3 c.c.	Marine Unit complete with Flywheel and Exhaust Stubs	£5 . 5 . 0

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MILLS BROS (MODEL ENGINEERS) LTD.
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REALISM IN CONTROL-LINE with the HAWKER SEA FURY X

FLIES AT OVER
60 M.P.H.

Fitted with a scale 'Drop-off' undercarriage it's a gem to handle—but not for the beginners!

IT'S SENSATIONAL—

A New Scale Control-line Stunt Model with COMBINED FLAP AND ELEVATOR CONTROL giving speed with super manœuvrability.

This unique design is guaranteed to do "everything in the book" and is the result of months of intense development by its designer Phil Smith to perfect a scale model capable of advance stunting.

Powered by any Diesel Motor of 1·3 to 3·0 c.c. or Glow-Plug Motor of 1·5 to 5·0 c.c. (Max. engine weight 6 ozs.), this beautifully proportioned and modern model has a super manœuvrability comparable to any of the conventional Stunt Machines. The secret of its success lies in the wonderfully **combined Flap and Elevator Control**—VERON'S latest masterpiece.

The development of this model was made with a standard E.D. Comp. Special Diesel Motor of 2 c.c. and engine weight of 5½ ozs.—all-up flying weight being 12 ozs.

KIT PRICE 22/6

Of essentially simple construction the kit contains many unique features new to Veron Kits.

- Span 25½ inches.
- Scale 1/18 full size or ⅜ of an inch to the foot.
- Airframe weight (without U/C and Engine) 6 ozs.
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The THUNDERBIRD

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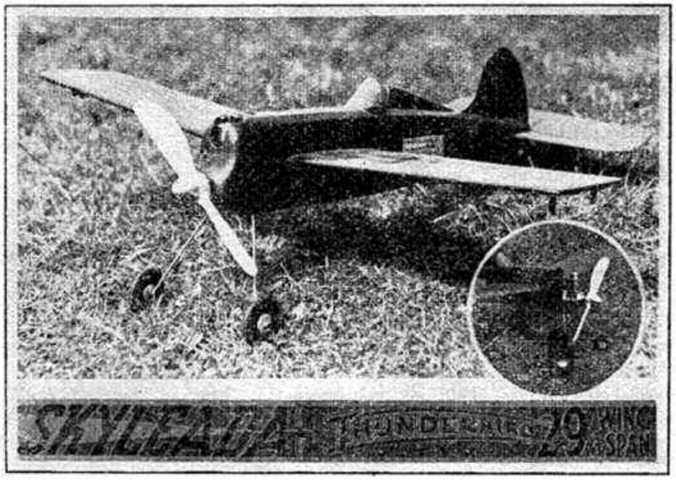
SUPER CONTROLINER

Kit complete, including rubber wheels.

GET ONE AT ONCE

22/6

"IT REALLY WILL STUNT"



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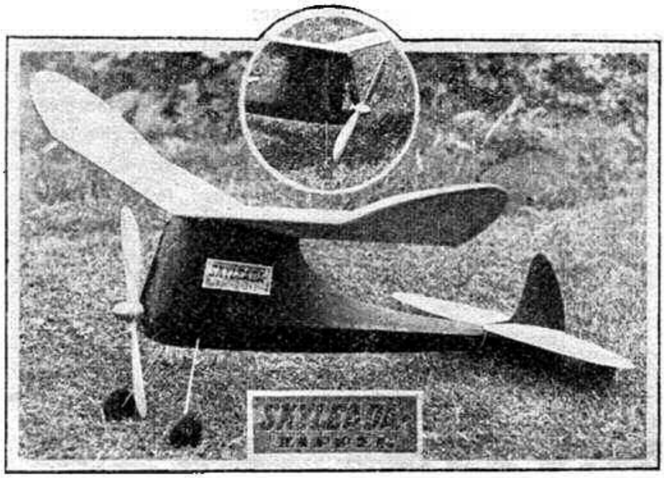

The ZIPPER

44 in. WING SPAN

A really complete kit, including rubber wheels.

Performance:—
Original model 4 mins. 53 secs. on 15 secs. engine run.

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Weight .. .. 7½ ozs. R.P.M. Flywheel 18,000 R.P.M. 10×6 prop 10,000 R.P.M. 10×8 prop 8,000	This Engine is	Glo-Plug head 10/- extra. Extended Crankshaft and Spinner 9/6 extra. 6 oz. Flywheel 8/6 extra.

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ENTIRELY NEW DESIGN

MORE POWER SPEED EFFICIENT — CRANKSHAFT INDUCTION, STREAMLINED TANK, EASY STARTING

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Direct from Britain's No. 1 Mail-Order House

- ★ A KIT FOR EXPERTS
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- ★ TWO TIMERS OF EXCEPTIONAL ACCURACY

It is not possible for us to feature more than a fraction of our full range in the advertising space at our disposal. This ad., therefore, announces four outstanding new lines. Details of hundreds of kits and the many engines and accessories we stock and recommend are to be found in our Easy-Reference List (No. 3). These lists are now firmly established as the guide for all personal and mail-order customers.

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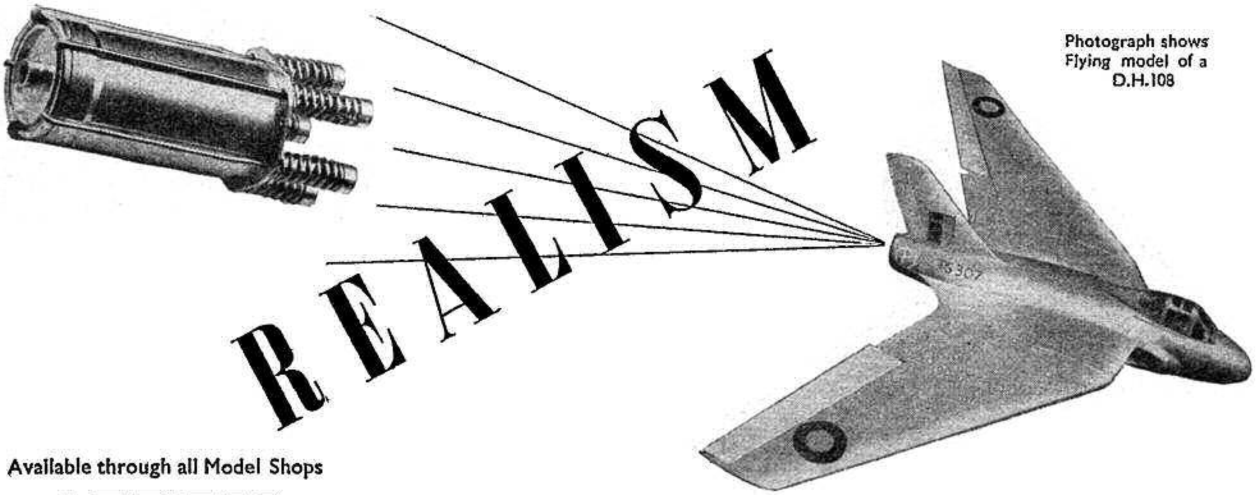

Photograph shows Flying model of a D.H.108

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This is also the ideal motor for canards, flying wings and all types of experimental designs. Even the smallest of the JETEX range develops sufficient power to fly a 24 in. span plane almost out of sight, whilst the spring loaded end cap eliminates any danger in the unlikely event of jet blockage.

Completely SAFE and TROUBLE FREE

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Bore ¾". Weight 7 ozs. Stroke 11/16".
R.P.M. 8,000 with 10"×8" prop.

Specially designed for racing efficiency and all-round competition performance, the "Vulture" is the fastest, lightest and most powerful 5 c.c. in production. Top features are all-round exhaust and transfer ports, rotary valve with spray bar induction, interchangeable diesel and glow plug heads and finned crankcase. **79/6**

Glow Plug Head 10/– extra. *Post free.*

"Airstar" 2·15 c.c. Diesel
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The result of both British and Continental experience, the "Airstar" features a unique eccentric crankshaft bearing for variable compression; giving reduced height, better cylinder head seal and no danger of over compression. A most flexible Diesel with many original features, including two interchangeable tanks for free flight or C/L aircraft. *Post free.* **75/-**

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Study "Elfin" engined models' many successes at recent meetings and see why it is now one of the most popular of the small capacity competition engines. Radial mounting, multiexhaust and transfer ports, rotary valve and extremely clean external finish are its main features. *Post free.* **79/6**

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Calling Radio Control Enthusiasts

E.D. R/C UNIT.

Here at last is a complete transmitter-receiver unit which comes ready for fitting to your model—suitable for Aircraft, Yacht or Speed Boat. Less batteries.

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If your engine is between 0·75 and 5 c.c. you can fly a version of Britain's most popular and successful power duration model. Three sizes in three superb kits.

32" span (0·75 to 1·0 c.c.) **10/6** 42" span (1·3 to 2·2 c.c.) **22/6**
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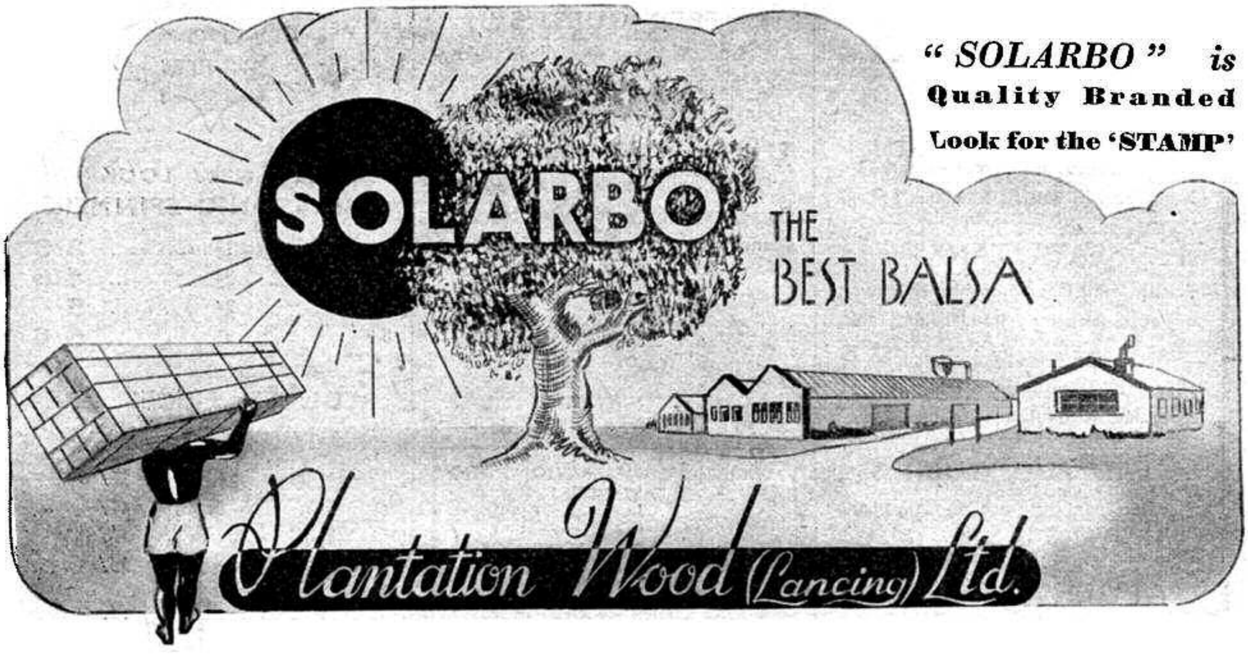

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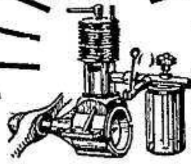
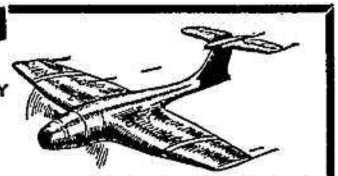
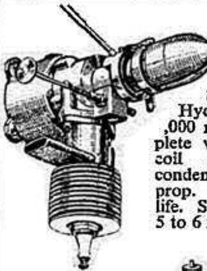


AMCO DIESEL Mk. 2. Now only £3 - 12 - 6
(Illustration shows Mk. I)



Superstreamliner C/L Speed model. Designed around the Mills 1·3, can be adapted to other motors of 1·8 c.c. to 3 c.c. Plan only 4/3. Jagra-Pack 15/9 by post.



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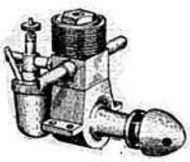
Swings a 12″×6″ Hydulignum prop. at ,000 r.p.m. £7 complete with M.I. Super-coil and Metalmite condenser. Hydulignum prop. Guaranteed for life. Suitable for models 5 to 6 feet span.



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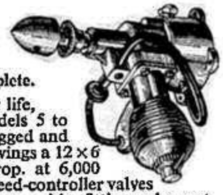

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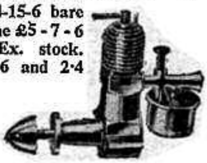
£5 - 17 - 6 Complete.

Guaranteed for life, suitable for models 5 to 7 ft. span. Rugged and dependable. Swings a 12×6 Hydulignum prop. at 6,000 r.p.m. Jagra speed-controller valves fitted as an extra,—side fitting rules out difficulty of mounting, experienced by the inexperienced with the early Jagra-Dyne.

★ *MILLS DIESELS* ★



1·3 c.c. Mk. 2 £4-15-6 bare and 1·3 c.c. Marine £5 - 7 - 6 with flywheel. Ex. stock. 0·75 c.c. £3 - 7 - 6 and 2·4 c.c. £5 - 17 - 6.
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2·48 c.c. DIESEL and/or GLOWPLUG MOTOR

SPECIAL FEATURES
1. Robust
2. Beam or Bulkhead installation optional
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4. Easy to start
5. Variable Compression for Glowplug working (a patented feature)
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7. Perfect set up for Control Line running, incorporating centrifugal feed from tank to motor
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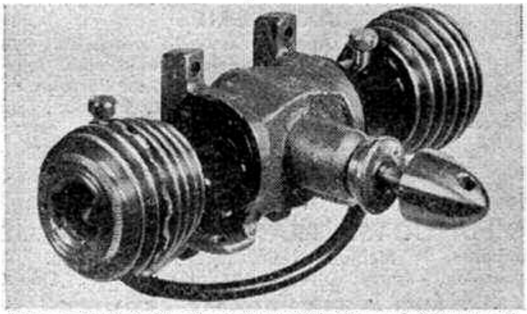
9. Full Scale appearance lending itself to adaptation to Flying Scale models
10. Patented layout by Lawrence Sparey (British Patents No. 576207) which gives many of the virtues of the ideal *flat twin* but none of the vices



The popular sized motor with the mighty roar!
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At £4.10.0 (excluding P.T.) it represents ***full value for money and a sound investment***

SPECIFICATIONS
Weight: 5¼ ozs. Revs. per minute: 6–7,000 (10×6 prop). Bore: ·580 ins. Stroke: 595 ins.

CONSTRUCTION
Cylinder and Piston specially alloyed "NI-CHRO" Iron; honed to mirror finish. Crankshaft, C. Rod and Carb. glass hardened surface for non-wear, heat treated core for strength, high grade steel. C. Shaft machined in one piece with Big-End. M. Bearing machined from solid high grade Phos. bronze. Crankcase and other light alloy parts from high grade alloy castings and A.I.D. dural.

MEASUREMENTS
Overall width 4¾″; length 3¼″; depth 1⅝″.
Mounting measurements:
Radial: width 1½″; length 1½″
Beam: width 1½″; length ⅞″

Trade Enquiries to: **PREMIER AEROMODEL SUPPLIES LTD.**
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FLYING SCALE KITS

AUSTER Wing span 36" **15/6** VIKING Wing span 31" **12/6**
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BANSHEE & SHUFTI Free Flight Control Line

Both Still Tops in Power Kits

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Sopey, Soc (Bi-plane), Wumpey, Snappy, Weepy, Knashful, Breezy.
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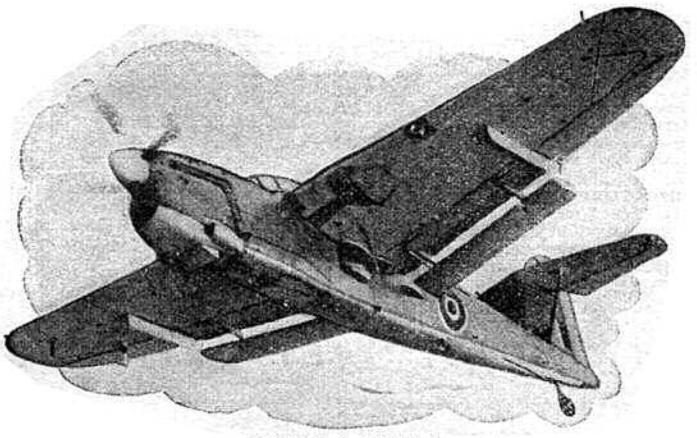
Waring's Helicopter still the most popular and perhaps the only Helicopter on the market. Price 6/9.

POWER FREE FLIGHT

Banshee 27/6, Aries 21/–.

CONTROL LINE

Hall Racer £4·4·0, Copperhead 23/6, Shufti 10/6.



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ACE SERIES

Approximately 28" wingspan. At 8/6 they are the very finest value in aeromodelling and it will be found that at least half the series can be adjusted for Petrol, either free flight or line control.
Hawker Hurricane, Typhoon, Spitfire, Airacobra, Defiant, Tempest, Mustang, Barracuda, Thunderbolt.

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Power Props in proved best medium walnut.
A new series of matt and glossy dopes, still the strongest known balsa cement, plastic sheet, etc., etc.

MARVELLOUS MASCOTS. TRANSFERS FOR NOSE MARKINGS.

Pistol Packin' Momma, Old Rattlebones, Memphis Belle, Dare Devil Dan, Air Avenger, Long John Silver, Son of Satan, Winged Serpent, Scarlet O'Hara, Round-up Roger, Sioux Sam, Fighting Pappy.

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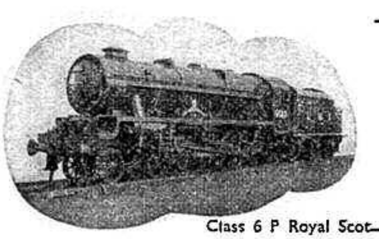

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AEROMODELLER

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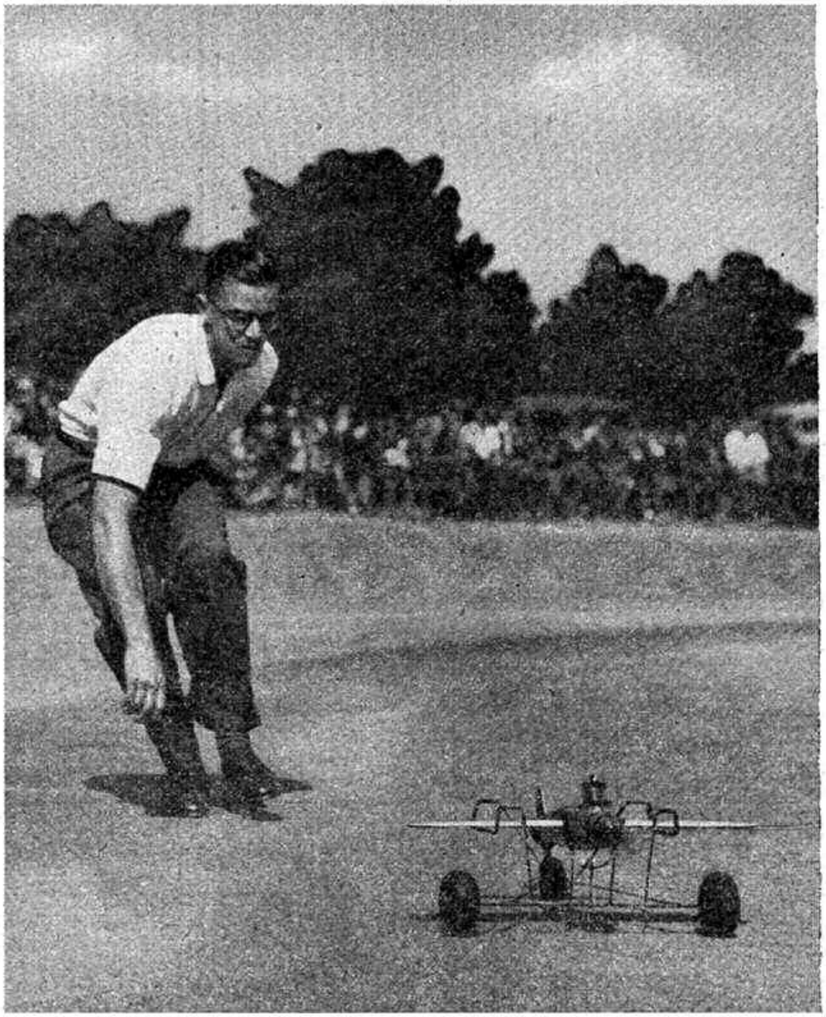

From Pretoria, South Africa, comes this splendid picture of a speed control-line model in action. Note the considerable dimensions of the "Dolly" undercarriage.

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VOL. XIV No. 156 JANUARY, 1949

EDITORIAL

FLYING FOR FUN

SINCE its inauguration some ten years ago, the motto of the National Guild of Modellers has been " fly with care ". Always have we stressed that model aircraft of all kinds must, at all times, be flown with care ; but from observations in recent months it has been increasingly borne upon us that there is a minority of aeromodellers who take the viewpoint that, having availed themselves of the N.G.M. 3rd party insurance, they have no *further* obligation to fulfil.

Nothing could be further from the truth. At all times there is the Christian injunction " to do unto others as we wish them to do unto us ". Always there is the undertaking given, when joining the N.G.M. that the member will "*fly with care* ". This recent increase of irresponsibility, small as it is, is not a good sign. It arises mainly in connection with the flying of control-line model aircraft. The description of this type of model flying is apt to be misunderstood. It does *not* mean that the model is (completely) under control, and newcomers to this latest kind of flying—really it is tethered flying—should realize that owing to the much higher speed, a model may possibly cause an accident, if not under control.

Keeping the model flying in a circle at the centre of which is the operator, is not enough. We hear of the irresponsible youth who, having started the engine of his model, said to a friend—" let her go, that will soon clear the crowd " ! An attitude such as this is to be severely deprecated, for even apart from the serious results that may ensue, it classes aeromodellers as a whole as irresponsible in the eyes of the public.

The fact that control-line flying permits of the model being flown in a relatively small space, has quite naturally encouraged aeromodellers to take their aircraft to relatively small open spaces. In many cases these are nearer to their homes than are large open spaces such as commons, airfields, and so on.

But : these larger spaces by virtue of their very largeness, are less densely " populated " or frequented by the general public. The aeromodeller has the area more to himself, and consequently there is less disturbance to the few onlookers who might collect. However, with the recent tendency to fly control-line models in parks and small open spaces adjacent to densely populated areas, there is a considerable increased " density " of onlookers and other interested parties, and thus the possibility of an accident, however primarily remote, is increased.

All conscientious aeromodellers regard their model flying as " flying for fun ", but at no time must they regard themselves as relieved from their responsibilities and duties to their fellow citizens. Whilst we have always preached the importance of obtaining 3rd party Insurance, the *first* duty must surely be to " fly with care " and to this we would add the qualification : " only when conditions are such that not even inconvenience, much less risk of an accident, is occasioned to nearby onlookers ".

I continue to receive from readers reports of banning—proposed and actual—of the flying of model aircraft on spaces under the control of local park committees and so on ; and am anxious to have as much information on this aspect of model flying as possible.

As I propose making a further " progress report " in a later issue of this journal, I shall be glad to receive any further news from readers at an early date.

Meanwhile, on behalf of the AEROMODELLER staff I wish all our readers the Compliments of the Season and good and safe flying in 1949.

IN the two preceding articles we saw that an efficiency of 55 and 60% could be expected of a small compressor and turbine respectively, providing that these components were correctly designed and constructed. And now a brief description will be given of a small gas turbine jet propulsion engine which was built by the writer, in an endeavour to satisfy his own enthusiasm on the subject.

Fig. 1 on page 92 shows a diagrammatic section which can be read in conjunction with the photographs and as will be seen a small single stage centrifugal compressor was employed, having a diameter of 4·04 ins. This was fabricated from sheet aluminium and comprises three main assemblies, namely the central hub which was turned up and slotted to give anchorage to the blade roots, the backplate which was carefully marked out and drilled, and the blades, which were made by sandwiching the roughly shaped blades in between two steel templates, and removing the excess material (in much the same way as making a number of balsa ribs). When removed from the templates they were smoothed off and bent to shape round a hardwood jig. Allowance was made in marking out for a small flange which was bent over and drilled to take two 1/16th countersunk aluminium rivets. The hub was attached to the disc by means of a stub end, which was pushed through the hole on the disc and peened over. The blades were then pushed into the slots and riveted to the back plate. This proved to be an extremely light but sturdy job, the weight being a little over ·75 oz.

The compressor housing consisted of the front casing which was fabricated from aluminium sheet, and the back plate which served as a duct for the airflow and a support for the eight straightening-cum-diffuser blades. These were bent to the appropriate angle of the air leaving the compressor tips, so that after leaving the compressor it was directed by the diffuser blades up and rearwards, having then onwards an axial motion. The front casing housed the forward bearing, supported by a streamlined cross shaped member at the intake entrance.

The main backbone of the unit is formed by the outside casing which is flanged at both ends to pick up the compressor front casing and the turbine ring.

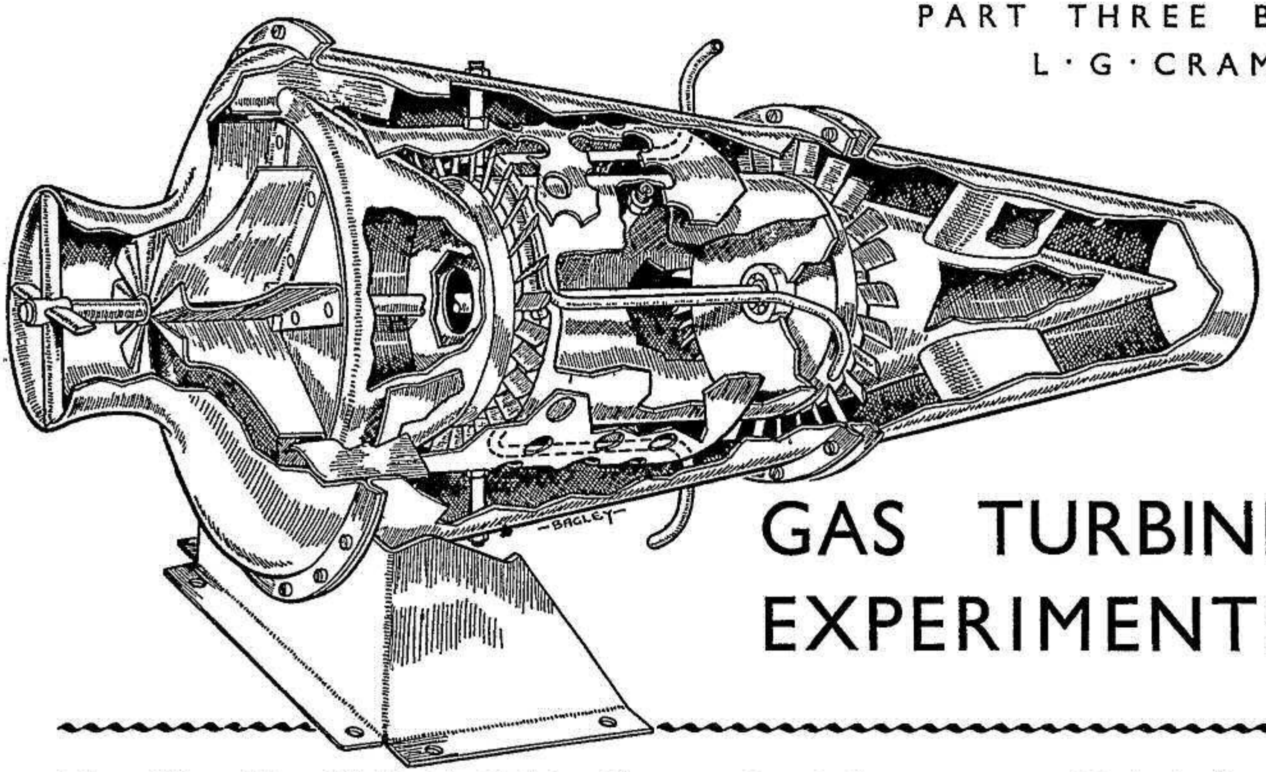
The inside flame tube consists of a thin steel tube having a disc at each end drilled at the centre, to allow for the rotation of the turbine shaft. At the extreme end of the tube are fixed the turbine nozzle blades, this assembly is pushed into the wide end of the main casing until the blades just make contact with the walls at the small end, the blade tips being tapered to the angle of the main casing to ensure a good fit. There is a clearance between the front end of this tube and the diffuser blade fairing, to allow for the swirl vanes and air metering rose. There is also an asbestos disc to offer further protection to the diffuser fairing and an additional clearance, to allow for the longitudinal expansion of the tube itself. This clearance again gives a certain amount of protection to the diffuser fairing by allowing a small stream of incoming air to be passed by between the face of the rose disc and the asbestos disc secured to the fairing end plate.

The outside flame tube was bell shaped at the front end, and eight slots were cut into this periphery, into which the eight straightener blades are pushed, and there are a series of different sized holes drilled in stages in the rear part of the flame tube, through which the main airflow is bypassed. The main casing and the two flame tubes are held together by four tubes, which being threaded at each end, form four bolts and these are secured by four lock nuts. Through these tubes there is an outflow of air, which serves as a coolant for the inner flame tube and rear bearing. The turbine ring is attached to the rear flange of the main casing by means of twelve small bolts, which pick up with twelve holes drilled in the rear nozzle flange. The nozzle itself is detachable, so that a series of nozzles with different cross sectional area and form could be tried.

Now as this was purely an experimental unit no preference was given for heat resisting metals, but where possible stainless steel was employed, for such parts as flame tubes, nozzle blades, turbine nozzle and bullet etc., and the turbine itself. A disc was turned in stainless steel having a diameter of 2·35

PART THREE BY
L · G · CRAMP

GAS TURBINE EXPERIMENTS



inches and the periphery slotted to take 30 blades. These were made with a true section by first cutting some strips of metal of the required width and pressing while red hot into a channel section to give the right curve, and filing to the correct profile when cold. The strips were then cut into short lengths leaving enough material for the blade roots and tip trimming, and the two corners of the blade roots were removed so that when inserted into the slots, the blade had a true section over its length, leaving two small gaps each side of the blade roots which were stopped up with welding material, the surplus material being removed by filing. The whole job was then put into the lathe and trimmed up, and after balancing and polishing was mounted permanently onto a 3/16 dia., silver steel shaft. Exactly the same procedure was employed for the 28 stator blades.

Now for the fuel system : As vaporised fuel was used preheaters were required and these consisted of four small bore tubes, entering the combustion chamber at a point just in front of the nozzle ring and bent with a sharp curve to bring them in line with the flame and after running the length of the chamber, turned through another sharp curve to form a segment of a circle, receiving support from four stops secured to the four tubular bolts, so that with the four fuel pipes in position, a complete circle was formed. Each segment had two small jets drilled into the upstream face, this was found after experiment to prove the best way of mixing the fuel vapour with the incoming air flow. A small spark plug was installed as shown, the earth lead being taken off the casing at a convenient point.

Now as will be seen the incoming air flow offers a small increase in pressure due to the divergent form of the annular entry duct, the primary air flow being bled off from the main stream by means of the small aperture formed by the bell shaped end of the outer flame tube and the conical fairing, and as will be seen, this formed a separate chamber for the primary air and as a rapid divergence takes place at this point, the air flow is slowed up considerably, so that after passing through the swirl vanes and metering rose, mixing is facilitated while the flame is not blown out. This proved quite successful in operation and one of the chief difficulties, namely combustion, was overcome. After leaving the compressor the main air flow enters the combustion chamber via the holes made in the outside flame tube, the edges of which are projecting in order to catch the incoming air and direct it into the flame centre, while a small percentage of the main air flow is allowed to bypass the flame tube altogether, thereby cooling the products of combustion before entering the nozzles.

Now although the writer anticipated difficulties in the operation of this engine, many were actually encountered, and it was only after months of experiment that any hope of success came into view. The first tests were made of the combustion processes by introducing a large volume of air, delivered from an auxiliary blower, into the compressor intake, the fuel value being slightly open and the spark plug brought into operation, the object of this was to burn a little fuel for preliminary heating, but as the fuel was not sufficiently atomised, this was not possible, but the difficulty was overcome by introducing a small pilot flame. After a preliminary heating the auxiliary volume of air was again brought into operation and the fuel valve manipulated. This time there was no doubt about it, combustion was good, but within a few minutes, the first of the bigger snags arose, namely expansion troubles. This involved a good deal of alteration and trial and error experiments, and when this difficulty had been

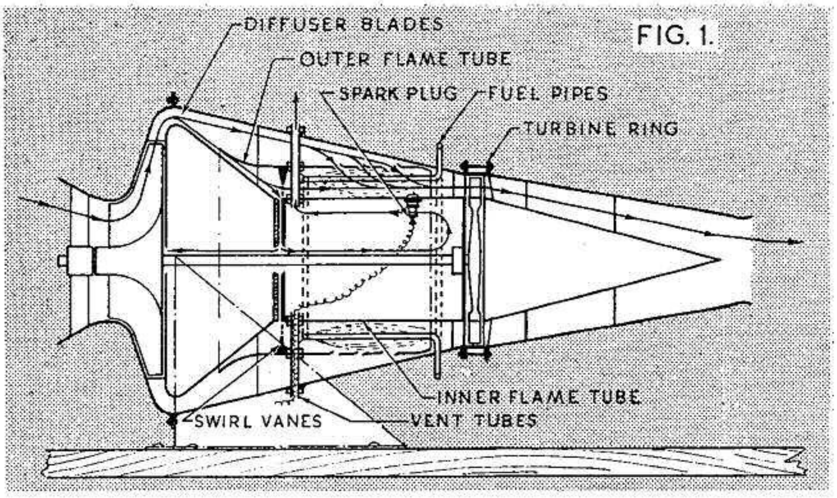


FIG. 1.

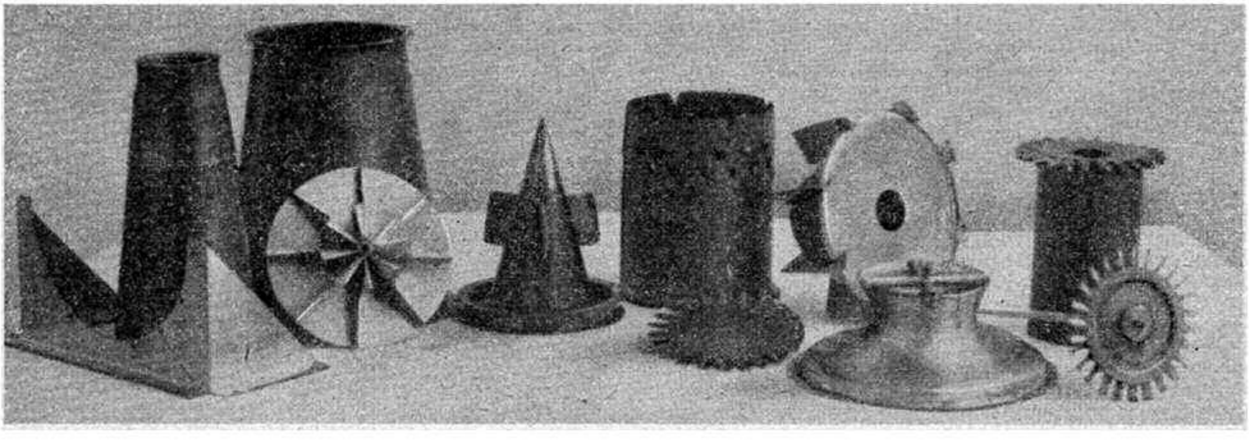
overcome, it was found that there was excessive burning in the region of the lower part of the combustion chamber and subsequent investigation showed that the cause of this trouble was brought about by incomplete vaporisation of the fuel, therefore there was a collection of fuel in the lower part of the combustion chamber, which burned quite fiercely. Fuel pipes of larger bore and jets of smaller diameter were tried, together with an increase of pressure in the fuel tank, this being some 6 lbs. per sq. inch, and this was found to bring about complete vaporisation and the variation in temperature brought about by a slight adjustment of the fuel valve, was quite remarkable. At this stage a few measurements were carried out which showed only a slight increase in pressure in the combustion chamber, while the r.pm. was in the region of 6,000, so that very little work (if any) was being done by the compressor, so arrangements were made to turn the rotor over with an electric motor at high revs. Now although the pressure was increased by the higher revs combustion was not improved and it was found that the flame length was much too long and instead of terminating before the turbine nozzles, it was found to be half way along the exhaust cone. This was a hopeless state of affairs and the effect it had on the turbine stator blades had to be seen to be believed and it brought home to the writer, with some added emphasis, a remark which was passed to him, in all sincerity, by a gentleman of some authority, when he advised that the stator blades be made of copper!! The unit was stripped down and the blades were cleaned and polished, and the swirl vanes and metering rose redesigned. This also entailed some modification of the fuel ring jets etc., but when the unit was reassembled the results were well worth the trouble. As a point of interest the writer would like to mention that a small turbine of this size does give off a very sweet turbine note, which can be controlled to a certain extent by manipulation of the fuel valve, this in itself is very encouraging. However, it was discovered that there was a certain critical stage when the engine showed signs of "getting away" and that after a few exhilarating moments, she would slow right up and finally stop until turned over once again by the motor. This indicated that the starting revs were not high enough to allow the compressor to build up sufficient rise in pressure, and another arrangement was made giving a higher speed of rotation. Now at last there was some success, the unit began to accelerate with a high pitched scream, but the temperature was terrific and it would definitely have been unwise to allow this to continue, with the result that only tantalising short bursts could be allowed.

This little unit served its purpose well before giving out and the writer has only one regret, that he was unable to take a measurement of thrust, but many hours of interesting experiment (not to mention a fire or two), were had with it, and at the least has satisfied himself with the knowledge that it is possible for a small gas turbine to function, though admittedly very inefficiently.

At the time of writing this article another design is being prepared, and the writer would be very interested to hear what is being done in this very interesting field.

The following is a table of weights of components parts described in this article.

	ozs.
Compressor impellor	·75
Compressor housing	1·5
Compressor fairing and straightener blades	1·9
Swirl vanes and metering rose	·65
Outer flame tube	2·1
Inner flame tube and stator blades	2·1
Main casing	4·25
Turbine ring	3·
Turbine wheel	3·6
Turbine bullet	2·1
Jet pipe	1·8
Jet orifice	·55
Coolant tubes and nuts	·9
Rotor shaft	1·
Bearings	·85
Fuel pipes	·85
Spark plug	·4
Nuts, bolts etc.	1·25
Total	29·55=1·847 lbs.



PETROL VAPOUR

PART TWO OF COLONEL C. E. BOWDEN'S ARTICLE ON GLOW PLUGS

ACETONE added in very small quantities to the fuel assists engine starting, and is an anti-knock component.

The Americans use nitro-methane added to methanol. This definitely gives a "souped up" performance. I find that it gives between 800 to 1,000 extra revs. according to the engine. But nitro-methane is not produced in any quantity in Britain, and its cost is very high, thus we are not likely to get it in any commercial fuel for some time at least, if ever. Its loss need not unduly worry us because except for racing speeds we can get all the performance we require from straight methanol with perhaps an additive of one of the cellulose solvents that have a somewhat similar but lesser effect. British commercial fuels are now ready blended and available at all good model shops.

If a modeller wishes he can mix his own fuel as laid down below, and these will give more power than a straight "petroil" mixture that he has been used to in his spark ignition petrol engine.

Commercial Fuel Blends.

There are two concerns already blending glow plug fuel in a large way. International Model Aircraft provide a ready mixed fuel, blended by Shell B.P., which has the correct amount of castor oil for lubrication added. It also has a two per cent. anti-knock component.

Henry J. Nichols has two fuels for glow plug ignition. These are blended (with the co-operation of the research staff of the Anglo-American Oil Company) by the High Flash Petroleum Oil Company Limited. They contain what is termed an "Ignition Fraction". Always shake the fuel bottle before use as Castor oil and Methanol have a tendency to separate when left undisturbed.

Home Mixtures.

Most engines will run well on the very simple mixture of one part Castrol R (Wakefield's) three parts Methanol. The Methanol can be bought from a chemist. Be sure to get the best (B.S.S. specification 16506/1933). Another mixture is, Methanol 80 per cent., Benzol 10 per cent., Aviation Petrol 10 per cent. Add 25 per cent. Castrol R by volume.

American Mixture.

Castor oil 2 parts, Methanol 3 parts, Nitro-methane 3 parts.

Lubrication.

Two very different types of lubricating oil are in existence. One is vegetable, the other mineral.

Methanol requires a vegetable castor oil to mix properly, whereas petrol based fuels can use a mineral oil.

Castor oil is used for racing motor cycles and cars, and that exciting smell of burning castor oil will stir the senses of all race fans or early pilots of bygone flying days and rotary engines. Castrol R is made by Wakefield's and can be obtained from a garage, or a similar castor based oil by other makers is perfectly satisfactory. Mineral oil is that greenish looking stuff used by the more sedate motor cycles and cars that we use for our daily business.

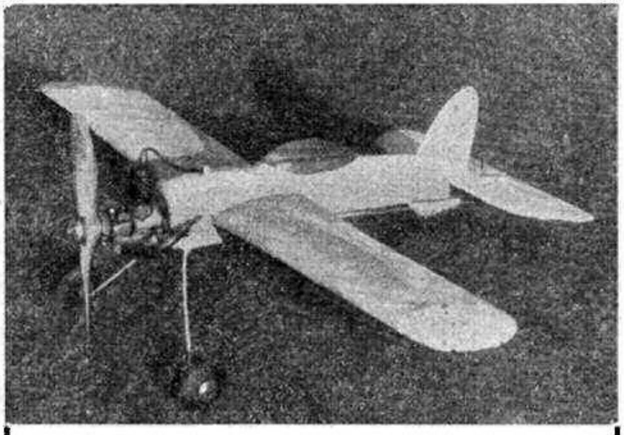
Methanol Damages Finished and Celluloid Tanks.

That lovely finish you have taken so long to get can be ruined in one day's flying unless you cover it with one of the special protective finishes now available. I have not yet found the absolute ideal, but shall be delighted to hear from anyone who can give me the gen. Celluloid tanks dissolve under the malign influence of methanol, so metal tanks are generally used for glow plug motors.

Glow Plugs.

I have stressed how important it is to use the right plug to suit the engine's compression and temperature, etc., particularly if it should be an old petrol motor.

There are three makes of glow plugs being manufactured at the moment in Britain. These are all good and if a modeller burns them out or damages them it is almost invariably due to a wrong voltage, leaving the accumulator on after the start, or using a pair of pliers to remove the plug and slipping onto the small hexagon thus damaging the element attachment. I have noticed all these sins committed by aeromodellers new to glow plug work.



The author's little Arden powered control line model has an exciting turn of speed and manœuvrability with glow plug ignition.

The firms making plugs are firstly K.L.G. who were first to go into quantity production with their "Mini-glo" plugs. The second is the McCoy British-made plug, which is at present the only long reach plug; and therefore suits many petrol engines that may have a recessed plug orifice. McCoy also make an adapter because glow plugs at present are only made in the ½ size; and some engines have the larger ⅜ plug hole in the cylinder. The third plug is produced by Keil and is of the short reach type. Plugs may be cleaned by ether. It is not generally necessary to take a plug out of the cylinder to see if it is glowing. By turning the engine so that the exhaust port is open the plug can usually be seen glowing if it is doing its job when the accumulator is connected up. When engines are inverted remove the plug after flying to prevent oil draining into the body.

Too "hot" an element reduces maximum speed of running. This is due to firing the charge too early. It is quite noticeable how the engine picks up its revs. when the battery is disconnected after starting, and the heat of the element is reduced.

Too "cold" a plug of course will not keep the engine running after the battery is disconnected.

The Advantages and Disadvantages of the Glow Plug Motor.

The American Arden concern have recently wisely produced a plug having two detachable elements. Thus the owner can try which suits his engine best and save his pocket from buying different plugs.

In the early days of glow plug work Mr. Arden kindly sent me one of his ball bearing Arden baby motors of the tremendous performance and exhaust note, together with the gen on glow plugs and a few Arden plugs. The Arden is the "perfect" glow plug motor and will run on almost any fuel and any plug. Such an accommodating attitude by this motor naturally gave me the initial impression that there was nothing to worry about in glow plug work. I was however disabused on trying my ancient petrol engines fitted with glow plugs, hence this lengthy article explaining all the ramifications of glow plugging! I learnt there is a lot in correct plug "reach", and compression ratio, etc!

Before we end it is as well to sum up a few of the reasons why we should or should not use glow plug engines. They will not suit all people any more than a diesel or petrol motor suits all a modeller's requirements. There are many like myself who like to have all types, including jets, to suit varying models. Others pin their faith and activities to one type of model, and like to weigh up exactly the sort of engine that suits their type of model. It is difficult in a short article to adequately cover the whole glow plug set up and suitable types of model. However a few general remarks may help.

The reader will remember that I stressed the glow plug motor must be allowed to rev. This is the keynote to the type of work that suits the motor. Control line has become most popular and here is where the glow plug itches to get busy. The slower speed but powerful little diesels have allowed us to fly and stunt very light small control line models which the baby petrol engine could not cope with when loaded up with battery and ignition coil. There is no denying the fact however that one can improve stunting powers in the small class if a good glow plug motor capable of its high revs. is used. Thus the occasional wavy loops and stepping back to tauten the lines can go if the extra speed obtainable is used to keep lines really taut. The baby glow plug engine in effect gives the rod taut lines on a small model, that the hot 10 c.c. petrol motors give to the larger model. Stunting is therefore made easy. Furthermore instead of the unrealistic models made with a couple of longerons and perhaps a sheet covering giving a flat thin " out-line " fuselage for small very light models, we can, with the extra urge and no more weight of power unit, use a light built-up fuselage that looks more like the real thing. A droppable undercarriage to reduce drag in the air completes the stunt picture in the light small field. I personally dislike peculiar purely functional models that bear no relation to a full sized aeroplane. If the more realistic model will do all the stunts in the book, then I prefer it to the oddity. I know that this view is not shared by everyone. If it were so, curious painters like Picasso would not flourish !

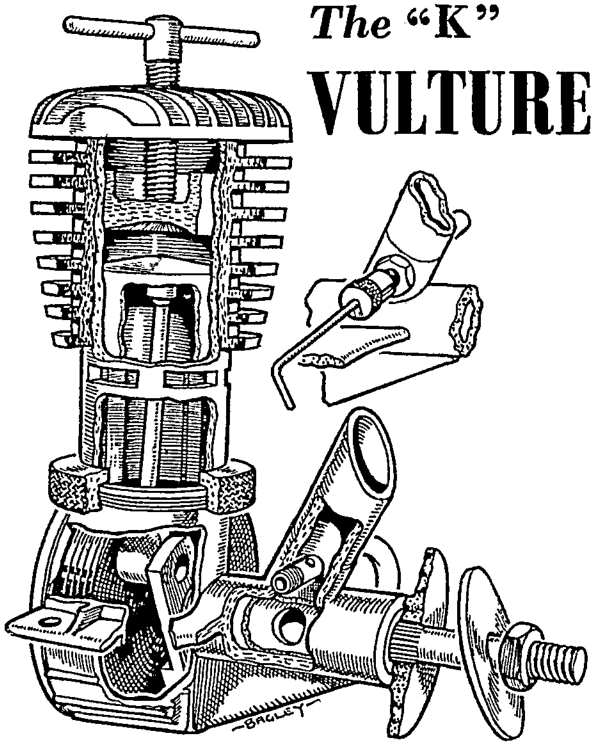
The little glow plug motor is easy to swing to start, but the large capacity motor is easier if provided with spark ignition retard and advance. The larger motor can carry the load of the ignition gear which some people may think worth while. This does not rule out the large glow plug engine, as there are many who will put up with the slight difficulty of starting what is in effect a " fully advanced ignition " engine. I find I can start them, but I must admit I like a controllable spark for the big boys as yet. The Americans start up their racing 10 c.c. hot ships as a general rule, by mechanical starter when using glow plugs for lightness and super speed. The baby glow plug motor is so simple to swing for the start that I would now never want to use a spark ignition set up for engines like the Arden or the Frog. The glow plug also gives the urge less the weight.

The glow plug motor is just the job for any form of racing, or speed contests, in aeroplanes, cars or boats. But it is not so good for radio control where the motor speed is probably required to be controlled by radio to climb the model, or allow to glide with engine throttled back. Nor is the glow plug so useful for slow flying models. Here the diesel comes into its own to perfection. The same applies to model boats. It will readily be seen that the type of performance should decide upon the engine type to suit the model

There is one very interesting development in multi-personality motors. Mr. Curwen of racing model car fame has produced a diesel-cum-petrol-cum-glow-plug motor ! He has put up some very good speeds with his car around 60 m.p.h. as a diesel, which is good going for only 5 c.c. This engine is hard to start when cold, so Mr. Curwen starts by spark ignition which is then removed once started. Incidentally the diesel gives greater power than when the engine is used entirely as a petrol motor with a special head. This engine is also used with entire success as a glow plug motor. The engine has a dual job as well as a multi personality, for it races a car and a hydroplane. Never have so many jobs been given to one small diesel with so much success !

This is particularly interesting, for normally a diesel wants to be free turning but have a close fitting piston to cylinder, whereas the glow plug engine must be almost " sloppy " to get the revs. There are two commercial diesels that can be run as glow plug engines, but these are better as such when very thoroughly run in, and completely eased up.

The "K" VULTURE



THIS month's engine test may well serve as a horrible warning against *generalising*—at least, where engine testing is concerned ! In a recent analysis report I stated that it seemed evident that with the larger engines the maximum horse power was reached at a lower number of revs. per minute than with the smaller engines. All the tests until then had confirmed this, but this month's engine is the exception which, I trust, may prove the rule.

The " K " Vulture 5 c.c. engine is rather different in design from any engine yet tested, as it embodies a true " uniflow " arrangement of exhaust porting, made possible by a novel type of transfer porting in conjunction with a conical piston top. This has resulted in an engine of the true " hot-stuff " type ; that is, one giving a large power output at comparatively high revs. per minute. However, as is usual with such high efficiency engines, one must pay for this performance by a sacrifice, to some degree, of easy starting control, and flexibility. A test of the Glo-Plug version of this engine will follow at a later date.

TEST.

Engine : " K " Vulture 5 c.c.

Fuel : Maker's recommended.

Starting : Hand starting, and pulley and cord was used. The hand starting was found to be fairly simple when the engine was loaded for speeds up to about 8,000 r.p.m. As the loading was decreased, and the settings altered for high r.p.m. hand starting became progressively more difficult. This is due to the extremely large exhaust port area which occupies almost the whole of the circumference of the cylinder. Thus, with a " fine " carburetter setting, a high compression, and a light loading, it was difficult to swing the engine by hand at a speed sufficient to prevent most of the fuel charge from being shot out of the large exhaust ports. On the other hand, when a pulley and cord was used, it was possible to revolve the engine smartly enough to give a quick cut-off to the exhaust ports. In this connection it may be said that the carburetter arrangement, embodying a crankshaft rotary-valve, very often introduces starting complications, owing to the fact that gravity fuel feed must nearly always be employed. This makes fine needle control difficult.

Running : Although the engine was tested over a wide

Engine Analysis

NUMBER NINE · BY LAWRENCE H. SPAREY

speed range, 5,000 to 13,000 r.p.m. this was not an easy matter, as it was difficult to maintain even running towards the extremes of speed. Here again, difficulty in setting the carburetter accurately seemed to be the chief cause, and around the 13 to 14,000 mark little more than sudden bursts of speed could be obtained. It was therefore difficult to get the engine to run long enough to take readings. This is, however, really of little importance, as the power developed fell rapidly as these speeds were approached. It cannot be over emphasised, also, that these peculiarities may be solely a characteristic of the particular engine tested.

B.H.P. : A glance at the accompanying graph will show that the b.h.p. output of this engine is higher than has been obtained before in these tests, and that a maximum of ·246 b.h.p. was obtained at the very useful figure of 8,900 r.p.m. At 5,000 r.p.m. the b.h.p. was recorded as ·158, rising in a fairly straight curve to the maximum. Beyond this the b.h.p. fell steadily until, at 13,000 r.p.m. it was but ·150.

When the engine was correctly loaded for maximum b.h.p. it ran quite steadily and evenly.

Power/Weight Ratio : ·5248 b.h.p. per lb.

Remarks : The makers give a "calculated" b.h.p. of ·5 at 15,000 r.p.m. and it is interesting to note that if the upward sweep of the graph were continued to a speed of 15,000 r.p.m. a b.h.p. of about this figure is obtained. Actual tests, however, show that, with this particular engine, b.h.p. falls away long before this figure is reached; thus showing that calculated figures are of little value.

In spite of the very high b.h.p. figure which was obtained, throughout the tests it was felt that the engine was not performing so well as it might. In particular it was felt that the carburetter was not doing itself justice, as control was rather difficult. This was doubtless a peculiarity of the particular engine being handled (I have encountered these individual troubles before in these tests) and there seems no doubt that could this particular trouble have been cleaned up the "K" Vulture might be a very remarkable engine indeed.

GENERAL CONSTRUCTIONAL DATA

Name : The "K" Vulture 5 c.c.

Manufacturers : The "K" Model Engineering Co., Ltd., Gravesend.

Retail Price : £3 19 6. Glo-plug head 10/– extra.

Delivery : 7 days.

Spares : 7 days.

Type Compression Ignition : Diesel with glo-plug conversion.

Specified Fuel :	*Diesel* Lubricating oil	20%
	Paraffin Oil	35%
	Ether	35%
	Castor Oil	10%
	Glo-Plug	
	Methanol	66⅔%
	Castor Oil	33⅓%

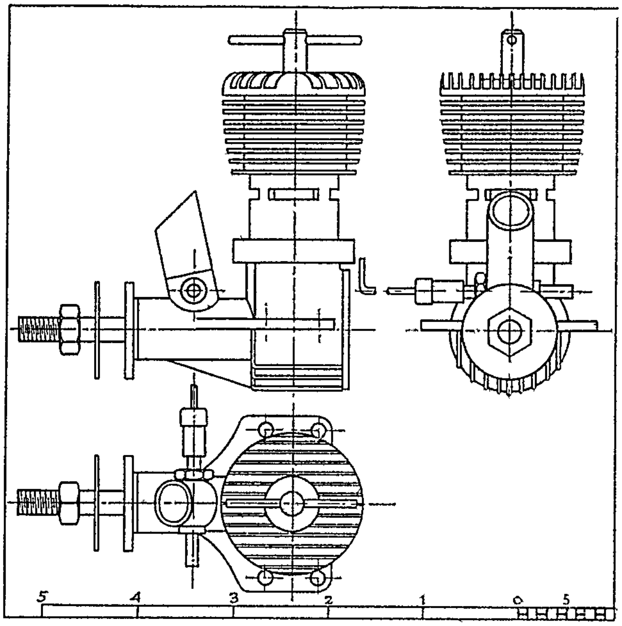
Capacity : 5 Cubic cms. ·32 Cubic inches.

Weight : Bare 7½ ozs.

Compression Ratio : Variable.

Mounting : Beam. Both upright *and* inverted.

Recommended Airscrew : Free Flight 13 in. diameter and 6 in. pitch. Control Line, 10 in. diameter and 8 in. pitch.



Recommended Flywheel : 8 ozs.

Bore : ¾ in.

Stroke : 11/16 in.

Cylinder : Hardened Steel, attached by retaining nut. 4 ports.

Cylinder Head : Aluminium Alloy screwed to cylinder.

Contra Piston : Hardened Steel, ground and lapped adjusted by compression screw.

Crankcase : Die cast aluminium alloy L.33.

Piston : Steel, hardened and ground with domed top and no rings.

Connecting Rod : High Tensile hardened steel.

Crankpin Bearing : Hardened steel, plain.

Crankshaft : Nickel Steel hardened and ground.

Main Bearing : Plain type lapped hardened steel.

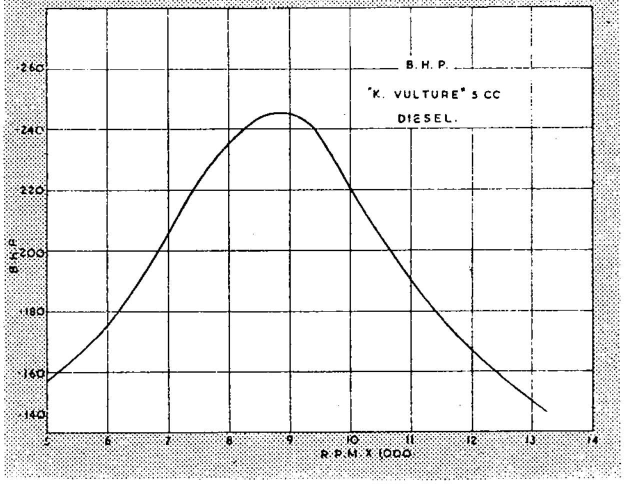
Little End Bearing : Ball and socket joint.

Crankshaft Valve : Shaft.

Glo-Plug : Mini-glow manufactured by Smith's Motor Accessories Ltd.

Cylinder Liner : Hardened steel.

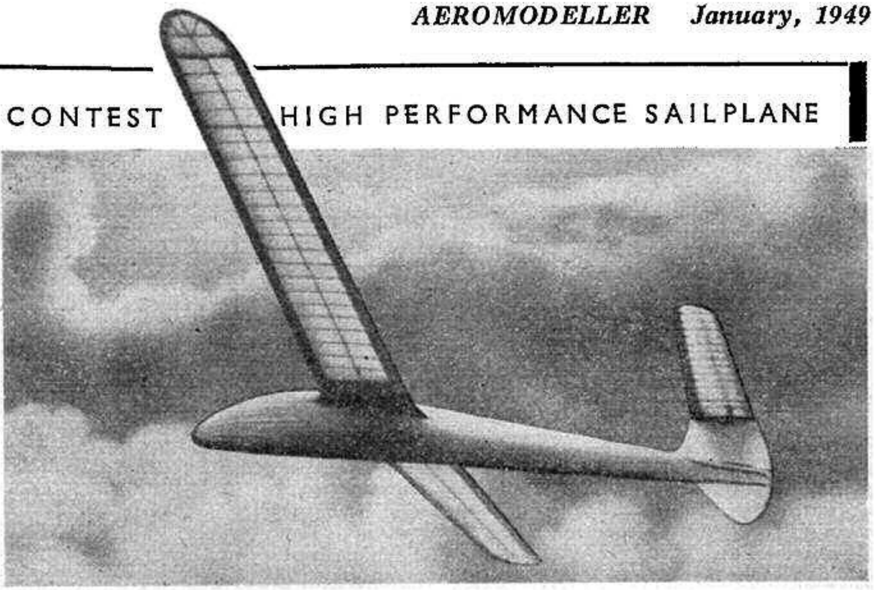
Special Features : Light weight with easy glo-plug conversion and no screws.



SEVEN FOOT SPAN CONTEST HIGH PERFORMANCE SAILPLANE

MOBY DICK

BY
ERIC SMITH



MY clothes became cement smeared for the first time in February, 1946. The lot of my present models is a far from happy one, but how those first kits suffered! By dint of much reading, repairing and observation, I felt competent by the following Xmas to build a model from my own drawing. The first requirement was that it should have what I considered a fine appearance. The second, be easily transportable. The third, be easily stored. The fourth, be free from warps. The fifth, simple construction, and finally, that I should be blessed with beginner's luck in the matter of performance. Nos. 2, 3 and 4 were accomplished by using straight dihedral and detachable wing and tailplane halves. When not flying, the halves are stored elastic-banded one each side of wooden frames, and the fuselage is suspended by its tail from the ceiling. No warps have ever occurred. This feature, coupled with positive location of all flying surfaces, makes the usual pre-flight hand-launched trim flights unnecessary. The building of a true fuselage was made easy by making the two separate halves and afterwards cementing together. The problem of broken skids and bent tow hooks was solved by not fitting them. The completion of the fuselage drawing was coincident with the broadcast of an episode in the story of the famous white whale, then in the schools' programme. One look at the drawing and the model had a name. Moby Dick and launcher are considered to be doing their jobs normally when a flight of three minutes is recorded from a 328 ft. tow line. Its " best " thermal flights, flying above clouds in each case, are:—Take-off—Eaton Bray 3.45 p.m., land—Halton R.A.F. Camp, 9½ miles, 6 p.m.; take-off—Eaton Bray 5 p.m., land—Barton Airfield, Luton, 10 miles, 7 p.m.

The model has since been cured of this vice by causing it to fly in very wide circles, its longest flight in this trim being 6 mins. Moby has been subjected to all the abuses a beginner can impose on his model and has never sustained damage. The wings are in no way distressed when " looped " off the line, and the fuselage absorbs the subsequent impact with only a slight flattening of the nose block. Even this danger has now been averted by fitting a Mk. II tailplane which enables the glider to flatten out from even this extreme evolution. My model is allowed to fly in its natural left-hand turn; providing it is towed up fast and steep, the turn has no effect on the launch. Speed and pull on the line is just right when a 328 ft. line begins to " sing."

Trimming. Best results are obtained with wing incidence at 4 degs., tailplane incidence 0 degs., and the model balanced on the rear spar. Trim tab is wedged till the required turn is obtained and then cemented in position. Slight inequalities of incidence between the two wings can be corrected by " stepping " the wing tongues. The wing fixing was suggested by " Zeus," the tow gear by Avis and the fin profile by one of Mr. Temple's models.

The moderate straight taper wing gives a fairly refined appearance and permits the block method of forming perfect ribs. Since a machine of this type is practically non-adjustable, the " look right is right " method of design is not good enough, and I laboriously worked out the dimensions from formulæ and the side areas by Mr. Zaic's practical method. I seemed to have made a big error in one calculation only, that of moment arm—tailplane area. This soon became manifest when the plane was stalled off the line. The stalls, by the time the ground was reached, could only be described as magnificent! As has been mentioned, a new dihedralled tailplane of 40 sq. ins. more area and thinner section has cured this fault. Experienced modellers, who having read everything else in this issue have in desperation waded this far in this article, are warned that it becomes even more boring from now on. Inexperienced modellers are, however, advised to carry on, for I personally have never yet met a modeller so dumb that something cannot be learned from him even if it's only what not to do.

Covering.

Underside of wings. The strongest possible to resist tow loads. Genuine rag tissue was used, two coats glider dope. Top of wings double covered with the finest weight English tissue.

Fuselage. So-called, rag, pulp, or Blotto; this sticks to the stringers when being doped. Two coats glider dope or one glider and one colour.

Tailplanes and top fin. Finest grade English tissue. One coat model dope.

Fuselage.

The fuselage is constructed in two vertical halves and afterwards cemented together. Trace fuselage outline and former positions on two sets of three sheets of 1/16×3×36 balsa, as shown, having first cemented the edges together. Groove the wood with an Abrafile, and cement and sew the tow tubes in position, having pressed the flattened ends into the sheet, and left enough of the other end projecting over base of the fuselage to be filed off flush, when the structure is completed. It is advisable to make the sides simultaneously and to ensure that the scarfe joints will cross each other when the body is assembled. Pin the sides down on a flat surface. Make ply or metal templates of Nos. 9 and 19 formers, including slots for backbone and master stringers. Bolt up between the templates the previously rough formed formers. The original No. 8 to No. 19 are made each from two 1/32 sheets cemented with grain at right angles, and No. 7 onwards from three laminations, two vertical grains enclosing one cross grain. If made this way, allow cement to set with the former under a brick to prevent curling. Sandpaper the templated formers including the slots to shape. Nos. 5 and 7 are double formers enclosing *hard* ⅛ sheet with the grain running horizontally suitably slotted to receive the wing tongues. In the case of these formers only, the outside grains are horizontal, sandwiching one vertical grain. All formers are now halved by removing a ⅛ slice between the two backbone slots, and cementing the halves in their relative positions together with the halved fin spars. When set, cement in place the ¼×1/16 hard master stringers. The forward end of the two uppermost may be cut from sheet as forcing straight stringers round the nose bend is liable to distort this area. The auxiliary 1/16 sq. in. stringers can now be cemented in place, thinning out at the tail if overcrowding takes place. Fit the wing fairing ribs, removing any stringers that prevent the inner rib being cemented to the formers. Fit leading and trailing edges and their continuations to the backbone, and when set sand to shape. Cover the ribs with 1/16 sheet, top and bottom, and face the end rib with 1/32 ply, in which only the wing brace slots are cut. Severely scratch the inner face of this rib, and let one coat of Durofix dry before giving a liberal second coat and fixing in position. This procedure applies to all the ply used. The fuselage halves are now ready for assembly. Lift and really let yourself go with slow drying cement on the halves' faces. Clamp with all available crocodile, paper, trousers, etc., clips. Having lined up all edges, I sewed them, one stitch per two inches, with a large needle and tow line, assisted by long, thin-nosed pliers, and gave the centre of the backbone the same treatment. A coat of quick-drying cement on the exposed thread pulled it up tighter. Hang up the fuselage—put a loop of thread through the tail—till the cement sets. Cement in place the brute-force-and-ignorance nose blocks, and carve. This type nose is used to force some of the idle ballast to do some useful work. The fuselage is now covered in order to ensure a rigid structure when mounting the tailplane platform. Fit the covered wings as far as the incidence lock pegs permit, and with the base of the fuselage flat on building board, check that each wing has equal incidence. When satisfied, smear front and rear ends of fuselage root ribs with plasticene and again offer up the wings. The pegs will now mark in the plasticene where the holes are to be reamed. The tongues should be a firmer fit in the fuselage than in wings as they are left in the fuselage permanently once incidence is set. The degree of firmness can be adjusted with the aid of gummed paper between one or more of the leaves. With the fuselage face flat on board, check actual incidence which should work out at 4 deg., in which case the tailplane platform will be mounted at zero degrees incidence. The platform is 1/16 birch ply in which the necessary spar slots are pierced. Dihedral is formed by deeply scoring along its under centre line and having bent to correct angle, filling the wound with Durofix. Push through and bend the crude but highly efficient band retaining pins. Fit a light straight-edge across the edges and mount the platform on liberally-Durofixed spars, so that the straight-edge lines up with the wings, and the platform flat with the building board in a fore and aft direction. Finish off the fins as per drawing. In order to save space on the platform, the top fin is flat plate section and to prevent warps is of sturdy construction. This can be considerably lightened, by gouging holes.

Gouge Detail.

It will be found that someone else's cycle front brake tube has at one end a tapered thread which is easily filed to very thin walls. When this is lightly pressed on balsa and twirled a very clean hole results.

Wings.

The tip is made and attached to the mainplane as a unit. The originals were dowelled in to facilitate easy renewal, but as the anticipated damages have not exceeded that which a tube of cement cannot deal with, the scheme is considered redundant.

Metal templates were made of the two end ribs and the necessary rough 1/16 ribs bolted up with five 4 BA bolts. Surplus wood sanded off, spar slots roughly filed out with the indispensable Abrafile and finally sanded. Four hard ⅛ in. sq. spars are selected and the faces destined to receive the braces given a coat of cement to enable them to resist wear. The front bottom spar is pinned on plan, suitably packed up. 1/16 slots are cut in any old strip of wood which has to do temporary duty as a trailing edge and pinned on plan to receive the rib ends. Ribs are cemented on to spar and inserted without cement into temporary trailing edge. Add and cement both top spars and 3/32 hard leading edge. Turn plane over and cement in place rear bottom spar. Cut the 1/16 sheet top trailing edge with plenty of spare width and work in a slight curve with thumb and fingers to fit snugly over the ribs. Place wing the right way up, with the trailing edges just overlapping the edge of the building board, and pin and cement the sheet to the ribs, making sure that the wing is flat everywhere. When set, reverse the wing and check up the front till the top trailing edge is as flat as possible on the board, then cement and pin in position the bottom 1/32 sheet which has been cut exactly to size. When set, cut the surplus top sheet back to the 1/32 sheet.

The wing is again pinned down flat with the leading edge projecting over the edge of the building board. The tongue boxes are formed-by cementing ⅛ sheet to the spars, grain running diagonally as shown on drawing. The first few bays outboard from the sheeting are double braced with hard 1/16 in.×⅛ in. strip and the remaining bays braced with a single strip. The trailing edge bay is completed by cementing 1/16 in. sheet between the edges of the top and bottom sheets. Don't forget the shaped root gusset which is swamped with cement. Fit leading edge gusset, and the two ⅛ in. birch incidence locks. Sheet leading edges in two operations, bottom first. Sand off the sharp bevel of the ribs between leading and trailing edges and cement on 1/64 or 1/32 capping strips, top and bottom.

The wing root can now be sheeted with 1/16, grain running span wise, the seams occurring along the spars. An end rib of 1/32 ply is cut with only wing tongue slots and incidence lock holes and Durofixed in position. Cement on the wing tip and the wing is finished constructionally. The ply end rib is sanded to fit the sheeting exactly and the sheet thinned gradually to nothing towards the tip. The rough cut trailing and leading edges are sanded to smooth contours. An Abrafile with one ball end removed is used to clean out unwanted rib portions in the tongue boxes. When forming the wing tongues it should be noted that the spaces between the spars taper slightly towards the tips. This taper makes the wings readily knock-offable on impact. Cover wings.

Tailplane.

1/32 sheet ribs are made between root and tip templates. Trailing edges are made from one length of ½ in.×⅛ in. cut diagonally. Leading edge is 3/16 in. sq. The 1/16 in. sq. spars are of hard balsa. Leading and trailing edges are slotted 1/16 in. deep to receive ribs. The paper tubes which are formed round candle-greased ⅛ in. dowel are cemented between Nos. 1 and 2 ribs (and not through these ribs) when the halves are chocked to their correct dihedral angle. Slots for the 1/16 in. bamboo pegs are filed in the leading and trailing edge, and the pegs securely Durofixed in position.

To Fix Tailplane.

The planes are plugged together on soft balsa dowels, the dowels passing through the elongated holes in the top fin. Small elastic bands are placed over the bamboo pegs, leading edge to leading edge and trailing edge to trailing edge, holding the planes tight against the upper fin. A larger band is placed over leading edge peg, passed under platform to trailing edge peg, thus holding down root of plane. Another band round leading edge pin of platform passes over tailplane to trailing edge pin, making the whole plane rigid in flight, but easily knock-offable since the dowels shear on the slightest provocation.

So much for pen pushing, having learned it's much easier to build up than write up a plane. And so back to the comparative joy of repairing the ravages of a bunched motor, and perhaps, in time, to learn to pile on bunchless turns.

Full sized plans (see ¼ scale reproduction overleaf) may be obtained for 8/- post free from Aeromodeller Plans Service, The Aerodrome, Billington Road, Stanbridge, Nr. Leighton Buzzard, Beds.

82½" WINGSPAN HIGH PERFORMANCE SAILPLANE

MOBY DICK

DESIGNED BY

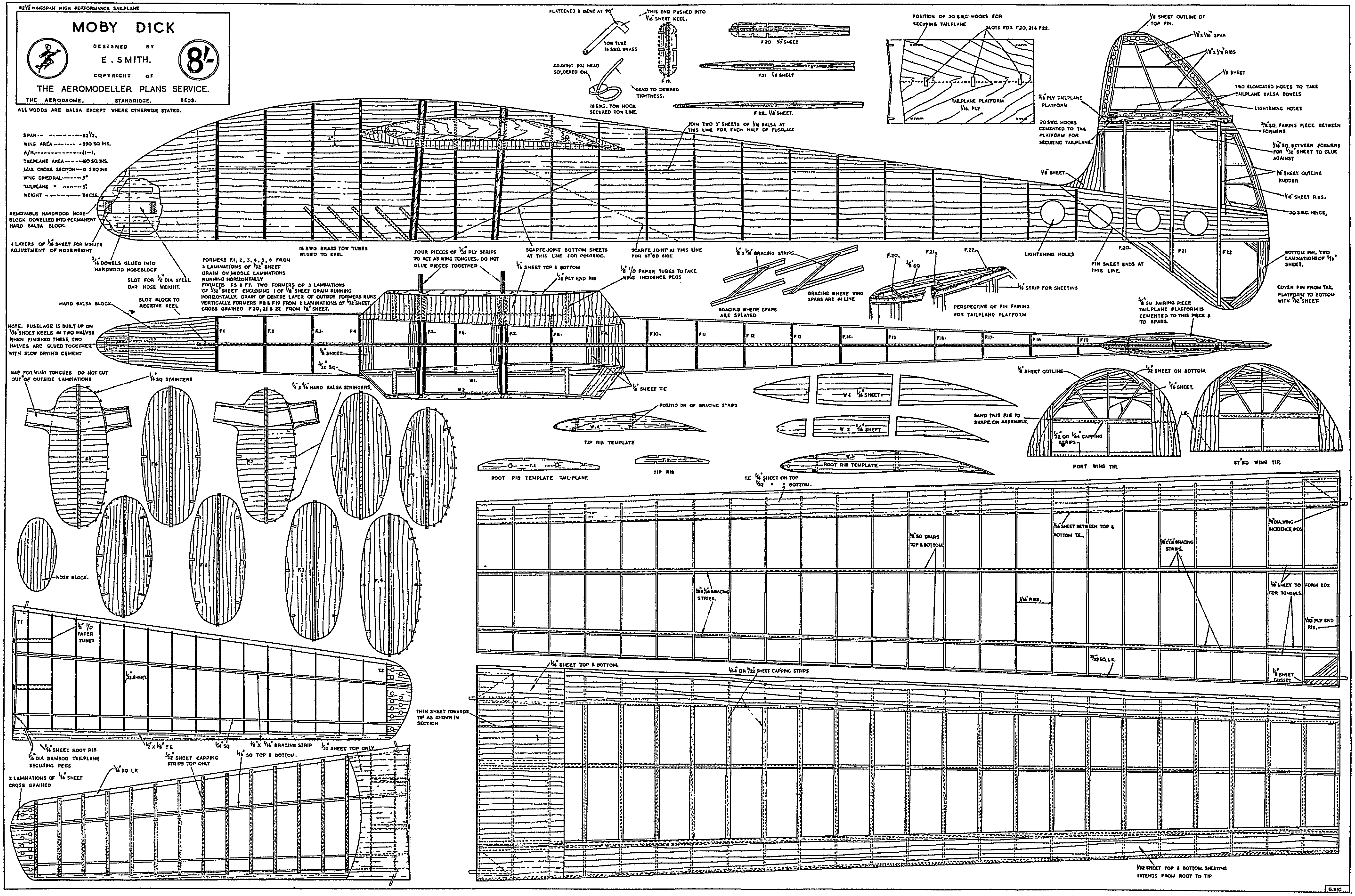
E. SMITH.

COPYRIGHT OF
THE AEROMODELLER PLANS SERVICE.
THE AERODROME, STANBRIDGE, BEDS.

8/-

ALL WOODS ARE BALSA EXCEPT WHERE OTHERWISE STATED.

SPAN ---------- 82½.
WING AREA -------- 590 SQ INS.
A/R. -------------- 11-1.
TAILPLANE AREA ------ 160 SQ. INS.
MAX CROSS SECTION --- 13 25 SQ INS
WING DIHEDRAL ------- 9°
TAILPLANE " ------ 5°.
WEIGHT ----------- 24 OZS.



G.310

Bullet Conversion

BY E · J · RIDING

LARGELY as a result of seeing G. E. Fisher's Frog-powered Sopwith Pup flying during the early summer, I was persuaded to resuscitate from honourable retirement the 1/8 scale rubber driven Bristol Bullet model described in the Christmas 1945 issue of THE AEROMODELLER.

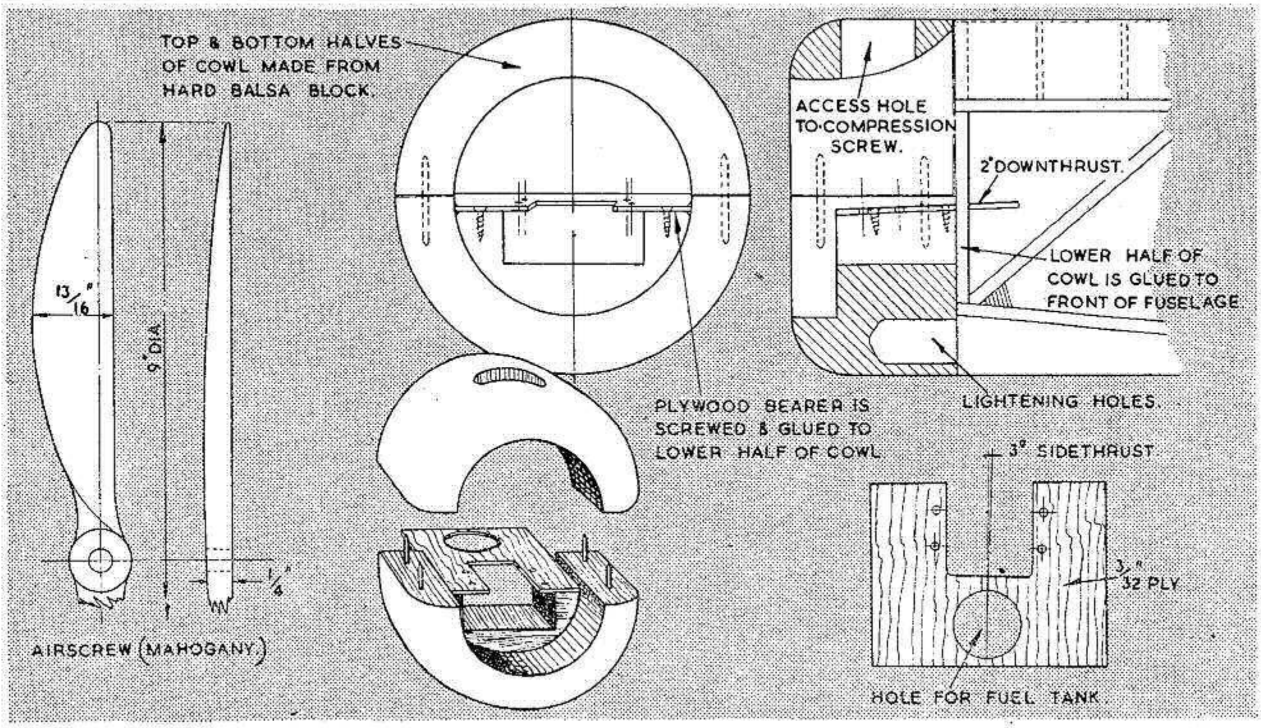
The business of converting the Bullet from rubber to Diesel power was relatively simple. The only alterations to the existing airframe being the removal of the papier-mâché cowling, dummy engine and diaphragm assembly and the substitution of a simple cradle for the ·87 Amco Diesel engine.

Constructional details of the engine mounting and solid balsa cowl are shown in the accompanying sketch (half full size). Note that the bearers are given a few degrees of downthrust as well as sidethrust. The whole assembly should be coated liberally with clear or red undercoating dope as a protection against fuel oil. The lower portion of the cowling, complete with bearers is then glued firmly to the front bulkhead of the fuselage.

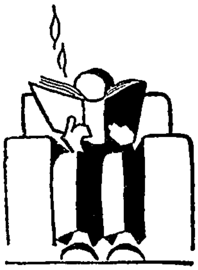
It is advisable to seal off internally the front bay of the fuselage in order to prevent the egress of residual oil. This can be done by doping a sheet of tissue across the fuselage at station No. 2; the underside of the fuselage at this point should be left uncovered i.e. from the front bulkhead aft as far as the rear undercarriage leg attachment points. This will permit easy access to the choke as well as providing drainage.

When completely assembled test for glide in long grass, trimming if necessary by altering the tailplane incidence. When the machine glides satisfactorily allow it to take off under power, checking any tendency to climb too steeply by adding further downthrust.

Full sized plans for constructing the Bristol Bullet, together with the necessary conversion drawing may be obtained price 3/6 from Aeromodeller Plans Service, The Aerodrome, Billington Rd., Stanbridge, Beds.



ARMCHAIR AERONAUTICS



With the inevitable eye to business publishers make an annual effort to give of their best at this time of year ; in the same spirit of co-operation we feel a few words on aeromodelling literature, and books with an aeronautical flavour may assist late shoppers in making a wise choice.

Model Sailplane Design, by P. R. Payne. (Percival Marshall 3/–.)

Here is a really practical theory book that no serious aeromodeller need hesitate to acquire. It is small enough to occupy but little space on the design board, while its doses of theory should not frighten the faintest heart. In accordance with his usual practice the author relies more on frequent graphs and diagrams, and those useful nomograms that he has made so essentially his " trademark ", than on copious text that can be so befogging to the technically illiterate. Within the compass of eighty-five pages have been compressed no less than nine chapters covering : Scale Effect, Wing Angle of Incidence, The Wing, Longitudinal Balance and Stability, Lateral Stability, Parasitic Components, Sylvia III (a design that tries out the theory expounded) together with three appendices and eight nomograms. Apart from one or two irritating errors that seem inseparable from publications of this nature both the author and publishers are to be congratulated on a useful little work that should be appreciated by all serious model sailplane designers. In passing, we must labour our usual point that, in technical books, an index is desirable, and its inclusion would have enhanced the value of " Model Sailplane Design."

The Book of Flying, Edited by Carlton Wallace. (Evans Bros. 12/6.)

This is an ambitious book that really succeeds in presenting an enthusiastic rather than a purely factual picture of flying in all its aspects. We were first impressed to note that the Editor had avoided the time worn approach to his subject via the legend of Icarus, and quite properly given credit for the first solo to Pegasus—the flying horse, an honour which will no doubt be welcomed by Airborne types everywhere. By a judicious mixture of papers it has been possible to include a large number of excellent half tone illustrations, many three colour paintings, and a liberal assortment of line drawings without making the price prohibitive. AEROMODELLER readers will be pleased to note a number of C. Rupert Moore's ex-cover paintings enjoying a new lease of life in these pages. Every aspect of flying is touched upon long enough to give an idea of its fundamentals and yet not so long as to become boring. Such widely separated angles as radar and model aircraft have their chapters, with " how to fly " chapters, running an airport, and even flying saucers there to intrigue the reader. It is the sort of book the wise aeromodeller will buy for the family as an insurance that the family car will not be denied next summer when an aeromodelling occasion is in the offing.

The New Book of Flight, Edited by C. H. Gibbs-Smith. (Oxford U.P. 15/–.)

Those who would like their flying served up in a somewhat more "donnish" manner may perhaps prefer "The New Book of Flight," which to some extent covers the same ground as "The Book of Flying, " but in an entirely different manner. Here the Editor has called upon a number of well-known figures to write chapters on their own speciality, rather than use his experts as a team, the method adopted by Mr. Carlton Wallace. We will not express an opinion on the better method—it is largely a question of the reader's own personal preference. Here, for the meticulous, it is possible to pin down the authorship of each individual chapter, which may be pleasing to those particular persons. Authors include such names as D. C. Smith on Rocketry, C. G. Grey on Pioneers he has known, John Stroud on British Air Transport and D. A. Russell on Aeromodelling. In connection with this last section it is a pity the author was not invited to revise his proofs before publication, as rather a lot of water had flown under the bridges between writing and publication, which rather dates certain parts of his contribution. Very little has been neglected in this really elegant production—there is even a chapter on Air Mail Stamps—which is of the technical standard expected of and inevitably provided by, The Oxford University Press.

ABC of Airports and Airliners, By Owen G. Thetford. (Ian Allan 3/6.)

It is a regrettable thought that while the general public are encouraged to visit our great airports, where they are herded in public enclosures to view aircraft arrivals and departures, little more is done to acquaint them with what is going on than is offered to livestock in rather similar pens on any country market day. That so very many have been keen enough to go along and learn for themselves suggests a lively interest that O. G. Thetford's latest pocket-size book will do much to satisfy. Basically, the book sets out to tell its readers what the principal airports look like, the length and location of their runways, situation of administrative and control buildings, the types of aircraft using the airport, and—a very important part this—the time of the day when they can be expected to come in or depart. Not only are the registration letters of every commercial aircraft of all nationalities using U.K. airports given, but also their names, where lines have been intelligent enough to bestow names. There is much glamour to be found in the S.A.S. fleet—with their " Torlak Viking " and her " Viking " sister ships ; in the B.S.A.A. " Star " fleet ; the famous " Clippers " and many others. O. G. T. makes grateful acknowledgment to his friend A. S. C. Lumsden who is responsible for the majority of the illustrations—high quality pictures excellently produced—and these serve to give a fitting finishing touch to a masterly little " airport-loungers' " guide book. Those who buy early and learn by heart will have a splendid opportunity to shine in the public enclosures next summer—until its green and orange covers appear in every hand.

Aeromodeller Annual. (Model Aeronautical Press 7/6.)

For the first time AEROMODELLER ANNUAL is offered to the public. If all those who, during the past years have urged the need for a general year book and miscellany of model plans from all corners of the globe, are equally determined to possess a copy of their own, its success should be assured. It is definitely the kind of book that any doubtful aunt can safely give an aeromodelling nephew, or any aeromodeller buy for his own stocking in the confident knowledge that it will tell him something he does not know and remind him of something he would otherwise have forgotten. Some thirty foreign models are described and illustrated, a useful supply of theory offered, with articles on many practical aspects to balance and a summary of contest results throughout 1948. This is all virtually new material previously unpublished in this country, and should do much to keep the stay at home modeller acquainted with what the other fellow is doing.

WAKEFIELD MODELS

PART II.

BY R · H · WARRING

BASIC features of a contest Wakefield are that it should be efficient and stable. Often this represents conflicting requirements, so that a compromise is called for and the degree of skill shown in selecting the best compromise is reflected in the ultimate performance of the model.

In the light of present knowledge of model design there is only one stability feature which should present any real problems—spiral stability. Adequate dihedral (10 degrees minimum) and large tailplane (up to maximum permitted by the rules; never less than 30 per cent. of the wing area) should take care of most stability problems, leaving fin area and disposition as the one unknown factor. This, unfortunately, is also one of the most important features of the design, and no satisfactory theoretical solution exists.

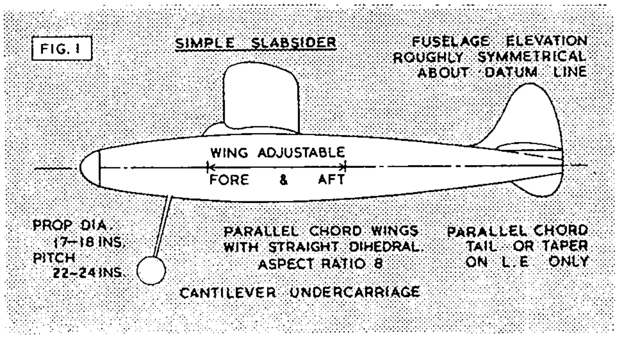


FIG. 1

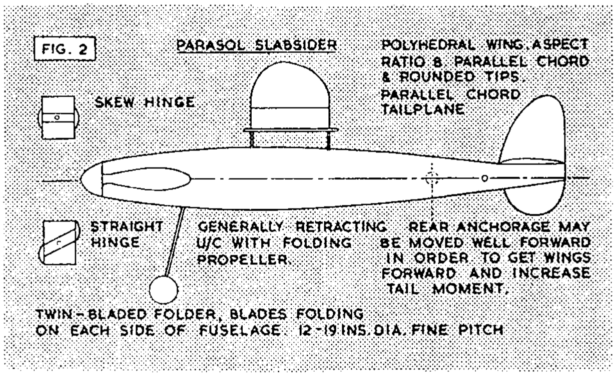


FIG. 2

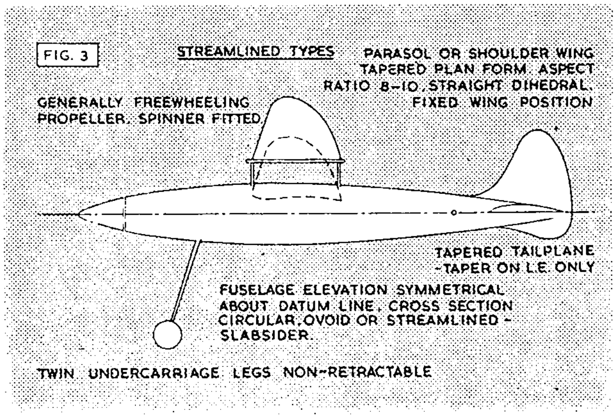


FIG. 3

The Basic Slabsider.

This is the orthodox slabsider with high-wing mounting, *i.e.*, the wings are strapped to the top of the fuselage and are generally adjustable fore and aft for trimming purposes. Their particular appeal is their simplicity, with construction time reduced to a minimum. Appearance is generally a secondary consideration.

Since the ultimate performance of any rubber model depends upon trimming (again unlike power models, where some kit models fly "right off the drawing board" without any necessity for trimming whatsoever) a skilled flier can achieve outstanding results with the simple slabsider. Its simplicity, in fact, is a great asset. However, very seldom is the *consistent* average particularly high.

Most slabsider successes are achieved with a parasol layout machine. The parasol wing model is much better suited to a folding propeller. A shoulder or high-wing design can be quite tricky to trim with a folder—parasol jobs have just that little extra longitudinal stability that makes a flat, non-stalling glide easier to achieve.

Compared with the elementary slabsider, these models represent an advance and the glide of a really good parasol Wakefield with folding propeller is at least the equal of any. Folding propellers do introduce complications other than trimming difficulties, not the least being the mechanical difficulty in getting the blades to fold really flush and obtaining a nice steady circle on the glide.

On the point of view of structural weight, the parasol type is heavier. In general, the wing mounting (cabane, pylon or cabin) increases the fuselage weight by as much as 20 per cent. But given the choice between the two the potentialities of the parasol type would appear to give it the overall advantage.

Diamond fuselages are not widely used. In the first place a perfectly square fuselage is not easy to construct and secondly, a box fuselage laid on its diagonal has little or no stability in any direction. The normal slabsided fuselage can give appreciable damping effect if properly used and well proportioned. The diamond shape does fit in well with certain layouts, such as a pylon mounted wing on a small cross section fuselage—the pylon itself accounting for a considerable proportion of the cross sectional area; or in an unorthodox layout like the Jaguar where the "underslung central fin" theory is directly incorporated in the fuselage side elevation. Apart from machines where variation of the design can use a diamond fuselage to advantage, it has no practical advantages.

The Streamliner.

The streamliner has become almost a separate class of Wakefield. Broadly speaking, the accepted form of the streamliner incorporates a fuselage utilising round, elliptic or ovoid formers and upwards of sixteen stringers of small cross section in place of the orthodox longerons and spacers of the slabsider. This method is certainly the most economical as regards weight. Streamlined fuselages built up around a basic rectangular box are invariably overweight.

The chief advantage of the streamlined fuselage, *i.e.*, better aerodynamic form, must be weighed against two main disadvantages—greater difficulty of construction and local weakness. By the latter is meant the fact that, owing to the small size of individual stringers (generally 1/16 in. square), these may be broken or crushed more readily than the stouter longerons and spacers of the slabsider. The slabsider is more readily serviced, particularly as regards field repairs (which may make all the difference between winning and losing a competition).

Streamliners as such have been condemned as unstable, but this is not necessarily true. The position is that the streamliner is *more critical* as regards stability, but with the proper technique and knowledge a streamliner can be made as stable as any slabsider. Nor are they necessarily any more difficult to trim.

One practical point can be mentioned about streamliners which appears in direct contrast to their greater vulnerability. Whereas the tissue covering on a slabsider quite frequently receives tears or splits, the covering on a streamliner remains intact for a much greater time. This is mainly because on a streamlined fuselage there is less area of tissue unsupported by structure, and also the whole covering is more uniformly stressed.

Logically, if a streamlined fuselage is chosen, the cross section should be circular. This section gives minimum wetted area (surface area) for a given cross section. Apart from such theoretical considerations, circular formers are infinitely easier to plot *accurately* than corresponding elliptic or ovoid sections. Yet many people still avoid the circular fuselage on account of its supposed unstable effects. We must note other exceptions here, such as Copland and Lees, who have developed a particular cross section and retained it throughout a series of models, or where a circular section does not give all the clearance required inside the fuselage.

Streamliners do not go well with high-wing layouts. The upper curve of the section gives an acute angle junction between wing and fuselage, which is very poor from the aerodynamic point of view. Hence the streamliner is almost invariably a parasol—or shoulder-wing machine.

The same remarks as for the slabsiders apply to the former, which may be chosen if a folding propeller is contemplated. Built-in pylons are now relatively common in this class.

The shoulder-wing layout has attracted considerable attention over recent years, following the presumed ideal of grouping all flight forces as near as possible to the thrust line. A certain positive bias is advisable, *i.e.*, centre of resistance above the thrust line, which makes the mid-wing model (with dihedral) the potentially fastest-climbing model. The parasol model has the greater reserve of stability, and thus the shoulder-wing layout is a compromise, at the same time avoiding the complication of a mid-wing fixing.

Whilst wing fixings have been developed for mid-wing layouts, none can be generally recommended. The tongue-and-box or sparless plug-in wing are the only two standard or universal methods. The former is simpler and permits of a lighter wing as well as giving greater clearance inside the fuselage—see Fig. 4. The sparless plug-in wing is more positive and has no tendency to damage the fuselage should the wing be knocked out. With tongue-and-box fixing the trailing edge (or leading edge) tends to penetrate the fuselage side, which must be suitably braced in this region.

To reduce a sparless wing to comparable weight, the large leading edge must be hollowed out to a degree and first quality wood is essential to maintain strength. Properly built the unit will be strong enough, but rather prone to warp upwards. Tongue-and-box fixing is generally used with a monospar wing, when it is important to note that the mainspar is heavily stressed at the point where the tongue finishes. Unless strengthened, the wing will fail at this point. The complete solution is triangular bracing, which produces an extremely strong structure with very little increase in weight. The weight of the spars can, in fact, be saved by punching lightening holes in the tongues themselves.

Forgetting for the moment the aerodynamic arguments associated with streamliners versus slabsiders, one feature of the former is highly desirable, namely, that all the components have a *positive* fixing. That is to say, the wings and tail unit are always assembled in exactly the same attitude and no accidental change in trim is likely to result.

The Streamlined-Slabsider.

It was this feature as much as anything which led to the development of the streamlined-slabsider. There was also the additional aerodynamic factor that by mounting the wings in the shoulder position on a slabsided fuselage the gross wing area was increased within present rules and the centre section efficiency was probably higher than that of a corresponding streamliner. The writer's first model of this type appeared early in 1944 and was simply a converted lightweight of 150 square inches wing area. Copland, independently, also produced a similar model at about the same time. Both models proved disappointing in the initial stages in that they were extremely spirally unstable.

In solving this particular problem the chief cause of instability in streamliners was also brought to light. Briefly, the instability of the shoulder-wing slabsiders in their original form could be attributed to the lowering of the centre of gravity resulting from lowering the wing position. The cure was in a re-design of the vertical tail surfaces with a view to bringing the centre of lateral area down near the level of the new centre of gravity. Doubting the efficiency of the central portion of the fin in any case, out-rigged fins were employed, now generally known as anti-spin fins. Anti-spin fins have worked extremely well on almost all rubber model design layouts associated with spiral instability and have been preserved on the writer's line of Wakefields up to the present time. These, too, are used on the writer's circular-section streamliner which is, if anything, more stable than the corresponding slabsiders.

To realise the best advantage of the shoulder-wing slabsided layout the nose was cleaned up to a circular cross section, so that the propeller could accommodate a spinner and thus considerably improve the nose entry. The simplicity of construction and maintenance of the slabsider is retained, with many of the purely aerodynamic advantages of the full streamliner. It is extremely doubtful, in fact, that the fully streamlined fuselage has a lower drag figure than that of the present streamlined-slabsider layout.

Comparative flight tests between the writer's streamlined-slabs and a full streamliner with the same wings, tail and propeller units showed a consistently better performance with the slabsiders, most noticeable on climb and even very slightly apparent on glide. The latter would probably be nullified with more prolonged trimming devoted to the streamliner. The writer's own opinion is that the streamlined-slabsider will outclimb the streamliner and lose out very slightly on the glide—both models trimmed to optimum performance.

(To be continued.)

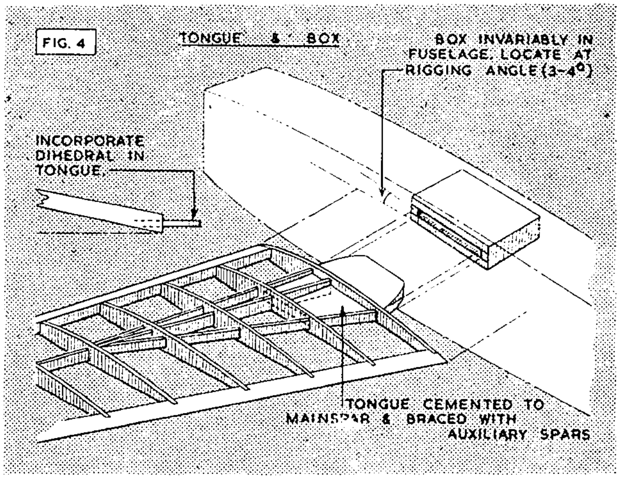


FIG. 4

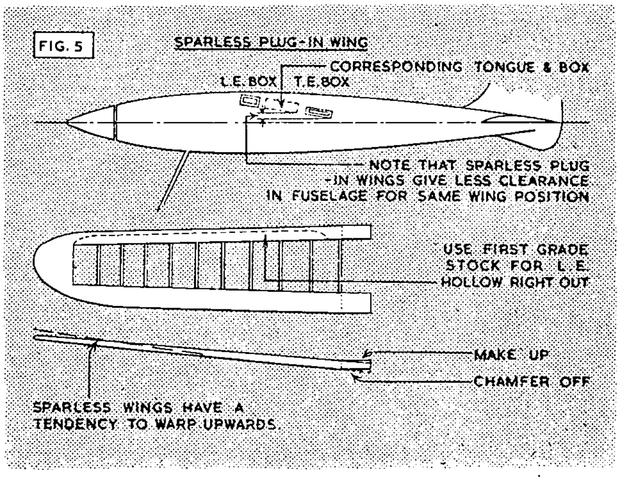
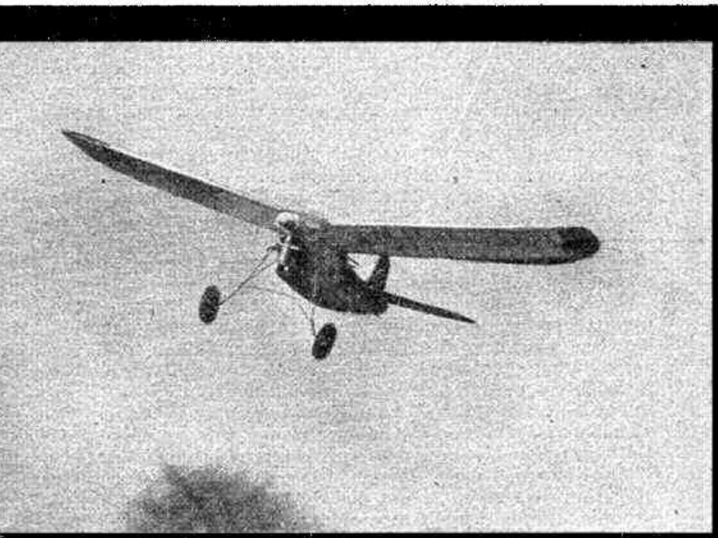
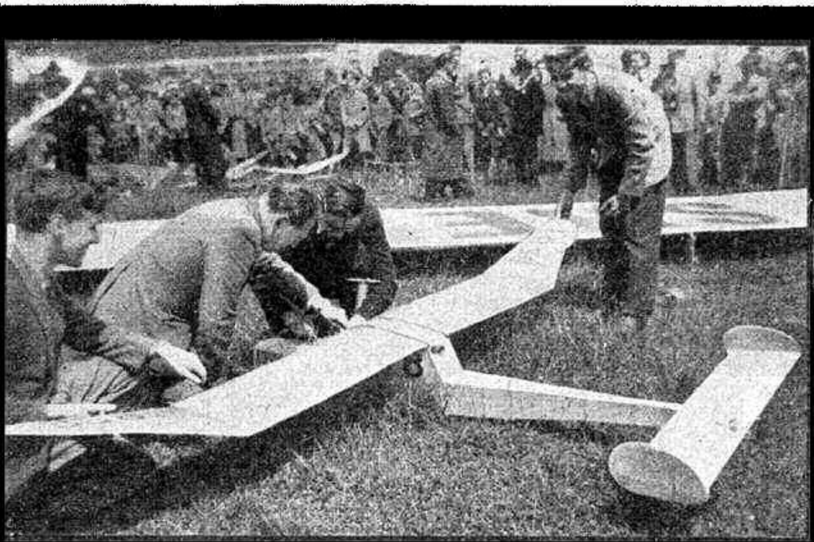


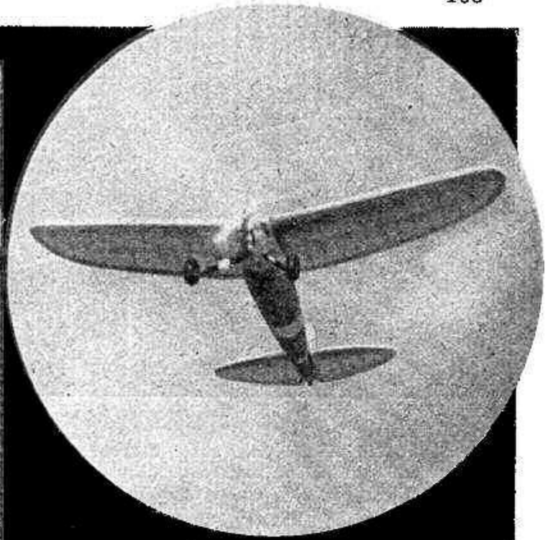
FIG. 5

MODEL NEWS

SELECTED ITEMS BY FLIAR PHIL





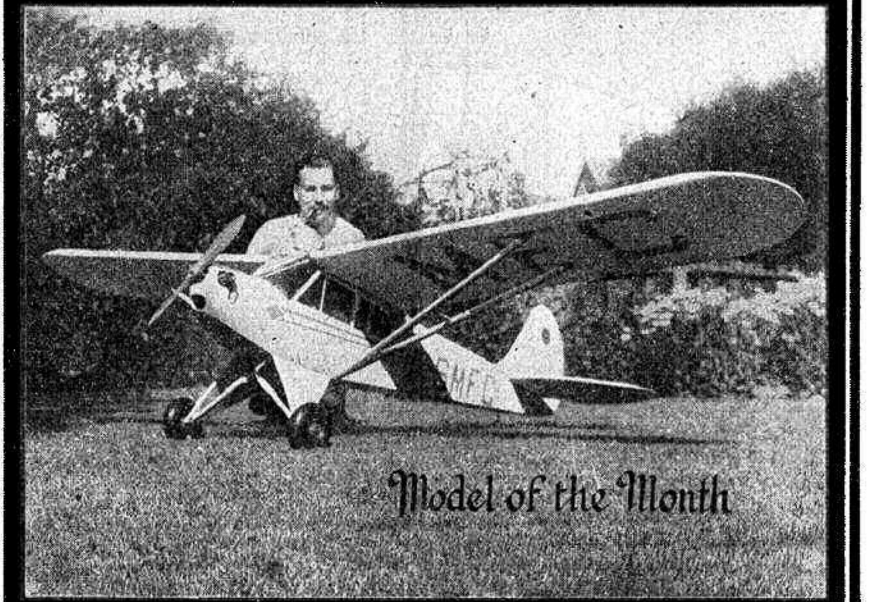


FLIAR Phil this month wants to thank all those readers who have sent and do send photographs and he hopes they will continue to do so. All that he asks is that if you do send him a photograph you do comply with one or two simple rules, which apply not only to this magazine but to most others which accept photographs. They are all set out for you in February, 1947, Model News.

Top money goes to N. Barker of the Surbiton Club for his Model of the Month, a really superb scale model Piper Cub intended for radio control. The model is 10 ft. span, quite dwarfing its builder as the photo shows. It is powered with an O.K. Twin developing a half h.p. Congratulations to Mr. Barker on producing such an epic machine, and we sincerely hope that its performance will be first class when the control unit is fitted. So far it has a good climb and a flat, steady glide, which is just what is required.

Fliar Phil is glad to see that flying shots are showing every sign of getting better, and in the top left-hand photo is an example from W. Palmer, who took the photograph in Nonsuch Park, Stoneleigh. The model is apparently a goat with the interesting innovation of an aileron flap on the inboard wing. No further details are to hand.

Bottom left is an attractive bit of rubber-driven scale model Tiger Moth by P. Hayward, a nautical type from Warrington, who offers his photograph as proof that not all sailors confine their activities to ships in bottles, or like Fliar Phil, just to bottles. It is based on C. Rupert Moore's plans, but brought up to date with modifications.



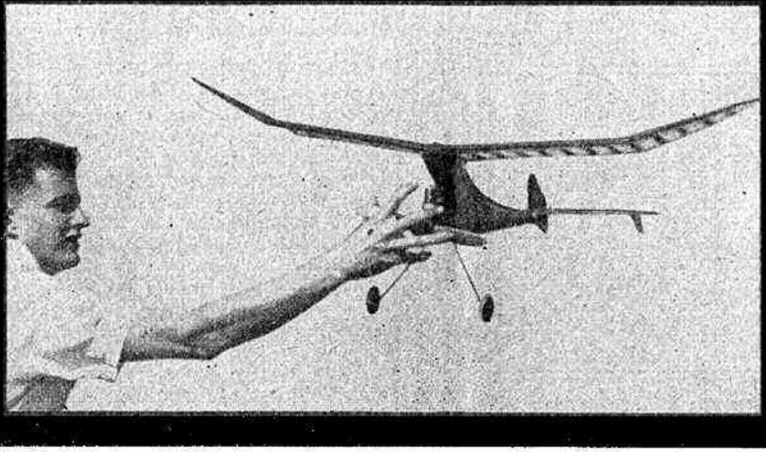
Left centre, bottom, shows a nifty bit of field work in a far-off clime—a Slicker being gently grabbed out of the way of maraudering thermals by a South African modeller from Port Elizabeth. M. Gough of England sent the photo, which was taken by his friend W. Sapsford of South Africa, and thus the whole is a truly inter-colonial effort.

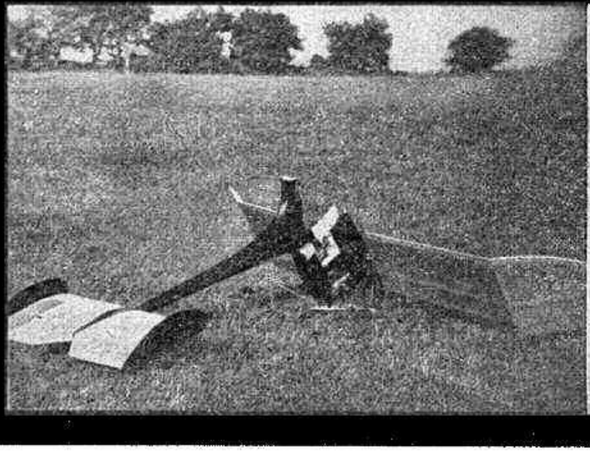
Photo at top right centre was taken by M. D. Rowlands of Brighton in Switzerland . . . The model is another hefty effort of 10 ft. span powered with a home-made jet which looks as if it is based on the Dynajet. Hand launched, it had quite a fair duration.

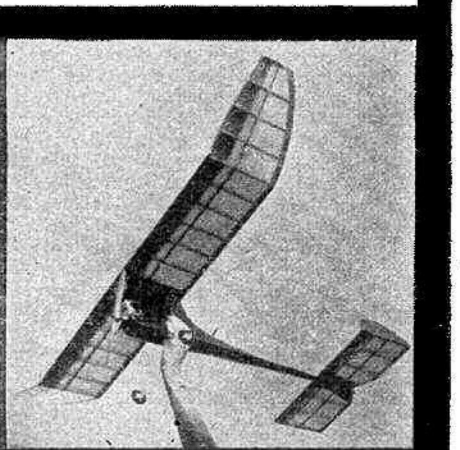
Top right is another first-class flying shot, this time of a genuine bitsa, being an amazing ensemble by Mr. Gibbens of the Cirencester M.A.C. P. Roberts of Tetbury, who sent us the photographs, describes it as an old Dr. Forster fuselage with unknown wings, so he, like Fliar Phil, doubts if anyone will recognise it!

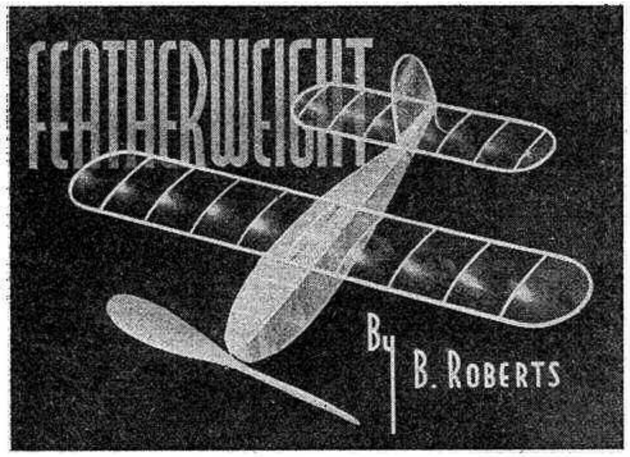
Our last photos show something which, when Fliar Phil racks his memory, he seems to have seen before! A luvverly new power model, this time built by Derek Newhouse of the cement-squeezing organisation down St. Albans, is shown bottom right in all its pristine glory, and a little farther to the left in a rather less pristine condition after its first test glide. The model was of the well-known St. Albans hatchet type pylon creation, 56 in. span, and powered by a 4·5 c.c. Majesco petrol engine.

That's the end of your January quota—but keep on sending in your photos—good, large, black, white, glossy, with all the gen . . .









THE "Featherweight" was designed in 1945 and has since been developed into a real contest winner. Although it has no very high record time, its best being the Coventry and D.M.A.C. club record of 3 mins. 39 secs., it can be relied upon to put up over 3 mins. with a good "rubber-propeller" combination.

To the enthusiast with previous experience there should be no difficulties in the construction of the "Featherweight," but to the newcomer to indoor activities for whom this is an ideal model, there are several important details to note.

Planes.

The novice usually finds it rather difficult to bend the layers of strip round the cardboard formers at the tips. The most satisfactory way to do this is to thoroughly soak the strip where it bends round the tip with water for the first layer. It should then be quite easy to ease it round with a penknife. When this layer is dry, the second is cemented on top and pinned in position until the cement is set. There is no need to wet the second layer as the cement makes the wood pliable enough without.

The outline should then be tapered and rounded off with very fine glass paper (grade 00) and ribs fitted in position.

Crack the leading edge near the centre on the inner side of the wing to give it about 3/16 in. positive incidence. This angle should be increased if the model sideslips until it stops.

Fuselage.

The best and cheapest method to obtain strip for the fuselage construction is to sand a sheet of 1/16 in. medium balsa down to 1/20 in. and then to strip off as required with a razor blade and metal ruler.

Cover fuselage crossgrain, especially if jap-tissue, otherwise the longerons will cave in on shrinking. The covering is steamed and then given one coat of very thin dope.

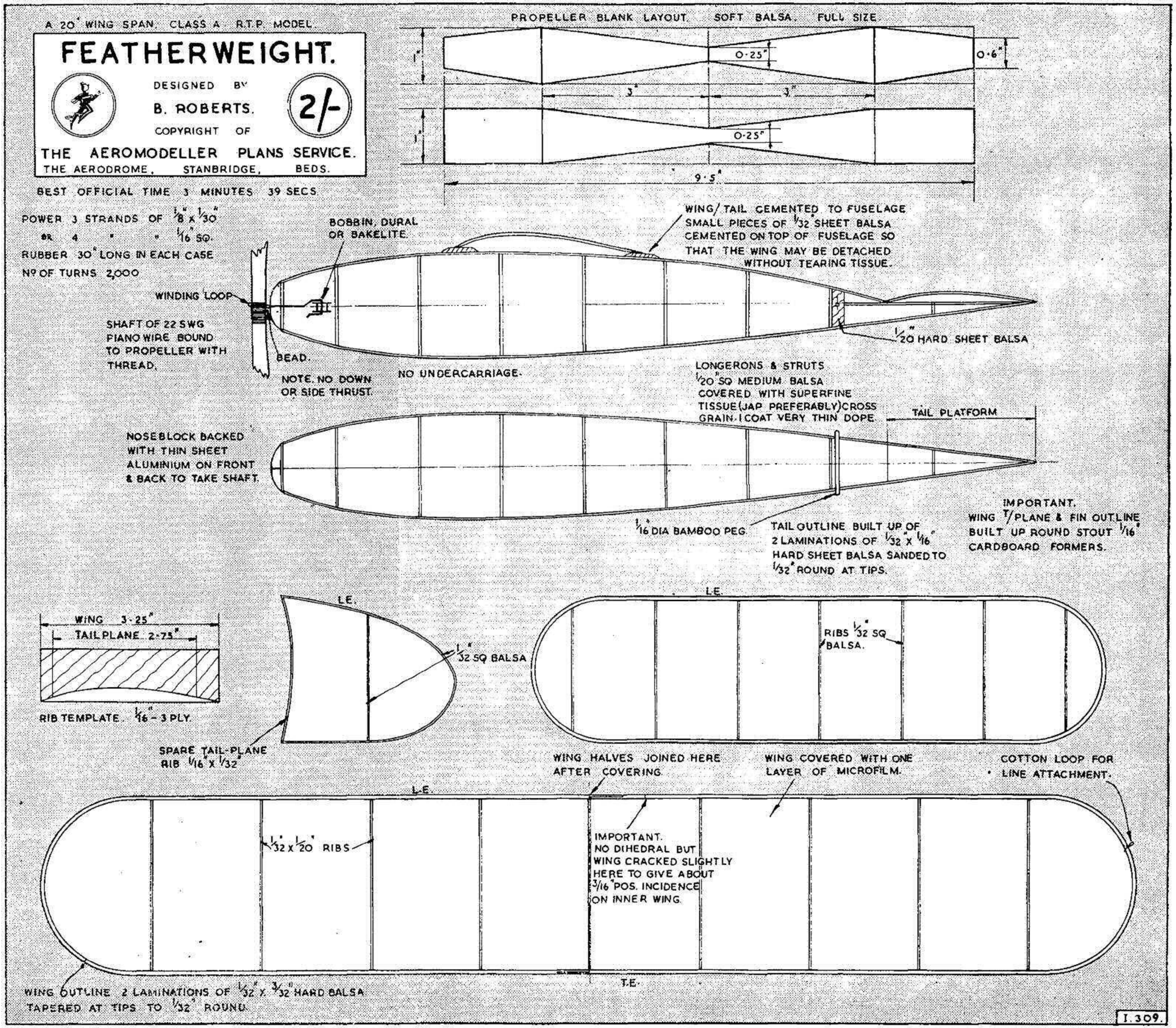
The whole model is made more robust if the planes are cemented on to the fuselage as rubber bands tend to slip. Small pieces of balsa are therefore cemented on top of the fuselage for the wing fixing so that the tissue is not torn when the wing is detached. No undercarriage is necessary.

Nose Assembly.

When the airscrew block has been shaped the under-cambered sides should be carved, the greater part of the work being done with rough and then very smooth glass paper. The other side should then be shaved to the shape of the undercamber and sanded to about 1/32 in. The hub of the propeller should be made as thin as possible so that the blades will fan out under full power. Since it is usually difficult to obtain aluminium tube as thin as 22 s.w.g., an alternative method of making the bush is shown on the plan. A hole is first drilled through the nose-block slightly bigger than the shaft. Two small pieces of very thin sheet aluminium, best made by uncurling ordinary tube and flattening out, are then bored with the right size hole and stuck on each side of the block.

Covering. Cover wings and tail with microfilm, fuselage with tissue, as per plan.

Full size plans (half scale reproduction opposite) may be obtained for 2/- post free from Aeromodeller Plans Service, The Aerodrome, Billington Road, Stanbridge, Nr. Leighton Buzzard, Beds.



TECHNICAL TOPICS

IN WHICH P. R. PAYNE DISCUSSES THE "TAPLIN CONTROVERSY"

AFTER all this we have been severely shaken to find that Mr. Taplin with his 2 c.c. motor has nearly touched the 90 mark.

"Now without going into the mathematical side of things we have worked it out roughly that his engine, using a ten inch propeller working 100 per cent. efficient, plus no drag whatsoever from the airframe, etc., had to turn at 9,500 r.p.m. and this takes some doing."

This letter is cited as an example of current control-line theory, and it is not the writer's intention to answer Mr. Evans personally, since this should be done under "Readers' Letters". Save two things: a model with "plus no drag whatsoever" could fly at 186,000 miles/sec.* and the propeller calculations bear out the claim that Mr. Evans was honest in his treatment of "the mathematical side of things".

The 'Plane.

Lt.-Col. Taplin has been kind enough to give the writer some details of the machine, which are as follows:—

Wing area: 100 sq. ins. *Wing span:* 26 ins. *Overall length:* 25 ins. *Tailplane area:* 38 sq. ins. *Weight:* 21 ozs. *Wing loading:* 33·1 ozs./sq. ft.

The model itself is clean but by no means "superstreamlined": rather could it be described as a cleaned-up "Phantom", from which the cockpit and fin have been removed. The engine is uncowled, although the fuselage houses all but the cylinder, and a brass spinner provides a clean entry.

Since the writer has himself obtained 74 m.p.h. with an almost standard "Phantom", he at least is satisfied with Taplin's claim: in the argument which follows it is hoped to show that the speed obtained is in good agreement with the value which may be theoretically predicted, and a simple method of doing this will be described.

The Performance.

In November's "Technical Topics" a simple method of estimating thrust in flight was given with the Nomogram for Ideal Efficiency. It should be remembered that an answer thus obtained for a certain speed applies only to an airscrew designed for that speed, and the point where the dotted line in Fig. 1 crosses the drag curve corresponds to a $7\frac{3}{4} \times 14$ in. airscrew turning at 9,000 r.p.m.

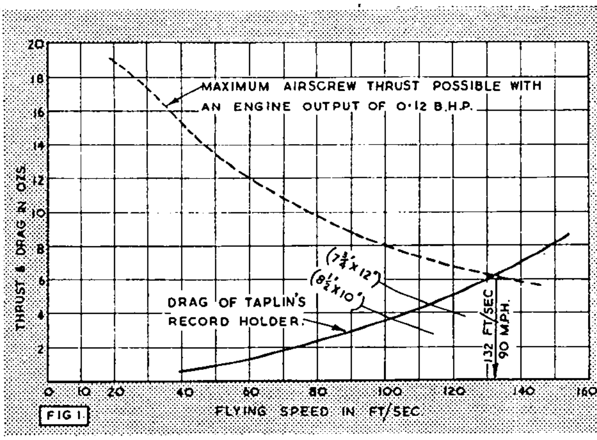


FIG 1.

In view of Mr. Evans' letter, it is interesting to note that the model will require an engine developing about 0·17 b.h.p. to develop the eight ounces odd thrust needed at 100 m.p.h. According to the "Engine Analysis" results, the only British engine which can do tis is the 5 c.c. Eta, and that only just. Thus it is not incompatible to claim 90 m.p.h. as feasible with a 2 c.c. engine, whilst at the same time admitting the necessity for a 10 c.c. American engine using a small prop at inefficiently high revs in order to pass 100 m.p.h.

Top Speed Calculations.

In "full-size" aerodynamics there are a number of short cuts in the estimation of maximum speed. These are made possible by the fact that under "maximum speed" conditions an aircraft's coefficient of drag remains roughly constant, since the C_L is of the order of 0·1. A fairly accurate answer can be obtained from the formula

$$\text{Max. Speed (ft./sec.)} = \sqrt[3]{\frac{4,620\ \eta\ (\text{b.h.p.})}{C_D.S.}} \qquad (1)$$

where η = airscrew efficiency (approx. 75%)
C_D = total coefficient of drag (average value is ·02—·03)
S = wing area in sq. ft.

Example.

"K's" 5 c.c. "Vulture" engine is *claimed* to swing a 10 × 6 prop at 10,000 r.p.m. This corresponds to a power of approximately 0·3 b.h.p., and since C_D=·024 for Taplin's model, we can work out the probable max. speed with this engine from equation (1).

$$\text{V. max.} = \sqrt[3]{\frac{4,620 \times 75 \times 0\cdot3}{\cdot024 \times 0\cdot695}}$$

$$= \sqrt[3]{\frac{103,950}{\cdot01668}}$$

= 184 ft./sec. or 125 m.p.h.

An approximate formula.

If we assume *average* values for η and C_D, we get a much shorter formula which gives

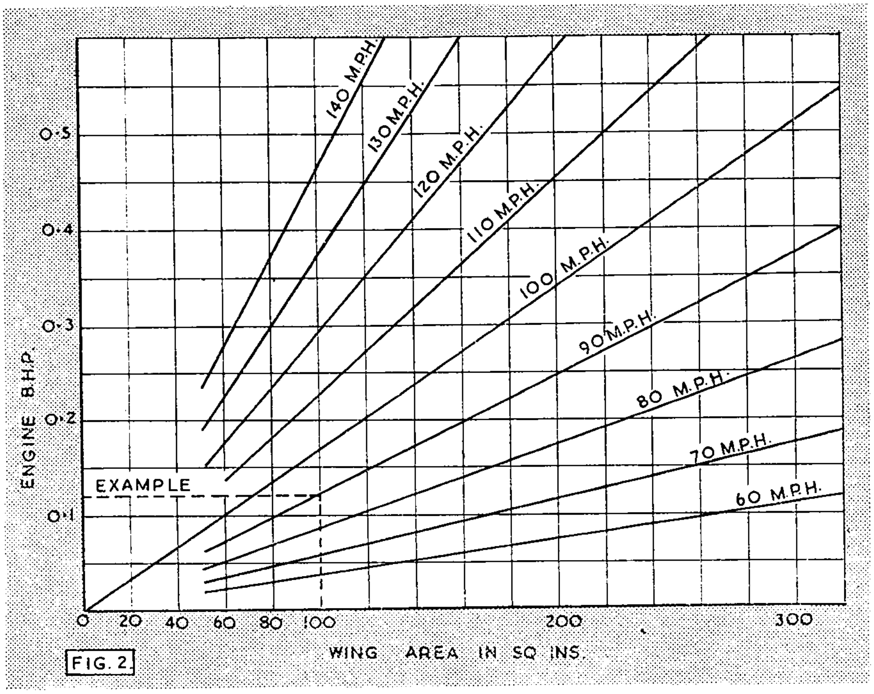


FIG. 2.

$$\text{Max. speed (m.p.h.)} = K\sqrt[3]{\frac{\text{b.h.p.}}{S}} \qquad \text{equation (2)}$$

where K = 160 (average)
b.h.p. = brake horse power of engine
S = wing area in sq. ft.

The value given for "K" is an average. For a "super-streamlined" machine with a cowled engine it might be as high as 180, whilst a "Phantom" would be about 140. Really angular stunt machines might be as low as 120, and it is interesting to note that the "full scale" world used 130 as an average in 1935.

Fig. 2 gives a rapid estimate of the top speed which may be expected for a given engine power and wing area.

The example shown is for Taplin's model, and is obviously in excellent agreement with practice. The chart may be used in three ways :

(*a*) to find the required wing area for given top speed and engine power :
(*b*) to find the engine power required for a given wing area and top speed :
(*c*) to find the maximum speed possible with a given engine power and wing area.

In all cases it should be remembered that the term "wing area" governs the general dimensions of a model. In other words, if a certain area is decided upon, the rest of the model should conform to this. Obviously it would be straining the formula too much to expect good agreement with a machine 50 ins. long and with 100 sq. ins. area.

Engine Power.

Readers will no doubt wish to point out that whilst Fig. 2 is most useful for use with engines which have been covered in the "Engine Analysis" series, these constitute a small and not very useful minority from the high speed point of view. This is true, of course, but the writer has recently hatched a gadget—as mentioned in last month's "Engine Analysis"—which will allow the all-important b.h.p. to be quickly measured. As with the AEROMODELLER whirling arm (for airscrew tests) all things have gathered together for to do evil and delay ; but it is hoped that details can be announced next month.

Optimum Wing Loading.

Fig. 3 shows two alternatives, both of which are obviously unsuitable for speed flying. Model (*a*) has a very high induced drag, because the wing has to operate at a large angle of attack, and model (*b*) has by far too much skin friction. There must be some compromise between these two extremes which will require the least amount of power at a given speed : in other words, there must be an optimum wing loading which will give a minimum of drag.

A preliminary mathematical analysis reveals that this optimum value may be expressed in form

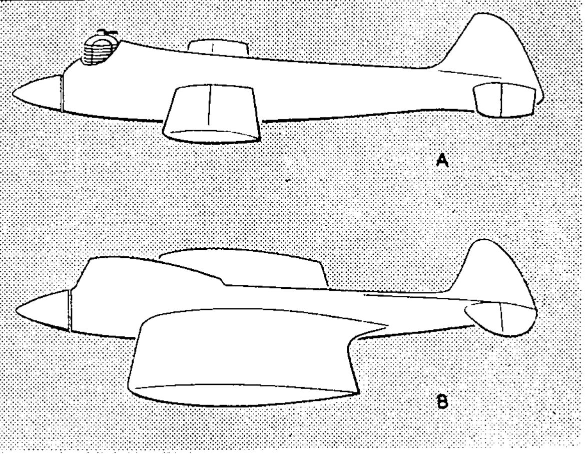
$$\frac{W}{S} = {\cdot}0338V^2\sqrt{A.\ C_{DO}.}$$

where V = maximum speed in ft./sec.
A = wing aspect ratio.
C_{DO}. = profile drag coefficient of model.
W/S = wing loading in ozs./sq. ft.

This formula is extremely interesting because it illustrates the "practically" proved fact that very small wings go with high speeds. Moreover it shows that an increase in wing aspect ratio, although relatively unimportant, does allow the wing area to be reduced slightly. The position of the drag term is rather difficult to understand, but the analysis leaves no doubt as to its importance.

As it stands, the formula has one very serious limitation : it assumes the value of C_{DO} to remain constant with varying wing area, which would, of course, only be true if the model's overall dimensions were varied in proportion. Provided that some idea can be gained of C_{DO}, however, there seems no reason why the formula should not be quite accurate enough in its present form.

FIG. 3



Example.

It is required to find the optimum wing loading for a model whose area is 100 sq. ins., weight 21 ozs. $C_{DO} = {\cdot}02$, and maximum speed 132 ft./sec. (90 m.p.h.).

$$\frac{W}{S} = {\cdot}0338 \times 17{,}424 \times \sqrt{{\cdot}02 \times 6} = 204 \text{ ozs/sq. ft.}$$

To the writer—who has flown nothing more vicious than a "Magnette"—this seems *exceptionally* high, but speed fans assure him that it is by no means abnormal in the light of current American practice. Moreover Fig. 4 provides amplification and confirmation.

Perhaps other modellers may care to let the writer know their wing loadings.

Erratum.

In the November issue, slipstream velocity was perverted : the formula should have read

$$\text{slipstream velocity} = \text{airspeed of model} \times \left(\frac{200}{\text{Ideal Efficiency}} - 1\right)$$

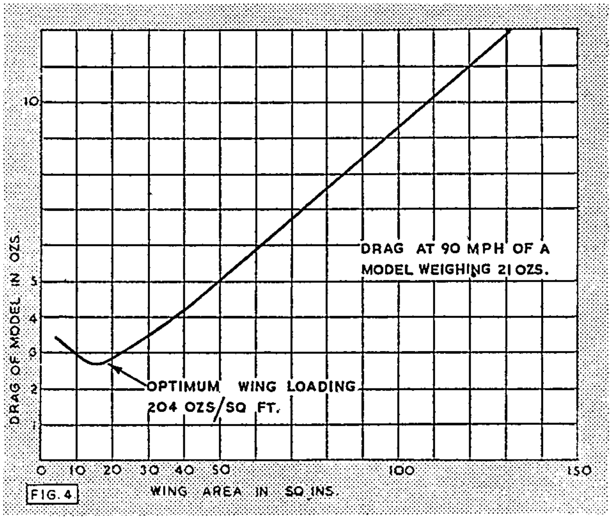


FIG. 4

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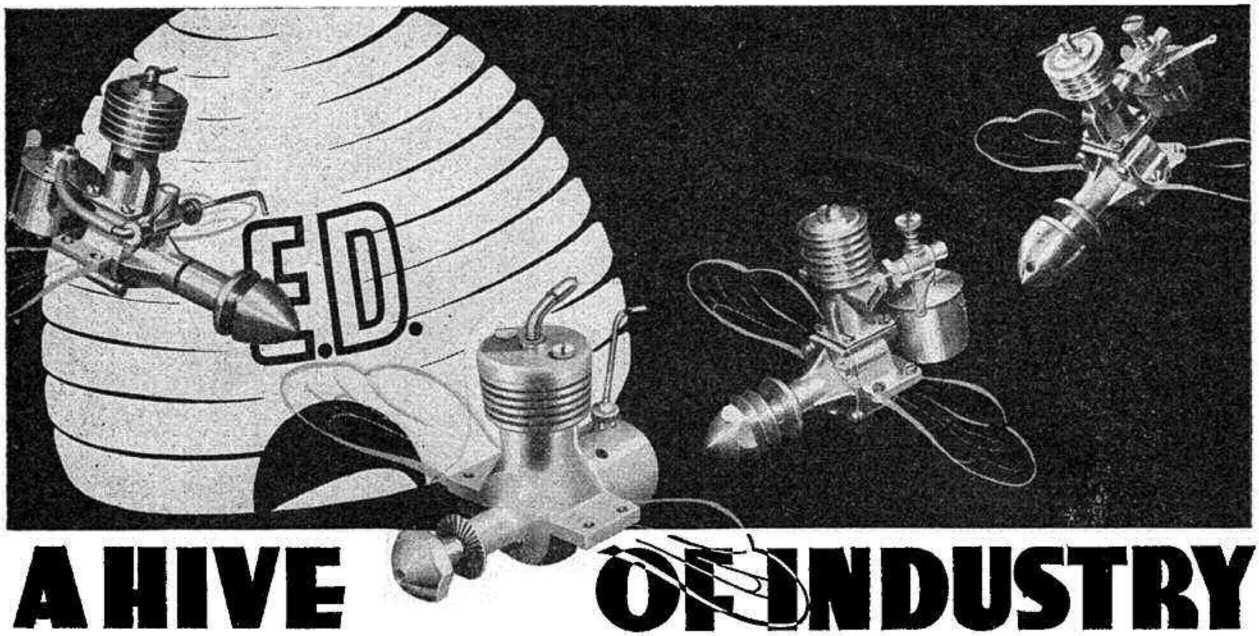
* i.e., assuming the airscrew could still function there is no reason why the model should not continue to accelerate up to this speed. According to Einstein's Theory of Relativity, the mass of the model would increase rapidly near this speed, and would become infinitely great at 186,000 m/s. The writer hopes Mr. Evans is wrong but will produce a series "Relativity for Modellers in a Four Dimensional Space" if the need arises!



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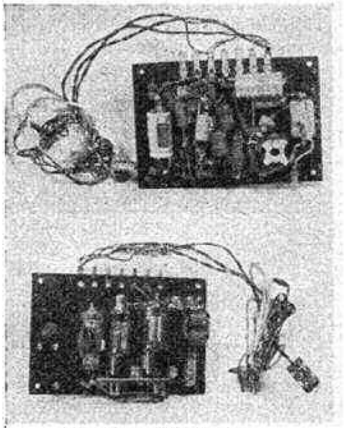

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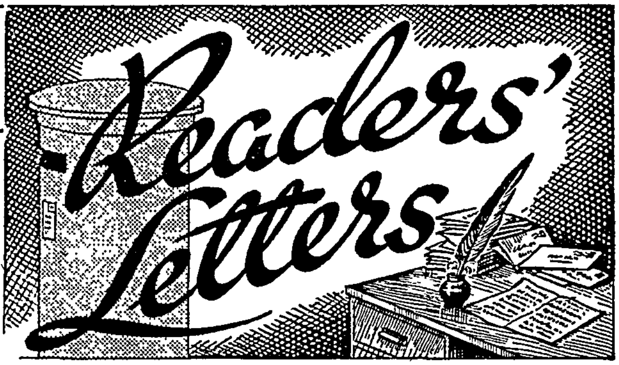


The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

DEAR SIRS,

It was with very mixed feelings that I read the letter of D. W. Evans, Secretary of the Weston Control Liners regarding the Class 2 Speed record recently established by my son. I would like to point out that Mr. Evans and his friends have absolutely no details whatever of our machine, and yet without so much as taking the trouble to ask me for these particulars in order that they might have something to work upon, they just blandly publicly disbelieve.

Since neither I, the designer, nor my son who actually flew the machine, had any hand whatever in the timing of this record, Mr. Evans' remarks can apparently only be aimed at the integrity or ability of the official timekeepers, and is, in my opinion, a thoroughly unsporting effort.

I should find it difficult to believe that such a spirit exists in the average aeromodelling club. Should I ever decide to take a trip to Weston-super-Mare it will not be for the purpose of giving a private demonstration to the Weston Control Liners.

Birchington-on-Sea. H. J. TAPLIN, Lt.-Col.

DEAR SIRS,

Controversy over J. D. Taplin's recently certified record of 89·95 m.p.h. is indeed justified. Obviously something revolutionary has been done either to Mr. Taplin's power plant or the timekeepers' stop-watches.

Reference to a few basic calculations show that an E.D. " Competition Special " running at maximum b.h.p., *i.e.*, 7,000 r.p.m., would have to turn a prop. of 16·98 in. pitch, assuming only 20 per cent. slip, to approach anything like 90 m.p.h., as the following formula shows :—

(Assuming 20 per cent. slip) Pitch in inches $= \frac{\text{Speed in m.p.h.} \times 1320}{\text{r.p.m.}}$

For the above case $P = \frac{89\cdot95 \times 1320}{7{,}000} = 16\cdot98$ inches.

Surely an impossible task for an engine of ·109 b.h.p.

Cranfield, Bucks. E. A. FAULKNER.

DEAR SIR,

The S.M.A.E. has the task of receiving and scrutinizing applications for British aeromodelling records; only when record attempts are timed by recognized timekeepers are claims entertained by the S.M.A.E.; recognition of the record is only granted when the Society is fully satisfied that the record has been established.

For any aeromodeller who has no knowledge of the facts to question either the actual establishment or official recognition of any record, after recognition has been formally granted by the Society, is not merely an impertinence; it is also an aspersion on the integrity of the officials concerned.

On 6th June, 1948, J. D. Taplin established a British Class II Control Line Speed Record of 89·95 m.p.h.; on the 21st of the same month the S.M.A.E. granted its official recognition of this feat. I, for one, do not doubt that Mr. Taplin did actually attain a speed of nearly 90 m.p.h.

However, this is evidently not good enough for a body known as the Weston Control liners. Mr. Evans, did it occur to you while involved in tedious calculation, that perhaps Mr. Taplin didn't use a 10-inch pitch propeller ! I believe Mr. Taplin actually used a 7½×14 in. pitch propeller; with very high pitch propellers the difference between static r.p.m. and flight r.p.m. figures is liable to be considerable; in fact N r.p.m. on the ground might well become 1·3. N r.p.m. in the air. Assuming an advance per revolution of 75% pitch, an approximate flight r.p.m. figure of 10,300 would be required at 90 m.p.h.; this might correspond with a static r.p.m. figure of just over 7,500; this, Mr. Evans, is possible with a 2 c.c. diesel.

Finally Mr. Evans, as you sign yourself Hon. Sec., are we to infer that the official attitude of your club is that the S.M.A.E. is not competent to deal with official records? Perhaps you feel that all decisions of the Society dealing with C/L matters should be ratified by the Weston Controlliners. If every club in this country refused to accept established records I feel that aeromodelling would suffer.

In short Mr. Evans, whether Mr. Taplin accepts your offer or not, I feel that your challenge is impudent and your attitude unsportsmanlike and conceited.

Godalming. T. D. R. REDMAN.

DEAR SIR,

In common with most other aeromodellers who know anything of the difficulties in reaching really high speeds with control line racers, I have wondered how young Mr. Taplin succeed in attaining almost 90 m.p.h. with an E.D. diesel in a large boxlike model more suitable for a beginner's first lessons in controlled flight.

I can at least offer what, I think, is the logical solution to this problem that has literally shaken the control line world.

My mother who is a keen follower of model matters, has informed me that this speed is entirely possible, with the model in question, as it was undoubtedly set up under favourable atmospheric conditions. You all know how the temperature and humidity affect the speed ? She says Mr. Taplin must have gone one better than the rest of us, and, stationing himself at the very centre of a whirlwind, cleverly flew his model with a 60 m.p.h. tail wind following it around.

Colchester. L. GEORGE TEMPLE.

The Taplin Controversy has deluged the Editorial Offices with correspondence, even our own technical contributor enters the fray in "Technical Topics" this month. We ourselves would mention that the S.M.A.E. rules in operation at the time the record was made do not bar " whipping " which may be one possible solution. Finally we would state that the ultimate solution must necessarily lie in the hands of the S.M.A.E. whom we invite to either confirm or confound the record in question.—Ed.

DEAR SIR,

Whatever the manner in which Mr. Guilmant's letter (November AEROMODELLER) may be written, I gather that he is opposed to certain phrases in the report of the 1948 St. Albans All-Herts. Rally. It seems to me that this is just a case of " One man's meat is another man's poison," and I hope a sufficient number of persons found the report " meat," and but a few, " poison."

The last two paragraphs of Mr. Guilmant's letter, *i.e.* :—

> " With due apologies to Edward Buxton, surely the AEROMODELLER can veto or discourage the further use of such phrases: obviously taken parrot-fashion from the American model magazines.
>
> " We can afford to leave the idolizing of our American friends to female bobby-soxers."

were unfortunate for two reasons. The first is that the paragraphs do not seem conducive towards continued good relations between American and British model aviation. And secondly, that he tends to reduce the effectiveness of his own argument against the use of what he calls " Americanisms," by employing the term " bobby-soxer."

St. Albans. E. J. BUXTON.

AIRCRAFT DESCRIBED
No. 15.

The AVRO ATHENA

BY E · J · RIDING

"Aeromodeller" Photos.

IN the same category as the three-seater Percival Prentice, the latest designs to emerge from the Avro factory at Manchester are the Athena Mks. I and II advanced Military trainers.

Contracts have been placed with Avros for three prototype Mk. I s to A/M Specification T7/45, and four prototype Mk. II's to A/M Specification T.14/47, these latter to be followed by a small pre-production batch order.

These two types are basically similar in layout with the exception of the power plants and wing positioning. The Athena Mk. I is equipped with an Armstrong-Siddeley Mamba prop-jet unit driving an all metal De Havilland three bladed airscrew. It is understood that the second and third Mk. I's will be fitted with Rolls-Royce Dart prop-jet units.

The Athena Mk. II is fitted with a Rolls-Royce Merlin 35 piston engine of 1,280 h.p. Because of the dissimilarity in load distribution, the wing on the Mk. I is positioned 27 ins. further aft than on the Mk. II.

Seating accommodation is provided for pilot and two pupils, one of the latter occupying the rear seat, from which point of vantage he will, no doubt, benefit from his comrade's instruction.

The windscreen and canopy are fitted with adjustable amber tinted screens, which when used in conjunction with blue tinted goggles can simulate conditions ranging from dusk to complete darkness when it is broad daylight outside the machine. This feature, together with the comprehensive instrument and radio equipment makes the aircraft conform to the latest R.A.F. all-weather specification. Full military equipment includes a camera gun (Stb'd wing), and a ·303 Browning gun in the port wing.

The Athena's duties include training in gunnery, bombing, photography and glider towing.

Construction. All metal. The fuselage is built up from light alloy hoops, stringers and plating, and the wings, also of light alloy construction, embody a new type of hydraulically operated combined flap and dive brake. The wing trailing edge is divided into four sections, the inner ones being normal type flaps, and the outer ones having both upper and lower surfaces capable of being opened apart by a hydraulically operated jack system inside the wing thus providing dive brakes.

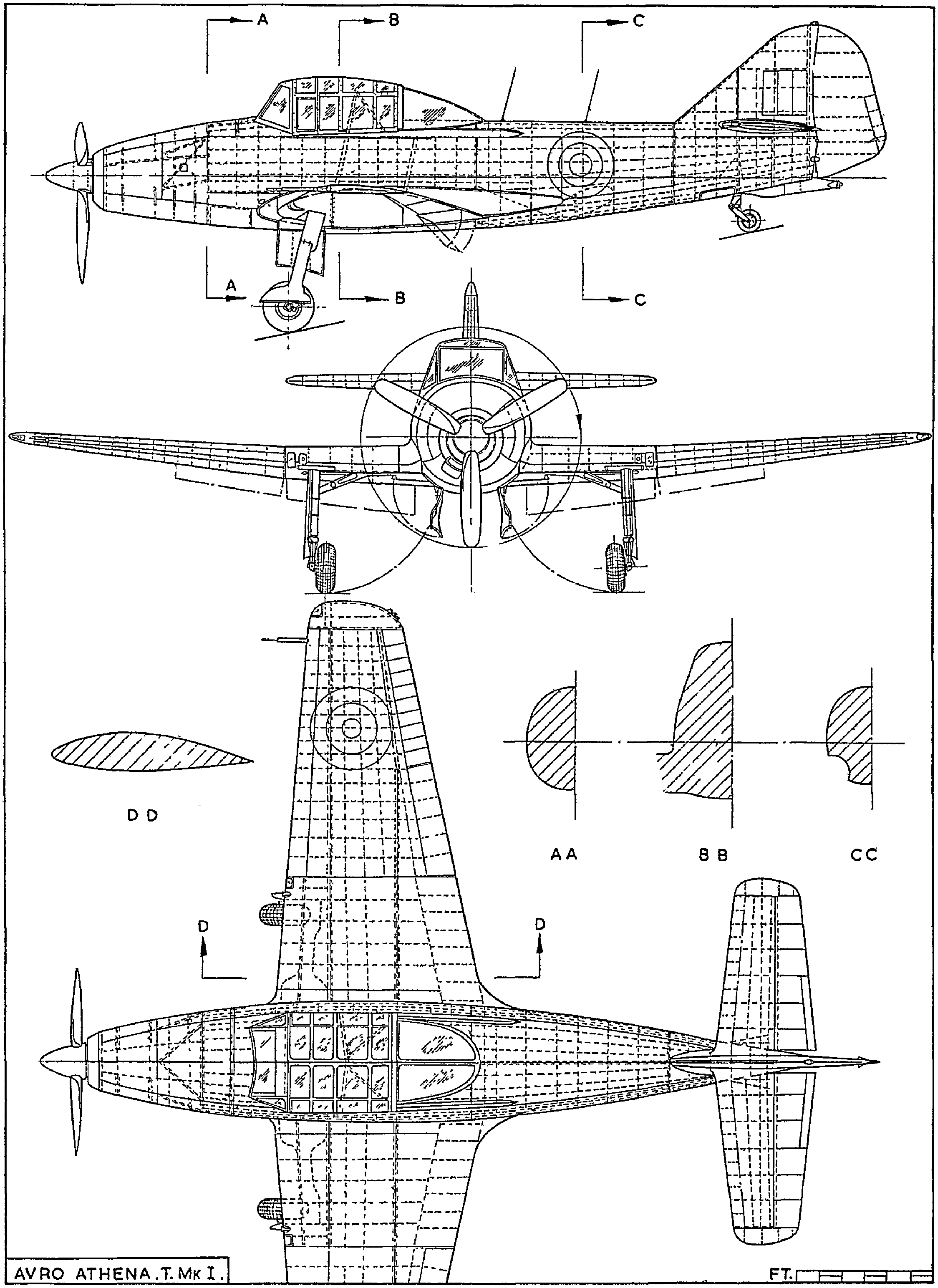
The jet outlet from the Mamba unit is carried away beneath the cockpit floor and emerges on the starboard side of the fuselage immediately aft of the wing.

Colour. Aluminium or natural metallic finish all over. Standard R.A.F. training scheme patches of yellow on sides of fuselage and wings as shown in our heading photograph. Serial numbers :—Athena I VM.125, Athena II VW.890, painted on the sides of the fuselage and under-surface of the wings.

Specification :

Length: 36 ft. 6 ins. (Mk. II 27 ins. longer).
Span: 40 ft.
Height: 11 ft. 11 ins.
Wing Area: 270 sq. ft.
Tare Weight: 5,067 lbs.
Maximum Weight: 7,438 lbs.
Maximum Speed: 287 m.p.h.
Cruising:—253 m.p.h.
Stalling:—80 m.p.h.
Service Ceiling: 34,800 ft.
Range: 620 miles (increased if desired by addition of drop tanks).

¼" to 1' reproduction of the G.A. drawing, price 1/–, and photographs price 2/– each (6"×4") or 6/– per set of four may be obtained direct from Eaton Bray Studios.



AVRO ATHENA .T. MK I.

S.M.A.E. NEWS PAGE

F.A.I. 1948

Great Britain, Belgium, Denmark, France, Holland, Sweden, Switzerland and Hungary attended the Paris Meeting, held during the week September 27th–October 1st. Mr. A. F. Houlberg (S.M.A.E. Chairman) retained the Presidency of the Model Aircraft Committee, with Vice-Presidency filled by G. Derantz of Sweden. Mons. F. Catier (France) was re-elected to Secretaryship, with Just Van Hattum (Holland) as Assistant.

The majority of the discussions aimed at cleaning up the present rules and eliminating ambiguities. The more important decisions taken were :—

(1) To create a Record Class for speed models over a circular course, either control-line or pylon attached. Minimum course 1 kilometre, with the option of three standard line lengths giving 6, 8 and 10 laps to the kilometre (87 ft., 65·25 ft. or 52·2 ft.). Further sub-divisions by engine capacity as follows :—(i) 0–2 c.c., (ii) 2–5 c.c., and (iii) 5–10 c.c.

(2) Creation of Record Classes for tele (radio) controlled model aircraft, for Duration, Distance, Altitude and Speed. (No speed class relating to R/C gliders.)

(3) Introduction of a standard badge for Merit Certificate holders.

(4) Use of dolly type undercarriages restricted to circular course speed record only.

(5) Record Class for Tailless Models introduced, and following definition accepted, *i.e., A tailless model is an aircraft having no horizontal stabilising surface separated from the principal supporting surface.*

(6) Allowance of an extensible (rubber ?) insert in glider launching lines, such insert not to exceed 1 metre in length.

(7) Reaction (Jet) Motor Speed Record Class introduced. Weight of motor not to exceed 500 grams (17·63 ozs.) and minimum weight of complete model (in flying trim) equal to or greater than four times motor weight. Wing loading—200 grams per sq. dcm. (65·573 ozs. per sq. ft.) maximum.

(8) Relating to Special Aircraft (Helicopters, etc.) the area of the fixed horizontal surfaces must not exceed *half* the swept area of the rotating surfaces.

Full details of the above and any other modifications will be found printed in the S.M.A.E. Handbook and Diary available early in 1949.

MERIT CERTIFICATE AWARDS. Ratified 13/11/1948.

" A " Class

No.		No.	
236	Royle, P. (Littleover)	242	Elliott, E. G. (Cheam)
237	MacPhee, H. (Reading)	243	Steels, I. H. ,,
238	Taplin, H. J. (Isle of Thanet)	244	Worby, D. ,,
239	Taplin, J. D. ,,	245	Richards, M. J. (Southampton)
240	Palmer, J. D. (Cheam)	246	Gordon, E. D. ,,
241	Lockyer, M. J. G. ,,	247	Guilmant, P. T. ,,

" B " Class 240 Palmer, J. D. (Cheam)

List of BRITISH NATIONAL MODEL AIRCRAFT RECORDS as at 19th November, 1948

OUTDOOR

Rubber :	Monoplane	Wingate, J.	31 : 32·2
	Biplane	Young, K.	31 : 05
	Wakefield	Copland, R.	27 : 56
	Canard	Paveley, D.	1 : 37·1
	Scale	Marcus, N. G.	5 : 21·75
	Tailless	Boys, H.	1 : 24·5
	Helicopter	Musgrove, R.	: 40·2
	Rotorplane	Crow, S. R.	: 39·5
	Floatplane	Parham, R. T.	8 : 55·4
	Flying Boat	Rainer, M.	1 : 09
Glider :	Tow Launch	Best, F.	63 : 46
	Hand launch	Peckett, G. D.	6 : 57·5
	Tailless (H.L.)	Twomey, B. J.	1 : 15·3
	Tailless (T.L.)	Harris, L. C.	10 : 30
Power :	Class A	Stothers, K. L.	6 : 10·8
	Class B		
	Class C	Frazer, A. T.	16 : 25
	Tailless	Boys, H.	1 : 24
	Scale	Petch, P. L.	: 36
	Floatplane	Bellinger, R. A. C.	1 : 08
	Flying Boat	Gregory, N.	2 : 08·5
Control-Line :	Class I	Butler, D.	51·7 m.p.h.
	Class II	Taplin, J. D.	89·95 ,,
	Class III	Houghton, C. L.	91·0 ,,
	Class IV		

INDOOR

Free-Flight :	Stick (H.L.)	Copland, R.	18 : 52
	Stick (R.O.G.)	Mackenzie, R.	8 : 42
	Fuselage (H.L.)		
	Fuselage (R.O.G.)	Gilbert, D.	4 : 33
	Tailless (H.L.)	Musgrove	: 36
	Tailless (R.O.G.)		
	Helicopter	Mackenzie, R.	1 : 33
	Rotorplane	Mawby, L.	: 32·2
R.T.P. :	Class A	Rock, R.	5 : 54·4
	Class B	Parham, R. T.	4 : 26
	Speed	Heaton, F. F.	34·04 m.p.h.

Records Officer S.M.A.E.

1949 S.M.A.E. PROGRAMME

April 3rd.	Gamage Cup	Unrestricted Rubber	*D/C*
April 17th.	"Model Engineer" Cup	F.A.I. Team Glider	
	"Flight" Cup	F.A.I. Rubber	*Area*
May 1st.	"Astral" Trophy	Power/Ratio	
	"Halfax" Trophy	Power Duration	*D/C*
May 15th.	Wakefield Eliminator	(Gutteridge)	*Area*
June 5th.	NATIONALS :		
	Thurston Cup	F.A.I. Glider	*C*
	Sir J. Shelley Cup	Power Duration	*Fairlop*
June 6th	Model Aircraft Trophy	F.A.I. Rubber	
	"Gold" Trophy	Control-line Stunt	*C*
	Cossor Trophy	Radio Control	*Fairlop*
June 19th	S.M.A.E. Cup	F.A.I. Rubber	
	Pilcher Cup	F.A.I. Glider	*D/C*
Saturday July 2nd	Wakefield Trials	(Barnard Shield)	*C* *Fairlop*
July 17th	Women's Challenge Cup	Unrestricted Rubber/Gl	
	Frog Junior Cup	Unrestricted Rubber	*D/C*
July 31st	WAKEFIELD TROPHY	Venue to be announced.	*C*
Aug. 1st	Bowden Trophy	Power Precision	
	International	Power Duration	*C*
Aug. 21st	Farrow Shield	Team F.A.I. Rubber	
	K. & M.A.A. Cup	F.A.I. Glider	*Area*
Sept. 11th	Lady Shelley Cup	Tailless	*D/C*
	Weston Cup	Wakefield	*D/C*
Sept. 25th	Keil Trophy *	Power/Ratio	*C*
	Hamley Trophy *	Power Precision	
		Control-line Speed	

* These centralised events are divided into Northern and Southern Sections to be held at Sealand and Fairlop respectively.

Plugge Cup : based on " Model Engineer ", " Flight ", Farrow Shield, and K. & M.A.A.

Senior and Junior Championships on Nationals contests.

CLUB NEWS

By Clubman

Reader N. Groves performed some candid camera work at the S.M.A.E. Annual General Meeting held in November at Londonderry House and catches the Comp. Sec., Val Turner reading his report.

THIS month sees the re-introduction of an S.M.A.E. page where, as far as possible, full official information on all matters concerning national (and international) affairs will be given. Unfortunately, the usual snag connected with a monthly publication will occasionally date the news contained therein, but as far as possible this will be kept to a minimum, and there will be no excuse for not knowing what is what in regard to rules, events and other important matters in this aeromodelling world.

Reference to the list of British model aircraft Records shows a number of unclaimed categories—and a number of figures that I am darn sure could be beaten by a mere novice. What about having a go at pushing some of the figures up, and at the same time collecting a few scalps for yourself and the club?

A most important international decision is that of banning reaction (jet) propelled models from free flight. A little thought discloses that this step was inevitable sooner or later, and it is to be hoped that no rebel will gum up the works by ignoring this very necessary restriction. Public opinion is too touchy at the moment (witness the lay Press) to allow of any fooling with sane regulations, and I trust none of you will hesitate to tear a strip off anyone they find jeopardising the goodwill that we still retain.

It came as a shock to learn of the untimely death of W. (Bill) White of the Blackheath M.F.C. in a motoring accident. Well known for his extremely well constructed models, Bill had a large measure of success in the aeromodelling game. His club have opened a fund for the purchase of a "Bill White Memorial Cup" which will be flown for annually, the first taking place on Blackheath on the 9th January, 1949, and will be for rubber driven models. Donations to the Cup should be sent to Mr. W. J. Bishop, 15, Gellatly Road, London, S.E.14.

Anybody seen a Cup? Following a country-wide chase after the S.M.A.E. Trophies in readiness for the annual Dinner and Prizegiving, I am still unable to locate the whereabouts of one cup, i.e. the C.S.S.A. (Civil Service Supply Association) Cup. Anyone knowing the whereabouts of this piece of silverware, or having any knowledge of any kind that will assist in recovering the cup is asked to contact me immediately c/o the AEROMODELLER. (This also applies to any other unclaimed trophies that may be lying around, as there has been a sad lack of appropriate records kept of such valuable assets.)

There is apparently no shortage of paper in South Africa, if the current examples of the "Pacemaker" (official organ of the Pretoria A.M.C.) is anything to go by. Duplicated foolscap sheets include plenty of news and sketches, and the 18 page effort must take some poor member an awful lot of spare time—though that is something tradition blesses them with as viewed in this country. Pukka sahib stuff you know! Anyhow, congrats on a good paper Doc Allen and Co., and let's hope we see a S.A. team in this year's Wakefield.

As a result of heavy mist and continuous rain, entries for the **NORTH WEST AREA** rally at Lobden Moor, near Rochdale on the 31st October were not up to standard. Best time of the day was made by A. Banks of Rochdale with a flight of 2 : 21, but most models were o.o.s. in 20–30 secs. Oldham & D.M.A.C. won the Lawton Team Trophy with an aggregate of 11 : 56, Whitefield placing second some 19 seconds behind. Banks won the Open Glider event with a total of 3 : 10, the Wakefield honours going to H. O'Donnell of Whitefield with an aggregate of 3 : 31·1.

Four new records have appeared in the **EWELL M.C.** list since their last report. H. Grist clocked 1 : 46 with his hand launched rubber job, J. Tucker set a 2·56 ratio in the junior power class, A, Vince (another junior) clocked 1 : 36 with his glider, and M. Struik made 52 m.p.h. with his speed control liner. Lady Luck helped W. Tinker win the Kemp Challenge Cup for C/L models, Struik's model breaking a wing whilst recovering from a wing-over.

Over 70 members and friends attended the **BLACKPOOL & FYLDE M.A.S.** Annual Dinner on October 15th. Mr. R. F. L. Gosling (just created a Fellow of the S.M.A.E. by the way) was guest of the evening, and presented an imposing prize list. Cliff Davey took most of the prizes, including the Teckni-Flo Trophy for a power flight of 9 minutes. A. B. Munden was the Club Champion, G. Martin collecting the Junior honours. J. Owen walked off with the glider record with a time of 8 : 35 o.o.s. Time I paid another visit up Blackpool way—seems years (and it actually is!) since I sampled the North West air and the sand hills.

SOUTHAMPTON M.A.C. won the Hobart Challenge contest for the second year in succession when beating Portsmouth. Much of this success is due to the method by which various experts concentrate and coach in their particular spheres, and the finishing score of 27–8 was pretty conclusive. Flown in three sections, rubber, glider and power, the "Saints" just about doubled their opponents' score in each case, leading men being M. Coxon (best flight 5 : 0·24), R. O. Richards (glider lost after 5 : 21·4) and J. Mountain power (1 : 33·8).

"Bowden" winner R. Scott of St. Helens won the

MERSEYSIDE REGIONAL COUNCIL of M.A.C's Glider contest at Woodvale Aerodrome on Oct. 31st. His aggregate for 3 flights was 5 : 19·6, top junior being S. Hinds of Wallasey, aggregate 2 : 53. Winding up the day with a spot of c/lining Scott broke no less then fifteen props—which should be something of a record for one day's flying !

One member of the **ODIHAM & D.M.F.C.** claims to have souped up a Mills Mk. I to 20,000 r.p.m. but is rather hazy as to how he does it ! The chaps have just acquired a new clubroom which should at least hold six members, whilst C. Farmer's "Frog 45" should fly any month now. Still, he's beaten by the boy who takes his job out regularly, takes a couple of hours starting the engine, and then loses the job o.o.s. first flip. 'Twas ever thus.

BOURNEMOUTH M.A.A.S. have been presented with a new trophy for control-line flying by Mr. Guy Rickard, for the encouragement of scale and semi-scale types. The S.M.A.E. wish all clubs to try out this class of control line flying during next season, and forward their views and experiences in order to standardise a set of rules for this realistic type of flying.

The **NORTH BIRMINGHAM M.A.C.** has decided to disband owing to general lack of support, balance of funds having been passed to the Midland Area for general use.

Another type of scale flying has been recently indulged in by the **LUTON & D.M.A.S.**, this time r.t.p. Three Austers, a Fairchild, a Ryan and a Blériot battled for honours, the winner being the Ryan, flown by F. Chapman with three flights around the 26 second mark. Second was Minney's Bleriot which "crossed the channel twice" but "came down in the drink" on the third attempt.

In aid of Battle of Britain Week, the **EVESHAM & D.M.A.C.** staged a full scale affair at Honeybourne Aerodrome, and raised nearly £100 for the R.A.F. benevolent funds. Weather was O.K. for a change, and a breeze just suited the glider experts. Gloucester, Tetbury and South Birmingham clubs turned up in force to make certain a good hundred entries.

Full results :—

Glider	**(Senior)**	**Ralph**	**(Gloucester)**	**3 : 04**
		Nottley	**(Sth. B'ham)**	**2 : 23**
		Hawkins	**(Sth. B'ham)**	**: 31**
	(Junior)	**Reed**	**(Sth. B'ham)**	**4 : 29**
		Bailey	**(Sth. B'ham)**	**3 : 03**
		Bishop	**(Gloucester)**	**2 : 45**
Rubber	**(Senior)**	**Stinchcombe**	**(Tetbury)**	**5 : 28**
		Bishop	**(Gloucester)**	**3 : 56**
		Roberts	**(Tetbury)**	**3 : 24**
	(Junior)	**Deakin**	**(Evesham)**	**4 : 09**
		Drinkwater	**(Evesham)**	**1 : 41**
		Miss Drinkwater	**(Evesham)**	**1 : 12**
Power		**Fosty**	**(Gloucester)**	**4 : 18**
		Howard	**(Evesham)**	**3 : 52**
		Wiggall	**(Gloucester)**	**2 : 57**
Control Line		**Wiggall**	**(Gloucester)**	**167 pts.**
		Johnson		**86 pts.**
		Arnold	**(Sth. B'ham)**	**72 pts.**

The **NOTTINGHAM A.C.A.** have prepared a very worth-while series of lectures for their members—and any others who like to attend. Full details from Sec. F. I. Lowe, 11, Wallet Avenue, Beeston, Notts.

First annual competition of the **HALL BOWER M.F.C.** was held on November 14th under atrocious weather conditions, resulting in a win for S. Blake, who aggregated 2 : 06 to win the Sir Stanley White Trophy. Runners up were J. Lee and W. Bainbridge.

Since it started in the beginning of the year, the **WEST KENT M.F.C.** has progressed well, membership now totalling nearly 40. J. Agutter has been particularly successful in the contest field, winning the glider and power comps at the Sevenoaks Gala, and placing 5th in the C.S.S.A. Cup. Club records at this date are :—

Open Rubber	**A. Dadd**	**4 : 19**
Wakefield	**A. Wraight**	**1 : 56·8**
T. L. Glider	**J. Blount**	**8 : 52·8**
F. A. I. Glider	**A. Dadd**	**3 : 54**

After a slow start, the **WORKSOP AEROMODELLERS** finally got going in June, and are currently concentrating on control-lining. In spite of what the reactionaries say, this club thinks that C/L is far more satisfactory than free flight, requiring more knowledge, skill and engineering ability than all the rest put together. (Well well, get ready for the comebacks Worksop !) Records with this group are :—

Rubber	**3 : 17**
T. L. Glider	**7 : 43**
Power ratio	**13·5**
C/L Speed	**105 m.p.h.**

Readers are reminded that the **SOUTHERN CROSS A.C.** are holding a model aircraft exhibition at the Robertson Hall, Ship Street, Brighton from Jan. 17–22nd inclusive, with contests for the usual classes. Full details from the Secretary, 64, St. Andrews Road, Portslade.

To round of the season, the **BIRMINGHAM M.A.C.** attended the "Wolves" Rally at Perton Aerodrome, and in spite of poor weather, returned with a fair share of the prizes. Wakefield member Chuck Doughty placed second in the open glider event with 6 : 02·2, Bob Perry third with 4 : 54. Ray Monk collected a third in the open rubber class with 5 : 51·6, and finished by being declared Champion of the day.

OXFORD METEORS have now amalgamated with the Oxford Civil Defence M.A.C. With such good free flight facilities on Port Meadow, C/L flying is rather frowned upon, and recently the rubber duration figure has gone up to 5 : 40 with a machine flown by D. Smith.

William L. Butler of 600, W. Buckthom Street, Inglewood, California would like to correspond with anyone who is interested in trading motors, etc. He is 38 years of age and a keen modeller, and I don't suppose he will go begging for someone to take him on !

The **PRESTON & D.M.A.C.** wish it to be known that they are still alive and smashing, in spite of long absence from these columns ! Recent contest results show wins for E. Vonslow (glider 6 : 39·7), J. Hurst (rubber 5 : 34) and J. Taig (power 3 : 57·7)—all on a three flight aggregate. Poor times in the power event were in most cases due to airdraulic timers that consistently ran for over 20 seconds !

So we reach the end of a further month's reporting. In spite of difficulties—and they are not light by any means—the good old game of aeromodelling bashes on regardless (and in some ways rewardless !). Local councils and deadheads may put restrictions and pitfalls in our way, but they cannot kill the spirit of the hobby, and I'm dead certain that we shall soon get around our current difficulties.

But—and don't forget it is the biggest BUT of all—it is the aeromodeller himself who will finally brush the clouds away, or bring down on us a veritable downpour of public opinion. Truly it is a case of watch your step very carefully, and it is better to forego a few hours' flying at the moment than to go ahead and possibly lose the lot through action outside our control. Take the long view chaps, and though it may be galling to be told to take those powered Yo-yo's out of the public park, remember the other bloke is entitled to his opinion on the " dangers " of our chosen hobby. Oh for the days when a benevolent Government realises the value of aeromodelling, and places proper and adequate facilities at our disposal !

The CLUBMAN.

NEW CLUBS

DEAL M.A.C.
M. Marshall, Neville House, King Street, Deal, Kent.
EAST BIRMINGHAM M.A.C.
R. B. Lee, 74, Green Road, Hall Green, Birmingham, 28.
WADEBRIDGE M.A.C.
E. T. Davies, Whiterock, Wadebridge, Cornwall.
EAST BRISTOL M.A.C.
K. A. Farmer, 16, Prospect Place, Whitehall, Bristol, 5.
FLEDGLINGS M.A.C.
J. Turte, 231 Squadron A.T.C., R.A.F. Camp, North Walsham Road, Norwich.

SECRETARIAL CHANGES

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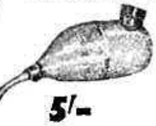

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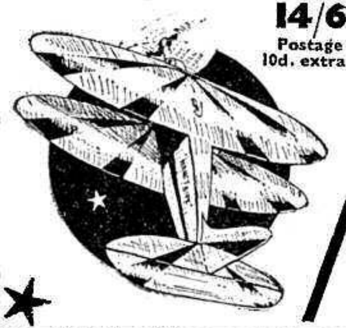

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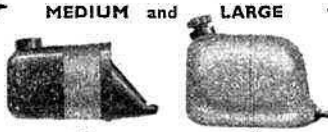

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Two outstanding American free flight designs are also featured, the cabin SPORTWAGON by Calhoun Smith and the JERSEY JAVELIN by Walt Schroder. Parts such as ribs and formers are drawn FULL SIZE in most of the plans. This annual also contains many features and articles, including cutaways of the FROG 180 and the Wakefield winning JAGUAR; "MIND THE LINES," by Ron Moulton; "MODEL TALK," by Bill Dean; ENGINE TEST REPORT by Henry J. Nicholls; "SPOTLIGHT ON BALSA"; "RUBBER MODEL SECTIONS"; cartoons by LAMBERT, and dozens of model photographs.

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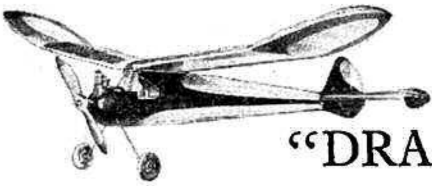

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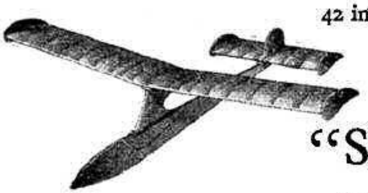

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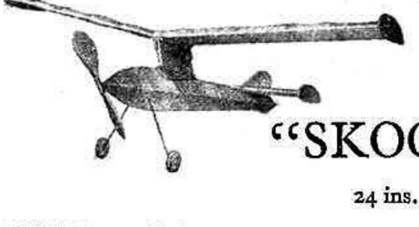

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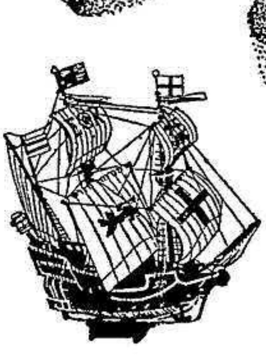

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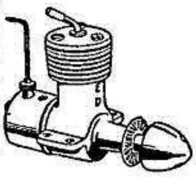

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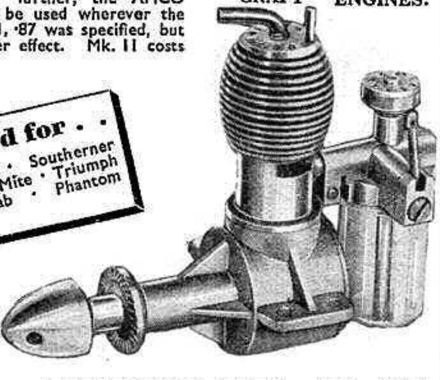

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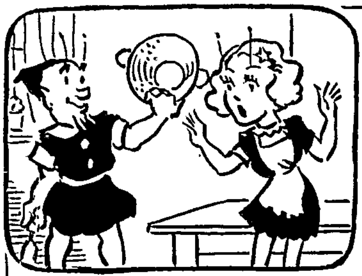

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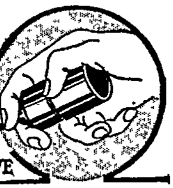

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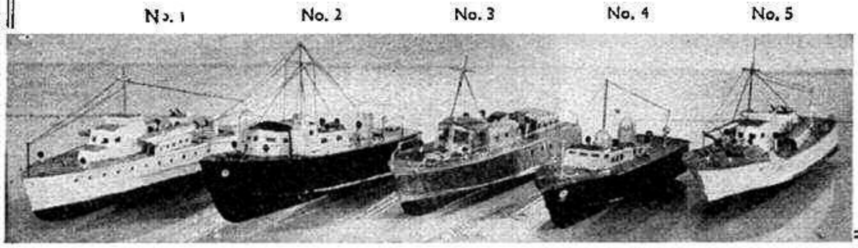
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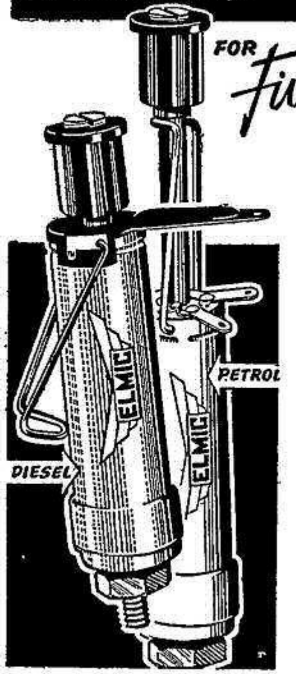
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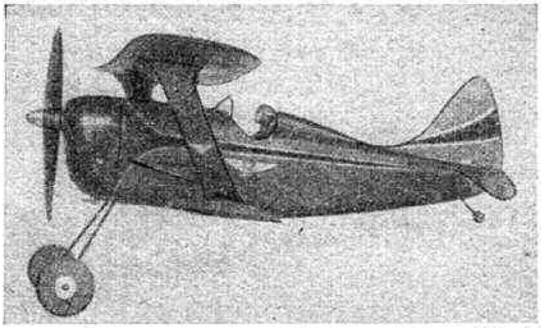

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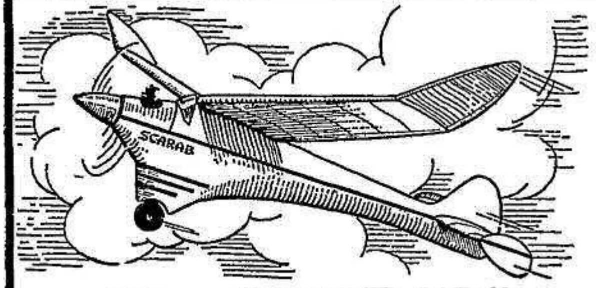

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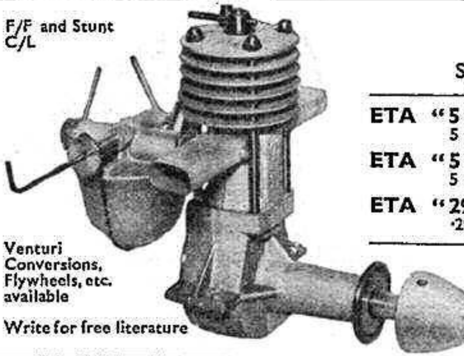
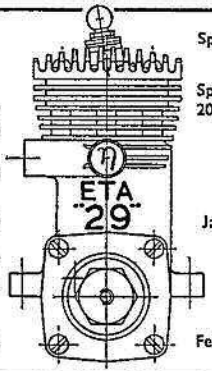

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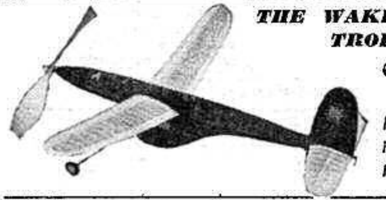


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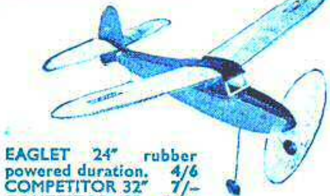

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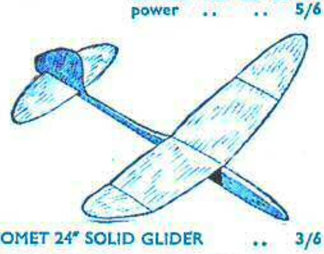

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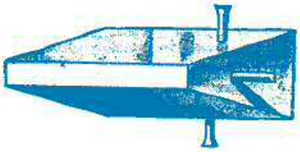

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