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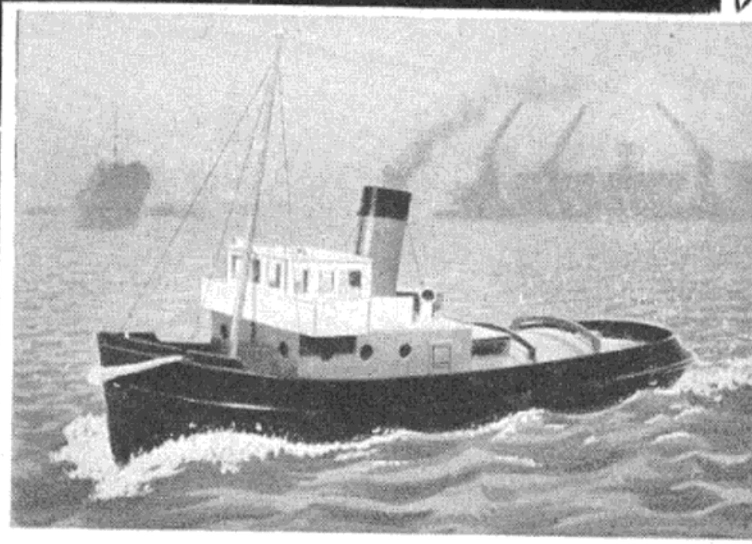

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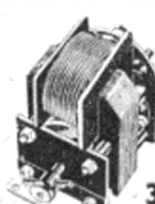

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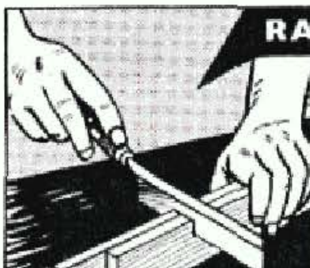

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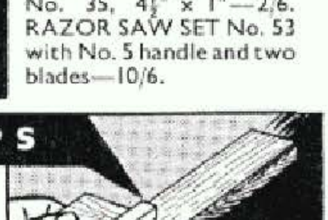

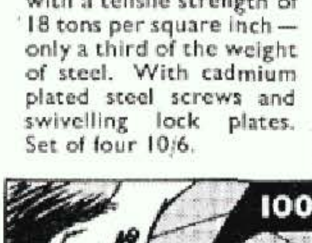

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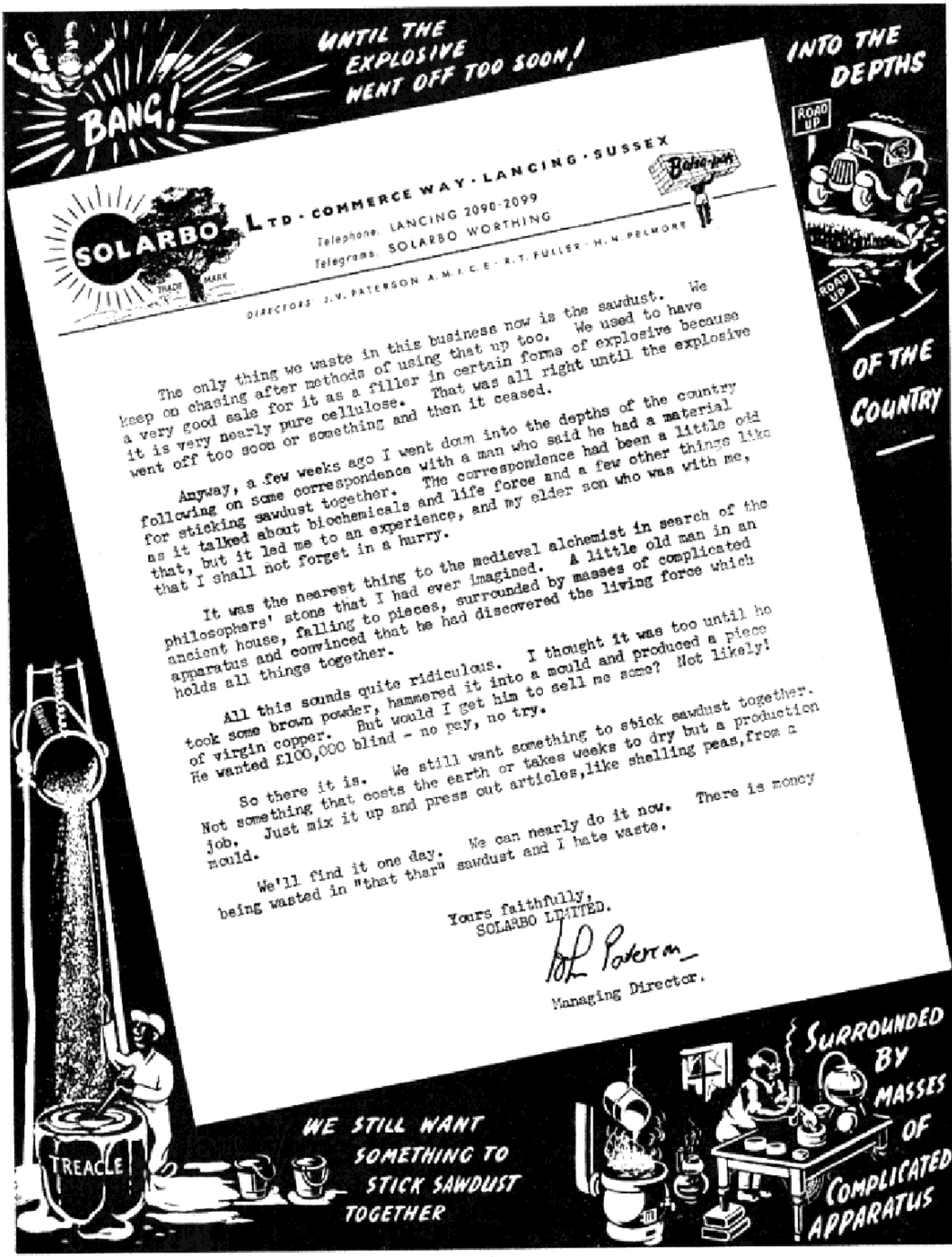

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The only thing we waste in this business now is the sawdust. We keep on chasing after methods of using that up too. We used to have a very good sale for it as a filler in certain forms of explosive because it is very nearly pure cellulose. That was all right until the explosive went off too soon or something and then it ceased.

Anyway, a few weeks ago I went down into the depths of the country following on some correspondence with a man who said he had a material for sticking sawdust together. The correspondence had been a little odd as it talked about biochemicals and life force and a few other things like that, but it led me to an experience, and my elder son who was with me, that I shall not forget in a hurry.

It was the nearest thing to the medieval alchemist in search of the philosophers' stone that I had ever imagined. A little old man in an ancient house, falling to pieces, surrounded by masses of complicated apparatus and convinced that he had discovered the living force which holds all things together.

All this sounds quite ridiculous. I thought it was too until he took some brown powder, hammered it into a mould and produced a piece of virgin copper. But would I get him to sell me some? Not likely! He wanted £100,000 blind - no pay, no try.

So there it is. We still want something to stick sawdust together. Not something that costs the earth or takes weeks to dry but a production job. Just mix it up and press out articles, like shelling peas, from a mould.

We'll find it one day. We can nearly do it now. There is money being wasted in "that thar" sawdust and I hate waste.

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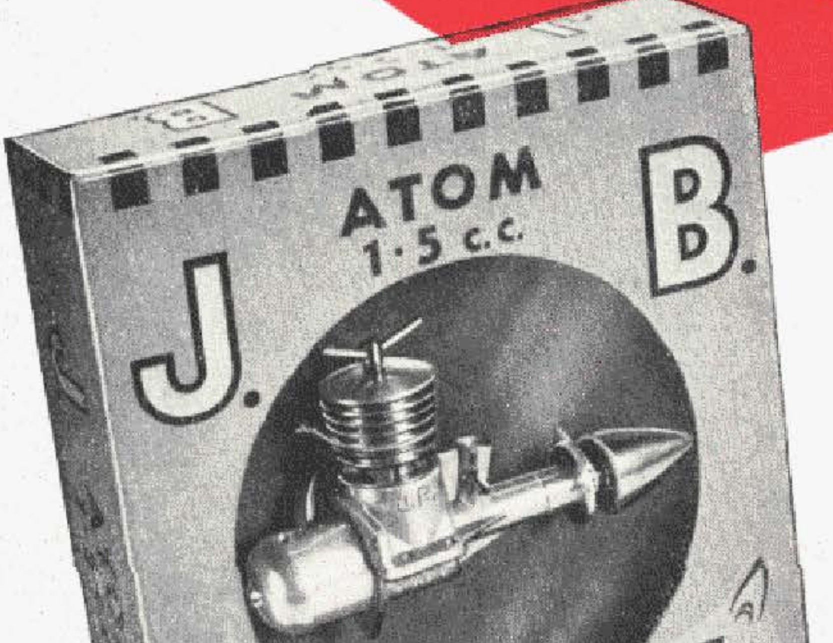

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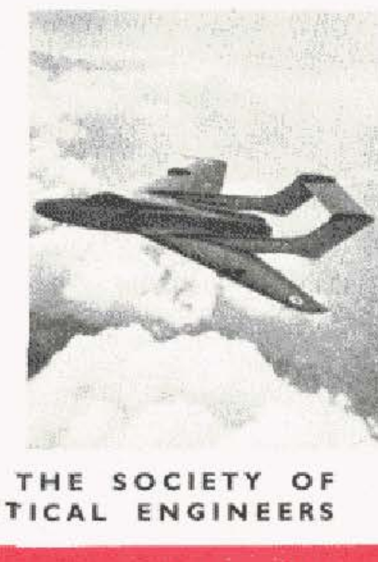
FEBRUARY 1956 No. 176. VOL. 15

Contents

Cover Story

A sea of cloud forms a majestic background for the sleek lines of this D.H.110 two-seat all-weather fighter. Originally designed to an Air Ministry specification, it is now under development for the Royal Navy for carrier-borne operations. Two Rolls-Royce Avon R.A.14 turbo-jets provide the power.

Our semi-scale C/L model follows the outline of its full-size counterpart fairly closely, and when airborne *and minus its* undercarriage, the prop is almost invisible, thus aiding simulation of jet flight.



THE JOURNAL OF THE SOCIETY OF MODEL AERONAUTICAL ENGINEERS

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Letters TO THE EDITOR

In-conveniences

DEAR SIR,—*This is an open letter to the St. Albans M.A.C. officials.*

On reading reports on the All-Britain Rally at Radlett last year, I am surprised that no comment was made with regard to the poor and inadequate toilet facilities provided. With a crowd variously estimated between 22-25,000, and of this number an ever increasing percentage of women and children, surely more provision could be made for the comfort of all? One appreciates the need for economy, and while not expecting white tiles and porcelain, one does hope for a certain amount of privacy.

We are all, I think, prepared to rough it a bit on these occasions, but the canvas structures provided last year were not only revealing to an embarrassing degree (unless you happened to be under 3 ft. tall), but the "Ladies" and "Gents" were placed indecently close together. Many members of both sexes professed disgust at the "sanitary" arrangements, and had it not been for one solitary toilet situated outside the flying field, even more people would have resorted to the dubious seclusion of the bushes—a tricky procedure in such a vast crowd.

In future could not a small marquee be erected for the benefit of the ladies at least? But if this is out of the question, please make the canvas walls high enough to hide our blushes—and those of the men, too. These shoulder high contraptions may be all right on the Continent, indeed I believe they are the rule rather than the exception, but we are rather more reserved over here.

Yours faithfully,

Sevenoaks. PAMELA BUCKLAND (Mrs.)

Shapes from the past

DEAR SIR,—I see in your December issue a letter in which are mentioned some of the rarer types of 1914-18 aircraft, such as the Junkers CL I, and Albatros D.X (not D "10" please, the Roman numerals were used to designate types under test or adopted by the authorities, the Arabic numerals only by the makers).

But I believe that the majority of modellers have hardly "scratched the surface, especially in so far as aircraft of the Central Powers are concerned. How many of your readers, I wonder,

(*Continued on page 69*)

Competition Entries Increase

IN his report at the S.M.A.E. Annual General Meeting the Competition Secretary, Major S. D. Taylor, stated that the total number of entries in S.M.A.E. contests last year was 3,700, which represents an increase of 20 per cent. over 1954. The sharp decline in entries which occurred in 1954 has therefore been checked. Favourable weather during last summer is partly responsible for this satisfactory state of affairs, but the decision to make pre-entry necessary for all de-centralised events also had some affect.

It is pleasing to note that, despite increasing difficulties in finding suitable flying grounds interest in competition flying is increasing.

Major Taylor again drew attention to the lack of co-operation which he had received from many area and club competition secretaries particularly with regard to the late submission of results which had resulted in disqualification in some cases. As an example, he mentioned that, in order that diplomas could be sent to them, first, second and third place contest winners had to be asked through the S.M.A.E. News Sheet to send their addresses to the Society. So far, only 16 out of 150 had replied !

APOLOGY

IN our item " Progress in Propultion " published last month we were misinformed when we attributed the *Rapier* to John Coatsworth. Our correspondent has since written to say that P. E. Norman is the builder, to whom we offer our apologies. As a matter of fact, P. E. is working in close co-operation with John Coatsworth and Maurice M. Gates on these fan jobs, and there should be some interesting results forthcoming.

Incidentally the *Rapier* is now quite fast as the result of a few small modifications, and we understand that it is one of the easiest fan models to fly well. Its swept wings span 36 in. and the power unit is an Elfin 2.49 c.c., which drives a 12-blade impeller. The all-up weight comes out at around 26-27 oz.

Gliders still 'Top the Poll'

AS in previous years gliders are still the most popular contest models and attract the largest number of entries. In view of this it is perhaps surprising that we have not, as yet, succeeded in winning the World Glider Championships. Perhaps the prospect of a trip to Italy for next year's event may inspire our A2 experts to greater efforts.

Second in order of popularity comes F/F power models, but rubber contest entries also increased last year. Team racing is still maintaining its interest, but other forms of C/L flying and R/C have shown a drop in contest entries. PAA-Load does not seem to have caught on here yet, despite the excellent prizes usually offered for these events—entries were approximately the same as in the past.

The Bowden Trophy Precision Contest, which has struggled along with poor entries since the War, attracted 57 entries in 1955. Maybe this is a sign of the times, and the necessity of using small flying grounds which are unsuitable for duration flying may result in a continued re-awakening of the interest in precision flying.

This Year's WORLD CHAMPS.

THE venues for the 1956 World Championships were decided at the December meeting of the F.A.I. The dates and places are :

Gt. Britain: Power, August 3rd to 6th, at Cranfield.

Sweden: Wakefield, August 17th to 19th, at Hoganas.

Italy: C/L Speed, September 15th and 16th, at Genoa; and also the A2 Glider Championships on October 6th and 7th, in either Florence or Rome.

Rule Changes for 1957

At the same F.A.I. meeting some surprising rule changes for 1957 were passed, resulting it seems from the weather and specialised conditions which appertained to last year's World Championships at Finthen. Under an accepted Belgium proposal, the weight of rubber in the Wakefield formula was reduced to 50 grams (1.75 oz.). The power formula was also modified and for 1957 stands at 400 grams for each c.c. engine displacement.

The view of the S.M.A.E. Council is that there was insufficient notice given of the alterations to enable them to be referred to the area committees for discussion. The Society have requested the F.A.I. to reconsider the decisions at their next meeting, but meanwhile members should assume that no further alterations may be made.

A further change, proposed by Gt. Britain, is the abolition of the r.o.g. rule; consequently in the 1957 World Championships all Wakefield and power models will be hand launched.

Other rule changes concerned team racing and radio control, and in each case the previously proposed rules were adopted with only small amendments.

* * *

The S.M.A.E. P.R.O. is listing film libraries and companies who are prepared to lend 16 mm. sound films to model aircraft clubs, free of charge or otherwise. Clubs which would like a copy of the list should write to the P.R.O.

S.M.A.E. DINNER

ANNUAL bright spot in the modellers' winter season is always the S.M.A.E. dinner and dance, and last year's event on December 10th was no exception.

The dinner was preceded by an informal gathering in the bar, after which the company—suitably fortified—sat down to a dinner that can only be described by that much overworked adjective — excellent. Principal speakers included Lord Brabazon of Tara, M.C., president of the S.M.A.E.; Mr. Henry J. Nicholls; and Mr. L. C. Nash of the Ministry of Transport & Civil Aviation.

Lord Brabazon, with such a wealth of personal experience to draw upon, did not disappoint his audience. He made many references to his own efforts with models in the early days of aviation, and mentioned that on one occasion he and "Charlie" Rolls (Hon. C. S. Rolls) flew a model glider in the Albert Hall!

Lord Brabazon thought there were tremendous possibilities for making new discoveries with the aid of models, and believed that much research could be done with regard to low speed flying.

Mr. Henry J. Nicholls, in a forceful speech, covered most points of topical interest to modellers. He mentioned the lack of flying grounds, and compared the amount of support received from the Government in this country to that abroad. He also paid a timely tribute to Group Capt. B. A. Chacksfield, O.B.E., commanding officer of R.A.F. Waterbeach, who was present, for his efforts on behalf of modellers.

Following the speeches came the prize giving, the winners receiving their cups and trophies from Lord Brabazon.

Then the assembly adjourned to the bar to await the preparation of the ballroom. Dancing continued until midnight, Henry J. acting in the capacity of M.C. as only he can.

Cup Controversy

WE have received the following letter from the secretary of the Whitefield M.A.C., which we publish here in full, in order to clear up any misunderstanding which may exist:—

DEAR SIR,—There has been considerable controversy about the awarding of the Plugge Cup for 1955—Croydon being given the trophy at the S.M.A.E. dinner in December.

We would be grateful, when your magazine publishes the Plugge results, if an explanation of the final placings could be included.

Croydon's win was by a margin of a few points lead over Whitefield, with total scores well over 1,000 points apiece. We were deprived of being "National Champion Club" simply and solely due to an error in the addition of one of our members' flight times by the N.W. Area Comp. Secretary, combined with the refusal by the S.M.A.E. to correct the results.

There was no question of the attempted correction being a last minute affair (since the N.W.A. Comp. Secretary wrote about it shortly after the event; this was subsequently followed by letters from the club), or doubt as to there actually being an error. The S.M.A.E. apparently decided that the club should be penalised for a mistake by an "outside" official; and confirmed its decision at the council meeting of December 11th, 1955, when the N.W.A. delegate brought the matter up on our behalf.

Our dissatisfaction can be better imagined than described—especially as the S.M.A.E. has recently corrected other results back as far as April.

It is hoped that some indication that Whitefield's 2nd, instead of 1st place in the Plugge is not our fault, could appear in print.

Yours faithfully,
J. O'DONNELL,
Hon. Secretary.

Missing Models

FLY a model from a club flying field and the chances of recovery are surprisingly good—provided it is clearly labelled with your name and address. Lose a model at any of the big rallies, and you will be lucky to see it again. Why the difference?

Inquiring into this apparent mystery it would seem that the odd stray model invariably finds its way into responsible hands. But any rally held on an airfield almost inevitably attracts groups of local children outside the boundaries, waiting to capture the wayward models. Often a model will disappear almost under the very nose of a pursuing flier, who may eventually locate it—minus the engine.

Losses in this way at rallies have become a serious deterrent to contest fliers. Entries in the contests for which the rallies are organised show a marked reduction, and so perhaps it would not be untimely to suggest that rally organisers give some serious thought to the problem before the start of the forthcoming season.

Leave No Litter

COMPLAINTS have been received by the S.M.A.E. that litter, particularly bottles, is being left on Epsom and Walton Downs, and the conservators state that action will be taken against offenders. Of course, not only modellers use the downs, but it is as well to remember that empty fuel bottles are pretty conclusive evidence and such thoughtlessness can only bring disrepute on the movement, and even more serious, possibly the loss of yet another flying ground.

A CONTROL LINE CONNIE

THIS scale model of a Super Constellation L-1049G is impressive not only by reason of its size, but also because of its superlative finish in the colours of Lufthansa German Airlines. Builder is Helmut Loese, of Kiel. and with it he gained a first prize in a Hamburg model contest and high honours in the German National Championships.

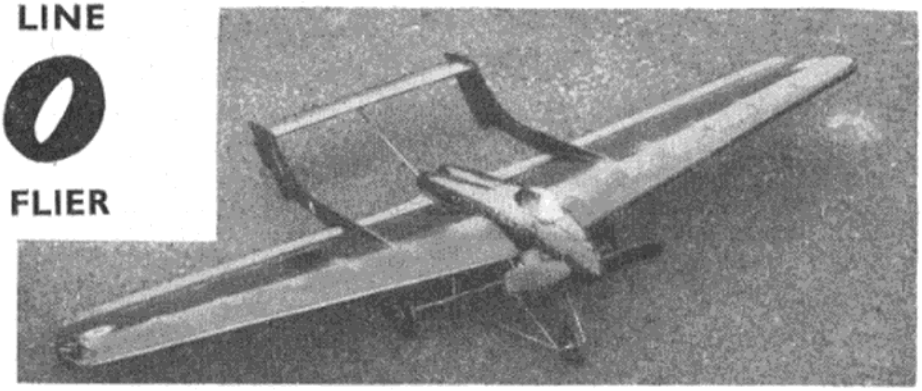
Span is 4 ft. 6 in., the undercarriage is retractable, and power comes from four diesels.

A SCALE CONTROL LINE

D.H.110

WHICH IS A STABLE FLIER AND A FINE STUNTER

by T. W. J. Stoker



STUNT models have been my main interest for about four years. Most of them were just profile jobs, but I tried to develop a model that had a high speed, would stunt readily, and yet be rock-steady inverted. I succeeded in my aim, and had quite a few northern contest successes.

Once I knew what the essentials were for a good stunter, I designed the model of the D.H.110. It makes no pretence at true scale, but in the air deviations from true scale are not readily apparent. It flies at more than 60 m.p.h. with a good P.B. Amco, on an 8 × 8 prop. It is smooth to stunt, and punches straight through wind gusts when inverted.

Wing

This should be built first, as everything ties around this member. The wing ribs are cut on a line level with the bottom of the trailing and leading edge, so that the wing can be built flat on the board. The top spars are glued in position, and the whole wing left to set. After removal from the board, the lower half of the ribs are cemented in place. The tank must be fitted next, before the bottom spars are added.

Now the two fuselage bulkheads are cemented in. A wedge-shaped piece of balsa across the join of the two $\frac{1}{4} \times \frac{1}{8}$ in. spars will provide a good setting for the rear bulkhead. After this construct the two booms and cement them securely to the wing ribs and spars, making sure they are lined up properly. Next, shape and cement the fins in place.

The elevators are hinged to the tailplane with nylon. Care must be taken to ensure that the tailplane is lined up properly with the wing, when it is cemented in place on the fins. I suggest using a simple cardboard jig.

Don't spare cement when sticking the tail, fins and booms, and then it will take a hard crash to dislodge them.

The wing flaps can next be hinged in position on the trailing edge, after which the complete control system can be put in. Spare no pains in making sure that the control system works smoothly, for on it largely depends how long will be the life of your model! The lead-out wires are heavy Laystrate, and the bell crank and tail control-horn are 16 gauge dural. The wing flaps are connected by wire, on which is soldered a wire control-horn. After this, the centre section of the wing can be sheeted with $\frac{1}{16}$ in. sheet. The joints of the booms to the ribs can be further strengthened by $\frac{1}{4} \times \frac{1}{16}$ in. sheet.

Fuselage

Begin by cutting out the two sides, which are divided on the centre line so that they can be cemented securely to the wing sheeting and bulkheads after the booms are in place. The $\frac{1}{2} \times \frac{1}{2}$ in. engine bearers can next be cemented in. These will have to be cut away in between bulkheads to follow the curve of the wing sheeting.

Forward of the rear bulkhead is covered with three pieces of $\frac{1}{8}$ in. sheet balsa. Aft, the fuselage is divided into two dummy "jets," so that the two fuselage sides, which stretch only to the rear bulkhead, will have to be fitted. They form a V, and are stuck together on the bulkhead.

Each "jet" has a top formed by three pieces of $\frac{1}{8}$ in. sheet. The bottom of the fuselage is flat $\frac{1}{8}$ in. sheet, except near the "jet" orifices, where it is tapered so that the wedge-shaped pieces of balsa can be inserted in such a way that when sanded, the orifices are rounded. The whole fuselage is rounded as much as possible without sacrificing strength. The long extent of fuselage without formers has given no trouble. Fairings are added between "jets," and also between booms and "jets."

The engine was cowled with block balsa on the original, and a $1\frac{3}{4}$ in. spinner fitted to resemble the nose-shape of the D.H.110. A commercial canopy *offset* on the fuselage can next be fitted. Brass tubes can be fitted in the positions shown, for a tricycle undercarriage. It is well worth the extra trouble for exhibition flying.

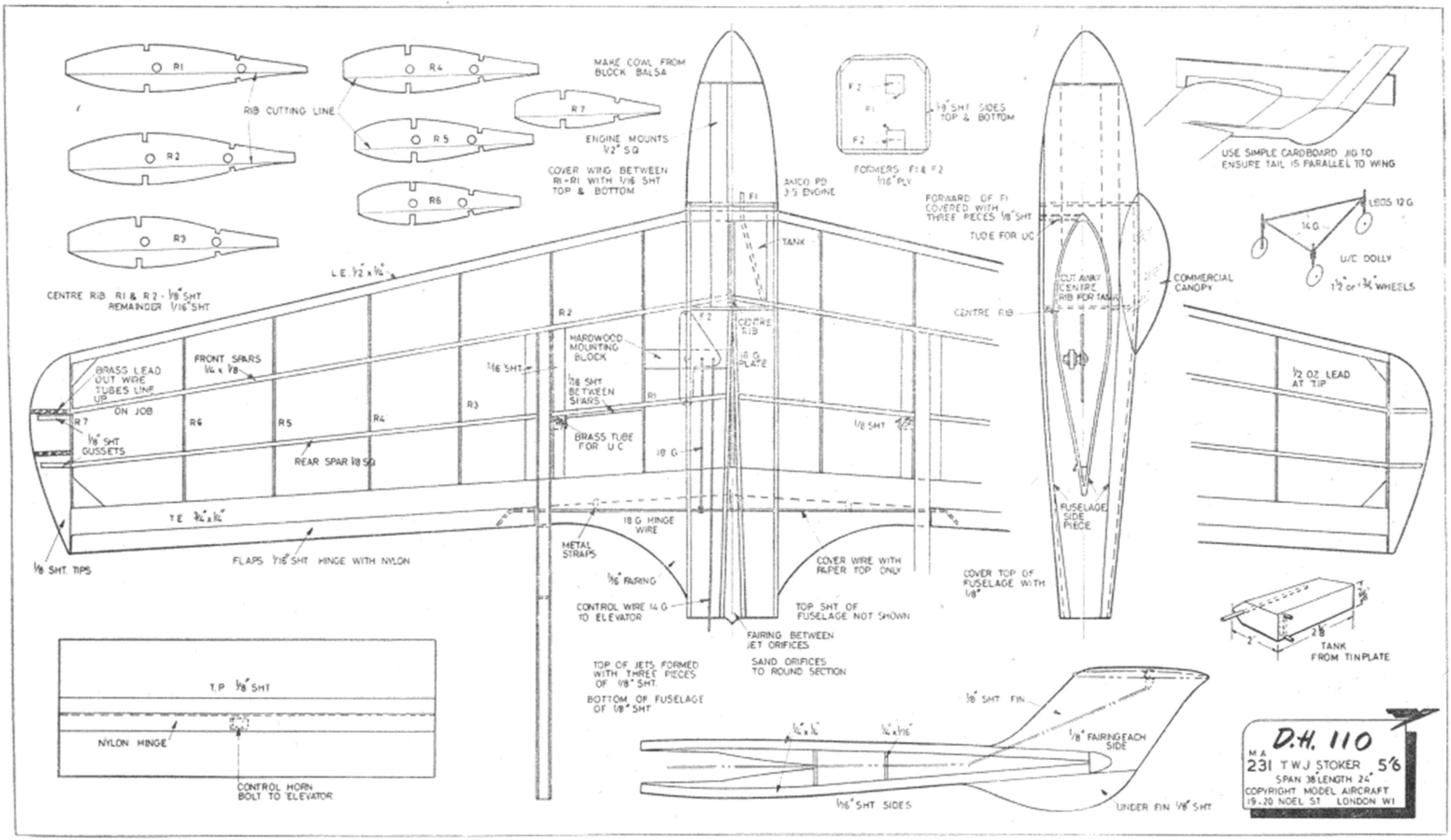
The wing was covered with heavy-weight black Modelspan, the tail, fins and fuselage in lightweight. One coat of dope, and one of banana oil was given. A midnight blue effect was achieved by painting the entire model with blue Aerolac, which I find is fuel-proof also. One coat was given to the wings, two on the tail, and four on the fuselage.

Flying

Use 50 ft. light Laystrate, with swivels on the handle end. The model has a reassuring pull on the lines. This can be adjusted to individual liking by means of the hinged rudder on the outer fin.

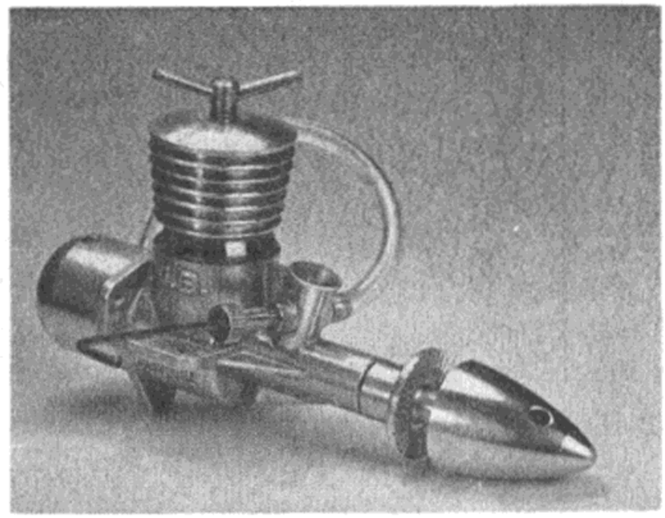
On take-off, keep the model on the ground long enough to gather speed, otherwise she may drop back on the undercarriage, which certainly would not do the tissue covering any good.

The author with his model D.H.110 which won the stunt contest at the Novocastria Rally.



FULL SIZE WORKING DRAWINGS ARE OBTAINABLE FROM YOUR LOCAL DEALER, OR BY POST FROM THE "MODEL AIRCRAFT" PLANS DEPARTMENT 19-20, NOEL STREET, LONDON, W.1, 5s. 6d., POST FREE

Engine Tests



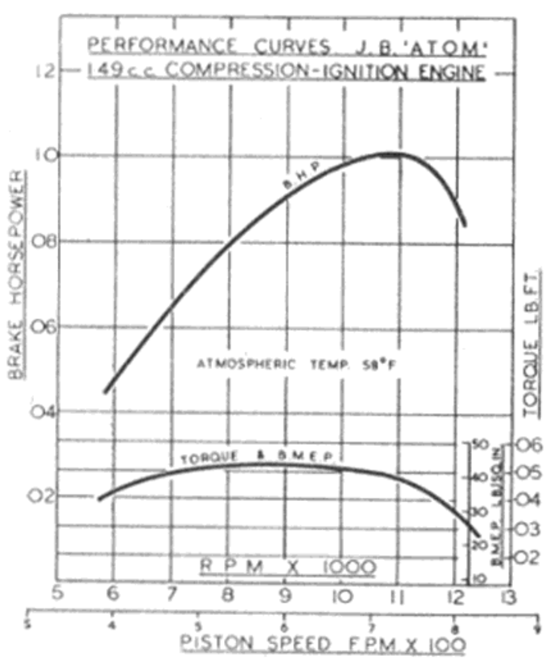
No. 82. The J. B. Atom 1.5 c.c.

THE J.B. Atom is a new engine manufactured by a new company under the direction of J. E. Ballard, formerly of the E.D. concern. It is a shaft valve diesel of generally conventional design but with one or two unusual features.

The engine is assembled around a one-piece crankcase and main bearing casting with integral carburettor intake and beam and radial mounting lugs. These latter resemble the beam and radial mounts seen on certain of the American Herkimer Cub engines and provide a well spaced out three point attachment where bulkhead mounting is preferred, in addition to the usual beam lugs aligned on the centre-line of the engine.

The engine is notable for its long crankshaft which, combined with a swept back needle-valve, helps to keep the fingers well back from the prop disc when making running adjustments. This also gives an impression of low cylinder height, which, however, is by no means an optical illusion since the Atom has the lowest stroke/bore ratio of any engine at present on the market and the lowest, we believe, of any diesel ever marketed.

Out-of-the-rut detail design is also apparent in the cylinder and piston assemblies. The exhaust ports are unusually deep (almost ⅛ in.) for such a small engine and give an exhaust period of over 150 deg. Almost as long a period is given to the transfer, since the tops of the transfer ports are almost level with the tops of the exhaust ports. As, however, the transfer ports are steeply inclined, entering the cylinder at an angle of only 40 deg. to the cylinder axis and are of circular section, they open very gradually and the effect should not, therefore, be of an excessive overlap of exhaust and transfer timing.



The piston employs a separate alloy yoke to carry the gudgeon pin, the yoke being retained by a circlip inside the piston skirt. This system, which encloses the gudgeon pin within the piston walls, is particularly desirable with this type of cylinder design, since it avoids any risk of the pin fouling the large exhaust ports and of the compression loss at these points which can prove an embarrassment in the design of an ultra-short stroke engine.

Unlike most current miniature engines, in which drop-forged duralumin connecting-rods are now widely used, the Atom uses a machined steel rod. The crankshaft has a web of a simple counter-balanced pattern, rather than the full disc type now commonly favoured by diesel manufacturers.

Although supplied by the factory, it is probable that our test unit was not a particularly good example, In support of this, it seems fairly certain that this particular engine had not been specially picked because the needle-valve assembly, as supplied, was out of register, with the result that the valve could not be closed enough to provide a sufficiently weak mixture for high performance. Tests were delayed while a replacement needle-valve was obtained.

Specification

Type: Single-cylinder, air-cooled, reverse-flow scavenged two-stroke cycle, compression ignition. Shaft type rotary-valve induction with slight sub-piston supplementary air induction.

Swept Volume: 1.496 c.c. (0.0913 cu. in.).

Bore: 0.539 in. Stroke: 0.400 in.

Stroke/Bore Ratio: 0.742 : 1.

Weight: 3.25 oz. including tank.

General Structual Data

Diecast and polished aluminium alloy crankcase with integral main bearing and beam and radial mounting lugs. Screw-in aluminium rear crankcase cover. Fully machined steel cylinder liner screwing into crankcase and having four transfer and four exhaust ports. Machined finned aluminium cylinder barrel screwing over upper part of liner. Fully machined alloy steel crankshaft running in plain main bearing.

Alloy prop driver fitted on mating crankshaft taper. Hollow machined aluminium spinner nut. Lapped conical-crown piston with inserted aluminium alloy yoke carrying a gudgeon-pin and secured by circlip. Machined steel connecting rod with circular section shank. Detachable cast and machined aluminium fuel tank fitted with single screw. Brass spraybar type needle-valve assembly.

Test Engine Data

Running time prior to test: 1 hour.
Fuel used: Mercury No. 8.

Performance

The test unit was quite free-running and no noticeable increase in performance occurred in the course of the nominal running-in period of one hour given.

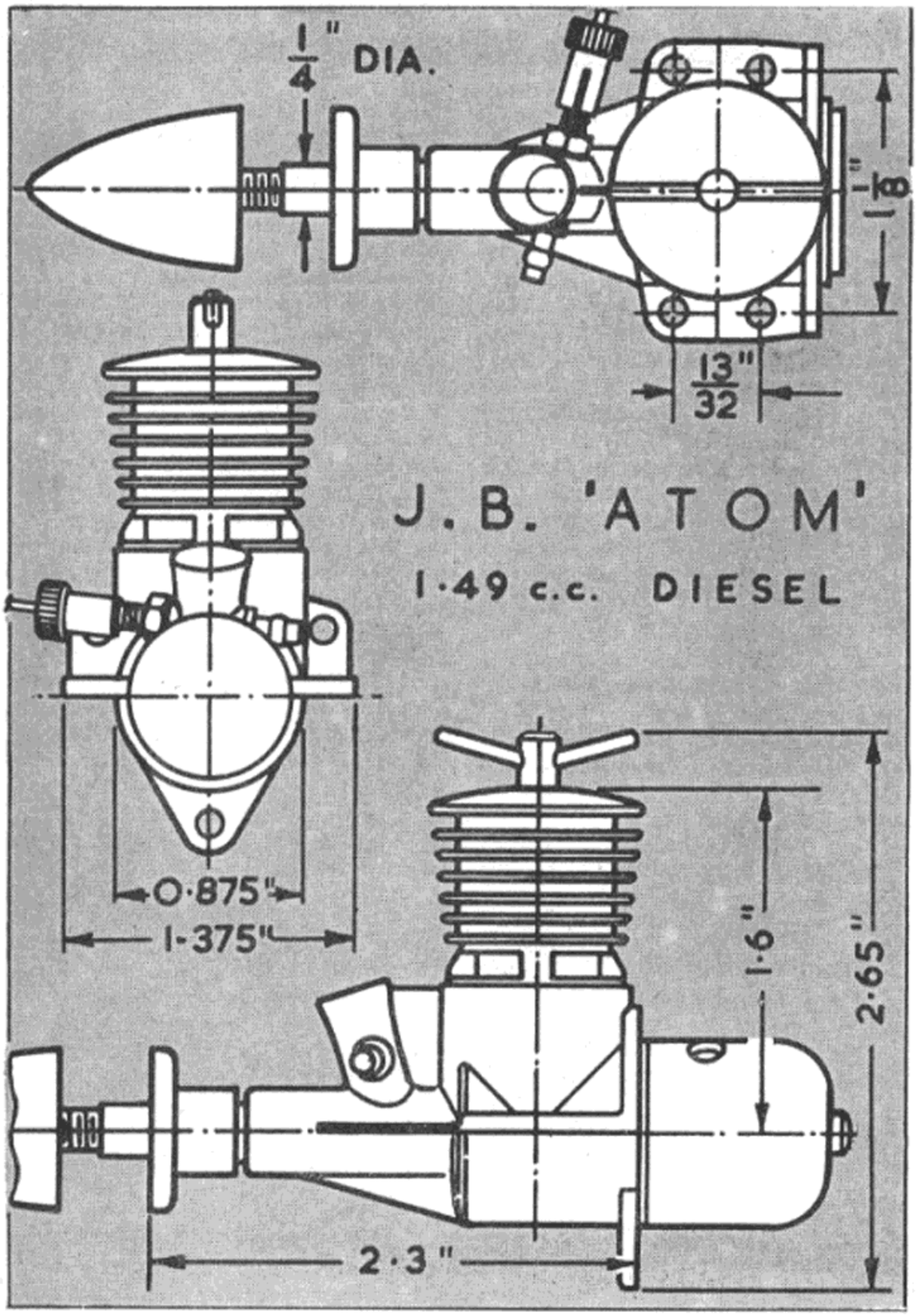
Received slightly in advance of release date, no instruction leaflet was included with our test example and the makers' recommendations regarding starting procedure are not therefore known. We found that priming the cylinder through the exhaust port was required for an initial start from cold and it was also found helpful to inject a small amount of fuel direct into the air intake.

On the test engine there was a slight crankcase compression leak below the exhaust flange. It is not advisable to overtighten the cylinder with this type of design since distortion of the crankcase threads, and even stretching of the crankcase itself, may occur. The insertion of a thin soft copper gasket between the cylinder flange and crankcase would, perhaps, be a worth-while modification here.

The most suitable prop size for F/F work would appear to be an 8 × 4 and about 9,000 r.p.m. can be expected. The test unit was happiest when so loaded and was also easier to start.

The Atom was reasonably free from vibration over the r.p.m. range tested and the controls, though fairly sensitive, were easy to adjust. The contra-piston was a good fit and had no tendency to seize, returning readily to lower settings when the compression screw was slackened off. The needle-valve, using the popular split threaded thimble, held settings firmly.

With its low cylinder height and long shaft, the Atom should prove well suited to scale type installations. The parabolic spinner, aided by the polished natural aluminium finish, lends an attractive appearance to the engine. A by-product of the engine's very short stroke is the extremely low piston speed—about 700/750 f.p.m. at peak output revs.—which in the presence of suitable materials should give a long piston and cylinder life.



Engine Materials—6

Sand Blasting. Sand blasting is commonly employed as a method of cleaning new castings and may also be used to produce a pleasant matt grey finish on crankcase castings, etc.

Silicon-Aluminium. Silicon content aluminium alloys are sometimes specified in connection with crankcase castings, etc. As in the case of other structural aluminium alloys, the silicon is employed as a strengthener for the soft base metal.

Silver Steel. This term is something of a misnomer since no silver is present in this high carbon content steel. Silver steel is sometimes used for gudgeon pins, being obtained in ground and polished rods.

Sintered Metals. Sintered metals, both iron and bronze, are sometimes used for the production of porous bushes for main bearings. Sintering consists of the binding together of powdered metals by the application of pressure and heat. The surfaces of the metal particles become fused together but a porosity of, perhaps, 30 per cent. of the volume of the component is retained. The bearing is then impregnated, under heat, with lubricating oil. Oilite bronze is a material of this type.

Spinning. Aluminium fuel tanks and propeller spinners may sometimes be produced by spinning. In this, a former, corresponding to the desired shape, is rotated rapidly in a lathe together with a circular blank of aluminium. The blank is lubricated with tallow and, by means of suitable shaping tools, is turned down over the blank, working gradually outwards from the centre.

Y-Alloy. A superior high-strength aluminium alloy, containing copper, nickel and magnesium, sometimes used for crankcase castings and also, occasionally, for connecting-rod forgings.

JET PROPULSION—and the MODEL

PART TWO

PULSE JETS

Last month the various types of jet engines were classified and in this article one of the most powerful kinds of model propulsion units is discussed. It should be remembered, however, that in this country pulse-jet models must be flown on control-lines. Fliers are advised to hold third-party insurance and not to fly in crowded areas.

Henry Nicholls explains to John Cunningham, De Havilland's chief test pilot, the workings of Johnny Nunn's Dyna-jet powered scale Vampire.

THE impulse duct or pulse jet engine was first developed as a practical motor for powering the German V-1 flying bomb, model size versions appearing soon after the war in America in the Dynajet and Minijet (by two separate companies), to be followed by several others throughout the world, including the Juggernaut and Decojet in this country. Only the Dynajet has survived as a commercial proposition with a guaranteed, reliable performance, although a number of individually made units of similar pattern appear from time to time. It is probably true to say, however, that all the successful pulse jet engines used in models follow closely both the layout and proportions of the "Dynajet," which appears to be an optimum "small" size.

There have been numerous attempts to produce a smaller unit, which would pretty obviously have a wide demand, but no such working design has appeared suitable for production. Whether this is due to lack of experiment in this field, or an inherent size limitation with this type of jet engine is a matter of conjecture. Certainly it would seem more logical to attempt to produce a really miniature size pulse jet engine than attempt to improve on the performance of the existing standard, which is virtually limited in application to C/L speed models. It is also used on a limited scale as the power plant for scale C/L models of jet prototypes, simply because there is no other alternative engine powerful enough to do the same job, which again is a pointer as to how relatively undeveloped is the field of model jet engines.

The pulse jet works on a combustion or explosion cycle but has only one moving part—a spring shutter or valve. In model sizes the valve or shutter is invariably in petal form, and each petal covers a port opening into the combustion chamber. Forward of the valve assembly there is a contoured head and aft the combustion chamber curves away to a tailpipe of generous length, usually parallel. Fig. 1 shows a typical head and valve assembly form.

In the model pulse jet the fuel (petrol) is introduced forward of the valve head and is sucked out in the form of a spray by a reduction in the head. This means that there must be an airflow into the head to "lift" and atomise the fuel with sufficient dynamic pressure to force open the valve petals and convey the mixture into the combustion chamber. Also the inner shape of the head must be contoured to produce the necessary "suction" at the right point, i.e. at the fuel jet—implying that the cross section must be reduced to speed up the airflow and thus reduce the effective pressure, in the manner of a venturi. The fuel jet would then come at the narrowest part of the throat. All the "contouring" may be done on the inside of the head, or the jet mounted in a

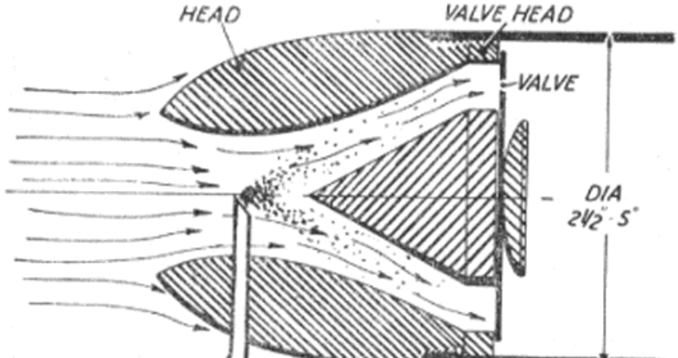


FIG 1

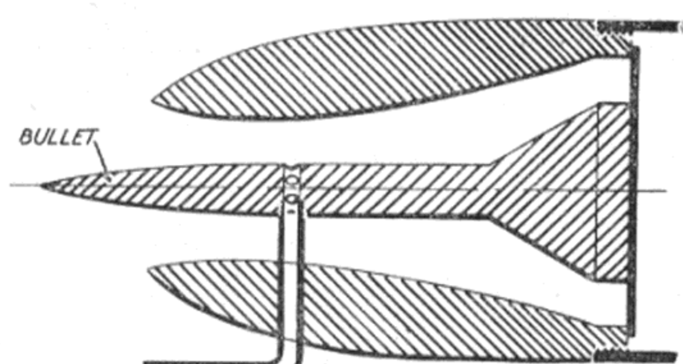
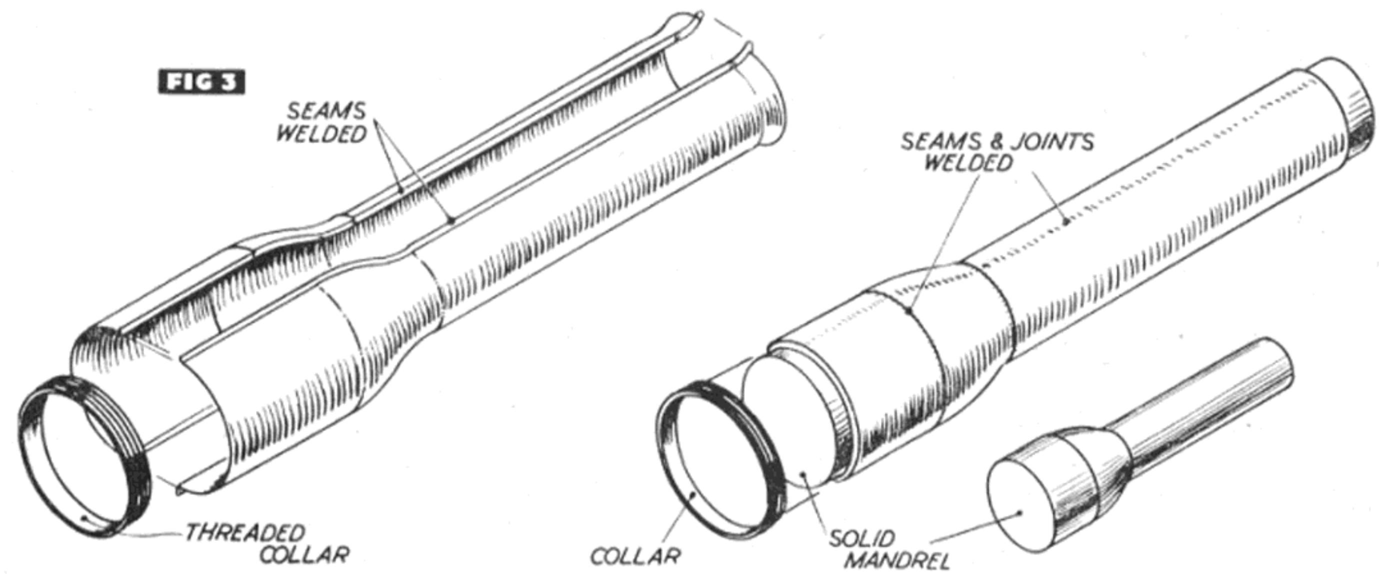


FIG 2



streamlined "bullet"—Fig. 2—or both.

Mathematical shapes can be worked out for the head contours but the process is too complicated to describe here. Satisfactory shapes can readily be produced by "cut and try" methods as the pressure reduction required is not critical. The amount of suction lift required is dependent on the distance of the tank below the jet, which is usually made as low as possible consistent with keeping the tank well clear of the combustion chamber. Having the tank too high introduces fuel feed trouble just as much as having it too low.

The head unit is not subjected to particularly high temperatures during operation and can therefore be made of light alloy, e.g. dural, and screwed into the rest of the unit. The valve head itself can also be made of dural, but anything aft of this must be in heat-resisting material, the most common materials employed being stainless steel or high alloy steel. The petal valve is even more exacting as regards material specification, this usually being the weakest point on all pulse jet engines (and the usual source of failure on both freelance and some earlier commercial units). A high grade pen steel will stand up to the temperature and operating frequency required, whilst spring vanadium steel is also mentioned as a suitable material.

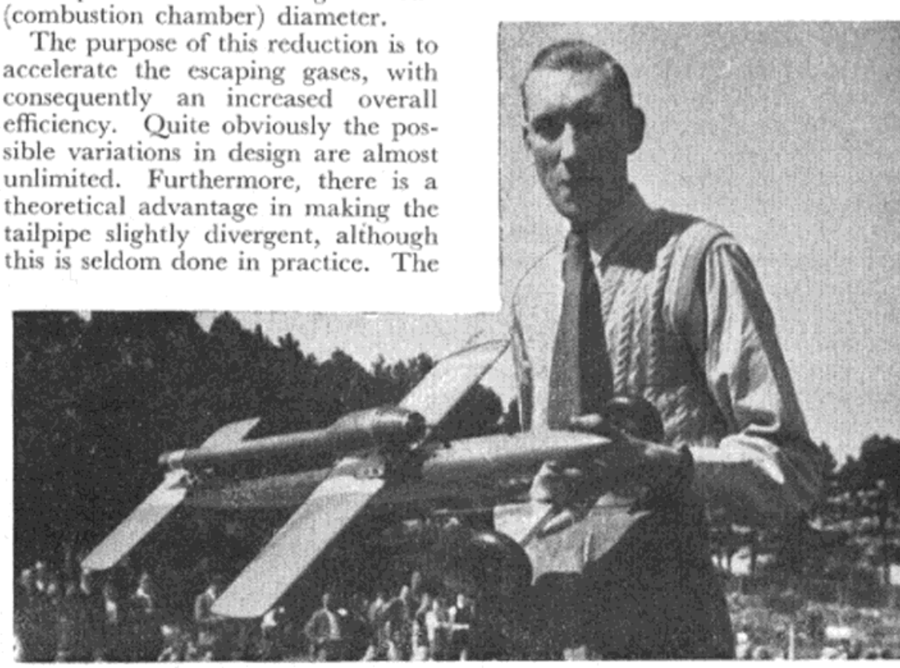
Construction of the combustion chamber and tailpipe assembly is an "engineering" job, in 22-20 S.W.G. steel for "Dynajet" sizes and 18-14 S.W.G. steel for units up to 30 in. overall length. Alternative methods of fabrication include forming two half shells and then joining, or building up in three separate sections, usually on a suitable form or mandrel—Fig. 3. In either case all joints are welded.

A number of variations in form have been tried. Length of combustion chamber does not appear to be all that critical, varying between one and two times the diameter, although the shorter length would appear more efficient in theory. Similarly the actual change in section produced at the tailpipe appears capable of wide variation, with working units. In general, however, a tailpipe diameter of one half of the combustion chamber diameter appears to be a good choice, the transition being accomplished within a length of one (combustion chamber) diameter.

The purpose of this reduction is to accelerate the escaping gases, with consequently an increased overall efficiency. Quite obviously the possible variations in design are almost unlimited. Furthermore, there is a theoretical advantage in making the tailpipe slightly divergent, although this is seldom done in practice. The same effect is obtained by opening out the extreme end of the tailpipe into a bellmouth—Fig. 4.

Of all the factors concerned in Fig. 4, probably the shape of the transition zone is the most important. Best performance is undoubtedly realised with a smooth bellmouth form. A straight conical taper, although much easier to fabricate, seems to result in poor gas flow, due to either high gas friction or the production of a certain amount of back pressure.

It is also commonly thought that tailpipe *length* is a critical factor as regards performance, or even the ability for the pulse jet to run at all. Actually, an otherwise well-proportioned pulse jet will run satisfactorily



A typical example of a Dynajet powered speed model.

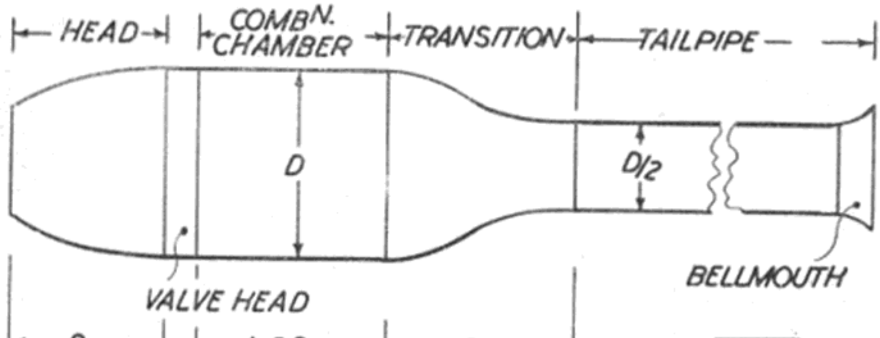


FIG 4

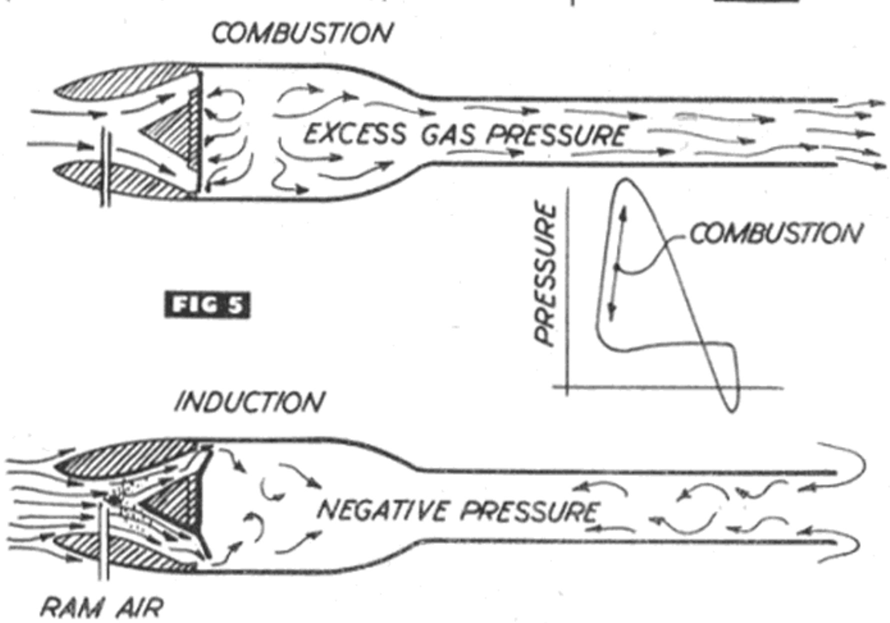


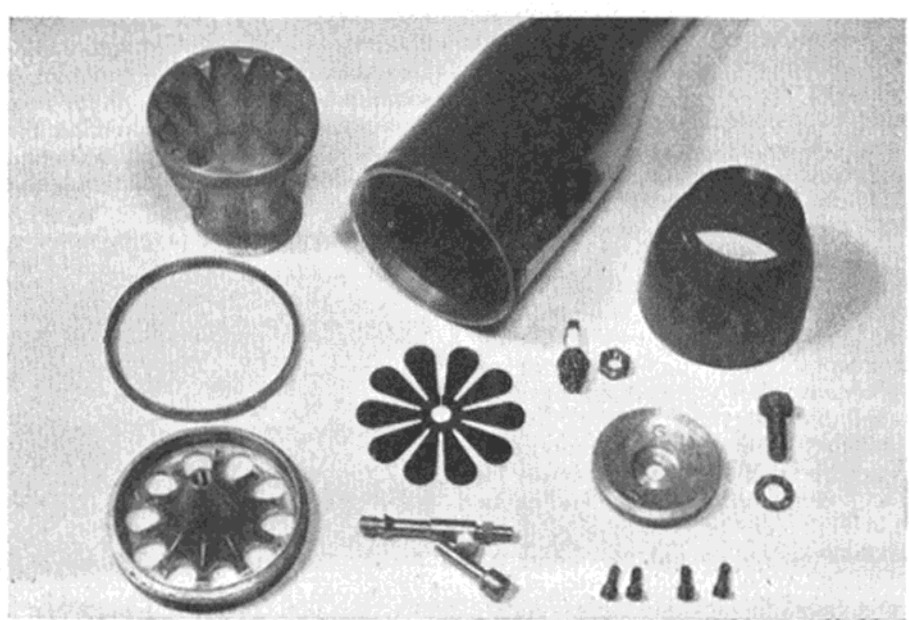
FIG 5

with a wide range of tailpipe lengths. The most noticeable effect is that the longer the tailpipe the lower the pulse rate, and vice versa. Thus, on the basis of equal thermal efficiency, the shorter the tailpipe the greater the number of operating cycles or pulses per second, and therefore the greater the thrust. At the same time, of course, fuel consumption goes up. The optimum length for maximum performance is then bound up with satisfactory scavenging and a number of other design factors, such as the inertia of the petal valve, valve spring pressure, combustion chamber volume, air inflow on the suction part of the explosion cycle, etc. A variable length tailpipe is probably the simplest method of initially adjusting proportions in an experimental unit, first to get satisfactory running and then maximum thrust.

The thrust output of a pulse jet engine is not constant, although all such units are invariably rated in terms of static thrust produced as the only convenient form of power measurement. This can sometimes be misleading, for a pulse jet with a high static thrust may have a relatively low "high speed" thrust because of the ram effect of the incoming air holding open the petal valves and not permitting them to close until well after the actual combustion point. Another cause of lost efficiency is a reversal of flow in the tailpipe during the induction part of the cycle, which again is a function of valve "timing" and also the respective internal volumes and shapes. To reduce ram air effect and make for greater efficiency at high speeds heavier gauge valves can be fitted, when starting will almost certainly be more difficult, static thrust may be lower and the unit may refuse to run continuously static.

Normally, for starting, it is sufficient to blast air into the head, over the jet—e.g., from a cycle pump screwing on to a suitable adapter, but preferably a blast of air from a compressed air cylinder. Once fired, subsequent cycles should repeat automatically without any further airflow, which is evidence that a negative pressure must exist in the combustion chamber during the induction.

A unit which runs satisfactorily static may suffer from two defects—poor thrust, or fading out completely when in flight. The former is a question of poor overall design—incorrect proportions, an excessively low cycle rate, insufficient mixture. Fading in flight may be due to the aforementioned ram effect or to failure of mixture supply at speed. The latter may be a question of altering the tank position to suit or the use of a different size of jet. Fading, erratic running, stopping, or refusal to start on a previously satisfactory unit is nearly always due to the petal valves developing a fault—burning away round the edges, distortion, lack of spring pressure, etc. The petal valves must,

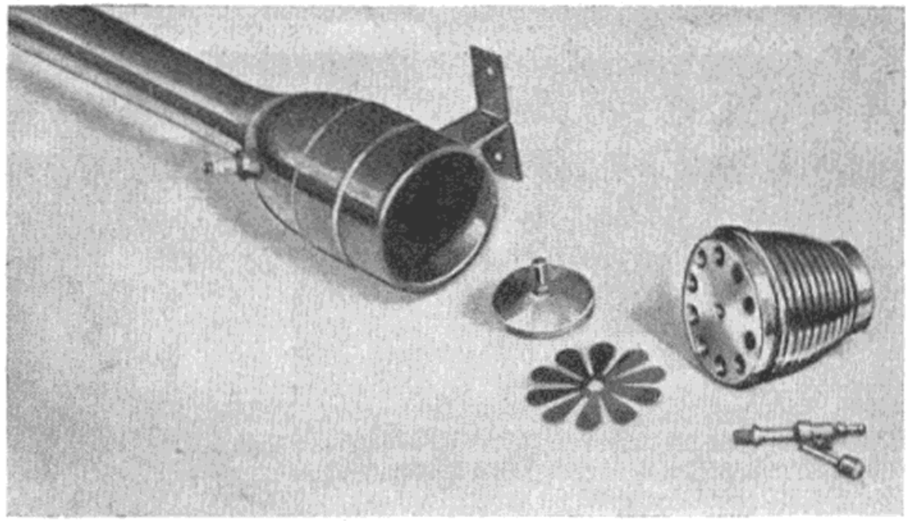


The component parts of the Japanese O.S. Type II pulse jet and (on the facing page) those of the American Dynajet.

be regarded as an expendable item.

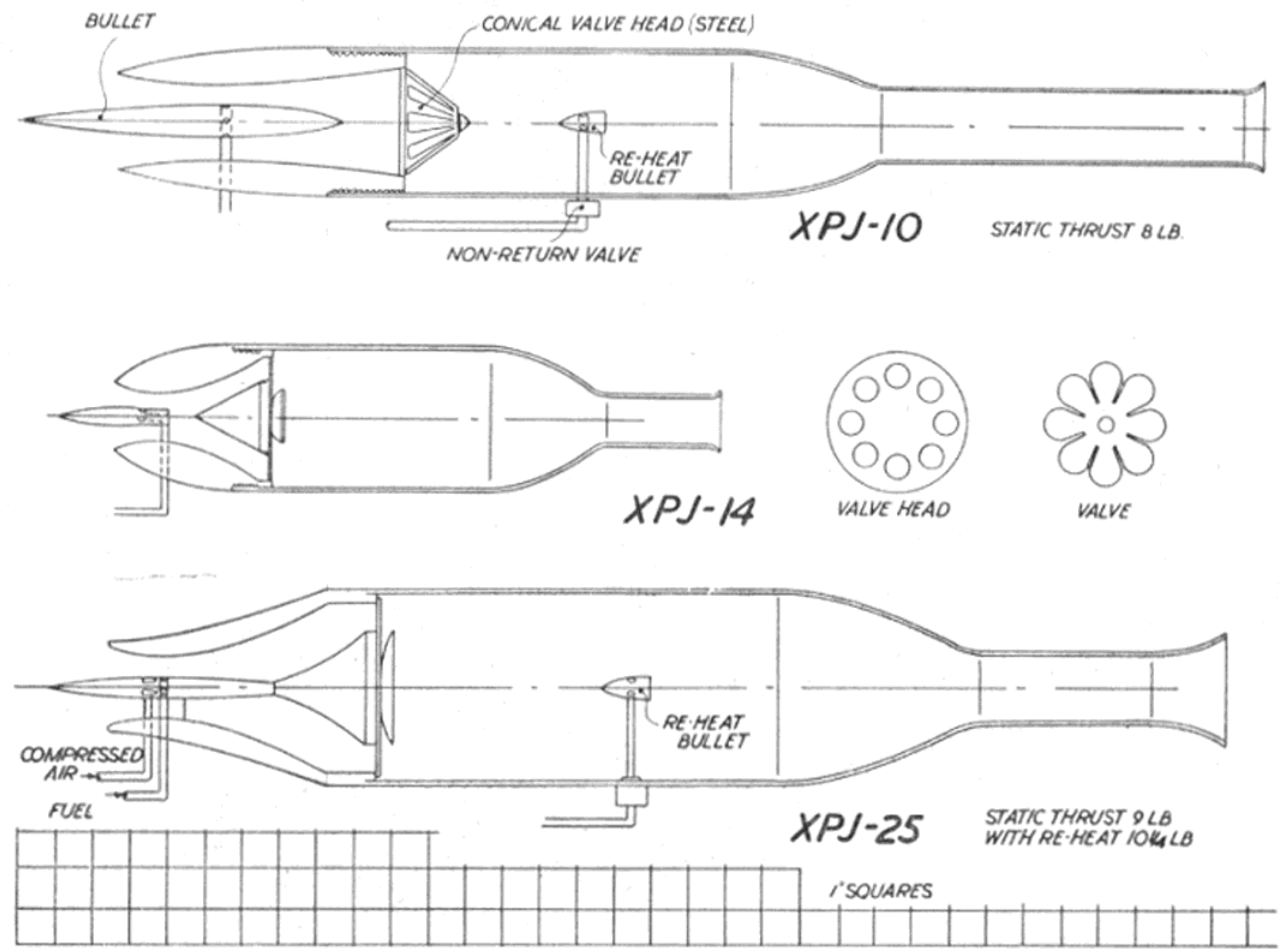
Although the overall thermal efficiency of a good pulse jet engine is lower than that of a model piston engine—probably of the order of 5 per cent.—it is a light, simple form of power unit capable of yielding a thrust/weight ratio of something like 4 : 1 (i.e. 4 lb. thrust for a unit weight of 1 lb.). Fuel consumption is high (very roughly about one quarter that of a comparable rocket motor and one half that of a ram-jet), but the fuel itself is relatively inexpensive. It is also much more efficient than a ram-jet at low speeds and therefore far more suited than that type for model work.

Its disadvantages are the shattering noise it produces in operation, the high temperature reached in the tailpipe and combustion chamber (bright red, almost white, heat in parts), the fire hazard and with it the difficulty of mounting the unit within a model fuselage (a majority of applications mount the jet unit "open" on C/L speed models). Also it is an S.M.A.E. rule that such types of engines must not be used in



F/F models. Starting is not a major difficulty with a properly designed unit. It is mainly a matter of having the right equipment, and the knack.

Some "freelance" developments in pulse jet design and construction undertaken in this country by W. Ball are illustrated in the final diagram. These range from a large 30 in. × 5 in. dia. unit to a "baby" 16 in. × 4 in. dia. model, somewhat tricky to start. Notable in the development series is the use of a conical valve head and valve assembly, which it is claimed both improves performance and reduces fuel consumption; and the application of reheat or afterburners for increased thrust (at a considerable *increase* in fuel consumption). The subject of afterburners, will be covered in a later article in this series.



OVER THE COUNTER

Following the undoubted success of the first vintage prototype (Hawker *Fury*) in their Star flying scale series, Skyleada are following up with a Bristol *Bulldog*—that grand biplane fighter full of fussy detail to delight the hearts of scale fans. The original machine, incidentally, has a generous 5 deg. dihedral on both wings sufficient for F/F model stability, so in this case it is possible to get away with true scale outline tail surfaces.

* * *

The makers of 217 dope, Hamilton colour Craft, have produced a range of plastic enamels suitable for colouring polystyrene models. Sold in small jars the Craft plastic enamel colours retail at 6d. while the metallics cost 7½d.

* * *

New *Mercury* C/L accessories include sandwich-style 15 c.c. and 30 c.c. team racer tanks (see illustration below) and a fabricated metal control horn assembly. The latter is made with two alternative "throw" dimensions—½ in. and ⅝ in. The wire torque arm can be bent to fit one-piece or split elevators, as necessary.

* * *

So you think that only jet power and deltas go together? Sqd. Leader Ellis proved otherwise with his prop-driven sports deltas and Mercury's have undertaken kitting his best design for 0.75 to 1.5 c.c. power on a grand scale. Probably one of the most stable free-flighters ever (a delta, properly trimmed, is most reluctant to stall), it should be a wonderful model for "Sunday flying." The kit should be ready by early spring.

* * *

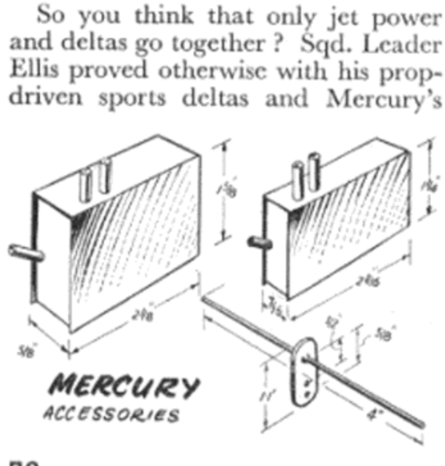
Of considerable interest to radio fans is a K Monel screwdriver, produced by Brooker and Jackson, Ltd. The only difference from an ordinary screwdriver is that the blade is made of Monel instead of steel, the specific advantage being that this metal is non-magnetic. It can, therefore be used for relay adjustment, etc., without the operation of the relay being affected by the introduction of an interfering magnetic field. The Monel blade is heat treated to have the same strength as steel and is, of course, rust proof and corrosion-resistant generally. This type of screwdriver has recently been issued to Post Office engineers.

Rumour has it that International Model Aircraft are cooking up some new kits around their new 2.9 BB motor. Due to the intensive development all Frog prototypes undergo, and the vast amount of production tooling involved, it is unlikely that these will appear until the summer, or possibly even later. But we have noticed that the experimental department has been putting in quite a lot of test flying recently.

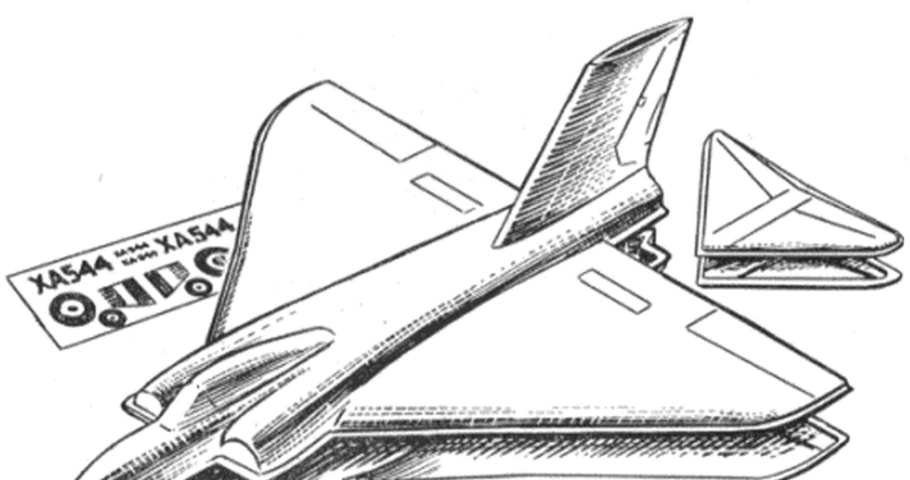
* * *

"Wimco"—Wilmot-Mansour-Company—"hollows" have adopted the rather uncommon 1/144 scale with the specific view of keeping all the models in the series to the same scale, but yet being able to include some of the really big stuff, which would otherwise work out to 2 ft. span or more. First models out are the *Javelin* and *Canberra*, to be followed by the *Valiant* in the immediate future, then by many more.

All the models are being produced by a new moulding technique from extruded styrene sheeting (as opposed to the more usual method of producing moulded plastic models as die castings). All components are therefore essentially thin shells, embossed with detail lines, etc., requiring a certain amount of trimming down of the flanges before cementing together (with polystyrene cement) to complete the assembly. A well-drawn, accurate plan is also included, together with complete transfer markings. Price has been kept down to compare with the usual wooden solid kit, so cement is not included. Similarly no undercarriage parts are supplied, although details of the scale undercarriage are given on the plan.



MERCURY ACCESSORIES



THE GLOSTER JAVELIN
JETEX Wimco "HOLLOW"

OVER THE COUNTER KIT REVIEWS

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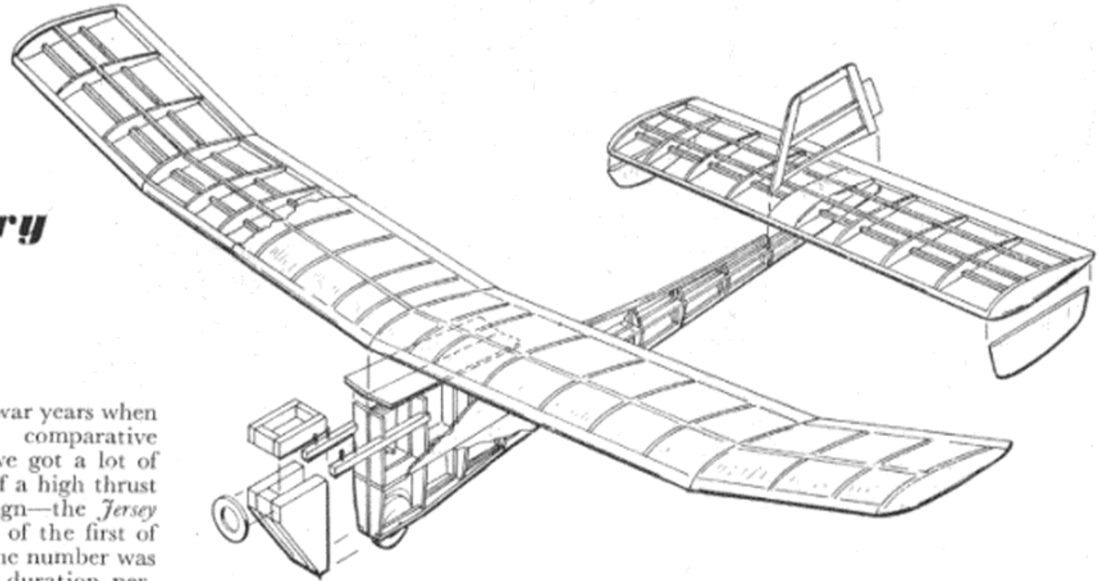
The Mercury TEAL

★



In the immediate post-war years when power models were a comparative novelty in this country, we got a lot of fun and satisfaction out of a high thrust line hatchet fuselage design—the *Jersey Javelin*. Powered by one of the first of the Mills diesels (the engine number was in the teens), it gave us duration performance with a stability sadly lacking in its cabin and pylon counterparts. Recently, of course, this similar design layout has achieved International repute with Stan Hill's "Amazon" and its derivatives, but we have often wondered why more designers have not favoured high thrust line stability.

The Teal could not be called a pretty looking model, but should be one of those duration models without vices, easy to trim and lacking the sensitivity of the high-powered pylon model which gets so many beginners into trouble. And on a 0.75 c.c. engine, it should have a really "hot" performance. Designer Ron Young, in fact, claims 3 min. off a 15 sec. motor run as easily attainable. We are certainly prepared to accept this figure, but it would need a good engine, a light model and just about optimum trim.

Fuselage construction differs from conventional practice and at first sight seems to involve a large number of pieces. The basic fuselage structure is a vertical crutch, built flat over the plan. Sheet parts are then added, in order, and go together quite logically and easily. The whole of the front and the bottom fuselage aft of the wing position is then sheet covered. Cowling is simple, neat, and the installed engine readily accessible. The engine could be equally well mounted inverted, if you are prepared to accept a little extra work and a less accessible unit for adjustment.

The wing has a relatively thick, heavily cambered section—a good "glide" section rather than one appropriate to fast climbing. Dihedral angle on the outer panels is generous, without being exaggerated to the point where the model tends to "Dutch roll." Construction is very straightforward and much as we personally dislike squared-off wing tips from the point of view of appearance they are the current trend, simpler and stronger than curved sheet tips.

Quality of the kit wood is very good—for our personal standard again, perhaps a little on the heavy side, but cleanly cut and all first class material. The bulk of the strip lengths are machined integral from sheet and just require parting off with a knife or blade. Wing leading and trailing edges are ready shaped, as are a number of the fuselage sheet members. Apart from cement (and a wheel) the kit is, in fact, delightfully complete.

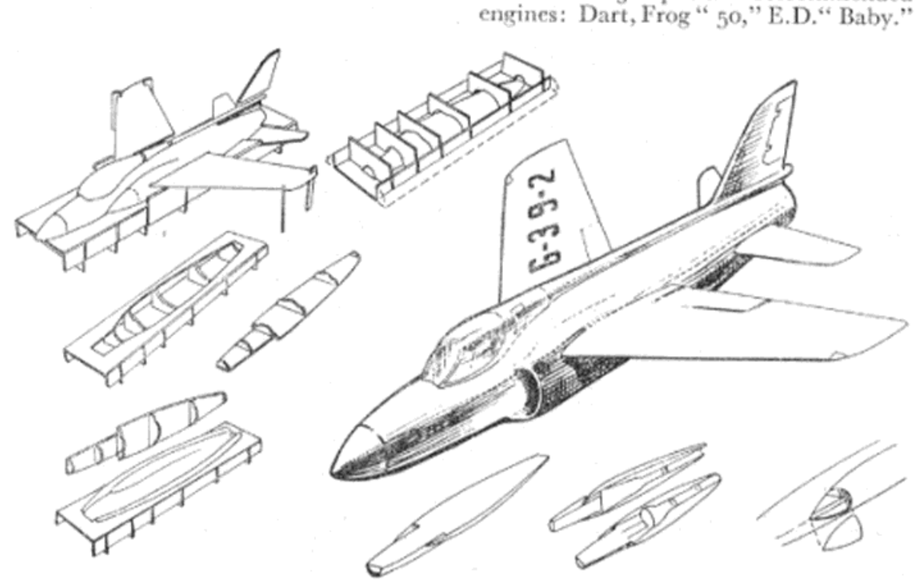
This is, without doubt, just the model we would recommend to anyone who wants to break into duration power flying—a model which has plenty of latitude as regards trim, is straightforward in construction and put out in the form of a really first class "modeller's kit," Even the experienced power flier would get a lot of fun and satisfaction out of it.

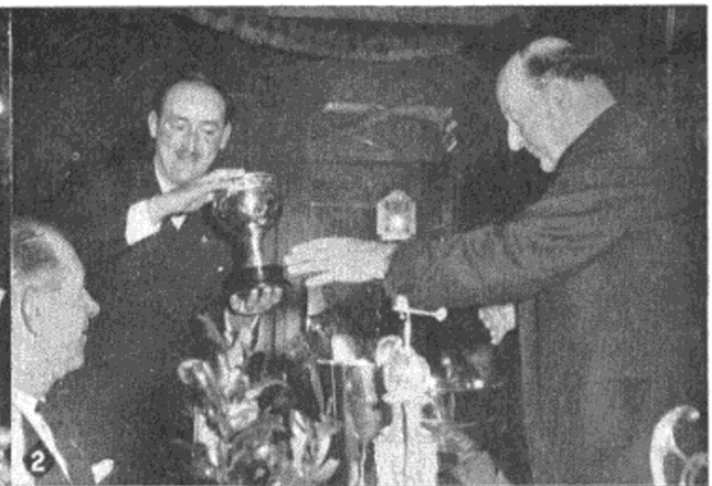
Model specification: Span 37 in. Length 26½ in. Wing area 215 sq. in. Recommended maximum weight 8 oz. Tail area 85 sq. in. Recommended engines: Dart, Frog "50," E.D. "Baby."

Jetex Folland Gnat

Latest in the Wilmot Mansour range of "Tailored" flying scale kits, the *Gnat* features the same high degree of prefabrication introduced with the earlier models. Fuselage shells are fully moulded in two-ply laminated balsa sheet and all balsa parts are die cut; an augmenter tube is not included as standard.

The fuselage is built on a jig, the card parts for which are again ready die cut to accurate size. Wings and tail surfaces are solid sheet, simply sanded to aerofoil section. If anything, the *Gnat* goes together rather more simply than the other models in this series and does make up into a wonderful job. Span is 9¼ in., length 12 in. and weight with Jetex 50 motor (unloaded) 1½ oz. Go easy with the colour dope finish or you will easily find the latter climbing to well over 2 oz.! And take your time over the construction—this is an exhibition standard job.





S.M.A.E. DINNER DANCE and PRIZE GIVING

1. Brian Harris came down from Scotland to collect the C.M.A. Cup.
2. Lord Brabazon hands the Thurston Cup to Dave Painter, while Silvio Lanfranchi looks on.
3. Henry J. Nicholls caught by the camera during his speech. In the foreground is Col. R. Yates, who proposed the toast "The ladies."
4. Lord Brabazon, one of the best after-dinner speakers in the country. In the foreground is A. F. Houlberg, chairman of the S.M.A.E.
5. Ted Hemsley receives the Aeromodeller R/C trophy.
6. An outsize in cups—the S.M.A.E. R/C trophy—goes to Alex McDonald.
7. A smiling Pete Buskell receives his trophy

Topical Twists

Trade Winds

Modellers have always shown a healthy respect towards the balsa scattering breezes. At one time it was quite the fashion to name the new breeze-doomed masterpiece after some colourful sort of wind: Zephyr, Sirroco, Mistral, * * * *, and so on. Nowadays, modellers have a more poetic turn of mind, and euphonic titles like Clot, Ker-rash, and Fizzlebug, are all the rage. But, still, its an ill wind that blows nobody good, and that same model mangling variety that sweeps across our dust-free island to cause such a chill draught in the region of the modeller's pocket, is affectionately referred to in the kit and counter business as the Trade Wind.

Residents in prosperous localities have been mystified by the appearance on Sunday mornings of large Havana cigars protruding from ornate casements. They might wish to learn that the ritual is a standard wind strength test carried out by wealthy manufacturers. If there is sufficient draught to snuff out the cigars they return to bed to conjure up roseate dreams of huge piles of wind-shattered kittery, and write out cheques for the new Rolls. If, on the other hand, the smoke rises in a sinister vertical, the champagne orders for breakfast will most likely be cancelled, and fourth footmen given their notice.

But I exaggerate. The recent trade bun fight turned out to be quite a modest affair, overshadowed by the imposition of further purchase tax on model gear, and the deep gloom of those wily manufacturers, who with a business eye on the housewifely chore of sweeping up balsa chippings, held large shares in broom companies. There were, indeed, no wild displays of opulence, and the only Rolls to be seen were of the buttered variety.

Report has it, too, that only one of the manufacturing tycoons can claim the distinction of being a yacht owner. And the fate of this proud vessel is uncertain, since it foundered, radio gear and all, on the reed banks of Clapham Pond.

Waisted Hours

Area Rule theorists are predicting that models of the future will have that Marilyn Monroe look. This is encouraging news, as it implies that some of the tedium will be taken out of design work. Models will be built direct off blue printed versions of your favourite pin up girl, based on a cross section formula of $BWH = 2Wh$, where $B = 38$, $W = 24$, $H = 36$, and $Wh =$ whistle.

Anticipating the future, I am already engaged on my "Luscious Lolly" project . . . C-c-crash, z-z-zing, b-blam, w-w-whoosh . . . As I was saying, my wife has just suggested I carry on with my Wakefield.

Free Orbit

When the model jet engine made its impressive debut it left all the other models standing—including its own. Hastily it was decided to put the snarling monster under restraint, so that now, the newsreel men—the only people who, out of a sense of public duty, are intrepid enough to venture near the things—are comforted by the existence of two microscopically fine wires, standing between them and a fate worse than television. Model fliers, and their associates, are not over-interested in the tethered blowlamp, since the model element to which it is attached, has diminished in size almost to the point of extinction.

Apart, therefore, from noise battered residents writing frantic letters to the authorities, it is only the newsreel men, and their public, safely entrenched in the one and ninepennies, who still suffer from the jet complex. An outlook which springs from the adult belief that the jet model on a string is the ultimate in thrilling toys.

If I may digress for a moment, the same attitude of mind was evinced by the well meaning gent who, seeing me piling on the Wakefield turns, interrupted with a few sage questions, based on the assumption that I was learning on elastic models before progressing to something with an engine. He now lies quietly at rest in a lonely corner of the common. . . .

Anyway, in order to revive the model fliers' interest in the jet engine, the PAA load people have thought up the brilliant idea of attaching it to a model plane, and modellers have been asked to give suggestions on adapting it for F/F purposes. One or two timid souls have answered in terms of immediate peace negotiation, while others have hinted at preliminary tests on the Woomera rocket range. Many more are asking if there are other, more civilised, ways of winning a gold watch. . . . Now, walk right up, ladies and gentlemen. . . .

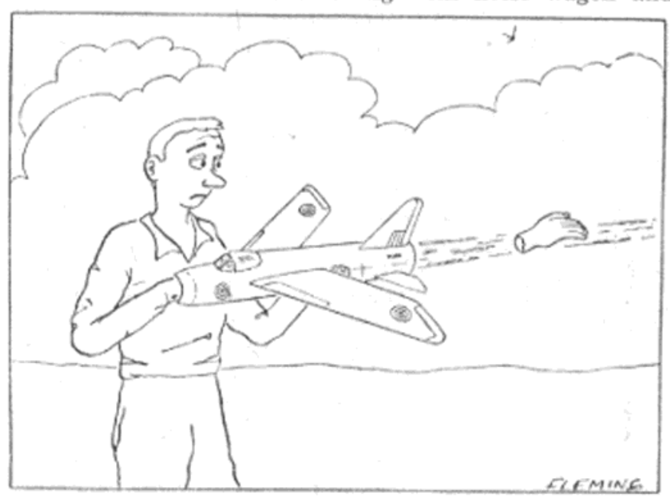
Co-existence

At a recent model display for the benefit of the Anglo-Soviet Friendship Society, some disappointment was felt at the absence of a Lavochkin 17 model. True, the appearance of a model fighter plane would have been a nice, peace-loving, friendly gesture, but, more appropriate, to my way of thinking, would have been a replica of the famous Mannski monoplane, which is immortally coupled with the name of Prangalotski, the inventor of the model aeroplane.

Collectors of outlandish club titles will be disappointed at the recent change of title of the Stockingford Air Scouts. Hopes for anything in the way of the Nylon Nomads were dashed by the mundane choice of Nuneaton & District M.A.C.

Making Tracks

R/C fliers, tired of fighting a losing battle with our gale force winds, have been toying with the idea of giving the breeze battered model its head, and chasing it pell-mell across country in the hope of breaking some record or other. Already the sport is well established abroad, where steppe, veldte and autobahn are crammed to overflowing with horse wagon and



jalopy, toting transmitter crews in a wild dash to the distant coastline.

While this sort of long distance duration flying presents certain problems in our own patchwork little island, these could be overcome to some extent by the use of an extra-large tank. Probably a Centurion would fill the bill.

The Final Word

Cause for personal encouragement is the discovery that the names of all the world championship winning models terminated with an "e." This gives hope that I am at last working on the right lines, and that my new masterpiece, Floppe IV, (the preceding three of which terminated with an O-h-h), will Win the Wakefield/Exceed 3 min./Exceed 1 min./Fly at all.*

* Delete items inapplicable.

Pylonius

A Hawker Nimrod Solid

by P. L. GRAY

The completed " Nimrod " finished in the colours of the carrier " Glorious."

MAKING the *Nimrod's* main components is straightforward, and follows normal solid practice. The fuselage was carved from birch as there is very little filling to be done. The cockpit was hollowed with a ¼ in. drill and then opened out with a pointed knife. The wings were cut from ⅛ in. spruce sheet. The tail unit was made from celluloid sheet, although thin ply sheet can successfully be used. It is essential that the holes for the struts be accurately located and drilled.

Templates for the undercarriage legs and interplane N struts are drawn full size—allowance having been made for both splay and stagger as necessary. These struts were cut from 20 S.W.G. aluminium and filed to final outline and section ; a somewhat tedious job, it is compensated by easier assembly and final appearance. An alternative method is to bend the struts from 20 S.W.G. brass wire (or sweat them together), finally covering with cartridge paper fairings to give the correct thickness.

The radiator was shaped from a small piece of birch, the front face coated with cement and short lengths of fine enamelled wire laid on it to represent a shutter effect. The uneven top and bottom edges of these were then masked with a narrow strip of paper as shown in the exploded drawing. This drawing also shows how the oil cooler was made up, thin metal sheet (milk bottle top) being used for the " fins " —it was rather a tricky part to make and one or two failures were experienced before success was achieved.

The long exhaust pipes were made from $\frac{1}{16}$ in. dia. (approx.) copper wire, a taper being filed on the forward part where the manifold would be. The tail skid was filed to shape from a small panel pin.

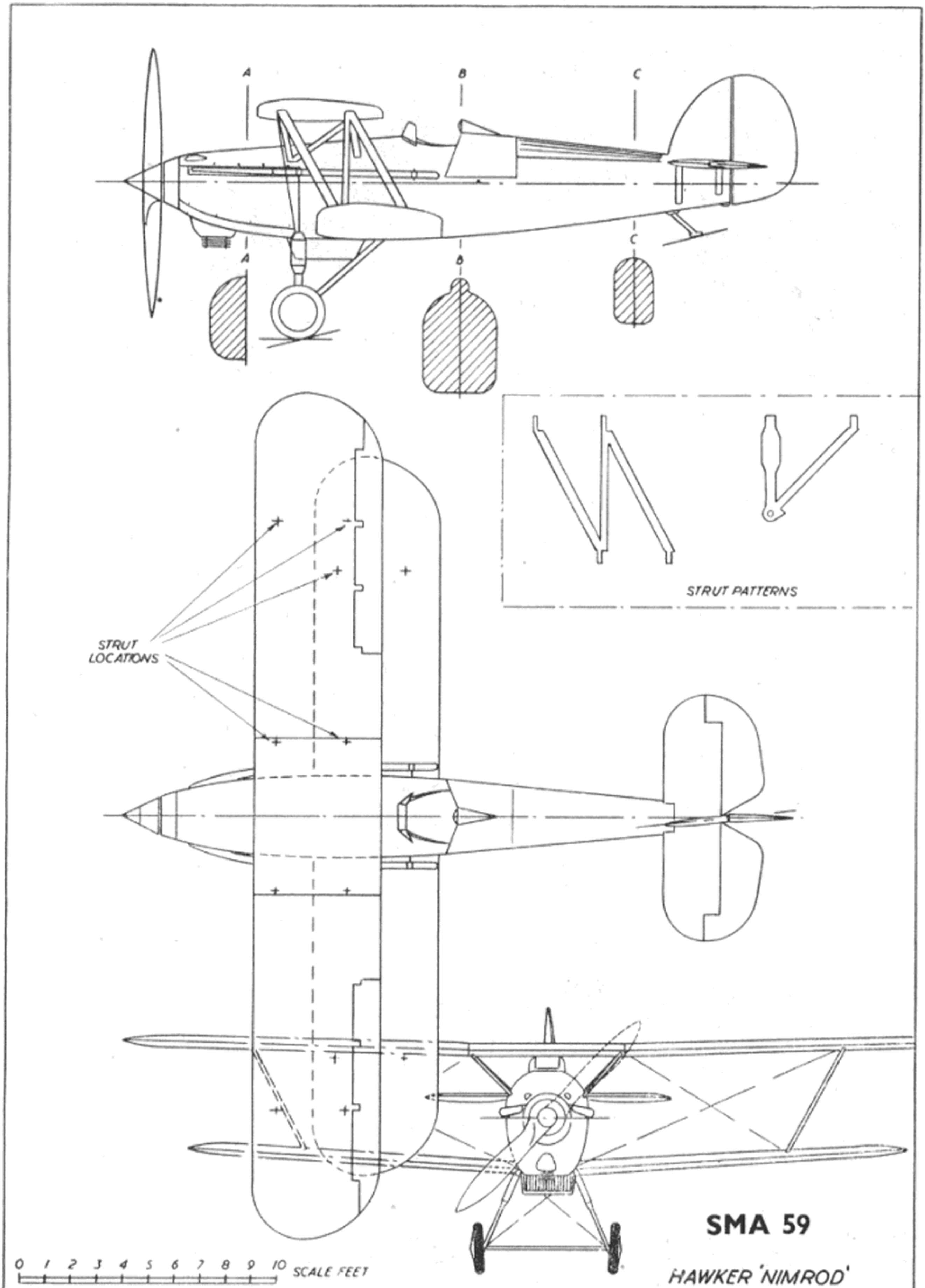
The propeller was carved with the correctly tapered boss integral. The spinner was shaped on the end of a piece of ⅛ in. dowel, slightly hollowed with a drill point and cemented on the propeller, effectively masking the pin on which it rotates.

Dihedral is incorporated in the wings by half sawing through, packing the centre, and holding down the tips with drawing pins, filling the saw cuts with glue and leaving overnight to dry out. Give bottom wing ⅛ in. dihedral and top wing 1 deg. only. The top wing could, in fact, be left perfectly straight and slightly less dihedral put on the bottom wing—it is less trouble and, in the final appearance, hardly noticeable.

Wings and tail surfaces were " ribbed " by ruling on lines of poster colour with a draughtsman's ruling pen. This gives just the right amount of relief and is more realistic (and quicker) than the usual method with cotton. Some experiment may be necessary with thinning the poster paint until it flows easily and yet dries out sufficiently " proud." As each surface is done, give a couple of coats of clear dope to " fix " the " ribs " so that they are not damaged when the opposite surface is completed.

Begin assembly by gluing lower wing in position ensuring it is perfectly square, then insert struts and fix on the top wing. For this operation I use a slow drying glue (Croid or Seccotine), which allows time to do a little manipulating. Tail surfaces are then interlocked and glued in position. The undercarriage is next positioned, ensuring that the track of the wheels is exactly 1 in. The other odds and ends are then attached and the model is ready for painting, or just touching up if you have painted the pieces before assembly, which I think is the better method.

The *Nimrod* belonged to the pre-Alclad era, therefore all the metal engine panelling, etc., had to be anodised for protection against the sea air and salt spray. The colour of this can be well represented by mixing medium grey dope with aluminium dope, then all the metal parts—engine panels, struts, undercarriage—painted with this mixture. All the fabric covered parts were, of course, plain aluminium dope. My *Nimrod* represented a machine from the carrier *Glorious* and had a chrome yellow fuselage band. The top wing had 11 diamonds between two yellow stripes; middle three diamonds in flight colour, i.e. white, yellow or blue.



SMA 59

HAWKER 'NIMROD'

NOTEBOOK FOR 1955

*

by

P. G. F. Chinn

From Japan came this beautifully made Sabre F-86F with all markings and lettering hand-painted

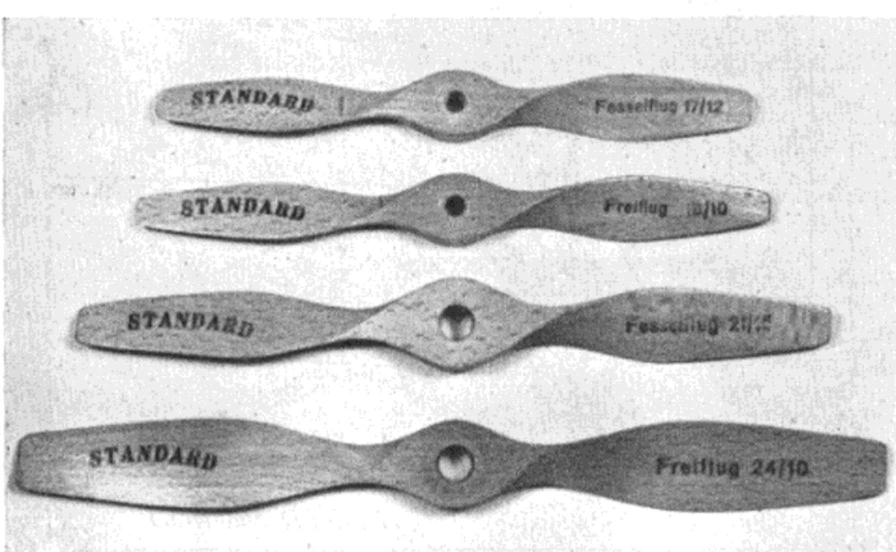
ABOUT this time last year, in reviewing our personal recollections of 1954, we were able to report an abundance of technical innovations which had partly made up for a disappointing season's weather. We had, for example, the introduction of reed-valve induction on a British motor, the advent of the world's smallest production engine, the arrival of the miniature i.c. outboard motor, the world's first constant-speed power model propeller and the development of three new airframe materials: resin-bonded paper-surfaced balsa, two-ply bonded balsa moulding and glass-fibre plastics.

The year 1955 cannot claim to have been quite so full of new arrivals, but nevertheless we have found much of interest in model developments during the past 12 months.

The last review included impressions of the reed-valve Elfin 1.49, then just going on the market. Subsequently, we had the opportunity of trying out the reed-valve 1.8 model. As later reported, this engine was exceptionally easy to handle and, being slightly more powerful, especially at the more moderate r.p.m., yet virtually of the same weight and size, was, perhaps, to be preferred to the 1.49 model except where class rules should dictate the use of the smaller capacity engine. This is one of the few small class I engines which we would be prepared to enter in F/F competition with motors of the full 2.5 c.c. permitted. It was, in everything except appearance, a better engine than the B.R. 2.49 unit which we later had for test. Our experiences with the 2.49 were not of the happiest and we await further news from the manufacturer concerning production model modifications.

The German firm of Johannes Graupner are the largest manufacturers and wholesalers of model materials and products in Germany, and one of the largest in Europe. Their 1955 catalogue is quite the most lavish we have ever seen. Measuring 11½ in. × 8 in., it has 84 pages and over 250 illustrations. Included are the full range of Graupner kits and plans, " Taifun " engines, " Standard " radio gear, props and fuel tanks and " Titan " fuels, in addition to numerous books, accessories, materials and tools of all descriptions.

Marketed during 1955 by Graupner was a new R/C plan, the *Electra*, designed by F. W. Biesterfeld. Apart from the design of the model itself, which is of obvious merit, the drawings are an object lesson in plan presentation. There are five sheets, the first showing the fuselage complete and detailed, while the second shows the fuselage panels, formers, cowling, windscreen template, etc., separated for easy construction. The



Considerable expansion of their very complete line of model products was made during 1955 by the German Johannes Graupner concern. Shown are a batch of " Standard " power model props.

third sheet gives the wing and tailplane plans, while the fourth includes detailed drawings of the receiver installation. The fifth sheet contains a series of perspective drawings illustrating the assembly of the various structures. In addition, there is a 32-page illustrated booklet, half of which is devoted to an English translation by our old friend Hans-A. Pfeil. The plans, too, include instructions in both German and English and the execution of the drawings (by Biesterfeld himself) is to a very high standard.

The Graupner plan service contains all types of models, another of the 1955 additions we have inspected being Lindner's World Championship-winning A/2.

We have mentioned the Taifun engines from time to time since their introduction three years ago. During 1955 we sampled three new ones, the Hobby, Rasant and Tornado. The diecasting on these engines is first class and the Hobby, in particular, deserves mention as one of the best small diesels on the market. We also tried a number of Graupner Standard props, both C/L and F/F types. These are accurately machined from beech and are fuel-proofed.

Amato Prati's world record of 118.35 m.p.h. caused no little surprise at the time it was established, but subsequent performances by the lapped-piston type Super-Tigre G.20, as used by Prati, have shown that this figure was no fluke. On the same short lines (no longer valid for world record attempts) Prati reached over 122 m.p.h. in July and up to 116 m.p.h. has been recorded on the new 52 ft. line length. In addition, of course, the Italian team took the team prize at the 1955 World Speed Championships by achieving 2nd, 3rd and 4th places and sharing 5th.

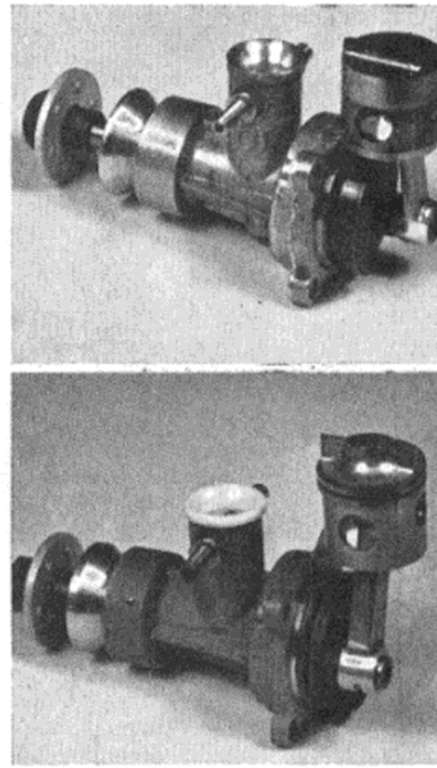
One of the most noteworthy items to come our way during 1955 was, therefore, a new lapped-piston G.20S. We will not go into detail here as the engine has already been mentioned recently in " Accent on Power " and is the subject of a full " Engine Test " report. It will suffice to say that the new model is an undoubted improvement on the ring equipped model. Not only is it more powerful and with better torque at moderate speeds : it also has the advantage of easier starting.

We seldom have any reason to comment on non-flying models, but we cannot resist including a photograph of a gift from Japan, a superb 1/50 scale North American *Sabre F-86F*. This is a straightforward wooden solid of 8.9 in. span, but so perfectly prepared and finished that it is invariably mistaken for a metal or plastic model. All the markings, including the U.S.A F stars and bars, are hand painted.

Frog all-metal construction had been a well kept secret when it burst upon an unsuspecting model world last June. Frog's *Pioneer* semi-scale cabin model is well named, for it is the first F/F kit model to use all-metal construction.

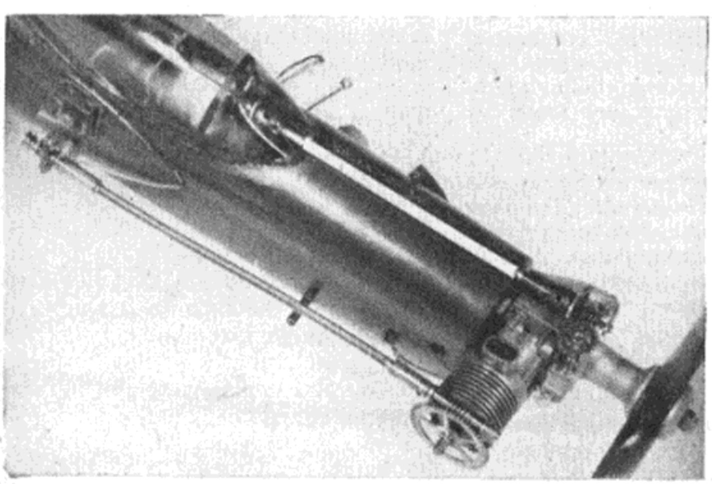
Our first sight of a *Pioneer* kit reminded us of one of the metal construction outfits of our youth. Most of the materials are contained in the bottom of the box but, on lifting the lid, one is confronted with a cardboard platform on which certain of the many ready formed components, cowling parts, ribs, formers, wheels, etc., are mounted. The effect bears little resemblance to the conventional model aeroplane kit.

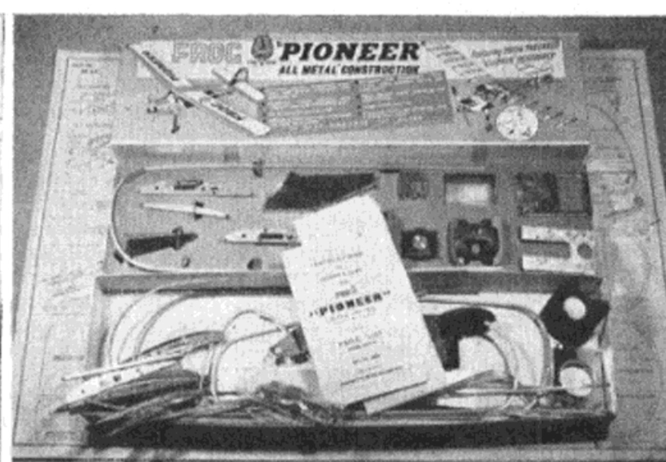
We found the *Pioneer* parts to be accurately made and easily assembled. The only non-metal parts are the moulded plastic cowling and rubber tyred wheels. The covering material supplied is tissue, although we felt that lightweight silk would be justified in order to make an already

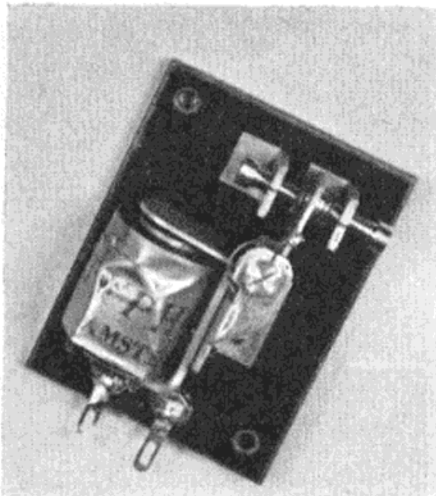


The most consistently successful 2.5 c.c. speed engine of 1955 was the Super-Tigre. Shown (top) is the latest lapped piston, shaft and bearing assembly, compared with the earlier ringed piston assembly.

Left: Norwegian stunt champion B. S. Ellingsen's unique speed control equipped David-Andersen engined model. Electric motors are used to actuate the geared controls. Current is supplied from a battery in the operator's pocket. Right: A 1955 " first," the Frog Pioneer, the world's first all-metal free-flight kit model.







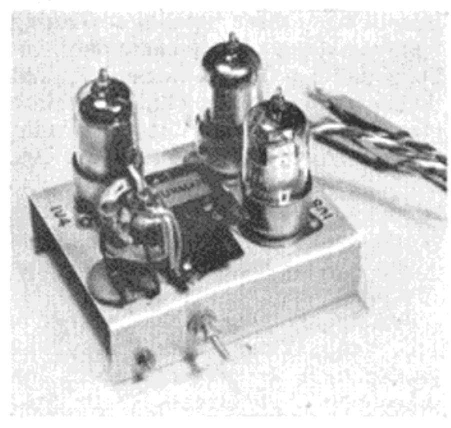
The new 1955 Typhoon 5,000-ohm relay which is ideally suited to separate mounting.

robust model (it weighs about a pound r.t.f.) less prone to annoying blemishes caused by the small tears and punctures to which paper coverings are so susceptible.

So far as outside activities are concerned, the R.A.F. Championships once again provided many interesting items for our Notebook. At this relatively small but important gathering, one gets a better opportunity of becoming acquainted with all the noteworthy models present, than at an event like the Nationals. Flying technique sometimes falls short of the technical perfection of the models themselves, but, in the stunt event, which we were co-judging with Ron Moulton, we witnessed one of the most outstanding performances ever given in near-impossible conditions when J/Tech. Higgins put an Eta 29 powered O/D model virtually through the book in a 25-knot wind. The model (at a guess, about 400 sq. in.) was a sleek job with a longish fuselage and modest elevator area. The Eta, installed inverted, ran beautifully and never missed a beat.

A willingness to "have a go" on the part of the competitors was a most noticeable feature of this meeting. Scale, concours and unorthodox are invariably well to the fore in the R.A.F. Champs. Such models are generally considered vulnerable and one would not blame any contestant, who had spent weeks or months preparing such a model, for electing not to fly in particularly bad conditions. Yet most of these types were flown and in conditions which could hardly have been worse. In particular do we remember C/Tech. Edwards's astonishing 1913 Lee-Richards annular aeroplane riding out a stormy passage through wind and rain to qualify and win the scale concours d'elegance, and Flying Officer Norman's beautiful and realistic little Merlin-powered Sea-Bee performing likewise to take second place.

Perhaps the most convincing demonstration of all-weather performance, however, was by Sgt. McHard's remarkable and very military looking *Super Swede*, winner of the unorthodox event. The model, a development of McHard's 1954 model, could hardly have been more unconventional so far as F/F models are concerned: a canard with delta planform flying surfaces, tandem



The Tone-Aerotrol 3-valve receiver, introduced during 1955, promises to be one of the most reliable yet marketed.

undercarriage and engine mounted in a pod above the fuselage with a "jet" efflux, through which the exhaust was ducted "turboprop" fashion. One might have been forgiven for supposing that this ambitious effort was for flying on lines only. In fact, it proved more stable in the wind than most of the orthodox models.

Something quite new, so far as the British model industry is concerned, was the introduction in December of "Wimco Hollows." Made by Wilmot Mansour & Co. Ltd., the Jetex people, and designed by Albert Judge, these accurate 1/144th scale kits take most of the more tedious work out of "solid" modelling and enable one to build up a collection of accurate scale display models with a minimum expenditure of time and money. Parts are moulded in grey polystyrene plastic.

Twin cylinder engines were in the

TOOL TIPS

Good tools are the most economic to buy in the long run. Poor tools made from inferior materials will let you down sooner or later, will not produce such good work and are often awkward to handle because they are poorly balanced.

* * *

A modelling knife is an efficient tool only as long as the blade is keen. It is quite a simple matter to keep knife blades sharp by honing on a smooth oil-stone at frequent intervals. A dulled edge will crush rather than cut, making accurate work impossible.

* * *

A really sharp **razor blade** is about the best tool for cutting off lengths of strip up to about $\frac{1}{8}$ in. square section. For cutting thicker sections to measured lengths, a razor saw is particularly recommended.

* * *

Hacksaw blades should be mounted with the teeth pointing *away* from the handle, so that you cut on a push stroke. If you want to cut through metal faster, increase the pressure, not the speed of your strokes. Best cutting *speed* is about 40 strokes per minute.

* * *

Pliers are easily overloaded, strained and ruined. Respect their limitations and use them only for the jobs for which they were designed. For cutting steel wire, use proper cutting pliers and cut as closely as possible to the jaw pivot. Do not try to rock or twist the pliers when cutting heavy wire.

* * *

Single-cut files are characterised by the "one way" appearance of their teeth. Most files are double-cut in one of three grades—"bastard," "second cut" or "smooth." Edges are usually "single-cut" or "safe" (plain). Flat warding files, available in a range of thicknesses from 1/32 in. upwards, are ideal for cutting rib slots in trailing edges, etc., provided they have one single-cut edge.

* * *

Plane irons are removed by tapping the nose or "toe" in the case of wooden jack planes and the back or "heel" with wooden smoothing planes. A small modelling plane is an excellent tool for shaping trailing edge sections from rectangular strip. Otherwise planes have a strictly limited use with balsa.

* * *

A **cobbler's awl** is a most useful tool to have in your model kit for piercing balsa and ply, or spotting centres for drilling. Cost is a few pence only.

news during 1955 with the description in the May MODEL AIRCRAFT of Lt. Col. Taplin's 5 c.c. diesel and with the entry of the American K. & B.-Allyn company into the twin cylinder market. Both engines are in-line alternate-firing units, a type hitherto neglected in favour of the horizontally-opposed simultaneous-firing twin, and the characteristics of these engines have already been fully discussed in past issues.

Having both engines on test, we confirmed that the twin has little to offer at present, by way of performance, in competition with single-cylinder units, but that it can definitely be smoother running (a possibly worth-while asset for R/C work) as well as being an interesting novelty. Col. Taplin has, more recently, built an in-line four cylinder 10 c.c. diesel based on the Taplin Twin. In this, the front two crankpins are rotated through 90 deg. relative to the rear two to produce a 1, 3, 2, 4 firing order. Front two and rear two cylinders are paired, a single carburettor supplying mixture via a simple manifold. Running at 8,000 r.p.m. produces over 500 firing strokes per sec. and thus an exhaust note equivalent to that of a single-cylinder two-stroke running at no less than 32,000 r.p.m.

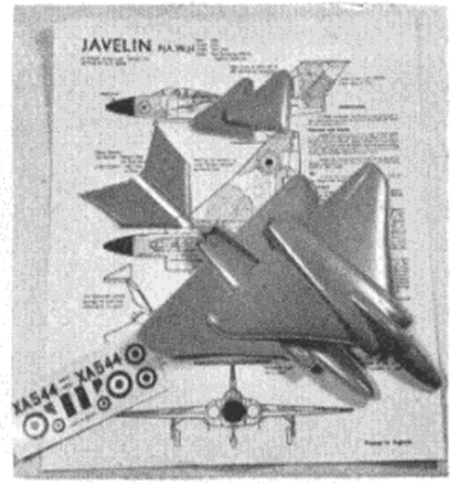
Apart from the announcement of the highly interesting Tri-ang equipment, which, however, is not yet available at the time of writing, little new equipment was introduced during 1955 by British R/C manufacturers. However, a new and noteworthy transmitter and receiver of American manufacture, which we were lucky enough to obtain, was the Tone-Aerotrol and earlier favourable impressions have been confirmed by subsequent use of this Walter Good-designed outfit, which promises to be the best yet experienced.

Another good quality R/C component from overseas made available in 1955 was the Typhoon relay, made by the well-known Amsterdam firm of engine and R/C manufacturers. The Typhoon relay at first sight looks more like an escapement and, mounted on a rectangular Paxolin type base, it is eminently suitable for installing separately from the receiver in the manner favoured by a number of R/C enthusiasts. It has silver tipped screw adjustment contact points and the coil resistance is rated at 5,000 ohms. A check on our test example gave a reading of 4,800 ohms. This compares with 3,000/4,000 ohms for other commonly used relays of similar nominal rating.

An outstanding performance at the 1955 R.A.F. Championships was given by J/Tech. Higgins flying this stunt model in a high wind. The large cup is the "Model Aircraft" Trophy for free-flight power which Higgins also won.

Flying Officer Norman, R.A.F., with the superb Republic "Sea-Bee" amphibian he flew at the 1955 R.A.F. Championships.

We often think that manufacturers whose products are built to above average standards of precision, must be somewhat discouraged by the scant attention paid to such facts by the modelling public. We could divide most commercially made engines into three groups: the "rough ones" (which most people recognise), the "average ones" (some of which, aided by a fancy outside finish are classed as super precision) and the genuinely "precision engineered and craftsman finished ones" (most of which, often less well endowed with costly publicity, pass unnoticed).

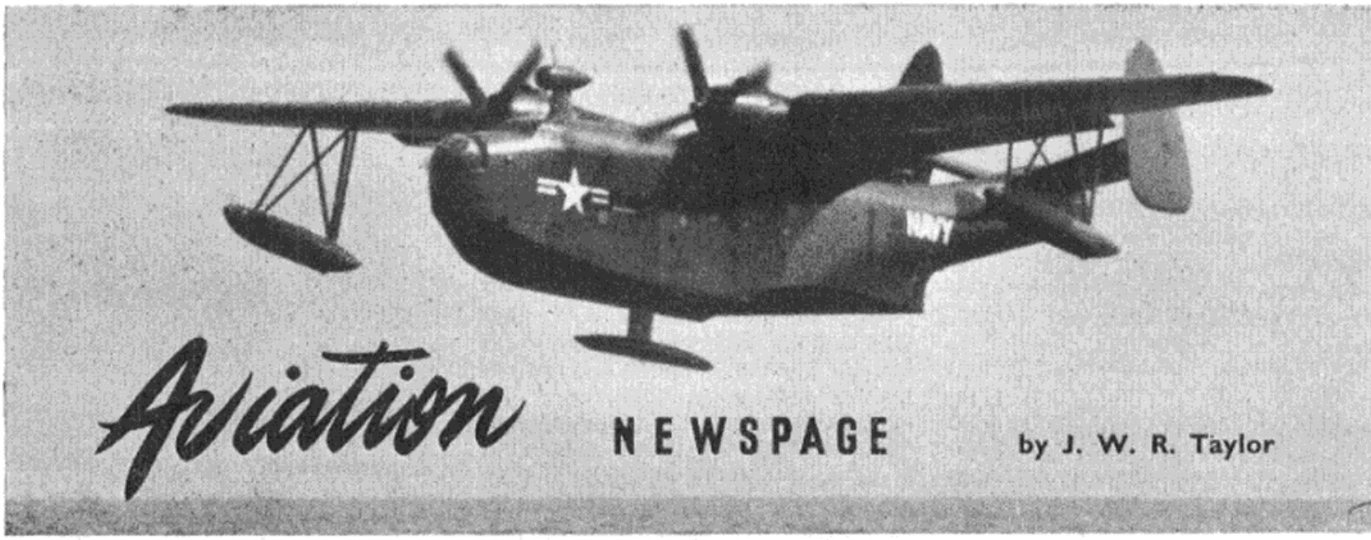


Newest "solid scale" development is the moulded polystyrene "Wimco Hollows" introduced in 1955 by Wilmot Mansour. Shown is 1/144 scale Gloster "Javelin."

An engine belonging to the last named group which, happily, now seems to be gaining some recognition outside the pages of MODEL AIRCRAFT, is the Norwegian David-Andersen, and the new D-A 1 c.c. unit, introduced early in 1955, is certainly one of the most beautifully made small engines available anywhere in the world today. On test, this precision manufacture, allied to good design, was seen to be repaid by the achievement of the highest output thus far realised in the M.A. Engine Test series for a 1 c.c. class unit.

Four years ago we tested the D-A 2.5 c.c. engine and, after four seasons' use in R/C models, this engine shows no sign of deterioration. Norwegian stunt champion B. S. Ellingsen has one of these engines in a C/L model, equipped with two electric motors, which, by means of worm drive reduction gearing, alter the compression and needle-valve settings in flight to give fully variable speed control. The model can be made to execute engine-on landings, taxi or remain stationary, fly fast or slow or practise circuits and bumps. Some idea of the layout of the system can be seen from the accompanying photograph.

Our test 12 month ended with two British engines in the popular 1.5 c.c. class, one the product of a new firm, the J. B. Atom, and the other an old favourite in a new guise, the Allbon Sabre, which replaces the six year old Javelin. Both are dealt with elsewhere in this issue.



Aviation NEWSPAGE

by J. W. R. Taylor

BEAUTY TREATMENT by Convair's Fort Worth Division has given this *Skymaster* (photo below) a new radar nose, B-36 type lookout blisters on each side of its rear fuselage and a brand new paint scheme, with the red fin and yellow wing tip and fuselage bands that distinguish all U.S.A.F. Search and Rescue aircraft.

First of many C-54s being converted into SC-54s, it has a completely redesigned interior. There is a seat for a flight engineer between the pilot and co-pilot, and the crew have 21 new electronic flying and navigation aids including TACAN search radar. Behind the flight deck are two bunks, above large reserve fuel tanks, then a new galley, and a special flare-launcher from which fluorescent green dye markers can be fired by the look-out man if he spots survivors in the water.

When survivors are located, the crew simply have to remove MA-1 kits from stowage bins on the starboard side of the cabin and heave them out of a newly-enlarged door on the port side. The kits include two 20-man life rafts, each about 12 ft. in diameter, "Gibson Girl" radios, tents and rations, to keep the ditched airmen as comfortable as possible until other help arrives.

* * *

ANOTHER ODD MOD, this time experimental, is the hydro-ski tested under the hull of a PBM *Mariner* by Martin in Chesapeake Bay, Baltimore, as shown in our heading photo. Hydro-skis were fitted to Convair's *Sea Dart* mainly to give a cleaner hull than the usual flying boat planing bottom. Saunders-Roe and others have shown how they can be used to enable landplanes to operate from water.

Object of the *Mariner's* hydro-ski is to confirm N.A.C.A. model tests which indicated that a rigid ski would enable a large flying boat to take off and land from really rough water. Built by the Edo Corporation, the ski is approximately one-fifth of the 80 ft. length of the *Mariner*. As a result, water forces acting on the hull during landings are kept small and closer to the c.g., because the small skid area comes into contact with the water first.

The ski is mounted slightly forward of the aircraft's c.g. and is being tested in three different extended positions, to find the best compromise between maximum "shock absorber" effect when fully extended and least aerodynamic and hydrodynamic drag when close to the hull.

* * *

SECOND VALIANT SQUADRON is No. 543, based at Wyton in Huntingdonshire. The first was, of course, No. 138 at Wittering, which took part in the 1955 S.B.A.C. Display at Farnborough.

* * *

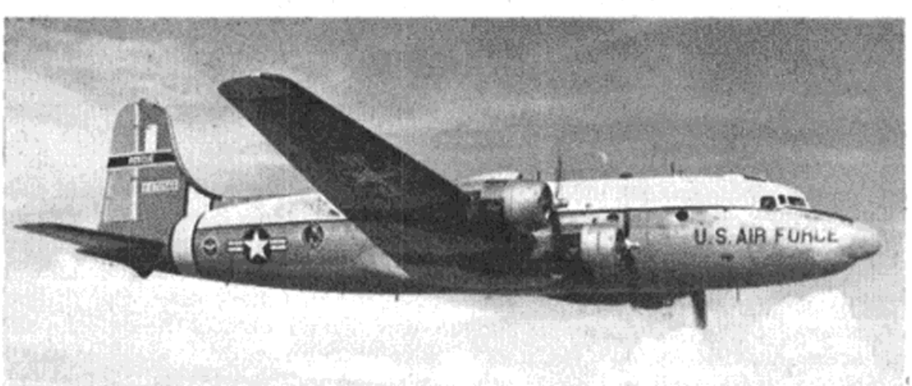
An American newspaper report says that Lockheed are leaving the present jet-liner **BATTLE OF THE ATLANTIC** to Boeing and Douglas only because they are planning a 200-passenger supersonic successor to the 707 and *DC*-8, for delivery in 1965. Of straightwing, needle-nosed layout, it is said to be designed for 1,000 m.p.h. cruising at 60,000 ft.

* * *

LATEST JAPANESE LIGHTPLANE is the Kawasaki *KAL*-2, of which two prototypes have been built for liaison duties with the National Defence Forces. Although using many components of the *KAT*-1 two-seat trainer, and having the same 240 h.p. Lycoming engine, it is a full four to five seater with slightly bigger span of 39 ft. 1½ in. and loaded weight of 3,530 lb. Cruising range is given as 1,000 miles at 130 m.p.h. on 40 per cent power.

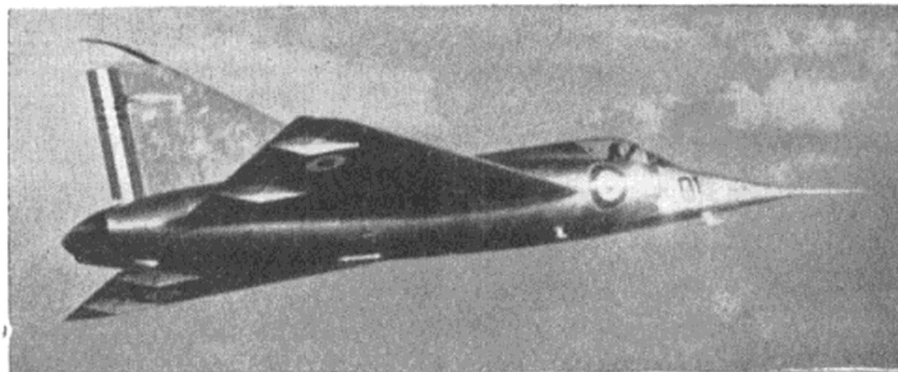
* * *

NEW FRENCH LIGHTWEIGHT INTERCEPTOR, the spike-nosed Dassault 550, looks like the twin of Fairey's *Delta* 2, but is intended to be three-engined. Present power plants



This "Skymaster" of the U.S.A.F. Search & Rescue service sports a bright new paint scheme and special mods. Designation is SC-54.

Top: The needle-nosed Dassault 550. Below: The sporty-looking Kawasaki KAL-2 designed and built in Japan. It has a top speed of 183 m.p.h.



are two Dassault-built A.S. Vipers, giving a total of 3,520 lb. thrust without reheat. When supplemented by an S.E.P.R. liquid-fuel booster rocket, they will make the 550 supersonic in level flight.

* * *

FAR FROM SUPERSONIC is the new Auster *Agricola*, which looks like something out of aviation's dim and distant past, but is claimed to be the most important contribution to farming progress since the tractor. Intended primarily for top-dressing in New Zealand, it has a 240 h.p. "jet-cooled" Continental engine and will take off in 250 yards with a ¾ ton payload.

For ease of repair, the steel-tube fuselage is fabric-covered and sealed to prevent a build-up of dust inside. The nylon-covered control cables run down the outside. The sturdy fixed undercarriage is fitted with balloon tyres for operation from soft and rough country and has interchangeable main legs. The ailerons and elevators are also interchangeable. Span of the square-cut wings is 42 ft. and fuselage length 27 ft. 6 in.

For maximum safety, the cabin is forward and above the dust-hopper and loading-chute, is framed with crashproof structure, fitted with minimum controls and instruments, well-padded and equipped with strong shoulder harness. Two seats to the rear of the dust loading-chute enable the pilot to carry his labourers with him when he travels from job to job.

* * *

BOEING'S KC-135 JET-TANKERS for the U.S.A.F. are expected to be fitted with the probe and drogue type of flight refuelling equipment, rather than the flying boom type tested on the Model 707 prototype. Reason is that the British-developed system has proved better at great heights and speeds. Significant first step is the recent U.S.A.F. order for conversion of 100 *B-50s* into probe and drogue tankers able to refuel three aircraft at a time through belly and wing-tip hose units.

* * *

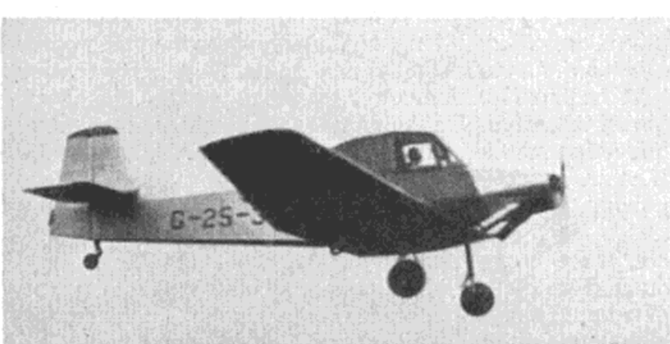
A FLYING SUBMARINE which lands on hydro-skis, and then submerges, after sealing its jet air intakes and exhaust, pressuring its cabin and flooding its ballast tanks, has been designed by the All American Engineering Company of Wilmington, Delaware. Under water, it is driven by a marine engine and propeller and manoeuvred by its aircraft control surfaces. Another similar project is under development by John K. Northrop.

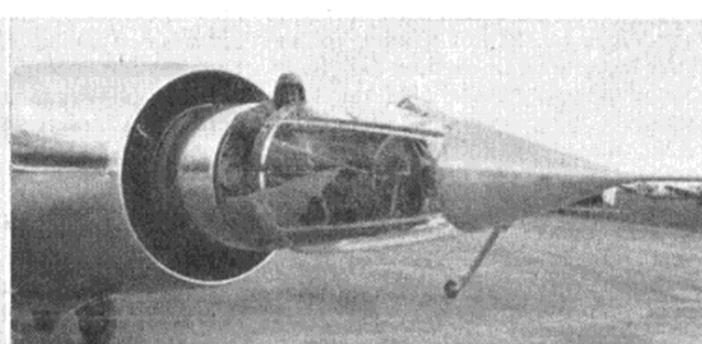
To perfect the **EJECTION CABIN** of his forthcoming Leduc 0.22 ramjet interceptor, French engineer René Leduc has flight tested models of similar cabins fitted to his earlier 0.10 and 0.21 research aircraft.

First experiments were made with scale models dropped from a *Languedoc* mother-plane. Soon after release, their cabin separated automatically from the airframe, just as it would on the full-scale aircraft, and then parachuted to earth, the whole sequence being recorded on film.

Later, dynamically-similar full-scale models of the cabin were released, the mechanism in this case being identical with that on the 0.10 and 0.21 prototypes. It consists of a single lever, which operates the separation mechanism, then causes a stabilising parachute to open before deploying the main canopy. Modifications suggested by the tests are already incorporated on the 0.21 and 0.22.

Left: Ironical that the unbeauteous "Agricola" is designed for top-dressing. However, it has the right qualifications for the job. Right: The unique Leduc 0.21 experimental aircraft.

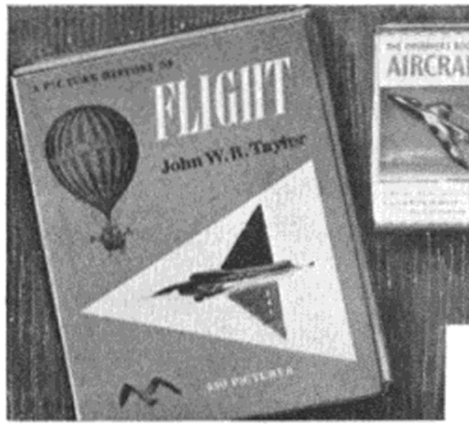


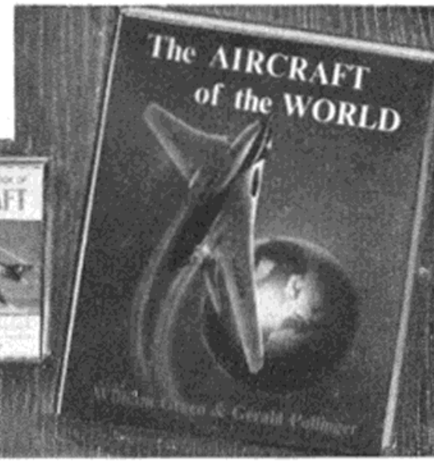


Book Department

Reviews of current aviation literature

★





The Observer's Book of Aircraft. *By William Green and Gerald Pollinger.* Warne. Price 5s.

The 1956 edition of this deservedly popular little book is well up to the standard of its predecessors and contains over 150 new photographs and many new three-view silhouettes. Due to the time lag between finalising and publication date, no book dealing with aircraft can ever be up-to-the-minute in its contents, but "The Observer's Book of Aircraft" comes very close to the mark. All the new types seen at Farnborough are included, together with most of the later marks of familiar types which were also introduced at the S.B.A.C. show.

A total of 208 aircraft are described and there are 305 illustrations. Definitely a book easy on the pocket, both in size and price.

Aircraft of the World. *By William Green and Gerald Pollinger.* Macdonald & Co. Ltd. Price 35s.

With interest in aviation constantly increasing, reference books on the subject abound and consequently there is a wide selection of material—some good, some bad—from which to make a choice. However, even a cursory inspection of "Aircraft of the World" indicates the worth-while value of its contents, while closer study fully justifies first impressions.

This title first appeared just over two years ago, when it was priced at 21s. Although the price has now increased to 35s. the contents are much more comprehensive, including as they do, all the new types revealed in the interim period. Also many old stagers previously not known to be flying have been unearthed and thus acquire a revered place in the 210 pages.

One major change made in this new and bigger edition is the grouping of aircraft in alphabetical order according to manufacturers' names, instead of classifying the aircraft in structural groups. This is a definite improvement and thus all the aircraft of a manufacturer that remain flying are grouped together. Of the types that appeared in the earlier volume, many are now illustrated with new photographs and silhouettes, and are accompanied by much fuller descriptions, thus there is very little, if any, overlapping.

The authors' claim that every type of aircraft known to be flying at the time of closing for press are included was too much of a temptation not to try and catch them out and weeks later we are still trying! It is difficult to credit that so many old planes dating as far back as the 20's are still airworthy, and it is odd to note that even the aircraft of the last war—many of which are still flying—now look a trifle antiquated compared with the shapes of the latest warplanes.

With its immense scope, this book is a fertile source of inspiration for the modeller, and it is certainly one which we, personally, wouldn't like to be without.

A Picture History of Flight. *By John W. R. Taylor.* Hulton Press. Price 25s.

A book like this was long overdue and the author has certainly done his subject justice. Words and illustrations combine to give us a survey the like of which would be hard to better—648 pictures with their informative captions, preceded by a commentary to each section, tell the story of aviation from 883 B.C. to the present day.

Our ancestors had some very fanciful ideas on air travel, from bird-like wings to flying bicycles. Of the latter, one built by Monsieur Gillon was "test-flown" on Epsom Downs on April 11th, 1907, but only the front wheel left the ground. But there are far more weird and wonderful flying (?) machines depicted in the 190-odd pages. While appreciating the valuable contribution to flying made by the early aviators, one cannot help but be amused at some of their efforts in the light of present-day knowledge. John Taylor, too, shows his sense of fun now and again with captions like the following beneath a photograph of a Victorian-looking gentleman with his "aircraft": "Early enthusiast at Weybridge was bewhiskered Mr. Bellamy, whose big bamboo and canvas gull wing biplane looked like a frame for growing runner beans."

But some of the photographs have to be seen to be believed and the author obviously had a monumental task in choosing such a representative selection as we have here.

Of especial interest to us were the photographs showing Sir George Cayley's model glider, and A. V. Roe's contest-winning 8 ft. tail-first rubber job. Incidentally, the glider, which was built in 1804, was the first heavier-then-air aeroplane to fly, while the contest won by A. V. Roe was organised by the *Daily Mail* in 1907.

If we have lingered in the past rather than dwelt on the present, it is only that the past as depicted here contains so much of fascination that is new to us. The other sections cover equally well the later momentous years. A comprehensive index to the aircraft and personalities is included for those likely to use the book for reference. Personally, we think this is the type of book to be repeatedly taken down from the bookshelf, with each inspection revealing something that previously was missed.

Letters

Continued from page 45

have ever heard of the Maerkische D.I, the Franz Schneider fighter of 1918, the Rex scout, the Goedecker B.I, or B.II, the huge and hideous, but revolutionary, Linke-Hoffman R.I, and its more shapely follower, the R.II? These are only a few of the *really* " rare " types, of German origin. Never a word do I read in the aero-modelling Press of the Austro-Hungarian aircraft of that period, the Lohners, the Lloyds, the " Oeffags " (Austrian) or " Ufags " (Hungarian) or the WKF or Pola types, the legendary von Karmann war-helicopter (it flew !), and all the other absorbingly interesting machines that appeared on the Russian and Italian fronts of the Austro-Hungarian armies.

I feel sure that some of these would make good flying-scale models, if plans were to be drawn up, and the necessary data unearthed. Be that as it may, the aircraft are, in themselves, invested with the magical quality of the " almost unknown "—they are " collectors' pieces," and would form the subject of an engrossing book.

Yours faithfully,

Send, Surrey. R. H. MANLEY.

More markings

DEAR SIR,—I found Mr. Lewis's recent feature on " Civil Markings " extremely interesting, and particularly his notes on aircraft of the 1930s, which brought to mind one or two other colourful examples of that era.

The Airspeed *Envoy* G-AEXX of the King's Flight was a very colourful affair. The wings and tailplane were silver with blue registration letters; the upper half of the fuselage was red and the lower half blue, the colours being separated by a white cheat line; the engine nacelles all red with the exception of the front of the cowlings, which were trimmed blue and white.

The MacRobertson Race entrants included some colourful machines, one, the Bellanca Racer, the Eire representative, which was entered, but did not start, had black wings. The fuselage was all white, and the registration letters EI-AAZ appeared on the fuselage in green, as did the race number 29 on the fin; the name *Irish Swoop* diagonally across a horseshoe was painted in black on the golden yellow engine cowling, and on the fuselage.

An American aircraft, the Waco UIC, registered in this country, was finished all grey with the registration G-ACGJ and fuselage flash in light blue.

Incidentally, surely Wiley Post's Vega *Winnie Mae* was finished all white with red, not blue, trimmings.

Quite a number of these attractive pre-war aircraft appear to be ideally suited to scale work, but unfortunately, unless one has access to pre-war aviation literature, accurate details and general arrangement drawings are hard to come by.

I am sure if you could find it possible to feature some of these machines in your solid model series, enthusiasts and modellers alike would be more than grateful. Who knows, we might even see a future scale contest line-up looking like a pre-war flying meeting.

Yours faithfully,

Manchester. R. BURROWS.

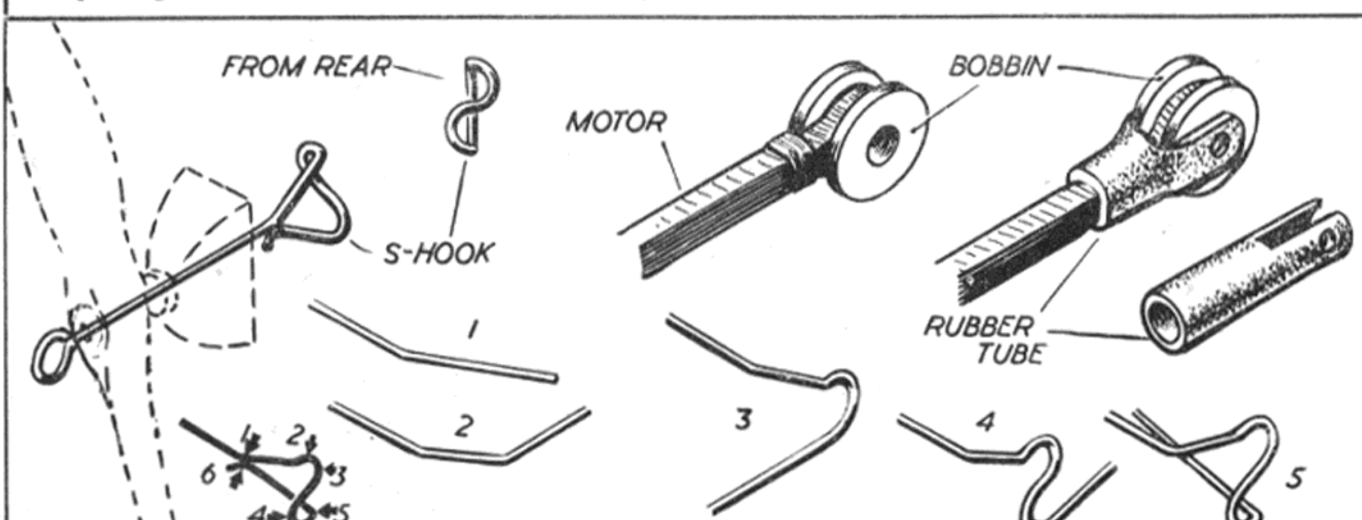
Fittings for Rubber Motors

Circular and diamond shaped front hooks for rubber motors suffer from the defect that the wound motor often tries to " climb " round the wire, resulting in an uneven motor run, or even rubber bunching and jamming the shaft completely. S-hooks completely eliminate this trouble, provided they are bent the right way round, and are true as regards alignment with the shaft.

An S-hook is a self-aligning fitting. When wound, the motor tends to creep to the exact middle of the S and will remain there. Bend the S the wrong way round and the motor will work right off the ends of the S, showing just how positive motor " creep " is with this type of hook.

The S-hook is easy to bend, if you follow the six simple stages shown. The two half circles which form the actual S shape should be made with round-nosed pliers. After completing stage 5, make sure that the centre of the S is lined up accurately with the shaft.

For the rear rubber fitting, loop the strands over a bobbin and bind tightly up to the bobbin with a rubber band. This will give a convenient, anti-bunch fitting for the back of the motor and one which is readily secured by the rear peg passing through the centre of the bobbin. This is a perfectly satisfactory arrangement for moderate length motors, but bunching troubles may still be experienced with really long motors. The cure here is to use a bobbin, as before, but slip over it a length of stiff rubber tube (e.g. rubber gas tubing) which has been slit and pierced so that it can be drawn over each side of the bobbin. The rear peg then anchors the rubber tubing as well as the bobbin and provides a stiff " lever " to prevent the motor doubling back on itself into a bunch.



J. Wood

designed this attractive semi-scale model for point-five motors, which he has named — BIPALO

A BIPLANE makes a refreshing change from the usual run of monoplanes, and Bipalo was the result of seeing a friend's biplane put up an effective performance. It is strong, cheap, and easy to build, and in fact the prototype has been flying since early 1954.

Fuselage

Start by building two basic sides on the plan. When dry, separate with a razor blade, cut out all formers, and sew undercarriage parts to F2 and F3. Assemble fuselage sides on the latter and add engine bearers. Draw tail end together and add bottom fuselage spacers. Now add formers F4-8 and also the stringers on the top decking. Assemble F1 on the front of the engine bearers, and build up the cowl with soft $\frac{3}{16}$ in. sheet. One half is made removable for access to the engine. Add gussets, undercarriage, fairings, wheels, etc.

Wings

Lay L.E. and T.E. over plan, not forgetting to pack up the T.E. to conform with the rib contours.

Add $\frac{1}{8}$ in. sheet tip pieces and all ribs, except those occurring at the dihedral joints. When dry, pack up tips, add ribs at dihedral joints, and cement securely. Remove from plan, and add spar and ply dihedral brace. Repeat for the other wing. Finish off the wings by making the struts, and fixing the tubes to the anchor struts. The model can be flown quite safely without the struts, as they do not hold the wings together.

Tail Unit

Lay the tailplane L.E. and T.E. over the plan, together with ribs and spar. Cement in all ribs. The fin is built over the plan in the usual manner.

Covering

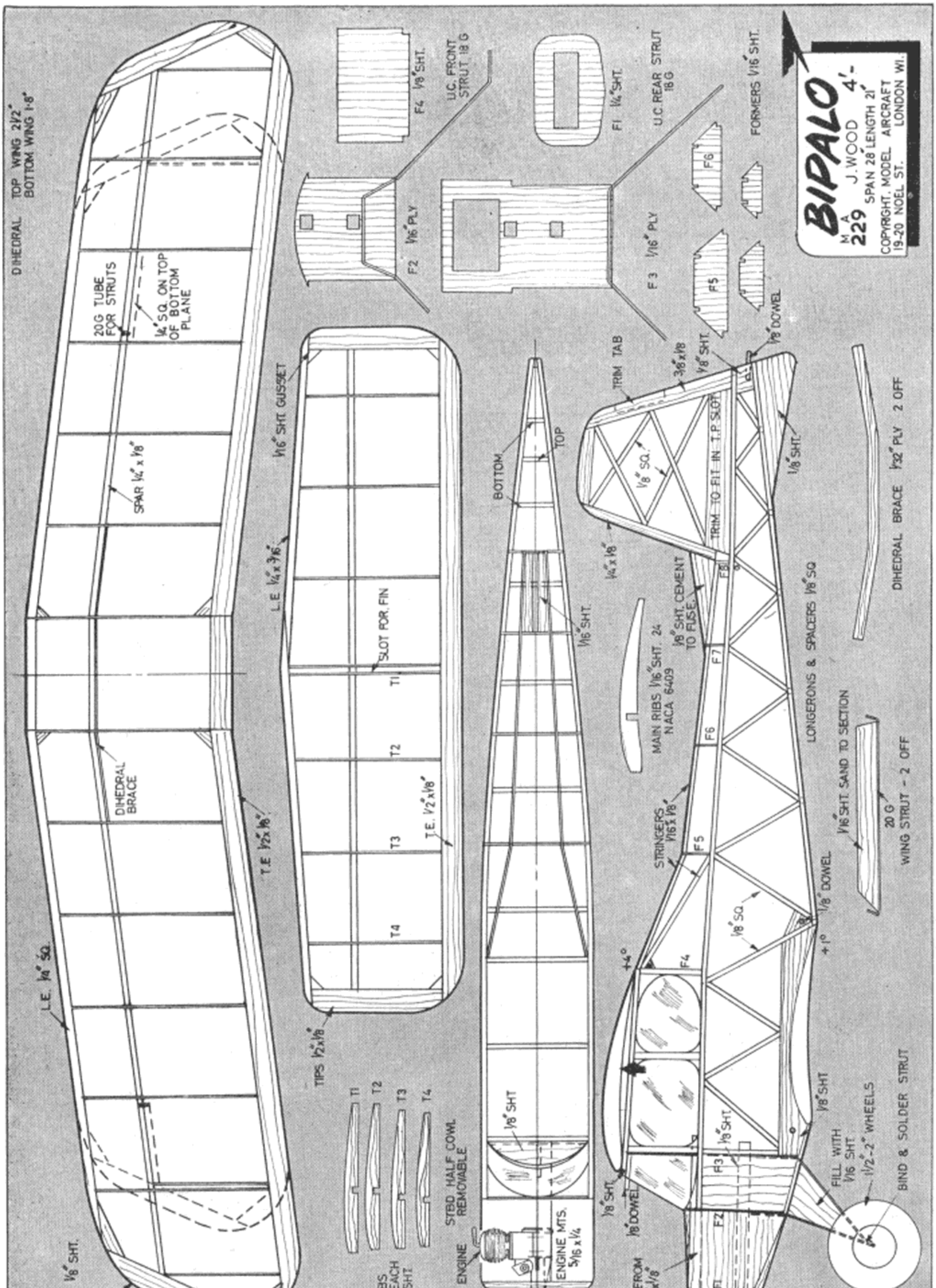
The complete model is covered with lightweight Modelspan and given two coats of clear dope. If desired, an additional coat of fuel proofer can be applied. After doping, the fin can be cemented into the tailplane. The model is finished by adding celluloid around cabin, wing dowels, etc.

Flying

Test glide the model on a fairly calm day and obtain a flat glide with some turn in either direction. After this a low power flight can be attempted.

The model flies safely either to the right or left, but do not attempt a straight flight, or a loop will result. After this stage, r.o.g. flights can be made from a reasonably smooth surface.

Trimmed correctly, the model should give hours of trouble-free flying.



FULL SIZE WORKING DRAWINGS [ARE] OBTAINABLE FROM YOUR LOCAL DEALER, OR BY POST FROM THE "MODEL AIRCRAFT" PLANS DEPARTMENT 19-20, NOEL STREET, LONDON, W.1, 4s. 0d., POST FREE

NEW BRITISH ENGINES

ACCENT ON POWER
by
P. G. F. CHINN

FOLLOWING a two year period in which very few new British engines appeared, several new models have been marketed during the past 12 months and 1955 has ended with a number of new British designs clamouring for attention. After having, of necessity, devoted much space in past issues to overseas products, we therefore welcome the opportunity of devoting an article to these latest British models.

Last month the new Frog 249 B.B. was dealt with in the MODEL AIRCRAFT Engine Tests and received a very favourable report. Apart from a somewhat out of the ordinary appearance, this engine leaves one with three distinct impressions.

Firstly, the quite exceptionally good manners of the 249 B.B. are enough to gladden the heart of the most hardened critic. Our test unit was an instant starter, almost irrespective of prop size. The controls were easy to adjust, were positive in operation and it was a pleasure to find a conventional ground contra-piston which moved as smoothly and easily as an O-ring-equipped component, yet retained an effective compression seal.

Secondly, the combined oil-seal and front bearing cover is an admirable idea. It is a feature which might well be commended to all manufacturers of twin-ball-bearing engines, allowing, as it does, the adoption of more complete lubrication of the front bearing, in addition to valuable protection against the ingress of dirt and grit which are often part and parcel of a day's flying hazards.

Thirdly, the 249 B.B. resembles the Oliver Tiger (whose cylinder porting it uses in a modified form) in its desire for high nitrate content fuels. The ordinary run of commercial model engine fuels are not suitable where it is required to take full advantage of the high speed output of the unit. If the engine is loaded for speeds above, say, 12,000 r.p.m., about 4 per cent. amyl-nitrate is desirable (i.e the addition of 2-3 per cent. to most proprietary blended fuels) otherwise the engine will spit or misfire in a manner which cannot be cured by the usual remedy of increasing compression. These symptoms are similar to those experienced with the Oliver Tiger at high speeds, when there is insufficient nitrate in the fuel. This, we believe, should be a step in the right direction and towards the realisation of higher specific outputs for model diesels.

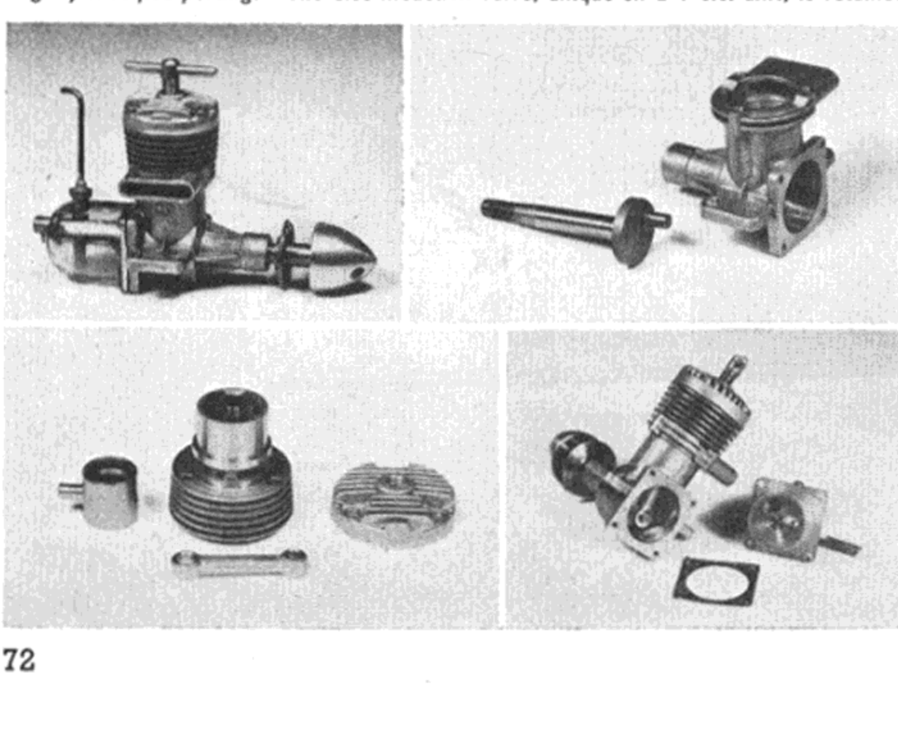
Some short time ago, George Fletcher, who was responsible for the design of the new Frog, gave us some r.p.m./prop figures, for two more new Frog engines, which were very encouraging. The first of these engines is a new 1.49 c.c. unit to replace the current Frog 150 and has clapper-valve induction. This engine should be reaching the market shortly. Details of the other engine, a smaller unit, we are not permitted to disclose at the present time.

It seems probable that the E.D. Bee 1 c.c. engine has, since its introduction in 1948, enjoyed the largest sales of any single model produced in Great Britain. The motor, unusual in its use of a disc induction valve for so small a capacity, was a success from the start and remained unaltered for almost seven years of production.

Recently, however, a " Series II " version has been introduced which, while of the same size and type, is virtually an entirely new production. Crankcase, crankcase-backplate, cylinder and cylinder head are all different and give the Bee a somewhat more " grown-up " appearance than most other engines of similar capacity.

It is a rather strange fact that the various diesels of the E.D. range have so little in common. Almost invariably we find a distinct family resemblance among the products of any one manufacturer. All the Allbon series, for example (with the exception of the original 2.8), were obviously of the same family, Javelin, Dart, Spitfire and Bambi, and, following the introduction of the Merlin in 1954, we now find the new Allbon Sabre following the revised layout. Similarly, all the American K. & B. Torpedo range are of the same basic design, as are all the German Taifun models. In other instances, various pairs or groups of engines of the same make are quite obviously related, such as are to be found in the McCoy, Super-Tigre,

The Series II E.D. Bee continues the easy starting of its predecessor, with improved performance and appearance. A one-piece cylinder with integral finning is now used, with slightly modified porting. The disc induction valve, unique on a 1 c.c. unit, is retained.

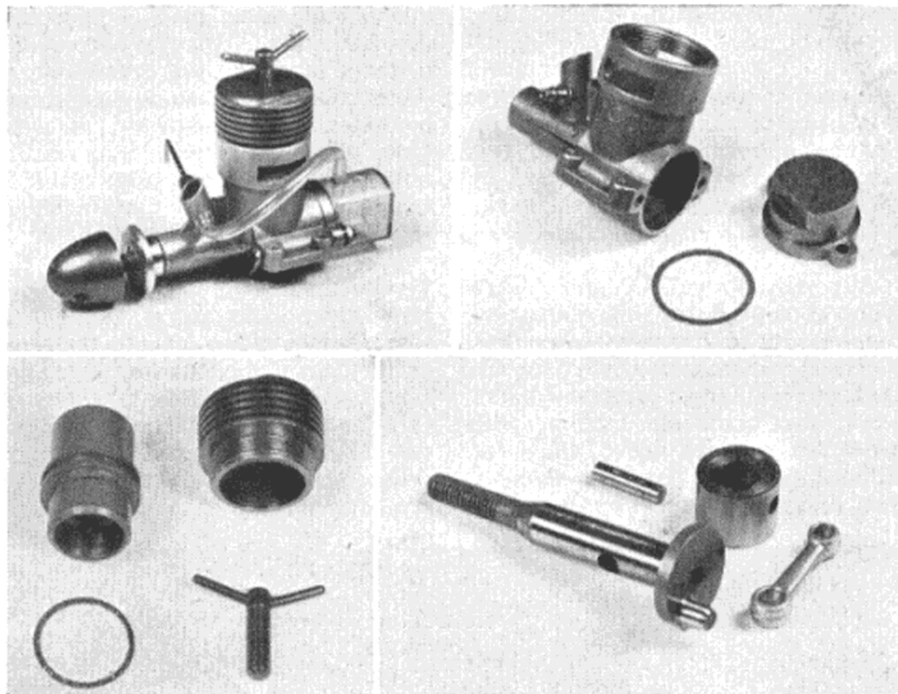


Herkimer, Mills, Frog and Elfin ranges. Not so with the seven-model E.D. range; practically every engine is quite different from its brothers.

The smallest, the E.D. 0.46 c.c. Baby, for instance, is a shaft-valve, radial-ported unit, whereas the next largest, the Bee, is a disc-valve opposed-port engine. Going further, we find that the 1.46 c.c. Hornet has a disc valve but radial porting, while the 2 c.c. Competition Special is of the 3-port type. The 2.46 c.c. Racer is, of course, a disc valve unit with radial porting and twin-ball-bearing shaft, but the 3.46 c.c. Hunter has only one ball bearing and is of the loop-scavenged type. Only the 5 c.c. Miles Special bears any direct relationship to another engine (the 2.46 Racer), it, too, being a twin ball bearing, disc valve, radial port unit.

Still more surprisingly, the engines differ even more widely in the construction methods used. There are cylinders with separate finned barrels, cylinders with integral finning, cylinders which are flanged at the base and secured with screws, cylinders through-bolted from the cylinder head and cylinders which are clamped in position by an outer barrel screwing over the crankcase. There are crankcases with screw-in rear covers and crankcases with flange-fitting rear covers, plain short crankcases and tall crankcases embodying exhaust ducts. There are internal grooved transfer passages, 360-deg. transfer passages and separate brazed-on, outside transfer passages. There are plain bearings, bushed bearings and ball bearings. There are even four distinct types of needle-valve. Almost the only feature common to all models, in fact, is beam mounting.

It was not altogether surprising, therefore, to find that no attempt has been made to closely model the new Bee on any established E.D. design. The new crankcase is a clean diecasting and includes a bronze bushed main bearing and a short exhaust duct. The back of the case is formed into a square flange against which the backplate induction unit is fitted. The crankshaft has a 7/32 in. dia. main journal, with disc crankweb and a tapered front section on which the steel prop driver is fitted.

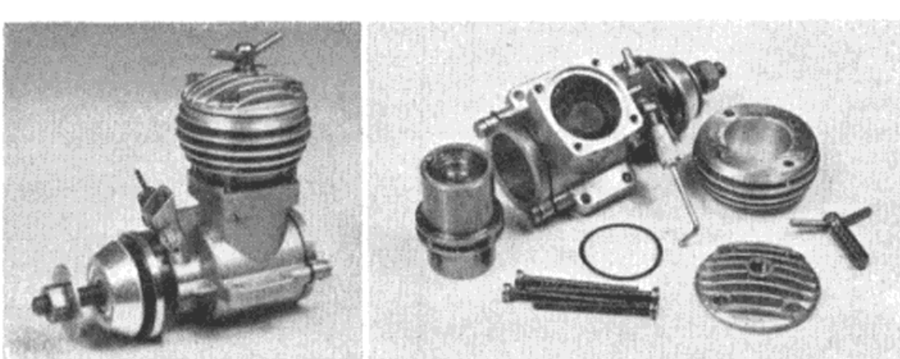


Successor to the well-known Javelin is Davies Charlton's new Allbon Sabre 1.49. As on the Merlin, machining operations during manufacture are reduced by the use of a plain cylinder liner and accurate pressure diecasting, requiring a minimum of finishing operations.

Instead of the sleeved cylinder of the original Bee, the new model has a fully machined steel cylinder with integral cooling fins. The cylinder head is now a neat diecasting with closely spaced cooling fins.

The Bee retains its easy handling characteristics, is a little more powerful in its new version and should continue to be one of the most popular small diesels.

One of the most outstanding of new British engines is the Frog 249 B.B. diesel. It combines outstandingly good handling characteristics with very good performance at exceptionally high r.p.m. A " hot " fuel is essential in order to realise the full high-speed performance of the engine



Atom, like Hornet, Wasp and Spitfire, is one of the names which engine makers seem to love and which are apt to lead to confusion due to engines of different makes and types being similarly named. Fortunately, no one seems to have laid claim to Atom for some time (there was the American Atom of 1939 and the post-war Czech Atom) except for the Atom-35 Jetex unit, so we should be able to get used to the idea of the new Atom by J. E. Ballard & Co. Ltd. Actually, of course, an Atom was announced by Messrs. Aeronautical Electronic and Engineering Co. Ltd. nearly two years ago. It appears to be this engine, in a revised form, which now appears as the new J.B. Atom.

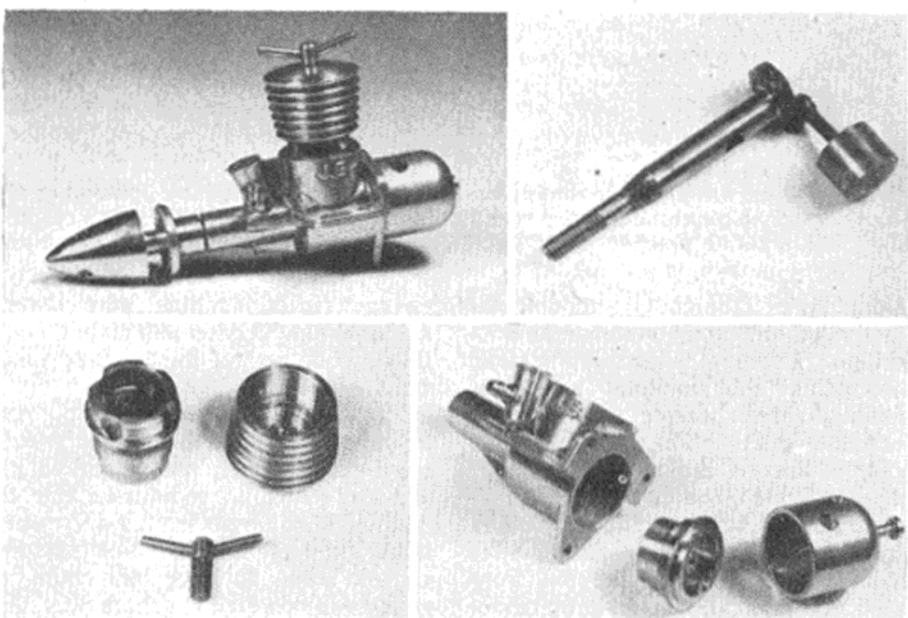
The J.B. Atom is dealt with in this month's Engine Test report and we will not therefore go into detail here. Some idea of the structural layout of the unit can be gained from the accompanying photographs. The engine is of attractive appearance, being of a natural polished aluminium finish.

The new Allbon Sabre is the second engine of what appears to be a new series by the manufacturers, Messrs. Davies Charlton Ltd., who, incidentally, have now moved their works from Lancashire to the Isle of Man. It will be recalled that the manufacture of the original Allbon engines, produced by the Allbon Engineering Co. Ltd., formerly of Sunbury on Thames and later of Bedford, was taken over about four years ago by Davies Charlton to supplement the 3.5 c.c. D.C. engines then being produced.

Although both D.C. and Allbon types were plain bearing shaft valve engines with reverse flow scavenging, construction was quite different, the D.C. 350 utilising an integral cylinder block and crankcase casting, with pressed-in cylinder sleeve, while the Allbons used the popular screw-in liner and screwed-on cylinder-barrel.

lower stroke/bore ratio), the useful provision of spanner flats across the cylinder head and the installation of the needle-valve at an angle inclined backward but not upward as well. One other difference, not readily noticeable, is that the prop driver is keyed to the shaft by mating tapers instead of a splined section.

The 1.49 c.c. Sabre continues the Javelin's ultra short stroke (stroke/bore ratio: 0.80 to 1), the actual stroke being, in fact, exactly the same as for the 0.76 c.c. Merlin, which has a stroke/bore ratio of 1.12 to 1. Continuing the Javelin tradition, too, the Sabre, we found, was a ready starter and delivered about the same power over much of the r.p.m. range.



An attractive looking 1.5 c.c. engine is the new J.B. Atom-1.5. The engine features an exceptionally short stroke (stroke/bore ratio 0.74 : 1) and a long crankshaft which gives it a squat appearance. The crank web is of a simple counterbalanced pattern and a steel conrod is employed.

Subsequent new Davies Charlton designs, the Spitfire and Bambi, continued the Allbon layout, but, in the later Merlin model, there was a partial reversion to former D.C. practice in so far as a plain liner was once again used, the crankcase extending up above the exhaust belt. However, instead of a cylinder head attached with screws, a combined finned barrel and head screws directly into the top of the main casting, clamping the liner at the exhaust belt.

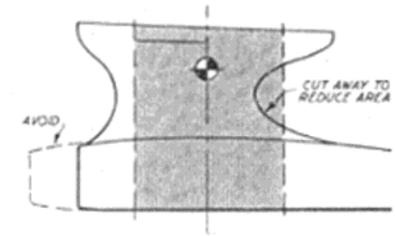
This same layout is used for the new Sabre and the structural design of the two engines is practically identical. Apart from size, the Sabre differs from the Merlin in appearance only in regard to the somewhat more squat cylinder (due to a very much

However, it was easier to start on small props, aimed at speeds in excess of 10,000 r.p.m., than the earlier models of the Javelin and, as a result, its usable r.p.m. range was considerably extended.

Unlike previous models, this new Allbon is put out in a large display-type carton, which also includes a 7 × 6 Allbon C/L prop of beech and a tommy-bar for the spinner-nut. Also included is a transparent fuel tank which is attached via the crankcase cover retaining bolts. This tank is of rather small capacity and gives a running time of about 30 sec. at a medium speed, which, however, is sufficient for most F/F applications. The weight of the new Sabre is a little more than the model it replaces and it scales $3\frac{3}{8}$-oz.

DESIGN TIPS No. 12

PYLONS

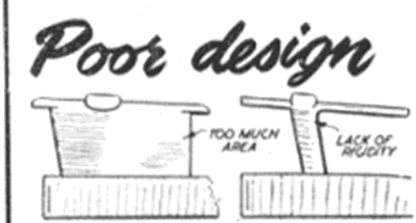


Pylon design for power duration models seems largely a structural matter. Yet despite the fact that the pylon layout, as such, is now some seventeen years old (and was actually a development of microfilm indoor layouts evolved during the mid 1930s), many modern designs infringe two basic rules.

The pylon is a method of mounting the wing high or in a "parasol" position. Aerodynamically it acts as a forward fin but, more important from the stability point of view, it is subject to side forces from the slipstream. Thus a "straight-ended" pylon, offering maximum side area, is bad from this point of view. It is good practice to cut away the side elevation as much as possible to reduce the pylon area, provided the structure is not weakened.

The shaded area on the bottom sketch will more or less cancel itself out as regards directional stability, since it is equally disposed about the centre of gravity. Cutting away the front area becomes even more important as the centre of gravity is moved farther back. Another cause of instability on many layouts is too long a nose projecting in front of the pylon.

Just as bad, or even worse in the long run, is to cut down the pylon structure so much that it is too weak to support the wing properly. Besides being vulnerable in a rough landing, a pylon mount lacking rigidity may allow the wing to twist out of alignment or change its incidence setting during flight, with disastrous results.



MODEL AERODYNAMICS No. 14

Torque reaction is an inherent feature of all propeller-driven aircraft, torque force tending to rotate the aeroplane about its rolling axis in the opposite direction to the rotation of the propeller. The value of the torque force is that being generated by the engine to drive the propeller, at those particular r.p.m.

The same engine will drive different propellers at different speeds, hence the torque figure will also be different. Knowing the actual r.p.m. and having a performance curve for the engine, the torque can be spotted on this curve—Fig. 1. Performance curves and prop-r.p.m. figures, however, are invariably obtained under static conditions. In flight, some of the load will come off the propeller and the r.p.m. will increase—usually by about 10-15 per cent. The true in-flight torque will therefore be slightly lower than the equivalent static torque. In Fig. 1 a typical torque figure of 10 ounce-inches is assumed as appropriate to an average 1-1.5 c.c. engine run below peak r.p.m.

Torque is controlled by the wings as the only readily available means of stopping the whole aircraft rotating—directly by wing lift which, in turn, is dependent on the speed of the aircraft for any given wing. Knowing the operating angle of attack for the wings and the characteristics of the section, the lift at various speeds can readily be calulcated—Fig. 2. Models under power generally fly with the wings at a low angle of attack when, for a 250 sq. in. wing and a C_1 value of 0.7, about 15 ounces of lift would be generated at a flight speed of 25 ft./sec. The formula given for lift gives lift in ounces for S in sq. in. and V in ft./sec.

At a slower speed, say 20 ft./sec., the lift for the same wing at the same angle of attack would be only 10 ounces. Increase the speed to 30 ft./sec. without altering anything else and the lift would be 20 ounces—Fig. 3.

Thinking of the wing only—Fig. 4—and assuming it to be 40 in. in span, the 15 ounces total lift generated (at 25 ft. per second) would be shared equally by the two halves—7.5 ounces lift each side—on a flat wing. With a dihedralled wing the same applies, only the lift force on each wing is perpendicular to the wing surface and this inclined inwards slightly. There is thus a slight loss of effective *vertical* lift, but unless the dihedral angle is particularly large (above about 12.5 degrees), this can be ignored.

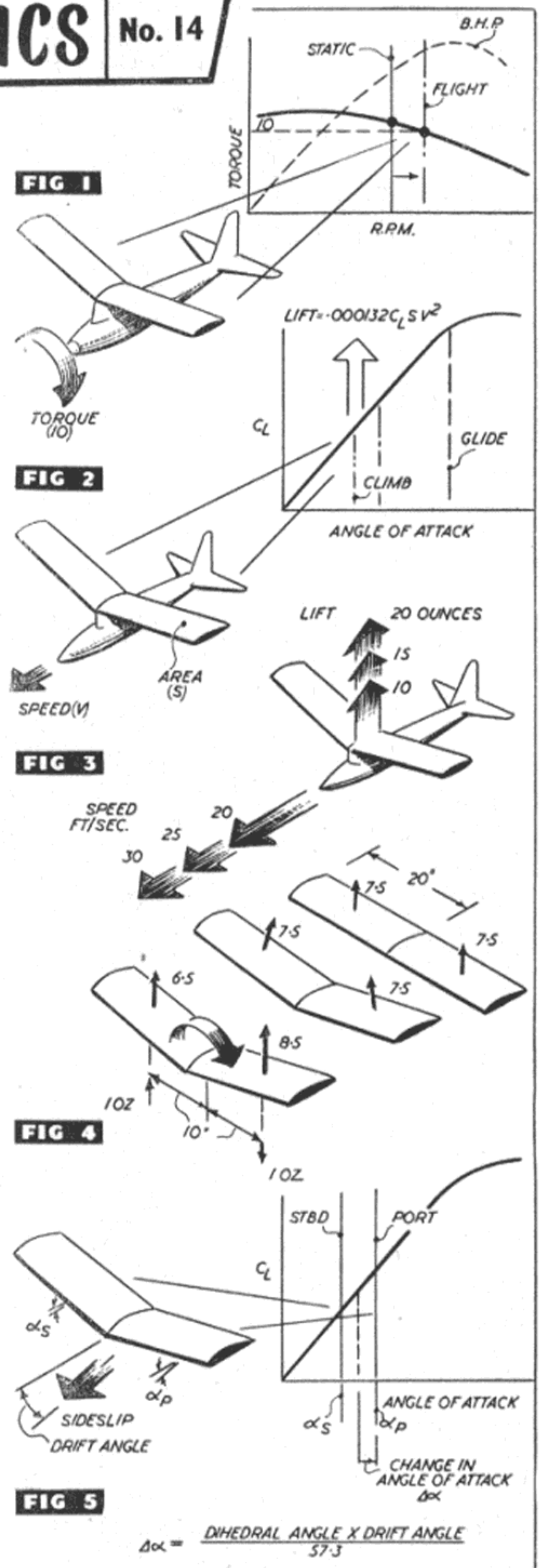
Applying a torque force to the system to be absorbed by the wings immediately unbalances the lift loading. The 10 ounce-inch torque figure originally chosen is equivalent to hanging a one ounce weight 10 in. out on the port wing, and pushing up the starboard wing with a force of one ounce, again 10 in. from the centre line. To keep flying level with this applied torque force the port wing must now produce 8.5 ounces of lift and the starboard wing only 6.5 ounces lift, for the same total (15 ounces) lift.

This it can only do if the wing is skidded sideways, when dihedral effect comes into play to *increase* the effective angle of attack on the inner wing and decrease the effective angle of attack on the outer wing. The overall effect in a skid is therefore that the starboard wing, as illustrated, is now operating at a lower lift coefficient and the port wing at a higher lift coefficient (at α s and α p degrees angle of attack, respectively, on the graph), the effective change in angle of attack (from the original condition) being such as to produce the required asymmetric lift from the wings. The change in angle of attack ($\triangle$) α is dependent on both the dihedral angle and the drift angle—if the former is small the latter must be large for the same overall effect, and vice versa.

Mathematically $\triangle \alpha$ can be expressed as dihedral angle (in degrees) times drift angle (in degrees) divided by 57.3. Thus using the figures previously quoted and assuming a dihedral angle of 10 degrees—

$$\triangle \alpha = \frac{10 \times \text{drift angle}}{57.3}$$

Where $\triangle \alpha$ is sufficient to give an effective change in lift of one ounce at 25 ft./sec. with a 250 sq. in. wing, i.e. a change in lift coefficient of around .05 or a matter of probably less than something like half a degree. Thus the drift angle resulting equals 57.3 x .5 divided by 10, or approximately 3 deg. Dihedral, in other words, is most effective as a means of torque control.



PHOTONEWS

WE have always had a sneaking feeling that a pretty girl and a model aeroplane go well together and photo **No. 1** provides ample confirmation. The model (brunette) is Miss Barbara Robson, the model (aircraft) a *Tiger Moth* built by R. G. Grimes of Acton. The " Tiggie " was built up from a Mercury kit and the power unit is to be a Mills 0.75.

Robust-looking team racer in photo **No. 2** is a modified *Philibuster* built by R. Nichols of Chester, and the power comes from an American Dooling 29. Colour scheme is a deep red fuselage, with wings finished with yellow Aerolac.

Still up north we cross over from Chester to Liverpool for the builder of the plane shown in photo **No. 3.** Norman Peacock designed this model for use as a flying test bed, and preliminary tests in its form as shown here resulted in very satisfactory results. It has a good sports performance, and for a low wing job has a fair rate of climb on full revs. from the Amco 0.87 c.c. engine.

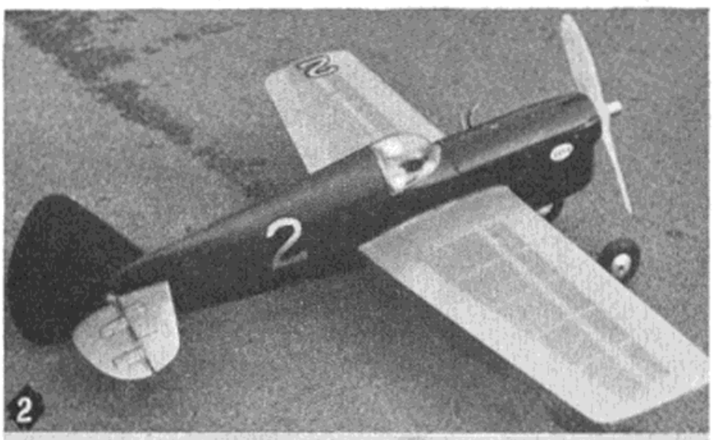
Photo **No. 4** shows a fine scale model of the amphibious Republic *Seabee*. Photographed in its natural surroundings it looks most realistic, and, in addition, is a good flier. Builder is P. Babb, junior member of Northwick Park M.A.C.

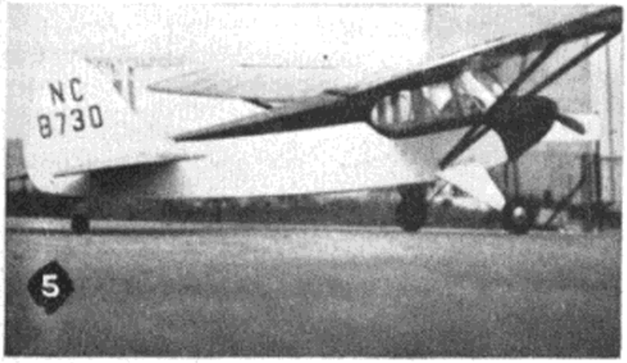
Photo **No. 5** shows the results that can be achieved with a kit of the Piper *Super Cruiser*. Builder is David Howard of Swindon, who tells us that the model flies convincingly on the power of its Allbon Dart diesel.

Another young lady (we're doing well this month), Miss Sheila Cameron, is one of the principals in photo **No. 6.** The other is the *Moose* A/2 built by Jeffrey Roderick from a Paramount kit. The A/2 has a span of 69 in., and we regret that no details of the other model are available for publication.

Colourful C/L model of the Grumman *Bearcat* in photo **No. 7** is by C. Paschmann of Germany. Power unit is a Webra Winner. Wilfried Kroger of Oelingrath, Germany, sent us the photograph. Incidentally, for readers wishing to build their own *Bearcat*, plans are available in the M.A. range. M.A.214 is a super-scale C/L version designed by P. M. H. Lewis.

Believe it or not, the Erco *Ercoupe* in photo **No. 8** was built from a 3s. 6d. kit, and intended (by Eddie Keil) for rubber power. Patrick Dunne of the Dublin M.F.C. had other ideas and installed an





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E.D. Bee, which drives a wooden 7 × 6 in. prop. Speed is in the 40 m.p.h. plus class. The fully detailed cockpit contains a scale pilot, seats, etc., and the colour scheme is silver with red trim and black lettering. Patrick must be something of a craftsman, for G. F. Woodworth, who sent us the picture, tells us it is only his (Patrick's) third-ever model and it "flies a treat." In addition, it took first place in the last contest of the season at Baldonnel Aerodrome in October.

From the stable of C. L. Halloway comes the class "A" team racer in photo **No. 9.** Its Oliver Tiger III takes it round at approximately 85 m.p.h. using a Tornado "Plasticate" 7 × 9 in. prop. Span is $21\frac{1}{2}$ in. and the overall length $15\frac{1}{2}$ in. The model divides down the centre line, two bicycle spokes providing the retainer "pins." Gig Eifflaender was responsible for the fine spinner, which was turned from solid dural and is $1\frac{3}{8}$ in. dia. × $1\frac{3}{4}$ in. long. Attractive colour scheme is white with a rich red top decking. The model is flown on 46 ft. 8 in. lines by Peter Banks who, like the builder, is a member of the Wimbledon Power Club. Man behind the camera for this shot was Don Keeley.

Finally, we have another Mercury kit *Tiger Moth*. Built by G. E. Spicer of Hove, this 33 in. span model is powered by an Allbon Dart, and features full cockpit detail and various other "refinements" such as walkways, navigation lights, etc., and is finished in R.A.F. training colours.

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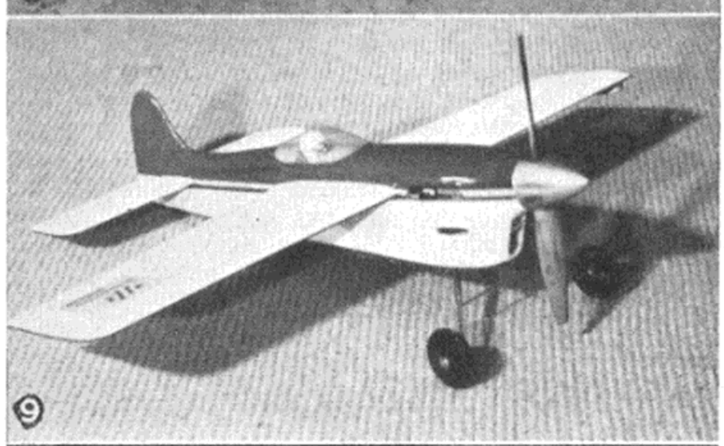

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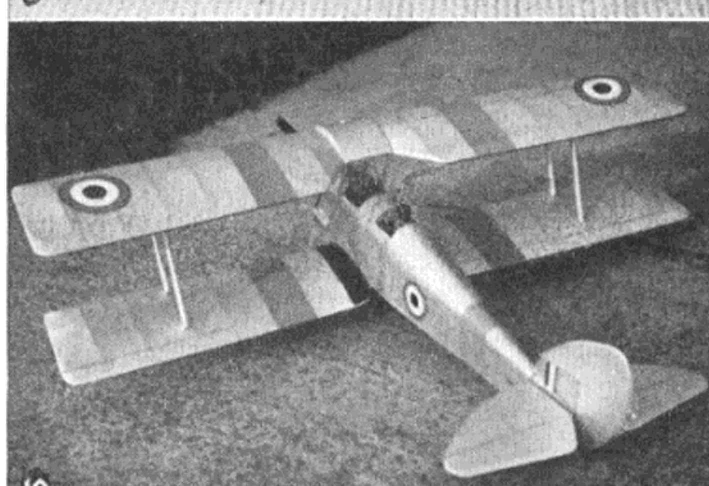

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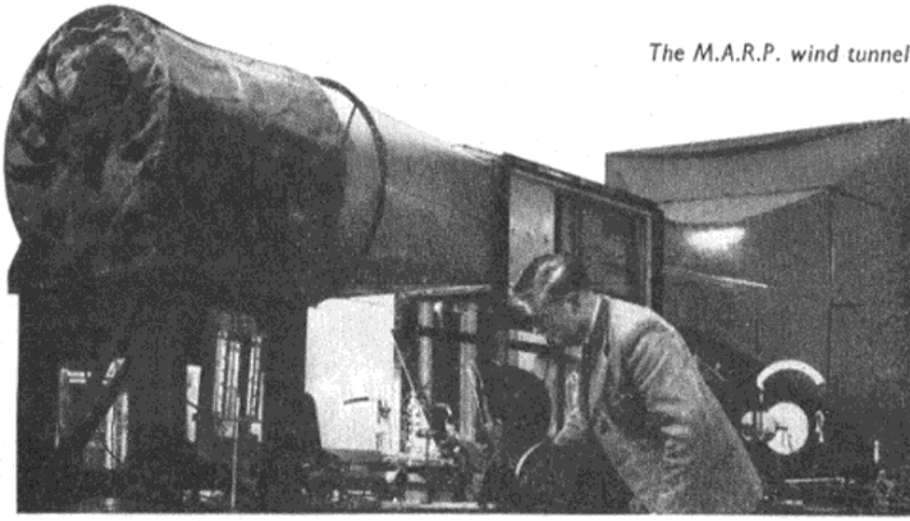
SUMMARY OF RECENT M.A.R.P. REPORTS



The M.A.R.P. wind tunnel.

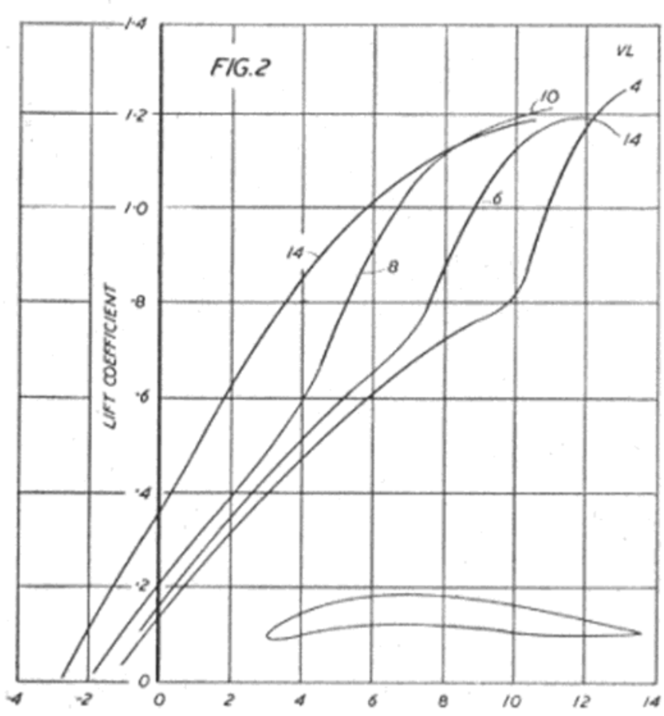
RECENTLY issued reports of the M.A.R.P. cover tests on two aerofoil sections at low Reynolds' numbers, i.e. at typical model speeds, and the results of some F/F glide tests which have yielded some extremely interesting results.

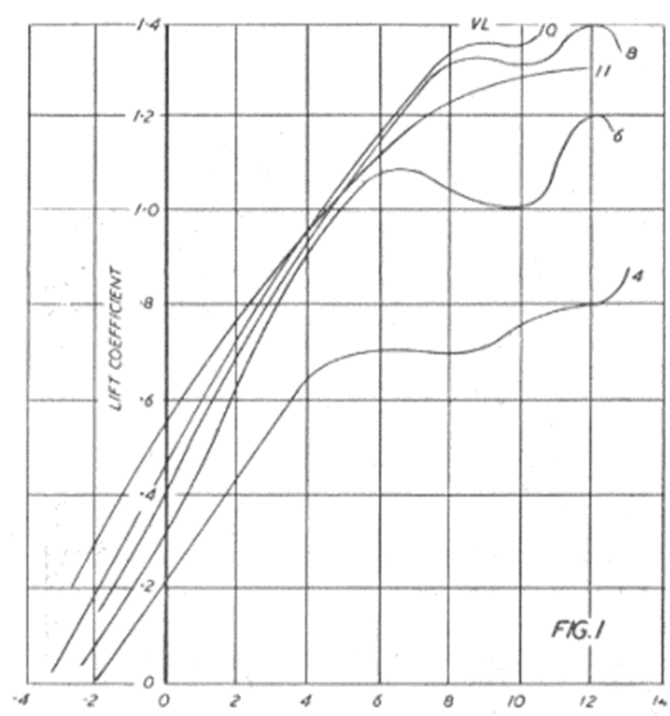
The two aerofoil sections concerned were the Sigurd Isacson 64009—a highly popular duration-type section—and a specially developed shape known as the M.A.R.P. 6309e designed by M. M. Gates. Both were tested in the 16 in. square low turbulence wind tunnel at Battersea Polytechnic, built-up models being employed of 16 in. span and 4 in. chord, with rib spacing at approximately 1-in. intervals, and covered with normal doped tissue.

Tests on the Isacson[1] section showed that with increasing aerodynamic scale (i.e. increasing VI or, since the " I " dimension was fixed by the size of the model, increasing V or airspeed), the lift characteristics of the section were quite different—see Fig. 1. The very much earlier breakdown of the airflow and stall at low VI (i.e. small chord and/or low speeds) is particularly marked and the test data would appear to indicate quite clearly that this particular aerofoil is unsuitable for applications where the product of airspeed (V) and chord (I) is less than about 10.

Above this value the maximum lift obtained is very good. In fact the pointed leading edge of the section appears to act as a turbulator at high angles of attack, delaying the stall. However, drag values also tend to rise with increasing VI which again is thought to be a characteristic of the pointed leading edge and this type of section would probably have excessive drag, as compared with a more round nose section, at VL values above 20. A VI value of between 10 and 20 is therefore the optimum range for this section, and probably most pointed nose sections of similar layout.

The 6309e was specially designed to obtain a low critical VI number[2], i.e. in an endeavour to produce a section which would remain efficient at low speeds and in small sizes. It was based on a standard NACA 4-digit section with the nose thinned to accommodate a small leading edge radius, accompanied by an appreciable thickening of the trailing edge—certainly a definite advantage from the structural point of view, compared with many other thin sections.





Again the sharp leading edge appears to act as a turbulator, effective in producing a lowering of the critical VI at high incidences. In other words, although the critical VI at low incidences is about 10, this is roughly halved at high incidences, which is a normal duration glide trim.

The section has also shown itself to be quite stable, tested on two tailless powered models, and rather less critical on VI range than a number of other model aerofoils. Its maximum lift, however, is a little on the low side, although this might be offset in practice by its reduced sensitivity to gusts, as shown by the quite gentle slope of the lift curve—Fig. 2.

A series of flight tests conducted by S. Hinds[3] with a glider model fitted with a 48 × 4 in. wing, NACA 6409 section, 25 per cent. NACA 6409 tailplane and balanced at mid-chord (wing) led to the rather startling discovery that the aircraft had two distinct sinking speeds, depending on atmospheric conditions. Quite obviously, sinking speed was also dependent on loading, and typical figures were extracted for total weights of 4.5, 8.5 and 12.5 oz., in turn, but the *respective* averages for sinking speed were anything up to *twice as great* in dead, damp air as in non-thermal but slightly gusty air—Fig. 3. All flights were timed as the consistent average from a 50 ft. tow launch, the odd results appreciably different from the mean being neglected entirely.

The author puts forward as the most probable explanation of this phenomenon the suggestion that the airflow was laminar in the dead air conditions whereas turbulence in the air under the "gusty" flight tests in turn gave a turbulent airflow over the model with less separation and consequently greater efficiency. Less probable explanations considered were the possibility of "dynamic soaring" effects in gusty air; the damp air smoothing out minute fluffiness on the tissue covering and removing possible sources of turbulation; and the very remote possibility of wave lift—the latter seemingly so remote that it can scarcely be considered a possibility.

Quite possibly, indeed, the explanation may have been even simpler—such as the natural circle of the model being greater in calm air, and thus the sinking speed naturally higher for the same trim. Gusty air would, in any case, tend to open out a natural circle, equivalent in effect to increasing the elevation. The method, as explained, specifies sinking speed as independent of the flight pattern; but as duration fliers will confirm, the glide circle often has a pronounced influence on the sinking speed of the model.

The second series of flight tests was conducted in the United States by Gilbert Hoffman[4], again using a glider model launched by catapult indoors, in a gymnasium. The inclination of the catapult was adjusted to launch the model at its correct flying speed and gliding angle. Height of launch was 5 ft. in each case and although the possibility of ground effect is mentioned (in theory, at least, appreciable ground effect must have been present) its influence could not be detected in terms of observed flare out or flattening of the glide.

Accuracy obtained with these tests was of the order of plus or minus 4 per cent. in glide ratio. An appreciably greater accuracy was obtained by fitting a small light to the model and tracking its path with a camera. This second method showed up any variations from steady flight condition.

Reynolds' number of the model ranged from 40,000 to 60,000, wing chord being 5 in. (section LOC-2) and speed of flight altered by adjusting the tailplane trim. The data were presented as polar curves (lift coefficient squared plotted against drag coefficient) and are remarkable for the break at a lift coefficient of about 0.93—Fig. 4. Strangely enough a similar phenomenon was observed by Dr. Lippisch in some wind tunnel tests on NACA 4612 at Gottingen some 30 years ago at similar R.N.

Despite the obvious limitations of the method of testing, however, these F/F data do show good conformity with the M.A.R.P. wind tunnel tests on the section, particularly confirming the *decrease* in drag coefficient which occurs with increasing lift. Also of interest is that the drag at *low* lift coefficients (high flight speeds) is amazingly high.

References

1. M.A.R.P. report: Aerofoil characteristics at low Reynolds' numbers (1).
2. M.A.R.P. report: Aerofoil characteristics at low Reynolds' numbers (2).
3. M.A.R.P. report No. 17.
4. M.A.R.P. Technical Note No. 3.

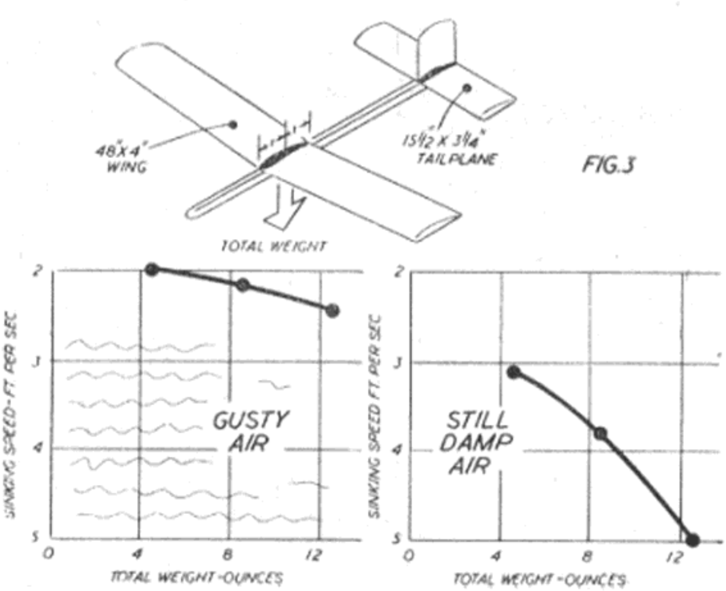


FIG.3

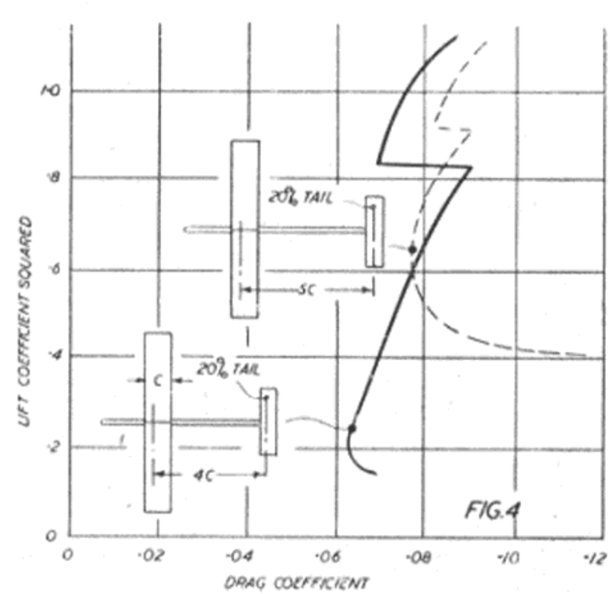


FIG.4

SUPPLEMENTARY ENGINE REPORTS

In addition to the full E.T. reports, we are presenting these condensed reports on some of the other interesting engines which have come into our hands

THE FUJI 0.049 c.c.

The Fuji 0.049 is an inexpensive Japanese engine built to conform to the American "Half-A" class for engines of up to 0.05 cu. in. (0.8 c.c.). In Japan it costs only 1,200 yen—about 25s.—although prices elsewhere are substantially higher for all Japanese engines.

In general appearance, the engine is similar to the popular American 0.049 cu. in. models, except that not so much attention has been paid to external finish. The engine is by no means "rough," however. Internally, the piston and cylinder have an excellent surface finish and the crankshaft is a good fit in the bronze main bearing. An uncommon feature of the engine is the all-steel one-piece cylinder, comprising cylinder, cooling fins and head all machined in one unit. It is, of course, most unusual for manufacturers not to use a detachable cylinder-head.

The engine obtained for test had a radial mount crankcase. Current models, however, are now also available in a beam mounting version.

Type

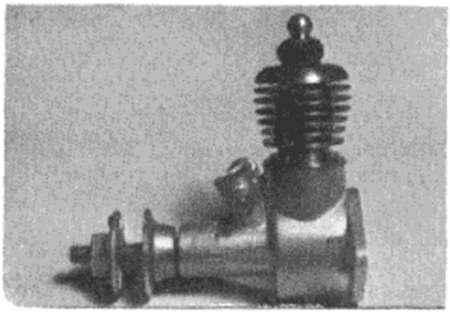
The engine is of the single-cylinder, air-cooled, two-stroke cycle, glowplug ignition type. It has rotary valve induction via the crankshaft main bearing, twin opposed exhaust ports and twin transfer grooves. The piston crown is of a shallow conical formation. Sub-piston supplementary air induction is employed.

Dimensions

Bore: 10.2 mm. (0.4016 in.); stroke: 10 mm. (0.3937 in.); swept volume: 0.817 c.c. (0.0499 cu. in.); height (to top of cylinder): 1.84 in.; length (to rear face of prop) : 1.65 in.; weight: 1.45 oz.

General Data

Aluminium alloy pressure diecast crankcase in unit with main bearing and carburettor intake. Screw-in crankcase rear cover. Counterbalanced crankshaft running in bronze main bearing. Diecast propeller driver fitted on matching crankshaft taper. Prop driver and washer have large diameter faces to grip prop securely without damage. One piece steel cylinder and head with integral cooling fins, screwed into crankcase. Lapped steel piston with pressed-in gudgeon pin. Turned steel connecting rod. Spray-bar type needle-valve.



Performance

In general, the Fuji 0.049 behaves somewhat similarly to the popular American baby glowplug engines of similar capacity. However, the Japanese glowplug supplied is, like many Jap plugs, of the 2-volt type and requires a full 2 to 2.2 volts to start. The best starting procedure was found to require an exhaust port prime and, even when hot and restarting after a run, a prime was still found to be a more positive than the normal choke and flick method. The needle-valve was fairly critical, despite the exceptionally fine thread adjustment used. The engine would run over quite a wide range of settings, but careful readjustment to find optimum settings gave a useful increase in performance.

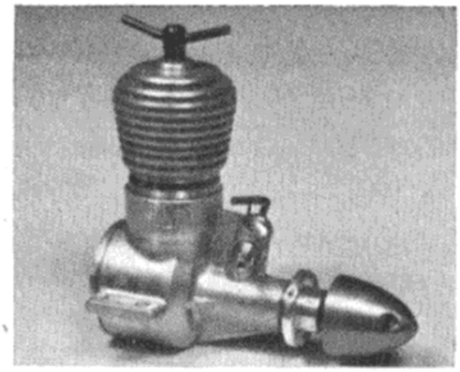
Tested on the torque reaction dynamometer, the maximum torque delivered was 3.8 oz. in. at 8,000 r.p.m.—equivalent to a b.m.e.p. of just over 30 lb./sq. in., which is a normal figure for glowplug engines of this size and type. Torque declined steadily as r.p.m. were increased and resulted in a maximum b.h.p. of 0.041 being reached at 13,200 r.p.m. A fuel consisting of 60 per cent. blending methanol, 25 per cent. castor oil and 15 per cent. 2-nitropropane was used. On a 6 × 4 plastic propeller, the engine reached 11,400 r.p.m.

TAIFUN RASANT

The Taifun Rasant is one of the three main production units of the German Johannes Graupner firm and, with its companion units, represents the latest development of this now well-known German marque.

Some ten different Taifun models have been produced. With the exception of the disc-valve Taifun Meteor 2.5 c.c. and Taifun Super 3.5 c.c. models, all have been of the shaft-valve, radial ported cylinder pattern and a definite family resemblance is evident. In the current three models, however, substantial modifications to structural design have been made.

These, in the main, concern the cylinder design. A screw-in liner is



now used, in common with the majority of diesels of this class. The liner is flanged in the region of the exhaust ports and a copper gasket is used to make the joint between the flange and the top of the crankcase. The finned alloy cylinder barrel and head is then screwed over the upper section. The present engines employ the original Arden-type circumferential porting system.

Type

Single cylinder, air cooled, two-stroke cycle, compression ignition. Rotary valve induction via crankshaft main bearing, with sub-piston supplementary air induction. Reverse-flow scavenged cylinder using four exhaust ports and four internal transfer grooves, with conical piston crown and matching contra-piston.

Dimensions

Bore : 14 mm. (0.5512 in.). Stroke: 16 mm. (0.6299 in.). Swept volume: 2.463 c.c. (0.1503 cu. in.). Height to top of cylinder: 2.6 in. Length, rear face of prop to backplate: 1.9 in. Diameter of prop driver boss: 10 mm. Weight: 3.5 oz.

General Data

Pressure die-cast aluminium alloy crankcase and main bearing. Screw-in type cylinder liner of chrome-nickel steel. Cast-iron piston with pressed-in gudgeon-pin. Connecting rod machined from duralumin. Alloy steel crankshaft running in plain bearing. Machined duralumin finned cylinder barrel and spinner nut colour-anodised blue. Spray-bar type carburettor with inclined needle-valve assembly. Beam mounting lugs.

Performance

Of the two 2.5 c.c. Taifun models, the Rasant is the "free-flight and general purpose" engine, being cheaper and simpler than the twin ball-bearing Tornado model. Some indication of the progress made in the development of the Taifun engines is, however, apparent when one discovers that the Rasant can equal or surpass the performance of the earlier disc-valve ball-bearing Meteor model of the same capacity.

The maker's claimed output for the Rasant is 0.23 b.h.p. at 12,000 r.p.m. and the test of our particular engine confirmed this figure.

WORLD SPEED RECORD ATTEMPT

Ray Gibbs sets new record with 129 m.p.h.

WITH his claim for a C/L world speed record for the 5.0 c.c. class made at the All-Britain Rally, and now a new record for the 2.5 c.c. class awaiting ratification, Ray Gibbs' record-breaking efforts may almost be described as prolific.

His first attempt on the 2.5 c.c. class record was made at Heston Aerodrome on December 4th when he achieved 123.5 m.p.h., thus establishing a new British record. At the time it was hoped that this would also qualify as an F.A.I. international record, but it was not to be. The following day it was learned that a Czech had flown a model at over 200 km.h.

However, when the first attempt was made it was believed that the F.A.I. rulings for line thickness were applicable, but it was later established, when it was known the Czech used 0.006 in. lines, that no lower limit on line diameter exists for record breaking. Consequently, Ray Gibbs made a further attempt on December 18th, using 0.008 in. lines and attained just over 129 m.p.h.—a magnificent achievement.

Of no lesser importance, of course, was the power unit—a Carter "Nippy I." This engine, a one-off job, was designed and built by Fred Carter, a watchmaker by profession—which perhaps underlines the amount of craftsmanship incorporated in its construction.

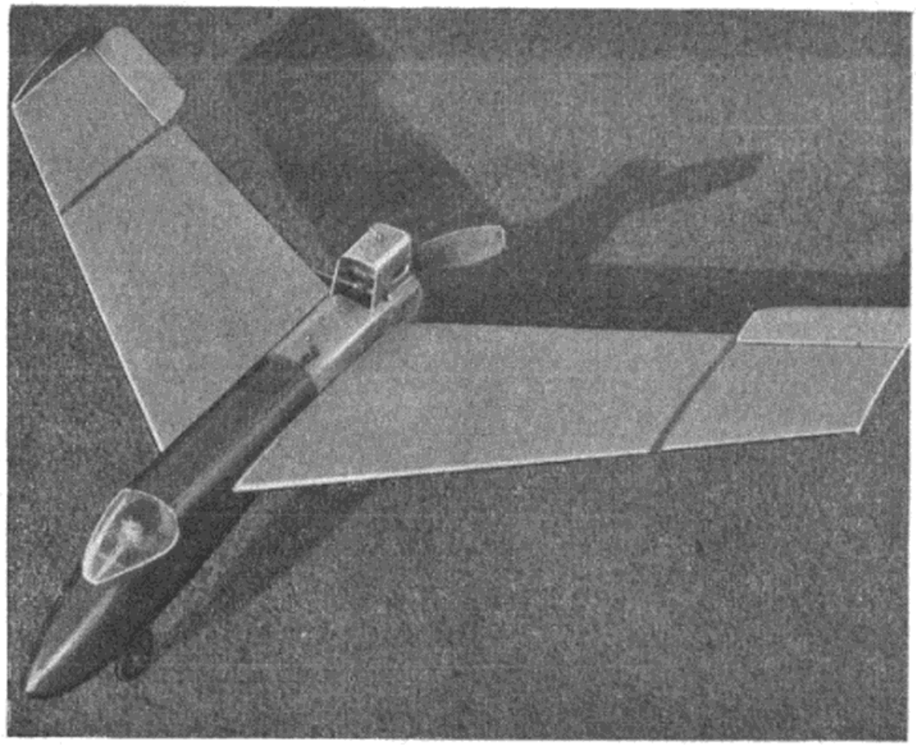
Top: The model, which follows conventional speed design layout.

Centre: Ray Gibbs with Fred Carter, designer of the engine.

Below left: Watched by Fred Carter, Ray Gibbs re-assembles the model in readiness for the attempt.

Below right: Timekeepers all—C. S. Rushbrook, Henry J. Nicholls and Ken Brooks.

NIMBUS



A SUCCESSFUL CLASS 'B' TEAM RACER WITH STRIKING CONTEMPORARY LINES

by H. F. Wilde

Wings

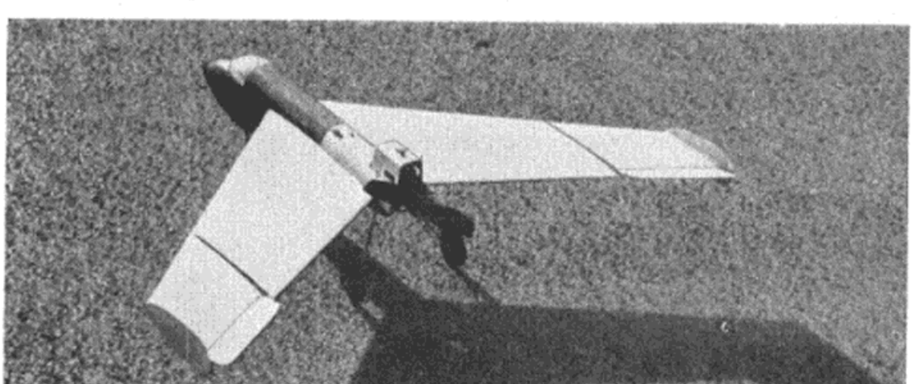
COMMENCE by building the wing. The trailing edge is of two laminations, one grooved to take the 16 S.W.G. elevator wire. Cement together with a piece of 16 gauge wire in position, rotate and withdraw before cement sets, then sand to dimensions indicated on the plan. Ribs are made by the block method; cut the hole for the wing tongue in the root rib only.

To assemble lightly cement leading and trailing edges to two $\frac{3}{16}$ in. thin balsa battens over the plan; packing will have to be inserted under the front and back edges to preserve the wing section. Cement in the $\frac{1}{8}$ in. wing tip and remove from plan, then cement wing ribs in place. Push wing tongue in place and cement balsa packing pieces top and bottom (not at sides). These packing pieces are to be flush with the outline of the ribs. Make sure the tongue is level in the wing on the building board before the cement sets, and remove the tongue. Remove batten from wing and cover with $\frac{1}{16}$ in. medium sheet where indicated. Push elevator wires in place, bind and solder elevator brace in position. Make holes in elevator tabs and cement in place. Being a symmetrical section the second wing panel may be built straight off the plan as with the first.

The fuselage crutch is built up of two laminations of $\frac{1}{4}$ in. medium sheet, upper lamination back to *F4* and lower back to *B*. Cement the bearers in place and clamp while drying—double cementing here is a "must." Holes are cut through the $\frac{1}{8}$ in. side strips for the wing tongue, and leading and trailing edges of wing. In the bearers, drill holes for engine, bellcrank, and elevator wires (these will have to be slots $\frac{1}{2}$ in. wide in order to pass the cranks through). Push wing tongue through crutch. Try the wings in position before attempting to cement in place, and check elevator wire; for full working. To fit wing, push the elevator crank through the slot hole first and then ease the wing on to the tongue and press home.

Fuselage

Fix F2 and the plywood nosepiece in place, then F1. Fix bellcrank and push rods, check for free working. Fix F5, bottom of fuselage and supporting strips. Fix the nosewheel and cement the fuselage sides on except at F1—here the sides must be soaked with water before holding in place with a strong rubber band.



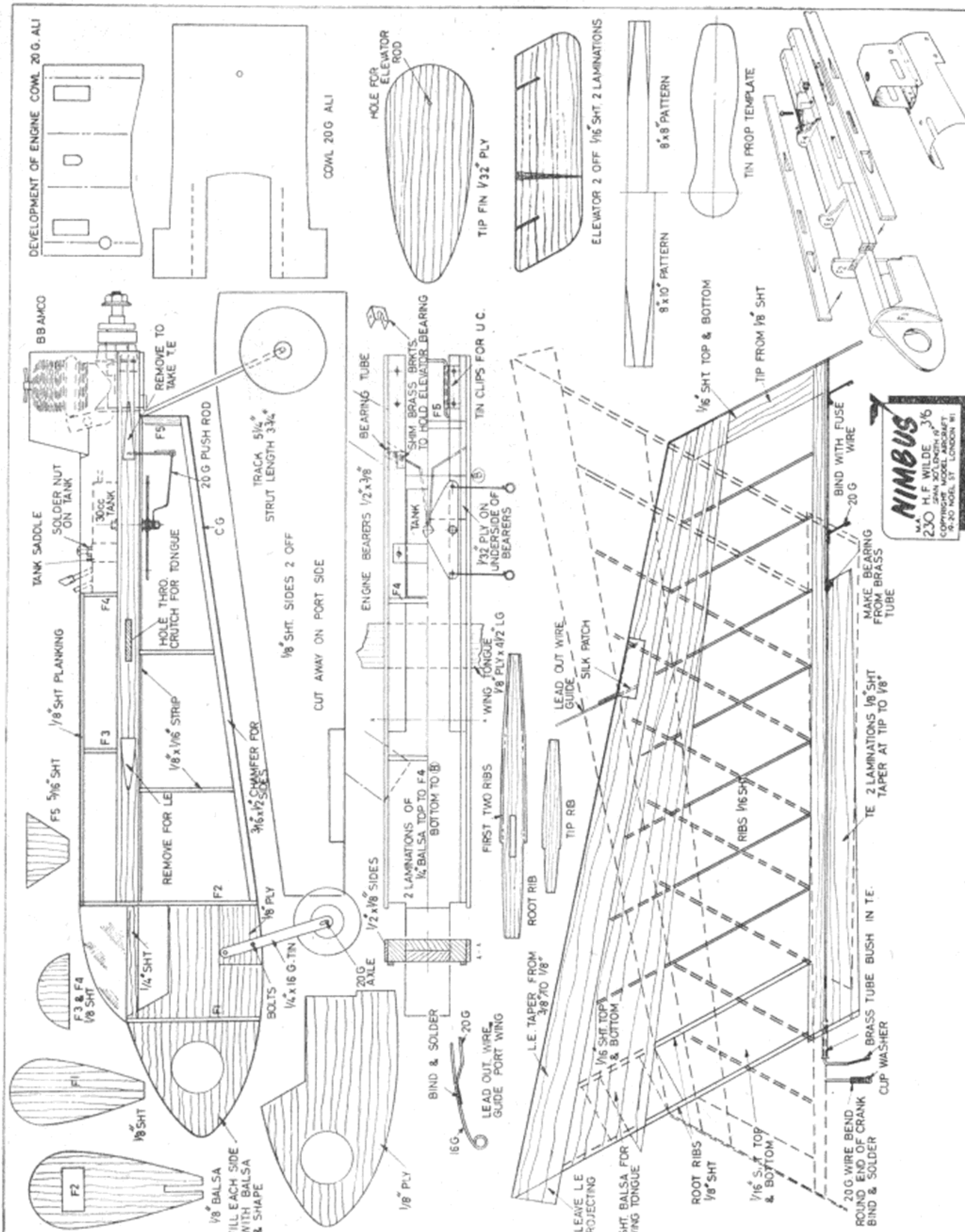
Spot cement the nose blocks on each side of the nosepiece curve and sand to shape. Remove and hollow out to about $\frac{1}{8}$ in. thickness. Cement back in place and hollow out top of cockpit for pilot. The cockpit cover on the original is the rear half of a bubble canopy.

The dural cowling is bent to shape from the outline shown on the plan and the engine cowl riveted in place.

As left-handed props are unobtainable one will have to be carved from birch or beech. Make a rough blank, drill for the shaft, make the tin half-prop template, and bolt in place. Clamp in a vice and remove surplus wood round the template with a rasp, swing the template round to the other side and repeat the process. After chamfering the ends as per the plan, rough out with the rasp and finish with scraper and sand paper.

From first flight let the model run half a lap before easing off the deck.

Colour scheme: Wings are covered with heavyweight Modelspan, with two coats clear dope, finished with two coats of silver. Fuselage has one coat of sanding sealer, then covered with lightweight red Modelspan and two coats of red dope.



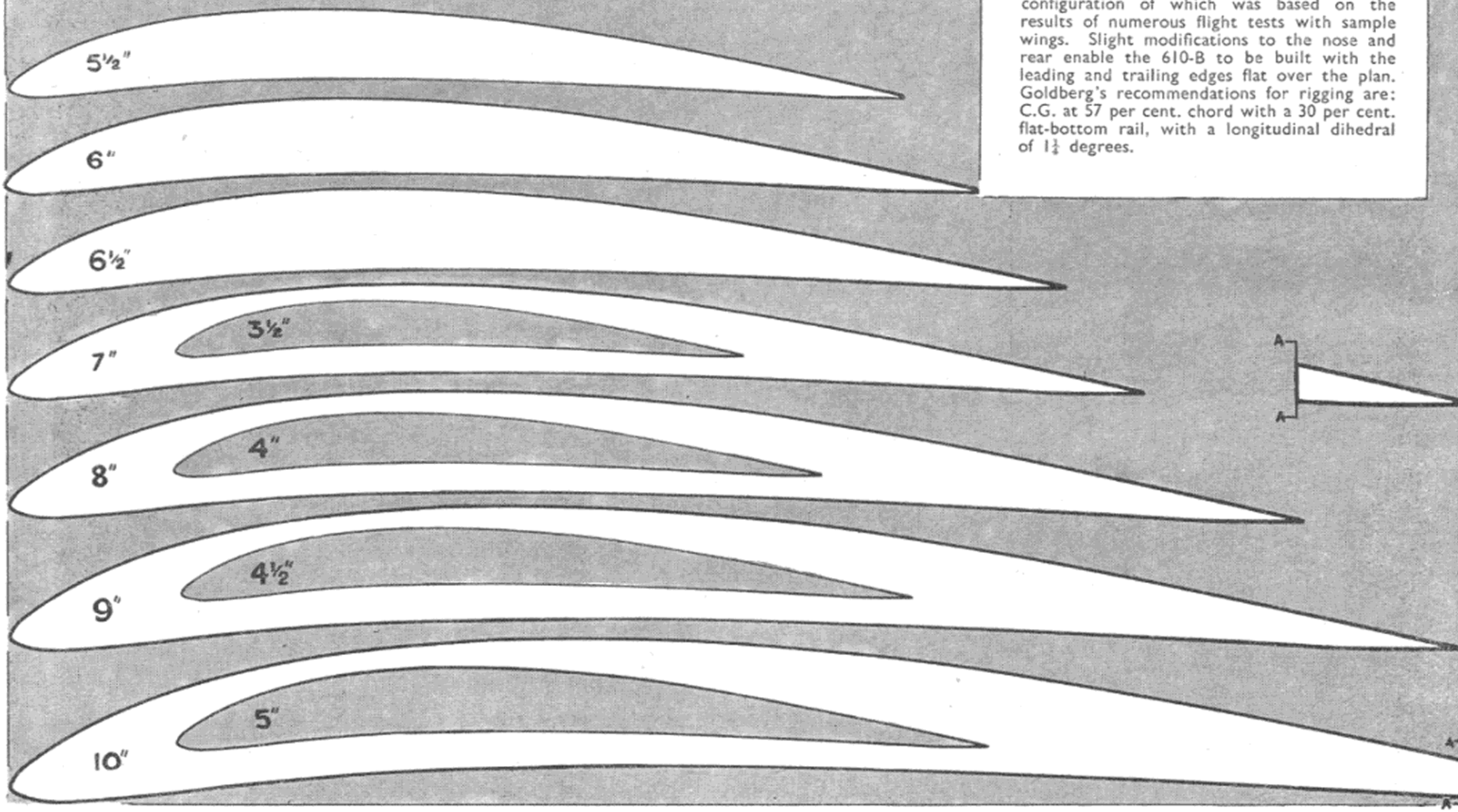
FULL SIZE WORKING DRAWINGS ARE OBTAINABLE FROM YOUR LOCAL DEALER, OR BY POST FROM THE "MODEL AIRCRAFT" PLANS DEPARTMENT 19-20, NOEL STREET, LONDON, W.1, 3s. 6d., POST FREE

STATION	0	2·5	5	10	20	30	40	50	60	70	80	90	100
UPPER	1	3·7	5·0	6·7	9·0	9·8	9·8	9·1	7·9	6·3	4·3	2·3	0·0
LOWER	1	0·0	·1	·7	1·5	1·9	2·0	1·9	1·6	1·2	·7	·1	0·0

GOLDBERG G-610-B

Pioneer of the pylon model, Carl Goldberg has remained in the forefront of power model designers for nearly twenty years.

The G-610-B is a modern adaption of Goldberg's original and well proven section, the configuration of which was based on the results of numerous flight tests with sample wings. Slight modifications to the nose and rear enable the 610-B to be built with the leading and trailing edges flat over the plan. Goldberg's recommendations for rigging are: C.G. at 57 per cent. chord with a 30 per cent. flat-bottom rail, with a longitudinal dihedral of 1½ degrees.



Club News

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

WEST OF SCOTLAND AREA

The West of Scotland Area, as a whole, seems to have died off as far as active flying goes. The only members present at any contest now consist of Lanark M.F.C., J. Findlayson from Glasgow S.A., and the dyspeptic Ayrshire Individuals (see MODEL AIRCRAFT, December 1955), who, by the way, are still doing very nicely, thank you. Perhaps the rest of the boys are busy on these 90 m.p.h. F.A.I. racers or 3-min. A/2s, but somehow we doubt it.

Of recent contests the aforesaid dyspeptics, have, as usual, been heading the results sheets with B. Harris of Prestwick topping area M.E. cup results and clubmate R. Sleight a fortnight later returning best area K.M.A.A. times. On the same K.M.A.A. day, R. Parsons, also a dyspeptic, topped power results followed by J. Muir, R. Cunningham, and R. Sleight in that order.

J. Findlayson has been robbed of his cherished position as Area Rubber Champion by W. N. Cliff. R. Parsons works out over the year as Power Champ., and B. Harris as Area Champion and Glider Champ.

At the recently held Ayrshire Gala, Prestwick added to their formidable collection of silverware by B. Sichi winning the Scale Shield, in addition to the club retaining the team trophy and all individual trophies.

BRIGHTON D.M.A.C.

Alan Mussell, the club's most prolific builder, has completed the Mk. III version of his *Kismet* and flying trials show it to have an even better performance than the Mk. I with which he gained a place in last year's power team. A second one is nearly complete as well as a new PAA-Load job. Joe Kay is building a *Swiss Miss* and Peter Brown two new *Fifteens*.

The Boxall brothers have been doing a spot of slope soaring and have been up to the Devil's Dyke to act as timekeepers to Graham Gates of the Southern Cross A.C. in his attempts on the British H.L. Lightweight Glider record.

CHEADLE M.A.S.

At the power and A/2 trials our hot favourites, Archer, Ross, and Green, met trouble down wind, eliminating their chance. Bill Archer's new Eifflaender 2.49 model started a cattle stampede with devastating results. Fred and Harold both lost their first line models.

In A/2 Messrs. Skerner, Cordrey and Evans all lost their first line models miles down wind, Garth's being his favourite 1952 vintage *Red Herring*. Despite this setback he dug out a '51 glider and eventually topped the area results, and is new northwest area glider champ.

Meanwhile Gordon Seymour had organised a squad of juniors and, working a double shift act, rattled off 10 flights, finally coming top in power and 4th in glider.

The cessation of contest activities marks the beginning of the social season; members are looking forward to the annual club dinner and prize giving, which will be followed by a film show.

Thirty-two members turned up to the A.G.M. and apart from the usual argument about club contest rules, all went home in one piece.

Club nights are held at the A.T.C. hut, Bank Street, Cheadle, on Tuesday nights and potential members are invited to come along and join the gang.

HORNCHURCH M.A.C.

A sudden influx of experienced senior members, plus a bevy of lively juniors, has given a decided fillip to club morale. As a result a record entry turned out for the Jackson Trophy, competed for on an "all-in" basis. Gliders, using the winter tow-line extension to good effect, snaffled the top two places. T. Thorby's A/2 just bettered P. Fraser's diminutive A/1 by a matter of 16 sec. Close behind came E. Hodges's fast-climbing Wakefield to secure third place.

Following this, a speed comp. was held, equally well supported. This again was the subject of a handicap system, with A. Collinson emerging the winner with a net speed of 108 m.p.h.

WHITEFIELD M.A.C.

Two winter club comps. have already been held These are combat and speed and are, incidentally, the first C/L events ever to be held in what has been mainly a F/F club. Both these comps. were won by M. Allen, a new member. The combat attracted four entries, whilst in the speed, only one model was airborne for the required distance and thus won at 59 m.p.h. J. O'Donnell completed his C cert flights when he produced three consecutive max's on a cold damp morning. The club's membership is now on the increase after a slight decline, probably due to the lack of a suitable flying field which now fortunately has been rectified.

CRYSTAL PALACE M.A.C.

Over 40 attended our annual dinner at Williamson's Restaurant, with a gentleman from the local paper present to see the *Crystal Palace Advertiser* cup awarded to Mike Ballentyne, who again scored most points during the flying season.

He also claimed two of the four individual comp. cups bought this year, for power and glider events. Mr. Lister (president), in his speech, called for greater competition by other members for these cups.

Reg Bench gained the cup for rubber, and the one for *concours d'elegance*, the adjudged winner failing to fly off, and the engine of the second place winner suffered from rigor mortis on the flying field.

After dinner, a discourse on the display of models followed (three R/C jobs included), while the projector was set up for films. "The History of the Helicopter" was very enlightening, but was soon forgotten amid the screaming ricochets of "Winchester 73" which wound up the evening.

REGENTS PARK M.F.C.

We have held two competitions recently—the club power championship and *Concours d'Elegance*, winner of the first being R. Dee, E.D. Baby powered *Ballerina*; the second being T. Hall with a half-size *Scalded Kitten*.

R. Denny achieves notoriety by being the first member of the club to tow a streamer comprising three copies of the *News of the World* behind a contest kit "Cresta," he claims, and it's the only way he can use an E.D. Bee with safety.

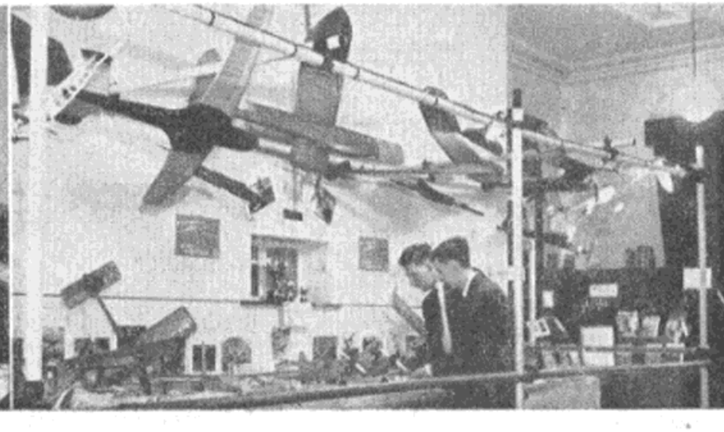
Some large models have been built in the club recently, amongst them a very large glider which had to be completely dismantled as the builder found it difficult for his wife and himself to live with it.

HEANOR & D.M.A.C.

On our presentation night, trophies were presented by our president to last year's champions, after which we had dancing and entertainment. The trophy winners were: K. Smith, open glider, D. Perritt (Derby), combat; L. Clifford, Jetex; D. Froggatt, open F/F power; L. Whitworth, Class "A"; M. Ward, Class "B."

The class "B" trophy was the last to be flown off, after being postponed This time we had four entries but Jim Bates had to scratch owing to a faulty engine, and Ron Evans crashed during a practice flight. Maurice Ward and Lewis Whitworth were the two who managed to reach the circle intact. At Lewis's first pit stop

Left: Mike Ballentyne receives the "Crystal Palace Advertiser" Cup from the Crystal Palace Club's president, Mr. Lister, at their annual dinner. Right: Nelson and District M.A.C. put on a fine show of models at their recent exhibition.



his ETA 29 proved stubborn and although his was the faster model, Lewis was unable to make up the arrears. Maurice Ward won by 18 laps.

We attended the Loughborough Rally and came away with a first and third in class "A." Lewis Whitworth and Ron Evans respectively bringing home the honours. We are all hoping that this is a good omen for the forthcoming season and our flying ground is now swarming with prototypes, on proving flights.

HAYES M.A.C.

Apart from certain of the more boastful members actually talking about building a model, the only activity in recent weeks has been the running of two rubber and two glider competitions. Times are restricted by the present condition of our flying field, necessitating a 2½ min. maximum under the very lowest wind conditions.

Johnny Wareham, back on a 48-hour pass from the R.A.F., turned up to tie first place in the glider with E. Welbourne. The rubber competition, run concurrently, produced winner F. Brench (who also records the total scores). The second pair of comps. were won by J. Marshall in rubber, with a 1 sec. lead over F. Brench, and E. Welbourne in glider.

Our points system for scoring in the club comps. may be of interest. The winner receives 100 points and the other competitors, percentages according to the ratio of their times to the winner's. A truer representation of individual ability is thus given, than on a points-for-place system.

Four comps. are held in each of the three classes and competitors may enter three out of the four in any class, so if unable to fly in one, do not lose any ground.

A certain member, who shall be nameless, has now applied for membership of the E.A.C.A.S. (Ex-Aeromodeller Car Admiration Society), having purchased, we are assured a quite exceptional Austin 7 Special. Fierce discussion breaks out every now and then, since it is only a two seater, and its predecessor was a Vincent chair outfit. Comp. sec.'s comments on this reduction of transport capacity were quite positive and completely unprintable.

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

The 1955 season was rounded off very pleasantly, when we held our chuck glider and A/1 glider contests in chilly but otherwise almost ideal conditions on Halton Moor, Leeds. No Bradford members participated, although several turned up to watch, and the chuck glider cup went eventually to Frank McNulty with an aggregate of 1 : 50 based on the three best flights out of six. His close friend Brian Eggleston placed second with 1 : 37. Both put up some fantastic flights of over a minute, but most of them were made while trimming (as the best flights always are !).

The A/1 attracted only four entries, but the general standard of flying was very good and the winner, Les Hey, aggregated 5 : 08 with a beautifully trimmed model of his own design which is rumoured to be the basis for his next A/2. If so, it should be good. His last flight should have given him a final total of nearer 8 min. had he not tripped whilst touring, which obliged him to cast off prematurely to avoid disaster and score only 34 sec. as a result.

WALLASEY M.A.C.

We completed our series of club comps. for 1955, and were comparatively lucky with the weather on the four consecutive Sundays. For all comps. a max. of 1 : 30 was chosen to suit conditions, and also five flights were decided upon. The overall champion for the four comps. was John Done, and the top results for the various comps. were:—

Power (engine run 10 sec.): 1 C. Bryan, 7 : 04; 2 G. M. Hutton, 6 : 43.

Rubber: 1 J. Hannay, J. Done (five max's, fly-off to be arranged later), 3 C. Bryan, 5 : 29.

Jetex	*Agg. Ratio*
1. J. Done	35 : 1
2. S. Hinds	15 : 7

Glider 25 meter line	
1. G. M. Hutton	5 : 40
2. S. Hinds	5 : 33

The winner of last year's points cup now seems to depend on the results of the flying scale comp. for the Wilcoxon Trophy.

NORWICH M.A.C.

Club champion for last year was R. Carr, who won the speed, A/combat, and stunt, and came second in B/TR, B/combat, A/TR. Second was G. D.vie, Sen., who won three contests and was second in two. C. Sparrow came third.

The only club evening activity has been a quiz which was won by C. Sparrow, followed very closely by M. Woodhouse—a remarkable performance as he is one of the youngest members of the club.

FORESTERS (Nottm.) M.F.C.

Juniors came first and second in the club scramble comp. held recently. Fred Edlin won with his diminutive rubber job averaging a minute a time to clock 18 : 44 in one hour, thus wrestling the cup from Pete Ball, who had won it the previous four years with his *Debutante*.

The club film, which Bill Ward has taken of our activities over the last year, is constantly being added to and shown to a self-admiring audience nearly every Sunday night.

SIDCUP AERONAUTICAL SOCIETY

Our club has been very active recently with small inter-club contests.

At a contest run by the Dartford M.F.C., Sidcup took the first four places in class "A" T/R., the honours going to M. Bassett, J. Harding, M. Templeman and A. Cooper, respectively. M. Templeman also came first in class "B" T/R, with P. Denyer second and L. Ashdown third.

At a later date the Dartford M.F.C. ran a combat contest where Sidcup again took the first four places in class 1 (2.5 c.c. engines), the honours going to M. Templeman flying "Pip" Selves' model, and L. Ashdown for first place, with A. Greenland third. Class II (5 c.c. engines) only saw second place by M. Templeman and fourth place by A. Houlding, who also took fourth place in Class I.

The club class "A" T/R Cup and the "½A" T/R shield have also been competed for once again with M. Bassett winning both, after a very tough fight in both contests.

The club championship cup has been won by P. Denyer for his outstanding success in class "B" T/R throughout the year.

CHANGE OF SECRETARIES

Eastbourne M.F.C. T. Parris, Esq., 13, Bradford Street, Eastbourne.

Regents Park M.F.C. R. Dee, 15, Oakfield Crescent, Kentish Town, London, N.W.5.

Worcester Skypals M.A.C. D. W. Batchelor, 26, Lyttelton Street, Worcester.

Leicester M.A.C. D. P. Kenney, 14, Mursell Street, Leicester.

AEROBODS OF NOTE

HUGHIE O'DONNELL

Hughie is the younger of the famous O'Donnell brothers. Consistently up with the winners, Hugh believed in starting young—was runner up in the 1953 Wakefield —aged 14 !

Northern Area Committee. K. F. P. Rutter 40, Lawrence Road, Leeds, 8.

NEW CLUB

Christchurch and New Forest Model Aircraft Club

Objects: To promote the building and flying of model aircraft throughout the New Forest area, and to encourage members to enter all local and national contests.

It is hoped that the club will eventually cover aeromodellers in Christchurch, Highcliffe, New Milton, Lyndhurst, Brockenhurst, Milford, Lymington, Ringwood and Fordingbridge.

Official flying field: Wilverley Post.

Chairman: C. A. Rippon; secretary: C. R. Foot, 2 Forest Grove, Holmsley South, Christchurch; treasurer: H. N. D. Brandon, Bargates, Christchurch. Membership on formation: 26 seniors, 4 juniors.

Owing to the confined space, only a few of the Norwich M.A.C. boys could get in on this photograph, taken in their club room, but if rather restricted for photography, it doesn't cramp their style when it comes to model building.

BRITISH NATIONAL MODEL AIRCRAFT RECORDS

as at December 10th, 1955

Rubber Driven				
Monoplane ...	Boxall, F. H. ...	(Brighton) ...	15/5/1949	35 : 00
Biplane ...	Young, J O. ...	(Harrow) ...	9/6/1940	31 : 05
Wakefield ...	Boxall, F. H. ...	(Brighton) ...	15/5/1949	35 : 00
Canard ...	Harrison, G. H.	(Hull Pegasus) ...	23/3/1952	6 : 12
Scale ...	Marcus, N. G.	(Croydon) ...	18/8/1946	5 : 22
Tailless ...	Woolls, G. A. T.	(Bristol & West)	25/9/1955	4 : 56*
Helicopter ...	Tangney, J. F.	(Croydon & USA)	2/7/1950	2 : 44
Rotorplane ...	Crow, S. R. ...	(Blackheath) ...	23/3/1936	0 : 40
Floatplane ...	Parham, R. T.	(Worcester) ...	27/7/1947	8 : 55
Ornithopter	White, J. S. ...	(Barking) ...	20/6/1954	1 : 55
Flying Boat ...	Parker, R. A.	(Kentish Nomads)	24/8/1952	1 : 05
Sailplane				
Tow Launch...	Allsop, J. ...	(St. Albans) ...	11/4/1954	90 : 30
Hand Launch	Campbell-Kelly, G. ...	(Sutton Coldfield)	29/7/1951	24 : 30
Tailless T.L.	Lucas, A. R. ...	(Port Talbot) ...	21/8/1950	22 : 34
Tailless H.L.	Wilde, H. F. ...	(Chester) ...	4/9/1949	3 : 17
A/2 T.L. ...	Allsop, J. ...	(St. Albans) ...	11/4/1954	90 : 30
A/2 H.L. ...	Campbell-Kelly, G.	(Sutton Coldfield)	29/7/1951	24 : 30
Power Driven				
Class A ...	Springham, H. E.	(Saffron Waldon)	12/6/1949	25 : 01
Class B ...	Dallaway, W. E.	(Birmingham) ...	17/4/1949	20 : 28
Class C ...	Gaster, M. ...	(C/Member) ...	15/7/1951	10 : 44
Tailless ...	Fisher, O. F. W.	(I.R.C.M.S.) ...	21/3/1954	4 : 12
Scale ...	Tinker, W. T.	(Ewell) ...	1/1/1950	1 : 37
Floatplane ...	Lucas, I. C. ...	(Brighton) ...	11/10/1953	4 : 58
Flying Boat ...	Gregory, N. ...	(Harrow) ...	18/10/1947	2 : 09
Radio Control	O'Heffernan, H. L. ...	(Salcombe) ...	7/10/1954	151 : 20
Class I Speed	Scott, R. ...	(St. Helens) ...	9/7/1950	80 mph
Class II ,,	Gibbs, R. ...	(East London) ...	4/12/1955	123.5 mph*
Class III ,,	Hall, J. F. ...	(Chingford) ...	20/9/1953	114.7 mph
Class IV ,,	Gibbs, R. ...	(East London) ...	25/9/1955	146.2 mph*
Class V ,,	Wright, P. ...	(St. Albans) ...	24/5/1953	124.3 mph
Class VI ,,	Davenport, R. F.	(East London) ...	11/7/1954	152.17 mph
Class VII Jet...	Stovold, R. V.	(Guildford) ...	25/9/1949	133.33 mph
Lightweight—Rubber Driven				
Monoplane ...	Wiggins, E. E.	(Leamington) ...	11/7/1954	40 : 13
Biplane ...	O'Donnell, J.	(Whitefield) ...	18/5/1952	6 : 46
Canard ...	Lake, R. T. ...	(Surbiton) ...	7/4/1952	7 : 32
Scale ...	Woolls, G. A. T.	(Bristol & West)	26/6/1955	1 : 22
Floatplane ...	Taylor, P. T. ...	(Croydon) ...	24/8/1952	5 : 15
Flying Boat ...	Rainer, M. ...	(North Kent) ...	28/6/1947	1 : 09
Lightweight—Sailplane				
Tow Launch...	Green, D. ...	(Oakington) ...	11/4/1954	36 : 02
Hand Launch	Redfern, S. ...	(Chester) ...	11/7/1954	11 : 15
Tailless T.L....	Couling, N F.	(Sevenoaks) ...	3/6/1951	22 : 22
Tailless H.L....	Wilde, H. F. ...	(Chester) ...	11/7/1954	9 : 51
Canard T.L....	Caple, G. ...	(RAF MAA) ...	7/9/1952	22 : 11
Lightweight—Power Driven				
Class A ...	Archer, W. ...	(Cheadle) ...	2/7/1950	31 : 05
Class C ...	Ward, R. A. ...	(Croydon) ...	25/6/1950	5 : 33
Tailless ...	Fisher, O. F. W.	(I.R.C.M.S.) ...	27/7/1954	3 : 02
Floatplane ...	Mussell, A. ...	(Brighton) ...	11/10/1953	2 : 53

(* Ratification pending)

Indoor				
Stick H.L. ...	Read, P. ...	(Birmingham) ...	10/10/1954	23 : 58
Stick R.O.G.	Monks, R. ...	(Birmingham) ...	12/9/1954	20 : 30
Fuselage H.L.	Parham, R. T.	(Worcester) ...	12/9/1954	13 : 16
Fuselage ROG	Parham, R. T.	(Worcester) ...	12/9/1954	12 : 10
Tailless H.L.	Monks, R. ...	(Birmingham) ...	12/9/1954	4 : 13
Tailless ROG	Parham, R. T.	(Worcester) ...	18/8/1951	2 : 28
Ornithopter	Parham, R. T.	(Worcester) ...	9/1/1954	1 : 10
Helicopter ...	Monks, R. ...	(Birmingham) ...	19/11/1954	5 : 01
Rotorplane ...	Poole, D. ...	(Birmingham) ...	8/5/1955	1 : 26
RTP Class A...	Muxlow, E. C.	(Sheffield) ...	10/12/1948	6 : 05
RTP Class B...	Parham, R. T.	(Worcester) ...	20/3/1948	4 : 26
RTP Speed ...	Jolley, T. A. ...	(Warrington) ...	19/2/1950	42.83 mph

INTERNATIONAL RECORDS

Rubber				
1 Duration...	Kiraly, M. ...	(Hungary) ...	20/8/1951	87 : 17
2 Distance ...	Benedek, G. ...	(Hungary) ...	20/7/1947	50.260 km
3 Height ...	Poich, R. ...	(Hungary) ...	31/8/1948	1,442 m
4 Speed ...	Davidov, V. ...	(Russia) ...	16/9/1947	107.08 km/h
Power				
5 Duration...	Koulakovsky, E.	(Russia) ...	6/8/1952	361 : 00*
6 Distance ...	Boricevitch, E. ...	(Russia) ...	14/8/1952	378.756 km*
7 Height ...	Lioubouchkine, G.	(Russia) ...	13/8/1947	4,152 m*
8 Speed ...	Stiles, E. ...	(U.S.A.) ...	20/7/1949	129.768 km/h
Helicopters				
9 Duration...	Evergary, G. ...	(Hungary) ...	13/6/1950	7 : 43
10 Distance ...	Roser, N. ...	(Hungary) ...	9/4/1950	238 m
(Records 11-16 no record established)				
Gliders				
17 Duration...	Ainadinov, S. ...	(Russia) ...	6/7/1950	198 : 00
18 Distance ...	Szomolanyi, F. ...	(Hungary) ...	23/7/1951	139.8 km
19 Height ...	Benedek, G. ...	(Hungary) ...	23/5/1948	2,364 m
Radio				
20 Duration...	Bethwaite, F. ...	(New Zealand)	10/1/1955	182 : 06
21 Distance ...		(No record established)		
22 Height ...	Gobeaux, J. P. ...	(Belgium) ...	15/8/1955	1,142 m
23 Speed ...	Stegmaier, K. H.	(Germany) ...	21/3/1954	58 km/h
Radio/GL.				
24 Duration...	Bethwaite, F. ...	(New Zealand)	16/5/1954	120 : 00
25		(No record established)		
26		(No record established)		
C/L Speed				
27 Class I ...	Koci, J. ...	(Czecho) ...	11/9/1955	203.5 km/h
28 Class II ...	Wisniewski, W....	(U.S.A.) ...	5/9/1954	230 km/h
29 Class III ...	Sugden, R. ...	(U.S.A.) ...	24/8/1953	248.8 km/h
30 Jet ...	Vassiltchenko, M.	(Russia) ...	6/1/1953	264.7 km/h*

(*Absolute World Records)

TABLE OF F.A.I. INTERNATIONAL RECORDS

Category of flight	Class of model	Method of propulsion	Record (and reference number) Duration	Distance	Height	Speed
Free Flight (V.L.)	F.1. Aircraft or seaplane	A) Rubber motor	1	2	3	4
		B) Mechanical motor	5	6	7	8
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		B) Mechanical motor	13	14	15	16
	F.3. Glider		17	18	19	
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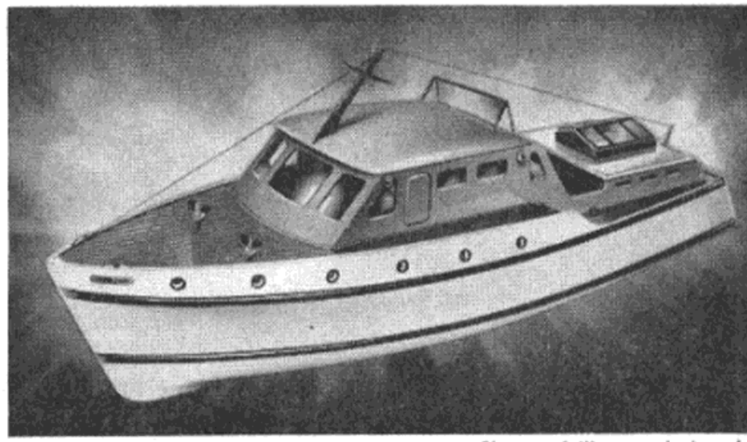

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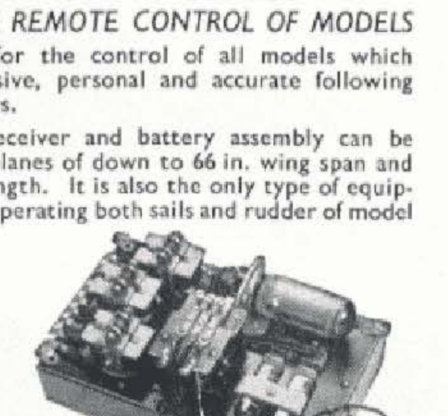

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